

**A CRITICAL DISCUSSION OF COMPLEXITY THEORY: HOW DOES
'COMPLEXITY THINKING' IMPROVE OUR UNDERSTANDING OF POLITICS
AND POLICYMAKING?**

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Abstract

In this article, we present a critical discussion of complexity theory. We ask: what does it really offer policy studies? We suggest that its stated advantages-- interdisciplinarity, theoretical novelty, and empirical advance--are generally exaggerated and based more on hope than experience. In that context, we identify a cautiously positive role for complexity theory, primarily as a way to bridge academic and policymaker discussions by identifying the role of pragmatic responses to complexity in policymaking.

Keywords

Comment [g1]: 3-5 key words here please

Introduction

It is customary to describe complexity theory as new, exciting, and interdisciplinary (Mitchell, 2009, p. x). Its advocates suggest that it offers a new way of seeing the world, a scientific paradigm to replace “reductionism,” a way for many academic disciplines to use the same language to explain key processes, and the potential for an impressively broad and rich empirical base (Geyer & Cairney, 2015; Cairney, 2012a, 2012b; Geyer & Rihani, 2010, p. 12; Middleton-Kelly, 2003, p. 26; Sanderson, 2006, p. 117; Room, 2011, pp. 6-7; Klijn, 2008, p. 314; Little, 2008, pp. 29-30; Lewis & Steinmo, 2008, pp. 15-20, 2010, p. 237).

In this article, we present a critical discussion of these high expectations, examining how they translate into something new for political and policy science. We ask: what does complexity theory really offer policy studies? We argue that its focus on greater interdisciplinarity is potentially misleading, its theoretical appeal may be more about conceptual consolidation than novelty, and it may take some time to demonstrate that it is empirically more valuable than more established theories. We identify a cautiously positive role for complexity theory as a way to bridge academic and policymaker discussions on politically important concepts such as democratic accountability and responsibility. In particular, we compare a democratic imperative, to hold elected policymakers to account for policy, with a pragmatic imperative, identified in complexity theory to recognise the limits to central government control.

Complexity theory: a language that spreads across disciplines?

Complexity theory can be sold as a way to encourage interdisciplinarity: if we can share a theoretical outlook, language, and set of research methods, we can combine disciplinary approaches to tackle major social and environmental problems. There are three obstacles to the realization of such a vision.

First, it is possible that we can maintain a similar language among disciplines only if it is highly abstract or superficially similar. The danger is that the same words mean different things in each discipline. Certainly, one would often get this impression about superficial similarity when speaking with natural scientists about complexity ideas in physics and biology. For example, in our conversations with colleagues in other disciplines, we have found some interesting differences in language that are easily resolved – such as that ‘first’ order change means almost no change in policy studies (with reference to Hall, 1993) but major change in physics (akin to Hall’s 3rd order, Kuhnian change) – but others that are more difficult to overcome, such as the meaning of ‘chaos’ and the role of deterministic arguments (which seem more useful to explain natural rather than social systems).

In complexity, a key difference in meaning may be in the discussion of “emergence” in the absence of a central brain or central control. In cell biology we can witness completely local interaction without a centre. In politics, there is a centre – central government – and our focus

is on emergence *despite* – rather than the *absence of* - its role. These are different processes which require different explanation (Cairney and Geyer, 2015).

Second, for us, complexity theory makes most sense when grounded in a well-established literature. As we discuss below, its value to policy studies may be to consolidate existing concepts rather than provide a completely new way of thinking. Yet, the necessity to make specific sense of complexity in each discipline undermines a general understanding: it takes time and training to become sufficiently aware of the relevant literature in each discipline; and, the translation involves using well-established concepts in one discipline that mean little in another.

Third, scholars express major differences of approach and understanding even within single disciplines. For example, when Cairney (2012b) wrote a policy-focused article on complexity in 2012, each reviewer noted the profound absence of discussion of particular individuals (such as Prigogine) or schools (such as Santa Fe or Brussels) without agreeing on whose absence mattered.

In other words, we identify a tendency for scholars to become excited at the prospect of interdisciplinarity when they begin to talk and recognise each other's language and interest in complexity, only to find that they may not be talking about the same thing (or the same complexity scholars).

Complexity does not represent new ways of looking at the policymaking world

Some of complexity's claims to novelty come from a sense that complexity theory is "anti-reductionist" (see Geyer & Rihani, 2010, pp. 74-75) or marking a major challenge to the old ways of doing science, in which, for example, we establish general laws or study individual parts of larger systems (Mitchell, 2009, p. x).

Yet, in the social sciences, there have been decades-long debates about the use of systems to explain social and political behaviour (Cairney, 2012a, pp. 113-114) and a greater sense of 'anti-reductionism' – or 'post-positivism' – for some time (Fischer & Forester, 1993). One can point to isolated examples in political science of scholars identifying simple regularities or trends in behaviour, but also a tradition of case study analysis to generate rich descriptions of specific decisions and events. It is therefore difficult to establish the sense that complexity is a new way of thinking, rather than simply the right way to think.

A new-ish way of looking at the world?

Instead, complexity theory may help us bring together many strands of the political science literature into one framework. For example, Cairney (2013) uses a discussion of complexity to supplement existing discussions of "evolutionary theory," in policy studies, which also

includes multiple streams analysis and punctuated equilibrium theory (Kingdon, 1984, 1995; Baumgartner & Jones, 1993, 2009:). Or, as we demonstrate below, elements of complexity theory link to a key elements of policy studies. We make reference to four main properties of complex systems and their relevance to policy studies.

1. Negative and positive feedback

‘Negative and positive feedback’ describes a tendency in complex systems for some inputs of energy to be dampened while others are amplified. Small actions can have large effects and large actions can have small effects. This process is described extensively in Jones and Baumgartner’s work on information processing (Jones & Baumgartner, 2005; Baumgartner & Jones, 1993, 2009; Baumgartner et al., 2014). They suggest that the cognitive ability of policymakers, and their ability to gather information, is limited. They can only pay attention to a small fraction of the issues for which they are responsible. They have to ignore most and promote a few to the top of their agenda. They receive the same amount of information over time, ignoring most for long periods (negative feedback) and paying disproportionate attention to some (positive feedback). Consequently, the controlling capacity of the centre is limited to the small number of issues to which policymakers pay particular attention or seek to solve energetically.

2. Strange attractors: regularities of behaviour which may be interrupted by short bursts of change

Positive and negative feedback extends to local parts of complex systems. For example, the instructions of central governments are dampened or amplified by actors responsible for policy delivery. Much depends on the patterns of attention paid by policymakers at the “centre.” In theory, they could pay attention to, and influence, any part of the system. However, to do so, they have to ignore most other parts. Consequently, all rules that develop in institutions or policy networks could be challenged at any time, but most tend not to be. Consequently, ‘strange attractors’ can describe the tendency for regular patterns of policymaking behaviour to persist in most cases despite the ever-present *potential* for policy instability (again, this is a feature of Baumgartner and Jones’ work; see also Bovaird, 2008: 320; Geyer and Rihani, 2010: 39). For example, they may be present in ‘institutions’ which represent sets of rules to which people adhere, causing regular patterns of behaviour.

3. Sensitivity to initial conditions and “path dependence”

The phrase “sensitivity to initial conditions” describes the contribution of events and decisions made in the distant past to the formation of institutions that influence current practices. For example, when an initial commitment to a policy becomes established it produces ‘increasing returns’ over time: as people adapt to, and build ‘institutions’ around,

the initial decision, it becomes increasingly costly to choose a different path (Pierson, 2000; Room, 2011, 7-18). Initial choices are reinforced when the rules governing systemic behaviour become established and difficult to change. As a result the bulk of policy is repetitive: most policy decisions are based on legislation that already exists, most public expenditure is devoted to activities that continue by routine, and policy implementation continues long after policymakers have lost interest (Rose, 1990; Hogwood and Peters, 1983; Lindblom, 1959; 1979). ‘Critical juncture’ begins to describe the infrequent and often dramatic series of events or decisions required to challenge such routines.

4. “Emergence” from the interaction between elements at a local level

The idea of ‘emergence’, in policy studies, can relate to attempts by central governments to control the system (or, in some cases, recognise the limits to centralisation and encourage ‘localism’). Emergence refers to behaviour which results from local interaction, *based on locally define rules*, with an emphasis on the extent to which local behaviour takes place despite central government policies or rules.

This concept resonates with the well-established literature on policy implementation and governance. For example, Lipsky (1980) frames local behaviour in terms of the limits to which ‘street level’ actors can meet central demands, and the extent to which they draw on their own judgement and professional training when interacting with service users. Local actors face so many targets, rules and laws that no public agency or official can be expected to fulfil them all. In fact, many may be too vague or even contradictory, requiring ‘street level bureaucrats’ to choose some over others. Or, central governments may introduce performance measures which limit the discretion of delivery organizations but relate to a small part of government business.

The broad theme of emergence has also been a key feature of modern accounts of ‘governance’ (Rhodes, 1997; Bevir and Rhodes, 2003: 6; Kooiman, 1993). It examines how governments have sought to respond to limited central control, particularly during the peak of New Public Management (NPM) which describes the application of private business methods to government (including attempts to secure order through hierarchical management structures and targets for public bodies to meet). Governance scholars often note that central governments struggle to maintain order and, in many cases, have exacerbated their limited control by introducing a wide range of new public service delivery functions which rely on public bodies and organisations in the third and private sectors for their success.

Newish normative advice for policymakers

The same point about newishness can be said for complexity theory’s practical or normative advice: it is justified in a new (and often convincing) way, but the advice itself is not new. Complexity theory’s focus on the lack of central government control on local behaviour and policy outcomes can be linked closely to the need to be pragmatic in government, to act with

a sense of realism regarding what policymakers can achieve (Cairney, 2015a; Teisman & Klijn, 2008, p. 288; Blackman, 2001; Cairney, 2012b, p. 349; Kernick, 2006; Sanderson, 2006, 2009).

In other words, if policymakers deny their reliance on other actors to help them understand and adapt to their policy-making environment, they are doomed to make the same mistakes as their predecessors. Instead, central government policymakers should embrace interdependence, to pursue more pragmatic solutions based on increasing the freedom of local actors to learn and adapt to environmental signals, such as the responses they get from service users. To address the ever-presence of uncertainty, they should make greater use of trial and error policy making. To address the inevitable gap between policymakers' aims and policy outcomes, they should change their expectations and the way they think about policy success and evaluation (Little, 2012, p. 16; Geyer, 2012, p. 32).

Such advice may be used by policymakers in parts of the UK and Scottish Governments, although without the need to make reference to the intricacies of complexity theory (Cairney & St Denny, 2015). Indeed, these are the kinds of recommendations *provided by Lindlom in 1959* (when policymakers were men):

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 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.

What is its original empirical base?

We expand on some of these issues with reference to our new edited collection on complexity theory (Geyer & Cairney, 2015). A large part of it is devoted to chapters which outline new ways of thinking in a range of disciplines, or discuss the benefits of particular methods such as agent based modelling. Some chapters discuss empirical case studies, but without giving us the ability to combine their insights to help produce accumulated knowledge in a straightforward way. For people seeking a payoff in terms of a bank of empirical case studies, complexity theory may seem like a source of as-yet-untapped potential. It is reasonable for scholars to wonder if we will ever get beyond a focus on new thinking and methods, towards a series of studies which can be linked to each other in a meaningful way.

The rise of systematic reviews of the wider policy literature magnifies this problem in two main ways. First, there is now some evidence of accumulated knowledge in more established policy theories (examples include multiple streams analysis – Jones et al, 2015 and Cairney and Jones, 2016 - social construction theory (Pierce et al, 2014), and the advocacy coalition framework (Weible et al, 2009). Second, these reviews show how difficult it is to accumulate

knowledge when empirical studies make only vague reference to a common theory and struggle to ‘operationalise’ key concepts in a way that can be compared meaningfully to other studies. A broad common reference point – such as complexity theory – is not enough to prompt the accumulation of empirical knowledge.

What is complexity theory useful for?

Yet, we should persist with complexity theory because, if we rejected theories on the basis of the concerns we have raised so far, we would have no theories left. Complexity theory still offers a way of thinking about, organising, and explaining future empirical studies. For example, Cairney and St Denny (2015) use the language of complexity to explore the interaction between new policy solutions/ ideas and the old ways of doing things in policymaking systems. Although it is not easy to compare their case study results with others, it is valuable to use a complexity framework to provide detailed understanding of cases, and to use multiple viewpoints – zooming in to examine the perception of actors, or zooming out to observe systems and their environments – to understand the same processes.

Consequently, the concerns we raise should prompt scholars to explore common topics with people in other disciplines *carefully* and perhaps to reduce the claims we make about theoretical and empirical novelty while we do so. For example, the way Cairney and Geyer (2015) describe Webb’s (2015) chapter on complexity theory and legal studies ties it closely to the themes in politics and policymaking that we have discussed in this article, but in a way that requires closer examination:

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.

As we discuss below, complexity also helps us think about practical problems, such as our ability to be pragmatic (and humble) or somehow manage or *influence* emergent behaviour.

Complexity and democratic accountability

In politics, a key practical question relates to traditional notions of democratic accountability: how can governments follow the advice of complexity theorists, to let go of ‘order’ and claim to be in control enough to take responsibility for their actions?

For example, a common argument in British politics is that the UK Government has exacerbated its own “governance problem”, or the gap between general expectations for central government control and its actual powers (see for example Richards & Smith, 2002,

p. 3; Marsh et al., 2001; Rhodes, 1997; Bevir & Rhodes, 2003; Gains & Stoker, 2009). For example, a collection of post-war reforms, many of which were perhaps designed to *reinforce* central control, has produced a fragmented public landscape and a periodic sense that no one is in control. This outcome presents major problems for the “Westminster” narrative of central government and ministerial accountability to the public via Parliament. If ministers are not in control of their departments, how can we hold them to account in a meaningful way?

Yet, in many cases, it is misleading to link these outcomes to specific decisions or points in time, since many aspects of the “governance problem” are universal: policymakers can only pay attention to a small fraction of the issues for which they are responsible; they do not have enough information to make decisions without major uncertainty; policy problems are too multi-faceted and ‘cross-cutting’ to allow policymaking without ambiguity; there is an inescapable logic to delegating decisions to ‘policy communities’ which may not talk to each other or account meaningfully to government; and, delivery bodies will always have discretion in the way they manage competing government demands. In this context, policymaking systems can be described usefully as complex systems, in which behaviour is always difficult to predict, and outcomes often seem to emerge in the absence of central control.

The literature on complexity provides some advice about how governments should operate within such complex systems. Unfortunately, much of this literature invites policymakers to give up on the idea that they can control policy processes and outcomes. While this may be a pragmatic response, it does not deal well with the need for elected policymakers to account for their actions in a way which stresses central control. What seems sensible to one audience, engaged in developing insights from complexity theory, may be indefensible to another, engaged in the articulation of simple lines of democratic accountability. The language of complexity does not mix well with the language of Westminster-style accountability (Cairney, 2015a).

So, while complexity thinking takes us beyond simple notions of central government accountability, we need to combine a governmental acknowledgement of the limits to its powers with *the sense that we can still hold elected policymakers to account in a meaningful way*. Ideally, this response should be systematic enough to allow us to predict when ministers will take responsibility for their actions, redirect attention to other accountable public bodies, and/ or identify the limited way in which they can be held responsible for certain outcomes. Beyond this ideal, we may settle for a government strategy based on explicit trade-offs between pragmatism, in which governments acknowledge the effect of administrative devolution (or, in the case of local authorities, political devolution), and meaningful representation, in which they maintain some degree of responsibility for decisions made in their name.

For example, there is a literature describing the extent to which the Scottish and UK governments have wrestled with the need to present two images of politics and policymaking: competing for elections on the basis of traditional Westminster-style accountability, in which

central governments are in control and responsible; but also developing new pragmatic forms of accountability with reference to direct institutional accountability, partnerships between national and local public bodies, and direct forms of accountability driven by the involvement of service users in the design of public services (see Gains & Stoker, 2009; Flinders & Skelcher, 2012; Richards & Smith, 2004; Osborne & Stokosch, 2013; Smith & Smyth, 2010, pp. 277-278; Cairney, 2015b). As the existence of this literature suggests, these problems are not new, but they remain unresolved. Complexity theory gives us a new language to describe important processes and consider how to respond, but as yet without an answer to the dilemma that governments face.

Complexity, norms, responsibility and pragmatism

In other words, a key challenge for complexity is its lack of a clearly developed normative framework. From a complexity perspective, so long as a system maintains core boundaries, is relatively stable and open, and encourages a wide variety of interactions, a plethora of particular structures and outcomes are possible. Detailed practical interventions and/or normative choices are uncertain. Yet, society (amplified by the mass media and willing political actors) continues to try to reassert a more causal/modernist policy position: someone must be in control and in democracies this should be our democratic representatives (and the bureaucratic machinery of national/regional/local policy that it is supposed to control). This implies a limited view of democracy where:

The trend in political life is to insist on controlling responsibility by tightening the external standards of accountability. Yet the real problem of our public life is the failure of responsibility, not accountability. Increasing demands for accountability often obscure actual responsibility and enhance the gap between responsibility and accountability. (Ansell, 2011, p. 134)

This dilemma of normative choice and democratic responsibility is not new and something that a variety of philosophic traditions have been wrestling with throughout the past two centuries – for example pragmatist philosophy (see the work of Dewey in particular). More recently, there has been a growing exploration of the overlaps between pragmatism and complexity. These overlaps have been touched upon by academics in different fields (Doll et al. 2005; Rescher 2003), but most importantly by the policy informed work of Sanderson (2002, 2006, 2009).

For Sanderson, Dewey provided three relevant contributions. First, Dewey's commitment to a continued "scientific" search for the "truth" through an engaged, democratic and open approach leads to policy making that is based on the best evidence "while recognising that such evidence does not constitute the final word" (Sanderson, 2009, p. 710). Second, mirroring the earlier Labour Government's focus on "what works," Deweyian pragmatism encouraged policy makers to view their actions as "policy hypotheses" that must be

continually tested with the best evidence available and through democratic societal debate. Third, Sanderson pointed out that pragmatism:

leads us to recognise that policy making is not a ‘technical’ exercise in instrumental rationality but rather a domain of ‘practical reason’... we are not just concerned with the ‘instrumental’ notion of ‘what works’ but rather with a broader ‘practical’ notion of what is ‘appropriate’ in the circumstances. (p. 711)

Similar to complexity, pragmatism is based on an engaged view of democracy and society that does not know or propose a final societal outcome but knows that the best way forward is through an open, educated, democratic society engaged in continual learning and dialogue with itself (free expression, debate, speech and interaction) and its governmental structures. Pragmatism is the philosophy of “evolutionary learning” and “democratic experimentalism” (Ansell, 2011, p. 5). In essence, complexity provides a meta-theoretical position, linking the natural and human societies, while pragmatism provides a justification and framework for societal/public action in a complex and uncertain world. It is based on a reasonably optimistic vision of human rationality and a belief in that ability of well-intentioned individuals and societies to progress, in a generally positive direction, through discussion, learning, experimentation, debate and interaction.

Being pragmatic in politics is not easy. It may be sensible to produce a range of measures based on a more realistic policymaking philosophy, and potential strategies include: relying less on centrally driven targets, and punitive performance management, in favour of giving local bodies more freedom to adapt to their environment; trial-and-error projects, that can provide lessons and be adopted or rejected quickly; and, to teach policymakers about complexity so that they are less surprised when things go wrong. Yet, as Tenbensen (2015) makes clear, these strategies should not be selected simply because we reject a caricature of top-down policymaking.

One of the best practical applications of complexity and systems inspired policy thinking is found in the excellent 2011 UK Munro Review of Child Protection. Following a string of high-profile child abuse cases, Professor Eileen Munro was asked to carry out a wide-ranging and in-depth review of UK child protection policy. Inspired by systems and complexity thinking, Munro produced an impressive document that highlighted the failings of the former well-intentioned but misguided approach that resulted in a tick-box culture and a loss of focus on the needs of the child. These weaknesses were further amplified by a media and public culture which demanded that ‘lessons must be learned’ and some individual or process must take responsibility/blame.

The core problem, which the Review made clear, was that in highly complex situations there are no simple solutions, lines of responsibility or easy targets to blame. What made this situation even worse was a knee-jerk governmental response that demanded ever-growing targeting and audit regimes to show that “lessons” had really been learned. The difficulty, as the Munro Review aptly demonstrated, was that this did little for the actual protection of

children, while greatly complicating the policy process of child protection. Hence, one of the key conclusions of her report was that there needed to be a radical reduction in central prescription in order to help social workers move from a compliance to a learning culture, and that we had to recognize that the larger societal pressures to find “someone to blame” (amplified by the mass media) misshaped the policy response to child protection.

What the Review demonstrates is that complexity theory is not a panacea for all policy problems. However, it is a way of recognising the limits of the dominant evidence-based and target/accountability approach. It is only when these limits are recognised that policy makers can truly understand and take reasonable actions to improve policy making. Furthermore, the existence of complexity presents a dilemma for the public: it must continually learn to accept that it cannot simply blame a small number of elected ministers for the ills of government. On the other hand, it should not absolve government entirely; complexity should not be an excuse used by policymakers to take no blame for their actions. Helping society to find this zone of reasonable balanced policy making is probably the most significant impact that complexity theory can make.

Conclusion

In many ways, the challenges faced by complexity scholars and policy makers are not new. Complexity theory comes from a range of fields and represents a wide range of concepts and implications and is certainly not a unified theory or body of work. It is difficult to get a sense of the “state of the art” in complexity theory, to establish what we know and still need to know. Moreover, it is not clear just how far we have come in generating a language of complexity that everyone understands and shares. This problem is magnified when we seek to combine insights from the natural and social sciences: we use the same language of complexity and emergence, but to refer to very different processes.

These difficulties are amplified when academics engage with the policy world. Political, normative and ethical factors come into play, and significantly increase the level of policy complexity. For example, imagine the challenges of mental health and policy. It is composed of a range of complex organisational systems surrounding individuals with ‘complex needs’ that place a wide variety of demands on social and public services. These public and private organizations and institutions operate within a complex policymaking system, in which mental health only appears very infrequently on the high-level political agenda, and in which policy is often made locally in the relative absence of central direction. The continually emerging and evolving cultural position of mental illness within a society adds another layer of complexity. Hence, telling these policy actors that their world is ‘complex’ is not helpful.

Nevertheless, this realisation of the limits of complexity is actually one of its hidden strengths for this reflects the reality of the policy world. At its heart complexity challenges the more hubristic claims of other approaches (for example funding bodies enthralled to the promises of ‘big data’). This challenge to the ‘quest for certainty’ in policy making (and other public arenas) as John Dewey put it in the early 20th century is an essential aspect of modern

democracy. Complexity doesn't answer our questions, but it does teach us to be humble in our answers and responsive to the ever-changing natural, social and political world that surrounds us. This may be a simple – and, for some, obvious – point, but it is one that needs to be constantly restated to avoid a continuous return to policymaking built on a simplistic search for central government control.

References

- Ansell, C. (2011). *Pragmatist governance: Re-imagining institutions and democracy*. Oxford University Press.
- Baumgartner, F. and Jones, B. (1993; 2009). *Agendas and Instability in American Politics* (1st and 2nd editions). University of Chicago Press.
- Baumgartner, F., Jones, B. and Mortensen, P. (2014). 'Punctuated-Equilibrium Theory: Explaining Stability and Change in Public Policymaking' in Sabatier, P. and Weible, C. (eds.) *Theories of the Policy Process* 3rd edition. Westview Press, 59-103.
- Bevir, M. and Rhodes, R.A.W. (2003). *Interpreting British Governance*. Routledge
- Blackman, T. (2001). 'Complexity theory and the new public management', *Social Issues* 1(2)
- Bovaird, T. (2008). Emergent Strategic Management and Planning Mechanisms in Complex Adaptive Systems. *Public Management Review*, 10 (3), 319-40.
- Cairney, P. (2012a). *Understanding Public Policy*. Palgrave.
- Cairney, P. (2012b). Complexity theory in political science and public policy. *Political Studies Review*, 10 (3), 346-58
- Cairney, P. (2013). What is Evolutionary Theory and How Does it Inform Policy Studies? *Policy and Politics*. 41 (2), 279-98.
- Cairney, P. (2015a). How can policy theory have an impact on policymaking? *Teaching Public Administration*. 33 (1), 22-39.
- Cairney, P. (2015b). Scotland's Future Political System. *Political Quarterly*. 86 (2), 217-25.
- Cairney, P. and Geyer, R. (2015). Introduction. in (eds) Geyer, R. and Cairney, P. *Handbook of Complexity and Public Policy*. Edward Elgar.
- Cairney, P., & Jones, M. D. (2016). Kingdon's Multiple Streams Approach: What Is the Empirical Impact of this Universal Theory?. *Policy Studies Journal*, 44(1), 37-58.
- Doll, W., Fleener, M. J., Trueit, D. and St. Julien, J. (eds.) (2005) *Chaos, Complexity, Curriculum and Culture*. Lang.
- Flinders, M. and Skelcher, C. (2012). Shrinking the quango state. *Public Money & Management*, 32 (5), 327-334.
- Gains, F. and Stoker, G. (2009). Delivering 'Public Value': Implications for Accountability and Legitimacy. *Parliamentary Affairs*, 62 (3), 438- 455
- Geyer, R. (2012). Can Complexity Move UK Policy beyond "Evidence-Based Policy Making" and the "Audit Culture"? *Political Studies*, 60 (1), 20-43.

- Geyer, P. and Cairney, P. (2015). *Handbook of Complexity and Public Policy*. Edward Elgar.
- Geyer, R. and Rihani, S. (2010). *Complexity and Public Policy*. Routledge.
- Hall, P. (1993). Policy Paradigms, Social Learning, and the State. *Comparative Politics*, 25 (3), 275–96
- Hogwood, B. and Peters, B.G. (1983). *Policy Dynamics*. St Martin's Press.
- Jones, B. and Baumgartner, F. (2005) *The Politics of Attention*. University of Chicago Press.
- Jones, M. D., Peterson, H. L., Pierce, J. J., Herweg, N., Bernal, A., Lamberta Raney, H., & Zahariadis, N. (2015). A River Runs Through It: A Multiple Streams Meta-Review. *Policy Studies Journal*.
- Kernick, D. (2006). Wanted – New Methodologies for Health Service Research. Is Complexity Theory the Answer? *Family Practice*, 23 (3), 385–90.
- Kingdon, J. (1984, 1995) *Agendas, alternatives and public policies*. (1st and 2nd editions), HarperCollins.
- Klijn, E. (2008). Complexity Theory and Public Administration: What's New? *Public Management Review*, 10 (3), 299-317.
- Kooiman, J. (1993). Socio-political Governance: Introduction, in (ed.) J. Kooiman, *Modern Governance*. Sage.
- Lewis, O. and Steinmo, S. (2008). Taking evolution seriously. European University Institute, <http://spot.colorado.edu/~steinmo/TakingEvolution.pdf>.
- Lewis, O. and Steinmo, S. (2010). Taking evolution seriously in political science. *Theory in Biosciences*, 129 (2–3), 235–45.
- Lindblom, C. (1959). The Science of Muddling Through. *Public Administration Review*. 19, 79–88.
- Lindblom, C. (1979). Still Muddling, Not Yet Through. *Public Administration Review*, 39 (6), 517–25.
- Lipsky, M. (1980). *Street-Level Bureaucracy*. Russell Sage Foundation.
- Little, A. (2008). *Democratic Piety: Complexity, Conflict and Violence*. Edinburgh University Press.
- Little, A. (2012). Political Action, Error and Failure: The Epistemological Limits of Complexity. *Political Studies*, 60 (1), 3-19.
- Marsh, D., Richards, D. and Smith, M.J. (2001). *Changing Patterns of Governance in the United Kingdom*. Palgrave.

- Mitchell, M. (2009). *Complexity*. Oxford University Press.
- Mitleton-Kelly, E. (2003). Ten Principles of Complexity and Enabling Infrastructures, in E. Mitleton-Kelly (ed.) *Complex Systems and Evolutionary Perspectives of Organisations*. Elsevier.
- Osborne, S. and Stokosch, K. (2013). 'It takes two to tango? Understanding the Co-production of public services by integrating the services management and public administration perspectives', *British Journal of Management*, 24 (S1), 31-47
- Pierce, J., S. Siddiki, M. Jones, K. Schumacher, A. Pattison, and H. Peterson (2014). Social Construction and Policy Design: A Review of Past Applications. *Policy Studies Journal*, 42 (1), 1–29.
- Pierson, P. (2000). Increasing Returns, Path Dependence, and the Study of Politics, *The American Political Science Review*, 94 (2) 251–67.
- Rescher, N. (2003). *Epistemology: On the Scope and Limits of Knowledge*. SUNY Press.
- Rhodes, R.A.W. (1997). *Understanding Governance*. Open University Press.
- Richards, D. and Smith, M. (2002). *Governance and Public Policy in the UK*. Oxford University Press.
- Richards, D. and Smith, M. (2004). The "Hybrid State", in S. Ludlam and M. Smith (eds) *Governing as New Labour*. Palgrave Macmillan.
- Room, G. (2011). *Complexity, Institutions and Public Policy*. Edward Elgar.
- Rose, R. (1990). Inheritance Before Choice in Public Policy. *Journal of Theoretical Politics*. 2 (3), 263–91.
- Sanderson, I. (2002). Evaluation, Policy Learning and Evidence-Based Policy Making. *Public Administration*, 80, (1), 1-22.
- Sanderson, I. (2006). Complexity, 'practical rationality' and evidence-based policy making. *Policy and Politics*, 34 (1) 115-32.

Sanderson, I. (2009). Intelligent Policy Making for a Complex World: Pragmatism, Evidence and Learning. *Political Studies*, 57 (4), 699–719.

Smith, S. and Smyth, J. (2010). The Governance of Contracting Relationships' in (ed) Osborne, S. *The New Public Governance*. Routledge.

Teisman, G. and Klijn, E. (2008). Complexity Theory and Public Management. *Public Management Review*, 10 (3) 287–97.

Tenbenschel, T. (2015). Complexity and health policy, in Geyer, P. and Cairney, P. (eds) *Handbook of Complexity and Public Policy*. Edward Elgar.

Webb, T. (2015). Critical legal studies and a complexity approach: some initial observations for law and policy, in Geyer, P. and Cairney, P. (eds) *Handbook of Complexity and Public Policy*. Edward Elgar.

Weible, C., Sabatier, P. and McQueen, K. (2009). Themes and Variations: Taking Stock of the Advocacy Coalition Framework. *Policy Studies Journal*. 37 (1), 121–41