

Pathologies of Epistemic Learning: What Are They and How Do They Contribute to Policy Failure?¹

Abstract

We analyse policy failure as a degeneration of policy learning. Analytically, we drill down on one type – epistemic learning. This is the realm of evidenced-based policymaking (EBPM), where experts advise decision-makers on issues of technical complexity. Empirically, we present the management of bovine tuberculosis (BTB) in England since 1997 as a failure of epistemic learning. Drawing on elite interviews and documentary analysis, weaknesses in government's management of its relationship with an epistemic community are analysed as problems of learning about different aspects of organisational capacity. We conclude discussing the value of learning theories as conceptual lenses for policy failure.

Keywords

Bovine tuberculosis (BTB), epistemic communities, policy failure, policy learning

Introduction and Motivation

As the introduction to this special issue highlights, the literature on policy failure is growing. A good deal of attention has been focussed on defining what we mean by failure. The most complete and best-used typology comes from McConnell who identifies three main types – process, programme and political (McConnell, 2010). The failure to link policy ideas to reality is either a failure of: process – the management of the policy-making process (e.g. examination of policy options, managing experts and stakeholders and commanding legitimacy); programme – the technical design and implementation of the policy; or, politics – the distortion of policy ideas for partisan or electoral reasons. This conceptualisation is important; by uncovering the different characters and subjects of failure, scholars can now move on from definition and concentrate efforts on explaining why policy failure happens and is often repeated. So far, three approaches dominate empirical studies (see the introduction to this volume): policy stages explanations (e.g. implementation analysis);

analyses that treat failure as a function of specific political institutions or people (e.g. leadership studies); and, analyses examining organisational capacity (e.g. policy tool analysis). This paper is located in the third tradition.

Most capacity-related accounts treat the failure to translate policy ideas in to reality as a function of the poor design of policy tools. Here, we take a different tack using theories of policy learning to understand policy failure; where failure is treated as a ‘degeneration’ of policy learning. Analytically, the paper drills down on the rational ideal type of policy learning – epistemic learning. This is the realm of evidenced-based policymaking (EBPM), where experts advise decision-makers on issues of technical complexity (see Ingold and Monaghan, 2016 for a recent discussion). Empirically, the paper presents a policy failure whose causes are rooted in the process of policy-making. Specifically, the management of bovine tuberculosis (BTB) in England since 1997 is conceptualised as a failure of epistemic learning – where learning processes degenerated as the result of various weaknesses in government’s management of its relationship with an epistemic community established to advise it. Drawing on documentary evidence and interviews with 54 elites (scientists, policymakers and interest group actors)², management failures in BTB are analysed as problems of learning about different aspects of organisational capacity.

Why take this approach? Why link failure with learning? Studies of policy learning have long focussed on the benefits associated with this activity. But, learning may not always be a good thing. It may backfire. Linking policy learning with policy failure allows us to illuminate this darker aspect; where enlightenment becomes ‘endarkenment’ (Weiss, 1979). Why focus on policy learning about organisational capacity? We know a good deal about the ideational dimension of policy learning; indeed it is the foundational theme of classic studies exploring the link between beliefs and social learning – e.g. Deutsch, 1966; Hecl, 1974, and more recently Béland and Cox, 2011; Hall, 1993). The governance dimension – that links learning with organisational capacity development – has enjoyed less widespread attention in policy studies (Borrás, 2011). By making these connections, we illuminate the relationship between governance failure and learning (Peters, 2015; Schout, 2009), and specifically how capacities can be generated to avoid or correct failures.

The paper is structured as follows. Section 1 outlines BTB management as a case of policy failure and, more specifically, as a failure of epistemic learning in government. It then outlines a recent learning typology where the epistemic form is differentiated from three

other types. Section 2 zooms-in on epistemic learning, expanding the concept to identify four different roles epistemic communities play when advising decision-makers and pathologies associated with each. With these possible roles established, section 3 builds on the organisational literature to outline the capacity challenges faced by decision-makers engaged in epistemic learning and the ways in which advisory relationships can go wrong and learning can degenerate. These degenerations are understood as rooted in failures in government's organisational capacities. Empirically, our analysis of BTB policy in England finds that epistemic learning degenerated as a result of weaknesses in the government's analytical and communicative capacities. We conclude with some reflections on the value of learning theories as a conceptual lens for policy failure.

Section 1: Conceptualising Bovine Tuberculosis (BTB) Management as a Degeneration of Epistemic Learning

This section presents the management of bovine tuberculosis (BTB) since 1997 as a policy failure. Specifically, it is categorised as a failure of epistemic learning. Before offering a conceptual elaboration, we first present the empirical story.

In what ways has the management of BTB failed? Bovine tuberculosis (BTB) has affected cattle in large parts of England since the 1950s. Despite being declared BTB-free in early 1970s, the number of infected herds rose gradually until the 1980s. Since then, BTB incidence has spread geographically and increased sharply – in 1986 638 cattle were slaughtered; by 2004 this figure was around 22,500 (effectively doubling every four years). The costs of managing the disease are considerable. For example, in 2002/03 the Department for Environment, Food and Rural Affairs (DEFRA) spent £73million – £31million in compensation for farmers with affected herds, £29million on BTB testing and associated veterinary costs and £13million on disease research.

Control of BTB is problematic due to the existence of a wildlife reservoir for the disease. In the UK, badgers are commonly infected with TB, and through their roaming across farmland, contribute to the spread of infection in cattle. By the 1990s research suggested that, while the evidence implicating the badger was 'compelling' (Krebs et al, 1997), for an effective policy response research was required to reveal the magnitude of badgers' contribution to the disease and to explore the effectiveness of different badger culling strategies.

In 1998, the Randomised Badger Culling Trial (RBCT) was initiated to provide data on the three types of culling – proactive, reactive and no culling – for a cost-benefit analysis. Given the strong public attachment to the badger and powerful animal welfare lobby in the UK, the RBCT was restricted to culling 30% – no future policy could be based on the animal’s ‘virtual elimination’ (ISG, 1998, 1999). The expectation was that the experiment would take around five years to complete, and that a proactive culling would be the best option.

When the ISG finally reported back in 2007, it could not have been clearer. The trial data and cost-benefit analysis suggested badger culling ‘cannot meaningfully contribute towards future control of BTB’ (ISG, 2007). The RBCT uncovered new evidence about badger ecology. As badger colonies were disrupted by culling, a ‘perturbation effect’ took place with displaced badgers that had escaped the cull moving away from their territory and re-colonising – taking the disease with them to other cattle herds. Given this, reactive culling had no discernible benefits, and the positive effects of proactive culling were largely offset by a negative ‘edge effect’ where incidence of cattle infection increased at the periphery of the culling zones (the net result was a saving of only 14 cattle herds over five years). For culling to be effective, it would have to be on a scale and intensity that was socially and politically unpalatable, practically unfeasible (given badger movements) and economically inefficient. Instead, the ISG argued that future policy should focus on cattle-to-cattle transmission.

Despite having created the bedrock of a new international scientific consensus on badger ecology, the ISG’s conclusions were contested by a new group of scientists commissioned by DEFRA (King, 2008). While these arguments raged, governments’ approach to BTB has been to continue cattle testing, movement restriction and compensated slaughter scheme. In 2012 alone, the cattle slaughter figure exceeded 31,000 costing nearly £100million.

In the years since the ISG’s report, successive administrations have struggled to develop a national control policy for BTB. The latest development in 2013 was the beginning of a four year cull targeting ‘at least’ 70% of badgers in TB hotspots. This policy has been highly controversial and, so far, unsuccessful. The first tranche achieved only 30% removal rate, leading the Secretary of State to famously declare that ‘the badgers had moved the goalposts’! (BBC, 2013).

How can we understand this failure? What is it a failure of? The failure to control BTB can be treated as a failure of epistemic learning. After ten years of experimentation on BTB management which yielded a clear result, decision-makers are left with the same fundamental

policy challenge (see McConnell, 2010 on failure indicators). To be clear, this is *not* a normative argument that decision-makers *should* have followed the ISG's conclusions. Rather, analytically, the proposition is that the policy limbo and problem escalation since the 1970s, and in particular since 1997, is in large part the consequence of pathologies in how scientific advice has been commissioned and managed by government.

To explore policy failure in BTB policymaking as a degeneration or pathology of epistemic learning, we first need to be clear about what we mean by policy learning. The policy learning literature is vast and reveals a variety of types. We distil this scholarship to define learning as updating of beliefs (Dunlop and Radaelli, 2013). This matches the central concern of all policy analysis – the study of how beliefs inform policy debates, content, performance, institutional structures and, on occasion, change. Beliefs are predominantly updated through social interaction, appraisals of one's experience or evidence-based analysis. Dunlop and Radaelli (2013) develop a four-fold learning typology, based on a review of this literature. Specifically, the proposal is that the type of policy learning decision-makers engage in is a product of two conditions associated with decision-making around knowledge-dense issues.

The first of these concerns the issue's level of *problem tractability*. Where technical uncertainty is extreme and issue intractable, decision-makers want authoritative advice – classically in the form of epistemic communities (Haas, 1992). The second dimension concerns the *certification of actors*: that is the extent to which a group of experts exists to advise policymakers on the issue at hand. These experts will hold consensual knowledge and their 'performances and claims' to expertise validated by the state (McAdam, Tarrow and Tilly, 2001: 121). Where no single certified group exists or one has been discredited, epistemic authority can be, and expertise may be, localised or plural. Taken together, levels of issue tractability and actor certification provide the basic conditions for four modes of policy learning that dominate the social sciences literature (see figure 1): epistemic learning, reflexive learning, learning through bargaining and learning in the shadow hierarchy.

These four have been outlined in detail in other places (Dunlop, 2014; Dunlop and Radaelli, 2016). Our interest is in epistemic learning and the BTB case meets the basic conditions for this – its management has long been the exclusive domain of scientists and it is marked by low tractability. Before exploring why things 'go wrong' in epistemic learning, the next section unpacks this learning type into four modes and the dysfunctional forms they can take.

FIGURE 1: CONCEPTUALISING KNOWLEDGE MODES AS POLICY LEARNING

		PROBLEM TRACTABILITY	
		LOW	HIGH
CERTIFICATION OF ACTORS	LOW	2. Reflexive Learning	3. Learning through Bargaining
	HIGH	1. Epistemic Learning	4. Learning in the Shadow of Hierarchy

Source: adapted from figure 1 (Dunlop and Radaelli, 2013)

Section 2: Unpacking Epistemic Learning

Using a theory of adult learning, the property space of each of the four types of learning can be expanded (Dunlop and Radaelli, 2013). By differentiating between instances where the decision-maker (i.e. the learner) focusses on the contents or objectives of knowledge creation, we capture the variety of roles inhabited by expert groups in epistemic learning settings. This differentiation is essential if we are to understand the different functions they may perform over the lifespan of an issue, and the variety of ways in which learning can succeed or degenerate. We generate four roles for each cell of the basic model. Figure 2 contains those for epistemic communities (see Dunlop and Radaelli, 2013: 608-610).

FIGURE 2: EXPANDING EPISTEMIC LEARNING

DECISION-MAKERS' FOCUS ON LEARNING OBJECTIVES

HIGH

LOW

HIGH

<p>Epistemic Community as CONTRIBUTOR</p> <p>Degeneration = knowledge debased</p>	<p>Epistemic Community as PRODUCER OF STANDARDS</p> <p>Degeneration = production of low quality knowledge</p>
<p>Epistemic Community as FACILITATOR</p> <p>Degeneration = knowledge politicisation</p>	<p>Epistemic Community as <u>TEACHER</u></p> <p>Degeneration = groupthink</p>

DECISION-MAKERS' FOCUS ON LEARNING CONTENT
LOW

The role of ‘teacher’ is the ideal type role for an epistemic community. Here, the issue is at its least tractable and experts their most authoritative. The challenge for decision-makers is to absorb as much knowledge as possible to get a basic grip on the main dimensions of the problem. The literature suggests this ideal type category is time-limited – decision-makers do not want to be positioned behind a heavy veil of ignorance for too long. Moreover, the aim of the epistemic teacher is to help decision-makers identify their preferences. Epistemic communities make effective teachers where decision-makers are able to listen to these communities but not be captured by them. In the worst case scenario, where decision-makers lose their analytical distance from, or are baffled by, expert advisers we risk ‘groupthink’ (Janis, 1972) where decision-makers fail to ask critical questions and are left unable to innovate.

At the opposite pole is the ‘contributor’ – the weakest role for experts generating epistemic learning. In these situations, decision-makers have grasped the direction they want policy to go in and the evidential basis required to reach that destination. Thus, the issue is open to

knowledge forms beyond those of the epistemic teacher – most notably from wider society. Here, the epistemic community becomes an efficiency device. At best, they will form the basis of, and make a continued contribution to, the emerging policy paradigm. At worst, they serve a perfunctory purpose – for example, as a symbol that evidence has been taken seriously. In extreme cases, the epistemic community becomes marginalised and its knowledge debased.

Where expert groups are ‘facilitators’ of epistemic learning, decision-makers are aware of the policy goal but require evaluation evidence to help them reach it. Here, the epistemic community’s role is to provide decision-makers with that policy-relevant evidence. This degenerates where the policy objective begins to distort or politicise the research process – for example, data analysis is driven by policy rather than epistemic concerns or evidence cherry picked by decision-makers.

The last quadrant is the epistemic community as a ‘producer of standards’. This concerns situations where decision-makers want to facilitate the production of robust evidence. Through its authoritative knowledge, the epistemic community determines what standards are appropriate in a policy area. Where this degenerates, decision-makers fail to provide the resources for the production of high quality knowledge and robust standards.

It is important that we are clear about the status of decision-maker/epistemic community relationships. For, no matter what role the epistemic community inhabits at a particular moment in an issue’s lifecycle, the advisory process is a form of informal governance (Christiansen and Piattoni, 2003). When decision-makers call upon experts, they are not making formal delegations of authority. They are working with knowledge producers whose professional training, institutional identities and values derive from their disciplines or specialist organisations. Thus, for epistemic learning to be successful, decision-makers must learn how to manage their experts. The next section explores the specific organisational capacity challenges associated with each epistemic mode, and examines how they played out in the BTB case.

Section 3: Pathologies of Epistemic Learning and Organisational Capacity in BTB Management

So, decision-makers and epistemic communities are involved in complex relationships where they inhabit multiple roles across an issue's lifespan. The management of those relationships is critical to the success of epistemic learning and resultant policy. To keep learning pathologies at bay, governments require various types of organisational capacity (Peters, 2015). Organisational capacity addresses the central concern of governance – the ability to develop the skills and tools required to achieve policy goals (Howlett et al, 2015a).

In technically complex policy dilemmas marked by uncertainty, epistemic communities represent the key policy partner. Yet, we must be realistic about what such partnerships can yield. Certainly, the epistemic communities' literature is replete with examples of the limited, or partial, influence of expertise on policy action and less still on actual outcomes (see Dunlop, 2013 for a review). What we lack, however, is a systematic way of identifying and analysing the aspects of governance that frustrate epistemic learning and threaten policy failure. Focussing on the link between organisational capacity and epistemic learning offers one promising analytical strategy.

Policy learning around an issue takes place in organisations marked by different types of capacity. Empirical studies on advisory relationships suggest that breakdowns, or weaknesses, in these capacities can create a breeding ground for pathogens that undermine learning. Drawing on accounts of policy learning and capacity in public administration (notably, Bennett and Howlett, 1992; Borrás, 2011; Howlett et al, 2015a) here we propose four types of capacity that support epistemic learning; explore how weaknesses in them may contribute to the degenerate of it, and how they relate to the variety of roles inhabited by governments and their epistemic advisers (see table 1 for a summary). To be clear, this typology does not aim to offer hard and fast prescriptions for action. Rather, we offer a set of capacity types based on public administration concepts, elaborated with reference to empirical studies, that authors can use to critically examine advisory relationships. Further empirical testing over time will lead to a clearer view of how useful and accurate these conceptualisations are. But, for now, they provide us with a much needed analytical starting point.

TABLE 1: ORGANIZATIONAL CAPACITIES AND EPISTEMIC LEARNING DEGENERATION

Epistemic communities approached as ...	Organizational capacity as ...	Learning about ...	Government focusses on ...	Learning degeneration as ...
Teacher	Absorption (ACAP)	Listening	Understanding expert advice	Groupthink
Producer of standards	Administrative (ADCAP)	Management tools	Supporting robust evidence creation	Failure to produce robust knowledge
Facilitator	Analytical (ANCAP)	Analytical tools	Defining policy relevance	Politicisation of research process
Contributor	Communicative (COMCAP)	Dialogic tools	Achieving stable paradigms	Debasing evidence-based policy paradigm

3.1 *Absorptive capacity* concerns the ability of decision-makers to acquire knowledge from experts to help reduce uncertainty. Specifically, we are dealing with the ability to listen to, understand and, if necessary, challenge, epistemic communities. The challenge for decision-makers is to avoid uncritical engagement that characterises ‘groupthink’ (Janis, 1972) – where fear of being thought inferior or of conflict result in decision-makers not asking for clarification from their advisors or ignoring warning signs that what experts are saying may not meet expectations. As shown by Hirschman (1970), paradigms provide their own blinkers and hindrances to learning when thinking outside the box is vital. For decision-makers to think outside the box they must first understand what is being said in it.

The idea of absorptive capacity stems from the management literature. Three skills recur in that literature (see Zaha and George, 2002). The first involves listening through regular information gathering. Decision-makers suffer from information overload, and struggle to know which messages to focus on (Jones and Baumgartner, 2005). Giving epistemic communities advisory positions *inside* the bureaucracy is a key part of ensuring key information is highlighted (Haas, 1992).

The second dimension of knowledge absorption involves the source of information. Decision-makers working with one set of expert advisors must develop their peripheral vision to ensure they are alive to any significant criticisms. Generating ways of capturing misgivings on the

part of other experts or rival epistemic communities is central to the avoidance of blinkered thinking.

Yet, being able to hear the voices of experts and their critics is just the start. Decision-makers must be able to understand as well as listen. In short, decision-makers in governments (like managers in a business) must react and, where necessary, adapt the original management (policy) strategy in the face of the information updates they receive (Argyris and Schön, 1978). This third skill of gauging the speed and intensity of reaction is incredibly difficult. Indeed, the knowledge utilisation literature is replete with examples where decision-makers do not change policy course in the face of evidence that their favoured policy solutions may not match the lessons being taught by experts (for a recent review see Turnpenny, Russel and Jordan, 2014). Understanding how knowledge may ‘play out’ in policy terms and adapting accordingly is politically risky in all issues. But, in technically complex issues it is a high wire act indeed since decision-makers are continually uncertain about how complete the knowledge they are reacting to is (Dunlop, 2010).

What was the absorptive capacity in BTB’s advisory governance? Throughout research process, the government demonstrated considerable listening skills. DEFRA provided the ISG with a secretariat which played a key role in keeping open lines of communication between the scientists and civil servants. Indeed, one of the conditions of the scientists’ work was that they did not meet to discuss the experiment without their assigned civil servants (interviews with two ISG scientists and one civil servant). The ISG chair also ensured that their message reached the key decision-maker. Following the advice of a senior government scientist, Professor John Bourne insisted that any formal reports or urgent findings be communicated by him to the Minister direct. This insistence was motivated, in part, by the concern that politically sensitive messages could become lost ‘in the system’ and the group become a scapegoat in a highly politicised issue (interviews with two ISG members and one government Minister). And, there is evidence of success in this regard – in 2003 when the ISG shared alarming data with officials that the first round of reactive culling had led to an increase in the risk of BTB infections (27%), the Minister acted swiftly to halt that intervention. This was something the scientists regretted (interview with three ISG members), but it does demonstrate a Ministry in ‘listening mode’.

DEFRA also ensured their epistemic community’s work was open to scientific scrutiny. Each of the ISG’s annual reports were audited by an independent statistician and given a clean bill

of health. Scrutiny also went beyond this routine. With the trial taking longer than expected and reactive culling having been suspended, in 2003 the Agriculture Minister ordered an interim review be conducted by a group of veterinary scientists chaired by Professor Charles Godfray (Godfray et al, 2004). The work was also peer reviewed by the wider scientific community – the ISG being free to establish the credibility of their work by publishing results as they came in international scientific journals (including *Nature* and *The American Proceedings of the National Academy of Sciences*).

As outlined, absorptive capacity requires more than information gathering and scrutiny. To truly *absorb* the information being given by their expert advisors, decision-makers must critically engage. In policy learning terms, this is demonstrated by the adaptation of policy design. In the BTB case, this did not happen. At the outset, in 1997, no one (scientists included) considered that small scale badger culling would be rejected as a viable strategy. Rather the issue was one of what type of culling worked best. By 2004, both the ISG and Godfray review group warned decision-makers that badger culling was unlikely to provide a viable policy solution and that cattle control and, in the long term, a vaccine should be explored. Yet, no alternative policy plans were developed at this point. As noted earlier, a key part of the absorption challenge concerns gauging the speed and intensity of reactions to information. As the BTB case demonstrates, where policy disputes are politicised and costs sunk around one policy solution, decision-makers' responses may be slow and uncertain, leaving policies in limbo.

3.2 *Administrative capacity* concerns establishing and managing resources to ensure the development of robust evidence. Three sets of operational tools are central to ensuring epistemic communities produce standards for an issue. First, and at the most basic level, administrative capacity concerns bureaucrats' freedom to act. Decision-makers' legal obligations, and historic policy legacies, shape the room for manoeuvre and ability for epistemic learning to reach its full conclusion. Such institutional hierarchies may work in favour of epistemic learning where regulations require that policy conforms to particular scientific standards (Weiss et al, 2005). Moreover, where power has been ceded to another level of government, or is shared with another government department or agency, bureaucrats' ability to manage advisory relationships and act on expert advice may be complicated or compromised.

Second, robust advisory science requires financial capacity; most obviously the ability to calculate and make available the requisite resources to fund research to its end point. Of course, the outlay depends on the type of knowledge required (Davies et al, 2000). Evidence reviews, or small-scale studies to plug empirical gaps, are relatively cheap when compared with the production of original data (a requirement most associated with situations of radical uncertainty). Moreover, decision-makers must appreciate that their financial commitments to an epistemic community charged with creating original data may change as that research progresses.

Third, there is the matter of expert recruitment and management. To secure authoritative knowledge, epistemic advisors must be able to produce the science. Moreover, while experts must understand the policy context, the management challenge for bureaucrats is to ensure they are able to conduct their research away from the political fray. Securing and insulating this expertise is harder than it may sound. In advisory relationships, research methods function as indicators of impartiality (Stoker, 2010). For example, bureaucrats are increasingly turning to large-scale quantitative research and randomised control trials (RCTs) because they offer statistical checks of validity and produce evidence that can be falsified by the wider expert community (Haynes et al, 2012). Allied to this, additional external experts may be recruited to perform a challenge function to check research quality.

In BTB, government supported evidence creation to identify the role of the badger in the disease and identify a suitable culling strategy. DEFRA had a high degree of freedom to organise its advisory relationship. Though the European Union (EU) requires that member states deal with animal disease, how they do this is a domestic matter. Moreover, coordination problems are minimal within government; BTB involves no other government Department. DEFRA used this capacity to take a bold step and commissioned the first ever randomised controlled field trial to be funded by the UK government (interview one civil servant). The role of badgers in BTB has been the subject of government-funded science since the late 1970s. But, these were observational studies and, with infection rates continuing to rise in the 1990s, decision-makers were convinced that only an RCT that compared different culling strategies would produce the robust evidence needed to guide a future cull (Krebs et al, 1997).

The selection of an RCT was not simply a reflection that decision-makers believed previous methods had produced partial knowledge. It also reflected the evidence-based policy-making

approach being championed by the incoming New Labour administration whose Agriculture Minister emphasised the need for policy underpinned by ‘rigorous and apolitical’ science (interview with Minister). This belief that RCTs have the explanatory power to depoliticise and issue and cut through value-based arguments is central to the increasing appeal of this method in government in general and in BTB in particular (Dunlop, 2016). And so, it was financially well-supported. That this would be the largest ever field-trial conducted by government was known from the outset, and scientists furnished with the requisite resources (interviews with five ISG members). The scale of financial commitment was huge, and a two year delay due to Foot and Mouth (FAM) disease plus the need for additional training of field operatives in culling techniques all contributed to an escalation of costs. An estimated £7million a year was spent on the experiment for the ten years it ran; yet there was no suggestion that at any point the government were unwilling to commit resources.

Similarly, there were few administrative capacity problems in terms of the selection of the scientists themselves. The ISG was assembled through recommendations made in 1996 by then government Chief Scientific Officer Professor Sir John Krebs and other scientific officers working inside government. Most of the groups’ seven members had previously advised DEFRA (and its predecessor Ministry of Agriculture, Fisheries and Food [MAFF]) and three had been part of the Krebs group. All were research active, full-time academic scientists and one of them counted a Nobel amongst their professional honours. While open-minded about the results, these scientists shared the expectation of policymakers and Krebs that a culling solution would result from the trial even on its small scale, with proactive culling expected to be the best solution. What was not expected was the ‘perturbation effect’ which provided negative results from the scale of culling conducted.

Until the publication of the final report, the ISG scientists were considered independent by the opposing sides in the debate (interviews with NFU and Badger Trust officials). While they did not enter the policy debate raging around them, the ISG did conduct public meetings to explain the trial design and its rationale. The scientists needed the cooperation of the affected communities where the culling pilots were taking place. But, the research process was not compromised by this – indeed without such engagement it is unlikely that the scientists would have been granted the access to land required for the experiment to work. Moreover, as was noted earlier (section 3.1), the scientists published their work widely and were scrutinised by a DEFRA appointed auditor. Moreover, though they were critical of the policy relevance of the findings, neither the Godfray nor the King reviews criticised the

ISG's science. Indeed, both sets of scientists were at pains to emphasise how robust it was (EFRAC, 2008).

Thus, this dimension of epistemic learning did not degenerate. On the contrary, the operational arrangements put in place by DEFRA supported the production of a new international scientific consensus on badger 'perturbation'. That localised badger culling continues and evaluations of that policy support the ISG's argument, underlines that success in one area of epistemic learning is not enough to prevent policy failure.

3.3 Analytical capacity concerns ensuring the relevance of the knowledge being produced for policy – i.e. identifying what works. In highly technical issues where epistemic communities dominate, in-house civil service analysts are not required to produce knowledge. Rather, their task is to work with epistemic communities to define the set of problems about which they want to learn something, and the set of solutions that are viable. The challenge is to translate this to highly-specialised experts. Experts can only facilitate policy if they understand the parameters of what is policy relevant. This is where decision-makers come in. If they want to receive knowledge which can contribute constructively to policy design, they must advise their experts on what policy-relevance actually means in the case at hand and update them when this changes (Lindblom and Cohen, 1979; for a recent empirical example see Dunlop, 2010 on the role of the Chief Scientific Adviser in UK departments).

Government is in a potentially vulnerable position in its relationships with epistemic advisers. While issue uncertainty means its grip on a policy is weaker than it would like, ultimately government still remains responsible for the production of policy-relevant knowledge. As scientific experts possess an informational advantage, procuring scientific knowledge in some respects creates even more uncertainty for decision-makers. In such circumstances, analytical capacity is a function of decision-makers' ability to determine rules to oversee their epistemic advisors. It is through these rules, that decision-makers keep knowledge production relevant. Drawing on principal-agent modelling, three particular challenges must be met (see Dunlop and James, 2007 for an empirical application of these).

First, decision-makers must recognise that, when they engage in epistemic learning they are involved in potentially non-hierarchical relationships. To maximise the chances of getting

policy relevant analysis, bureaucrats must set clear parameters for experts' work (Guston, 1996). Most obviously, this can be done by setting an exact mandate and research question to be addressed, and advising epistemic actors on their precise role in policy making – for example, are policy options to be analysed or suggested by these experts?

Second, decision-makers should select their advisers carefully. While we previously discussed the administrative matter of selecting scientists capable of conducting the research, the analytical challenge for bureaucrats is to ensure their experts' normative or policy views do not clash with those of government (Verdun, 1999). To procure analysis that is appropriate for policy bureaucrats must be aware of an epistemic community's normative beliefs and the institutional affiliations of its members before insinuating them into the policy process. This is a fine line to tread however. Where selection is adverse the risk is advisory knowledge which is not relevant to the policy goal, and where the experts normative views do not clash with decision-makers' preferences charges of bias. In both instances, the research process becomes politicised and ideas produced to facilitate policy action become the source of further policy instability.

The final challenge of analytical capacity is to develop management techniques that guard against unwanted behaviour by the epistemic community (Guston, 1996). Such 'moral hazards' are avoided through the use of monitoring and reporting agreements (other common management tools like incentives and penalties can have little role in knowledge procurement). Where monitoring is systematised, it is commonly handled by a dedicated (and ideally stable) secretariat that services the expert group; the art here is to keep track in a way that makes intervention from the policy side possible but allows experts to engage in technical discussions freely. Striking the right balance here is critical to maintaining the functional inter-personal relationships necessary for effective communication on policy relevance.

On reporting, government's need for control over the content of an expert group's findings is obvious. While decision-makers cannot write experts' reports for them, healthy analytical capacity requires that bureaucrats are able to question and comment on early drafts and contribute to the iterative development of conclusions. Such involvement in the evolution of an epistemic community's findings represents a critical learning mechanism – as bureaucrats are able to explore how the evidence and different policy options might fit together (Dunlop and James, 2007). Clarity on how the epistemic knowledge will play out in policy terms may

also require dialogue with the wider policy network and stakeholders – where early findings of an expert group are shared.

At its inception the ISG's policy literacy was strong. It was given autonomy to execute the RBCT, but the policy context in which it was conducted was made plain – any future policy could involve only 30% of badgers being killed and that must be done humanely. So, DEFRA set the key parameter for *how* they answered it – trial areas limited to 100km² and culling performed by trapping with closed seasons to ensure that no cubs could die underground.

The selection of experts also augured well. The ISG scientists were uncontroversial; these were academic scientists with no discernible conflicts of interest. But, experts and their views do not come from 'nowhere'. As Haas notes they have normative and policy ideas (1992). Beyond a normative commitment to positivism in knowledge creation, some members were willing to disclose their strong desire to, and assumption that they would, find a culling solution for the farming communities of which they were a part (interviews with three ISG members). And so, there was nothing out of tune between the scientists and the decision-makers' policy commitments and beliefs. The policy dimensions of the ISG's work were also clear. In addition to the political parameters on the scale of culling that would be acceptable, policymakers also requested that the ISG assess the cost effectiveness of the culling options, and explore the epidemiology of cattle-to-cattle transmission.

But, as the findings on the 'perturbation effect' began to accumulate from 2005, decision-makers' struggled to exercise control over the experiment's findings. Specifically, the absence of any well-developed 'plan B' (see 3.1) left the ISG without any guidance on the relevance of this unexpected evidence. Trust began to breakdown between the scientists and DEFRA (interviews with three ISG members and two Ministers). These strains were crystallised in the 2005 public consultation which presented localised culling options to the public despite the ISG's counsel that they would not work. The ISG's unequivocal conclusions of 2007 – that badger culling on the scale envisaged as politically acceptable could not 'meaningfully contribute towards future control of BTB' (ISG, 2007) – put DEFRA's preferred policy under threat.

Rather than accept the ISG's conclusions, a further group of scientists were commissioned to review the study. Led by Government Chief Scientist – Professor Sir David King – the King group argued that though the ISG's work was robust, in crucial respects it was irrelevant in policy terms; its small scale made its findings too niche. Citing the success of large-scale

badger culling in Ireland, King suggested that positive results would be achieved on trial sites of 300km² (King et al, 2007). While acknowledging that implementing badger culling areas of 300km² would mean culling around 70-80% of the badger population (King, in EFRAC 2008: Ev90), the group did not explore the practicalities of that – in either political or logistical terms (EFRAC, 2008: Ev 91-92). Rather, they emphasised that ‘these are issues that can be addressed by officials’ (King in EFRAC, 2008: Ev88). This sub-text – that the ISG and results had become politicised and left to determine what policy was relevant in this case – had been anticipated by Godfray back in 2004:

‘...the ISG have borne too heavy a responsibility for the running of these projects, and links between policy formulation by DEFRA and the scientific input from the ISG have not been as seamless as would be desirable. In designing future projects of this size we would recommend that the essential independent scientific group has a less direct management role’ (Godfray et al, 2004: 6).

While we could argue that the ISG’s research was policy-relevant in one respect – it demonstrated that small scale culling on DEFRA’s terms could be counter-productive – fundamentally it left decision-makers without a culling policy option backed by science. This is not only the failure to absorb the ISG’s evidence and create a plan B. It also suggests weakness of analytical capacity and purposeful politicisation. Though DEFRA was aware in 2005 of the mounting evidence against culling, it did not intervene in the research or discuss alternatives with the ISG (interviews with DEFRA officials and ISG scientists). Nor did decision-makers work with its key stakeholder – the NFU – to explore the implications of the findings in advance of their publication. Indeed, such was the NFU’s surprise at the ISG’s conclusions that it suggested that its final report had ‘... been slanted *at the last moment* to ... give a definite steer against culling’ (NFU Policy Director, Martin Haworth, in EFRAC, 2008: Ev29-30, 33, emphasis added). This led the NFU to threaten to withdraw cooperation on a range of other agricultural issues until culling was put back on the policy agenda. The result was the creation of a counter-epistemic community that re-imagined the policy parameters and rendered the ISG’s conclusions irrelevant. Indeed, this re-imagining drives the current localised culling policy.

Failure to redefine policy relevance in the face of unanticipated scientific findings is not a new phenomenon (see Dunlop, 2010 on biofuels, for example). The consequences of not developing and communicating a ‘plan B’ to the scientists was politicisation of the advisory process. The ISG appeared out of touch; a group producing epistemic lessons without any

real world application (something anticipated by Godfray in 2004). The gap between policy (expectations) and the evolving evidence was filled by additional scientists and stakeholders; i.e. moving away from epistemic learning. We cannot prove our counterfactual of course, but much of the testimony of civil servants, scientists and interest groups at the BTB inquiry (EFRAC, 2008) suggests that reconfiguring the policy options in light of the epistemic lessons on perturbation in 2004-05 would have boosted the chances that the gold standard science was also useable, and narrowed the space that was filled by contestation.

3.4 *Communicative capacity* concerns the capacity to develop and maintain a policy paradigm that commands approval and legitimacy in wider society (for comprehensive review see Bartels, 2015). This goes beyond the key policy stakeholders to relations at the macro-level. Communicative capacity in epistemic learning involves developing a social consensus around what an evidence-based approach in a given sector entails; in short agreeing what evidence is legitimate. What citizens define as evidence, and the extent to which that evidence should determine policy, is often contested. Where such a paradigm cannot be constructed and communicative capacity is weak, epistemic learning will also be weak and policy decisions based on evidence liable to instability. Thus, the stakes are high, and government highly motivated to achieve broad agreement. The default technology used to boost communicative capacity and involve citizens in the advisory process is the consultation (LSE GV314 Group, 2012). Yet, these exercises are often criticised as being insensitive to local differences – where particular populations’ voices are over- or under-represented. Moreover, consultations present citizens with pre-selected policy options. For some, more capacity is generated when engagement is developed ‘upstream’ in the policy process where citizens, scientists and policymakers come together to discuss the policy problem before any solutions have been formulated (Willis and Wilsdon, 2004).

BTB was not marked by any radical ‘upstream’ policy-making involving citizens. Rather, the ISG and its work became important symbols of the rational evidence-based policymaking (EBPM) paradigm which came to prominence in the late 1990s. While a scientific approach was not new in BTB policymaking, the nature of the ISG and its research did mark a shift. Though it was contentious among stakeholders from different sides for different reasons, the creation of the ISG embodied the first New Labour administration’s aspirations for the modernisation of policymaking in the UK (Sanderson, 2006). Specifically, the decision to

make the group independent of DEFRA, and the choice of an RCT, were emblematic that the best of best practice would be used to find the ‘definitive answer’ (Krebs et al, 1997) to contentious policy problems like BTB.

The commitment to a high scientific approach to BTB was sincere, and citizens’ approval assumed. When the experiment was commissioned, policymakers in DEFRA and their Ministers believed this would yield the silver bullet that had eluded their predecessors for nearly two decades (interview with two Ministers and one NFU official). Commissioning such a large-scale RCT was seen by some in the policy community in the European Commission and Ireland as an over-rationalisation of the problem (interview with DG Agriculture and DAFM officials). But, throughout the RBCT, policymakers defended the research. Notably, they were willing to highlight the difference between its evidence-based approach with the ‘farmer-driven approach’ of the Republic of Ireland (interview with RoI scientist and policymaker).

Given the unexpected length of the study, the Minister was keen to explore whether the social parameters on badger culling, which had been based on various public opinion surveys and presented in 1997 as a ‘red line’ that could not be crossed, were still as restrictive. The public consultation in 2005 yielded over 35,000 submissions and, unsurprisingly, no consensus. Despite the ISG being clear that reactive and proactive culling would be unworkable, the different culling options were presented to the public. The ensuing public row between DEFRA and the ISG laid bare the inherent nebulosity of EBPM (Sanderson, 2006); what counts of evidence is politically and socially contested.

Any hope that EBPM could represent a stable paradigm for policymaking in controversial issues like BTB is undermined by DEFRA’s response to the ISG’s final report. By mobilising a counter-epistemic community – the King group – the government undermined the idea that a consensus could be reached on what knowledge matters for BTB. The debate and policy action since 2007 reflect this instability with the current Conservative-led coalition defending localised badger culls as evidence-based against scientists and animal welfare lobbyists that cite the work of the ISG.

While this is presented as a degeneration of epistemic learning, it is pertinent to ask whether EBPM is a paradigm that can actually be debased? It appears to be a ‘vehicular’ idea that is broad enough to have elements of legitimacy and illegitimacy for everyone. Such nebulosity placates wider society and closes off debate (McLennan, 2004) – as society engages in a

dialogue of the deaf – but it does not yield stable policy paradigms. Given this, perhaps no government could muster the communicative capacity strong enough to weaken its elasticity.

Conclusions

How does the policy learning perspective perform against the approaches that dominate policy failure studies? Thinking about the stages-based approaches, learning analysis is not confined to a single moment in policy-making (e.g. decision-making or implementation). Rather, it treats all forms of policy failure – processual, programmatic or political – in their entirety. As well as avoiding the artificiality of stagist analyses, the learning framework helps us escape the atheoretical determinism of accounts that treat failure as a function of institutional characteristics or individual characters. By focussing on learning, we have a causal mechanism that trains attention on how decision-makers' beliefs are updated (or not). Finally, the learning account helps systematise governance capacity accounts of policy failure. While tool-based explanations identify causal mechanisms, the accounts remain stand alone. By linking a recent policy learning framework to the capacity literature, we have a single model for the analysis of a variety of policy-making settings.

Of course, there are trade-offs with this kind of approach. First, we may simply not 'buy' policy-making as the realm of learning. There are certainly plenty of recurring policy failures that appear to give substance to that argument. Adopting a learning approach requires that we move beyond treating policy learning as something which is either present or absent, to accepting that learning is omnipresent – although it is sometimes dysfunctional. Second, conceptual lenses famously obscure as much as they illuminate. If we are looking for learning are we missing power? We would answer 'no'. Policy learning may be about the science of BTB and capacity building around the management of science. But, as our case demonstrates, it may also be a way to define and re-define power relations – pausing epistemic learning and opening up the issue to additional stakeholders, for example.

What have we learned about the policy failure in the epistemic mode? Two key contributions can be highlighted. First, exploring policy failure using theories of policy learning and organisational capacity illuminates both the multi-faceted nature of learning and its complex relationship with policy performance and governance (Borrás, 2011; Dunlop, 2015; Zito and Schout, 2009). While the capacity to learn from experts may be strong in one respect,

weaknesses in other areas may be enough to frustrate policy action based on the advice being given. In the BTB case, despite strong administrative capacity, weaknesses in certain aspects of absorptive, analytical and communicative capacity interacted to create the conditions for failure. Specifically, the inability to absorb the epistemic community's message deeply enough to create a policy 'plan B' left decision-makers' isolated from reality. The lack of control over how the findings were linked to policy resulted in the politicisation of the research process; and the absence of social consensus around the research and method left evidenced-based policy-making on BTB debased and ineffective.

Second, conceptualising policy failure as the degeneration of learning about organisational capacity underlines the fundamentally dynamic character of policy failure. In particular, this case demonstrates the temporal and political dimensions of failure (Howlett et al, 2015b McConnell, 2010). Taking time first, decision-makers did not alter or strength their absorptive and analytical capacities as the experiment results began to come in. This case demonstrates that such blocks to capacity building can be highly political – from 2004 decision-makers struggled to create a non-culling policy alternative in the face of pressure from the NFU for example. Then after the ISG's report was released in 2007 learning degeneration that had been unintended then became orchestrated; with a counter-epistemic community (King group) created to open-up the science and issue.

Finally, this leads us to prescriptive implications, and specifically how capacity can be re-built or re-designed. Identification of the two central dimensions of learning, reveals what is needed for functional policy learning (Dunlop and Radaelli, 2016). When learning is incomplete or becoming dysfunctional, the framework can be used to generate alternative learning strategies.

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² These semi-structured interviews were conducted between December 2009 and April 2010. Respondents were elites central to the advisory governance of BTB and were identified through reports (official, NGO and scientific) and established professional contacts. Interviews were conducted under 'Chatham House Rules' and lasted between 45 minutes to 6 hours!). They were digitally recorded, transcribed by the author and manually coded to elicit findings.