Evidence-Based Policy: Four Schools of Thought

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Abstract A conceptual review of the literature and commentary on evidence-based policy reveals four different school of thought on the approach to the practice of policy making, from fervent enthusiasm to radical skepticism. The most vocal proponents of evidence-based policy are seldom aware of the evidence on the subject itself. A heterogeneous literature converges with respect to the *experience/practice* of evidence-based policy making, but differs radically on the *meaning* of that experience.

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Introduction

Is the evidence-based policy movement a sign that major improvements in policy-making are there for the taking, were governments and researchers to make the necessary efforts? Are governments currently neglecting evidence which would provide valuable support for significantly improved policies? No one doubts that where research usefully addresses public problems, it should be exploited to the greatest extent practicable. Not everyone agrees as to (a) how much research "usefully addresses" public problems, (b) how much "the greatest extent possible" exceeds the current extent to which research is exploited in the making of policy, and therefore, (c) what efforts should be devoted to achieve a better supply of better employed evidence?

We define *evidence* as the product of research: organized knowledge produced in accord with the standards of the relevant academic disciplines. *Policy* is defined as the position or approach adopted by public authorities – governments, agencies, school boards, the military, the police – toward problems or opportunities which are perceived to affect public welfare.

This paper attempts to respond to these questions through a conceptual review (Petticrew and Roberts, 2006, 39) of the literature on evidence-based policy making (EBP), developing a synthesis of the research and critique on the performance and potential of EBP. We identify four major schools of thought which differ in their general orientation to the questions raised above.

Some commentators on EBP suggest that the definition of "evidence" be broadened to include other factors which they have come to see as inputs to public policy-making; however, these suggestions lose whatever prescriptive power may reside in the EBP idea (Clarence, 2002, 6; Wyatt, 2002, 26).

An important literature moves from the often contested status of evidence (Barker and Peters, 1993, 4; Boswell, 2014; Boyd, 2013, 160; Cairney, 2016, 42-3; Daviter 2015; Lewis, 2003, 10; McCall, 1984, 10; Newman, 2017, 217-8; Parkhurst, 2016, 3-103; Raedelli, 1995; Strassheim, 2017; Strassheim and Kettunen, 2014; Topf, 1993, 103-106) to alleged technical and political bias in the production and use of organized knowledge in policy-making (Clarence, 2002, 5; Hammond et al, 1983, 290-2; Levidow and Papaioannou, 2016; Monaghan, 2010, 1, 8; Newman, 2011, 481-2; Newman and Head, 2015, 385; Neylan, 2008, 13; Pawson, 2006, 175; Pollitt, 2006, 262; Rein, 1976, 33-4; Sanderson, 2002, 5; Stevens, 2011; Wagner and Steinzor, 2006). It is clear that "science" and "evidence" can be used more or less benignly to shield policy processes from the pressure of interest group politics (Bocking, 2004, 21, 169; Hilgartner, 2000, 42-85; Jasanoff, 1990; Salter, 1988, 9, 196) as well as, sometimes cynically, to attempt to legitimize a decision arrived at on other grounds (Boswell, 2008; Byrne, 2011, 99-119; Ezrahi, 1980; Hertin et al, 2009; Kissinger, 1969, 164; Lynn, 2001, 210-1; Maybin, 2016, 90-2, 123-5; Newman, 2017; Nutley et al, 2007, 51-3; Shils, 1987, 199, 201; Weiss, 1979, 429). This paper focuses primarily on studies of good faith attempts to operationalize the EBP idea; we therefore do not pursue the exploitation of evidence in *realpolitik* any further, although a species of it reappears in our discussion toward the end of the paper.

It is important to note that just as scientific papers do not provide an account of the *process* of research (Bijker et al, 2009, 28; Hilgartner, 2000, 29; Vaughan and Buss, 1998, 46-7) with its false starts, negative results, and sheer failures, but rather an account of its *results*, so too do accounts of policy fail to provide any sense of the *process* of arriving at that policy, with its many reversals, "irrationalities", and contingencies (Bogenschneider and Corbett, 2010, 153-71; Cleevely, 2013, 87-88; Colebatch, 2006, 313; Featherman and Vinovskis, 2001; Jasanoff, 2012, 7; Maybin, 2016, 92; Newman, 2017, 219). Political rationales accompanying policy announcements should never be mistaken for accurate accounts of underlying processes or motivations (Dreyfus, 1977, 100) . The point is that whatever the educated layperson may choose to assume about the making of public policy, there is no substitute for reading the literature on the subject, a. k. a. the evidence. Much of that literature argues the partiality or infeasibility of the rationalist model cherished by many proponents of EBP (Adams, 2004; Bocking 2004;

Bovens and t'Hart, 2016; Edwards, 2001; Fischer and Forester, 1993; Freiberg and Carson, 2010; Greenhalgh and Russell, 2009, 313-5; Hall, 1990; Hallsworth, 2011; Heymann, 2008; Kingdon, 1984; Knaggård, 2014; Lewis, 2003, 2-3; Light, 1991, 179-94; Lindblom and Cohen, 1979, 91-2; Majone, 1989, 15-20, 146; Maybin, 2016; McDonough, 2000; Mitton et al, 2007, 757; Neylan, 2008, 13; Nutley et al, 2007, 245, 300-4; Rhodes, 2005; Salter, 1988; Schuck, 2014; Scott and Shore, 1979, 63-75, 133-162; Smith, 2013; Stevens, 2011; Tenbensel, 2004; Tetlock, 2005; Volgy, 2001; Weingart, 2003, 62-4; Weiss and Bucuvalas, 1980; for theory, see Bendor, 2010, 1-50; Dunn, 2000; Nutley et al, 2007, 94-8; Paris, 1988; Stone, 2002; for history, see Goldhamer, 1978, 129-152).

Furthermore, it has been difficult to identify the successes of research in resolving the challenges of public policy (Aaron, 1978, 165; Anton, 1984, 202; Black, 2001, 276; Bogenschneider and Corbett, 2010, ix, 2-3, 6-7, 291-2; Brooks and Gagnon, 1988, 11; Burton, 2006, 185; Cairney, 2016, 95-102; Cairney and Oliver, 2017, 2; Caplan, 1979, 459; Contandriopoulos et al, 2010, 458-9; Conway, 1990, 168-70; Davies and Nutley, 2002, 6; Daviter, 2015, 493; deLeon and Martell, 2006, 43; deLeon and Vogenbeck, 2007, 3, 9-10; Greene, 2008, 157; Hammond et al, 1983, 287; Head 2010, 80-1, 84, 86, 88; 2016, 474; Hertin et al, 2009, 1187; Kettl, 2016; Levin, 2013, 46-7; Lindblom and Cohen, 1979, 1; McCall, 1984, 3, 6-7; McCall and Weber, 1984, v; Maybin, 2016, 2; Mead, 2015; Mitton et al, 2007, 756; Newman, 2014, 615, 2017, 214-5; Newman and Head, 2017, 11; Nutley, 2003; Oliver et al, 2014b; Pawson, 2006, 7; Rein, 1976, 97; Sanderson, 2002, 15; 2009, 699-700; Scott and Shore, 1979, ix-x, 3, 12, 14, 31-3; Sharpe, 1977, 45; Shulock, 1999, 226-7; Smith, 2013, 19, 24, 2014, 563; Smith and Joyce, 2012, 57, 59; Strassheim, 2017, 504; Vaughan and Buss, 1998, x; Webber, 1991, 7, 21; Weingart, 2003, 67n16; Weiss, 1979, 427; Weiss and Bucuvalas, 1980, 3; Weiss et al, 2008, 30-1; Wilson, 1978; Young, 2013, 6-7; for alternative views, see Knorr, 1977, and Nutley et al, 2007, 2-3).

The potential of EBP is therefore contested and contentious. In the next section of the paper, we describe the methods used to identify the relevant literature, and certain of its characteristics. In the following sections, we describe four major schools of thought on EBP. A short conclusion follows.

Conceptual Review

The PAIS bibliographical database was interrogated for peer-reviewed books and scholarly articles with 'evidence-based policy' in their titles. This generated 132 references, which were complemented by the author's bibliography of policy-relevant references. Articles which addressed issues using the expression as an indicator of legitimacy, but which did not address the practice of evidence-based policy explicitly, were dropped from the review. This left several dozen potential references, which were read and from which manual searches of notes allowed snowballing for other relevant references. A total of nearly 400 relevant books, book chapters, conference papers, and articles, from a variety of disciplinary traditions, were ultimately identified and reviewed. This cannot be regarded as comprehensive review of all the relevant literature; however, it surpassed the point of "data saturation" (Booth, 2001) where no fundamentally novel arguments were emerging.

A number of general conclusions followed. The first was that the issues canvassed as to the practice of policy making in the literature which explicitly evoked evidence-based policy were very similar to those discussed in the earlier literature from the seventies onward on policy making, the "policy sciences" and "knowledge mobilization." This was not a surprise. EBP is the millennial descendant of the policy sciences movement of the postwar era (Aaron, 1978, 1-15, 146-178; Adams, 2004, 40; Anderson, 2003, 32; Conway, 1990, 161-8; Ezrahi, 1980, 111; Featherman and Vinovskis, 2001, 49-82; Fischer and Forester,1993; Heckman, 1990; Heclo, 1996, 38-52; Hoppe, 1999; Howlett, 2009, 153; Lynn, 2001, 193-7; Nathan, 2000, 15-33; Nelson, 1977, 23-36; Nutley et al, 2007, 10-1; Pawson, 2006, 8; Strassheim, 2015, 322; Weiss, 1977, 4-7), and while that movement gave some way to postpositivist policy theory beginning in the eighties (deLeon, 1997; Lynn, 2001, 201-217), it never died. The earlier literature has been employed as part of this review, both because it complements the explicitly EBP literature, and because it recognizes important earlier figures in the study of research and policy such as Carol Weiss, Nathan Caplan, Martin Rein, Richard Nathan, Richard Nelson, and Henry Aaron, to name only a few.

A second conclusion was that there is a serious shortage of evidence on evidence-based policy – at least, a serious shortage to the extent that one takes the standards of evidence cherished by the EBP movement to apply universally . For proponents of EBP of various tendencies, "there is still a remarkable dearth of reliable empirical evidence about the actual processes and impacts of research and other evidence use in policy" (Oliver et al, 2014a; see also Bogenschneider and Corbett, 2010, 253-311; Contandriopoulos et al, 2010, 447-8, 468; Gagliardi et al, 2016, 10-1; Landry et al, 2003, 193-6; Ward et al, 2009, 274-6). In one of the most important surveys of research use, Nutley, Walters and Davies (Nutley et al, 2007, 271; see also Levin, 2008; Mitton et al, 2007; Nutley, 2003, 5) observe that:

> As anyone working in the field of research use knows, a central irony is the only limited extent to which evidence advocates can themselves draw on a robust evidence base to support their convictions that greater evidence use will ultimately be beneficial to public services. Our conclusions…are that we are unlikely any time soon to see such comprehensive evidence neatly linking research, research use, and research impacts, and that we should instead be more modest about what we can attain through studies that look for these.

A third conclusion followed from the second, to wit, that "when the evidence jigsaw is suspected to have many pieces missing, it makes sense to try to collect as much as possible of the pieces that do exist" (Petticrew and Roberts, 2006, 188). In this paper, we have of necessity been open-minded about methodology and variety of sources and have tried to compensate for a mixed quality of research with a broad sweep of the literature.

A fourth conclusion was that there are indeed a variety of methodological approaches in the relevant literature: survey research with or without additional interviews (e.g., Weiss and Bucuvalas, 1980; Landry, 2001, 2003; Ouimet et al, 2009); practitioner/participant observation (e. g., Aaron, 1978; Bogenschneider and Corbett, 2010; Heymann, 2008; Nathan, 2000, Schuck, 2014; Stevens, 2011); systematic reviews (Contandriopolis et al 2010; Oliver et al, 2014a); ethnography (Rhodes, 2005); theory (Cartwright and Hardie, 2012; Stone, 2002); observation and interviews (Salter, 1988); a myriad of case studies; and – the majority of the references – a

great variety of critique, commentary, and passing observation pertinent to the question of the use of evidence in the making of public policy.

A fifth conclusion was that there is – insofar as the phenomena associated with the use of evidence, scientific and social scientific research , in the making of policy - a considerable convergence among the many distinct kinds of research and commentary on EBP; the divergence in view – at least in the three best informed schools of thought – is not about what happens, but about its significance for the project of EBP. If many, albeit contestable, studies all point in the same direction, there may be value in looking that way. The study of the making of public policy is not a science and it is not about to become a science. We are nevertheless interested in knowing what those who have tried to study it have observed and concluded.

Four perspectives on evidence-based policy: The *Reinforce* school

One can divide the conclusions from scholarship on evidence-based policy into four schools of thought. This is not a conceptually airtight typology. Some students of EBP might reasonably be placed on the borderline of two categories. The purpose is simply to employ a convenient heuristic to cope with the stylized facts of EBP research. For different typologies, see Head (2016, 473-4) or Newman (2017).

The *Reinforce* school wonders why the obvious merits of evidence-based policy have not yet dawned upon governments. This school considers that the onus is on public persons and public institutions to get with the program of EBP (Cairney, 2016, 104; Greenhalgh and Russell, 2009, 305-6, 307-8, 311; Heinrich, 2007, 259; Newman, 2017, 216-7; Stilgoe et al, 2006, 57, 69). The role (Jasanoff, 2013, 62) of "Scientific advice…is to keep politicians and policymakers honest by holding them to high standards of evidence and reason."

For many members of the *Reinforce* school, if policy is not made on the basis of evidence, then it must be made on the basis of some unedifying motivation: self-interest, power, ideology, ignorance, naked electoralism, co-optation by "elites", craven submission to "interests", and so

forth. The possible roles of principle, prudence, compassion, historical commitment, or respect for public opinion, are ignored.

The literature of the *Reinforce* school is hortatory and advocative in nature. Governments are told they *should* do this and that (Pew-MacArthur, 2014).

This school shows little interest in the process of public policy-making nor in the research which has been carried out upon the use of knowledge in policy-making. These are among the people who, as Gluckman and Wilsdon (2016; see also Carden, 2011, 165-6) put it, "feel frustrated by the visible failures of evidence to influence policy" and who (Nutley et al, 2007, 299) endorse "the 'what works?' type of instrumental knowledge central to the 'evidence-based everything' agenda."

Cairney (2016, 5; see also 19-20, 23-4; De Marchi et al, 2016, 29-30; Ezrahi, 1980; Parkhurst, 2016, 5) calls this the "naïve EBPM view", an aspirational "ideal type" featuring "comprehensive rationality, in which policymakers are able to generate a clear sense of their preferences, gather and understand all relevant information, and make choices based on that information." This (Cairney, 2016, 7, emphasis in the original; see also Black, 2001, 277; Boaz et al, 2008, 241-2; Cairney and Geyer, 2015, 13; Cairney and Oliver, 2017, 2; Davies et al, 2015, 133; Hammersley, 2013, 1-55; Klein, 2000; Light, 1991, 180-1; Lomas, 2000, 142-4; Lynn, 2001, 208; Maybin, 2016, 140; Mead, 2015, 260-1; Oliver et al, 2014a, 2014b; Prewitt et al, 2012; Scott and Shore, 1979, 4-5, 204-6; Stoker and Evans, 2016, 15-22; Weiss, 1979, 431; Young et al, 2002, 218) "highlights a potential irony—people seeking to inject more scientific evidence *into* policymaking may not be paying enough attention to the science *of* policymaking. Instead of bemoaning the lack of EBPM, we need a better understanding of 'bounded-EBPM' to inform the way we conceptualise evidence and the relationship between evidence and policymaking."

The *Reinforce* school misses the lesson that a lifetime's research on knowledge mobilization confirmed for Weiss (1995, 148), that "Research does not win victories in the absence of committed policy advocates, savvy political work and happy contingencies of time, place and

funds." Weiss and Bucuvalas (1980, 10; cf. British Academy, 2008, 3; Cairney, 2016, 129; Stoker and Evans, 2016, 265; see also Banks, 2009, 9, on the standards for policy research), describe these happy contingencies as follows: "The requisite conditions appear to be: research directly relevant to an issue up for decision, available before the time of decision, that addresses the issue within the parameters of feasible action, that comes with clear and unambiguous results, that is known to decision-makers, who understand its concepts and findings and are willing to listen, that does not run athwart of entrenched interests or powerful blocs, that is implementable within existing resources." All this means that for Weiss (1995, 146; see also Andrews, 2002, 109), "Most policy research is probably born to die unseen and waste its sweetness on the desert air."

The *Reinforce* school constitutes the approving audience for the EBP movement. It is important, not for its insight, but for its enthusiasm, and its demonstration of the intuitive and immensely attractive appeal of the basic logic of EBP.

The *Reform* school

The *Reform* school differs markedly from the *Reinforce* school in that it recognizes the flaws in what Head (2015, 7; see also Hammond et al, 1983, 293) calls, "The traditional science 'transmission' model, whereby academic knowledge-producers disseminate their scientific findings and expect others to recognize the superior merit of their work."

The *Reform* school is concerned to amend or adjust the approach to EBP in order to reap its obvious benefits. It is principally responsible for rediscovering many of the phenomena associated with the use of science in policy-making. The *Reform* school thinks of its work as so many signposts on the pathway to the improved use of scientific evidence in policy-making.

It remains convinced that more research and imagination, on the one hand, and/or improved discipline by key actors, on the other, will unlock the benefits inherent in the EBP idea (e.g., Bogenschneider and Corbett, 2010, 23-4; Nutley et al, 2007, 2). Once the evidence on evidence has been assimilated, it should lead to a greater subtlety and sophistication in the EBP movement

and a greater sensitivity among policy-makers to the potential of evidence as a support for policy (e.g., Gluckman, 2016; Gluckman and Wilsdon 2016).

The consensus in the *Reform* school would seem to put the priority upon (1) recognizing that evidence is most likely to be helpful in enlightening and educating policy-makers rather than providing solutions to specific policy problems, (2) accepting that a variety of types of evidence - beyond that obtained by randomized controlled trials, for example – should be admissible, and (3) the finding that evidence provided by researchers who are in direct and sustained contact with potential consumers among policy-makers is most likely to be influential (for a general overview, see Bogenschneider and Corbett, 2010, 33, 52-4).

Among important recent work in the *Reform* vein, Paul Cairney's searching account of the ways in which policy-making differs from the naive impressions in the EBP movement places the onus of adjustment on the suppliers of evidence (Cairney, 2016, ch. 5), perhaps concluding that democratic systems possess an inertia which precludes major changes in the name and cause of EBP.

The *Reinvent* school

The *Reinvent* school uses the same base of evidence on EBP as the *Reform* school does, but concludes that there are such major flaws in the basic premises of EBP that they can only be rectified by major alterations in one or both of research for policy or its management and reception by government. The contrast between *Reform* and *Reinvent* is nicely if inadvertently captured when Nutley, Walters and Davies (2007, 232) "observe that UK initiatives to improve research use have largely adopted a somewhat bounded and conservative approach based on encouraging researchers and policy makers to do a little bit better, and only rarely have they been more radical in nature by seeking to establish fundamentally new relationships between research and policy." The *Reinvent* school thinks that tweaks to the status quo will not realize the promise of the EBP movement.

For this school, quite fundamental changes to existing practices, turning upon a formal set of procedures for the better management of evidence in policy-making, are required. Such changes would demand an explicit and emphatic commitment to more intensive management of evidence in policy-making by senior officials, from the demand side, called *governance of evidence*, or on the part of scientists, from the supply side, called *knowledge assessment*. I consider these two approaches to reinvention in that order.

According to Pearce and Raman (2014, 390), "The core problem, therefore, is one of epistemic governance: how the production of evidence for policymaking is, and should be, governed…. evidence possesses multiple meanings, there are plural sources and types of evidence, and hybrid institutions are required to manage evidence's inherent complexity." What would these hybrid institutions do? According to Raman (2015, 18, emphasis in the original), "If we are interested in the role that knowledge *ought* to play in policy, then we want to know how this knowledge is produced, what it consists of, how real and potential disagreements are managed, and what forms of evidence are acceptable in pluralistic societies. This is the domain of 'epistemic governance'."

In his recent work, Justin Parkhurst has made extensive recommendations regarding what he calls "good governance of evidence." In Parkhurst's view (2016, 140), there is a need to balance the contending tensions of EBP and "respect for a democratic decision-making process." This demands an attention, in the first and foundational instance (2016, 142), to:

> The establishment of formal evidence advisory systems, designed by a legitimate representative body, which serves to reduce both technical and issue bias in the evidence utilised. It also requires decision authority to rest in the hands of those who are representative of, and accountable to, local populations, and processes to be in place that produce some form of transparency and deliberation with the public.

So good governance of evidence will require auto-regulation of the policy-making process by governments wishing to achieve it (Parkhurst, 2016, 154, emphasis in the original):

> Evidence systems will decide things such as: who has the right to speak on expert matters; when and for which sorts of decisions evidence will be invoked; where budgets will be utilised to generate new evidence; and, ultimately, whose interests are represented and promoted from the operation of the evidence advisory system. In these ways…such institutions work to *govern* the use of evidence in policymaking.

If **we** have understood Parkhurst correctly, the making of policy under good governance of evidence would have to be subject to requirements and audit procedures such as those applicable to, say, programs for assessment of immigration or asylum claims, or the engagement and the promotion of officials named under merit-based public personnel systems (both of which happen in many democracies to be subject to judicial review). Policy-makers would have to document their actions and choices, so as to permit review for compliance with evidence systems requirements.

This would be a very tall order indeed. As Weiss (Weiss and Bucuvalas, 1980, 33; see also 33-36,155-6, 162, 172, 264; Hammond et al, 1983, 291-2; Landry et al, 2003, 196; Levin, 2008, 9; Webber, 1991, 15,18; Weiss, 1982, 623, 1995, 142-3) has repeatedly pointed out, "People often cannot tell you which studies they have used or found useful. They do not remember; they do not catalogue references in their minds; they merge social science research with other sources of information; and...they are usually unclear about what using research means." Or as Rein (1976, 117) noted long ago:

> The influence of research is often diffuse, oblique, and always embedded in the changes it reflects. The process is a complicated one and it is difficult, if not impossible, to isolate the unique role of research and to disentangle whether research is a cause of policy or a consequence of it. For the interplay of knowledge and ideals, political manoeuvre and intelligent problem-solving is bound to be very subtle, ambiguous and complicated - a subject which is itself an important theme for empirical research.

An alternative approach to the management of evidence is premised on the complexity of policy-relevant phenomena (on which more below), which is seen to require greater scrupulousness in the supply of evidence by scientists. In particular, we are to surrender the assumptions of normal science in the Kuhnian sense, and accept that in many important domains, such as climate change or social deprivation, we must live without the hope of consensually sanctioned knowledge to drive us onward. The evidence available will never lift the burden of judgment from our shoulders, but we can be much more honest with ourselves, and more particularly with our decision makers and the public, as to the quality of evidence we are able to supply ourselves.

The solution offered by this tradition within the *Reinvention* school has been christened "knowledge assessment." It involves the systematic screening of research products to ensure clarity and quality control. A variety of protocols, structured to expose the limits, weaknesses, lacunae and contextual linkages of evidence are proposed (Funtowicz, 2006; Saltelli and Giampietro, 2015, 14-23; Strand and Canellas-Boltà, 2006; van der Sluijs, 2006, 74-79), together with vaguely specified gestures in the direction of participation and deliberation (for more than a gesture, see Maasen and Weingart, 2005; Stilgoe et al, 2006). What the knowledge assessors see as "extended peer review and extended quality assurance" (von Schomberg et al, 2006, 156; see also Lentsch and Weingart, 2011, 368-9; Mitchell, 2009, 105-19) appear to be forms of meta-research in which the assumptions of complexity serve as a base for the deployment of a critical apparatus in aid of rating the aptness of any given piece of evidence to serve policy makers. This apparatus is conceptually more elaborate, more searching, and broader than, but not fundamentally different in kind from, traditional disciplinary standards. This would be the "critical social science of knowledge applications…that uncovers and raises to a level of explicit consciousness those unexamined prior assumptions and implicit standards of assessment that shape and also distort the production and use of knowledge" in public policy, for which Dunn (1993, 256) called 25 years ago.

The challenge for these reinvention proposals is that they demand a very large commitment of time and energy on the *processes* of policy-making rather than, or in tandem with, the *outcomes* of policy-making (Hawkins and Parkhurst, 2015, 581). Advocates of *Reinvention* do not, to my knowledge, describe how such regimes might be implemented in real world decision making.

The *Reject* school

The *Reject* school does not deny the value of the best evidence for policy-making; it rejects the pretensions of the EBP movement to offer a fundamental improvement in the making of public policy. It is composed of two related approaches. The first argues that the real world of policy problems is rarely so straightforward as to offer much scope for research which would simultaneously meet disciplinary standards *and* meaningfully address the needs of policy-makers. The second argues that the distinction between evidence and policy-making collapses in the face of the embeddedness of science in the sociopolitical system and of scientists as citizens-bearers of values. The claim that EBP can offer a counter to the politics in policy-making therefore fails, since the politics in question is constitutive of democratic public life.

Let us begin with the first approach. William Byers, in his book, *The Blind Spot: Science and the Crisis of Uncertainty* (2011, 59, emphasis in the original; see also Byrne, 2011, 154; Little, 2015; Mitchell, 2009, 85-119; Montuori, 2008, vii-xliv; Saltelli and Funtowicz, 2014; Saltelli and Giampietro, 2015, 9-13; Sanderson, 2006; van der Sluijs, 2006, 65-7) offers an admirably succinct overview of the position:

> What is the connection between our understanding of science and the crises that society is now facing ? It is not that science is responsible for these crises but rather that a misguided view of science has been used as an attempt to create an environment that is secure and predictable in situations that are inappropriate. Human beings have a basic need for certainty. Yet since things are ultimately uncertain, we satisfy this need by creating artificial islands of certainty. We create models of reality and then insist that the models *are* reality. It is not that science, mathematics, and statistics do not provide useful information about the real world. The problem lies in making excessive claims for the validity of these methods and models and believing them to be absolutely certain. It is the claim that the current theory has finally captured the definitive truth that leads to all kinds of difficulties.

Why are things "ultimately uncertain"? Byers refers to the inadequacies of what he calls (2011, 56; see also Craye, 2006), "Classical science…a kind of unambiguous objectivity and certainty," which underpins (2011, 68), "The idea that science will inevitably save us from ideology [which] is itself an ideology....Science does great damage when it turns into ideology, when it begins to worship certainty." Science, on this view, must accept its own subjectivity and immanent defeasibility (2011, 164): "There is a discrepancy between the story that science tells about itself, which is monolithically unambiguous and the realities of life on the ground, so to speak, in which science is intrinsically self-referential, creative and ambiguous."

Colander and Kupers adopt a similar position at a level more directly engaged with policy-making, in *Complexity and the Art of Public Policy: Solving Society's Problems from the Bottom Up*, where (2014, 26; see also Nelson, 1977, 24, 33-36) they argue that "the standard policy frame" must give way:

> Within a complex evolving system, control is impossible - the best one can hope for is influence. Simply acknowledging that control of an interconnected society is not possible is a major step. The policy metaphor in the complexity frame changes from an image of government behind the steering wheel driving on a well-lit road, to an image of government trying to drive a car, with the windshield covered in mud, going down an unlit, winding road, with hundreds of people grabbing the wheel.

Does evidence provide solutions? According to Colander and Kupers (2014, 16; see also Anton, 1984, 202-3; Hammersley, 2013, 13; Hammond et al, 1983, 291-2, 295-6; Mitchell, 2009, 85-119; Parsons, 2002, 49-53; Rein, 1976, 101-3; Sanderson, 2002, 7-9; 2006; 2009, 705-708), "In the complexity frame, scientific models provide a vision for policy, not an answer for policy. So how does one arrive at a policy? By touch, feel, and intuition." Accepting complexity means surrendering some of the cherished ideals of science as entrenched in the standard policy frame (Colander and Kupers, 2014, 84), "In a complex system, there are simply too many variables interacting, too much influence of random events being magnified, for anyone to predict the future" meaning that (2014, 174; see also Mitchell, 2009, 85-119; Morin, 2008, 21; Sarewitz and Pielke, 2000), "Theory will be much messier than we had hoped, and far less helpful."

In the complexity frame, we face a non-ergodic world with non-linear dynamics, phase shifts, multiple/suboptimal equilibria, path dependency, institutional lock-in, increasing returns, irreversibilities, and a number of other phenomena with which scientists and mathematicians are only beginning to grapple (Castaldi and Dosi, 2006; Colander and Kupers, 2014; Craye, 2006; Johnson, 2015; Mahoney, 2006; Mitchell, 2009; Morin, 2008; Room, 2015; Stone, 2002, 194-7; van der Sluijs, 2006; Wimmer, 2006). Complex systems produce emergent qualities, such that the whole is greater than the sum of its parts, and so frustrate the reductionism of classical science.

In such a world (Morin 2008, 55) it is impossible to reliably translate intention into effect: "As soon as an individual takes an action, whatever that action may be, it begins to escape from his intentions. The action enters into the universe of interactions and in the end, it is the environment that seizes it in the sense that it can become the opposite of the initial intention. Often the action will fly back at our heads like a boomerang." As a consequence, Stone (2002, 195) concludes that "It is impossible to attribute blame in any fashion consistent with our cultural norm that responsibility presupposes control."

While some students of complexity and policy hope that in due course complexity science may furnish greater support to policy-making, they are by no means certain when. Others are even less assured (Craye, 2006; Sanderson, 2006, 120-1). For Cairney and Geyer (2015, 459; see also Nathan, 2000, 11, 197; Hardin, 2003), "We have to be pragmatic when faced with perhaps insurmountable problems regarding our knowledge and control of the world," and for Kiel (2006, 55-6; see also Mitchell, 2009, 86), "Attempting to calculate the richness and diversity of the multiple components contributing to social systems change is likely a hopeless endeavor…. This reality may simply be an unchanging constant of the human condition."

The second component of the *Reject* school comes to much the same conclusions for somewhat distinct reasons. Collingridge and Reeve (1986, 157) claim that repeated disappointments regarding the oversight of technology by the state mean that while "We are convinced that science ought to do better than this in informing policy. The answer is not to undertake some

root-and-branch reform of the policy process, so that it can better utilize the discoveries of science, nor to seek fundamental changes in the conduct of scientific research that would make its products more acceptable to policy-makers. Rather, our expectations must be adjusted to what science can really deliver to the policy-making process," and that is more or less what it currently delivers: if we drop "The myth of rationality…then policy-making involving technical issues can be seen as essentially the same as decision-making in any other kind of issue." Science and evidence are morally compromised to the same extent as the rest of the body politic, as well as – insofar as policy is concerned - subject to same epistemological limitations.

Little (2012) explores the implications of complexity for policy-making and concludes that we have failed to understand the ubiquity and inevitability of failure. Success and failure in a democracy must be politically constructed claims (Cairney, 2016; 16; Howlett, 2009, 159; Little, 2012, 6,10; Nathan, 2000, 104, 184). "The complex terrain of contemporary democratic politics is…*constituted* by failure…there is a 'constitutive failure' at the very heart of democratic politics in complex societies," concludes Little (2012, 7, emphasis in the original). However, he (2012, 11, 14-5, 17) is not resigned to a stagnating polity; on the contrary, he accepts failure and the experience it offers in order to do better next time. If we have understood Little correctly, however, he does not count upon classical science producing evidence as more than a minor influence upon the experience and judgment required to do better in a complex environment (Little, 2012, 16): "In suggesting that we need to engage with the ideas of error and failure…we should relinquish the epistemological certainties…and concentrate instead on thinking about the unknowability of outcomes…this free[s] political argument from a hostage to fortune – successful outcomes – which discredits the whole of democratic politics." In communist Eastern Europe, citizens used to say "We pretend to work and they pretend to pay us." Little thinks that public persons should stop pretending to know so that citizens may stop pretending to believe them.

Conclusion

Sir Peter Gluckman (2017), the doyen of global science advising, repeatedly warns his audiences that scientists should beware of hubris. It is remarkable how often similar themes – modesty,

humility - emerge in studies of EBP and related issues (Bogenschneider and Corbett, 2010, 219-20; Heller, 1969, 35, 37; Kisby, 2011, 121; Scott and Shore, 1979, 204): Jasanoff (2007, 33) calls for "Technologies of humility"; Anderson (2003, 110) concludes that "Familiarity with the peculiar history of social science and public policy itself…should certainly engender appropriate humility"; "The taming of scientific hubris is at the basis of a more effective use of science for governance," (Saltelli and Giampietro, 2015, 16); "If evidence-based policy were human, he would be a modest soul with much to be modest about," (Pawson, 2006, 37); "Above all, one must be modest in reflecting faithfully the limited authority of evidence itself. Good science is not futurology; we should always be humble about predicting the path ahead on the basis of what we know about the one already trodden, " (Pawson, 2006, 167); "It is time to develop a more realistic, and altogether more humble, view of science and its importance for policy," (Collingridge and Reeve, 1986, 14); "Confidence in our ability to understand and explain the behaviour of such [social] systems…needs to be tempered with a degree of modesty about what we can achieve," (Sanderson, 2002, 19; see also 2009, 706); "The acceptance of intrinsic limits to systems of thought requires a certain humility in our attitude toward the models we use and the theories to which we subscribe. We cannot claim too much for any system," (Byers, 2011, 184); "Policy makers need to necessarily wrap their proposals in a shroud of humility…The problem is there is no one to keep the experts humble," (Colander and Kupers, 2014, 15, 174); "Government needs a modest and self-aware sense of the strengths and limitations of expert knowledge: a culture of humility," (Stilgoe et al, 2006, 73); Lunn and Ruane (2013, 7) "conclude that the evidence-based policy approach is much more limited in what it can achieve than many of its proponents claim"; from his experience in government, Mulgan (2013, 36) notes that "Advisers who think that they are very clever while all around them are a bit thick, and that all the problems of the world would be solved if the thick listened to the clever, are liable to be disappointed"; Mitchell (2009, 118) argues that "a search for the one, singular, absolute truth must be replaced by humble respect for the plurality of truths that partially and pragmatically represent the world"; for Strand and Canellas-Boltà (2006, 100-1), "experts should not be trusted too much…we are entitled to promote our ideas and approaches if and only if we combine them with the virtues of modesty, sincerity and openness"; and Klein (2000, 66) concludes that the research community "must assert its claims to recognition and funding with due modesty: excessive claims about… EBP are likely to lead to excessive disillusion."

Those in the *Reform* and *Reinvent* schools who have devoted significant time and effort to EBP would mostly share Head's (2016, 475) conclusion that "The search for evidence-informed policy and practice will be a long and arduous journey," and the latter school might endorse even Pawson's declaration (2006, viii), "There is no such thing as evidence-based policy. Evidence is the six stone weakling of the policy world," although, elsewhere in the world of academia and the foundations, in the *Reinforce* school, optimism about EBP remains (e.g., Bhatta, 2002; Pew-MacArthur, 2014).

It is unlikely that this situation – a wide variety of views on the viability and imminence of EBP – will change anytime soon. As long as the socialization associated with doctoral work in the empirical sciences remains as it is, there will always be sympathy for rationalist assumptions and puzzlement that they do not seem to have more application to the world of practice.

References

Aaron, H. J. (1978). *Politics and the Professors* Washington, DC: Brookings Institution.

Adams, D. (2004). Usable knowledge in public policy. *Australian Journal of Public Administration,* 63(1), 29-42.

Anderson, L. (2003). *Pursuing Truth, Exercising Power: Social Science and Public Policy in the 21st Century*. New York: Columbia University Press.

Andrews, C. J. (2002). *Humble Analysis: The Practice of Joint Fact-Finding*. Westport, CN: Praeger.

Anton, T. J. (1984). Policy sciences and social sciences: Reflections from an editor's chair. In G. J. McCall and George. H. Weber (Eds.), *Social Science and Public Policy: The Roles of Academic Disciplines in Policy Analysis* (pp. 201-14). Port Washington, NY: Associated Faculty Press.

Banks, G. (2009). *Evidence-based policy-making: What is it? How do we get it?* Paper presented at the ANZSOG/ANU Public Lecture Series, Canberra, 4 February 2009.

Barker, A. and Peters, B. G.. (1993). Introduction: Science policy and government. In A.Barker and B. G. Peters. (Eds.), *The Politics of Expert Advice: Creating, Using ,and Manipulating Scientific Knowledge for Public Policy* (pp. 1-6). Edinburgh: Edinburgh University Press.

Bendor, J. (2010). *Bounded Rationality and Politics*. Berkeley: University of California Press.

Bhatta, G. (2002). Evidence-based analysis and the work of policy shops. *Australian Journal of Public Administration,* 61(3), 98-105.

Bijker, W. E., Bal, R. and Hendricks, R. (2009). *The Paradox of Scientific Authority: The Role of Science Advice in Democracies*. Cambridge, MA: MIT Press.
Black, N. (2001). Evidence based policy: proceed with care. *British Medical Journal,* 323(7307), 275-9.
Boaz, A., Grayson, L., Levitt, R. and Solesbury, W. (2008). Does evidence-based policy work? Learning from the UK experience. *Evidence & Policy*, 4(2), 233-53..
Bocking, S. (2004). *Nature's Experts: Science, Politics, and the Environment*. New Brunswick, NJ: Rutgers University Press.
Bogenschneider, K. and Corbett, T. J. (2010). *Evidence-Based Policymaking: Insights from Policy-Minded Researchers and Research-Minded Policymakers*. New York Routledge.
Booth, A. (2001). Cochrane or cock-eyed? How should we conduct systematic reviews of qualitative research? Paper presented at the Conference on systematic reviews of qualitative research, Coventry University, May 14-16 2001. http://www.leeds.ac.uk/educol/documents/00001724.htm . Accessed 20 November 2017.
Boswell, C. (2008). The political functions of expert knowledge: Knowledge and legitimation in European Union immigration policy. *Journal of European Public Policy,* 15(4), 471-88,
Boswell, J. (2014). 'Hoisted with our own petard': Evidence and democratic deliberation on obesity. *Policy Sciences,* 47(4), 345-65.
Bovens, M. and 't Hart, P. (2016). Revisiting the study of policy failures. *Journal of European Public Policy*, 23(5), 653-66.
Boyd, I. (2013). Research: A standard for policy-relevant science. *Nature,* 501(7466), 160.
British Academy. (2008). *Punching our Weight: The Humanities and Social Sciences in Public Policy Making*. London: British Academy.
Brooks, S. and Gagnon, A-G. (1988). *Social Scientists and Politics in Canada: Between Clerisy and Vanguard*. Montreal: McGill-Queen's University Press.
Burton, P. (2006). Modernising the policy process: Making policy research more significant? *Policy Studies Journal,* 27(3), 173-95.
Byers, W. (2011). *The Blind Spot: Science and the Crisis of Uncertainty*. Princeton: Princeton University Press.
Byrne, D. (2011). *Applying Social Science: The Role of Social Research in Politics, Policy and Practice*. Bristol: Policy Press.
Cairney, P. (2016). *The Politics of Evidence- Based Policy Making*. Houndmills, Basingstoke: Palgrave Macmillan.
Cairney, P. and Geyer, R. (2015) Conclusion: Where does complexity and policy go from here? In R. Geyer and P. Cairney (Eds.) *Handbook on Complexity and Public Policy*, (pp. 457-65). Cheltenham: Edward Elgar
Cairney, P. and Oliver, K. (2017). Evidence-based policymaking is not like evidence-based medicine, so how far you should go to bridge the divide between evidence and policy? *Health Research Policy And Systems*, 15, 1-11.
Caplan, N. (1979). The two-communities theory and knowledge utilisation. *American Behavioral Scientist,* 22(3), 459-70.
Carden, F. (2011). Influencing policy: Experience from the field. In G. Papanagnou (Ed.), *Social Science and Policy Challenges: Democracy, Values, and Capabilities* (pp. 165-80). Paris: UNESCO.
Cartwright, N. and Hardie, J. (2012). *Evidence-Based Policy: A Practical Guide to Doing it Better*. Oxford: Oxford University Press.

Castaldi, C. and Dosi, G. (2006). The grip of history and the scope of novelty: Some results and open questions on path dependence in economic processes. In A. Wimmer and R. Kössler (Eds.), *Understanding Change: Models, Methodologies, and Metaphors* (pp. 99-128). Houndmills, Basingstoke: Palgrave Macmillan.

Clarence, E. (2002). Technocracy reinvented: The new evidence based policy movement. *Public Policy and Administration*, 17(3), 1-11.

Cleevely, D. (2013). Networks, nodes and nonlinearity: How scientific advice gets into policy. In R. Doubldeday. and J. Wilsdon (Eds.), *Future Directions for Scientific Advice in Whitehall* (pp. 87-91). Cambridge: University of Cambridge Centre for Science and Policy, and others.

Colander, D. and Kupers, R. (2014). *Complexity and the Art of Public Policy: Solving Society's Problems from the Bottom Up*. Princeton: Princeton University Press.

Colebatch, H. K. (2006). What work makes policy? *Policy Sciences,* 39, 309-21.

Collingridge, D. and Reeve, C. (1986). *Science Speaks to Power*. New York: St Martin's Press.

Contandriopoulos, D., Lemire, M., Denis, J-L. and Tremblay, E. (2010). Knowledge exchange processes in organizations and policy arenas: A narrative systematic review of the literature. *Milbank Quarterly,* 88(4), 444-83.

Conway, T. (1990) Background reading: The crisis of the policy sciences. In S. Brooks and A-G. Gagnon (Eds.), *Social Scientists, Policy and the State*, (pp.159-77). Westport: Praeger.

Craye, M. (2006). Reflexively dealing with uncertainty and complexity in policy-related knowledge. In A. Guimares Periera, S.Guedes Vaz and S. Tognetti (Ed.), *Interfaces Between Science and Society* (pp. 54-63). Sheffield: Greenleaf Publishing.

Davies, H. T. O., and Nutley, S. M. (2002). Evidence-based policy and practice : Moving from rhetoric to reality. Research Unit for Research Utilisation, Department of Management University of St Andrews, Discussion Paper 2. http://www.ruru.ac.uk/PDFs/Rhetoric%20to%20reality%20NF.pdf . Accessed 18 November 2017.

Davies, H. T. O., Powell, A. E., and Nutley, S. M. (2015). Mobilising knowledge to improve UK health care: Learning from other countries and other sectors - a multimethod mapping study. *Health Services and Delivery Research,* 3(27), DOI: 10.3310/hsdr03270.

Daviter, F. (2015). The political use of knowledge in the policy process. *Policy Sciences,* 48(4), 491-505.

De Marchi, G., Lucertini, G. and Tsoukias, A. (2016). From evidence-based policy making to policy analytics. *Annals of Operations Research,* 236(1), 15-38.

deLeon, P. (1997) *Democracy and the Policy Sciences*. Albany, NY: State University of New York Press.

deLeon, P. and Martell, C. R. (2006) The policy sciences: Past, present, and future. In B. G. Peters and J. Pierre (Eds.), *Handbook of Public Policy* (pp. 31-47). London: Sage.

deLeon, P. and Vogenbeck, D. M. (2007). The policy sciences at the crossroads. In F. Fischer, G. J. Miller and M. S. Sidney (Eds.), *Handbook of Policy Analysis: Theory, Politics, and Methods* (pp. 3-14). Boca Raton: CRC Press.

Dreyfus, D. (1977). The limitations of policy research in Congressional decision making. In C. H. Weiss (Ed.), *Using Social Research in Public Policy Making* (pp. 99-123). Lexington, MA: Lexington.

Dunn, J. (2000). *The Cunning of Unreason: Making Sense of Politics* NY: Basic Books.

Dunn, W. N. (1993). Policy reforms as arguments. In F. Fischer and J. Forester (Eds.), *The Argumentative Turn in Policy Analysis and Planning* (pp. 254-90). Durham, NC: Duke University Press.

Edwards, M. (2001). *Social Policy, Public Policy: From Problem to Practice*. Crow's Nest, NSW: Allen and Unwin.

Ezrahi, Y. (1980). Utopian and pragmatic rationalism: The political context of scientific advice. *Minerva*, 18, 111-31.

Featherman, D. L., and Vinovskis , M. A. (2001). Growth and use of social and behavioral science in the federal government since World War II. In D. L. Featherman and M. A. Vinovskis (Eds.), *Social Science and Policy-Making: A Search for Relevance in the Twentieth Century* (pp. 40-82). Ann Arbor, MI: University of Michigan Press.

Fischer, F. and Forester, J. (1993) Editors' introduction. In F. Fischer and J. Forester (Eds.), *The Argumentative Turn in Policy Analysis and Planning* (pp. 1-27). Durham, NC: Duke University Press.

Freiberg, A. and Carson, W. G. (2010). The limits to evidence-based policy: Evidence, emotion and criminal justice. *Australian Journal of Public Administration,* 69(2), 152-64.

Funtowicz, S. (2006). Why knowledge assessment? In A. Guimares Periera, S. Guedes Vaz and S. Tognetti (Eds.), *Interfaces between Science and Society* (pp. 138-45). Sheffield: Greenleaf Publishing.

Gagliardi, A. R., Berta, W., Kothari, A., Boyko, J. and Urquhart, R. (2016). Integrated knowledge translation (IKT) in health care: A scoping review. *Implementation Science,* 11(38), 1-12.

Gluckman, P. (2016). The science-policy interface. *Science,* 353(6303), 969.

Gluckman, P. (2017). Science Advice in a Troubled World. Lecture, Institute for Science, Society and Policy, University of Ottawa, 16 January 2017.

Gluckman, P. and Wilsdon., J. (2016). From paradox to principles: Where next for scientific advice to governments? *Palgrave Communications,* 2, Article Number: 16077, doi:10.1057/palcomms.2016.77.

Goldhamer, H. (1978). *The Adviser*. New York: Elsevier.

Greene, J. C. (2008). Evidence as 'proof' and evidence as 'inkling'. In S. I. Donaldson, C. A. Christie, and M. M. Mark (Eds.), *What Counts as Credible Evidence in Applied Research and Evaluation Practice* (pp. 153-67). London: Sage.

Greenhalgh, T. and Jill Russell. (2009). Evidence-based policymaking: A critique. *Perspectives in Biology and Medicine,* 52(2), 304-18.

Hall, P. A. (1990) Policy paradigms, experts and the state. In S. Brooks and A-G. Gagnon (Eds.) *Social Scientists, Policy and the State*, (pp. 53-78). New York: Praeger.

Hallsworth, M., with Parker, S. and Rutter, J. (2011). *Policy Making in the Real World: Evidence and Analysis*. London: Institute for Government

Hammersley, M. (2013). *The Myth of Research-Based Policy and Practice*. London: Sage.

Hammond, K. R., Mumpower, J., Dennis, R. L., Pitch, S., and Crumpacker, W. (1983) Fundamental obstacles to the use of scientific information in public policy making. *Technological Forecasting And Social Change,* 24(4), 287-97

Hardin, R. (2003). *Indeterminacy and Society*. Princeton: Princeton University Press.

Hawkins, B., and Parkhurst, J. (2015). The 'good governance' of evidence in health policy. *Evidence & Policy,* 12(4), 575-92.

Head, B. W. (2010). Reconsidering evidence-based policy: Key issues and challenges. *Policy and Society,* 29, 77-94.
Head, B. W. (2015). Relationships between policy academics and public servants: Learning at a distance? *Australian Journal of Public Administration,* 74(1), 5-12.
Head, B. W. (2016). Toward more "evidence-informed" policy making? *Public Administration Review,* 76(3), 472-84.
Heckman, J. J. (1990). Social science research and policy: Review essay. *Journal of Human Resources,* 25(2), 297-304.
Heclo, H. (1996). The Sixties' false dawn: Awakenings, movements, and postmodern policy-making. *Journal of Policy History,* 8(1), 34-63.
Heinrich, C. J. (2007). Evidence-based policy and performance management : Challenges and prospects in two parallel movements. *The American Review of Public Administration* 37, 255-77.
Heller, W. (1969). Economic Policy Advisers. In T. E. Cronin. and S. D. Greenberg (Eds.), *The Presidential Advisory System* (pp. 29-39). New York: Harper and Row.
Hertin, J., Turnpenny, J., Jordan, A., Nilsson, M., Russel, D., and Nykvist, B. (2009). Rationalising the policy mess? Ex ante policy assessment and the utilization of knowledge in the policy process. *Environment and Planning A,* 41(5), 1185-1200.
Heymann, P. B. (2008). *Living the Policy Process*. New York: Oxford University Press.
Hilgartner, S. (2000). *Science on Stage: Expert Advice as Public Drama*. Stanford, CA: Stanford University Press.
Hoppe, R. (1999). Policy analysis, science and politics: From 'Speaking Truth to Power' to 'Making Sense Together'. *Science and Public Policy,* 26(3), 201-10.
Howlett, M. (2009). Policy analytical capacity and evidence-based policy-making: Lessons from Canada. *Canadian Public Administration* 52(2), 153-75.
Jasanoff, S. (1990). *The Fifth Branch: Science Advisors as Policymakers*. Cambridge, MA: Harvard University Press.
Jasanoff, S. (2007). Technologies of humility. *Nature,* 450, 33.
Jasanoff, S. (2012). *Science and Public Reason*. London: Routledge.
Jasanoff, S. (2013). The science of science advice. In R. Doubleday and J. Wilsdon (Eds.), *Future Directions for Scientific Advice in Whitehall* (pp. 62-8): University of Cambridge Centre for Science and Policy and others.
Johnson, L. (2015). Complexity modelling and application to policy research. In R. Geyer and P. Cairney (Eds.), *Handbook on Complexity and Public Policy* (pp. 150-70). Cheltenham: Edward Elgar.
Kettl, D. F. (2016). Making data speak: Lessons for using numbers for solving public policy puzzles. *Governance,* 29(4), 573-9.
Kiel, L. D. (2006). Chaos in social systems: Assessment and relevance. In A. Wimmer and R. Kössler (Eds.), *Understanding Change: Models, Methodologies, and Metaphors* (pp. 51-8). Houndmills, Basingstoke: Palgrave Macmillan.
Kingdon, J. W. (1984). *Agendas, Alternatives and Public Policies*. Glenview, Ill.: Scott, Foresman.
Kisby, B. (2011). Interpreting facts, verifying interpretations: Public policy, truth and evidence. *Public Policy and Administration,* 26(1), 107-27.
Kissinger, H. (1969). The policymaker and the intellectual. In T. Cronin and S. Greenberg (Eds.), *The Presidential Advisory System* (pp. 156-68). New York: Harper and Row.

Klein, R. (2000). From evidence-based medicine to evidence-based policy? *Journal of Health Services Research & Policy*, 5(2), 65-66.

Knaggård, Å. (2014). What do policy-makers do with scientific uncertainty? The incremental character of Swedish climate change policy-making *Policy Studies,* 35(1), 22-39.

Knorr, K. (1977). Policymakers' use of social science knowledge: Symbolic or instrumental? In C. H. Weiss (Ed.), *Using Social Research in Public Policy Making* (pp. 165-82). Lexington, MA: Lexington.

Landry, R., Amara, N. and Lamari, M. (2001). Utilization of social science research knowledge in Canada. *Research Policy*, 30(2), 333-49.

Landry, R., Amara, N. and Lamari, M. (2003). The extent and determinants of the utilization of university research in government agencies. *Public Administration Review,* 63(2), 192-205.

Lentsch, J. and Weingart, P. (2011). Quality control in the advisory process: Towards an institutional design for robust science advice. In J. Lentsch and. P. Weingart (Eds.), *The Politics of Scientific Advice: Institutional Design for Quality Assurance* (pp. 353-74). Cambridge: Cambridge University Press.

Levidow, L., and Papaioannou, T. (2016). Policy-driven, narrative-based evidence gathering: UK priorities for decarbonisation through biomass. *Science and Public Policy*, 43(1), 46-61.

Levin, B. (2008). *Thinking About Knowledge Mobilization.* Ottawa: Canadian Council on Learning and the Social Sciences and Humanities Research Council.

Levin, B. (2013) The relationship between knowledge mobilization and research use. In S. P. Young (Ed.), *Evidence-Based Policy-Making in Canada*, (pp. 45-66). Toronto: Oxford University Press.

Lewis, J. M. (2003). Evidence based policy: a technocratic wish in a political world. In V. Lin and B. Gibson (Eds.), *Evidence-Based Health Policy: Problems And Possibilities* (pp. 250-59). Melbourne: Oxford University Press.

Light, P. C. (1991). *The President's Agenda: Domestic Policy Choice from Kennedy to Reagan*. Baltimore: Johns Hopkins University Press.

Lindblom, C. and Cohen, D. K. (1979). *Usable Knowledge: Social Science and Social Problem Solving*. New Haven, CN: Yale University Press.

Little, A.(2012). Political action, error and failure. *Political Studies* 60(1):3–17.

Little, A. (2015). Complexity and real politics. In R. Geyer and P. Cairney (Eds.), *Handbook on Complexity and Public Policy* (pp. 32-47). Cheltenham: Edward Elgar.

Lomas, J. (2000). Connecting research and policy. *Canadian Journal of Policy Research*, 1, 140-4.

Lunn, P. and Ruance, F. (2013). When and how can evidence inform policy? In P. Lunn and F. Ruane (Eds.), *Using Evidence to Inform Policy* (pp. 1-22). Dublin: Gill & Macmillan.

Lynn, L. E. Jr. (2001). The making and analysis of public policy: A perspective on the role of social science. In D. L. Featherman, and M. A. Vinovskis (Eds.), *Social Science and Policy-Making; A Search for Relevance in the Twentieth Century* (pp. 187-217). Ann Arbor, MI: University of Michigan Press.

Maasen, S. and Weingart, P. (Eds.). (2005). *Democratization of Expertise?: Exploring Novel Forms Of Scientific Advice In Political Decision-Making* Dordrecht, Netherlands: Springer.

Mahoney, J. (2006). Analyzing path dependence: Lessons from the social sciences. In R. Kössler and A. Wimmer (Eds.), *Understanding Change: Models, Methodologies, and Metaphors* (pp. 129-39). Houndmills, Basingstoke: Palgrave Macmillan.

Majone, G. (1989). *Evidence, Argument and Persuasion in the Policy Process*. New Haven: Yale University Press.

Maybin, J. (2016). *Producing Health Policy: Knowledge and Knowing in Government Policy Work*. Houndmills, Basingstoke: Palgrave Macmillan.

McCall, G. J. (1984). Social science and social problem-solving: An analytical introduction. In G. J. McCall. and G. H. Weber (Eds.), *Social Science and Public Policy: The Roles of Academic Disciplines in Policy Analysis*, (pp. 3-18). Port Washington, NY: Associated Faculty Press.

McCall, G. J. and Weber, G. H. (1984). Preface and acknowledgments. In G. J. McCall. and G. H. Weber (Eds.), *Social Science and Public Policy: The Roles of Academic Disciplines in Policy Analysis* (pp. v-ix). Port Washington, NY: Associated Faculty Press.

McDonough, J. E. (2000). *Experiencing Politics: A Legislator's Stories of Government and Health Care*. Berkeley, CA: University of California Press.

Mead, L. M. (2015). Only connect: Why government often ignores research. *Policy Sciences*, 48(2), 257-72.

Mitchell, S. D. (2009). *Unsimple Truths: Science, Complexity and Policy*. Chicago: University of Chicago Press.

Mitton, C., Adair, C. E., Mckenzie, E., Patten, S. and Perry, B. W. (2007). Knowledge transfer and exchange: Review and synthesis of the literature. *Milbank Quarterly,* 85(4), 729-68.

Monaghan, M. (2010). the complexity of evidence: Reflections on research utilisation in a heavily politicised policy area. *Social Policy & Society*, 9(1), 1-12.

Montuori, A.(2008). "Forward: Edgar Morin's path of complexity." In [E. Morin], *On Complexity*, (pp. vii-xliv). Cresskill, NJ: Hampton Press.

Morin, E. (2008). *On Complexity*. Cresskill, NJ: Hampton Press.

Mulgan, G. (2013). Experts and experimental government. In R. Doubleday and J. Wilsdon (Eds.), *Future Directions for Scientific Advice in Whitehall* (pp. 32-8). University of Cambridge Centre for Science and Policy and others.

Nathan, R. P. (2000). *Social Science in Government: The Role of Policy Researchers*. Albany: Rockefeller Institute Press.

Nelson, R. R. (1977). *The Moon and the Ghetto: An Essay on Public Policy Analysis*. NY: Norton.

Newman, J. (2011). Boundary troubles: working the academic–policy interface. *Policy & Politics*, 39(4), 473-84.

Newman, J. (2014). Revisiting the 'two communities' metaphor of research utilisation. *The International Journal of Public Sector Management*, 27(7), 627-14.

Newman, J. (2017). Deconstructing the debate over evidence-based policy. *Critical Policy Studies*, 11(2), 211-26.

Newman, J. and Head, B. W. (2015). Beyond the two communities: A reply to Mead's 'why government ignores research'. *Policy Sciences*, 48(3), 383-93.

Newman, J., and Head, B. W. (2017). Wicked tendencies in policy problems: Rethinking the distinction between social and technical problems. *Policy and Society*, preprint, 1-16. http://www.tandfonline.com/doi/full/10.1080/14494035.2017.1361635. Accessed 24 November 2017.

Neylan, J. (2008). Social policy and the authority of evidence. *Australian Journal of Public Administration,* 67(1), 12-19.
Nutley, S. M. (2003). Bridging the policy/research divide: Reflections and lessons from the UK. Conference paper at Facing the future : Engaging stakeholders and citizens in developing public policy, National Institute of Governance Conference, Canberra, 23-24 April 2003.
Nutley, S. M., Walter, I. and Davies, H. T. O. (2007). *Using Evidence: How Research Can Inform Public Services*. Bristol: Policy Press.
Oliver, K., Innvar, S., Lorenc, T., Woodman, J. and Thomas, J. (2014a). A systematic review of barriers to and facilitators of the use of evidence by policymakers. *BMC Health Services Research,* 14(2), doi:10.1186/1472-6963-14-2.
Oliver, K., Lorenc, T. and Innvær, S. (2014b). New directions in evidence-based policy research: A critical analysis of the literature. *Health Research Policy And Systems,* 12(1), doi:10.1186/1478-4505-12-34.
Ouimet, M., Landry, R., Ziam, S. and Bedard, P-O. (2009). The absorption of research knowledge by public servants. *Evidence & Policy,* 5(4), 331-50.
Paris, D. C. (1988). Policy inquiry and rational ideologies. In E. B. Portis and M. B. Levy (Eds.), *Handbook of Political Theory and Policy Science* (pp. 75-89). NY: Greenwood Press.
Parkhurst, J. (2016). *The Politics of Evidence: From Evidence-Based Policy To The Good Governance Of Evidence*. London: Routledge.
Parsons, W. (2002). From muddling through to muddling up - Evidence based policy making and the modernisation of British Government. *Public Policy and Administration,* 17(3), 43-60.
Pawson, R. (2006). *Evidence-Based Policy: A Realist Perspective*. London: Sage Publications.
Pearce, W. and Raman, S. (2014). The new randomised controlled trials (RCT) movement in public policy: Challenges of epistemic governance. *Policy Sciences,* 47(4), 387-402, doi:DOI 10.1007/s11077-014-9208-3.
Petticrew, M. and Roberts, H. (2006). *Systematic Reviews in the Social Sciences: A Practical Guide*. Oxford: Blackwell.
Pew-MacArthur (2014). *Evidence-Based Policymaking: A Guide for Effective Government*. New York: The Pew Charitable Trusts and the John D. and Catherine T. MacArthur Foundation.
Pollitt, C. (2006). Academic advice to practitioners-what is its nature, place and value within academia? *Public Money & Management,* 26(4), 257-64.
Prewitt, K., Schwandt, T. A., and Straf, M. L. (2012). *Using Science as Evidence in Public* Policy. Washington, D.C.: National Academies Press.
Raedelli, C. M. (1995). The role of knowledge in the policy process. *Journal of European Public Policy,* 2(2), 159-83.
Raman, S. (2015). Science, uncertainty and the normative question of epistemic governance in policymaking. In E. Cloatre, M. Pickersgill, (Eds.), *Knowledge, Technology and Law: Interrogating the Nexus* (pp. 17-32). London: Routledge.
Rein, M. (1976). *Social Science and Public Policy.* Harmondsworth: Penguin.
Rhodes, R. A. W. (2005). Everyday life in a ministry: Public administration as anthropology. *American Review of Public Administration,* 35(1), 3-26.
Room, G. (2015). Complexity, power and policy. In R. Geyer and P. Cairney (Eds.), *Handbook on Complexity and Public Policy* (pp. 19-31). Cheltenham: Edward Elgar.

Saltelli, A. and Funtowicz, S. (2014). When all models are wrong. *Issues in Science and Technology*, 30(2), 79-85.
Saltelli, A. and Giampetro, M. (2015). The fallacy of evidence-based policy. http://www.andreasaltelli.eu/file/repository/PaperDraftPolicyCartesianDream_16c.pdf . Accessed October 14, 2017.
Salter, L. (1988). *Mandated Science: Science and Scientists in the Making of Standards*. New York: Kluwer Academic.
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.
Sarewitz, D. and. Pielke, R. A. Jr.. (2000). Prediction in science and policy. In R. A. Pielke. Jr. and D. Sarewitz (Eds.), *Prediction: Science, Decision Making and the Future of Nature* (pp. 11-22). Washington, DC: Island Press.
Schuck, P. (2014). *Why Government Fails So Often and How It Can Do Better*. Princeton: Princeton University Press.
Scott, R. A. and Shore, A. R. (1979). *Why Sociology Does Not Apply: A Study of the Use of Sociology in Public Policy*. New York: Elsevier.
Sharpe, L. J. (1977). The social scientist and policymaking: Some cautionary thoughts and transatlantic reflections. In C. H. Weiss (Ed.), *Using Social Research in Public Policy Making* (pp. 37-53). Lexington, MA: Lexington.
Shils, E. (1987). Science and scientists in the public arena. *The American Scholar,* 56, 185-202.
Shulock, N. (1999). The Paradox of policy analysis: If it is not used, why do we produce so much of it ? *Journal of Policy Analysis and Management*, 18(2), 226-44.
Smith, K. (2013). *Beyond Evidence-Based Policy in Public Health: The Interplay of Ideas* Houndmills, Basingstoke: Palgrave Macmillan.
Smith, K. and Joyce, K. E. (2012) Capturing complex realities - understanding efforts to achieve evidence-based policy and practice in public health. *Evidence and Policy* 8(1), 59-80.
Stevens, A. (2011). Telling policy stories: An ethnographic study of the use of evidence in policy-making in the UK. *Journal of Social Policy*, 40(2), 237-55. doi:doi:10.1017/S0047279410000723.
Stilgoe, J., Irwin, A. and Jones, K. (2006). *The Received Wisdom: Opening Up Expert Advice*. London: Demos.
Stoker, G. and Evans, M. (2016*). Evidence-Based Policy Making in The Social Sciences.* Bristol: Policy Press.
Stone, D. (2002). *Policy Paradox: The Art of Political Decision Making*. New York: Norton.
Strand, R. and Canellas-Boltà, S. (2006). Reflexivity and modesty in the application of complexity theory. In A. Guimares Periera, S. Guedes Vaz and S. Tognetti (Eds.), *Interfaces between Science and Society* (pp. 100-17). Sheffield: Greenleaf Publishing.
Strassheim, H. (2015). Politics and policy expertise: Towards a political epistemology. In F. Fischer, D. Torgerson, A. Durnova, and M. Orsini (Eds.), *Handbook of Critical Policy Studies* (pp. 319-40). Cheltenham: Edward Elgar.

Strassheim, H. (2017). Trends towards evidence-based policy formulation. In M. Howlett and I. Mukherjee (Eds.), *Handbook of Policy Formulation* (pp. 504-21). Cheltenham, UK: Edward Elgar Publishing.

Strassheim, H. and Kettunen, P. (2014). When does evidence-based policy turn into policy-based evidence? Configurations, contexts and mechanisms. *Evidence & Policy,* 10(2), 259-77.

Tenbensel, T. (2004). Does more evidence lead to better policy? The implications of explicit priority-setting in New Zealand's health policy for evidence-based policy. *Policy Studies*, 25(3), 190-207.

Tetlock, P. E. (2005). *Expert Political Judgment: How Good is it ? How Can We Know ?* Princeton: Princeton University Press.

Topf, R. (1993). Science, public policy and the authoritativeness of the governmental process. In A. Barker. and B. G. Peters (Eds.), *The Politics of Expert Advice: Creating, Using and Manipulating Scientific Knowledge for Public Policy* (pp. 103-17). Edinburgh: Edinburgh University Press.

van der Sluijs, J. (2006). Uncertainty, assumptions, and value commitments in the knowledge base of complex environment problems. In A. Guimares Periera, S. Guedes Vaz and S. Tognetti (Eds.), *Interfaces between Science and Society* (pp. 64-81). Sheffield: Greeenleaf Publishing.

Vaughan, R. J. and Buss, T. F. (1998). *Communicating Social Science Research to Policymakers* Thousand Oaks, CA: Sage.

Volgy, T. J. (2001). *Politics in the Trenches: Citizens, Politicians, and the Fate of Democracy*. Tucson: University of Arizona Press.

Von Schomberg, R., Guimares Pereira, A. and Funtowicz, S. (2006). Deliberating foresight knowledge for policy and foresight knowledge assessment. In A. Guimares Periera, S.Guedes Vaz and S.a Tognetti (Eds.), *Interfaces between Science and Society* (pp. 146-74). Sheffield: Greenleaf Publishing.

Wagner, W. and Stienzor, R. (Eds.). (2006). *Rescuing Science from Politics: Regulation and the Distortion of Scientific Research*. Cambridge: Cambridge University Press.

Ward, V., House, A. and Hamer, S. (2009). Knowledge brokering: The missing link in the evidence to action chain? *Evidence & Policy,* 5(3), 267-79.

Webber, D. J. (1991). The distribution and use of policy knowledge in the policy process. *Knowledge and Policy,* 4(4), 6-35.

Weingart, P. (2003). Paradox of scientific advising. In G. Bechmann and I. Hronszky (Eds.), *Expertise and Its Interfaces: The Tense Relationship of Science and Politics* (pp. 53-89). Berlin: Editions Sigma.

Weiss, C. H. (1977). Introduction. In C. H. Weiss (Ed.), *Using Social Research in Public Policy Making* (pp. 1-22). Lexington, MA: Lexington.

Weiss, C. (1979). The many meanings of research utilization. *Public Administration Review,* 39(5), 426-31.

Weiss, C. H. (1982). Policy research in the context of diffuse decision making. *The Journal of Higher Education,* 53(6), 619-39.

Weiss, C. H. (1995). The haphazard connection: Social science and public policy. *International Journal of Educational Research,* 23(2), 137-50.

Weiss, C. with Bucuvalas, M. J. (1980). *Social Science Research and Decision-Making*. New York: Columbia University Press

Weiss, C. H., Murphy-Graham, E., Petrosino, A., and Gandhi, A. G. (2008). The Fairy Godmother and her warts - Making the dream of evidence-based policy come true. *American Journal Of Evaluation,* 29(1), 29-47.

Wilson, J. Q. (1978). Social science and public policy: A personal note. In L. Lynn (Ed.), *Knowledge and Policy: The Uncertain Connection* (pp. 82-92). Washington DC: National Academy of Science.

Wimmer, A. (2006). Models, methodologies, and metaphors on the move. In A. Wimmer and R. Kössler (Eds.), *Understanding Change: Models, Methodologies and Metaphors* (pp. 1-33). Houndmills, Basingstoke: Palgrave Macmillan.

Wyatt, A. (2002). Evidence based policy making: The view from a centre. *Public Policy and Administration,* 17(3), 12-28.

Young, K., Ashby , D., Boaz, A. and Grayson, L. (2002). Social science and the evidence-based policy movement. *Social Policy & Society,* 1(3), 215-24.

Young, S. P. (2013). Introduction, evidence-based policy making: The Canadian experience . In S. Young (Ed.), *Evidence-Based Policy-Making in Canada*, (pp.1-25). Toronto: Oxford University Press.