

**Reading Complexity in Social Policy Contexts:
The Value of Q Methodology**

By

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Abstract

Many social policy problems are recognised as complex and intractable, and hence necessitate analysts' having the capability to address them. Epistemological influences embedded in approaches to policy can impose constraints on the natural capacity and capability that people have to make sense out of particular experiences of complexity in the course of policy analysis work. Within the dominant policy approach adopted by policy analysts under the rubric of evidence-based policy, such complexity capability eschews any explicit role for opinion. However, the application of Q methodology by Michel van Eeten among others in a specific case of policy deliberation in the Netherlands, which had proven resistant to the standard, evidence-based policy analysis, shows that there could be a role for what is otherwise overlooked. Accordingly, this thesis examines the proposition that opinion indeed may play an important role in policymaking in complex and intractable situations. Q methodology is an established research methodology for acquiring and developing knowledge from a subjective standpoint. It has a growing record of successful application to public policy controversies, where solutions were made possible because opinion - and its everyday experiential rationality - were made available. Q methodology is also seen, however, as a marginal methodology. There has been insufficient explanation of why the application of Q methodology could make a positive difference to policy problems of a complex and intractable kind.

The two research questions focus on the efficacy of Q methodology. Q methodology could make a difference in an adjunctive sense. It meets a policy need, namely to make opinion available as a complement to other evidence knowledge and thus adds to understanding of problems and solutions while remaining firmly within the prevailing evidence-based policy epistemology. Alternatively, Q methodology could make a difference of a transformative kind. It opens up a new epistemological space for doing policy analysis work with the power to create substantial policy-analytic change.

To address these questions, the thesis develops an argument that establishes the linkages between pragmatism, complexity thinking and Q methodology and, in so doing, provides a path for understanding the role and place of opinion in

policy making contexts. It proceeds through several stages which together make an epistemological argument for the efficacy of Q methodology. First, the nature of the policy problem is explicated as one of the separation of opinion from knowledge. Secondly, the thesis turns to a counter argument drawing on Peirce's pragmatism and his attention to abduction. In the next stage, dominant practice ideas about the capability needed to address complexity are critically examined, which shows that opinion is not valued in that practice. The success of van Eeten's work leads to a detailed examination of complexity in the policy context, and the claim that opinion is less problematical than are the overall epistemological choices made in policy analysis.

Focusing on those epistemological choices, the argument draws together, in a fresh look, the thinking entailed in Q methodology in respect of its abductive logic and its theory of knowledge. Q methodology is shown to be a kind of science that allows objective fact to be approached from a subjective standpoint under experimental conditions. Finally, therefore, Q methodology is shown to open up an epistemological space quite unlike others. This makes the practice described as "reading complexity" in a real-world policy application possible.

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Chapter 1: The research project

Introduction

Citizens working at the interface of policy analysis and scholarship in New Zealand cannot but be aware of the emphasis on evidenced-based policy. The need to understand better the complex problems that require a policy response provides the impetus for evidence-based approaches to policy analysis and policy advice. New Zealand, like many states around the world, has an acknowledged history of intractable policy issues and repetitive analyses of these problems (English, 2009). The normal experience is that attempts to tackle difficult policy issues in areas such as the environment, health, justice, welfare and social security have often resulted in controversy, policy failure, or unintended outcomes. Rivers are still polluted, demand for healthcare and the costs of meeting that demand continue to grow, welfare reform is a hotly debated topic and jobs stay out of reach for those who want and need work. Every substantive intractable issue tests policy analysts' ways of thinking and understanding of the problem situations they are confronting. If we could better understand what contributes to the complex problem and knew various potential solutions would act on the problem, then we could better select among those solutions.

This research makes a broad claim that prevailing epistemological influences embedded in evidence-based approaches to policy analysis impose constraints on a common human capability to reckon with complex realities, uncertainty, and things in flux. Further, that what is defined as "opinion", 'the untested views of individuals or groups' (Davies, 2004:3) and ruled out in evidence based policy may play a more important part in policy analysis than has been acknowledged by advocates of the use of science-based evidence as a major policy analysis strategy.

In late 1999 in the United Kingdom, the Blair Labour Government reopened a debate about how to improve approaches to the analysis of policy and the quality of policy advice in a policy context of complexity and change. In the ensuing decade growing numbers of states (for example, Australia, United States, Canada, and the European

Union) have picked up on the ideas and principles of evidence-based policy popularized by the United Kingdom (Donaldson, Christie & Mark, 2009; Head, 2010). Evidence-based policy analysis rests on a conception of rigorous and reliable knowledge and a rejection of opinion along with common sense-making modes of thinking and knowing. However, this is not to suggest that opinion is absent from policy decisions or that decisions are made largely on evidence.

Of concern in this thesis are the practices normally considered the purview of the analysts and not the political decision maker. It is important to point out that there is a difference between a “successful policy” and “successful policy analysis”. Research processes and methods of analysis can help policy analysts provide more useful information to policy decision makers in the policy process, but this information may not have a direct impact on policy as studies into the extent knowledge is utilised in the policy process have found (Caplan, 1979; Knorr, 1977; Neilson, 2001; Weiss, 1977). Policy analysis is only one influence on policymakers, who also have their own experience, views, and interests influencing them, which the evidence-based policy analysis literature recognises (Davies, 2004; Head & Alford, 2008; Nutley, Davies & Walter, 2003). One of the aims of evidence-based policy is to integrate the experience, expertise and judgment of decision-makers with the best available evidence from social science research (Davies, 2004).

In rejecting opinion, the evidence-based approach puts forward a way of addressing complexity that makes opinion marginal and distrusted. Opinion is conflated with ‘ideological standpoints, prejudice, and speculative conjecture’ (Davies, 2004:3). The account of evidence-based policy in material disseminated by the United Kingdom Labour Government and summarized by advocates and critics alike equates reliable evidential knowledge with rigorous systematic research and scientific objective knowledge, to the neglect of peoples’ common capability to make sense of complex situations in order to act (Marston & Watts, 2003; Mulgan, 2003b; Parsons, 2002; Pawson, 2002; UK Cabinet Office, 1999b).

Conception of opinion

A standard dictionary definition of opinion is a ‘judgement or belief not founded on certainty or proof’ (Collins Dictionary of the English Language, 1982:1031). The

origins of a conception of knowledge that excludes opinion can be traced back to the ancient Greeks. Plato identified an epistemology consisting of the “realm” of knowledge, and a second “realm” of opinion where humankind is without knowledge (Oldroyd, 1986:10-11). The distinction between these two realms described by ancient Greeks was further developed by the early empiricists. Rene Descartes (1596-1650) who laid the foundation for the concepts of objectivity and subjectivity, described the role of ‘rational and objective method’ (Hollinger, 1994:23) in creating knowledge. According to Descartes, ‘value claims cannot be proven’ using such methods, ‘therefore, value judgements do not constitute knowledge’ (Hollinger, 1994:23) or have a role in science.

Writers on philosophical concepts such as Julian Baggini and Peter Fosl (2003) point out that the objective/subjective distinction applies to the use of concepts like opinion and knowledge. They further point out that though philosophers have moved beyond seeing “what is objective” and “what is subjective” as a simplistic divide, the ‘basic terms of reference are still the same’ (Baggini & Fosl, 2003:163). They give a concise statement of the objective/subjective distinction: ‘The subjective is ... what pertains to the (individual) subject, consciousness or mind, while the objective is what stands outside or independently of the (individual) subject’ (Baggini & Fosl, 2003:161). They explain what this distinction means applied to opinion:

When a judgement or point of view is rooted entirely in one individual’s particular perspective on the world, we often call that opinion “subjective”. In doing so we signal that we suspect that the judgement is partial, probably doesn’t take account of all the facts, or fails to rise above the personal viewpoint. When, however, a judgement takes into account all the relevant data, disregards personal prejudice and finds agreement with other competent and informed people, we say a judgement is objective. By this we mean that the judgement is impartial, well grounded in facts, and rises above the personal (Baggini & Fosl, 2003:161).

Applied to knowledge, the distinction means that objective knowledge is ‘freed from all taint of particular perspective’ (Baggini & Fosl, 2003:162) and based on a view from the “outside”. Carla Willig (2001:3), a writer on qualitative research methods in psychology, points out that in contemporary epistemological debates ‘what people disagree about is the extent to which our understanding of the world can *approach* objective knowledge’ (see Nagel, 1986). Different responses to this question manifest

in different intellectual currents and epistemological positions that range from positivism to postmodernism, with pragmatism being one stance among the positions.

In this thesis, opinion is defined in Q methodological terms. Opinions are ‘self-referent statements held, as the dictionary says, on grounds short of proof’ (Stephenson, 1965:284). As such, opinions are viewed as ‘modes of behaviour largely involving the self’ (Stephenson, 1965:286) and are a basic way ‘individuals have of thinking about themselves and society’ (Stephenson, 1965:286). This Q methodological definition of opinion is viewed as a concept that meshes with classical pragmatist critique of science grounded in ‘the philosophies of flux’ (Dewey, 1958:50) and the belief that we live in ‘a universe which is not all closed and settled, which is still in some respects indeterminate and in the making’ (Dewey, 1950:52). In this pragmatist view, an individual’s own opinion relative to some topic or situation, which may not be agreed to by all, arises from some complex of a self, interaction, communication, and common sense-making. Opinions can be emergent in experience, in which thought is sensitive to ‘uncertainty, choice, hypotheses, novelties and possibilities’ (Dewey, 1950:52).

Debates that relate to the separation of opinion from knowledge will be further discussed in Chapter 2, with a focus on how knowledge is considered to be produced and justified in the world of science, and in Chapter 3, with a focus on how opinion is assessed in evidence-based policy.

Aim of this research and research questions

In this thesis my claim that opinion is undervalued in evidence-based policy analysis is explored through an analysis of Q methodology. The primary aim of this research is to provide an epistemological explanation of the efficacy of Q methodology in policy situations of complexity. As such, the aim of the research resolves into a research question of two parts:

Does Q methodology have potential because it meets a policy need, namely to make opinion available as a complement to other evidence knowledge and thus adds to understanding of problems and solutions while remaining firmly within the prevailing evidence-based epistemology?

In other words, does Q methodology have an adjunctive power and simply adds to what can be determined through existing practices embedded in policy analysis in which case, recourse to opinion is simply a mechanism for breaking deadlocks.

OR

Does Q methodology have potential because it opens up a new epistemological space for doing policy analysis work?

In which case, could it be claimed that Q methodology has transformative power to create a more sustained, substantial policy-analytic change that may enable an analyst to see a given issue in a new analytical perspective.

This study is a theoretical piece of work and interdisciplinary in its scope. Rather than an empirical study grounded in the collection and analysis of data, this study draws on secondary sources and the diverse literatures on conventional policy analysis, complexity thinking, pragmatism, and Q methodology. Given that this study seeks to provide an epistemological explanation of the efficacy of Q methodology in policy situations of complexity, a detailed discussion of the broader contextual literature relating to, for example, other framings and approaches to social complexity (e.g. Ackoff, 1974; Schön, 1995; Snowden 2005; Ulrich, 1994) is excluded primarily on the basis of a need to be selective and set limits on how much to cover, and in what level of detail.

The literature that relates to the postmodern critique of modernism, rationality, positivism, and domination (e.g., Foucault 1980, Derrida, 1976; Lyotard, 1984) is pertinent in many ways to questions about the policy analysis of difficult issues. This extensive literature, which questions the philosophical foundations of the social sciences and the possibility of ‘sound communication, objective reporting, valid generalisations, and theoretical knowledge’ (Shalin, 1993:303) takes seriously the primacy of power relations and politics in the formation of knowledge.

The argument of this thesis develops not by referring to an entire range of other approaches to subjectivity but by referring to what is likely the most prominent among them in the context of policy studies, *viz.*, varieties of discourse analysis (Glynos, Howarth, Norval & Speed, 2009). The postmodern analysis of “epistemes”,

“regimes of truth” “forms of discourse” is inquiry that ventures into the ‘link between scientific discourse of truth and the political discourse of power’ (Shalin, 1993:310-312) and its political consequences. In this thesis, it is recognised that areas of this literature resonate with an interest in subjectivity as defined in Q methodological terms, for example, as shown in the work of John Dryzek (1988, 1990) on political discourse analysis and his critical scrutiny of public opinion surveys.

The rest of this introductory chapter sets out the background and context of the inquiry. It discusses what motivates this inquiry and outlines the structure of my argument. The chapter finishes with an outline of the contents of the thesis.

Background and context

Epistemology of policy analysis practices

This thesis offers the view that the dominant epistemological distinction made between knowledge and opinion that delineates evidence-based policy analysis in discourse and practice, by accepting knowledge and rejecting opinion, effectively precludes the possibility of coming to grips with complexity in experience, without which there is a reduced likelihood of the development of a good policy response under conditions of change and uncertainty (Hajer, 2003). To the extent that scientific rigorous knowledge is desirable and opinion eschewed, evidence-based policy raises an issue of epistemology in policy analysis practice.

In academic terms, epistemology concerns theories of knowledge. It is the branch of philosophy that inquires into the possibilities of knowing about reality, complex or otherwise. It deals with the scope and limits of knowledge, validity and reliability of claims to knowledge, modes of reasoning, and how knowledge is perceived. It investigates, for example, ideas of perception, fact, evidence, proof, belief and certainty (Mautner, 2000). Discussions of epistemology are ubiquitous in research methodology texts and research training. In contrast, the related activities of policy analysis practice are often not commented on explicitly or discussed in terms of epistemology. Yet, epistemological assumptions used to inform the act of researching can and do embed themselves in the policy development process and influence policy outcomes. Evidence-based policy is a case in point. The inclusion of some knowledge

practices and capacities and rejecting others in evidence-based policy analysis is thus a case of epistemological interest.

In practice, when the policy analyst offers advice to the policy decision maker, the analyst is operating within a prevailing epistemological influence that imposes constraints on what counts as knowledge (as do all epistemologies). In particular, the knowledge people have through common sense-making, which is a term used here in a non-pejorative sense, will not easily be accommodated.

Epistemological influences percolating through the policy process affect not only possibilities for the gain of knowledge but also the lack of knowledge; of overlooking or missing elements of social reality (Brunner, 1991). In evidence-based policy analysis, opinion compared with knowledge is rendered second-rate and supposedly should be eschewed when it comes to policy analysis practice (Davies, 2004, Salmond, 2003). This eschewal of opinion, on the basis of low epistemological status as knowledge, is indicative of a specific attitude of scientific inquiry with emphasis on rationality, objectivity, the scientific method, and quantitative methodology as a preferred basis of understanding intractable and uncertain policy situations (Hajer, 2003).

Specifically, the eschewal of opinion reflects a positivist epistemology. The foundations of positivist research that came to dominate standards of analytical rigour and criteria for the appraisal of scientific knowledge remain prominent today (Schön, 1983). It is not surprising, given the dominant intellectual traditions of science-based rationalism and the sustained emphasis on analysis of fact, hypothetico-deductive logic, and principles of Newtonian science such as objectivity, reductionism, determinism, and predictability that the best evidence should be understood to be that which is derived from analytic approaches role in policy analysis ‘relying on economic and social statistics’ (Head, 2010:17).

Evidence-based policy analysis is not ill-suited in many cases, but in this thesis interest centres on complex, uncertain, and intractable situations. Many policy problems are recognized as complex, and so policy analysts have developed ideas about complexity capability. By “complexity capability” I mean policy analysts’ ability to conceptualise complexity and use those conceptualizations as a basis to

understanding how it may be possible to act and appreciating the implications for action in the context in which policymakers are acting. However, it appears there is a sort of dualism in the current policy thinking about constitutes complexity capability in evidence-based policy. In one aspect, the thinking seems scientistic giving attention to more and better use of science in policy making (Lynn, 1999). In another aspect, the thinking fits post positivist thought that focuses on participatory, discursive, and collaborative ways of working whereby problems and their solutions are socially, not scientifically defined (deLeon, 1997; Dryzek, 2000; Fischer, 1990; Innes & Brooker, 1999; Wagenaar & Cook, 2003).

Despite interest in incorporating the experience of participants the primary focus is the science. It appears that far from implying the importance of participatory processes in the development of policy, the practice idea of complexity capability rather implies that how citizens think about policy questions can be rejected as either spurious or simply not a source of credible knowledge (United Nations Educational, Science and Cultural Organization, 2006). This assessment of opinion in the literature on evidence-based policy appears to involve the assumption that common sense-making is implicated in the reason why policies fail or lead to unintended consequences (Davies, 2006; Banks, 2009).

Questions about analysts' abilities to comprehend complexity and a felt necessity to circumvent the putatively limited capability and capacity of human beings to work coherently with complexity and avoid dubious decisions are at issue. There is a lack of confidence in the common ability people have to make sense of complex situations and arrive at sound decisions about what to do in the circumstances in which they are acting. The dominant practice ideas about the needed capability to address complexity surrounding policy questions under the rubric of evidence-based policy are critiqued in Chapter 3. Discussion touches on epistemological choice as a factor in either limiting or extending complexity capability in policy analysis.

Epistemology: the complexity aspect

Complexity theorists are entertaining the notion that scientific modes of inquiry lack something in the face of complexity which may be found in a combination of favoured and eschewed abilities deployed in relatively novel and imaginative ways

(Dennard, Richardson & Morçöl, 2008). Thus, while efforts are underway in policy circles to harmonise policy-relevant research with the central tenets of evidence-based policy, having taken cognizance of complexity, the scientific community has engaged with a rethink of hard science and the criteria of analytic rigour (Emmeche, 2004; Heylighen, Cilliers & Gershenson, 2007; Stengers, 2004).

For instance, Edgar Morin (2005) argues the value of research strategies predicated on the autonomy of the inquirer, that is, their subjectivity and independent acts of thinking. Since most professions require explicit, rational, objective practice and most professionals are used to working this way a subjective approach amounts to a profound change of methodology even though it may be realized that subjective aspects are always implicit in the practice of the profession. To the extent that scientific behaviour is determined by standards of objectivity and not subjectivity, any form of break from the tradition of objectivity in policy analysis practice can be considered a radical shift.

In their respective responses to a shared view of a rapidly changing and unpredictable world, complexity science and evidence-based policy show signs of divergence. For policy, an implication of this parting of ways is that it has veered, possibly, away from the actual frontier of innovative practice and potential for developing complexity capability through other ways of knowing. As things stand, even if greater analytic rigour is realized in policy analysis through evidence-based policy, methodological problems involved in understanding complexity are preserved.

The meaning of the word “complexity” comes from the Latin *complexus*. In non-scientific discourse the designation of something as “complex” can involve three basic meanings, which are: opposed to simple; made up of various interconnected or interwoven parts, patterns or elements; or hard to understand or analyse. Since the 1980s, complexity has emerged as a fledgling scientific paradigm. Complexity research has evolved from those disciplines (for example, physics, chemistry, biology, mathematics) that are archetypical of science and gained their footing in the classical or Newtonian/Cartesian scientific paradigm (the paradigm of mechanical explanations).

As given in Nigel Thrift (1999:33), instead of a single coherent body of theory - an integrated science - the sciences of complexity organise 'an accretion of ideas' and the many analytical techniques brought to bear on complex problems. The new sciences of complexity such as chaos and non-linear dynamics (for example Lorenz, 1993), the life sciences (for example Capra, 2002), complex adaptive systems (for example Holland, 1995), dissipative systems (for example Nicolis & Prigogine, 1989), network theory (for example Barabasi, 2005), self-organisation and notions of criticality (for example Kauffman, 1996; Bak, 1996) and schools of systems thinking - "soft", "hard", and "critical" (for example Checkland, 1981; Churchman, 1971; Jackson, 2001) - offer a variety of specific concepts, methods, and relevant technical language for explanations of complexity understood in different ways.

The thinking that binds together all complexity research is "new" thinking that challenges the "old" thinking of classical Newtonian science (Toffler, 1984: xi-xxvi). In the context of complexity research, the natural sciences have become immersed in a current of change; a post-modern turn (Cilliers, 1998) or new dialogue with nature (Prigogine & Stengers, 1984). Natural science, in all aspects of thinking, skills, practices and knowledge, confronts an impulse of fundamental reconceptualisation and reconstruction. Latterly, as noted in Sandro Schindwein and Ray Ison (2004), because the new thinking amounts to a displacement of the view of classical science and because there are different understandings and explanations of complexity in the science discourse attention has begun to focus on questions of epistemology.

In the context of complexity research, the activity of knowing has become associated with more integrative methods of thinking (Morin, 2005). The idea of new thinking or complexity thinking means not only a new theoretical model or conceptual framework, that is, of thinking in terms of complexity ideas (for example self-organisation, adaptive systems, non-linear dynamics, emergent behaviours), but a way of thinking that necessitates drawing upon the ways in which we can think; scientific and non-scientific. In Fritjof Capra's (1997) description, a complementarity is at the core of the new thinking. This duality comprises two opposite patterns or tendencies. On the one side is the 'rational, analysis, reductionist, linear' (Capra, 1997:9) tendency. On the other side is the 'intuitive, synthesis, holistic, non-linear' (Capra, 1997:9) tendency. What is to be avoided is a method of thinking that over emphasises

one tendency and neglects the other. Currently, it is unclear whether complexity is itself a school of thought that differs from positivist, interpretative, or critical approaches, or is a field of inquiry open to 'epistemological choices' (Schlindwein & Ison, 2004:27).

Morin (2005:1) argues that the notion of complexity, 'rejected by classical science', did not figure in the epistemic debates of the 20th century led by such scholars of epistemology as Karl Popper, Thomas Kuhn, Imre Lakatos, Paul Feyerabend (see also Schlindwein & Ison, 2004). As a result, thinking about complexity was left marginalised. For Morin (2005:24), acceptance of the idea of complexity - for example, "we live in a complex world" - necessitates an 'epistemological rethinking', rethinking which needs to bear not only on the organisation of knowledge into disciplines, paradigms, schools of thought but also on the researcher's 'mental functioning'.

In Chapter 4, I pick up on the epistemological significance of the notion of a new paradigm of complexity provoking interest in new ways of thinking in order to better understand what complexity capability might mean in policy settings.

Motivation for the inquiry

This inquiry takes as starting point statements about complexity in policy. In the literature appear references to the complexity of policy problems, the policy environment, and the limits of conventional methods of policy analysis and policy development when it comes to tackling complex problems. For example: social problems have been described as inherently complex and some have been termed "wicked" due to their resistance to analysis and agreed solutions (Rittel & Webber, 1973); policy analysts work in an environment 'full of complexities, usually involving a diverse range of players, coming from different perspectives and spawning a host of unexpected events' (Edwards, 2004:7); yet, it is said that 'policy analysts have great difficulty handling uncertain, complex, and polarized issues with conventional methods' (van Eeten, 2001:392).

In this context, a particular intractable problem caught my attention. It was the specific case of the planning for a fifth runway for Amsterdam Schiphol Airport, which is a policy story about the deepening of public controversy over a thirty year

period, after planning for a fifth runway had started in the early 1970s through to 2003 when the fifth runway was finally opened. Demonstrably intractable, the expansion issue proved to be “wicked” (no clear and agreed solutions). Multiple stakeholders who came from different levels and sectors of government, airport authorities, airline corporations, national environmental organizations, local citizens’ and environmental groups, and commercial interest groups were involved. Unexpected events occurred such as planning failures, unanticipated noise regulations, unanticipated rapid growth in aviation demand, and a sustained low level of public acceptance (Kwakkel, Walker, & Marchau, 2008; van Eeten, 2001). The Schiphol Airport case study will be discussed further in Chapter 3.

Having completed a Master of Public Policy, and worked in a range of public-sector contexts, I had begun to develop some scepticism about certain aspects of what was presented as standard policy analysis practice in complex problem areas. I read the Schiphol case, and initially, what caught my attention in particular was that it incorporated two clearly differentiated events of policy analysis. The first event was marked by conventional methods of policy analysis and the use of systems thinking approaches to conceptualise the policy situation and ways to respond to the uncertainty in analysis (Walker, 2000). The form of policy analysis was entirely consistent with how to practice policy analysis is taught. Basically, employ social science theory and empirical methods to predict consequences of alternative policies. In this sense, the first event is illustrative of methodological rigour in policy analysis, yet, ultimately, it led to decision-making reaching an impasse, underscored by controversy that continued to build.

The second analytical event concerns the use of Q methodology in helping to resolve the “wicked” problem of airport expansion. The use of Q methodology was predicated on turning to stakeholders’ points of views to improve policy analysts’ understanding of the issues requiring a response and finding leads on how to proceed with the policy deliberation process (van Eeten, 2001). One of the things that struck me in the account given of the second event of policy analysis in the Schiphol case was that Q methodology was used, in effect, to conceptualise the complexity of the policy environment in a way that allowed open exploration of the question “what does the situation of a fifth runway for Schiphol Airport mean?” Not quite “seeing what others

see” or “standing in others’ shoes”, but more along the lines of seeing how other understandings would conduce effective policy analysis. From this grasp of how others see the situation it appeared possible for the analysts to assess how explanations in use might be furnishing irrelevant policy responses, that is, responses likely to be bedside the point in terms of the basic complex of issues of human concern arising in peoples’ experience.

My sense was that Q methodology enabled understanding how to act that was opinion-based, with implications for the standard methodology of policy analysis practice. By “standard” is meant approaches to policy analysis with the presupposition that the world is objective and external to the individual and can be understood by a neutral observer (Anderson, 2006). This introduction to Q methodology, through the literature, led me to learn more about Q methodology, and to contribute to a small Q methodological study in New Zealand, the experience of which piqued my curiosity about Q methodology further, and I began what turned into a long and surprising intellectual journey.

Q methodology and its record

Q methodology is an established research methodology for acquiring and developing scientific and common knowledge from a subjective standpoint - an individual’s personal point of view on any matter of personal or social importance (Brown, 1980; McKeown & Thomas, 1988; Stephenson, 1953). The methodology depends on the communicability of individual points of view and on the premise that the points of view are advanced from a position of self-reference.

Contemporary commentaries have addressed Q methodology as attuned to a variety of approaches, including, for example, hermeneutics (McKeown, 1998), feminism (Kitzinger, 1986), critical theory (Stainton Rogers, 1997/1998), political discourse analysis (Dryzek & Berejikian, 1993), and participatory approaches (Durning, 1999). In the field of policy related studies, the use of Q methodology features most prominently as an approach to discourse analysis (Dryzek & Berejikian, 1993; Addams & Proops, 2000; Glynos, Howarth, Norval & Speed, 2009). Q methodology, as described in this thesis, derives from original work by William Stephenson (1953), who laid the foundation of this subjective science, which is fundamentally different

epistemologically from the more standard research methods that are used in policy (Brown, Durning, & Selden, 1999). This claim of epistemological difference, however, does not go unchallenged. Paul Robbins and Rob Krueger (2000:642), for example, suggest that ‘any special epistemological position for Q method’ is ‘impossible to defend’.

The fact that Q methodology is an abductive and not a deductive or inductive methodology is vital for the argument I raise in this thesis. Abduction is the logic of Charles Sanders Peirce’s method of pragmatic inquiry. The role of Peircean pragmatism and its logic is considered in more detail in Chapter 2. Stephenson incorporated abduction in Q methodology and explicitly linked the logic of Q methodology to Peirce (Stephenson, 1961b). In so doing, Stephenson rendered Q methodology a rare exemplar of Peirce’s pragmatic scientific method. The logic of abduction has also been identified as the logic of grounded theory in its later form. According to Jo Reichertz (2007:215), Anslem Strauss (1984) and then later, Anslem Strauss and Juliet Corbin (1990), failed to systematise abduction. Nor did they link it to the considerations of Peirce. This claim by Reichertz carries the implication that researchers using grounded theory could be left unaware of abduction in mixed methods and the controversial nature of their mode of reasoning.

Stephenson’s (1961a) account of abduction proved useful not only for my understanding of Peirce’s pragmatism, with its focus on a method of thinking in inquiry in contrast to the pragmatism of “what works”, but also, for shedding further light on the nature of the debates that underpin the use of abductive strategies in the world of research. The fact that abduction is the logic of Q methodology means that through the use of Q methodology complex problem areas can be examined independently of pre-existing theoretical perspectives, conceptual frameworks, and understandings (Brown, 1989:95).

Q methodology has a growing record of successful application in the area of policy, particularly to cases of public controversy where evidence-based analysis practices have failed to provide policy success (Durning, 1999; Focht & Lawler, 2000; Steelman & Maguire, 1999; van Eeten, 2001). Yet, while applications have increased significantly in recent years, Q methodology is also seen as a marginal methodology in policy. This is likely to be because Q methodology differs in fundamental aspects

from the types of methodologies that are put forward as exemplars of methodological rigour within the evidence-based frame. There has been insufficient explanation of why the application of Q methodology could make a positive difference in policy areas of a complex and intractable kind. Discussion in Chapter 5 concentrates on the thinking that underscores the efficacy of Q methodology and its potential to inform a viable complexity and opinion-based policy analysis practice.

Policy analysis in New Zealand: the epistemology

In New Zealand, evidence-based policy is in prominent use. In 1999, and in a similar vein to the Blair Labour Government, the New Zealand State Services Commission opened debate on the quality of inputs to the policy advice process with a focus on the use of information, research, evaluation, and consultation (New Zealand State Services Commission, 1999). Government had expressed concern about why ‘a large and costly advice system’ (New Zealand State Services Commission, 1999:5) apparently did not provide sound information for sound decisions.

The overall message of the New Zealand State Services Commission’s (1999) paper in which the concerns of government were set out, seemed to be that problems with the quality of policy advice were essentially to do with questions of capability for greater rigour throughout the policy development process, including implementation and evaluation. In an attempt to make some headway in policy making, to stop doing the things that don’t work and improve policy the New Zealand Government was an early adopter of the idea of evidence-based policy initially advanced by the United Kingdom. Successive governments in New Zealand, since the late 1990s, have emphasized the need for policy to be based on evidence and for that evidence to be robust and plausible.

Evidence-based policy in New Zealand has many of the key features of evidence-based policy practice typical of evidence-based initiatives generally (see Australian Government Productivity Commission, 2010; United Kingdom Cabinet Office, 1999a, 1999b). The effort is to rebuild and strengthen analytical policy research, policy analysis, policy advice, evaluation, and strategic policy making capacity with a reinvigorated pragmatic focus of learning and doing what works. The core of evidence-based practice is research activity using established and innovative

methodologies as required. Such research involves conventional models of academic/scientific inquiry, data collection, analysis and synthesis as well as evaluation, forecasting, and modelling (New Zealand Ministry of Social Development, 2004). Typical evidence-based schemes place research using qualitative methods very low in a hierarchy of methodological rigour. The objective is to provide a policy-relevant knowledge evidence base of sufficient quality to inform: policy development and advice, programme development and delivery, and public debate. Government officials claim that a well-developed evidence base provides a route to better understanding of complex social issues and innovative, creative solutions to the difficult problems that contemporary New Zealand society is confronting (New Zealand Ministry of Social Development, 2005).

However, while there is interest in innovative methodologies the epistemology of evidence-based practice in New Zealand, largely assumed and not explicit, is positivistic. The best evidence in the area of social policy analysis and interventions, for example in addressing questions of poverty, welfare reform, income disparities between the rich and poor, is understood to be that which is derived from the data and tools of social measurement (New Zealand Ministry of Social Development, 2000). What is surprising, at least to an increasing number of policy practitioners, is that this is really the only admissible form of evidence (Peace, personal communication, April 18, 2011). What was particularly surprising to me was the resistance, in policy circles, to the findings from other forms of research activity and in particular, resistance to Q methodology.

In 2004, I was involved with a contract with the New Zealand Ministry of Social Development that allowed for a trial of Q methodology. The trial was incorporated into a larger work programme of research focused on Sickness Benefit and Invalids' Benefit and concern about the growing proportion of the working age population claiming incapacity benefits. The aims of the Sickness Benefit and Invalids' Benefit research focused on identifying key factors behind the growth in Sickness Benefit and Invalids' Benefit recipients, gaining a better understanding of people's lives in a context of illness and disability, and identifying approaches and interventions that support wellbeing and participation in employment. The trial of Q methodology related to the gain of a better understanding of the question of wellbeing in relation to

Sickness Benefit and Invalids' Benefit clients' lives. The details of this project are used as a case study in Chapter 5. Q method seemed not only a very straightforward and cost effective way to collect and analyse data but also one that could provide valuable insights into the kinds of complicated and often intractable policy problems that agencies such as the New Zealand Ministry of Social Development faced.

Very early on reading about Q methodology (Brown, 1980, McKeown & Thomas, 1988; Stephenson, 1953) and then attending a course on Q methodology - the 37th Summer School in Social Science Data Analysis and Collection, University of Essex, United Kingdom, run by Steven Brown (leading Q methodologist and scholar) - enabled me to become conversant with Q methodology as a method for undertaking research. It was this working knowledge of the data collection and analysis techniques that made me a candidate for inclusion in the Sickness Benefit and Invalids' Benefit study team. In 2004 there were perhaps four or five people in New Zealand who had the confidence or experience to offer "how to" guidance in a Q methodological study.

During my involvement in the Sickness Benefit and Invalids' Benefit project what surprised me most, perhaps, was the subsequent resistance in the policy agency to taking the results seriously and using the insights afforded by the study in further policy analysis. This was despite the fact that other best practice techniques, such as work shopping the results with the policy analysts and disseminating the findings in a range of forms were deliberately followed (Peace, Wolf, Crack, Hutchinson & Rooda, 2004). Rather than being deterred by this resistance, I began to think more about whether use of opinion in the context of policy analysis could be justified, with the example of Q methodology in mind.

I also had the feeling that simply sharing the results of the project somehow undersold the efficacy of Q methodology, that there was more to be said about how to think about the findings and the kind of differences of practices that the application of Q methodology could make. I had an intuitive sense that something more might be going on with Q methodology than it simply being a handy method that was hard to persuade policy analysts to use. I came to the insight that abduction might be that "something more going on" and that I had some more learning to engage with since prior to my encounter with Q methodology, I had never encountered the notion of abduction as a logic of inquiry.

It was on the basis of these elements: The apparent insufficiencies of evidence-based policy analysis; the persistence of intractable and complex issues in policy domains; and the potential but marginal status of Q methodology that this thesis rests.

Areas of investigation

The argument as finally developed in this thesis proceeds from an investigation in more detail in the four areas of conventional policy analysis, complexity thinking, pragmatism, and Q methodology. Emphasis was on the theme of knowing complexity. These literatures, which have informed my inquiry, encompass: longstanding and recent debates about the practices that define policy analysis; epistemic debates in the philosophy of science that have shaped understandings of systematic inquiry; the new sciences of complexity and the discourse of a scientific revolution underway that challenges understandings of systematic inquiry; the writings of Peirce and William James in the area of epistemology; and the works of Stephenson that explicate a science of subjectivity.

In the policy area I looked at the history, motivation, and ideals or aspirations of evidence-based policy in order to understand its prominence and claimed effectiveness. I looked at the idea of evidence-based policy as an idea about capability to address complexity, with a view to understanding the kind of policy analysis practices that the idea dictates. I investigated alternative thinking about complexity capability in the context of policy and concentrated on “wicked” social problems and the argument for social rationality alongside scientific rationality as a theme that can be distinguished in public policy literature; a theme that concerns complex social problems and the extent to which these problems can be tackled (or not) through standardized approaches of policy analysis. In the first event of policy analysis in the Schiphol Airport case, analysts had framed the problem of runway expansion as “wicked” (Walker, 2000:11). They had used systems thinking in their analysis and followed a standard policy analysis methodology. In the evidence-based policy literature, systems approaches have been promoted as cutting edge (Chapman, 2010; Mulgan, 2001a). This being the case, I investigated the differences between standard and alternative approaches to policy analysis exemplified in the case of the Schiphol Airport runway expansion controversy.

In the complexity area, I investigated the import of a paradigm of complexity in order to explore further the concept of complexity capability as discussed in scientific discourses. My concern was to identify what the claims that have been made about the need for new ways of thinking in policy, which are underscored by complexity theory and research, might entail if acted upon in policy analysis practices. Initially, I read in the area of complexity theory and the vocabulary of concepts that have emerged to describe aspects of the phenomenon of complexity. On the realization that the term “complexity thinking” could be interpreted as a method of thinking as distinct from the use of complexity theory and concepts in thinking, I turned my attention to those theorists who have identified problems with the philosophical basis of modern science, especially from an epistemological perspective and the challenge complexity thinking poses to Cartesian theory of knowledge (e.g., Capra, 2002; Cilliers, 1998; Morin, 2005; Morçöl, 2005; Stengers, 2004).

Having read in the area of abduction, I found myself assessing the ideas of complexity thinkers in the light of classical pragmatist thought, in particular the thought of Peirce and James. As a result, I then concentrated my investigation on the epistemological linkages between pragmatism, complexity thinking, and Q methodology in order to provide a basis to understanding and interpreting the value of the application of Q methodology in the policy analysis of complex and intractable policy issues.

In the Q methodology area I concentrated on Stephenson’s thinking as evinced in his writings. I did this in order to gain a better understanding of the epistemological basis of Q methodology and its method of science, particularly in respect of its abductive logic and theory of knowledge. The focus of my investigation was to determine if Q methodology, as a way of science, may serve as a paradigmatic case of demonstrating complexity thinking with relevance for a policy analysis complexity practice.

Investigation in the area of Q methodology prompted my reading in the area of classical pragmatism as a further substantive area of inquiry. My reading in the area of classical pragmatist philosophy of science led me to consider what I will call the ability to “read complexity” in an everyday sense as a neglected aspect of human capability in professional policy practice. I pick up the notion of reading complexity in Chapter 4.

Methodological approach of this study

As I came to understand it, my inquiry was in the Peircean mode of abductive inquiry. In advance of the discussion of my research process in Chapter 2, abductive inquiry develops a proposition (a hunch or insight or theory or hypothesis) to explain facts in order to find an explanation for how things are. Abduction relies on the researcher's ability to see connections or a pattern that suggest something may be the case and posit what are often hidden continuities (Haack, 2005). In the way of all abduction, I started with an observation leading to a possible explanation; investigating an argument that took shape as the patterns and hidden continuities were progressively, though not sequentially, revealed. It is a research design based on observation, discovery, elaboration, evaluation, criticism, and insight in a quest for new understanding.

Drawing on the insight of Peirce, in general terms an abductive approach to inquiry involves intellectual activity based on a three stepped process:

1. Something is observed, a surprising fact, that requires an explanation;
2. The researcher develops a proposition based on a hunch, or an initial idea, that functions as a plausible explanation for the surprising fact;
3. Through the elaboration of the meaning of the proposition based on recursive thinking, scholarship, debate and or empirical inquiry, attention is drawn to conceivable differences of practice and possible practical effects.

Subsequently, these differences and effects may be explored and developed through either inductive or deductive inquiries. In relation to the three steps listed above, the main elements of the abductive research method developed for this study are broadly outlined as follows:

Step 1 was achieved through the observing that while an expensive, time consuming, deductive approach to resolving an intractable policy situation appeared to fail, what seemed to require an explanation was how and in what ways (little known) Q methodology was capable of conducting a policy analysis impasse to resolution that had otherwise proved resistant to the standard policy analytic effort.

Step 2 was achieved by identifying the primary research question derived from the observation and determining that it was insufficiently explained: “Why would the application of Q methodology make a difference in a policy situation of this kind?”

Since there is no single, precise, standardized set of procedures associated with abductive inquiry, in the first instance a procedure was developed for this research that entailed: identifying some guidelines for conducting abductive inquiry (discussed in Chapter 2); the determination of a starting point that helps limit the scope of inquiry (it helps to have a broad sense of where to look for an explanation); the identification of what needs to be understood or explained, and the collection of insight (the material or data used) that support an emergent hypothesis. The goal, then, was to find a plausible explanation in the context of existing knowledge.

In terms of step 3, this research elaborates a way of making opinion useful in the policy analytic effort that is characterized as abductory and termed “reading complexity”. The notion of reading complexity is a restatement of classical pragmatist inquiry tailored to the policy situations of complexity and intractability.

Abductive research requires some articulation of the hunch that is underpinning the inquiry. I have teased out my initial hunch (that opinion has a role to play in policy analysis) by determining a set of nine propositions. These propositions convey an order and selectivity that emerged in the research. As set out in Table 1 (p.28) in effect the nine propositions outline the structure of the argument of this thesis. The table shows the chapters in which the propositions are established.

PROPOSITIONS	CHAPTER COVERAGE			
	Ch 2	Ch 3	Ch 4	Ch 5
1. Peircean pragmatism gives a reason to embrace opinion based on an articulation of abductive inquiry	x			
2. Evidence-based policy rejects opinion in favour of evidence-based knowledge.		x		
3. Therefore complexity capability in evidence-based policy analysis is limited.		x		
4. Nevertheless, humans have complexity capability (reading complexity) in an everyday sense because they can abduct and connect <i>individual experience</i> with <i>social rationality</i> as they go through life.			x	x
5. Complex, wicked problems need what human capability for reading complexity offers.		x		
6. However, for policy to have effective access to this epistemological capability requires <i>method</i> to make available what is available in complexity reading.		x		x
7. The epistemological basis of reading complexity is that of classical pragmatism.			x	
8. Q methodology is a way to read complexity by making the opinion contained in social rationality available because it is founded in classical pragmatism.				x
9. Therefore, there is an epistemological basis to the adjunctive and transformative capacity of Q methodology in the revalorization of opinion for policy purposes.				x

Table 1: Propositions and chapter coverage

Thesis outline

The layout of this thesis reflects a cumulative argument. Taken together, Chapters 1 and 2 comprise a detailed introduction to my research. Chapters 3 to 5 reflect the three areas of investigation: evidence-based policy, complexity thinking, and Q methodology, with epistemological thinking the dominant motif.

Chapter 1 has commenced by identifying the focal claim of the research, that opinion may play an important role in policy making in complex and intractable situations on the strength of an observation concerning the use of Q methodology, and outlining the research rationale as an epistemological issue in the context of policy analysis. It has included a short introduction to the research strategy relating to this inquiry. The chapter sets out my research questions and the set of propositions arrived at that are used to assess the claim that opinion may matter in policy analytic work in relation to complex and intractable policy problems.

Chapter 2 describes the methodology, research strategy and methods used in this research. This chapter expands on Peirce's pragmatism and abductive inquiry which became my research strategy for this thesis. It includes, then, the first substantive inquiry from the literature which is used to develop my first proposition that through abductive logic the use of opinion can be justified, which gives a basis in methodology for the embrace of opinion.

Chapter 3 discusses a range of aspects of policy thinking. It begins with a critique of evidence-based policy analysis. Focus is on the concept of evidence-based policy as an idea about complexity capability with a discussion that includes: how evidence-based policy approaches complex problems; the limitations of the evidence-based approach; and differences between evidence-based and alternative epistemological choices and methodologies of research. The chapter concludes with the Schiphol Airport runway expansion controversy used as a comparative case study of policy analytic approaches. Discussion of this case study introduces the use of Q methodology and highlights the epistemological space in which Q methodology can contribute to policy advice.

In Chapter 4, discussion is grounded in some of the intellectual debates about what constitutes complexity thinking as it developed over the 20th century. The discussion

focuses on complexity thinking described in terms of classical pragmatism. This focus provides for a fuller description of what is implied by the term “reading complexity” and reveals the linkages between pragmatism, complexity thinking, and Q methodology as a path for understanding the role and place of opinion in policy analysis.

Chapter 5 examines the thinking entailed in Q methodology. The Sickness Benefit and Invalids’ Benefit project is used as a case demonstrating the use of Q method in a “stand-alone” way. The main focus is on how Q methodology, its manner of gaining knowledge, opens up a new epistemological space.

Chapter 6 summarises the thesis through reference to the nature of the approach taken in this study, the two main research questions, and the discussions that stem from the set of propositions. The chapter concludes by highlighting “reading complexity” as the main contribution that this thesis makes to knowledge.

Contribution of the research

The research contributes to the field of policy analysis. It offers a scholarly account of the linkages between pragmatism, complexity thinking and Q methodology, and in so doing presents an epistemological reframing for the revalorizing of opinion in policy advice in complex and intractable situations. It offers a contribution to Q methodology scholarship by articulating in both adjunctive and transformative terms why Q methodology works in policy contexts of complexity. This research makes a contribution to knowledge by describing complexity thinking in terms of classical pragmatism, and describing “reading complexity” as a human capacity for complexity thinking. In addition to making a contribution to the areas of policy analysis methodology and Q methodology, by demonstrating an abductive process this research contributes to the methodology of research practice.

Chapter 2: Methodology

Introduction

This chapter sets out the methodology and research strategy relating to this inquiry. The first section details the research strategy drawing on the three steps in Peirce's abductive approach to inquiry introduced in Chapter 1 (p.26). I discuss my observations of surprising facts; my development of propositions to provide plausible explanations for these facts and, finally, my elaboration of the meaning of the propositions in terms of reading complexity in order to articulate a different policy analysis practice. Issues regarding adopting an abductive research strategy will be touched on. I follow this with more detailed explanations of Peirce's pragmatism and abductive inquiry which is used to establish my first proposition.

My three steps

The procedures for this research fall into three categories: project development, the process of investigation, and 'reasoning toward meaning' (Shank, 1998:841). I categorise these as the three steps of Peirce's inquiry: something is observed, that is, a surprising fact that requires an explanation; development of propositions based on a hunch, or an initial idea that functions as a plausible explanation for the surprising fact; and, the elaboration of the meaning of the propositions. Such phasing of the research conveys an order that belies the process by which my research strategy, the ensuing propositions, and research questions were arrived at.

Step 1: Something is observed

This first step involved reflecting on the event of reading the Schiphol Airport runway expansion case. By "event" I mean what came to mind in light of Michel van Eeten's (2001) account of the application of Q methodology in this specific case of policy analysis. Articulating the event retrospectively, I can say only that a range of thoughts came to mind, simultaneously, in a bundle. First, was the thought that it was clear that Q methodology among other approaches to policy analysis had "worked". Second, was the thought that Q methodology was a way to read complexity although, when

asked, I could not explain what I meant by “reading complexity”. Nevertheless, it was a thought that lingered. Third, was the thought that Q methodology showed that there could be a role for what is otherwise overlooked in evidence-based policy analysis, namely, opinion, and its role in the breaking of deadlocks.

In the initial stage of the project I had the clear idea that I would need to understand Q methodology in detail, particularly as my thoughts converted into the question of “why?”: Why would Q methodology work when a combination of systems thinking and a standard approach to policy analysis failed to make a positive difference to the policy problem facing the Netherlands Government? It became obvious from an initial reading of some of the main texts (Addams & Proops, 2000; Brown, 1980; McKeown & Thomas, 1988; Stephenson, 1953) that there was a gap in the literature that related specifically to the question of why the application of Q methodology could make a positive difference in complex and intractable policy situations. Identifying this gap led to the development of my research strategy.

In conversation with a senior lecturer in the School of Government, Victoria University of Wellington, it was drawn to my attention that addressing the question of “why would Q methodology work?” lent itself to an abductive research strategy. At this early stage, I was aware that Q methodology was an abductory methodology, but had little appreciation of abduction. I read a range of social science texts on research methodology but found few references except in Norman Blaikie’s (2000) *Designing Social Research*.

The research strategy

Blaikie’s (2000:9) use of the term “research strategy” refers to the logic of inquiry: ‘to the steps involved in answering the research questions - that is, the starting point of inquiry, the end-point, and the stages needed to get from the beginning to the end’. He identifies four research strategies or logics of inquiry, each with different starting and end points, and stages in between; each entailing different ontological and epistemological assumptions. The four strategies are: the inductive, deductive, retroductive and abductive (Blaikie, 2000:9-10). As taken from Blaikie (2000:10), the distinguishing characteristics of the research strategies are as follows:

The *inductive* strategy produces generalisations from data.

The *deductive* strategy tests theories by testing hypotheses derived from them.

The *retroductive* strategy proposes causal mechanisms or structures and tries to establish their existence.

The *abductive* strategy generates social scientific accounts from everyday accounts.

In starting to place my strategy in Blaikie's typology, I was initially drawn to the abductive since it was the best fit to a question that called for an account of why Q methodology works. Nevertheless, it was not a tight fit since my data were not everyday accounts. Thus, while continuing to refer to Blaikie's work as a touchstone for clarity in developing the research strategy, I needed to delve further into the philosophy of science. In the end, the design of this research was patterned on an abductive research strategy, but my interpretation of abduction differs from the interpretation in Blaikie and is more consistent with that of Peirce.

Blaikie (2000:122) comments that choosing a research strategy necessitates understanding:

The capabilities and the relative strengths and weaknesses of each strategy.

The philosophies of social science and approaches to social inquiry with which each research strategy is associated.

Accordingly, my task was to understand abduction with respect to the prevailing trends in the philosophy of science and the types of research methods that emerged over the course of the 20th century.

The outcome of that research led me to appreciate why Blaikie's (2000) research strategy with respect to abduction was not an exact fit to the strategy I needed. I concluded that the interpretation of abduction underlying the research strategy given in Blaikie (2000) was only one interpretation among a number and its explication, was, perhaps, just a bit confusing in light of the other accounts of abduction I had read (e.g., Aliseda, 1997; Fann, 1970; Hanson, 1965; Shank, 1998). The point of confusion arose from Blaikie's identification of the starting point of the abductive research

strategy. In other accounts, the starting point of abduction is given as some “surprising” fact, observation, or anomaly. The task is then to determine what might serve to explain the surprising fact. Norwood Hanson (1965:65) describes abduction as ‘the study of the inferential moves’ the inquirer makes from the recognition of something surprising to a recognition of what kind of hypothesis could explain the fact. Susan Haack (n.d.:6) describes abduction, a process of ‘positing continuities’, as the means in the sciences of ‘bringing propositions to the test’ (Haack, n.d.:6). Arthur Stewart (1997:30) describes abduction as the ‘pragmatic logic of events’ - a form of reasoning arising in response to a problem that yields a hypothesis.

Blaikie (2000:25) identifies the starting point of the abductive research strategy as the ‘social world of the social actors being investigated: their construction of reality, their way of conceptualizing and giving meaning to their social world, their tacit knowledge.’ In this interpretation, the task of the researcher is to enter the world of the social actors and discover their motives and reasons, then, ‘re-describe’ these ‘in the technical language of scientific discourse’ (Blaikie, 2000:25). My investigation led me to consider instead Peirce’s pragmatic theory of scientific method. The abductive research strategy I follow in this thesis is consistent with the generative or “logic of discovery” interpretation of abduction and incorporates the pragmatic maxim (see p. 48). My research strategy framework is outlined in Table 2 below:

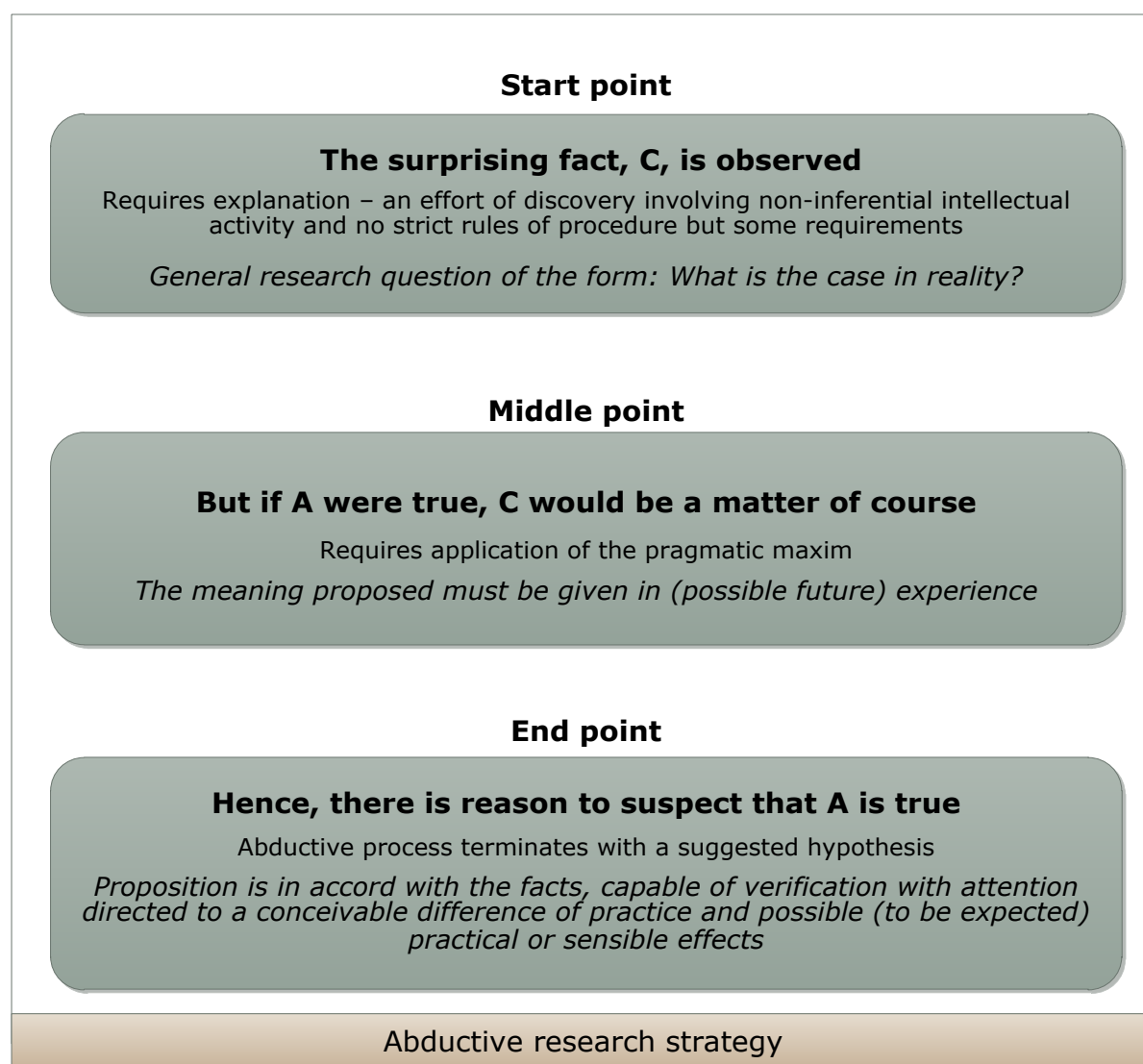


Table 2: Research strategy framework

In this framework, the logic of abduction based on my reading of Peirce is expressed. I secured my approach by starting with the surprising fact (C) and having the hunch (A). In literal terms, the surprising fact (C) that “Q methodology worked in a situation of complexity and intractability which had proved resistant to evidenced-based policy analysis” had been observed. But if (A) “opinion had a role and place in policy analysis” were true, that Q methodology works in complex policy situations would be a matter of course. Hence, there would be reason to suspect that opinion could have a role and place in policy analysis in relation to complex and intractable policy situations. On the basis of this discursive outline, two main tasks were involved in my study. First, I had the task of developing a plausible hypothesis that might explain why Q methodology works as evinced in the case of the Schiphol Airport runway

expansion. Second, I had the task of elaboration; of articulating the meaning of the explanatory hypothesis in terms of both the differences between Q methodology and the current practices of evidence-based policy analysis and the practical effects deriving from recourse to Q methodology.

In choosing this strategy, I note Blaikie's (2000:27) caveat:

Unless a researcher is testing an existing hypothesis, the formulation of good hypotheses requires a great deal of theoretical work. The testing of personal hunches as hypothesis constitutes a much lower level of research activity and should, therefore, be avoided in good-quality research. Such hypotheses usually make very little contribution to the advancement of knowledge because they are not well connected to the current state of knowledge.

Blaikie stresses an important point. Theoretical work in the context of formal inquiry is not something to launch into lightly, especially when the inquiry is open and may be unusual in the context of research published in one's field. Moreover, "open" inquiry does mean that the research horizon is vast – I wanted to explain the surprising facts of Q methodology's success, but I could not see all the way to the horizon. And there are traps. Richard Feynman, Nobel Prize winner and theoretical physicist, warned about how, in the process of theorising (he was talking about quantum mechanics), you can 'go down a drain into a blind alley from which nobody emerges' (cited in Gribbin, 1996). The term "theoretical" usually denotes work concerned with knowledge, but not with the practical application of knowledge, or it means that theory is dealt with but not facts as presented by experience. Peirce's view about how to theorise, a topic he addresses in his Lowell Lecture *How to Theorize* (CP, 5.603)¹, however, redefines the nature of theorising. His pragmatism connects theoretical work with facts of experience and the practical aspects of contributing to the advancement of knowledge.

The abductive pattern of inquiry following Peirce will allow me, in the first instance, to theorise about Q methodology in a context of experience, existing knowledge, and the emergent thinking of those who make use of Q methodology. In the second instance, an abductive approach will allow me to think through the relevance of

¹ Note: citing Peirce. References for citing Peirce do not follow the author/date scheme. The following abbreviation is used: "CP" refers to Peirce, C.S., *Collected Papers of Charles Sanders Peirce*; vols. 1-6, C. Hartshorne & P. Weiss (Eds.); vols. 7-8, A.W. Burks (Ed.). Cambridge, MA: Harvard University Press. References are cited by volume and paragraph numbers.

abduction in the context of policy analysis. In terms of the latter, my interest is in opening up the possibility of a different policy practice in circumstances marked by intractability, genuine uncertainty, and complexity.

Step 2: Development of propositions based on a hunch

Although there are no strict rules of procedure associated with abduction, of crucial importance is to look for underlying continuities; a process of detecting information about particular things and events much like, for example, ‘a detective checking blood traces at a crime scene’ (Haack, 2005:246). This led me to properly begin my research and set about reading Stephenson in what became a sustained process of re-reading and reflection. By following leads provided by Stephenson concerning key themes (e.g., abduction, behaviour, communication, psychology, everyday experience, quantum science, complexity) and references to Peirce, James, Niels Bohr, Werner Heisenberg, Ilya Prigogine, Harold Lasswell among others, I had an early “aha” moment. It appeared that early pragmatism and the new sciences had conceptual links that are manifest in Stephenson’s conception of science and Q methodology. This led me to concentrate on the linkages between pragmatism, complexity thinking, and Q methodology. My initial thought was the explanation could come through a complexity lens.

I began drafting ideas in 2004 and preparing presentations to supervisors, audiences of other PhD students, and conferences of the International Society for the Scientific Study of Subjectivity (ISSSS). The propositions were initially extremely fluid. But by the end of my third iteration of my emerging ideas, by which time I had also read widely in the areas of philosophy of science and the new sciences of complexity, a set of propositions began to emerge. While the 9 propositions presented in Chapter 1 were finessed and refined as the thesis became clearer, the central hunch was that the connections between pragmatism, complexity thinking, and Q methodology were theoretically important in and to policy contexts. By ‘deliberately juxtaposing’ (Shank, 1998:854) these three areas of study, and indeed, juxtaposing them further with evidence-based policy analysis, I was able to participate in the idea that Shank (1998:854) has so persuasively laid down ‘of treating any connection we can draw, no matter how arbitrarily, as a source of insight’. But, then, in reading Peirce and James against complexity thinking, I came to a realisation that rather than use a complexity

science lens to elucidate the problem I needed to use an epistemological lens. This was the point at which I realised that Q methodology opened up an epistemological space for doing policy analysis work.

The culmination of this abductive journey led me to seek to articulate the differences of practices that are made possible through use of Q methodology and to reflect further on the possible implications of their practical effects.

Step 3: Elaboration of the meaning of the propositions

Paying careful attention to a possible difference of practice that the propositions might entail was an integral aspect of the process of positing continuities. I was always, in Peircean terms ‘reasoning toward meaning’ (Shank, 1998:841) of the relevance of Q methodology in the context of policy analysis. It was not until I was well along the path of my inquiry that I came to a fuller appreciation of the necessity of ‘hypotheses involving true continuity’ (CP, 6.173; CP, 6.169). This is a necessity to develop continuity in experience and thought, the two always working together. I was engaged in developing a train of thought that would need to be continuous with the facts of the external world and possible future experience of everyday life.

Clarification of the meaning of the propositions is encapsulated in the concept of reading complexity. It is a thought about the conduct of the policy analyst doing policy analysis work in a context of complexity. As an alternative and complement to the evidence-based approach, I have proposed a reading complexity account of an opinion-based policy analysis based in a rationality that is common sensist and social. This alternative approach acknowledges continuities - epistemological and methodological - between classical pragmatism, contemporary complexity thinking, and Q methodology. But I was increasingly dealing with my own “genuine doubt” as to whether reading complexity as I was beginning to describe it did serve to clarify the relevance of Q methodology to policy analysis. The research questions that appear at the beginning of this thesis (see p. 10) that emerged retrospectively were useful for finally encapsulating my argument, namely, that the relevance and efficacy of Q methodology in a context of policy analysis can be understood in both adjunctive and transformative terms.

The practical effects of my own abductive strategy in terms of the development and articulation of this research can be seen as a document that comprises the record of the study and elaboration of the proposition that opinion indeed may play an important role in policy analysis in complex and intractable situations and of the efficacy of Q methodology in policy situations of complexity. This document can be seen as a provisional, contextualized, time sensitive thesis that can be used as a starting point for further debate and inquiry in the policy context.

Abductive research is yet to be explicated in a way that a novice researcher could pick it up and run with it in the way that a scientist in a laboratory might be called upon to test a hypothesis in the time honoured hypothetico-deductive way. Lacking a ready-made framework made me alert to Peirce's insights. It is to a more detailed discussion of Peirce's theory that I now turn so that it might be drawn upon in the elaboration of the overall proposition that opinion could have a role in policy analysis. The remainder of the chapter discusses abduction in the context of Peircean pragmatism. This discussion draws on a review of literature reflecting on pragmatism and its place among rival traditions of research.

Peirce's pragmatism and abductive logic

In 1905, Peirce distinguished his meaning of pragmatism from the proliferation of interpretations of pragmatism at the time, particularly the interpretation espoused by fellow pragmatist, James, that led to an emphasis on "whatever works" (McDermott, 1997; Menand, 1997; Snider, 2000b). Peirce (CP, 5.414) rechristened his version of pragmatism, "pragmaticism", to indicate more precisely that what he meant was a 'method of thinking' (CP, 8.205) and 'a method for ascertaining the real meaning of any concept, doctrine, proposition, word, or other sign' (CP, 5.6). The point here is that the pragmatism of Peirce, which has a direct bearing on experimental methodology and observation, emphasises that there is a way of knowing that is an ordinary and common activity which can engage with complexity. The process of engagement is embodied in experiences of cognition. These experiences include acts of perceiving, doubting, uncertainty, curiosity, questioning, and wondering as well as intuition, imagination, guessing, hypothesising, and believing. People have real and reliable experiences of complexity and they have real ideas or opinions resulting from those experiences (Buchler, 1939; Moore, 1961).

A practicing scientist, philosopher, mathematician, and logician, Peirce initially trained as a chemist and worked in public employment as a physicist with the United States Coast and Geodetic Survey. Peirce wondered how scientific discoveries were actually made; what thinking was actually involved, believing that the advance of science was not down to mere chance, good luck, or deduction. Peirce disavowed a mechanistic view of the world and was neither enamoured with Cartesian science nor with the developing logical positivism of his time (Bernstein, 1997; Moore, 1961). He advocated in favour of a pluralistic world of living nature, manifesting a complexity of which human kind is a part. Having come to the view that science had taken the wrong path to inquiry, that is, the path of Newtonian science and of “mechanical explanations”, Peirce looked to nature and common sense-making for principles to remedy the problem of “a paradigm gone awry” (Buchler, 1939; Rooker, 2001).

In Peircean pragmatism, the researcher’s subjectivity, their point of view, is indispensable in the scientific project of discovery, understanding, and explanation of “truths”. Peirce’s epistemological outlook allows the researcher to explicitly maintain a subjective act of inquiry. Peirce holds that a researcher is an active, lively participant in a ‘conversation with nature’; neither with a ‘vacant stare’, nor as a purely passive ‘mechanical receptor of data like a seismograph record’, but with the capacity to experience with an adaptive mind (Reilly, 1970). From Peirce’s view, a researcher, or any inquirer for that matter, is able to scrutinise an intelligibly structured world in which complexity is to be expected. As John Smith (1965:105) notes, Peirce contended that:

... the human mind is neither fixed nor static; it is a most complex set of powers and capacities that stand related to a unified person seeking to live a purposeful life in an evolving universe. The mind moves between doubt and belief ... Between doubt and belief stands inquiry.

Peirce’s pragmatism challenges the easy dismissal of people’s ideas on grounds of opinion, whether in the course of doing science or doing policy. On this basis, his pragmatism supports the possibility of systematically addressing difficult policy issues through subjective experience and thereby bringing common sense-making elements back into the policy framework as it currently stands, that is, to epistemologically reclaim common sense-making and opinion in the context of policy analysis. “Common” does not mean the same unity of understanding - what is

common, commonly shared in this expression of the issue is the innate capability people have to make sense out of a complex world and accomplish their endeavours.

Logic of the pragmatic method of inquiry

Abduction is the defining logic of the pragmatic method of inquiry in the sense that Peircean pragmatic inquiry includes the classical forms of inference, *viz.*, deduction and induction. In Peirce's method of science, knowledge for deduction and induction arises from abduction (Reichertz, 2007; CP, 5.171). A concise statement of Peirce's method of logical inquiry is given in Stephenson (1961a:7):

Abduction is what one does in guessing or inventing, or proposing a theory or explanation or hypothesis: it is the initial proposition to explain facts. Deduction thereupon explicates the initial proposition, deducing the necessary definitions and formal hypotheses for empirical testing. Induction is then the empirical establishment of the hypotheses.

The notion that something like the concept of abduction is integral to inquiry is not controversial. People are given to wondering about things. Curiosity drives inquiry. People have ideas. Thought experiments are part and parcel of the theoretical imagination. That said though, the incorporation of the logic of abduction renders Peirce's method of inquiry beyond "normal" science's understanding of what logical inquiry is about (Aliseda, 1997; Reichertz, 2007), a view to which I will return further on. His method of inquiry has yet to feature as a standard approach in the methodology textbooks. Abduction has yet to be incorporated into formal logic; it is not a standard feature in contemporary research methods literature (see Reichertz, 2007). So the fact that Blaikie (2000) deals with abduction is unusual in itself. On the other hand, examples of the use of abduction in research can be found, for example in social research (Moser, 1999), education (Thorsen, 2008), cognitive studies (Magnani, 2004), linguistics (Melrose, 1995), semiotics (Semetsky, 2004), law (Andreewsky & Bourcier, 2000), and artificial intelligence (Flach, Kakas, & Ray, 2006).

Understanding abduction

The concept of abduction is not new. According to Jo Reichertz (2007), the term "abduction" was first introduced in 1597 by Julius Pacius to translate the Aristotelian concept *apagoge*. The concept languished in obscurity until Peirce took it up to

denote a third type of inference distinct from deduction and induction. Peirce grouped deduction and induction together as types of logical conclusion and distinguished abduction from this group as the only knowledge-extending means of inferencing (Reichert, 2007:216). The collected writings of Peirce contain various expressions of the concept: “presumption”, “hypothesis”, “retroduction”, and “abduction”. Their use, somewhat interchangeably, has contributed to a sense among Peirce scholars that ‘Peirce’s concept of abduction is still poorly understood’ (McKaughan, 2008:447, citing Chiasson, 2001). Similarly, Jaakko Hintikka (1998) has identified the clarification of the idea of abduction as a fundamental problem in contemporary epistemology.

The logic of abduction supports open-ended inquiry. It is also illustrative of acts of common sense-making. The crux of abduction is that the inquirer comes to understand or to learn something new: ‘If we are ever to learn anything or to understand phenomena at all, it must be by abduction that this is to be brought about’ (CP, 5.171). Otherwise, without abduction, science is effectively a closed system: ‘involved with the application of knowledge already attained, and therefore could scarcely be *evolving* discoveries’ (Stephenson, 1961a:7, emphasis in original).

Involved in the explication of abduction is the premise that people have the capacity to ‘originate ideas that are true’ (CP, 5.50) when guided by experience. Experience provokes an inquisitive state. For Peirce (CP, 5.539), experience is both a relation between self and the external world and a cognitive operation. As Peirce (CP, 6.469, emphasis original) explains: ‘Every inquiry whatsoever takes its rise in the observation ... of some surprising phenomenon, some experience which either disappoints an expectation, or breaks in upon some habit of expectation of the *inquisturus*.’ In Peirce’s (CP, 7.198; 7.200) view, there is “the inquirer” in whom experience has built up a ‘habit of expectation or belief’. When this belief-habit is broken in upon by some unexpected event or change of experience, and for which there is no appropriate explanation, the contrast between what was to be expected and the unexpected event (a cause for surprise) gives rise to doubt or wonder of some sort. This kind of experience, which is an embodied shift from “belief” to “doubt”, calls for an explanation (see Reilly, 1970:25-30). The inquisitive process is the attempt to explain the unexpected fact or experience and resolve wonder.

For Peirce, the explanation that is derived from acts of imagination has its origins in an instinctive process apparent in common sense-making. He describes this intuitive way of knowing as the human capacity to guess a correct or nearly correct hypothesis able to explain the fact or experience in question (Santaella, 2005). The initial formation of the hypothesis appears in a flash of insight by a mind in tune with nature - an “A-ha” effect or “eureka” moment. Involved in such moments is the free play, flight or leap of imagination, or musement and feeling of plausibility; not the controlled and critical operation of reason (CP, 5.173; CP, 5.181; CP, 5.591).

Abduction is a means of discovery from facts, not theory, and is a means of generating new ideas in science (Wolf, 2005). Abduction signifies the intellectual activity whereby a called-for explanation of experience is arrived at (CP, 2.776, CP, 5.145). Peirce (CP, 5.188) viewed abduction as an act of creative insight with a ‘perfectly definite logical form’. The inference is from the observed facts, the combination of features for which there is no appropriate explanation, to the unobserved:

Upon finding himself confronted with a phenomenon unlike what he would have expected under the circumstances, he looks over its features and notices some remarkable character or relation among them ... so that a theory is suggested which would explain (that is, render necessary) that which is surprising in the phenomena (CP, 2.776).

Peirce’s early expression of abduction was in syllogistic form, which he used to study the relation between deduction, induction, and abduction and illustrate how each type of inference is independent and different from the others. Taking a lead from Gary Shank (1998:847), who provides an annotated version of Peirce’s comparison, I offer a version (Table 3) that may help in seeing the differences in a quick reading. Standard definitions of deduction and induction in formal logic are listed. In terms of formal logic, abduction is an issue in on-going interpretative debates. It is not the intention of this thesis to engage with those debates. Nevertheless, the issues at the core of those debates are of interest here.

However it is defined in terms of formal logic, abduction has the status of a suggestion; a suggestion that something may be the case in reality (Moore, 1961; Reilly, 1970). Though the abduction is made, there is ‘no formal necessity to form

such a hypothesis' (CP, 2.624, as cited in Reilly, 1970:33). In Peirce's comparison of the three types of inference (Table 3), abduction proceeds from a "surprising fact" by creating a hypothesis (These beans are from this bag) to explain a curious circumstance (What's the story with these beans?) by supposing it to be the case of a general rule (All the beans from this bag are white). Abduction introduces something new to thought in the form of a tentative, though good, plausible explanation of experience; one just short of proof (CP, 2.96, CP, 5.171). In Peirce's view, "plausible" connotes an explanation 'suitable for being tested by experiment' (NEM 4, 62)².

FORMAL LOGIC		PEIRCE
DEDUCTION	A statement or theory whose truth or falsity is known in advance of experience or observation (a priori: prior to experience) (Hart, 1998:82). A valid deductive inference is: One in which the conclusion is a necessary consequence of the premises so that the conclusion cannot be false if all the premises are true (Mautner, 2000:124).	<p>Rule [It is true that] All the beans from this bag are white.</p> <p>Case [We know that] These beans are from this bag.</p> <p>Result [Certainly, it is true that] These beans are white.</p>
INDUCTION	A statement whose truth or falsity is made more probable by the accumulation of confirming evidence (a posteriori: based on experience) (Hart, 1998:82). A sound induction is supported by the premises and may be very probable, given the premises, but it can be false, even if all the premises are true (Mautner, 2000:124).	<p>Case [We know that] These beans are from this bag.</p> <p>Result [Observed] These beans are white.</p> <p>Rule [Probably, then] All the beans from this bag are white.</p>
ABDUCTION		<p>Rule [In reality; independent of what we think] All the beans from this bag are white.</p> <p>Result [Fact] These beans are white.</p> <p>Case [It may be the case in reality] These beans are from this bag.</p>

Table 3: Peirce's comparison of the three types of inference

² Note: citing Peirce. The abbreviation "NEM" refers to Peirce, C.S., *The New Elements of Mathematics*, vols. 1-4, C. Eisele (Ed.), The Hague: Mouton, 1976). References are cited by volume and page numbers.

Peirce (CP, 5.189) next proposed a broad logical formulation for the explanatory function of abduction in inquiry (Reilly, 1970). According to Peirce (CP, 7.192), the function of an explanation is to ‘supply a proposition which, if it had been known to be true before the phenomenon presented itself, would have rendered that phenomenon predictable’:

The surprising fact, C, is observed;

But if A were true, C would be a matter of course,

Hence, there is reason to suspect that A is true.

This formulation has proven to be a point of departure for interpretations of Peirce on abduction. But, how to abduct has become a matter of some controversy:

So, which explanation should we choose? Philosophers thinking about abduction have developed a number of key principles of selection - though note that a good deal of interesting controversy surrounds them (Baggini & Fosl, 2003:39).

In the literature, two standard interpretations feature. One traditional view sees abduction as a means of generating theoretical discoveries in the form of explanatory hypotheses that involve the invention of new concepts. Daniel McKaughan (2008:449) refers to this as the ‘generative’ interpretation in which Peirce’s conceptualisation of abduction involving non-inferential behaviour (creative insight, guessing instinct, imaginative leaps) is recognised (for example Hanson, 1958; Fann, 1970; Davis, 1972; Santaella, 2005). A second traditional view sees abduction as inference to the best explanation. This so-called “justificatory” interpretation avoids emphasis on the process of forming an explanatory hypothesis (McKaughan, 2008). In the justificatory interpretation, emphasis is rather on the process of choosing an explanatory hypothesis (for example Harman, 1965; Rescher, 1978; Lipton, 2004). In this regard, Peirce gives guidance.

For Peirce, a hypothesis must meet three criteria to be admissible: it has to be explanatory, testable, and economic (see Reilly, 1970). Faced with any number of possible plausible explanations, the economic criterion is a requirement for choosing which hypotheses to test. By way of addressing the question of which hypothesis to

test first, Peirce elaborates on the three criteria and sets out some considerations for selecting the hypothesis. One consideration, he suggests, is the “best hypothesis”: ‘The best hypothesis, in the sense of the one most recommending itself to the inquirer, is the one which can be the most readily refuted if it is false’ (CP, 1.120, 6.528-6.530, as cited in Reilly, 1970). Note that this consideration underwrites hypothetico-deductive logical inquiry - I will say more about this aspect shortly. Rather than falsity, the justificatory interpretation has a focus on truth. As given in McKaughan, inference to the best explanation requires the researcher to argue the viability of the explanation chosen to the extent that it is ‘true or approximately true or probably true or at least more likely to be true than any available alternative’ (McKaughan, 2008:451).

A second consideration in selecting the more apt of a number of plausible hypotheses for an early test is the “simpler hypothesis”. The simpler hypothesis is one suggested by instinct, intuition, or common sense and not by controlled reason. Ordinarily, simplicity would indicate that the hypothesis is subject to the test of Ockham’s razor, that is, on the basis of the methodological principle that the explanation of any given fact should appeal to the smallest number of factors required to explain the fact in question. Francis Reilly (1970:44) citing Peirce, (CP, 6.496) draws attention to Peirce’s (1908) *A Neglected Argument* in which Peirce mentions that it would be a mistake to think of the simpler hypothesis’ meeting the test of Ockham’s razor. Instead, the simpler hypothesis is: ‘the more natural and facile, the one suggested by instinct’. After which, the hypothesis must meet with the control and criticism of the verification process. This is the application of Peirce’s principle of critical common-sensism (see Reilly, 1970; 45-53). *The Encyclopaedia of Philosophy* (1967, I/II:157, as cited in Bertilsson, 2003) describes critical common sense as the philosophical views which combine the greatest respect for common sense with the admission that at least some of its beliefs are open to critical revision. Of these two traditional interpretations of abduction, inference to the best explanation has tended to prevail as the received wisdom. The generative view, however, lends support to the notion of abduction as “the logic of discovery”.

Over time the concept of abduction has been adapted to accepted principles guiding research in general, even though, ironically, as I will discuss below, these principles

have tended to consolidate around the rejection of abduction as a relevant logic of knowledge. The broad logical formulation of abduction makes more sense when read in the methodological context intended, in other words, in the context of a pragmatic method of science that relies on experience, for the formation of the hypothesis through to its empirical establishment (Moore, 1961).

Pragmatic maxim

Underpinning this thesis, then, is an interpretation that comes primarily from Peirce's theory of scientific method given in Reilly (1970), and also in Stephenson (1961a); in combination with an interpretation of Peirce's pragmatism in Edward Moore (1961); alongside my own reading of Peirce. The view common to these readings is that it is not enough to have an "originating" moment. Nor is it enough to merely describe the idea, proposition or hypothesis being raised. A hypothesis is an explanation if it explains the facts of experience and is scientifically useful. A hypothesis may be judged useful if it is in accord with the *pragmatic maxim*:

Consider what effects, that might conceivably have practical bearings, we conceive the object of our conception to have. Then our conception of these effects is the whole of our conception of the object (CP, 5.402).

Peirce gave two statements of the pragmatic maxim. His original statement (above) is the canonical version. A later (1905) statement reads: 'In order to ascertain the meaning of an intellectual conception one should consider what practical consequences might conceivably result by necessity from the truth of that conception; and the sum of these consequences will constitute the entire meaning of the conception' (CP, 5.9). The pragmatic maxim is essentially what Peirce (CP, 5.6). meant by pragmatism as 'a method for ascertaining the real meaning of any concept, doctrine, proposition, word, or other sign'. As Christopher Hookway (2008) points out, the pragmatic maxim is Peirce's way of ensuring that the researcher becomes: 'reflectively clear about the contents of concepts and hypotheses' by identifying their practical considerations or consequences. In effect practical considerations are thoughts about conduct. They are in thought a guide for action, directing, in the words of Stephenson (1961a:6) 'attention to conditions for observing', or, information researchers would need for 'testing hypotheses and theories empirically' (Hookway, 2008). For Peirce, such practical considerations or consequences are the meaning of

any concept. The pragmatic maxim amounts to an approach which is generalised as: ‘If I act in manner x , then I will have experiences of the sort y ’ or ‘If I want to experience y , then I will act in manner x ’ (Moore, 1961).

In Peirce’s view, little in the way of new knowledge or learning comes from analysing definitions (Hookway, 2008; Moore, 1961). The real meaning of a concept is not a question of logic. Peirce links the meaning of a concept to experience and his theory of reality. The “real” nature of any phenomenon needs to be determined or checked by reference to the experiences of a community of observers or inquirers. Better then to describe how the concept is used in practice. As given in Moore (1961:70), the real attributes of any phenomenon (physical, biological or social) are:

...those attributes open to public inspection by the community of scientists. To say that I have discovered a new property of say, protoplasm, is to describe an experiment (i.e. a certain manner of acting) which, if engaged in by any investigator, will lead to [their] having a certain experience (that of a previously unobserved property).

In Peirce’s words (CP, 5.400): ‘Thus we come down to what is tangible and practical, as to the root of every real distinction of thought...there is no distinction so fine as to consist in anything but a possible difference of practice.’

The notion of “the logic of discovery” underlies abduction being viewed as a fundamental problem of contemporary epistemology. The problem involves debates that have shaped research dynamics and the growth of various types of research, roughly speaking since the mid-1930s. I conclude this section on Peircean pragmatism and abduction with additional contextual comments. These concern, on the one hand, the nature and history of some key aspects of on-going research methods discourse, and on the other, the neglect of Peirce’s method.

Logic of discovery and epistemic debates

Epistemic debates involve the world of science in making distinctions or divisions between what is apposite and what is not; between science and non-science. These are debates often marked by old issues that are re-enlivened. One such issue concerns the growth or discovery (generation) of scientific knowledge and the question of whether there is a logic for this process. From a historical perspective, this question has been

addressed as a problem of the theory of scientific method. From that perspective, the nature of the problem has to do with the ability to critically appraise theories and justify science's claim to truths.

Early on Hans Reichenbach distinguished between contexts of justification and contexts of discovery in *Experience and Prediction*. He held that philosophers of science “cannot be concerned with reasons for suggesting hypotheses, but only with reasons for accepting hypotheses” (Reichenbach, 1938, as cited in Hanson, 1965:43). Richard Braithwaite (1953) in *Scientific Explanation* subsequently argued: ‘The solution of these historical problems involves the individual psychology of thinking and the sociology of thought. None of these questions are our business here’ (Braithwaite, 1953, as cited in Hanson, 1965:43). Completing this set of pronouncements is Karl Popper's (1959:31) view: ‘The initial stage, the act of conceiving or inventing a theory, seems ... neither to call for logical analysis nor to be susceptible of it.’ Such demarcation between contexts of discovery and justification not only set the stage for the dismissal of Peirce's method, but also helped to entrench many of the conditions from which emerged more contemporary dualistic debates, such as: objective/subjective, quantitative/qualitative, “hard”/ “soft” sciences, and positivist/postmodern. A brief mention of the epistemic debates that set the conditions for many ensuing debates follows.

From a historical perspective, 20th century research can be viewed as a field marked by two major developments with one driving the other. One development was the contention over how knowledge is considered to be produced. This sustained contention then drove the expansion of types of research in the so-called “context of discovery” category (Howe, 2008).

Popper (1959) expressed the terms of demarcation in a “YES-but-NO” dismissal of the idea that there could ever be such a thing as a “logic of discovery”: “Yes”, if what was meant was a systematic method of examining logically new ideas whereby the ideas: ‘may be discovered to be a discovery’ (Popper, 1959:31). “But”, if what was meant involved either the act or process of conceiving a new idea, or acts of inductive inference, then “no”. Karl Popper's (1959) *Logic of Discovery*, which reflects his critical rationalism and was influential in the emergence of post-positivism, can to a surprising extent be read as an interpretation of Peirce, but with major fundamental

exceptions. Popper did not mention the influence of Peirce on his thinking until much later, as mentioned in Stewart (1993:21): ‘Karl Popper was delighted to acknowledge several years ago that he and Peirce arrived at some startling similar views’. See further comment in Santaella (2005). So, on the one hand, the process of having a new idea or knowing is beyond logical analysis. That is, there is no such thing as a logical method of having new ideas. Nor is there a method of examining the process, or for that matter, techniques by which it is possible to ascertain that the experiences of any two observers are in fact similar (Popper, 1959:30-32). For Popper, the nature or process of knowing is a problem for psychology to deal with, not epistemology.

On the other hand, induction for Popper presents a problem of justification; of having to rely on conclusions that may turn out not to be true: ‘... for any conclusion drawn in this way may always turn out to be false; no matter how many instances of white swans we may have observed, this does not justify the conclusion that all swans are white’ (Popper, 1959:27). In his note, *On the So-called ‘Logic of Induction’ and the ‘Probability of Hypotheses’*, Popper (1959:315) reiterated the view that the procedure of justifying a hypothesis has nothing to do with inductive logic. Ideas of induction are ‘superfluous’ and have ‘no function’ in a context of justification. Popper’s logic of discovery is the hypothetico-deductive method also referred to as “the scientific method”. It is the method of ‘hypotheses and refutations’ (Aliseda, 1997); the testing of hypotheses in the attempt to refute falsehoods. The contemporary import of the logic of discovery debate is found in Howe (2008:100):

Consistent with this, precise quantitative data were to be obtained and plugged into the inferential machinery. Testing of scientific hypotheses was reserved for formalized inference vis-a-vis the “context of justification”. Less formalized, qualitative data and inference were relegated to the “context of discovery”, where tentative hypotheses might be invented and mulled but not verified or falsified.

In the contemporary research methods literature, the received wisdom is that research is diverse and pluralistic. Sotirios Sarantakos (2005:11) expresses the tenor of the main stream of current views: ‘It must be stressed that diversity is not an indicator of weakness of, or problems with, research procedures. All types of research have a task to perform, and are valuable in their own context and for their special properties’.

Thus, consensus holds that the days of “one method of science to rule them all” are gone.

Despite this view, the expansion of types of research in the so-called context of discovery category still resurrects questions about the process of knowing and what constitutes a rigorous qualitative research project and method of appraisal of the knowledge gained. This is particularly so in light of the prominence of qualitative research in the social sciences as outlined in Charles Ragin, Joane Nagel, and Patricia White (2004) (cf. Denzin, 2009). Discussions in contemporary research methods evince the view that in the absence of a consensus on what makes an acceptable qualitative analysis (what method for appraisal?), essentially, positivist criteria for scientific research still stand as the default position; the benchmark for rigour and quality. Qualitative research underpinned by alternative epistemological positions is thus susceptible to varying views in the area of legitimacy as indicated, for instance, in Leslie Henrickson and Bill McKelvey (2002).

The background picture, then, suggests an epistemological continuum, broadly construed (Howe, 2008; Opfer, 2009). Figure 1 gives an indication of how current alternative research frameworks relate in terms of epistemological positions on the continuum. These positions are marked above the continuum, in relation to the poles of objectivity and subjective experience, and the types of research methods which are aligned below.

Pragmatism has recently come to feature as a “third wave” research movement or paradigm. It is the philosophical partner of mixed methods research which has popped up ostensibly to occupy the “middle area” between the two opposing traditions of quantitative and qualitative research (Johnson & Onwuegbuzie, 2004:15). Pragmatism is viewed as a coherent philosophical system systematically developed by the classical pragmatists - for example, Peirce, James, Dewey - which over time has been taken in newer directions by modern neo-pragmatists (for example Rescher, 2000; Rorty, 2000) (see Johnson & Onwuegbuzie, 2004). In mixed methods research, the traditional standard interpretation of pragmatism applies: “doing what works”. From this interpretative position, mixed methods research translates Peirce’s pragmatic maxim as follows: ‘Choose the combination or mixture of methods and procedures that works best for answering your research question’ (Johnson & Onwuegbuzie,

2004:17). This translation of Peirce’s pragmatic approach is consistent with the justificatory interpretation of abduction, that is, inference to the best explanation:

Philosophically, mixed research makes use of the pragmatic method and system of philosophy. Its logic of inquiry includes the use of induction (or discovery of patterns), deduction (testing of theories and hypotheses), and abduction (uncovering and relying on *the best of a set of explanations* for understanding one’s results) (Johnson & Onwuegbuzie, 2004:17, emphasis added).

However, the statement appears inconsistent with the pragmatic method of inquiry which uses induction to test hypotheses, deduction to explicate, and abduction to suggest an explanation for observed yet inexplicable facts.

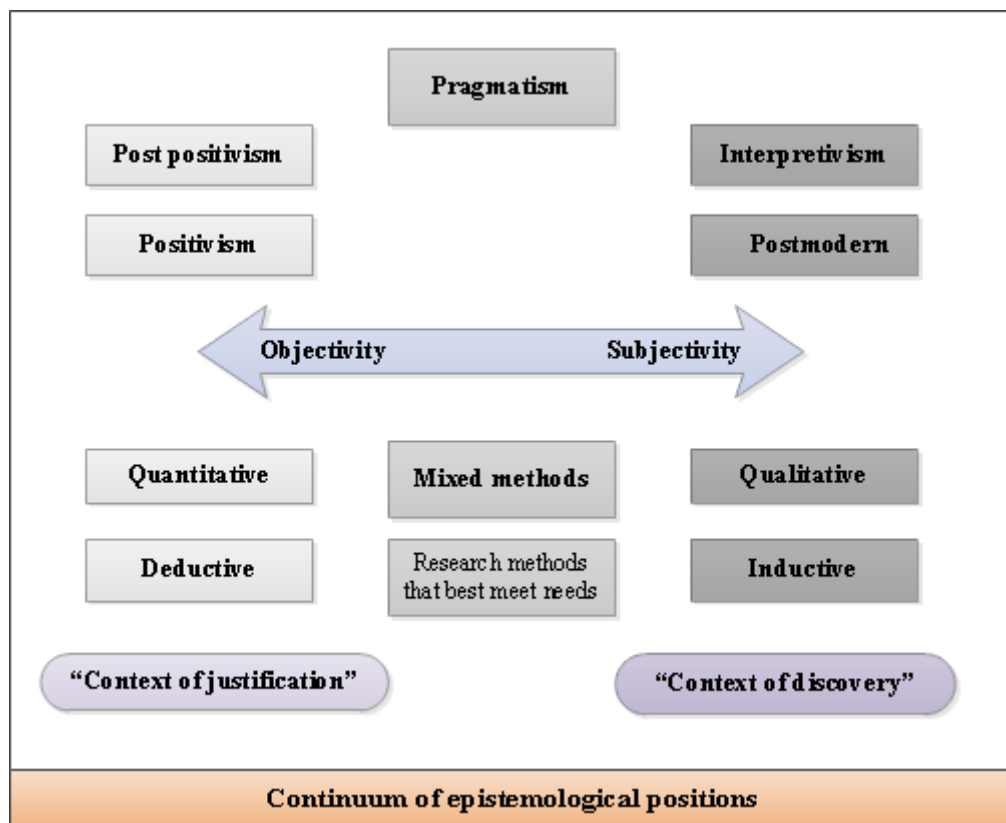


Figure 1: Indicative continuum of epistemological positions

Source: adapted from Opfer (2009).

Part of the justification for mixed methods research given in R. Burke Johnson and Anthony Onwuegbuzie (2004:17), is the notion derived from Peirce that if two

distinct interpretations of a concept ‘do not make a difference in how we conduct our research then the distinction is, for practical purposes, not very meaningful’. In the case of mixed methods research, the interpretation given of Peirce’s pragmatic maxim and method is very meaningful, since it appears to be in the tradition that keeps a logic of discovery at bay. Thus, I am not sure whether mixed methods justify the moniker of a “third way” of research. In this thesis, I present a different point of view. In this view, I hold that a new phase of research behaviour has yet to emerge in a fully coherent form. But, whatever is yet to unfold into that “new way” will have a complexity aspect to it.

When read from left to right, the continuum in Figure 1 indicates the evolutionary nature of the overall structure of contemporary research. The formation of the structure of contemporary research can be visualised as a progressive departure from positivist thought. As given in Mautner (2000:438), positive theories of knowledge asserted that there cannot be different kinds of knowledge. All inquiry is concerned with description and explanation of empirical facts. From a positivist perspective, in principle there could be no difference between the methods of the natural and social sciences. However, in the context of research in general, the 20th century was a period of increasing internal differentiation, growth, and development in schools of thought, research methods, and the social sciences.

What is not obvious from the placement of epistemological positions shown on the continuum is the progressive shift in ontological perspective that has emerged within the natural sciences over the comparative length of time. The first seeds of this change were planted by quantum mechanics (Gleick, 1998; Mainzer, 1997; Prigogine & Stengers, 1984; Zukav, 2001). Quantum science challenges the classical belief in the certainty of scientific knowledge and science’s claim to get at the truth of reality purely by objective means (see Heisenberg, 1999). A significant flow-on effect of the quantum experience has been the reconnection with the psychology of knowledge in the context of complexity research (see Capra, 1997; Emmeche, 2004). Quantum theory holds that the inquirer is an integral part of the system they observe, and their presence ‘seems to be the catalyst that produces clarity from an unclear situation’ (Evans, 1998:237). This is an argument that indicates a failure to resolve the debates

in the world of science centred on positivist notions of knowledge and how scientific knowledge is considered to be produced and justified that occurred from the 1930s.

Summary

In this chapter, details of the research strategy chosen to pursue the purpose of this study have been outlined and discussed. The research approach adopted for this study can be characterised as non-positivist and abductive, consistent with Peirce's pragmatic theory of scientific method. This method of inquiry runs counter to a basic premise of modern science, namely, that the act of conceiving a new idea (an act or process involving the individual psychology of thinking) lacks method. Peirce's pragmatism and his attention to abduction as a common, everyday way of thinking that extends knowledge serves as a counterargument to the knowledge versus opinion debate and exclusive focus on justifying a hypothesis (the method of closed inquiry).

In this chapter I have begun to elaborate the proposition of the role of opinion as a complement to evidence through an analysis of Peircean thinking and the connection between abduction and pragmatism. Peirce's articulation of abduction gives a basis in methodology for the embrace of opinion. My hunch is that Stephenson's ability to develop Q methodology was dependent on his own capacity to think abductively.

Having examined Peircean pragmatism and Peirce's articulation of abduction, the following chapter presents a critique of evidence-based policy analysis in light of the knowledge versus opinion debate and the concern that has been expressed by some governments about a needed capability to address complexity surrounding policy questions. This examination of evidence-based policy analysis addresses the proposition that evidence-based policy analysis rejects opinion with the implication that complexity capability may not be fully realised in policy analysis practice.

Chapter 3: Policy thinking

Introduction

In this chapter I examine a range of aspects of policy thinking in order to make the links between policy, complexity, and Q methodology and to create the epistemological space for opinion that Peirce's logic and Stephenson's Q methodology point toward. The chapter discusses evidence-based policy in relation to the thinking needed for complex policy problems. It combines a review of the literature that broadly concerns the idea of evidence-based policy with a discussion of the kind of policy practices that that idea dictates. The chapter also introduces the differences between alternative epistemological choices and methodologies of research, which are exemplified in the case of the Schiphol Airport policy controversy.

Complexity capability is a theme shared between two closely linked arguments in policy, which bear in contradictory ways on the promise of evidence-based policy when applied to complex policy issues. The first argument is about coping with rapid change in modern society. Simply stated, it is an argument for more and better use of science in policy analysis. The second argument, which focuses on tackling complex policy problems, is an argument for participatory, dialogical, and collaborative ways of working whereby problems and their solutions are socially, not scientifically, defined.

I begin with a critique of the evidence-based policy movement in the course of which I look more closely at the idea of evidence that has been advocated by proponents of evidence-based policy, noting how "evidence" is delineated and determined. Particular attention is then paid to the issues of complexity capability and new thinking needed for complex policy problems. The chapter concludes with the Schiphol Airport case which is used to compare differences between two epistemological alternatives and their effects.

Evidence-based policy movement: a critical examination

Since the last decade, evidence-based policy has become pervasive as a framework for thinking about policy and practice in government. This current movement in public policy has roots in the “Third Way”, pragmatic - in the sense of “doing what works” - and reformist political project of the United Kingdom Blair-led Labour Government (1997-2010). Launched in the late 1990s by the United Kingdom Government, by 2004 evidence-based policy had gained status as a movement (Davies, 2004). Growing numbers of Western states (for example, Australia, Canada, New Zealand, United States) embarked upon progressive reform of their respective policy systems in broad conformity with the ideas and practices of the evidence-based approach of the United Kingdom. Adherents to the approach can also be found in growing numbers of diverse policy communities such as research organizations, think-tanks, and non-governmental organizations.

The central components of the United Kingdom approach have been published, updated, and widely disseminated by the United Kingdom Government as well as variously summarized by proponents and critics alike (for example, Denzin, 2009; Donaldson, Christie & Mark, 2009; Marston & Watts, 2003; Nutley, Davies & Walter, 2003; Parsons, 2002; Pawson, 2002; Solesbury, 2001). In the following section I draw in the main from the United Kingdom documents: *Modernising Government White Paper* published in March 1999; the United Kingdom Cabinet Office paper of September 1999, *Professional Policy Making for the Twenty First Century*; the Performance and Innovation Unit, United Kingdom Cabinet Office, report published in January 2000, *Adding it Up - Improving Analysis and Modelling in Central Government*; the National Audit Office report of October 2001, *Modern Policy-making: Ensuring Policies Deliver Value for Money and Assessing Quality in Qualitative Evaluation: A framework for assessing research evidence* produced for the United Kingdom Cabinet Office (Spencer, Ritchie, Lewis, & Dillon, 2003). In these documents it is clear that the United Kingdom Government sought a coherent approach to policy work that would meet a set of needs.

These needs could be listed: the need for long-term thinking and strategic policy work; the need for new thinking such as systems thinking; the need for improved rigour in policy-relevant research, analysis, and evaluation, and the need for

innovation in the form of creative solutions and new ways of acting with a focus on so-called “wicked” or complex social and economic policy problems, that is, problems that are often characterized by intractability and policy failure. Meeting those needs in policy work gives a platform for sound decision-making and analytically driven solutions grounded in rigorous research and knowledge. Analytical rigour requires adherence to the scientific method under the rubric of “best practice” (a process of standardization).

Broadly speaking, this means that policy work is open and explicit; objective and empirically based; consistent with existing knowledge; results are verifiable and reproducible; and justified. Emphasis is on the idea of interventions carried out under experimental and controlled conditions, systematically evaluated, leading to the cumulative development of reliable evidence for subsequent policy purposes. In addition, an emphasis on best practice in policy analysis is intended to stimulate the search for new approaches, better ideas, and new ways of thinking to promote improvements in the policy process and the successful handling of complex policy problems. Cutting edge economic and social modelling techniques, methodologies for rigorous evaluation, and the testing of policies against possible future scenarios as found in the United States policy community are favoured. Evidence gained in these ways constitutes evidence of “what works”. It also means more generally that the process of policy analysis itself and not just the practice of marshalling scientific evidence emulates the process of conventional scientific inquiry.

Seeking better approaches to policy development has been a feature of public policy analysis over many decades. Clearly, the United States policy experience is a precursor to the current evidence-based policy movement. But reflected in the United States experience is the possibility that analytic capability is not equivalent to complexity capability.

United States legacy: rationality project

The policy professions came into existence because of acknowledged complexity at the heart of policy making (Snider, 2000a; 2000b). The United States policy movement throughout the 1950s, 1960s, and 1970s consolidated interest in the improvement of policy analysis through recourse to science and rational analysis,

variously described as “scientific”, “comprehensive”, “technical”, or “instrumental rationality”, with an emphasis on apolitical efficiency (deLeon, 1994, 1998; Fischer, 2003; Lynn, 1999; Schon, 1983). Deborah Stone (2002) called this interest in the improvement of policy making the “rationality project”. The rationality project ‘extricates policy from politics’ and leads to reasoning by calculation: ‘calculating to figure out which actions yield the best results’ (Stone 2002:376-383). Describing this approach in general terms, policy analysts draw on social science theory and methods to predict the expected effects of alternative policies, provide evidence, and evaluation that supports or refutes specific policy measures as appropriate to resolve policy problems (Howlett, 2008; Majone, 1989; Weimer & Vining, 1999).

Policy analysis, which was conceived as a craft that uses analytic tools wielded with skill, emerged in the United States during the 1960s. It was the means by which the knowledge of science was to be applied (Rittel & Webber, 1973). From the outset, emphasis was on quantitative methods and the accumulation of empirical evidence. Economics, statistics, cost-benefit analysis, operations research methods, and so-called “first generation” systems analysis and the findings from program evaluations made up the core of approaches most widely used (Durning, 1999; Shadish, Cook & Leviton, 1991; Stokey & Zeckhauser, 1978).

Mainstream or traditional policy analysis takes its due from positivism (Durning, 1999). Positive economics, as Brunner (1991) tells us, is the form of positivism that has defined policy analysis, furnished definitive standards of research and practice, and analytical expertise within the craft of policy analysis. For government, positive economics was seen to offer rationality, objectivity, and empirically based causal knowledge (scientific facts). Brunner (1991:73) explains it as follows:

- Rationality was served because the consequences of policy alternatives could be predicted with precision and accuracy, independent of the particular context.
- Objectivity was served because these predictions could be independent of the researcher/analyst’s subjective viewpoint. Anyone else could employ positivist scientific methods to replicate the results.
- In principle, the development of causal generalisations and models with predictive power could reduce controversy in policy to differences over value

judgments. The researcher/analyst would be able to maintain a ‘value-neutral’ position above and apart from these controversies.

As a precedent for evidentiary policy practice, policy analysis has been subject to sustained critique on epistemological, methodological, and political grounds (deLeon, 1994). Laurence Lynn (1999:411), at the Harris Graduate School of Public Policy, University of Chicago, described policy analysis as ‘conceived in controversy’. More specifically, the profession of policy analysis was conceived in a milieu, on the one hand, of scientism - the view that any meaningful question can be answered by the methods of science (Longino, 2011) - and, on the other hand, of dissenting post positivism.

Lynn’s (1999) review of the discourse about the nature and usefulness of policy analysis, up to the period that saw the launch of evidence-based policy as a new initiative in the United Kingdom, identified the ‘scientistic’ (Lynn, 1999:416) form of policy analysis as the focal point of sustained critique and controversy. Lynn’s (1999:420) use of the term “scientistic” is in reference to: ‘the positivist penchant for facts, causal models, instrumental rationality, evaluation of alternatives and evidence-based practice’. Allied to this theme of scientism is the following strand of criticism of policy analysis as an outdated practice in the contemporary world (Durning, 2005).

Maarten Hajer and Hendrik Wagenaar (2003), argue that policy analysis is based on an outdated model of government. The old order of democracy practised in Western democracies over the course of the last century, which they describe as “Madisonian”, that is, hierarchical and elitist, is giving way to the new order of a “network society” (Hajer & Wagenaar, 2003, as cited by Durning, 2005:689). Their claim is that deliberative policy analysis is required for a society in which policy is made and implemented in networks of interdependent public and private actors (see also Kickert, Klijn & Koppenjan, 1997). Similarly, Goktug Morçol (2000; 2002) argues that because of its positivist foundations, policy analysis is also based on an outdated understanding of science. In the new sciences, for example, quantum mechanics and chaos and complexity theories, reductionist methodology is replaced by a holistic one: ‘empirical and quantitative methods are either supplemented or supplanted by other ways of knowing (intuitive, experiential, qualitative, or spiritual)’ (Morçol, 2000:3). The new sciences require a “new mind for policy analysis” (Morçol, 2002). In Fischer

(1998), the argument is that policy analysis is based on an outdated view of the scientific method and the practice of science.

Post positivism was conceived as a way of addressing these issues. It is broadly construed to include the various shifts in epistemological thinking away from that of a positivist understanding of science. In the social epistemology of post positivism, knowledge emerges from social context. Concerns and meaning are multiple and constructed from experience. And, the possibility of separating fact from value in analytic work is a contested notion (Durning, 1999:399). John Dryzek (1989, as cited by Durning, 2005:659) in discussing ‘technically sophisticated policy analysis’ from a critical perspective, points out that public policy is made ‘the prerogative of experts’, thereby diminishing the importance of public preference (see also Fischer, 2003; Torgerson, 1997). So, against the imperatives of scientific rationality and technique embodied in policy analysis, arguments for social rationality were developing. “Social rationality” as used in this thesis is an umbrella term that captures notions of common sense ways of thinking and concerns with the role of participatory, deliberative democracy, and social, discursive, and collaborative processes in the development of policy.

The enduring policy sciences school of thought, which takes its orientation from the work of Harold Lasswell, has been a source of consistent alerts about ‘what science can and cannot know about society and its complex policy problems’ (Brunner & Ascher, 1992:297). Lasswell, who was influenced by John Dewey’s pragmatism, emphasised that science is ‘an altogether human and fallible enterprise’ (Lasswell, as cited in Torgerson, 1992:229). Douglas Torgerson’s discussion of Lasswell’s influence iterates a core tenet of Dewey’s pragmatism that underlies the policy sciences challenge to scientific rationality:

Pragmatism does not expose science as an emperor without clothes, but does suggest that it should not be the emperor. In *The Public and Its Problems* of 1927, Dewey indeed warned explicitly of an oligarchy of experts and emphasised the need for communication and participation in a democratic society: ‘The essential need...is the improvement of the methods and conditions of debate, discussion and persuasion. That is the problem of the public (Torgerson, 1992:229).

In the late 1990s, a series of debates on the evidentiary basis of policy analysis dealt with questions about the way policy analysis skills are conceived, taught, and applied in practice (see deLeon, 1998a; Durning, 1999; Fischer, 1998; Lynn, 1999; Weimer, 1998). Basically, the debates were about taking stock of policy analysis, its usefulness, sufficiency, and the future of practice in light of the experience of the field where rational analysis seemingly created more problems than it solved. All of these debates provide evidence of the extent to which the policy literature offers a record of accumulating critique of the practices that defined policy analysis as an evidentiary practice from the outset.

Post positivist perspectives on how to correct what is thought to be the shortcomings of the on-going valorization of expert-led practices in government have not been realised in terms of an accepted alternative model of practice (Durning, 1999; Fischer, 2003). A number of reasons for why this may be the case have been put forward. For instance, it has been suggested that a lack of consensus on post positivist standards of research and practice has been a significant factor (Brunner, 1991:82). deLeon (1998:7), referring to the standing of post positivism within the policy movement, says it was exposed to the charge of speculative science, offering ‘little more than informed and always changing speculation’. Rebecca Blank (2002), an economist, who has worked for the United States Federal government on social policy, pointed out that the contention is not so much that positivism and economics have shortcomings, but, that “on Capitol Hill” they present, rightly or wrongly, as superior to any other method of policy analysis available. And David Ellwood (2003), a former senior policy advisor in the Clinton Administration, speaking to the Social Policy Research and Evaluation Conference, convened by the New Zealand Ministry of Social Development in 2003, said:

Economics seems to have a sizable lead in the influence category, probably in large part because it ... offers compact ways of describing some of the forces that shape behaviour, and economics alone seems willing to quantitatively predict how responsive people will be to changed policies.... Increasingly the language of economics and the statistical analysis tools that economists favour are being applied to policy design (Ellwood, 2003:23)

When viewed as having a heritage in the United States policy analysis tradition, evidence-based policy represents continuity and a default position. The idea that the

craft of policy analysis should have more of a scientific as against more of a social footing is not new. Nor can it be claimed that a scientific base has proven especially effective in critical areas of concern. Although proponents of evidence-based policy appear to want to make a break from past debates (see Oakley, 2000), the importance of not turning a blind eye to the epistemological contestation inherent in the United States policy tradition is amplified by discussions at the sciences-policy nexus and by new developments in scientific thinking which are provoked by an interest in complexity.

As far as the development of evidence-based policy is concerned, recognition of the rapid and irreversible changes occurring in society is a key factor. Advocacy of this “forces-of-change” thesis has been advanced on a wide number of fronts through debates in the natural sciences, social sciences, and politically-led debates such as the reform of government and policy in the United Kingdom. A broad consensus appears to have emerged on the most appropriate means of solving the problem of complexity capability, evident for example in the *Declaration on Science and the Use of Scientific Knowledge* (UNESCO, 1999), the *Buenos Aires Declaration calling for a new approach to the social science-policy nexus* (UNESCO, 2006), and is manifest in approaches to evidence-based policy in various states. The core concepts of the forces-of-change argument and the general tenor of discourse about it comprise the next section.

Forces of change and the need for science/evidence

The logic of the forces-of-change argument runs, roughly, as follows. Forces of change call into question established political, governance, and policy analysis frameworks (Driver & Martell, 2000:150). To remain credible and effective government has to adapt and cope with the new situation of rapid change, with its increasing social complexity, and attendant uncertainties (see Blair, 1999; UK Cabinet Office, 1999b). To facilitate adaptation, the government needs to enhance its ability to interact with, manage, and use knowledge in systematic ways (Mulgan, 2003b).

Defining the problem

In February 1997, Jane Lubchenco gave the Presidential Address at the Annual Meeting of the American Association of the Advancement of Science (AAAS).

Lubchenco (for the published version, see Lubchenco, 1998) spoke of a new social contract for science. Her focus was a call for a renewed relationship between science and society based on the recognition that we live in a new global situation of complexity and rapid change in the natural and social worlds. Her overview of the changes occurring in biological, ecological, social, economic, and political systems described an imperilled world, primarily of human making: ‘humans have emerged as a new force of nature’ (Lubchenco, 1998:492). Yet, as a new force of nature we lack the ability to exercise control over eventual outcomes and face runaway consequences. This is essentially the argument Anthony Giddens (1999) pursued in the BBC Reith Lecture series where he discussed the notion of a “runaway world” and the ideas behind his call for a political “third way” social democratic renewal (Giddens, 1998, 2000).

Conventional ways of approaching pressing issues such as, for example, increasing poverty, inadequacies of the welfare state, economic crisis, ecological and climate change, seem to aggravate rather than ameliorate the problems faced. The crisis of this new situation comes, in part, from a lack of complexity capability in the sciences-policy nexus. A lack of complexity capability, Lubchenco (1998:492) suggests, combines with inescapable uncertainty about the future: ‘greater uncertainty about responses of complex biological, ecological, social, and political systems; and more surprise’. So framed, Lubchenco’s argument recognises that there are, at the moment, substantive limits to scientific knowledge with implications for, on the one hand, traditional conceptions of scientific knowledge, and on the other hand, conventional ways of defining problems, identifying solutions, and implementing actions in policy (see also, Gallopin, Funtowicz, O’Connor & Ravetz, 2001).

Lubchenco (1998:495) argues that although science cannot determine the solutions, which is the role of policy, it can: ‘help frame the questions to be posed, provide assessments about current conditions, evaluate the likely consequences of different policy or management options, provide knowledge about the world, and develop new technologies’. There is a contingency, however. Lubchenco (1998) suggests that for science, it must not be a case of “business as usual”. According to Lubchenco (1998:495), the scientific community has to prepare itself to meet the new situation of

change and complexity; a task which requires the new science ‘of the 1990s’ and not the science ‘of the 1950s, 1960s and 1970s’.

The best means of meeting the challenge

A World Conference on Science, *Science for the Twenty-First Century*, held in Budapest in 1999, met to consider issues around this notion of a new contract between science and society, the results of which are embodied in the *Declaration on Science and the Use of Scientific Knowledge* (United Nations Educational, Scientific & Cultural Organization, 1999). Gilberto Gallopin, Silvio Funtowicz, Martin O’Connor and Jerry Ravetz (2001) advance a critique of the outcomes of this conference. They explicitly criticise the way of thinking about, or attitude toward, the appropriate means of facing the forces of change, at least on the side of the sciences. In their assessment, the conference documents show that a fundamental point of the initial argument made in Lubchenco (1998), that is, that science itself may be in need of change, was basically ignored or overlooked.

Gallopin et al., (2001:220) observe:

... their [conference documents] main message is that the problems with science lie essentially in the way science is used, misused and, mostly underused, but that the model of science, and its practice, is fine as it is, for the new century as for the past one, ... as well as for fundamental understanding and the resolution of practical problems.

As they suggested, a central question for science, which the conference did not consider, is:

... to what extent (and in which situations) problems with science are caused by the non-application (or misapplication) of the existing rules of inquiry, and to what extent (and in which situations) the scientific rules themselves have to be modified, or even replaced (Gallopin et al., 2001:220).

According to Gallopin et al., (2001) failure to consider inadequacies of conventional scientific practice means default thinking prevails in this United Nations, global, political, knowledge context. Such thinking emphasises science as the source of solutions and that a world of complexity cannot be ‘easily captured by common sense’ (Mulgan, 2001a:29). A lack of complexity capability in the sciences-policy

nexus can be explained by: ‘the imperfection in the current knowledge and/or its application’ (Gallopín et al., 2001:227). The thinking advances along the lines that with more rigorous adherence to established scientific methods, more rigorous analysis, more scientific knowledge, more new technologies and instruments, and improved communication, uncertainties will reduce with an increased capacity to meet the challenges of the new situation.

The forces-of-change argument has culminated in a belief that the most appropriate means to meet the challenges of change and increasing complexity is a new approach to the links between scientific research, the practice of government, and policy. At the core of this new approach as given, for example, in the *Final Report, Buenos Aires Declaration Calling for a New Approach to the Social Science-Policy Nexus* (United Nations Educational, Science and Cultural Organisation, 2006), is the suggestion that only the sciences have the analytically rigorous means necessary: ‘to determine why well-intended reforms can fail, what effects can result from proposed actions, and how best to achieve socially desirable objectives’ (United Nations Educational, Science and Cultural Organisation, 2006:3). The most appropriate means identified proceed from science as the source of credible evidence, followed by more effective utilisation of what can count as evidence and legitimate knowledge relevant to the policy process.

Focus on “the best”

Proponents of evidence-based policy have advanced this framework, some with a great deal of enthusiasm as suggested, for example, by themes of “evidence-based everything” and the promise of an “evidence-based global society” appearing in the literature (Donaldson et al., 2009; Oakley, 2002). The United Kingdom Labour Government’s effort to achieve better government, defined as ‘better policymaking, better responsiveness to what people want, better public services’ (UK Cabinet Office, 1999a:9), embodies the forces-of-change argument:

Social sciences should be at the heart of policy making. We need a revolution in relations between governments and the social research community – we need social scientists to help determine what works and why, and what types of policy initiatives are likely to be most effective (Blunkett, 2000).

The United Kingdom Labour Government couched its modernising agenda in pragmatist terms: “what counts is what works”. Sandra Nutley, Huw Davies, and Isabel Walter (2003) and William Solesbury (2001) point out that a pragmatist stance was intended to mark a shift in the nature of politics, that is, the end of ideologically or “conviction” driven politics, as well as herald a new age in policy making, at least in the United Kingdom setting. In the United Kingdom Labour Government’s vision, policy making should be based on the best available evidence. In addition, policy development should include rational analysis of the evidence about what was proven to be effective in addressing social problems (Nutley et al., 2003).

In a BBC broadcast, Geoff Mulgan (2001b) explained:

Scientific knowledge in all its forms is now much more explicitly part of the governing process and there’s a very important reason for that. We have seen a reducing role for ideology, the conviction politics of both the 70s and the 80s has gone into decline and knowledge about what works has, to some extent, filled that space and therefore there is more of a demand for objective and neutral analysis and feedback in terms of what is happening in relation to policies.

Recognition that social scientific knowledge should ‘compete’ (Nutley, 2003:4) with other forms of science, knowledge, and interests exists among proponents of evidence-based policy. Nevertheless, the focus of evidence-based policy remains on science, coupled with rigorous analysis in policy practice. The idea of evidence follows from this, with its use rooted in a presupposition of what constitutes the best scientific approach for finding out and expressing how things work. Since the conception of evidence appears to be the antithesis of social rationality, use of the concept has been taken as signifying a nascent rationality project. Wayne Parsons (2002:3), for example, says that:

... despite the rhetoric of ... ‘modernisation’, a return to the old time religion: better policy making was policy making predicated on improvements to instrumental rationality.... In this respect EBPM [Evidence Based Policy Making] marks not so much a step forward as a step backwards: a return to the quest for a positivist yellow brick road....

The next section looks at the use made of the conception of evidence for policy purposes.

Use of the conception of evidence

Central to understanding evidence-based approaches in general is the question of “what constitutes evidence?” There are a variety of ways to answer this question, ranging from general conceptions of evidence to conceptions that are highly specific. Common conceptions of evidence are associated with notions of proof, rationality, and justification. In answering the question in a general way, the term “evidence” can refer to that which provides a ground for a belief, theory or decision, that is, evidence for something. It can also refer to information bearing on the truth or falsity of something claimed to be the case - that is, evidence of something (Miller & Fredericks, 2003). In addition, as defined in the *Penguin Dictionary of Philosophy* (Mautner, 2000:184) the term “evidence” can also refer to the ‘quality of obviousness, intuitive certainty’.

In their discussion of evidence in relation to decision-making contexts such as medicine and policy, Mark Dobrow, Vivek Goel, and Ross Upshur (2004) identify two contrasting orientations in determining what constitutes evidence. Firstly, they refer to a philosophical-normative stance. This orientation is about addressing: ‘what sources of evidence would be most ideal for justifying a decision’ (Dobrow, et al., 2004:208). A philosophical-normative stance focuses on the characteristics and properties of evidence, for instance, on validity and reliability in order, they argue, to: ‘establish the appropriateness and credibility of specific types of evidentiary sources for supporting decisions’ (Dobrow, et al., 2004:208). From this stance, determining what constitutes evidence is a function of the quality of the evidence, based on the assumption that ‘higher quality evidence should lead, in turn, to higher quality decisions’ (Dobrow et al., 2004:208). In their view, a philosophical-normative orientation restricts thinking on evidence to narrowly defined scientific evidence.

Secondly, Dobrow et al., (2004:209) refer to a practical-operational stance. This stance is context based, that is, the specific decision-making context is integral to defining evidence. A practical-operational orientation suggests evidence can be subjective, have an emergent and provisional nature, and be incomplete or inconclusive (Dobrow et al., 2004:209). They also suggest that what constitutes evidence is less defined by qualities and more by ‘relevance, applicability or generalisability to a specific context’ (Dobrow et al., 2004:209). This orientation

avoids a narrow determination of what constitutes evidence implying more leeway when thinking has to adapt to the contextual features of the action environment.

A repudiation of opinion

The United Kingdom Labour Government adopted the conception of evidence in use in medical science as the benchmark for their support of evidence-based policy. Evidence-based medicine is centred on the justification of decisions defined as: ‘... the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients’ (Evidence-Based Medicine Working Group, 1992, cited in Dobrow et al., 2004:207). The conception of evidence associated with evidence-based medicine, not surprisingly, reflects the demarcation between knowledge and opinion. Evidence in the sense of “intuitive certainty” is eschewed:

... evidence developed through systematic and methodological rigorous clinical research, emphasising the use of science while deemphasising the use of intuition, unsystematic clinical experience, patient and professional values, and patho-physiologic rationale (Evidence-Based Medicine Working Group, 1992, cited in Dobrow et al., 2004:207).

Post 1992, the United Kingdom Labour Government introduced a working definition of evidence-based policy, which dominates the way evidence-based policy has been disseminated and understood in policy discourse. This working definition has two main aspects to consider. The first, as shown in Figure 2, is the aspect that defines the overall approach as “evidence-based”.

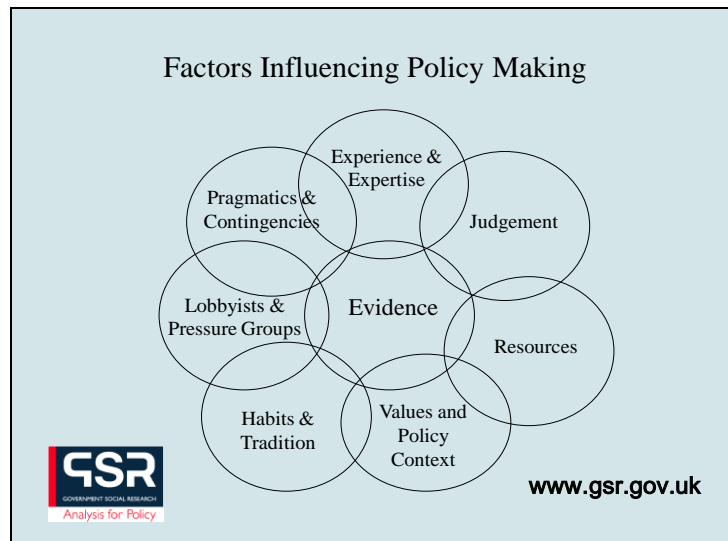


Figure 2: Evidence at the heart of policy development

Source: United Kingdom Government Social Research³

The United Kingdom Labour Government defined an evidence-based policy approach as: ‘putting the best available evidence from research at the heart of policy development and implementation’ (Davies, 2004:3). Emphasis is on the integration of professional judgement, experience and expertise with the use of valid, reliable, credible, and relevant research evidence while cognisant that other factors come to bear when policy is determined⁴.

What this definition means in practice is shown by the second aspect in Figure 3. Consistent with the determination of what passes as convincing evidence in the evidence-based medicine approach, the United Kingdom Labour Government’s definition distinguishes between unfounded opinion and evidence. The net effect in principle is close to a repudiation of ways of paying attention to issues that could be categorised as non-scientific or not scientific enough. As Philip Davies (2006) has indicated, the sheer uncertainty of unscientific knowledge counts such knowledge out of the picture. The distinction he makes between opinion-based and evidence-based policy is drawn in stark terms⁵:

³ <http://www.gsr.gov.uk>

⁴ <http://www.policyhub.gov.uk>

⁵ <http://www.policyhub.gov.uk>

The opinion and judgement of experts that are based upon up-to-date scientific research constitute high quality valid and reliable evidence. Those opinions that are not based upon scientific evidence, but are unsubstantiated, subjective and opinionated viewpoints do not constitute high quality, valid and reliable evidence.

Opinion, common sense, intuition, experiential or craft knowledge, for example, are implicated in poor quality evidence. As well, much of the evidence provided by civil society groups, community leaders, individuals, citizens, indigenous peoples, for example, is seen to lack credibility unless their information and ideas offer: ‘a clear line of argument; tried and tested analytical methods; analytical rigour maintained throughout processes of data collection and analysis, and clear presentation of the conclusions’ (Sutchcliffe & Court, 2005:4).

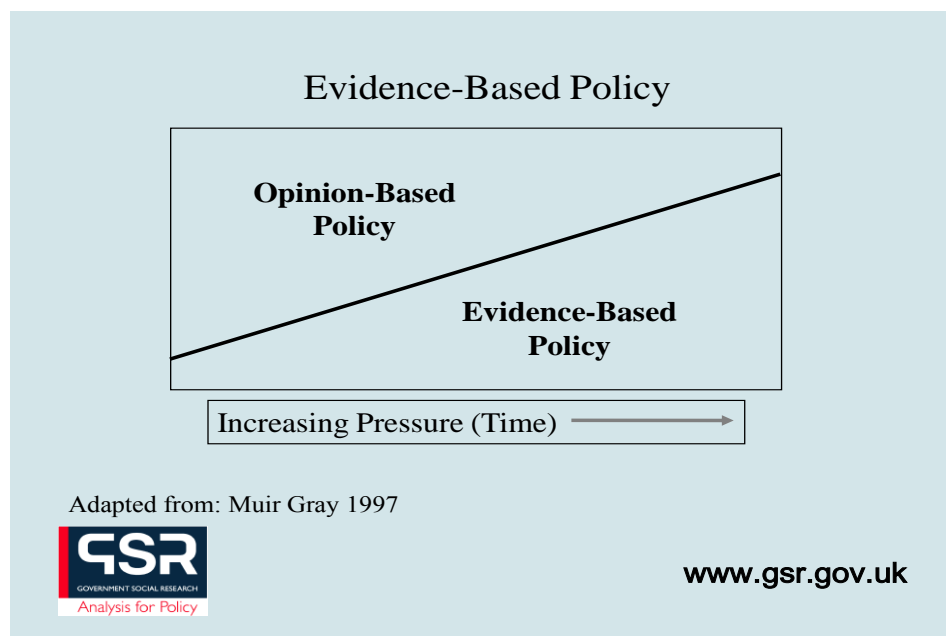


Figure 3: Reducing use of opinion in policy development

Source: United Kingdom Government Social Research

This is not saying that people’s views are ignored. Rather people’s views are a source of experiential evidence. The use of different methods for understanding different stakeholder perspectives and to provide evidence of how policy affects people’s daily lives is a necessary and central feature of policy analysis (Davies, 2006). However, what is prominent is fear of the perceived downside of opinion - dubious decisions

based on hunches, spurious beliefs, speculation and bias, for example. This fear, it seems, outweighs fear of the downside of rational analysis - the production of ramifying effects and changes unable to be controlled, managed, or understood expressed in the forces-of-change argument.

The graphic above in Figure 3 of evidence as insulating policy analysis from opinion is one that informs many accounts of evidence-based policy that stem from the United Kingdom Government's dissemination of its model. The rational retreat from opinion has been accompanied by a strand in the discourse that impugns, sometimes mocks, even denigrates what may fall under the rubric of "opinion". For instance, Geoff Mulgan (2003a), when Director of the United Kingdom Prime Minister's Strategy Unit, rehearsed the key message of the eschewal of opinion that underscores evidence-based policy in a graphic at the end of a power point presentation *Evidence and strategy: UK lessons*, shown in Figure 4 below. In this particular illustration the type of opinion to be avoided in policy is that of spurious convictions held by decision-makers.

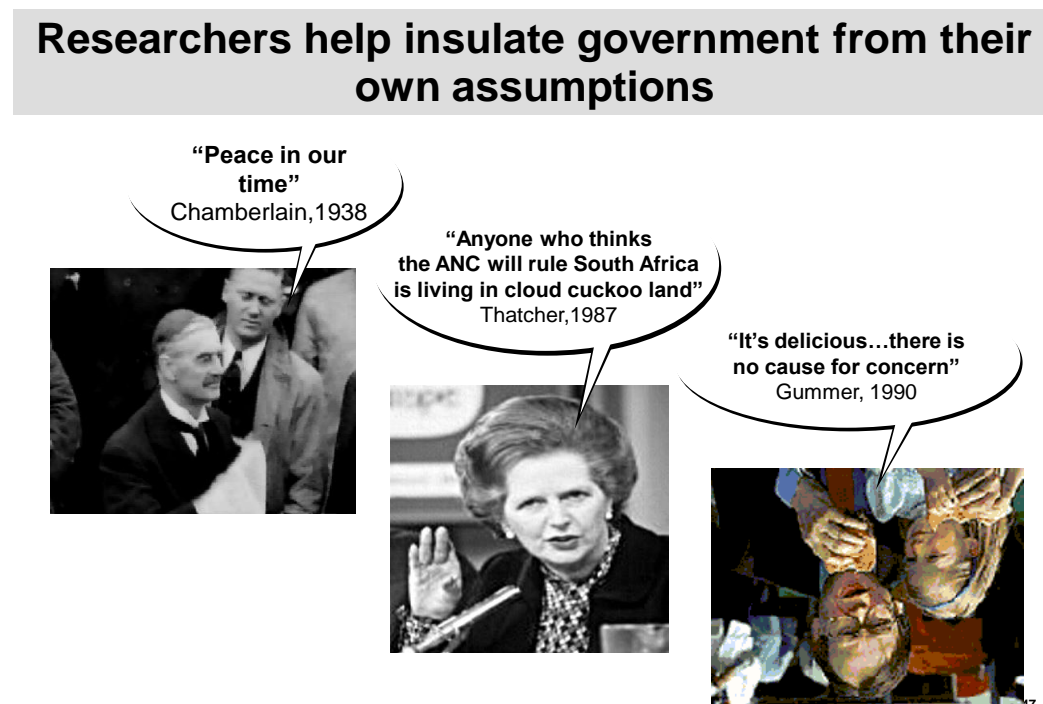


Figure 4: Evidence insulating policy from opinion

Source: Mulgan (2003a)

This discourse is said by Rudolf Klein (2003:429) to be based on a platitude: ‘The platitude is that policy should be *informed* by evidence. Who could possibly disagree?’ Frequently, found in the evidence-based policy literature and often used to explain evidence-based policy, are certain stock remarks which are used to refer to ways of knowing that are not scientific or scientific enough. This sceptical strand of discourse, moreover, purports that the reason why policies fail or have unintended repercussions and consequences, is due to non-scientific elements crowding out rigorous science from policy development (United Nations Educational, Science and Cultural Organisation, 2006).

By way of example, a cull of the literature from a variety of sources includes the following stock remarks.

Governments have become ravenous for information and evidence. A few may rely on gut instincts, astrological charts or yesterday’s focus groups. But most recognise that their success ... now depends on much more systematic use of knowledge than it did in the past (Mulgan, 2003b).

As for the absence of analytical rigour, it leaves the field open for prejudice, dogma, and spurious “common sense” (United Nations Educational, Science and Cultural Organisation, 2005:742).

Without evidence, policy makers must fall back on intuition, ideology, or conventional wisdom – or, at best, theory alone. And many policy decisions have indeed been made in those ways. But the resulting policies can go seriously astray, given the complexities and interdependencies in our society and economy (Banks, 2009:3).

Data deficiencies inhibit evidence-based analysis for obvious reasons. They can also lead to reliance on ‘quick and dirty’ surveys, or the use of focus groups.... They have a purpose, but I think it is a more superficial one, better directed at informing marketing than analysing potential policy impacts (Banks, 2009:11).

[Education] is too important to allow it to be determined by unfounded opinion, whether of politicians, teachers, researchers or anyone else (EBE Network, as cited in Biesta, 2007:4).

However, without analysis, important policy choices are based on hunches and guesses – sometimes with regrettable results (Walker, 2000:11).

Social policies and strategies have often been devised and enacted without the benefit of systematic inquiry. Initiatives frequently go awry, or have

unintended consequences. This is the craft model of practice at work, based on intuition and guesswork, rather than inquiry (Salmond, 2003:1).

The United Kingdom model, it seems, evokes an attitude towards the types and hierarchy of evidence.

Hierarchy of evidence

Consistent with the marginalisation of opinion in policy, a significant proportion of the evidence-based policy literature is devoted to questions about the rigour of research, what counts as credible evidence produced from research, and the need (or not) for standard criteria for research quality. This aspect of the literature can be viewed as the expression of a formal attitude towards those methodologies considered not capable of proof that something works, that is, methodologies that are viewed as not scientific enough. In the evidence frame, qualitative methodologies fit this category. Although, as Head (2010:17) notes, ‘the central agencies have recognized that qualitative studies are important, provided they are conducted with appropriate methodological rigour’, qualitative researchers are under pressure to increase the reliability and validity of their findings (Morse 2006b:4; Denzin, 2009). Viewed as having a much greater propensity for bias (opinion creeping in) than inquiry in the positivist tradition, the interpretative tradition of qualitative inquiry, it seems, does not have the confidence of reformist evidence-based governments.

The insistence described above on positivist approaches as the benchmark for best available evidence has resulted in a hierarchy of evidence, methodologies, and of expert opinion. Within the social sciences academic community, however, talk in these terms has provoked controversy, as shown by the recent phase of debates in the literature (Biesta, 2007; Denzin, 2009; Donaldson et al., 2009; Morse, 2006a; Stronach, Piper & Piper, 2004). At the top end of the putative hierarchy, the “hard” positivist sciences are placed, while “soft” social sciences are at the bottom end. In this milieu, what appears to be intractable is the degree of scepticism expressed about whether interpretative qualitative inquiry can deliver methodological rigour (cf. Morse, 2006a). Since evidence-based policy posits a fixed hierarchy for the value of evidence, which then reproduces the primary elements of the rationality project and a policy practice that is subjected to it, it is difficult to see how such best practice in

policy analysis, if adhered to, could orchestrate innovation and the finding of new solutions in the process of policy analysis problem solving.

The above discussion has been about systematic inquiry. Within this though, it is clear that how citizens think about policy issues is not adequately attended to or properly understood – even at the stage of discussion, debate, and argument. There are several reasons for this. Firstly, this is because of the way evidence is defined; secondly, because methodological rigour presupposes what can count as useful evidence; thirdly, because of the rift between what is considered opinion and what is considered knowledge, and fourthly, because of lingering attitudes that impugn non-scientific thinking. I propose that this lacuna becomes particularly problematic when it comes to solving complex, intractable and “wicked” problems. But to embrace understanding of this kind, the problem solving process would have to be bound closely to the real concerns and viewpoints of citizens. From this viewpoint, complexity capability must be implicated in social rationality. It is in this direction that arguments about how to effectively address “wicked” problems point.

“Wicked” or complex social policy problems

In this section I concentrate on the original argument of “wicked” problems advanced by the system thinkers Horst Rittel and Melvin Webber (1973) from the University of California, Berkeley, in order to develop the notions of social processes and rationality introduced above. According to Rittel and Webber (1973), the kind of knowledge at which policy makers have to aim is found in social processes and the rationality of stakeholders and citizens. Rittel and Webber’s (1973) assessment of the difficulties with conventional professional practice in fields such as planning and policy analysis can be read as an exposition of what any form of rationality (scientific, social, personal) must contend with in the process of coming to know the particular complexities that may surround a policy question. The work of Rittel and Webber is treated as a primary resource for academics and policy practitioners presently exploring the characteristics of “wicked” or complex problems and the challenges they pose in contemporary policy making (Australian Public Service Commission, 2007; Chapman, 2010; Head & Alford, 2008; Roberts, 2000; also Fischer, 1993; Innes, 1996; Mason & Mitroff, 1981).

The basic argument

In their paper, *Dilemmas in a General Theory of Planning*, Rittel and Webber (1973:155) summarised the problem of “wickedness” as follows:

The search for scientific bases for confronting problems of social policy is bound to fail, because of the nature of these problems. They are “wicked” problems, whereas science has developed to deal with “tame” problems. Policy problems cannot be definitively described. Moreover, in a pluralistic society there is nothing like the undisputable public good; there is no objective definition of equity; policies that respond to social problems cannot be meaningfully correct or false; and it makes no sense to talk about “optimal solutions” to social problems unless severe qualifications are imposed first. Even worse, there are no “solutions” in the sense of definitive and objective answers.

“Tame” or as Rittel and Webber imply, “tamed” problems, are straightforward insofar as they are amenable to standard analytical approaches used to structure the way problems are understood and ultimately how they are responded to. The argument of “wicked” problems, in contrast, starts from a view that there is a class of problems that are not so amenable to analysis. Problems in this class are not so ‘definable, understandable and consensual’ (Rittel & Webber, 1973:156) because they manifest a combination of and sometimes all, of the following features as identified by Rittel and Webber (1973, 161-167). In brief:

1. There is no definitive formulation of a wicked problem.
2. Wicked problems have no stopping rule.
3. Solutions to wicked problems are not true-or-false, but good-or-bad or, more likely, better or worse.
4. There is no immediate and no ultimate test of a solution to a wicked problem.
5. Every solution to a wicked problem is a ‘one-shot’; because there is no opportunity to learn by trial-and-error, every attempt counts significantly.
6. Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan.
7. Every wicked problem is essentially unique.
8. Every wicked problem can be considered to be a symptom of another problem.

9. The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution.
10. The planner has no right to be wrong.

Rittel and Webber's argument directs attention to three focal elements: plurality, ethics and, as well, to the "new thinking" encompassed by the sciences 'of the 1990s' mentioned by Lubchenco (1998:495) in her address to the AAAS. Each of these elements is discussed in more detail below to further the argument that complexity capability in evidence-based policy analysis is limited.

Plurality

The word "plurality", as used by Rittel and Webber, has affinities with early pragmatist thought as well as being synonymous with contemporary usages of the word "complexity". In *Pragmatism: A new name for some old ways of thinking* (1907) and *A Pluralistic Universe* (1909) James argued that the world is not a closed and finished universe but an open and evolving multiverse. The human experience is of disconnection and various kinds of unity and interconnectedness in a world of flux. Forces of pluralism involve not just numbers ("more than one" or "a multitude") but also: uncertainty; novelty; ambiguity; dynamic interdependencies; and an increasing variety or diversity in society (see Bernstein, 1997 for an account of pluralism as a theme in pragmatist thought). This insight provided by plurality, namely, of the pervasive multitude and variety in social contexts - for example, the variety in and differentiation between groups, perspectives, understandings, interests, intentions, types of thinking, values, meanings, lifestyles and experiences of personal life - means, as a matter of practicality, that neither is there nothing like just one experience or unitary opinion or unique view, nor is there nothing like unique correct definitive solutions to problems in the social context (Rittel & Webber, 1973).

James' (1890) argument in *The Importance of Individuals* offers further insight to the pluralist line of thought. James (cited in Haack, 2010:3) observed that 'the preferences of sentient creatures create the importance of topics'. He also said: 'the zone of the individual differences and of the social "twists" which ... they initiate, is the zone of formative processes'. Hence (and here I follow Haack, 2010:4), James points to the

relations between many points of view or opinions as significant since among these we see “wicked” problems (social twists) ‘in the making’. With this view a “wicked” problem can be thought of as a manifestation of a particular instance of social complexity. Moreover, since policy analysis is a practice in this peopled context where complexity, the winding of diverse views about one another, is in the making, there are also ethical issues to consider.

Ethics

When Rittel and Webber (1973) coined the term “wicked problems”, they meant ‘tricky (like a leprechaun) ... vicious (like a circle) ... or aggressive (like a lion, in contrast to the docility of a lamb)’ (Rittel & Webber, 1973:160). Their use of the word “wicked” was intended to signify both the nature of the difficulties “wicked” problems presented to policy makers and a moral or ethical imperative to act responsibly and treat “wicked” problems for what they are. They convey a key message through their personification of wickedness: Handling a lion requires a different approach from handling a lamb - ‘it becomes morally objectionable for the planner to treat a wicked problem as though it were a tame one, or to tame a wicked problem prematurely, or to refuse to recognise the inherent wickedness of social problems’ (Rittel & Webber, 1973:161).

Of the ten features of “wicked” problems identified by Rittel and Webber listed above, the tenth is a reference to the ethical component made explicit in their argument. Rittel and Webber point out that policy practitioners who act as ‘applied scientists’ (Rittel & Webber, 1973:160) work under a set of constraints that differ from those who operate in a science context. In view of those constraints, Rittel and Webber argue that the ability of policy professionals to solve problems in the way scientists can solve their problems is called into question. As they explain:

It is a principle of science that solutions to problems are only hypotheses offered for refutation ... based on the insight that there are no proofs to hypotheses, only potential refutations. The more a hypothesis withstands numerous attempts at refutation, the better its ‘corroboration’ is considered to be. Consequently, the scientific community does not blame its members for postulating hypotheses that are later refuted (Rittel & Webber, 1973:166-167).

In other words, the scientist “doing science” has the right to be wrong. Peirce (1898) made a similar argument in his Cambridge Conferences Lectures, *Philosophy and the Conduct of Life* in so far as he speaks of the ideal condition of the scientific man:

Its [science] accepted propositions, therefore, are but opinions, at most; and the whole list is provisional. The scientific man is not in the least wedded to his conclusions. He risks nothing upon them. He stands ready to abandon one or all as soon as experience opposes them. Some of them, I grant, he is in the habit of calling established truths; ... Still, it may be refuted tomorrow; and if so the scientific man will be glad to have got rid of an error (Peirce, cited in Stewart, 1993:135-136).

Being “wrong” is viewed as integral to the scientific pursuit of truth. In contrast, for the policy professional “doing policy” the aim, as Rittel and Webber (1973:167) put it, is ‘to improve some characteristics of the world where people live’. The fifth feature of “wicked” problems identified by Rittel and Webber, that is, what they refer to as the “one-shot”, establishes a significant constraint on the right to be wrong in professional policy practice: ‘every implemented solution is consequential. It leaves “traces” that cannot be undone ... many people’s lives will have been irreversibly influenced’ (Rittel & Webber, 1973:163). Unintended repercussions and consequences of the actions that professionals generate affect people in ways that matter.

Impacts of implemented policy are not dispelled by processes of refutation; they are irreversible. In view of this situation, Rittel and Webber contend that the professional policy practitioner has no tolerable right to be wrong. However, this is a nuanced argument. Their contention is not the same as arguing that there is no right to make mistakes or mistakes are intolerable, since it is from mistakes that we learn. They argue that when professionals are alert to “wicked” problems and know that the ‘cognitive style of science’ (Rittel & Webber, 1973:160) has not developed to deal with the forces of pluralism and may not be appropriate in particular circumstances, then, professionals are liable for the consequences of their doing. It would be a mistake to recognise their argument as one against positive science *per se* and the knowledge associated with its practice. Rittel and Webber argue for a relevant professional practice in a social context of complexity. And one that was ethically aware.

The concept of “wicked” problems links the idea of society to the idea of a dynamic interacting open system subject to the forces of plurality and change (Rittel & Webber, 1973:156). According to Rittel and Webber (1973:169), there is little in the application of traditional scientific thinking that can ‘dispel wickedness’ which the forces of pluralism in society provoke. Since this is the case in their view, Rittel and Webber (1973:156) describe science meant for a world of closed systems as a ‘weak strut’ in professional policy making.

Without doubt the process of problem-solving establishes a public policy-science interface, yet, any conviction that the application of science automatically means good sense is made of a “wicked” problem is problematical. Linkages between the sciences and society and the interface between the different perspectives and activities of scientific or systematic research, politics, and policy analysis are implicated in questions of complexity capability and new thinking that are part of the rationale for evidence-based policy. In order to understand the contexts in which present day policy analysis encounters complexity I will first rehearse the idea of complexity capability.

Complexity capability

Everyday definitions of “complex” are relevant in policy contexts. As mentioned previously, these include things which are: opposed to simple; made up of various interconnected or interwoven parts, patterns or elements; hard to understand or analyse. In her discussion exploring the concepts of reality and thinking in *The Life of the Mind*, the political scientist Hannah Arendt (1978:51), referred to a tenet of Peirce’s pragmatism: ‘reality is there even if we can never be certain that we know it’. This insight of realness, namely, of ‘sheer thereness’ (Arendt, 1978:51) applies to complexity acknowledged to be at the heart of policy making. In so far as complexity is something we experience in the operation of our thinking and in the contexts in which we act, and as invoked in policy practice, we can say complexity exists, practically in reality.

Policy makers recognise that issues surrounding social policy questions are often complex. The issues interconnect and encapsulate the complexity of human behaviour (Davies, 2006; Mulgan, 2001a). In Brunner’s (1991, 1997) account of the policy

movement, he notes that there are alternative views expressed about what might constitute “the common problem” of policy analysis when it comes to complexity in policy. According to Brunner (1991) there is a view that policy analysts lack satisfactory concepts or theory that might resolve increasingly complex problems, or alternatively, and the view Brunner (1991:67) subscribes to, is:

Typically, as an analyst simplifies a policy problem, he or she misconstrues some important part of the context or overlooks it altogether. But what is overlooked or misconstrued in the analysis nevertheless affects outcomes in the real world ...

In this view, the realness of complexity is often realised in policy ‘in retrospect’, in other words ‘after resources have been committed and the unintended and often adverse results start coming in’ (Brunner, 1991:67).

In policy, as in other fields, it is one thing to know that issues surrounding policy questions are complex, and another to know about the particular complexity at issue. From a policy practitioner perspective, the ability to know that there is complexity is not at stake. Davies (2006), who wrote under the auspices of the United Kingdom Government, for the Chief Social Researcher’s Office in the Prime Minister’s Strategy Unit of the Cabinet Office, loosely indicates the kind of complexity capability that is needed in policy. Crucial for policy, he states, is the capability, first of all, ‘to know about this complexity’ (Davies, 2006:102), that is, to know of the particular complexity. Next, and equally as important is the ability to have insight to respond to ‘it effectively and efficiently’ (Davies, 2006:102). In pursuit of such knowledge and insight a question of the “how to” kind arises: how to pay attention to context and to what may be the particular complexity at hand before problems and solutions are defined, and resources are committed (Brunner, 1991).

Missing from among ideas about complexity capability in policy, however, is the idea of common sense-making as described by Peirce: the common, abductive capacity to complexly think and make our way, individually and together, in a world of complexity about which we are uncertain. To bear fruit, this embodied complexity capability does not require ‘expensive ... instruments, but only careful attention to our everyday experiences’ (Haack, n.d.:4). His argument is a counterargument to the idea that complexity engenders the necessity of opting for analytical rigour and rejecting

opinion, common sense, or intuition. Each has something important to offer to inquiry.

Notwithstanding that the world is full of complexities, the main concern for policy analysts, and for the argument of this thesis, is how to know about the policy-relevant complexity of issues emanating from the social context.

The literature debating the relationships between politics and policy analysis, theory and practice, belief and action, research and application in policy making is extensive. In this thesis, science, politics, and policy analysis are differentiated in simple terms. My aim is to convey a standard view of how these activities are defined in relation to each other in a context of public policy. In such a standard view, the three terms (science, politics, and policy analysis) may be described as follows:

Science: the development, provision, or interpretation of scientific knowledge (objectively proven knowledge); information gathered in a rational, systematic, testable, and reproducible manner (Lackey, 2007).

Politics: a collective, interest and value-laden process of conflict, debate, negotiation, deliberation, compromise, collaboration, decision and action. To cite Hannah Pitkin (1981:343), politics is “the activity through which relatively large and permanent groups of people determine what they collectively will do, settle how they will live together, and decide their future, to whatever extent this is within their power”.

Policy analysis: a formal assessment of the possible options for addressing a policy problem, the consequences and implications, and the articulation of reasons for the recommended course of action in the social context (Lackey, 2007).

As illustrated in Figure 5, the activities of science, politics, and policy analysis overlap. Complexity capability, characterised as knowing the particular complexity surrounding a policy question, is not restricted to any one sphere of activity. All three spheres share the predicaments of a common world marked by complexity and change. The question is whether traditions of systematic inquiry practiced in each sphere and overlapping at a nexus between each sphere, are adequate or sufficient.

This question, expressed in another way, is whether traditional science, with its criterion for analytical rigour, is capable of making a difference across all the spheres or whether the capability required at the nexus for seeing and becoming well enough acquainted with the issues that may in reality shape a complex policy problem is beyond the grasp of traditional science alone.

My argument for a revalorization of opinion, alongside traditional scientific insights, is behind my claim that complexity capability at the nexus of science, policy, and politics needs to be differently enabled. In this regard, Rittel and Webber (1973) were early advocates for the need for so-called “new thinking” in policy contexts beyond the embrace of both Newtonian science and its characteristic simplifying assumptions and the Popperian version of “the logic of discovery”, that is hypothetico-deduction, that Popper argued, properly demarcates (scientific) knowledge from (unscientific) opinion.

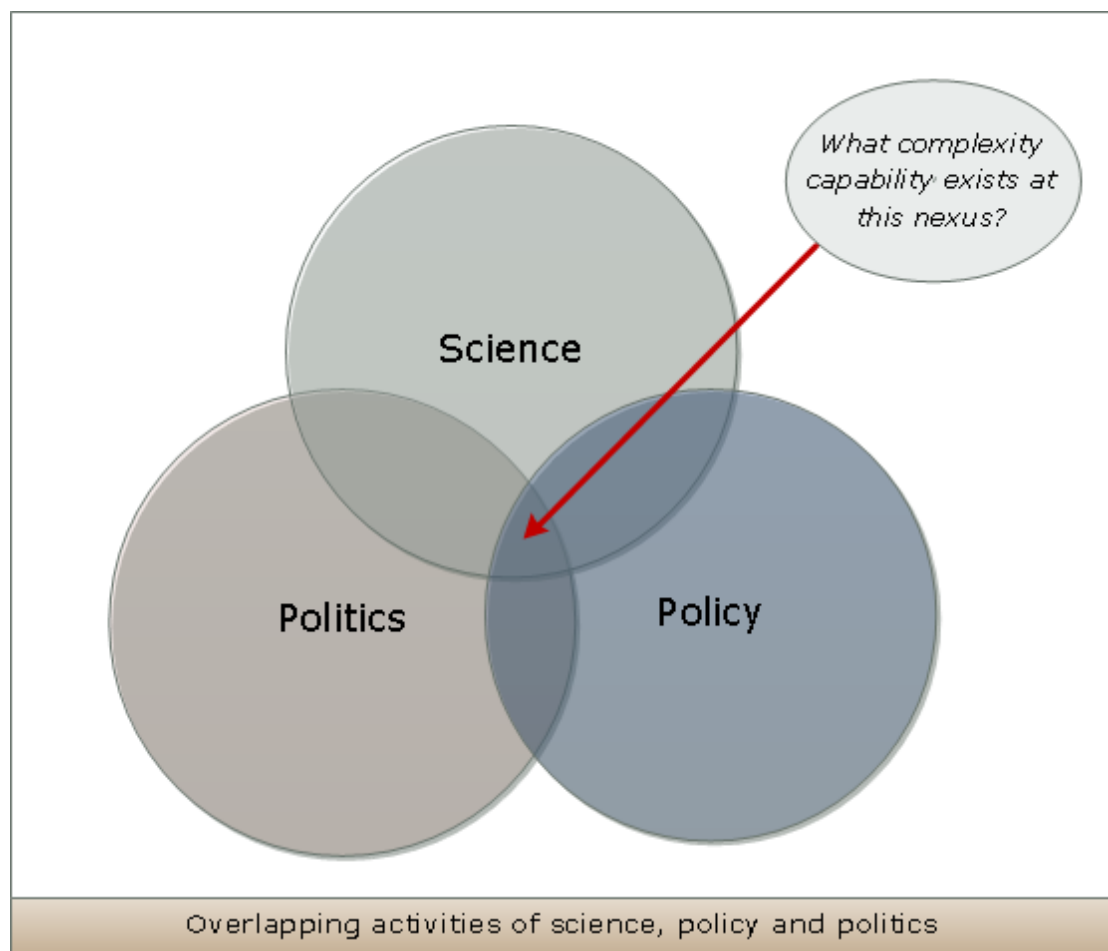


Figure 5: Three activities: science, politics, and policy analysis

New thinking

“Wicked” problems resist analysis. To begin to remedy this situation requires a move from reductionist to holistic approaches. The new principles of thought evinced by “thinking in systems” or “thinking in complexity” are using a conception of an irreducible whole, such as a system, a complex, a network, or a web. These principles compel the development and use of methodological approaches that are incompatible with strict reductive, deterministic, predictive and objective science, and rational analysis. (See Capra, 1997; Checkland, 1981; Gershenson & Heylighen, 2005; Jackson, 2001). Rittel and Webber suggested that complex social problems could be tackled using a systems-based means of structuring discussion, debate, and argument. In their words:

The systems-approach “of the first generation” is inadequate for dealing with wicked problems. Approaches “of the second generation” should be based on a model of planning as an argumentative process in the course of which an image of the problem and of the solution emerges gradually among the participants, as a product of incessant judgment, subjected to critical argument (Rittel & Webber, 1973:162).

“First generation” is a reference to the “hard” positivist mode of systems thinking that preceded the emergence of “soft” systems thinking (Checkland, 1981). Traditional operations research and systems analysis are in this “hard” mode. The first generation of approaches proved successful within the fields of engineering and systems analysis but when extended to the social realm clear-cut success was elusive (Checkland, 1981). The use of first generation approaches became a matter of concern and the subject of their use became a focus of research (see Checkland, 1981, who discusses the problem of first generation systems thinking in depth). An account of systems thinking is relevant at this point, in order to make better sense of what Rittel and Webber were arguing for.

Systems thinking

Systems thinkers point out that the methodologies associated with systems thinking were developed precisely to allow analysis of complex problems (Checkland, 1981; Jackson, 2001; Midgley, 2003; Ison & Stowell, 2001). There are three methodological streams of systems thinking involving three distinct rationales (Jackson, 2001). These

three methodological streams conform to the familiar modes of knowledge acquisition that are categorised positivist, interpretative, and critical (Checkland, 2000; Held, 1980; Jackson, 2001). In the systems thinking literature, methods from all streams can be used to engender and structure discussion and debate while bearing in mind their different theoretical rationales and hence differentiated purpose (Checkland, 2000; Jackson, 2001; Lyons, 2005; Midgley, 2003). All three streams of methodologies use modelling techniques which draw upon system ideas. All three streams evince a melioristic stance and focus on improving specific real-world problem situations (Checkland, 1981; Jackson, 2001). In generic terms, the three methodologies referred to in the systems literature can be described as follows:

“Hard” (functionalist) methodology is associated with positivism. The basic assumption is that systems are objective aspects of reality (the world is systemic). This approach involves quantitative analysis and the use of numerical models, for example, in the form of computer simulations, spread sheets, statistical analysis, large mathematical models or forecasting scenarios. The logical basis of the methodology is to work out the best way to achieve a goal, system design, and efficient and effective intervention. “Hard” systems methodology contributes to a positivist discourse of expertise, analytical rigour, and authoritative judgment. ‘Intervention is conducted on the basis of expert knowledge’ (Jackson, 2001:241).

“Soft” (interpretative) methodology is based on the assumption that the process of inquiry into a problematic situation can be organised as a system (inquiry is systemic). This approach involves qualitative analysis based on exploration and interrogation of people’s perceptions. The approach involves, for example, the use of rich pictures, modelling by storytelling, and cognitive or dialogue mapping techniques. The logical basis of the methodology is to structure discussion and debate about situation improving changes which are feasible and desirable under changing circumstances. “Soft” systems methodology contributes to a discourse of shared understanding, consensus, participatory democracy, and learning (Checkland, 1981, 2000). ‘Intervention is conducted on the basis of stakeholder participation’ (Jackson, 2001:241).

“Emancipatory” (radical) methodology is associated with critical theory. Work in the area of soft systems thinking has led to the development of what has become called

emancipatory systems thinking. Such thinking advocates the critical and complementary use of various systems approaches. Spearheaded by work of Werner Ulrich (1983), Robert Flood (1990), and Robert Flood and Michael Jackson (1991), this approach accommodates the knowledge-constitutive interests of Jürgen Habermas (1971) and the interpretive analytical orientations of Michel Foucault (1972) through a meta-methodology involving constant critical reflection (Laszlo & Krippner, 1998). The meta-methodology serves as the basis for the generation of a new methodology that critically applies various systems approaches encompassing “hard”, “soft”, “radical” and postmodern approaches to problem solving. In this approach, the presupposition is that not all have equal authority or power over the situation, with the potential for some to dominate and subordinate or marginalise the perspectives and interests of others. Analysis aims to reveal the pertinent issues and who is disadvantaged by current systemic arrangements. Modelling is used to reveal sources of alienation and disadvantage. The logical basis of the methodology is intervention to deal equitably and effectively with issues and suggest possible actions that will improve the position of those disadvantaged by the status quo. Emancipatory systems methodology contributes to a discourse of critical and social awareness, stakeholder participation, collaboration, and dialogue leading to radical social change. ‘Intervention is conducted in such a way that the alienated and/or disadvantaged begin to take responsibility for the process’ (Jackson, 2001:241).

Since the argument of wicked problems was first presented, further work in this area has led to an active interest in systems and complexity thinking combined with collaborative coping strategies as indicated, for example, by the Australian Public Service Commission’s (2007) discussion document, *Tackling Wicked Problems: A Public Policy Perspective*. Mulgan (2001a:4) referring to the United Kingdom setting, noted a demand for systems thinking in government growing out of the recognition for ‘a more holistic understanding of phenomena’. Support for systems thinking is evidenced by the promotion of systematic modeling in the United Kingdom Government report, *Adding it Up* (UK Cabinet Office, 2000). In an address to a gathering of the United Kingdom Systems Practice for Managing Complexity (SPMC) network (see Ison & Stowell, 2001), Mulgan (2001a) acknowledged that applying systems ideas was not widespread in government. In his assessment, the lack of widespread use of systems thinking in government could be attributed in the main

to the sunk costs in established ways of working; and also to concern about evidence. Mulgan (2001a:29) stressed the need in government for ‘theoretical reflections to be matched with rigorous applications of that theory’. Again, methodological rigour matters.

To elaborate, policy thinking in evidence mode affords primacy to one general methodology, that is, one set of principles of policy method for the process of policy development and for looking at policy impacts whether or not problems are thought “tame” or “wicked”. The set of principles guides analytically rigorous policy practice that has at its heart the hypothetico-deductive scientific method. Policy practice, in the words of Gary Banks (2009:9), the head of the Australian Productivity Commission: ‘test[s] a theory or proposition as to why policy action will be effective - ultimately promoting community wellbeing - with the theory also revealing what impacts of the policy should be observed if it is to succeed’. The argument concerning wicked problems, however, would seem to suggest that this form of capability and expertise differs from and is contrary to the kind of complexity capability that is needed for intractable situations.

To clarify further the problematic of “tame” (hard, positivistic) approaches to “wicked” (soft, intractable) problems and to draw to a close this critique of the evidence-based policy movement, I introduce in advance of the discussion of complexity thinking in the following chapter an argument drawn from the literature on complexity and issues of epistemology. This argument concerns the appropriate use of predictive modelling, especially computer modelling as the new tool for thought or so-called “third way” of doing science (Sanders & McCabe, 2003). It is an argument that has relevance for policy-relevant research and analysis and has a bearing on my explanation of epistemological choice as a factor in both policy success and failure - which is the focus of my analysis of the Schiphol Airport case. The argument implies that when it comes to conditions of complexity, a new ethic conjoined with new thinking would need to be more broadly based than solely on deductive power and computational models, requiring a new rigour for understanding and innovation, not just explanation and prediction.

Modelling and prediction in a complex world

Steven Banks and Robert Lempert (2004:264-265) indicate a portrayal of rigorous predictive modelling (see Figure 6 below). According to Banks and Lempert (2004), researchers who are aware of complexity, increasingly, are backing away from deductive modelling whereby the researcher starts with a model of a reality constructed in the first instance as intrinsically simple (see also Batty & Torrens, 2005). Banks and Lempert (2004:6) point out that a researcher treating such models as predictive may go on to commit an act of ‘invalid reasoning’. The invalidity of reasoning arises in the act of conflating “properties true of the model” with “properties true of the actual system”. Donald Mikulechy (2005:343) has argued that a modelling relation of this type culminates in a loss of perspective since ‘the epistemology spills over into ontology’. In other words, the complex real world becomes excluded to be replaced with paradigms and models (Mikulechy, 2005).

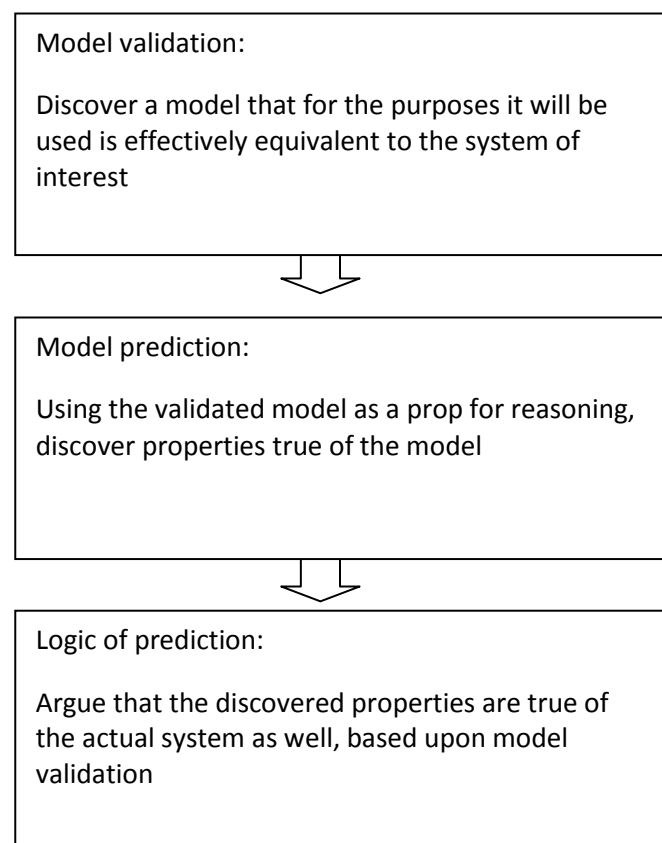


Figure 6: Predictive modelling

Source: based on Banks & Lempert (2004)

Peter Allen and Liz Varga (2007) make the same argument. Rather than gaining an accurate, as far as possible, reflection and correspondence with a complex real world situation, models move, increasingly, far from actual reality. They give the example of modelling an ecosystem using population dynamics. Figure 7 reproduces a diagram Allen and Varga (2007) use to show what happens when the computer is used as the new tool for thought in relation to complex phenomena, but used in the old way of scientific practice. Their example refers to an ecosystem model of interacting populations where, in the Figure, the computer manipulations of population data over time produce simplifications that do not reflect what happens in the real world.

Algorithmically defined systems – a calibrated ecosystem - fed into the computer runs forward in time. Allen and Varga (2005:25) maintain:

...that although the model was calibrated on what was happening at time $t=0$ it diverged from reality as time moved forward. The real ecosystem stayed complex, and indeed continued to adapt and change with its real environment. But this shows us that the mechanical representation of reality differs critically from that reality. Our “mechanistic epistemology” fails to represent reality!”

‘Third way’ of doing science

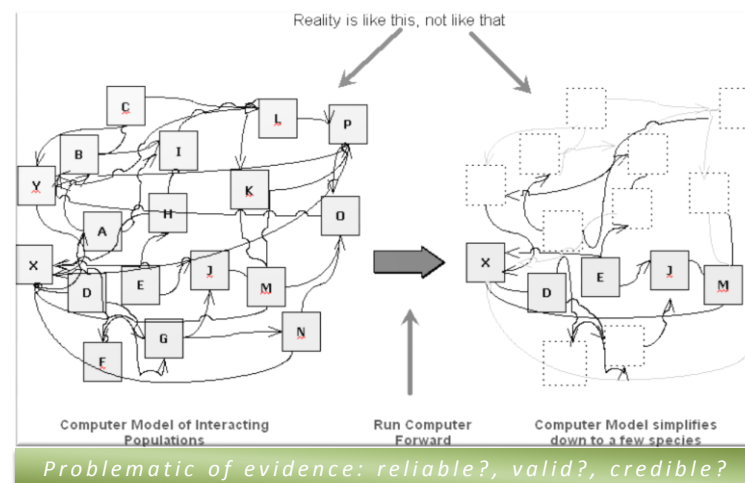


Figure 7: Modeling relation

Source: based on Allen & Varga (2007:25)

On a continuum

A duality is in play. Whereas coping with the forces of change afforded a rationale for analytically driven solutions in a context of complexity, the argument of “wicked” problems provides a rationale for the use of the “softer” processes of inquiry. More specifically, along with the replacement of reductionism with holism, the “softer” modes of systems thinking method bring subjective processes to bear on a particular problem; open discussion facilitates social explanation of the problem, and what comes to be taken as knowledge emerges from the discursive interaction of analysts, stakeholders or citizens, and decision makers (Checkland, 1981; Fischer, 1998). As reflected in the Australian Public Service Commission’s (2007:iii) statement, ‘tackling wicked problems is an evolving art’, this alternative way of working gives shape to a less formal policy practice whereby knowledge is conceived broadly and can be subjected to negotiation (see Deelstra, Nooteboom, Kohlmann, van den Berg & Innanen, 2003). Rationality is defined more in subjective and intersubjective terms with emphasis, for example, on insights, shared understandings, creative and innovative thinking, and learning.

Overall, this chapter has suggested that evidence-based policy is a framework for thinking about policy and practice, which promotes a stance in which two epistemological poles - the evidence or high quality, reliable knowledge pole is juxtaposed with the opinion or low quality, unreliable knowledge pole. These poles define the ends of an epistemological spectrum of sources of “credible” knowledge expressed below in Figure 8.

This spectrum can be viewed in terms of the relationship of knowledge and rationality to evidence-based policy. The means by which knowledge can be held and expressed ranges from the experiential, subjective opinions and judgments of citizens - the zone of intuition, common sense, hunches and guesses - through to the zone of scientific analytic rigour and reliable and valid knowledge, which is expressed in quantitative form, by experts and specialists. The acquisition of knowledge is characterised by a combination of elements that are shown in the list below the continuum in the diagram. In light of the use made of the conception of evidence in evidence-based policy, moving from left (evidence) to right (opinion), through all the possible epistemological demarcations that could figure on the continuum (for example

positivism, interpretivism, critical theory, common sense-making), at some point on the spectrum how knowledge is looked at changes from “scientific” to “not scientific enough”. In that change, complexity and analytic capabilities are mutually implicated in so far as a gain to whatever degree of capacity in one brings a loss to whatever degree of capacity in the other. Broadly, referring to the spectrum, complexity capability expressed as knowing the issues surrounding a policy question in social context emerges to the right and analytic capability defined by positivism emerges to the left.

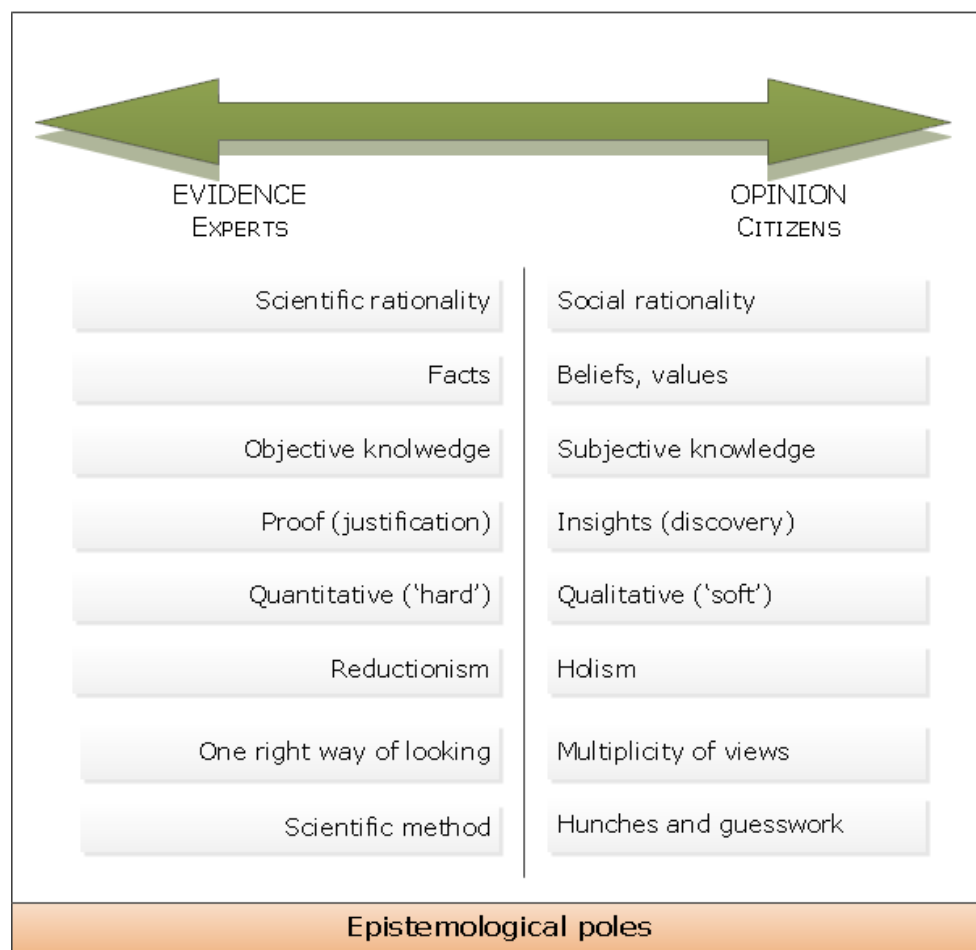


Figure 8: Epistemological poles of credible knowledge

It seems appropriate, and timely, at this epistemological juncture to introduce Q methodology in action. The process of raising and discussing policy thinking and complexity capability is designed to highlight the space in which, I contend, Q methodology can emerge as a plausible alternative to those modes of knowledge

favoured by evidence-based policy thinking. A view of the efficacy of Q methodology, even ahead of my explanation of what it is and how it works, can be seen in the specific case of the controversy surrounding the planning for a fifth runway for Amsterdam Schiphol Airport. This case serves as a clear illustration of the differences implicated in making choices between two epistemological alternatives.

At the core of policy analysis is interest in the determination of a public course of action. How to put into effect a decided course of action is also of interest. What matters is that the problematical situation is improved; not exacerbated. Policy practitioners are taught that to practice professionally is to engage in rational, systematic problem-solving activity. Sound policy analysis is inextricably linked to the ability to frame an issue, gather, and analyse information in such a way that joins theory and evidence to structure a feasible and helpful response (Weimer & Vining, 1999). Yet, as Michel van Eeten (2001:392) observes:

Policy analysts have great difficulty handling uncertain, complex, and polarized issues with conventional methods. Increasingly, policy analysts and public managers turn to varying types of stakeholder involvement to improve their understanding of the dilemmas and the feasible responses. Their hope is that stakeholder involvement will enable them to recast the issues into a more amenable, policy relevant form that provides a basis for action.

An implication of scientific paradigmatic thinking embodied in a policy analysis project is that explanation supplants understanding as a means of making sense of issues. As a consequence, the problematical nature of a policy situation can be exacerbated as was the case with the long-standing Amsterdam Schiphol Airport runway expansion controversy.

The idea expressed by the United Nations Educational, Science and Cultural Organisation (2006) forum on the social science-policy nexus that only a rigorous analysis can provide the means necessary for the determination of sound policy accords with a central tenet of policy analysis. The tenet, succinctly stated, is “look before you leap”, that is, know what you are getting into before you commit, and consider the possible consequences before acting. A rigorous analysis stands as a procedure for explanation. Just as a rigorous analysis closes the door to prejudice, dogma and spurious common sense suggested by the United Nations Educational, Science and Cultural Organisation forum, it can also close the door on understanding;

on “seeing” the situation as it is. When policy situations are experienced as uncertain, complex, and intractable, rigorously derived explanations alone do not help. Explanations are assumed to convey understanding of the particular situation. However, it is possible to have an explanation without having an understanding occurring, a situation that teachers, for instance, would know. Conversely, it is possible to understand a situation without having an explanation that can account for or determine it. Being able to see what will solve the problem can happen regardless of explanation.

The Schiphol Airport expansion controversy is an example of an intractable policy situation that was resistant to the hypothetico-deductive paradigm that governs most evidence-based policy analysis but was susceptible to an analysis grounded in understanding how stakeholders thought about the problem.

Case description – a fifth runway for Schiphol Airport

Controversy surrounding the fifth runway (from 1995)

Plans for a fifth runway for Schiphol Airport were described by a journalist for *FLUG Revue* as having ‘always been an explosive political issue’ (Rodenbücher, 2000:2). Analysis and decision making fuelled controversy in a drawn out attempt to produce a strategic plan for the long term development of the Airport. Controversy and political conflict was sustained until the problem ceased to be treated as a tame one and a change in practice and method enabled the problem to be approached in a “wicked” way (Deelstra et al., 2003; Kwakkel, 2008; Walker, 2000; van Eeten, 1999, 2001).

The core of the expansion controversy was the effort to balance the relationship between the economic importance of Schiphol Airport and the environmental impact of increasing air traffic. The controversy emerged from the tight coupling that exists between growth in air traffic and detrimental environmental impacts such as noise pollution, gas emissions, and other attendant health and safety risks. Airports effectively “bring home” this tight coupling. In immediate ways, people living in the vicinity of an airport experience the existence of this connection understand what it means in their corner of the world, and respond. Settings and circumstances may vary, but airports around the world replicate, or are capable of replicating, the tight coupling that exists at the moment between civil aviation and the quality of its

environs. To the extent that this connection is stable and definitely known it is not surprising that plans for airport expansion would foster controversy; certainly if the airport is close to densely populated centres (Organisation for Economic Co-operation and Development, 1998).

In contrast, loose coupling exists between the benefits that might accrue to a national economy and growth in air traffic capacity. Settings and circumstance do make a difference with other factors susceptible to change influencing the immediate relationship. The nature of the connection is less emphatic, more uncertain. Equally, it would be reasonable to expect controversy could be fuelled should the economy not reflect the claims of national economic benefit made to justify a specific expansion.

From the early 1990s, world air traffic had undergone rapid growth. Schiphol had evolved as a European hub airport, that is, a facility for passengers to transfer to or from onward flights. Due to a small domestic market, the airport strategic plan centered on tapping into the significantly larger transfer market as the mainstay of the airport's operations.

Schiphol's original layout was four runways in a tangent so that regardless of wind direction at least one runway could be used for landing and take-off. Owing to its hub status, Schiphol Airport needed to handle incoming and outgoing air traffic simultaneously. With four runways Schiphol Airport operated a two-and-one system. First, two runways were used for landing and one for take-off, and then the pattern shifted to two for take-off and one for landing. However, due to North Sea weather conditions (westerly winds), often the airport was reduced to using only two runways reducing capacity and efficiency. The addition of a fifth runway, according to the airport authorities, would give capacity to operate three out of five runways simultaneously and increase air traffic from 460,000 movements annually to between 520,000-600,000. In 2003, more than 30 years after planning started, and eight years after The Netherlands Government finally gave the go-ahead, Amsterdam Schiphol Airport's fifth runway was opened.

The period of interest in this case is from 1995. By this time it became obvious that the policy process was not working smoothly or effectively: controversy continued to build around both the policy analysis and the way knowledge was used to inform

policy development. By 1995 public debate had polarised for and against further growth and decision-making was in an impasse (Deelstra et al., 2003; Walker, 2000; van Eeten, 2001). In 1995 matters came to a head when The Netherlands Parliament ratified the Government's White Paper on the future of Schiphol. The White Paper allowed for the construction of Schiphol's fifth runway with provisos. The planning period was 20 years (from 1995 till 2015) (Kwakkel, 2008). Known as the "double decision", the plan was that an expanded runway would bring more flights and less noise disturbance while making an important contribution to the economy. Informing this belief was a model developed by The Netherlands Central Planning Bureau (CPB) (Walker & Marchau, 2003:3). The model assumed that the number of passengers passing through Schiphol was directly related to the value of The Netherlands Gross Domestic Product (Walker & Marchau, 2003). A constraint was imposed on the growth of the airport which limited the maximum volume of passengers and cargo per year (culminating in the maximum of 40-45 million passengers by 2015). Noise pollution was also subject to regulation with the specification of stringent noise limits. But, van Eeten (2000:44) points out, even at the time the plan was published it was clear that air traffic was growing faster than the models in use predicted (volumes in passenger and cargo had already reached the predicted volumes for 2004) threatening the implementation of stringent noise limits. At the same time the benefits of national economic growth appeared over-estimated. As it happened, the limits of the noise regulations were reached in 1999 (Walker & Marchau, 2003:3), leading to a temporary shutdown of the airport, and the maximum passenger limit was reached in 2005. According to Jan Kwakkel, Warren Walker, and Vincent Marchau (2007:39), whose interest is in the area of airport strategic planning and dealing with attendant uncertainties, such 'demand forecasts are practically always wrong' and 'often near impossible to implement'.

The need for the fifth runway was disputed by environmental groups and the local population, who had 'no faith' (Deelstra et al., 2003:533) in the predictions, questioning the computer model-based analysis used to inform decision making and public debate. It appears that was the case from the outset, even before the predictive knowledge was shown to be inadequate (Deelstra et al., 2003).

Reanalysis

The Netherlands Government had to reassess and redefine its civil aviation policy through a deliberative process with stakeholders (van Eeten, 2000; Walker, 2000). Hence, in 1996, the TNLI policy analysis project (Toekomstige Nederlandse Luchtvaart Infrastructuur or Future of Dutch Civil Aviation Infrastructure) was initiated. Involving three ministries (the Ministry of Transport, Public Works and Water Management; the Ministry of Housing, Spatial Planning and Environment, and the Ministry of Economic Affairs), the TNLI policy project was to address the policy question:

The demand for infrastructure for civil aviation transport in the Netherlands may continue to increase. Activities related to civil aviation have social, economic, safety, environmental, spatial, accessibility, and cost consequences. The question the nation must answer is whether or not to accommodate the demand in light of these consequences, and, if so, how (Walker, 2000:19).

The TNLI project commissioned a policy analysis study by RAND Europe (European-American Center for Policy Analysis). RAND Europe's brief was firstly to look at future developments of demand and capacity of air transport, and secondly, to consider alternative infrastructure options that could be implemented. In addition, a cost/benefit analysis was required (Walker, 2000). RAND Europe carried out a "hard" systems impact assessment study, with computer-based forecasting and the creation of scenarios as the main analytical tools. This computer model-based policy analysis was carried out in conformity with conventional best practice policy analysis procedures. The problem to be addressed had been identified, objectives were specified, criteria with which to measure alternative policies were determined, options for consideration selected, analysed and then compared in terms of projected costs and benefits (see Walker, 2000; RAND Europe, 1997). Warren Walker (2000) presents the RAND Europe approach detailing how their conventional policy analysis, 'based on the scientific method' (Walker, 2000:12), using a "hard" systems approach provided for a structured, rational, objective analytical process whereby policy choice 'based on hunches and guesses' (Walker, 2000:11) was avoided.

This reanalysis is the first analytical event, carried out during the period August 1995-October 1996 (Walker, 2000). Publications by RAND Europe and Walker (co-

authored) are drawn on for the outline that follows (RAND Europe, 1997a, RAND Europe, 1997b; Rahman, 1997; Walker, 2000; Walker, Harremoes, Rotmans, van der Sluijs, van Asselt, Janssen & Krayen von Krauss, 2003; Walker & Marchau, 2003).

Applied systems science

RAND Europe brought systems thinking and a model-based approach to bear on the Schiphol Airport expansion issue. RAND Europe's interpretation of the situation and the problem as framed drew attention to a policymaking process hamstrung by uncertainty because of the increasing complexity of an unpredictable, rapidly changing world. From their systems stance, a central question was how to deal with uncertainty about the future and the unanticipated changes in the world that will affect the system of civil aviation policymaking. They argued that the existing policy paradigm assumes the future can be predicted at least well enough to make successful policies. Yet, such an assumption is no longer credible by virtue of the fact that often policies prove untenable with unimagined and serious effects. As a consequence, predictive approaches are not appropriate. Moreover, since uncertainties continually exist and the future is unknowable a precise, accurate, scientifically certain determination of the question, "whether or not to accommodate future demand" was nigh-on impossible.

Walker et al. (2004:2) observe:

The future structural elements of the world are unknown and unknowable at the time of analysis – for example, which countries will be most powerful in 2030, how will the population be distributed between cities and outlying areas, how will the climate change? The answers for 2030 will be known with certainty in 2030 – but will remain uncertain until then.

Policies need to be adaptive, that is, devised not to be optimal for a best estimate future, but robust across a range of futures. Such policies are responses to changes over time and make explicit provision for learning. Hence, in terms of their approach, RAND Europe identified two objectives. The first was to do the analysis in accord with the logic structuring the conventional process of policy analysis: identify problem; specify objectives; decide on criteria with which to evaluate alternative options; select alternatives; analyse alternatives (using models); compare alternatives in terms of cost and benefits; implement chosen alternatives; monitor and evaluate

results. The second was to specify a framework for developing adaptive policies and an adaptive policymaking process for civil aviation in the Netherlands in order to deal with the uncertainty in analysis.

Model-based concept of the situation

In the RAND Europe policy analysis, analysts drew on a conceptualization of the policy making process that incorporates a system model in that process as depicted in Figure 9 below. Three elements of their policy analysis approach are highlighted: a system model of the system of interest (civil aviation infrastructure), context of complexity producing inputs to the system model, and outcomes of interest. The system model represents the cause-effect relationships characteristic of the system. It is used to focus on the response of the system to context and the system's performance, that is, the resulting values of the outcomes of interest. Outcomes of interest are those produced by the system that relate to the policy goals and objectives such as, for example, "reduce noise pollution" or "manage growth in capacity". Context encompasses external forces acting on the system. There are two forms of external forces: First, those that are outside the control of actors in the policy domain and these are a source of high uncertainty. They entail, for example, the economic environment, developments in technology, and the preferences and behaviour of people. Second, there are those developments within the control of the actors but nevertheless affect the structure and performance of the system. Policies are of this latter kind. Policy changes, which take shape through the rational systematic policy process, are not uncertain. They are: 'a set of actions taken by a government to control the system, to help solve problems within in or caused by it, or to help obtain benefits from it' (Walker, 2000:13). Yet, the effects of policy changes on the system are often highly uncertain. External forces acting on the system foster structural uncertainty.

Structural uncertainty can be understood as a type of uncertainty in analysis. The term refers to the uncertainty that arises from a lack of knowledge about the present or future behaviour of a system that is the subject of the policy analysis. Adnan Rahman (1997:2) elaborates:

Lacking knowledge about the system that we are trying to model implies that any one of many models might be a plausible representation of the system. We can lack knowledge about the current behaviour of a system (structural model

uncertainty), the future evolution of the system (structural scenario uncertainty), or both the present and future behaviour of the system.

Structural uncertainty, then, makes for uncertainty in analysis that is ‘the most difficult to handle’ with ‘the largest consequences for decision making’ (Rahman, 1997:3). Nor can structural uncertainty be ‘dealt with or reduced ... by collecting more data’ (Rahman, 1997:3). To deal with uncertainty in their analysis RAND Europe used scenarios as their main analytical tool.

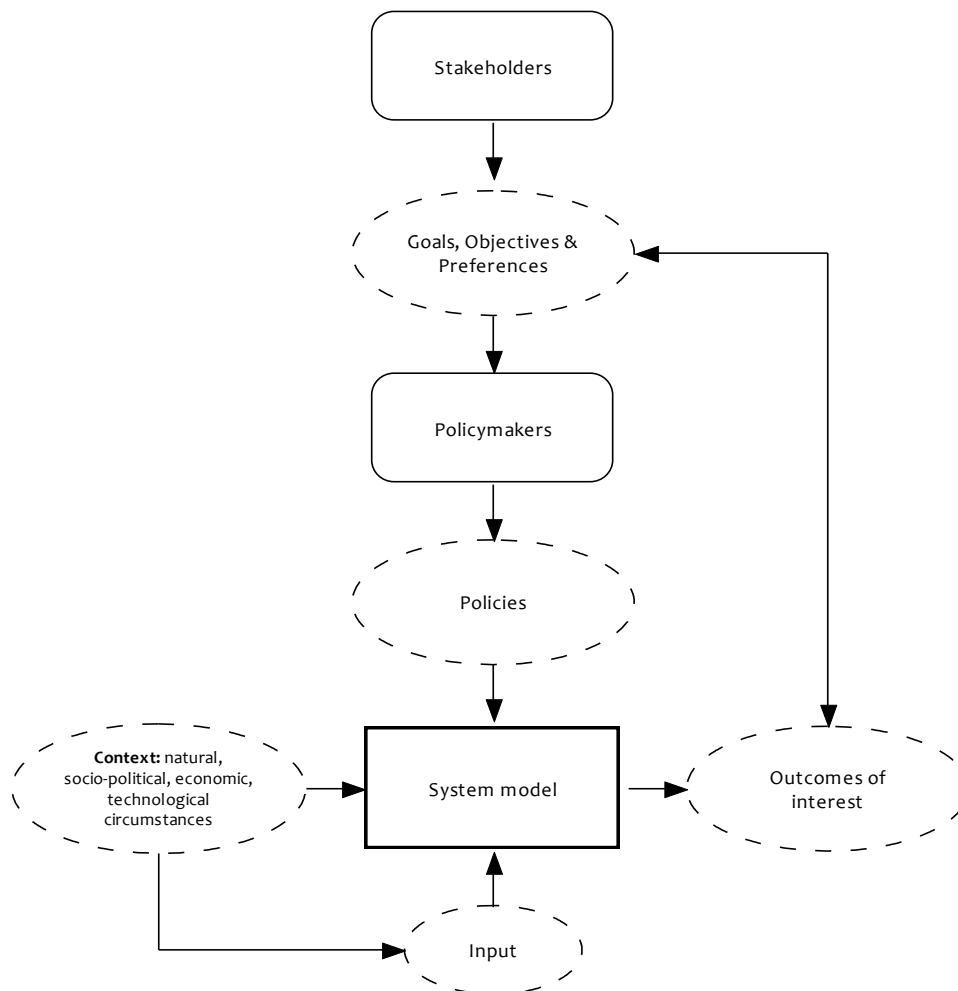


Figure 9: The role of the system model within the policymaking process

Source: Walker, Harremoes, Rotmans, van der Sluijs, van Asselt, Janssen, & Krayen von Krauss (2003:8)

Main analytical tool

RAND Europe used (computer-based) scenarios to explore the effect of alternative policies on the preferred outcomes of interest and for examining the trade-offs among

the different options. Stakeholders were involved in developing the scenarios. Scenarios, as articulated by RAND Europe, are plausible descriptions of how the system and driving forces may develop. Hence, a scenario is not intended to be used for prediction. Each scenario is built from a set of assumptions about key relationships and forces – for example, changes in technology, in prices, in market structure. The different scenarios or “future worlds” reflect the variety of alternative circumstances which may occur (e.g., changes in economic, environmental, social conditions) leading to changes in the system, affecting the outcomes of interest. In relation to these scenarios, policies represent the alternative mechanisms for affecting the system that are under the control of the policymakers, such as changing the infrastructure, regulations, pricing, and so forth. The best policies will be adaptive, that is, robust across the range of scenarios. However, in order to be adaptive such policies can only come about through a change in the policy process; it will need to be adaptive too.

Adaptive policymaking

In RAND Europe’s view, the policymaking process needs to confront the fact that policy will be adjusted as the world changes and as new information becomes available. A flexible and dynamic process is essential. The way to act in the formulation of policy is to: ‘take those actions now that cannot be deferred; prepare to take actions that may later become necessary; monitor changes in the world and take actions when they are needed’ (Walker & Marchau, 2003:3). In effect, according to Warren Walker and Vincent Marchau (2003) the policymaking process entails the continual monitoring of the validity of the assumptions underlying policies as events unfold.

RAND Europe’s (1997a) conceptualisation of an adaptive policymaking framework involves four steps. The first step is a stage setting exercise which results in a definition of success and policy goals. Step two involves assembly of a basic policy with the necessary (initial) conditions for success. Then, in step three the rest of the policy is specified in terms of:

- a. Vulnerabilities: potential adverse consequences associated with the policy
- b. Mitigating and hedging actions: taken in advance to reduce risk of possible adverse effects

- c. Signposts: information that should be tracked to determine whether defensive or corrective actions or reassessment is needed
- d. Triggers: critical values of the signpost variables that lead to implementation of defensive or corrective actions
- e. Defensive action: adjust the basic policy in response to triggers
- f. Corrective action: after the fact to preserve a policy's benefits
- g. Reassessment action: when the policy has lost validity.

Finally, Step four is the implementation phase in which events unfold and signpost information is collected. Until a trigger event is reached the adaptive process is suspended.

The outcome

According to Walker (2000), the results of RAND Europe's analysis helped the policymakers to identify the infrastructure options that should be looked at more closely and those that should be dispensed with altogether. Subsequent attention focused on two infrastructure options: an artificial island in the North Sea and Schiphol expansion on the existing site.

The artificial island option was attractive for it had the potential to eliminate the problems associated with airport noise, although construction would cause new environmental problems. However, this option was also very expensive. The expansion of Schiphol - the ostensive fuel of persistent controversy- remained a viable option as it required less new construction than any other option and therefore was the least costly of all the infrastructure options examined by RAND Europe.

Even if it was decided to re-present the option as a "base policy" in an adaptive policy framework with new and refined specifications, The Netherlands Government had to confront the practical face of their predicament, namely, that the expansion of Schiphol Airport remained the option that would expose large numbers of people to aircraft noise and the other attendant problems associated with air traffic. The Netherlands Government had ample explanation of the options and the challenges associated with each for choosing a course of action except for their immediate challenge of escaping a policy impasse.

RAND Europe's interpretation of the situation and the problem as framed influenced their analysis of options, the particular kinds of evidence gathered, and constrained the identification of solutions. van Eeten was able to point out that the prevailing policy question which drove the RAND Europe analysis simply mirrored the debate's prior polarization with the result that the intractability of the problem was confirmed and controversy 'only intensified and accelerated' (van Eeten, 2000:44). The policy analysts were not able to work with the full complement of information embedded in the complex of issues at stake and therefore were not capable of finding acceptable solutions. This is Brunner's (1991) argument about the common problem of policy analysis, that is, of inadvertence, a misconstrual, or overlooking some important part of context. The TNLI project team were compelled to gain insight into the controversy and thereby their own policy analysis predicament and look for leads on how best to proceed.

The next development in the case involved the TNLI-project, in 1997, employing van Eeten who used Q methodology as an alternative way of facing the Schiphol policy controversy. van Eeten's (2000; 2001) focus was on the "policy arguments" in the controversy: the experiential context of the controversy and the opinions of stakeholders featured strongly. He wanted to know how people thought about the issue. The Q methodology study was informed by the idea that the initial framing of the problem, for/against growth, effectively mis-specified the focus of debate. As van Eeten construed it, the time seemed ripe for a recasting of the problem, and his approach was to involve stakeholders directly in that recasting (van Eeten, 2001:392). The following summary of this second analytical event draws from a series of published accounts of van Eeten's policy analysis study (van Eeten, 2000; 2001, 2007).

Narrative policy analysis

Van Eeten (2007) brought a narrative-based approach to bear on the problem of determining whether or not to accommodate future growth in civil aviation. van Eeten locates narrative policy analysis in the post empiricist paradigm represented by the so-called "argumentative turn" in policy. A turn, van Eeten notes, sparked by Majone's (1989) 'demonstration that good policy analysis revolves around crafting an argument rather than applying logic and science' (van Eeten, 2007:251). According to van

Eeten, narrative policy analysis builds from the central insight that: ‘stories commonly used in describing and analysing policy issues are a force in themselves, and must be considered explicitly in assessing policy options’ (van Eeten, 2007:251). Policy narratives are defined as:

Those stories- scenarios and arguments – that are taken by one or more parties in the controversy as underwriting and stabilizing the assumptions for policymaking in the face of the issue’s uncertainty, complexity or polarization (van Eeten, 2007:251).

van Eeten’s (2007) narrative stance draws attention, first, to the controversy itself and the policy narratives likely to have opposing implications for action, and second, to the methodological issue of how stakeholders’ arguments can be identified without forcing a specific problem definition (van Eeten, 2007:257). van Eeten himself does not use the term “abduction”. Nevertheless, an interest in not forcing a specific problem definition encompasses the logic of abduction.

The analysis aimed to develop a new narrative that took into account the existing narratives but recasted or reframed the intractable problem into a more amenable form for deliberation and debate. The analysis, therefore, can be understood as an attempt to ‘shift the paradigm of the problem’ (van Eeten, 2007:255). The process of recasting in this narrative-based policy analysis centred on finding the “meta-narrative” – the narrative about the narratives.

Means of interpretation

Discovery of a meta-narrative provides van Eeten with the means for interpreting the controversy and determining how the meta-narrative recasts the issue. The analytical process stems from the idea that analysing relations between narratives point to a meta-narrative “told” by the comparison. van Eeten (2007:255-256) outlines the meta-narrative methodology as developed by Emery Roe (1994, 3-4). Four steps are involved:

Step 1 -Identify the conventional narratives that dominate the issue. These are the *stories*.

Step 2 -Identify the narratives that do not conform to the conventional definition.

These are the *non-stories*, that is, stories that run counter to the dominant narrative.

Step 3-Compare and contrast the two sets of narratives (stories-non stories) in order to generate a meta-narrative “told” by the comparison.

Step 4 -Determine if and how the meta-narrative recasts the issue in such a way as to make it amenable to deliberation, analysis and policymaking.

Bear in mind that the methodology does not require a specific method but allows for a variety of appropriate methods for identifying the sets of narratives. And, as van Eeten (2007:253) emphasises, the narrative policy analysis ‘starts only after the narratives have been (re)constructed’. van Eeten used Q method to elicit the narratives for comparison.

Main tool: Q method

In brief and as told by van Eeten (2000, 2001), to carry out the Q methodological study he collected 200 statements about the expansion of the airport from media archives, advocacy papers, interviews, and policy papers. From this collection of statements, he selected a sample of 80 statements for a Q sort which he administered to 38 stakeholders. The stakeholders reflected the distribution of views on the issue and included people from the airlines, airport management, different levels and sectors of government, national environmental organisations, local citizens, environmental groups, and commercial or regional economic interest groups. The participants were asked to sort the 80 statements into seven groups along a continuum from -3 (most disagree) to +3 (most agree) with 0 indicating indifference. van Eeten factor analysed the 38 Q sorts by correlating them and factor analysing the correlation matrix. He identified four factors, A to D, containing five “policy arguments”. Factor B was bipolar, representing a dichotomy of views on the same cluster of statements, that is, views which reflected the polarised debate as it had been understood up to that time. The other four factors had overlapping elements. van Eeten labelled these arguments as listed below in Table 4:

<p>Argument A</p> <p>Societal integration of a growing airport</p>
<p>Argument B1</p> <p>Expansion of civil aviation infrastructure as a necessity in the face of international economic competition</p>
<p>Argument B2</p> <p>Expansion of civil aviation infrastructure as an unjustified use of public funds</p>
<p>Argument C</p> <p>Ecological modernisation of the civil aviation sector</p>
<p>Argument D</p> <p>Sustainable solutions to a growing demand for mobility</p>
<p>Arguments derived from Q sorts</p>

Table 4: Policy arguments derived from use of Q method

Source: van Eeten (2001:398)

Recasting the policy agenda

Based on his understanding of the policy arguments derived from the Q methodological analysis, van Eeten (2007) was able to arrange the five arguments in terms of stories and counter stories. Policy arguments B1 and B2 reflect the dominant narrative, *viz.*, the polarised debate about deciding on growth in civil aviation. Policy arguments A, C, and D are the counter stories or non-stories than are subsumed by the dominant narratives. These are narratives that do not see the decision on growth as the core issue for policy. A meta-narrative encapsulates both of these contrary narratives at the same time, that is, “decide on growth and not decide on growth”, or expressed counter wise, “neither” of these two narratives.

As van Eeten (2007:266) explains, the opposition points to a useful meta-narrative:

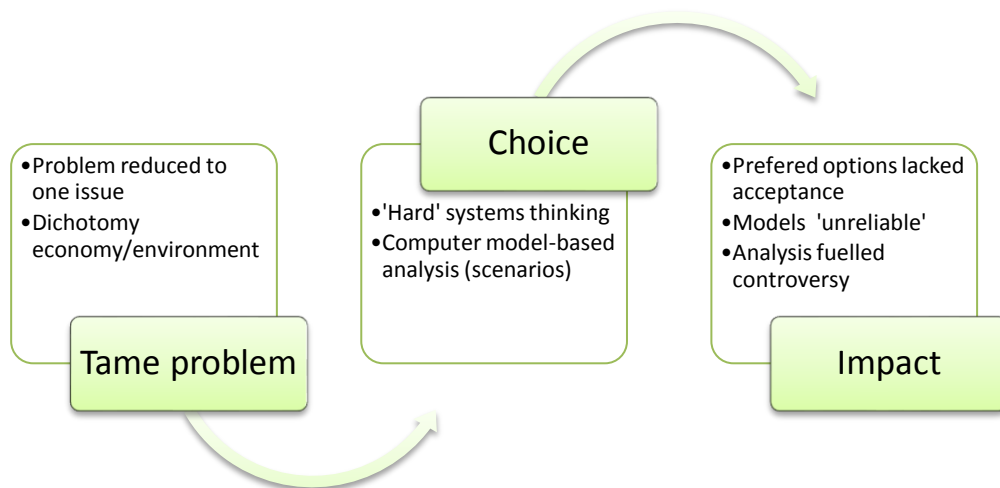
Decouple the expansion decision from the issues articulated by A, C, and D. Give the latter their own policy agendas. This way, whatever the outcome of the expansion decision, the government can still make important advances

with regard to A, C, and D. It could, for example, begin to put in place “normal” operating conditions for the civil aviation sector: fuel taxes, enforce noise standards that actually offer legal protection to citizen, and the dismantling of hidden subsidies.

In other words, van Eeten suggested that a way to proceed would be to pay attention to the elements of the nonpolarised factors so that a solution could be found, since the polarised factors had made the issue intractable. The policy arguments reached through the Q methodology analysis enabled understanding of how the specific recasting of the policy agenda would work. To clarify, Van Eeten (2007) gives an example:

That of the 38 stakeholder respondents 13 had stronger affinity with arguments A, C or D and the proposals they represent than with arguments B1 or B2. This means that for them it is more important that action is taken on these issues, than that the expansion decision goes one way or the other.

Controversy typically signifies a situation that makes sense in a variety of ways. By using Q methodology van Eeten was able to make out a more intricate and nuanced pattern of debate or system of understandings than was previously inferred by the policy analysts (Addams & Proops, 2000). Although it is unclear that van Eeten’s study had a direct effect on final policy or how the different arguments were actually used in policy discussions, by bringing the policy arguments A, C, and D into the debate a new agenda of issues could be used in the policy deliberation that commenced in 1997. The differences between the conventional policy approach to The Netherlands Government policy problem pursued from the outset and followed in the RAND Europe study, and the alternative approach that used Q methodology is concisely pictured in Figure 10.



Differences between approaches

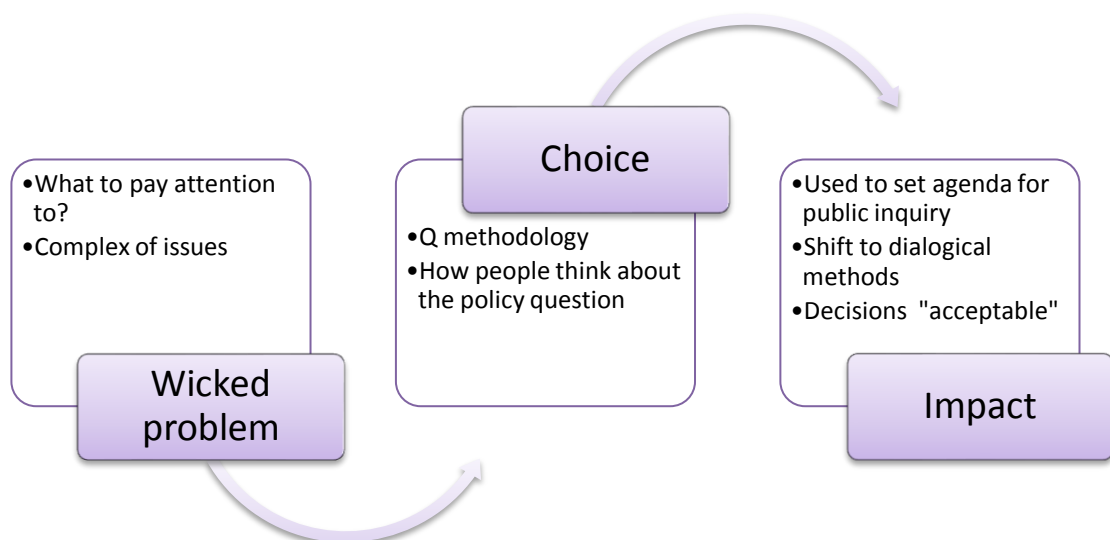


Figure 10: Differences between policy analysis approaches

With reference to the epistemological spectrum in Figure 9 (p. 90), the two policy analytic events can be characterized as entailing the epistemologically constructed borderline between “right-sided” and “left-sided” thinking, namely: between scientific rationality and knowledge and social rationality and opinion. Of interest is that the two policy analytic events show a radical difference in how the problem that was to be addressed in analysis was conceived and conceptualized.

In the standard approach the process of identifying the problem to be addressed fits a deductive pattern: a pre-existing specific problem definition was used and then the problem was conceptualized in the paradigmatic way of second generation systems

thinking in the “hard” positivist mode. The use of so-called “third way” science technology then ensued that embodied the logic of predictive modelling, albeit that the analysts were critically aware of the limits of such modelling but mindful that such models aid thinking. The RAND Europe systems analysis, which did offer an account of how to proceed in an uncertain policymaking environment, in evidence-based terms provided credible knowledge. Yet, this knowledge left unresolved the expansion issue and impasse in decision-making. This was a result that bears out the argument of “wicked” problems advanced by Rittel and Webber in the 1970s, namely, that “wicked” problems are not amenable to standard science-based policy analytic methods.

In contrast, use of Q methodology, that uncovered features of a social dynamic of public understanding or social rationality holding sway, can be a means to shift the way of knowing the issues to be addressed in analysis. In this “softer” approach the process of understanding the issues to be addressed fits an abductive pattern of open inquiry: a pre-existing theory, understanding, or problem definition was not used. In the paradigmatic way of the interpretive social sciences attention turned to the social domain in order to tap stakeholder thinking, conceptualised as narratives. The use of Q method then ensued, in a supplementary role, to elicit the narratives for analysis. This approach made a positive difference to the policy analysis situation. This too, was a result that bears out the argument of wicked problems, namely that wicked problems are amenable to “softer” methods of inquiry conducted on the basis of stakeholder participation and shared understandings.

As a case study, the Schiphol policy controversy has been used to illustrate the limits of quantitative modelling and forecasting under conditions of uncertainty in policy analysis (Kwakkel et al., 2008; Walker & Marchau, 2003). The case could well be used as a study in disputes over values; a conventional view of what underlies policy intractability.

Another way to view this case is in a context of opinion. The experts had the technical expertise to express convincing arguments to justify the government’s policy position, but the affected population had opinion to counter those arguments. As it happened, the citizens were “right” in their belief that the technically sophisticated analyses were unable to develop reliable predictive knowledge. Their concerns and opinions pointed

to the socially relevant issues that needed to be discussed and responded to in analysis and decision making. Paying attention to this social knowledge can enable the analysts to provide new analytic frameworks based in opinion for an analysis of what not to overlook in the policy situation in which they are acting.

Summary

Among proponents of evidence-based policy it is argued that rational analysis and good evidence can ‘ameliorate’ or ‘neutralise political obstacles’ facing a reformist government (Banks, 2009:8). This evidence-based argument is that in a world of increasing complexity and rapid change, science (knowledge and method) is more likely than common sense thinking (craft method) to make the difference between policies that ultimately work and those that fail. Furthermore, theory matched with methodological rigour is seen to open the pathway to better policy analysis, better responsiveness, and better public services. Conversely, opinion is viewed as a common cause of policy failure and unintended consequences and should be properly subordinated in that policy process. In evidence-based policy analysis, opinion is marginalised in favour of evidence as credible knowledge. The justification for the eschewal of opinion carries with it a lingering attitude that impugns non-scientific thinking.

However, arguments concerning “wicked” problems reflect a long and diverse history of ideas particularly in pragmatism and various other post positivist and postmodern epistemologies. In these world views, argument is premised on concepts of complexity that incorporate ideas of social rationality and human subjectivity. The argument of “wicked” problems articulated by Rittel and Webber (1973) is an assessment of why social policy problems are not amenable to standard analytical approaches but require the rationality of stakeholders.

There seems to be a sort of dualism in the current policy thinking about what constitutes complexity capability in the prevailing evidence-based epistemology. In one aspect, the thinking recapitulates the US policy analysis tradition that emerged during the 1960s, giving attention to more and better use of science in policy analysis. In another aspect, however, the thinking recapitulates the post positivist thought that focuses on participatory, deliberative, discursive and collaborative ways of working.

Despite interest in the role of social rationality when it comes to tackling complex social problems, in evidence-based policy a primary focus is on the quality of science. Moreover, the assessment of quality, gauged in terms of standards of rigour of the methods followed is in the positivist tradition, with the result that other standard epistemologies that generate evidence that can account for experience are ranked below quantitative approaches.

I argue that what is really in contention in complex policy contexts is epistemology, which can be viewed as an expression of confidence in sources of knowledge (individual, social, or scientific) with confidence in the positivist scientific methods the footing for the practice idea of complexity capability. Nevertheless, the Schiphol Airport controversy clearly affords the view that it is not so clear-cut that opinion blocks the road to policy success in circumstances of complexity and change.

In the specific case of the Amsterdam Schiphol Airport runway expansion issue the efficacy of Q methodology can be seen in two ways. First, and to use a contemporary, if less than perfect analogy, the efficacy of Q methodology can be viewed in much the same way as an application (“app”) download that is installed on a computer system to perform a specific function. The existing capabilities of the computer system (the policy analysis system) are harnessed to the application (Q methodology) for a specific task (breaking a deadlock). Q methodology renders opinion a mechanism for breaking deadlocks in policy analysis. Alternatively, other applications such as post positivist epistemologies are harnessed to Q methodology for the same function of rendering opinion. In the case of the Netherlands Government, the use of Q methodology met a policy need, namely to access the opinion of stakeholders as a complement to other evidence knowledge. In other words, Q methodology can be seen to work because it plays an adjunct role, supplementing what can be determined through existing practices while remaining firmly within the evidence-based epistemology with its dual aspects.

Second, the efficacy of Q methodology can be viewed in much the same way as a download that is installed on a computer modifies or changes the computer operating system (the policy analysis system) introducing new capabilities of the computer such as a shift from a single (evidence-based system) to a multiple operating system (evidence-based and opinion-based). In other words, Q methodology can be seen to

work because it has transformative power to create a substantial change in the method of doing policy-analytic work.

Q methodology opens the possibility of a common sense-making approach in policy analysis work that would be to: practice abductive inquiry and harness the policy analysis system with its abductive capability to social rationality in order to gain, each time, a fresh analytical perspective from which to better analyse what to pay attention to and not overlook in analysis of a difficult social policy problem. This way of working is what I associate with the human capability for reading complexity that I describe in more detail with reference to cases in Chapter 4.

Having reached a point in traversing a range of extant ideas relating to evidence-based policy, and the science, policy, politics nexus, this chapter has laid the foundation for what follows in the pursuit of an explanation as to why Q methodology, generally, has particular revelatory power in contexts of policy analysis – does it work because it plays an adjunctive role or because it plays a transformative role?

While there are a number of possible approaches to study social constructions of an issue such as, for example, opinion surveys, narrative analysis, discourse analysis, soft systems methodology, I suggest that the use of Q methodology as shown in the Schiphol policy controversy introduced a fundamentally different non-positivist epistemological influence into the standard policy process.

The alternative that Q methodology offers has the imprint of pragmatism which deals with pluralistic knowing and the possibility of effective use of opinion as social knowledge in a systematic way. At this stage of the discussion, two questions that arise are: first, what epistemological rethinking would support an opinion-based policy analysis practice? Second, what would be the practice idea of complexity capability? In Chapter 4, I address the question of an epistemology for an opinion-based practice and describe complexity capability in terms of reading complexity, with a focus on the thinking that links pragmatist thought to complexity thinking.

Chapter 4: Complexity thinking

Introduction

Through focussing on complexity and some of the intellectual debates about what constitutes complexity thinking, I am seeking to foreground epistemological debates with the aim of an epistemological reframing of policy analytic work oriented to reading complexity as an idea of complexity capability. This chapter provides a link between the examination of the epistemic bases of evidence-based policy in the previous chapter and the examination of Q methodology in relation to complexity capability and doing policy analysis work, which will follow in the Chapter 5. Thus, this chapter explores further the question of complexity capability but as it is currently discussed as a general idea in scientific discourses.

Increasingly, public policy practitioners are urged to apply the insights and methods of complexity science as they tackle difficult problems in policy areas such as health, environment, economics, energy, and public safety (Organisation for Economic Co-operation and Development, 2009). The belief that a complexity toolkit will improve understanding of both policy development and public administration reflects what John Urry (2005) refers to as “the complexity turn” in the social and cultural sciences. This “complexity turn” is provoking interest in developing a new kind of social science and a different kind of policy understanding based in complexity theory (Bolton, 2010; Funtowicz & Ravetz, 2003; Meek, 2010; Morçöl, 2008; Richardson, 2007; Walby, 2007).

In order to follow the link from the discussion of evidence-based policy and the issue of complexity capability to complexity thinking and the relevance of Q methodology, I am going to step through a series of short summaries of the relevant intellectual history of ideas that make this linking possible. I focus on the epistemological significance of the notion of complexity, rather than on the theory and concepts of complexity science in its pervasive form of complex adaptive systems modelling (Heylighen, Cilliers & Gershenson, 2007). This means I will be dealing with

complexity in generic terms, that is, as characteristic of a way of thinking and manner of knowing that can be applied in a general way (Morin, 1992).

In his reflections on the need for a new paradigm of complexity in *From Concept of System to the Paradigm of Complexity*, the complexity thinker and philosopher Morin (1992) indicates that, in order to be applied in a general fashion, complexity thinking does not require a scientific understanding of complex phenomena. Dealt with in this fashion, even a rudimentary or non-scientific concept of complexity (opposed to simple; made up of various interconnected or interwoven parts, patterns or elements; hard to understand or analyse) can be treated as a problem of knowing and of experience. Schindwein and Ison (2004:27) pursue this line of argument in their exploration of complexity as an epistemological problem for the sciences:

... the 'real-world' of human affairs seems to us to be different than the world simplified by science – we experience it as complex, or more complex than the world and the issues that are usually addressed by 'normal science' and its methods we live embedded in situations of complexity.

Schindwein and Ison's (2004) view entails the basic notion that complexity can be understood as something met with in experience in all ways of being and doing and as something undergone in thinking, knowing, feeling, and acting. On this point, all approaches to systematic inquiry that entail belief in a complex world are implicated as well as approaches to professional practice whether with a single or interdisciplinary base.

Philosopher and complexity thinker Isabelle Stengers (2004) suggests that notions of complexity challenge ways of doing science when she states:

... the problem is no longer one of deduction but of wondering what is relevant and how. Scientists no longer address a system as explained by what they know about it, even if they know it perfectly well, because it is a model. Their questions imply an open situation: "What will it be able to produce?" "What kind of behaviour will emerge?" And the question must be asked each time, with each new situation" (Stengers, 2004:96).

Stengers' view implies that the question of how to know complexity is less a matter of the notion of complexity as a specific scientific concept or theory and more an issue of how scientists behave in relation to what they address (Stengers, 2004).

Complexity thinking necessitates thinking about what you are doing as producing an effect in the study being undertaken.

For my purposes, an emergent paradigm of complexity holds interest because it has a bearing on what is meant in relation to public policy (and public administration) when claims are made about new ways of thinking. For example, how might practice of policy analysis be envisaged and acted upon in light of the claim expressed by Irene Sanders and Judith McCabe (2003) in their report to the United States Department of Education on the topic of complexity science activity in research and educational institutions?

Complexity science ... has created a major shift in how we must think about, organize, plan for and lead 21st century organizations. You can no longer be an effective leader nor build an effective organization without understanding the basics of complexity science and developing the skills of complexity thinking (Sanders & McCabe, 2003:10).

In what follows, and with the view that a complexity paradigm is still somewhat elusive, rather than focusing on complexity thinking as a new development, I focus on a classical pragmatist-inspired method of thinking and manner of knowing which deals with the constitutive character of complexity met with in experience in the ‘‘real-world’’ of human affairs (Schlindwein & Ison, 2004:27).

Discussion in this chapter proceeds in two parts. In the first section, I note the recurrent theme of a scientific revolution putatively underway that accompanies the use of complexity theory in the social domain. This will include a picture that I use to map four generic modes of knowledge. This picture will also help later in locating the place of Stephenson’s kind of science, manifest in Q methodology, in its epistemological sense. In the second, I highlight pragmatism with emphasis on the work of James as offering a classical expression of complexity thinking. I argue that while largely marginalised by the mid-20th century due to the influence of ‘‘analytic philosophy’’ (Bernstein, 1997), pragmatism has contemporary relevance as a philosophy of complexity and mode of knowledge with implications for how we might view complexity capability and entertain the methodological possibilities yet to be fully realised in policy. I then draw on classical pragmatism to develop the idea of reading complexity as a possible alternative practice idea of complexity capability.

20th century scientific revolution

Paradigm shift

The advent of the sciences of complexity is associated with a scientific revolution, new world view or paradigm shift (for example Capra, 1997; Emmeche, 2004; Heylighen et al., 2007). In the philosophy of science, “paradigm” is frequently used in the sense of a pattern of thinking, a set of background assumptions that are taken for granted. This use of the term “paradigm” is consistent with Thomas Kuhn’s (1970) account of paradigms in *The Structure of Scientific Revolutions*. Kuhn’s account is of evolutionary scientific change involving phases of crisis, revolution, paradigm shifts, and renewal of normal science.

By his own account, Kuhn (1977:xix) took his concept of a scientific paradigm from language teaching and extended it to science. When learning an inflected language such as Latin students learn to conjugate verbs and decline nouns and adjectives. They learn, for example, to recite *amo, ama, amat, amamus, amatis, amant*. Students can then use that standard form to produce other first conjugation Latin verbs. The student has learnt a paradigm. In rhetoric the term is used for an illustrative parable or fable – a guiding metaphor (Fleener & Meritt, 2007). Use of the term “paradigm” in science, grammar, and rhetoric retains the term’s general meaning of an explicative and exemplary pattern or model from the Greek words: *paradeigma* pattern; *paradeiknunai* to show, to compare.

For Kuhn, a paradigm (also referred to by Kuhn as a “disciplinary matrix”) consists of a constellation of shared commitments that involve the general theoretical assumptions, values, instruments, and techniques that the members of a particular scientific community are taught to adopt. A paradigm is the reference point and sets the standard for the normal way in which inquiry is conducted within a given field. The term is also used for a set of assumptions and attitudes present in a society, in a culture, an organisation, and so forth (Mautner, 2000). In science, the function of a paradigm is to supply puzzles for scientists to solve and to provide the tools for their solution.

Alexander Bird’s (2009) entry on Kuhn in *The Stanford Encyclopedia of Philosophy*, suggests that a crisis in science arises when confidence is lost in the ability of the

paradigm to solve worrying puzzles called “anomalies”. In periods of normal science anomalies are ignored or explained away. But, when the scientific profession finds that it can no longer solve its problems by known rules and procedures and avoid an accumulation of anomalies then the legitimacy of the existing paradigm is challenged and the practice of normal science is undermined. Crisis is followed by a scientific revolution if the existing paradigm is superseded by a rival. About such revolutions in science, Kuhn (1970:6) says: ‘They are the tradition-shattering complements to tradition-bound activity of normal science’. Revolutions in science trigger changes in the scientific imagination, a process described by Kuhn (1970:6) as ‘a transformation of the world within which scientific work’ is done. A paradigm shift, from which appears a new scientific world view, often serves as a seed for changes in society.

Towards a paradigm of complexity

Since the early 1980s, complexity thinkers have sought to develop a paradigm informed by the concept of complexity. I use as a reference point the first international event on the topic of complexity science held in Montpellier, France, in 1984. Organised by the United Nations University (UNU) this symposium on Science and Praxis of Complexity explored the epistemic consequences of concepts such as non-linearity, self-organisation and emergence in systems composed of many interacting parts (Lee, 1993). Published in two volumes in 1985, the material from contributors can be read as a guide to rethinking science. Recent accounts include: Morin’s (2005) transdisciplinary epistemological position aimed at overcoming the disjunctive logic (either/or) on which, in his view, knowledge is organised; Ilya Prigogine and Isabelle Stengers’ (1984) interdisciplinary account of “man’s new dialogue with nature” which can be read as a manifesto for a new complexity-inspired philosophy of physics; Francis Heylighen, Paul Cilliers, and Carlos Gershenson’s (2007) considerations of the philosophical tools for understanding and reasoning about complexity; Kurt Richardson and Paul Cilliers’ (2001) and Richardson’s (2007) analytical philosophy of complexity in which critical thinking and pluralism in analysis are taken to be of central importance; Funtowicz and Ravetz’s (1991) notion of “post normal science” for problem solving under conditions of uncertainty, and Morçöl’s (2005) view that complexity theory (and cognitive science) suggest a phenomenological epistemology whereby the embodiment of knowledge would be

recognised. All share the view that the classical conception of science, which is based on reductionism, determinism, and objective knowledge as a reference point and path of knowledge, is limited or limiting in the development of knowledge. From this standpoint, one of the challenges of complexity lies in seeing how the classical model of science fits within a larger scientific worldview which is not limited to a 'clockwork' mechanical universe (Fleener & Merritt, 2007).

Eric Dent (1999) gives a pictorial representation of the differences in underlying assumptions between the traditional (or modernist) worldview (TWV) and emerging larger world view (EWV), which is reproduced in Figure 11. Dent recognises that by and large complexity theorists do not suggest that the traditional worldview is wrong. Rather, the suggestion is that elements that characterise complexity such as indeterminism, subjective reality, mutual causality, and holism are those that lie 'out of range' (Dent, 1999:6) of classical science.

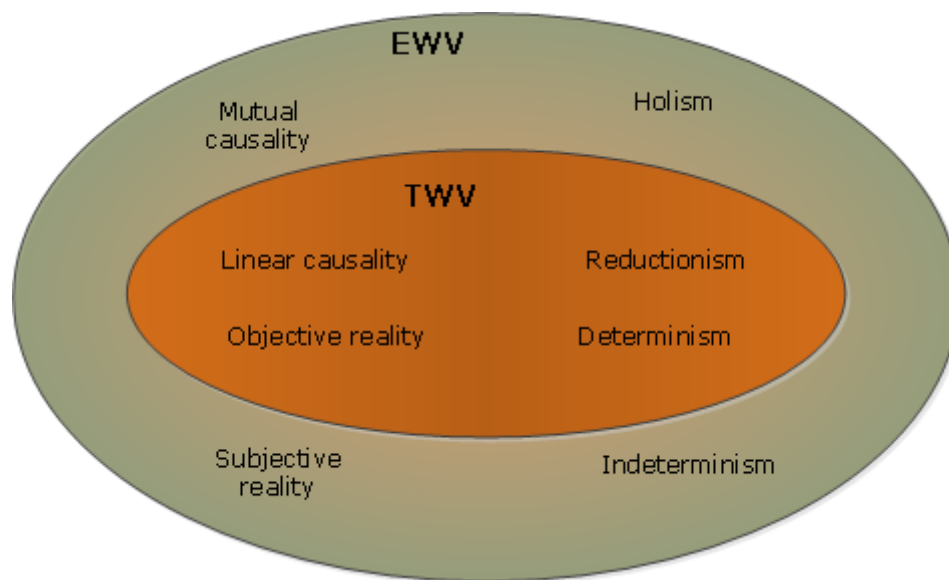


Figure 11: Differences in worldviews

Source: Dent (1999:9)

Dent's picture of the relationship between the emerging world view and the traditional worldview is intended to show that the emerging worldview holds in 'a larger number of instances' (Dent, 1999:7) than with of the traditional worldview. On this theme, complexity theorist Heylighen (1988) wrote: 'science only appears capable of solving

problems in very specialised, restricted domains’ while avoiding ‘complexity as much as possible’. This notion of normal science restricting complexity, or, in Kuhnian terms rendering complexity an anomaly, can be found explicitly advanced in the work of Morin (2005).

Morin (2005:5) identifies what he refers to as ‘the three principles of the rejection of complexity by “classical science”’. As articulated by Morin (2005:5), these are:

1. The principle of universal determinism
2. The principle of reduction, that consists in knowing any composite from only the knowledge of its basic constituting elements
3. The principle of disjunction that consists in isolating and separating cognitive difficulties from one another, leading to the separation between disciplines, which have become hermetic from each other.

In Morin’s view, an isomorphism is at play. In combination, these principles affect the organisation of knowledge reflected in the disciplinary nature of research. Alfonso Montuori (2008: xxvii), in his review of Morin’s work, provides a summary of Morin’s thesis of isomorphism as follows:

Reductive/analytic approaches to issues are unable to account for and give sufficient understanding of complex, interconnected phenomena. Reductive approaches isolate phenomena from their environment and operate with a disjunctive logic of either/or.

This way of thinking is manifest in the organisation of knowledge in universities where knowledge is broken down in ever smaller disciplines and specialisations, with increasingly impermeable boundaries.

Many movements that define themselves in opposition to Newtonian/positivist science and reject ‘parts’ in favour of ‘wholes’, ‘analysis’ in favour of ‘synthesis’, and ‘control’ in favour of ‘emergence’, are themselves a product of disjunctive thinking.

Again, Montuori (2008) further suggests disjunctive thinking can be represented in the following oppositions that indicate what classical scientific thought accepts and at the same time what classical science dissociates from:

Objective knowledge of objects in the exterior world, rather than subjective knowledge of interior moods, opinions, experiences and so on

Quantification and therefore ‘objective’ data that could be measured as opposed to qualitative data that is ‘subjective’ and cannot be measured

Reductionism, or a focus on parts rather than wholes (holism)

Determinism, or finding laws of cause and effect that determine events as opposed to chance events that cannot be predicted by laws (contingency)

Certainty, rather than ‘relative’ knowledge

Universal knowledge (applicable anywhere and everywhere) rather than particular, local knowledge (applicable only to certain specific settings)

One right way of looking at a situation, rather than a multiplicity of perspectives, and the search for that one right way

Either/or thinking, borrowed from Aristotle, which rejects any form of ambiguity or paradox.

Among complexity thinkers such as Morin and others who do not uphold disjunctive thinking, the belief is that a new paradigm of complexity is needed to transcend both positivist and postpositivist/postmodernist approaches to science since each, as “movements of opposition”, cannot be relied upon for understanding complex phenomena in a sufficiently coherent fashion. This belief has led to a view that knowing complexity should be seen as a transdisciplinary effort.

A transdisciplinary effort

According to Morin (2005), each movement of opposition as a product of disjunctive thinking, ‘remains within the epistemology of classical science’. Accompanying this perspective, then, is an effort to find a middle or “third” way of inquiry based on an impulse to integrate developments in science from across the disciplines. As Heylighen et al., (2006:1) suggest:

The science of complexity is based on a new way of thinking that stands in sharp contrast to the philosophy underlying Newtonian science, which is based on reductionism, determinism, and objective knowledge ... Determinism was challenged by quantum mechanics and chaos theory. Systems theory replaced reductionism by a scientifically based holism. Cybernetics and postmodern

social science showed that knowledge is intrinsically subjective. These developments are being integrated under the header of “complexity science”.

In addressing this push to integrate developments in the sciences, Morin argues that the disjunctive principle of knowledge, that is, of ‘separation (between objects, between disciplines, between notions, between subject and object of knowledge)’ (Morin, 2005:11), should be substituted by a principle that ‘maintains the distinction, but that tries to establish the relation’ (Morin, 2005:11). This would necessitate a logical complexity: ‘we should link concepts which normally repel each other logically, like unity and diversity’ (Morin, 2005:13). In this way, Morin’s argument pre-supposes the need for an integrative or conjunctive principle of knowledge that serves to complexify (connecting and contextualising) knowledge instead of separating and isolating in the effort to know. It is an argument for transdisciplinarity, that is, the integration of knowledge across disciplines: the physical sciences, social sciences, and the humanities (Capra, 1997; Niekerk & Buhl, 2004).

Transdisciplinarity moves beyond interdisciplinarity, which involves using the methods of one discipline to inform another, by drawing on multiple disciplines while at the same time, according to Montuori (2008:xxi): ‘challenging the disciplinary organization of knowledge’ (see also, Klein, 2004). It is an argument that intends linkages to wider knowledge networks: ‘[the conjunctive principle] not only concerns all fields, but also relates to our knowledge as human beings, individuals, persons, and citizens’ (Morin, 2005:25). In this respect, the argument for transdisciplinarity recognises that complex social problems to be solved do not originate with science, that is, in the paradigmatic fashion described by Kuhn: ‘They are external developments in *Lebenswelt*, the living world’ (Klein, 2004:4). Julie Klein (2004:4-5), drawing on Schön (1983, 1995), goes on to say that such complex problems are: ‘without a discipline’; in the ‘indeterminate zones of practice’ and the ‘swamp’ of ‘nonrigorous inquiry’. These are problems that involve the skills of dialogue, interaction, and negotiation as integral parts of complexity-based inquiry (see also, Emmeche, 2004).

The literature would suggest that a complexity movement (or “complexity turn”) is developing and gaining in vigour - a view, for instance, which informs the work of the Gulbenkian Commission on the Restructuring of the Social Sciences (1996) which

has advocated breaking down the division between natural and social sciences through seeing both as characterised by complexity. However, it would be premature to assert that the practice of “normal” science is being undermined and superseded by a rival paradigm of complexity. On this point, for example, Claus Emmeche (2004:25), in his discussion of the significance of complexity, says the discourse of a new complexity paradigm of science replacing the former mode of thinking ‘may derive from storytelling mediated by science writers than from concrete studies of science at the workbench’.

Away from a paradigm of complexity?

Richardson and Cilliers (2001), based on their study of complexity literature in relation to the science of complex systems, and later, Richardson (2007), argues that different schools of complexity thinking are developing. These two authors identify three potential schools, which, to a large extent, are synonymous with the three methodological streams of systems thinking mentioned previously in Chapter 3, namely: the neo-reductionist or “hard” school of complexity science; the metaphorical or “soft” school; and the complexity thinking or critical-pluralist school of complexity.

Firstly, the neo-reductionism school relies on the accelerating advances in computer technology for the study of complexity, especially complex systems. This use of research models in the form of ‘bottom-up agent-based modelling’ has been described as a completely new way of practising science (Emmerche, 2004; Sanders & McCabe, 2004). As noted in the Organisation for Economic Co-operation and Development paper, *Applications of Complexity Science for Public Policy*, such modelling means that scientists are enabled:

... to create large numbers of virtual system components and set them to interact with each other in simulated worlds. By varying the parameters of these simulations, researchers can explore the spectrum of collective behaviours, validate theoretical models, and compare the virtual systems with their real-world counterparts (OECD, 2009:2).

Secondly, the so-named metaphorical school, which reflects applications of complexity theory to the social sciences, uses complexity theory ‘with its associated language’ (Richardson 2007:192) (for example complex adaptive systems,

emergence, co-evolution, self-organisation) as a lens to see the complexity inherent in what they address. As Sylvia Walby (2007) mentions, in the social sciences, interpretations and use of complexity theory in social theory have varied. For example, Walby (2007:457) cites the following: David Byrne (1998) who interprets complexity theory as a defence of realism; Cilliers (1998) who posits that complexity theory advances postmodernism; and Brian Wynne's (2005) argument that complexity theory challenges both the reductionism and the denial of uncertainty among science policy makers. The consequences of the use made of complexity concepts for social theory have been debated. Attempts have been made to correct for the uncritical importation of ideas via metaphor. These attempts have been out of a concern that much of complexity theory is based on mathematics of complexity, not on empirical inquiries into social change and thereby may not be directly applicable to the social world (Capra, 1997; Mainzer, 2004; Richardson, 2007; Walby, 2004).

Thirdly, the critical-pluralism school adheres to the view that in order to know complexity an inquirer need not use the tools that have been developed by the complexity science community; that all tools for thought have the potential to provide insights concerning complex systems, albeit each with its own limitations. The critical element, then, is to develop a 'critical attitude' (Richardson, 2007:212) toward all instruments of understanding and use tools with a concern for their limitations. In this way, complexity thinking involves the inquirer in a continual rethinking of what they are doing, grounded in the complexity perspective of an open, ever changing, and evolving reality.

With respect to these three schools of complexity, Richardson (2007), among others, points out that the tendency is towards neo-reductionism and away from softer approaches. Such a tendency undermines the notion that a revolution in science in its truest sense (Kuhnian sense) is fully underway. Rather than a shift to a new paradigm of complexity, the complexity field may simply be shifting focus from linear to non-linear models. As Richardson (2007:215) puts it:

Despite all the iconoclastic rhetoric about reshaping our worldview ... many complexity theorists of this [neo-reductionist] variety have actually inherited many of the assumptions of their more traditional scientific predecessors by simply changing the focus from one sort of model to another ... Rather than using the linear models associated with classical reductionism, a different sort

of model - nonlinear models - have become the focus. Supposedly, bad models have been replaced with good models.”

On this point, Stengers (2004:98) sounds a note of warning. In her critique of the neo-reductionist proclivity for using computer simulations (models of complex systems) she argues that the positivist inclination to ‘restrict’ complexity remains strong. The rethinking of “doing” applies to the choice of the right tool for the right situation (Stengers, 2004). According to Stengers (2004:97), tools of inquiry are not ‘ready-made instruments’; and no tool confers ‘the power of judging’. In other words, she says, tools ‘oblige’ the inquirer ‘to think and wonder’ (Stengers, 2004:97). About the so-called “third” way of doing science, Stengers (2004:98) warns: That there is ‘a strong temptation to use the new models as a kind of universal key, able to serve whatever purpose we like’ and that ‘what makes the models and their use potentially dangerous is the claim that the business of science is to explain away what is only subjective opinion and illusion’. Stengers concludes with the question: ‘How are we to avoid taking a simulation as a scientific theory, eliminating what the model had no need to take into account?’

In short, Stengers’ argument is for a change in the characterisation of what is relevant in the relationship between the inquirer and what they address. In her view, to have cognisance of complexity an inquirer would be well advised to break the scientific habits of reductive acts and deduction (Stengers, 2004). She talks about a need in science to further develop skills of interrogation, which she describes as an aptitude, for example, of thinking and ‘wondering what is relevant and how... each time, with each new situation’ (Stengers, 2004:96). Stengers (2004:98) proposes the type of questions that matter for a science of complexity, and, she insists, that have always mattered in each field of inquiry: How to learn? How to pay attention? How to acquire new ways of thinking? How to concentrate or explore other kinds of experiences? Those who inquire into complexity need to know how to question in an open situation of inquiry which does not become reduced to ‘a certain number of principles of action and ways of operating’ (Stengers, 2004:95-96).

To conclude this part of the discussion I have produced a diagrammatic summary of these epistemological shifts (see Figure 12). In doing so, I am bringing to the fore a variant of complexity thinking which in the literature is not explicitly discussed as

such, although it is alluded to by some writers (for example Prigogine & Stengers, 1984). I am referring to classical pragmatism.

Epistemological shifts

From the beginning of the 20th century, through to the present in the 21st century, a period of more or less 100 years, there have been a number of significant epistemological shifts that have led to the contemporary scientific knowledge system becoming more, not less, organised, which is to say, more complex. Here, I use the analogy of a river system. River systems can be differentiated from each other by the pattern of water in the river channels. On the surface, the epistemological shifts in the last 100 years resemble a dendritic pattern. That is the main channel decomposing into multiple split streams separated from each other by land forms. However, to make the analogy, consider science or systematic inquiry as a main channel of knowledge, evolving over time, with a distributary network of diverging modes of knowledge (multiple streams).

Divergent modes of knowledge arise from differences of kind in science, that is, from different approaches to systematic inquiry. The separation of ways involves: the presupposed principles on which a science is based; what is paid attention to and concentrated on; what is ignored, ideas that are rejected, or considerations that are missing, as well as heuristics of choice (for example computer simulations, models, ideal types, conceptual devices). Currently, scientists, social scientists and policy practitioners inhabit a world, in which post positivist and postmodernist views of science compete with the on-going salience of positivism (“modernist” view of science). This development can be mapped as in the diagram shown in Figure 12. Again, as noted above, this diagram gives a rough depiction of the kind of epistemological rethinking of “normal” scientific inquiry that has occurred.

What this diagram shows is that in the 20th century a positivist epistemology, derived from the work of Comte, among others, and the basis of classical science, emerged as a dominant path of knowledge which set the standard for the normal way in which inquiry in general is conducted. During the century various expressions of scientific praxis also emerged to challenge this positivist science, including pragmatism and,

later, quantum science, as well as a marked growth in the number of disciplines, especially in the social sciences.

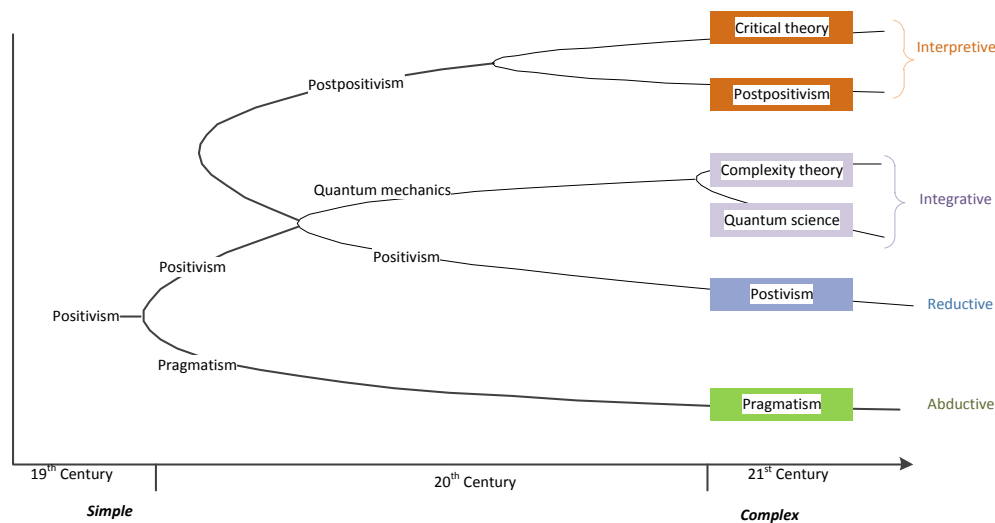


Figure 12: Epistemological shifts and modes of knowledge

It should be noted that a knowledge system such as it is figured above, also has ‘hidden continuities’ (Prigogine & Stengers, 1984:309). While at first glance there appears to be a pattern of increasing fragmentation or differentiation in the knowledge system which shows up in the development of epistemic rifts between the social sciences and the natural sciences over the course of the 20th century, there is at the same time a pattern of developing confluences in the system. As given in Prigogine & Stengers (1984:309), these confluences or hidden continuities involve ‘difficult questions rejected by many as illegitimate or false but that keep coming back generation after generation - questions such as the dynamics of complex systems ...’ and about which science has devoted some but not the most effort.

In the way in which I am framing this argument, what is relevant is a series of splits producing multiple modes of knowledge that have developed from this positivist stream. In Figure 12, as an example, what is significant is the pattern of bifurcation which I show leads to at least four distinct generic modes of knowledge. I label these four generic modes in the diagram as:

- *interpretative* (research strategies associated with post positivism and post modernism)
- *integrative* (research strategies associated with new sciences of complexity)
- *reductive* (research strategies associated with positivism)
- *abductive* (research strategies associated with pragmatism).

My argument concerns the saliency of pragmatism as a non-positivist philosophy of inquiry. In brief, the classical pragmatists (for example Peirce, James, and Dewey), before the advent of the so-called “new” sciences, paid attention not only to complexity and a real or living world subject to change and variation but also to the human experience and ultimate mode of knowing in relation to complexity.

Pragmatism: a classical expression of complexity thinking

According to Richard Bernstein (1997:390), pragmatism had waned as an influential movement in America by the mid-20th century, to be superseded by analytic philosophy with a ‘positivistic temper’. As a consequence, and though there were those who sought to keep the pragmatic tradition alive, from the post-World War Two period onwards, there was ‘a forgetfulness’ (Bernstein, 1997:390) of the pragmatic legacy. Although only a few complexity thinkers explicitly acknowledge a direct indebtedness to the classical pragmatists (for example Prigogine & Stengers, 1984:302-303), many of the constitutive elements sought in a new paradigm of complexity and spoken about in the contemporary discourse (for example Morin, 1992; 2005) originated in classical pragmatist thought, particularly in the work of Peirce and James.

Accompanying their rejection of the idea of a “clockwork” universe, Peirce and James were interested in relations and believed in synechistic pluralism. Synechistic pluralism, which has a direct bearing on the question of how to envisage and contend with a real world that is inevitably complex and subject to change and variation, is an idea that challenges the Cartesian theory of knowledge (Haack, 1975). Peirce’s way of putting it was to say that Cartesian philosophy ‘performs its analyses with an axe; leaving, as the ultimate elements, unrelated chunks of being (Haack, 2005:240). As

Henry Levinson (1996:x) states in his introduction to *A Pluralistic Universe*, “unrelated chunks of being” encompass things like ‘minds, meanings, intentions, and purposes’. Leaving such things unrelated suggests ‘only truncated intelligence’ with no room ‘for things that let people care’ (Levinson, 1996:x).

In the next section, I concentrate on the pragmatist idea of complexity thinking as expressed in the writings of James. James taught experimental psychology at Harvard University (1875-1907). He considered psychology a natural science concerned with the study of the causes, conditions, and immediate consequences of states of consciousness in human beings (James, 1890b). While it is not within the scope of this thesis to delve in any depth into James’ ideas about psychology, it is important to note that he had come to believe that subjective reality was researchable at a time when his contemporaries (experimental psychologists) held to the view that psychologists could not observe or study personal states of consciousness or subjective life (Hunt, 2007). The ideas that James (in McDermott, 1977) advanced include:

- experience is cognitive, that is, a mode of knowing
- consciousness is a process, function, or an activity, not a thing
- consciousness is personal and has changing and continuous states
- consciousness has a fringe as well as a focus and thus able to grasp a flowing stream of impressions at the periphery of attention
- consciousness includes the apprehension of relations as well as elements, of ‘transitive’ as well as of ‘substantive’ states, that is, the distinction between knowing as in transit and on its own way and the same knowing verified and completed
- the activity of consciousness is selective, that is, consciousness welcomes, rejects and chooses from among the objects presented
- we think of certain things as *me* and *mine*; these feelings and the acts associated are the ‘empirical self’
- ‘the empirical self’ can be investigated by introspection (“looking into our own minds and reporting what we there discover”) and observation
- the function of personal consciousness is knowing’
- our thoughts are mental modes of adaptation to reality; our thoughts are real.

James contended that the universe comes in one edition, the one we experience (James, in McDermott, 1977:457). James' philosophy ties psychology (theories of consciousness), synechistic pluralism, and pragmatism together under the banner of radical empiricism (James, 1912). In James' philosophical system, subjectivity, relations, experience, communication, human ability to contend with events as they arise and, as I intend to illustrate, abduction, all have importance for human knowing. As far as I know from my own selective reading, James does not appear to have used the term "abduction". As I understand it, the concept Peirce expressed by abduction was invoked by James in his use of the concept "concatenation" – that is, things being linked together. The idea of concatenated knowing that James refers to implies the interconnectedness and reticulated nature of knowledge.

The Jamesian variant of complexity thinking can be aligned with the contemporary version advanced, for instance, by Morin. In my view, however, what is missing from contemporary ideas of complexity thinking is the role of abduction, as a capacity of human thought or operation of knowing, fit for figuring out how to act under conditions of complexity. The preceding comments require clarification. I begin by stepping very briefly through what is meant by radical empiricism, synechistic pluralism, and the relevance of abduction as a mode of knowing in relation to experiences of complexity.

Radical empiricism

According to John McDermott (1977:xli) radical empiricism was James' effort to describe the process of knowing: a 'process which takes place inside the relational field of concrete experience'. In James' view, 'knowledge of sensible realities ... comes to life inside the tissue of experience. It is *made*; and made by relations that unroll themselves in time' (James in McDermott: 1977:201). A postulate, a statement of fact, and a generalised conclusion comprise the central meaning of radical empiricism. James' (in McDermott, 1977:136) doctrine of radical empiricism runs as follows.

The postulate is that the only things that shall be debatable among philosophers shall be things definable in terms drawn from experience ...

The statement of fact is that the relations between things, conjunctive as well as disjunctive, are just as much matters of direct particular experience, neither more so nor less so, than the things themselves.

The generalized conclusion is that therefore the parts of experience hold together from next to next by relations that are themselves parts of experience. The directly apprehended universe needs, in short, no extraneous trans-empirical connective support, but possesses in its own right a concatenated or continuous structure.

In other words, a logic of relations runs throughout radical empiricism which provides a case against the Cartesian or dichotomous theory of knowledge. In radical empiricism, the relationship between the world of objects and the world of consciousness is not taken as a dualism of subject and object, of matter and thought, or of thought and actuality. Though able to be distinguished - object from subject, thought from matter – the world of objects (the physical, “outer” world) and the world of consciousness (the psychical, “inner” world of mind) are continuous: ‘... there is no reason to attribute to them an essential difference of nature. Thought and actuality are made of one and the same stuff, the stuff of experience in general’ (James, in McDermott, 1977:187). James’ account of relations encompasses the notion of “supervenience”.

Supervenience is an important concept in classical pragmatic complexity thinking. It helps us make sense of radical empiricism, synechistic pluralism, and the pragmatic method of inquiry advanced by Peirce and used by James. Strictly speaking, supervenience is not about integration but interaction, change taking place, mutual implication, and emergent consequences - that is, things happening.

The concept of supervenience

In recent philosophy of mind and consciousness studies, the concept of supervenience has been a major topic of interest and debate (Horgan, 1993). Briefly, the term comes from the Latin “super”, meaning *on, above, or additional*; and from the Latin verb “venire”, meaning to *come*. In common use, supervenience signifies coming or occurring as something novel, additional, or unexpected. As an example of supervenience, used in this non-technical sense and applied to an event in daily life,

consider the case of people tramping in a National Park but not fully equipped for any eventuality. The weather turns bad and hypothermia supervenes (comes). The occurrence of hypothermia is in some way dependent on, determined by, or supervenient on the trampers' preparedness for being in the environs and, in turn, the changes taking place in the weather. In the discourse of daily life, the phenomenon of supervenience is implicated in statements such as "the next thing we knew", "the problem is what happens next?" or "there were unintended consequences".

In the sciences, the term "supervenience" has a technical meaning that concerns a relation of dependency between two sets of properties or facts (Hare, 1984; Horgan, 1993). *The Dictionary of Philosophy of Mind* (online) gives this definition of supervenience in connection with the mind/body problem in philosophy of mind and metaphysics ("M" representing mental respects and "P" physical respects):

A set of properties or facts M supervenes on a set of properties or facts P if and only if there can be no changes or differences in M without there being changes or differences in P.



Figure 13: Concept of supervenience

More simply stated, supervenience means: 'there cannot be an M-difference without a P-difference' (Mc Laughlin & Bennett, 2010). And, in slogan form: "the difference a difference makes". Used in its technical sense, the concept of supervenience comes across as, if not synonymous with, then connoting other specialist technical concepts,

for example: co-evolution, co-variation, transitive, structural coupling, and emergence⁶.

James wrote repeatedly on the theme of supervenience in connection with radical empiricism and the relationship of human interests. For instance, he asserts:

There can be no difference that doesn't make a difference – no difference in abstract truth which does not express itself in a difference of concrete fact, and of conduct consequent upon the fact, imposed on somebody, somehow, somewhere, and sometime (James, in McDermott, 1977:349).

In experience, in other words, thought, actuality, and conduct are a supervenient relation. A change taking place (a difference) will effect a turn in experience – in thought, of fact, and in conduct. In Jamesian philosophy, experience becomes a methodological postulate expressed as follows:

Nothing shall be admitted as fact ... except what can be experienced at some definite time by some experient; and for every feature of fact ever so experienced, a definite place must be found somewhere in the final system of reality. In other words: Everything real must be experienceable somewhere, and every kind of thing experienced must somewhere be real (James, in McDermott, 1977:279).

Here, James alludes to the belief that while relations can be overlooked, denied, or ignored, they cannot be suppressed. James (in McDermott, 1977:279) also linked the pragmatic method (Peirce's pragmatic maxim), to supervenient relations: 'The pragmatic method starts from the postulate that there is no difference of truth that doesn't make a difference of fact somewhere.' By "truth", James means 'practical truth', in other words experience, which gives 'something to act on' (James, in McDermott, 1977:178).

In James' view, then, supervenience is a phenomenon that matters in human experience and in the process of knowing, particularly how to know for action: 'Whence do we *know* activity?' (James, in McDermott, 1977:279) or from where do we know how to act? In short, the Jamesian answer is experience and from an awareness of what pragmatic consequences (a reference to the pragmatic maxim) an

⁶ There are much more complicated technical statements of supervenience than the one I have just given – see, for example, the entry by McLaughlin and Bennett (2010) in *The Stanford Encyclopedia of Philosophy*.

opinion would carry or what particular differences in any one's experience an opinion would make if acted upon. The concept of supervenience underlies synechistic pluralism and the use by James of the concept of concatenation.

Synechistic pluralism

Synechistic pluralism can be understood as a 'doctrine of connections' (McDermott, 1977:xxxvi). Synechism or continuity, from the Greek *synergos* – working together, was a term used by Peirce. He used this term to describe his whole system of philosophy (Haack, 2005). His interest in how things work together shows, for instance, in his idea of scientific method whereby abduction, deduction, and induction synechistically conjoin. "Concatenation" (meaning *linked together*, from the Latin word for chain), is a similar concept. Concatenation was used by James as a core principle of his philosophy of inquiry and characterisation of a pluralistic universe. For James, concatenation signified a type of union (not an integration) or, as he had a way of putting it, "eaches hanging together" in a 'union of concatenation' (James, in Mc Dermott, 1977: 413), but not like a chain. James preferred instead to use the metaphor of a rope 'of which each fibre, discontinuous, cross-wise' can be conceived 'as an absolutely single fact', but followed in the longitudinal direction 'they are many' (James, in Mc Dermott, 1977:411). In *A Pluralistic Universe*, James iterates his conception of concatenation in contrast to the monism (of his day):

Our 'multiverse' still makes a 'universe'; for every part, tho it may not be in actual or immediate connexion, is nevertheless in some possible or mediated connexion, with every part however remote, through the fact that each part hangs together with its very next neighbours in inextricable interfusion. The type of union, it is true, is different here from the monistic type of all-heit [oneness]. It is not a universal co-implication or integration of all things *durcheinander* [in confusion]. It is what I call the strung-along type, the type of continuity, contiguity, or concatenation. If you prefer greek words, you may call it the synechistic type (James, in Mc Dermott,1977:808).

In other words, James conceives of complexity in unity: 'the manyness in oneness that indubitably characterises the world we inhabit' (James, 1909). For James, "oneness" and "manness" are on a par, neither more essential than the other. The recognition of this fact of experience, he says, 'is what distinguishes the empiricism which I call 'radical', from the bugaboo empiricism of the traditional rationalist critics, which (rightly or wrongly) is accused of chopping up experience into atomistic sensations

...’ (James, in McDermott, 1977:808). Thus, the term “concatenation” is important for understanding the type of pluralism advanced by James and which he fully embeds in radical empiricism.

Synechistic pluralism, which James (in McDermott, 1977:258) describes as ‘between pluralism and monism’ is an answer to the question of whether reality exists distributively or collectively, or, as he says, whether reality exists ‘in the shape of *eaches, everys, anys, eithers*? Or only in the shape of *all* or *whole*?’ Noting that ‘pluralism stands for the distributive, monism for the collective form of being’ (James, in McDermott, 1977:259), James tells us that synechistic pluralism stands for the legitimacy of the notion, and in reality as we daily experience it, that:

The world is One ... just so far as we experience it to be concatenated. One by as many definite conjunctions as appear. But then also not One by just as many definite disjunctions as we find ... It is neither a universe pure and simple nor a multiverse pure and simple (James, in McDermott, 1997:412)

The result, he maintains, is ‘innumerable little hangings-together of the world’s parts within the larger hangings-together, little worlds, not only of discourse but of operation, within the wider universe’ (James, in McDermott, 1977: 408). Here, James is telling us that synechistic pluralism provides a systematic point of view and that from this systems perspective all ‘these definite networks actually and practically exist’ (James, in McDermott, 1977:408). James (in McDermott, 1977:408) concludes by saying: ‘Enormous as is the amount of disconnexion among things ... everything that exists is influenced in some way by something else, if you can only pick the way out rightly’.

James then goes on to mention the sort of concatenation or union that obtains among things. James’s view is that the generic unity in things matters. He writes: ‘Things exist in kinds, there are many specimens in each kind, and what the ‘kind’ implies for one specimen, it implies also for every other specimen of that kind’ (James, in McDermott, 1977:409). Hence, beings, thinkables, experiences, situations, issues and concerns, for example, in practical life can be considered in this way. Were this not the case, according to James (in McDermott, 1977:409), logic would be ‘useless’. Otherwise, ‘with no two things alike in the world’ we couldn’t reason from our past experiences to our future ones’, nor could we make generalised conjectures (James, in

McDermott, 1977:409). In short, then, a synechistic-pluralist would envisage a plurality of coordinate things, of ‘reticulated or concatenated forms’ (James, in McDermott, 1977:408), similar parts, and involving many varieties, grades and scales. Under other terms of contemporary complexity discourse, a synechistic pluralist would envisage: systems, patterns that connect, relations, webs, or networks.

In sum, the basic reality of the pragmatist approach is complexity, the conception of which entails ideas of supervenience, synechism and concatenation. The key idea of continuity, applies to the process of knowing and developing knowledge. In other words, we can talk of “concatenated knowing” or “knowing together” in a variety of ways and as something occurring at different levels: at the level of personal consciousness and at the level among individuals. Talk of concatenated knowing brings us to the relevance of abduction as a mode of knowing in relation to experiences of complexity.

The relevance of abduction

Peirce’s logic of abduction intersects with James’ concatenated knowing. A form of concatenated knowing relates to the knower acting in a wider world. The assumption is that in process of knowing, there is continuity between what is intended, what is occurring, and how to act next. As espoused by James, our self, or subjective life, or personal point of view, involves complex experiences, which are the base of human thought, the function of which is knowing. Pragmatically stated by James (in McDermott, 1977:348), the significance of thought lies in ‘what conduct it is fitted to produce’. Knowing, then, culminates in action; either action thought possible or concrete action. What matters is that how we (each or together) ultimately act is well-conceived. Personal consciousness and operation of thought are also a form of concatenated knowing at a different scale. At the level of personal states of consciousness the concatenation involves continuity in acts of cognition which include perceiving, remembering, imagining, conceiving, judging, reasoning, and feeling. James makes the point that ‘however complex the object may be, the thought of it is one undivided state of consciousness’, a single (but concatenated) ‘pulse of subjectivity’ or state of mind.

Defined in terms of Peircean logic and as pointed out by Haack (n.d. :6), abduction ‘posits continuities’ (e.g., as previously discussed in Chapter 2 (p. 43): ‘It may be the case in reality that these beans are from this bag’). In Jamesian psychology, abduction can be regarded as having the status of a state of consciousness - abductivity. Briefly, to illustrate this we can look at three examples of abduction/abductivity that come from everyday handling of experiences. Each is an example of knowing as a process that takes place inside the relational field of concrete experience and of continuity in the process of knowing - what is intended, what is occurring, how to act and in the everyday process of intending, occurring, and acting people are responding to complexity.

All three examples, crossing a busy road, the Helen Keller story, and the agrarian practice of Andean potato farmers share the theme of knowing of an ordinary and common kind, which Peirce called abduction. All three cases are examples of how abduction/abductivity prepares well-conceived action (the principle of pragmatism) relevant to a specific practical situation which, from the point of view of the knower, entails a degree of uncertainty. Abduction/abductivity occurs somehow because we want to act, whether as a pedestrian checking out if it is safe to cross a busy road, as a young woman trying to figure out how to learn words, as potato farmers in the Andes (or as a policy analyst furnishing advice on difficult or intractable policy issues) (Haack, 2005) All three examples show human complexity capability that I call “reading complexity”.

Reading complexity in an everyday sense

Reading complexity is predicated on two notions: that encounters with complexity are familiar experiences in everyday life and fields of practice, and that complexity is something intelligible.

Crossing an uncontrolled busy road

Consider that you are intent on crossing a particular road as you have done many times before. This road is a major route into the central business district and so there is a continual flow of traffic (motorbikes, cyclists, buses, cars, and trucks). As you do on each occasion, you stop and look before you attempt to cross because you know you are likely to get hit if you do not. Having an explanation that accounts for the

flow of traffic - it is rush hour - does not change your quandary which is how to get across the flow of traffic to the other side, safely. Each time you come to cross the road you are interacting with a dynamic environment, face a new reality, experience a moment of uncertainty, and rely on your own nous for getting safely across the road. On each occasion of crossing comes a moment when you realise it is safe for you to cross.

Significantly, your success on each occasion does not involve attempts by you to exert control over the flow of traffic but on the contrary involves you taking into account how the traffic acts - the motorbikes, cyclists, buses, cars, and trucks. Your success arises from your ability to determine your own behaviour in connection with the traffic event occurring and leave the traffic well alone. In determining your behaviour, and not the behaviour of the traffic, you nevertheless change your circumstance, achieve your intent and thereby resolve your quandary, and move on. And, it is likely, without unintended consequences. Evidently, you have engaged in an operation of knowing that is not, as the saying goes, “rocket science”, but suited for understanding how to act in a complex situation which involves you in a dynamic and uncertain circumstance.

Helen Keller story

Helen Keller’s specific need and intent was to learn words, which she could not do. Her tutor, Anne Sullivan, began to spell into Helen’s hand the names of various objects. This was done for a long period, and met with incomprehension on Helen’s part. Again, in Helen’s case, an explanation did not suffice for understanding what the spelling was about (see Davis, 1972:144-146). Shown in Figure 14 is the process of knowing by which Helen Keller came to solve the enigma of spelling.

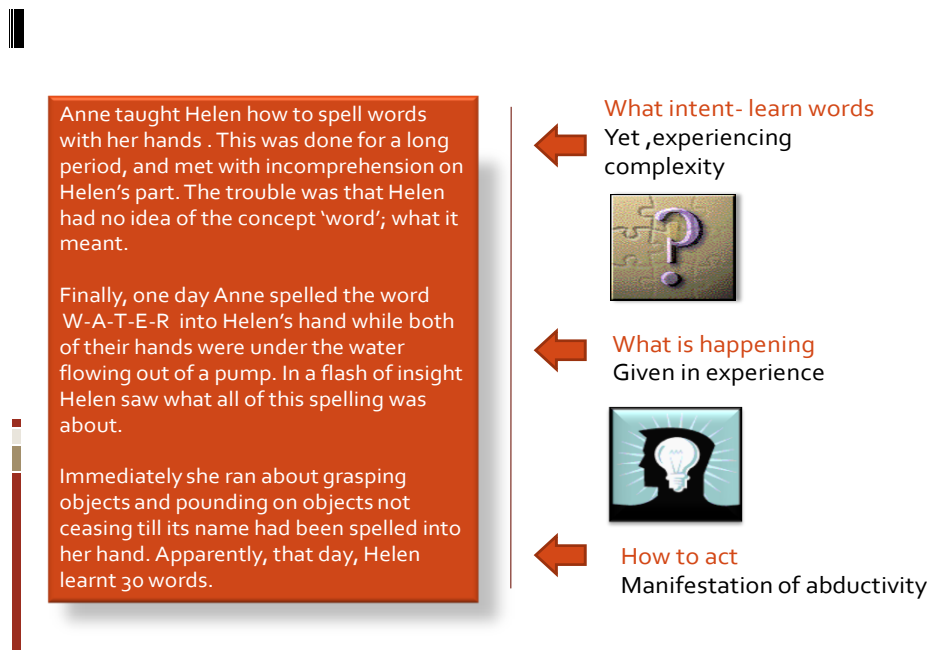


Figure 14: Reading complexity in an everyday sense

Helen abductively conceptualises the method by which she can learn words and acts accordingly. Implicit in the Helen Keller story is a reminder that our innate capacity to know “stuff” is not a mere adjunct to tools of inquiry. The use of innate abilities is itself a method for knowing, with or without tools. This is the point Stenger’s (2004:96) makes in her warning about not taking for granted the inquirer who has to ‘wonder what is relevant and how each time, with each new situation’.

Helen Keller’s behaviour is illustrative of ‘a concrete bit of personal experience’ (James, in McDermott, 1977:768) of complexity involving subjective concatenated knowing: a relation between self and the external world and the cognitive operation of abduction. It is a relation connecting real events (e.g., experiencing complexity) with real events (i.e., what is happening and the activity of thought).

Agrarian practice of Andean potato farmers

Changing patterns of temperature, humidity, air pressure, wind and precipitation produce weather: the dynamic state of the atmosphere at any one place at any time. Weather manifests different aspects under certain conditions. Weather is a concrete example of complexity; of a natural phenomenon that behaves complexly (Nicolis &

Prigogine, 1989). The creation of scientifically-based forecasts is made possible by use of sophisticated computer programmes and satellite technology. Computer simulation of the weather relies on forecast models to provide predictions on atmospheric variables such as temperature, pressure, wind and rainfall. A weather forecaster examines how the features predicted by the computer will interact to produce the day's weather. The task is data intensive. Official forecasts, as meteorologist and eminent chaos theorist Edward Lorenz (1993:77) reminds, are sometimes 'just plain wrong'. Forecast accuracy is a matter of degree and 100 percent accuracy elusive. The creation of official forecasts with a degree of accuracy is time limited, usually to about a week. And it is certainly outside the scope of practice of meteorology to read the sky and warn of weather months ahead. Even so, as this next story shows, it is possible to take a common sense-making approach, read the sky, and forecast what the weather would bring in certain conditions months later.

Weather forecasting based on scientific methods is commonly thought to be a vast improvement on the quaint superstitions and "mumbo jumbo" of common sense methods that result in rituals, or the observation of phenomena ostensibly extraneous to weather like the moon or stars, and weather rhymes such as "red sky at night" - all of which are features of the agrarian practice of potato farmers in the Andes of Peru and Bolivia investigated by Benjamin Orlove, John Chiang and Mark Cane (2000, 2002).

During the festival of San Juan in late June each year, local farmers go to the top of the nearest mountain and look for the Pleiades star cluster in the constellation Taurus. They believe that the appearance of the stars can be used to forecast summer rainfall four months ahead and the size of the autumn harvest. Their common sense rule-of-thumb or principle for prediction is expressed in lore along the lines of: 'if they [Pleiades] come out at their biggest, this year we'll have plenty; but if they come out at their smallest, we're in for a very hard time' (Orlove et al., 2002:435). Their predictions determine the planting dates of potatoes. If poor rains are predicted planting is postponed by 4-6 weeks (Orlove et al., 2002). According to Orlove et al. (2000, 2002) the Andean potato farmers' forecasting method works with a marked degree of reliability that exceeds modern scientific forecasting practice.

The implication, in this story of encounters with complexity, is that there are people who are not scientists, who do not necessarily “get it wrong”, and people who are scientists, who do not necessarily “get it right”. What the Andean potato farmers study does not address is the question of how come the farmers, the non-scientists, actually ‘got it right’. Nor does the study ponder why science, as yet, cannot match the farmers’ practice, even though meteorology and climatology are sciences of complexity.

Rather than addressing the complexity manifest in weather with a model, the common sense-making approach shown by the Andean farmers addresses, first-hand, the complexity manifest in their situation. The common sense saying, “if they [Pleiades] come out at their biggest, this year we’ll have plenty; but if they come out at their smallest, we’re in for a very hard time”, indicates that Andean farmers posited a connection between what they observed and experienced on the ground, what they observed and experienced in relation to the night sky, and their intent. The particular lore relates: what to look out for in the night sky (stars big or small), occasion (June) and significance (good harvest or poor). The lore captures the insight which enables people to foresee how they would behave (not the weather) in light of the pattern bearing on their circumstance. Salient patterns that are realized can be viewed as a paradigmatic way of comprehending complexity.

Another look at the Andean farmers’ situation as described by Orlove et al. (2002) reveals a continuity comprising: space-place, time, seasons, weather, growth of crops, as well as the farmers’ purpose and behaviour:

The Indian villagers there must live within the tight constraints imposed by the elevation and climate and by the basic requirements of the crop. There is a distinct growing season during rainy months of the year, usually from October through March. These are also the warmest months and have the longest days, so they are the best for crops. However, potatoes have stringent requirements. If soil moisture remains too low after the tubers are planted, they will not produce strong shoots. If the ground freezes, the plants will be damaged. The farmers, well aware of the need for proper soil moisture and air temperature, aim to plant their potatoes right at the start of the rainy season, so that they will be assured of an adequately long period with appropriate conditions (Orlove et al., 2002:429).

Experience of scant rain and attendant consequences is in stark contrast to the form of experience from abundant rains, even though both are forms belonging to one larger or general pattern.

Centuries later, descendants know the patterning: know what to look for; know what they would expect given certain conditions as opposed to “know what will happen”, and can adapt their behaviour accordingly. What remains unknown until they observe the stars, of course, is the form of patterning that will actually become the case, or even, if the forms of patterning persist. For descendants, the common sense-making lore summarizing the initial reading of complexity by their ancestors, gives the salient facts about what is relevant and to be taken account of, and what is likely to ensue, by which they can act with likely success.

In giving an account of their research, Orlove et al. (2002) indicate the kinds of questions that motivated their cross-disciplinary study. How could credence possibly be given to the Andean farmers’ behaviour? How could the appearance of stars possibly be connected with rainfall? Does this traditional method do the farmers any good? Especially, when the Andean farmers’ belief, which they have acted on for centuries, “seemed as implausible as foretelling the outcome of a battle by examining the intestines of a sacrificed bull” (Orlove et al., 2002:428). Eventually, a scientific explanation was determined that revealed even more complexity at play. In short, the poor visibility of Pleiades in June is caused by an increase in high altitude cloud, invisible to the eye, but indicative of an El Nino year which is usually linked to reduced rainfall during the growing season months later (Orlove et al., 2000:68). Note that this explanatory finding, while of great interest to the scientific community, is essentially irrelevant in practical terms to the on-going lives of the villagers.

Each of the three cases demonstrates that people have a capacity for complexity thinking generally. The three specific cases are a demonstration of complexity thinking in the most basic sense described by Peirce and James and underscore their classical pragmatist perspective that such thinking is about the way ‘we do think’, not ‘what we ought to think’ (James, in McDermott, 1977:385). A non-holistic but synechistic approach, which involves paying attention to what obtains in experience, concatenated knowing (what is intended, what is occurring, how to act) and abduction

(understood as the positing of continuities), constitutes a way we can think and know complexity for action (see Figure 15).

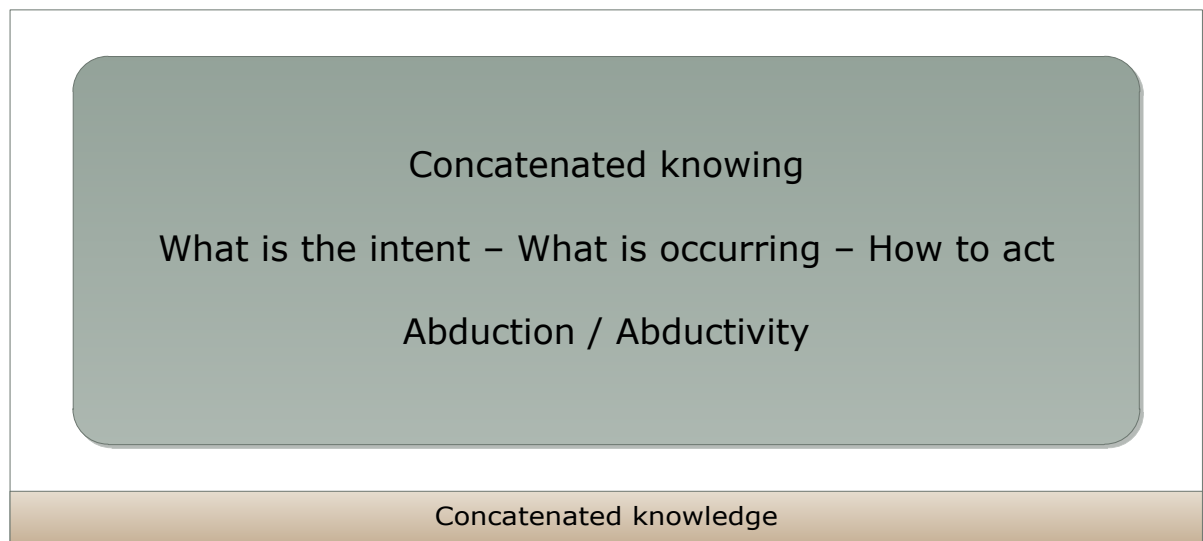


Figure 15: Concatenated knowledge - a capacity for reading complexity

Thus, the concept of complexity capability in policy analytic work can be re-framed and re-developed in the context of complexity thinking as described in terms of classical pragmatism. Rather than a focus on developing new ways of thinking by understanding the basics of complexity science, a possible alternative is to develop a practice of synechistic, concatenated knowing that utilizes human capability to read complexity. The implications of complexity capability re-framed in classical pragmatist terms for policy analytic work include the imperative to look at concatenated knowing at a different scale, namely at a social level.

In this next section I complete my examination of pragmatism as a classical expression of complexity thinking with consideration given to the kind of complexity that reading complexity in the social domain would entail in light of the epistemological argument of “wicked” problems, namely, that knowledge policy makers need is to be found in social processes and the rationality of stakeholders and citizens (Rittel & Webber, 1973).

Reading complexity: opinion-based policy analysis

There are other systems of knowledge concatenation besides what is intended, what is occurring, how to act. In addition to complexity thinking as a general capacity that human beings share, James' account of systems of knowledge concatenation includes a wider system of intellectual pluralism which can be regarded as a knowledge system of subjectivity. Such a system yields a complex reality in which policy analysts (and politicians and public administrators) are implicated even when engaged in objective practice. About this form of knowledge concatenation, James (in McDermott, 1977:264-265) wrote:

... everything in the world might be known by somebody, yet not everything by the same knower, or in one single cognitive act, - much as all mankind is knit in one network of acquaintance, A knowing B, B knowing C, Y knowing Z, and Z possibly knowing A again, without the possibility of anyone knowing everybody at once. This 'concatenated' knowing, going from next to next, ... makes a coherent type of universe in which the widest knower that exists may yet remain ignorant of much that is known to others.

The point of view of a many, of autonomous knowers "hanging together" or "knowing together" in a knowledge system (a network) of subjectivity, connotes a wide field of experience and knowing. James talked of a 'forest of human experiences'. Subjective reality that is constituted at the individual level is a constellation of points of view or a complex of opinion at different scales of social life (see Figure 16). In the terminology of our day, rather than refer to synechistic, concatenated subjectivity we might refer to social subjectivity, social experiences, intersubjectivity, or public opinion.

In such a knowledge system of subjectivity in which the psychology of the individual 'can never be omitted or suppressed' (James in McDermott, 1977:768) individual elements of experience and knowing manifest multiple iterations of common ways of knowing rooted in multiple "concrete bits of personal experience". Processes of social rationality encompass, then, multiple repetitions of looking at issues but with variation in individual discovery and meaning. As talked about by James (in McDermott, 1997:768) subjective reality, that is, 'our very experience itself' as 'felt or thought of', affects what eventuates in social contexts.

Further, James (in McDermott, 1997: 432) stressed the importance of communication for knowing. He (in McDermott, 1977:435) urged: ‘we must talk consistently just as we must think consistently’, ‘for both in talk and thought we deal with kinds’. James (in McDermott, 1977:435) insists that all human thinking ‘gets discursified’, ‘verbally built out’ and ‘made available for everyone’. Moreover, he argues, we may be co-conscious and not know it, that is, our experiences may be ‘ “with” each other in various external ways’. In other words, “the point of view of a many” formulation of concatenated knowing suggests that a pattern of opinion lies hidden within the subjective system. This implies, in general terms, that an explicatory and exemplary pattern of experience is present but not easily observed. From a policy standpoint, this would-be existent pattern can be viewed as a “situational paradigm” indicating a working context that implicates policy analysis. If this situational paradigm could be known then policy analysts might use that knowledge to arrive at a realistic conceptualization of what to pay attention to and not explain away as “anomalies” in the real world of human affairs.

Social processes & the rationality of citizens have the
basic characteristic of subjectivity

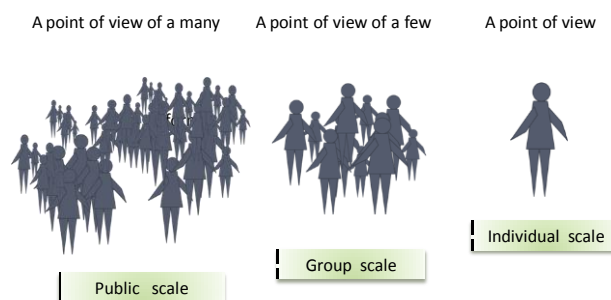


Figure 16: A knowledge system of subjectivity

To take concatenated knowing at this level seriously, the level of a point of view of a many that according to James, in his day, was ‘sneered at as unscientific’ (James, in McDermott, 1977:768), for James meant that it is possible to work things out together.

Assuming that subjective relations are real, that social processes have the basic characteristic of subjectivity, and that opinion can be defined to incorporate the social rationality available in individual experience, it may be that what occurs as a complex of opinion likely to hang together about specific matters of social wellbeing, or social concerns and issues, constitutes what is to be taken account of in a reading complexity policy practice; just as the traffic is to be taken account of in the act of crossing the road, or the patterns of brightness apparent in the stars are heeded in the act of planting the staple crop in the Andes. If this assumption holds, then, few if any attempts to understand complex problems of social policy are likely to succeed without, in some way or another, making use of subjectivity in the conceptualization of such issues. This epistemological claim implicates reading complexity as an approach to knowledge about social subjectivity for an analysis of what to pay attention to and not overlook in regard to a particular issue.

If I tease this out a little more, I could represent my discussion of a reading complexity practice in a comparative table. As I have already discussed, Dent's (1999) portrayal of differences in worldviews associates modernist methods of science with limited complexity capability. In general, those elements such as subjective reality, mutual causality, indeterminism, and holism that from a scientific perspective characterise complexity are elements typically ignored within the paradigm of analytical rigour. Policy analytic methods that share the commitments (theoretical, instruments, and techniques) of modernist science are thus implicated in a paradigmatic process, in Kuhnian terms, of an accumulation of anomalies. Confinement to one standard form of practice - evidence-based policy analysis - is not an easy path to new understandings.

In Table 5 I have suggested, in broad terms, a list of some commitments that describe what might a practice of reading complexity entail that is different from an evidence-based policy analysis practice. This revalorisation of opinion in policy advice in complex and intractable situations, predicated on linkages between pragmatism and complexity thinking, is an argument for choice in how to practice science according to the cases of policy analytic work that arise.

	Standard evidence-based policy analysis practice	Reading complexity opinion-based policy analysis
Mode of rationality	Scientific	Common sense
Epistemological footing	Positivism	Classical pragmatism
Logic	Deductive	Abductive
Epistemological context	Justification	Discovery
World view	Traditional (objective reality)	Emerging (subjective reality)
Manner of knowing	Reliance on pre-existing theoretical perspectives, conceptual frameworks and understandings	Reliance on open thinking independent of pre-existing theoretical perspectives, conceptual frameworks and understandings
Complexity capability	Limited to what flows from objective, deterministic, reductive and disjunctive thinking	Enhanced by (the complements) of subjective, abductive and conjunctive thinking

Table 5: Differences between evidence-based and reading complexity policy analysis practice

Evidence-based and opinion-based are not mutually exclusive practices. Drawing on a play of words from Haack (2005), policy analysts could rely on both scientific and common sense modes of rationality, replacing ‘cynicism’ about our natural capabilities and the value of opinion with ‘synechism’ and the idea that understanding complexity is ‘possible for us’ (Haack, 2005:242) when we rely on an adaptive mind that ‘stands related’ (Smith, 1965:105) to a purposeful life in a complex and changing world. The implication of replacing cynicism with synechism is that confidence and

the opportunity to develop skills in reading complexity activity based in the classical pragmatism mode of science (abduction-deduction-induction), would be required.

Missing from the list of commitments is a methodology that can be applied to reading complexity as an epistemological capability. Without the recognition of a set of specified procedures through which reading complexity can take place confidence is an unlikely prospect. In this regard, Q methodology may be an invaluable help as I shall go on to discuss in Chapter 5.

In closing this part of my discussion I make one last point concerning how classical pragmatism relates to the new sciences based on my selective reading of the new science literature.

Classical pragmatism and new science

Classical pragmatism is not usually said to be the precursor of the new thinking: this generative capacity is rather attributed to quantum, chaos, and complexity theories, which signify a fundamental change taking place in our understanding of the world and the way we know it (Morçol, 2000). Yet, much of classical pragmatist thought pertains to the emerging perspective or sciences of complexity. The classical pragmatist doctrine of relations advanced by Peirce and then James lies at core of these new sciences as indicated below.

Heisenberg, writing in 1958, gives his account of quantum theory in *Physics and Philosophy*. He makes clear that the Copenhagen Interpretation accepts a world of concatenation that ‘does not allow a completely objective description of nature’ (Heisenberg, 1999:107). He states:

... one sees that one has now divided the world not into different groups of objects but into different groups of connections ... What can be distinguished is the kind of connection which is primarily important in a certain phenomenon ... The world thus appears as a complicated tissue of events, in which connections of different kinds alternate or overlap or combine and thereby determine the texture of the whole (Heisenberg, 1999:107).

Henry Stapp (1971:1313), a physicist who has written on the topic of the web philosophy of quantum science points out that the Copenhagen Interpretation of quantum theory is ‘completely pragmatic’. One of its starting points is that ‘the

objects of everyday experience exist roughly the way suggested by common sense' (Stapp, 1971:1313). Also accepted is that the idea, for example, of a table existing alone in the universe has an 'air of unrealness about it' (Stapp, 1971:1313). A real table, as Stapp (1971:1313) goes on to say:

... is constructed by certain workmen acting with certain tools on trees from a certain forest. It rests in a certain place, e.g., in my study, and has certain other objects arranged about it, e.g., my chair and me ... Any conception of the table that isolates it from its past, its environment, or its future, is an idealization the limits of validity of which are not immediately known ... At the atomic and elementary-particle level, the idea of independent entities dissolves; the most elementary things have meaning only in terms of their effects on other things.

In quantum theory and in classical pragmatism the world is seen to have a concatenated structure. The idea of supervenient relations pertains in both epistemological frames as does James' conclusion, as previously cited, that 'everything that exists is influenced in some way by something else, if you can only pick the way out rightly'.

More latterly, Capra (1997, 2002), who was trained as a particle physicist, advances and extends the web philosophy for understanding complex adaptive living systems and social reality. Capra (2002:xii) has sought to provide a unified view of 'mind, matter, and life' for the purpose of approaching 'some of the critical issues of our time', which certainly qualifies as a pragmatic undertaking. He attempts to present what a unified scientific view of social reality would entail for becoming conversant with complex social phenomena, that is, what would constitute a scientific complex perception of social reality. According to Capra (2002), such a scientific perception of social reality would necessitate, along with seeing 'networks and networks nested within larger networks' the taking account of relations between form, processes, meaning, and matter. His framework, which he develops in detail using complexity theory, the cognitive sciences, and insights from the natural and social sciences, is essentially epistemological. It deals with the integration of knowledge about life. In this respect, Capra's framework is in keeping with the transdisciplinary school of complexity thinking.

The important difference between Capra's version of complexity thinking and the classical pragmatist version lies in the classical pragmatist distinction between "what

to think” and “how to think”. The former means to think in terms of complexity theory, concepts, and methods and address issues on the basis of scientific explanations of complexity. It is a form of objective complexity thinking. The latter means to think abductively and in terms of “what you are doing” in relation to “what is occurring” and address issues on the basis of well-conceived action. It is the latter version of complexity thinking which I associate with classical pragmatism.

Summary

In this chapter I examined the idea of complexity capability from a complexity thinking perspective. There have been suggestions made in the complexity literature as to what form a new paradigm of complexity could take. My discussion centred on classical pragmatism as offering a set of different commitments and a way to conceptualise opinion in relation to the development of knowledge that might better meet the demands of a “complexity project” in the policy sphere in contrast to the rationality project associated with modernist science.

A fundamental issue I have associated with the quest by policy analysts for complexity capability and new ways of thinking is that of knowing what mode of knowing may make a difference in what eventuates from the policy process: knowing complexity theory, or a synechistic, concatenated knowing? As I argued, an epistemological basis for an opinion-based policy practice, described as “reading complexity” that relies on a characteristic of common sense-making way of thinking, namely, abduction can be found in classical pragmatism. In light of this, and in response to the research questions that concern the efficacy of Q methodology in relation to policy analytic work, in Chapter 5 I inquire into “Q thinking” and the kind of science advanced by Stephenson for its potential to enable a reading complexity practice.

Chapter 5: Q thinking

Introduction

Stephenson's science of subjectivity has been used to research difficult public policy issues and help find solutions to intractable policy problems (Brown, Durning & Seldon, 2007). The Schiphol Airport policy controversy is one illustration of Q methodology being used to assist the search for solutions to a specific difficult policy issue. Through the use of this research tool, not only was previously unavailable policy relevant knowledge provided from the Q methodological study but a realistic overall picture of a body of policy arguments made it possible to define the problem in tractable ways and commence fresh deliberations on the issue of airport expansion.

The value of Stephenson's science of subjectivity tends to be assessed on the basis of its technique, the means by which data are collected, and method, the means by which the collected data is analysed (Brown, 2011c). To recap, in simple terms, Q methodology technique and method involve:

... statements of opinion (Q sample) that an individual rank-orders in terms of some condition of instruction - e.g., from "most agree" (+5) to "most disagree" (-5). The items so arrayed comprise what is called a Q sort. Q sorts obtained from several persons are normally correlated and factor-analyzed ... (Brown, 1980:6).

By contrast, however, the value of the thinking behind the research procedures tends rather to be overlooked. While not attempting full coverage of the founding concepts of Q methodology, in this chapter I consider Stephenson's kind of science and the "Q thinking" that goes with it. Of interest is the extent to which Stephenson's insights contribute to a potential epistemological reframing that is different from interpretative, or reductive, or integrative modes of science. The chapter highlights that Q methodology as distinct from Q method has an epistemological claim in the revalorization of opinion. My primary interest is in how Stephenson's kind of science offers the potential to read complexity in the social policy context, especially where explanation may not suffice for understanding what an actual policy situation is all about.

Since Stephenson first proposed Q methodology and then advanced the thought underlying Q methodology and its application in his book *The Study of Behaviour* (1953), several key works in Q methodology have been published that, to a greater or lesser extent, give an extended treatment of technique, method, and applications. Among these, Steven Brown's (1980) *Political Subjectivity: Applications of Q methodology in political science* features as a primary work that provides detailed treatment of the philosophy, methodological issues, method and technique. Bruce McKeown's and Dan Thomas' (1988), *Q Methodology*, offers an introductory primer to prepare those unfamiliar with the methodology for engaging with the more substantial literature covering theoretical, philosophical, and methodological debates, critiques, clarifications, and applications. This work has been followed up with the publication in the journal, *Operant Subjectivity*, of a simplified introduction to the procedures and technical aspects of Q methodology by Brown (1993:91-138) in *A Primer on Q Methodology*. In this primer, Brown looks also at different conceptions of the methodology.

Since the mid-1980s, the number of papers and chapters on Q technique and methodology has increased as the applications of Q methodology in systematic studies of a wide range of subject matters have increased in psychology, political science, communication and media studies, the environmental sciences, the health sciences, and the behavioral sciences more generally as evinced in the bibliographical updates made available through the journal *Operant Subjectivity*. These documents and chapters typically provide introductory summaries of the basics of Q method. Recent accounts include: the chapter on Q methodology in *Handbook of Research Methods in Public Administration* by Steven Brown, Dan Durning, and Sally Seldon (2007); the document *Q methodology: A Sneak Preview* by Job van Excel and Gjalte de Graaf (2005); an introduction to the methodology by Jonathan Donner (2001) in *Social Analysis: Selected Tools and Techniques*, and Helen Addams' (2000) chapter on Q methodology in *Social Discourse and Environmental Policy*.

The use of Q methodology in the context of public policy has resulted in an expanding body of work. Brown, Durning, and Seldon (2007:745-754) have categorised, with a bibliographical guide, the use of Q methodology by policy analysts and researchers under a series of headings and subheadings to indicate a

research agenda in the various fields of public administration, public management, public policy, and evaluation. In the field of public policy, Q methodology has been used in studies to: research influences on decisions that were made in the past (e.g., Donahue, 2004; van Excel, de Graaf & Rietveld, 2004; Webler, Tuler, Shockey, Stern & Beattie, 2003); understand better the perspectives of stakeholders and decision makers on decisions that will be made in the future (e.g., Steelman & Maguire, 1999; Wolf, 2004; Woolley & McGinnis, 2000); provide a mechanism for marginalised or powerless groups to make their views known (e.g., Brown, 2005; Combes, Hardy & Buchan, 2004); facilitate the search for compromise solutions to difficult policy issues (e.g., Dayton, 2000; Focht, 2002; Maxwell, 2000).

Discussion proceeds in four parts. In the first part, concern is with three focal elements: the idea of a science of subjectivity, the rationale for an abductory methodology, and the general idea of knowledge which Stephenson advanced. I note that to my knowledge, Stephenson does not directly present Q methodology in terms of a theory of knowledge *per se*. He does, however, outline a general theory for subjective communicability (Stephenson, 1980b). Rooted in reclamation by Stephenson of the old concept of “conscire” as against the modern notion of “consciousness”, I suggest that this theory of communicability, equally, may be read as a theory of knowledge, that is, ‘the conscire approach’ (Stephenson, 1980b:23) to theory and research for addressing problems from a subjective standpoint. A description of basic elements of Q method, with reference to the Sickness and Invalids’ Benefit policy project case, comprises the third part and leads to a consideration of the proposition of the epistemological status of Q methodology and its transformative power in the fourth part.

Subjective science

Q methodology was first proposed at a time when science in general (positivism), including psychology, was reluctant to deal with ‘matters of opinion’ (Stephenson, 1986:39), discounting subjectivity as ‘contrary to objective science’ and its investigative procedures until, at least, the advent of quantum physics. In the context of physics, Heisenberg (1999), among other quantum scientists, argued that scientific descriptions are not independent of the observer and the process of knowing. He said: ‘we have to remember that what we observe is not nature in itself but nature exposed

to our method of questioning' (Heisenberg, 1999:58). This is the view which Stengers (2004) invokes in her claim that, for inquiry into complexity, the need in science is to further develop skills of interrogation. According to Capra (1997:40), this recognition of methods of questioning can be understood as: 'a shift from objective to "epistemic" science; to a framework in which epistemology – "the method of questioning" – becomes an integral part of scientific theories'. This view is a basic premise of the transdisciplinary stream of complexity thinking as evinced, for instance, in the works of Capra (1997, 2002) and has already been discussed in Chapter 4.

Brown (2011b) reminds us that the writings of Stephenson focus on 'the science of subjectivity' with references to specific Q studies to emphasise understanding what you are doing in the way of a subjective science. Irvin Goldman (1999:589) and later Michael Stricklin (2004/2005:87) suggest that in the human and social sciences Stephenson articulated an alternative framework of questioning and knowledge that ran counter to certain mainstream presumptions about what a science-based epistemology does and does not include.

Unlike many of his contemporaries, Stephenson did not subscribe to Newtonian deductivism, determinism, or to disjunctive approaches marked by 'mind-body dualism' (Delprato & Brown, 2002:146) (see also Good, 2010; Stephenson, 1988/1989). Nor did Stephenson attribute an essential difference of nature to objective and subjective. In Stephenson's view, objective and subjective are, to borrow a Jamesian phrase, 'of one and the same stuff' (James, in Mc Dermott, 1977:187). In other words, objectivity and subjectivity are understood as behaviour in general: 'whether subjective to a person or objective to others' (Stephenson, 1953:23). For Stephenson, methodologically, the difference between objective and subjective is a matter of self-reference. To clarify, an example of the distinction is given in Stephenson (1995/1996:4):

To sit down in front of TV, and to view for an hour, are statements of fact, as objectively regarded: they are testable without self-reference – anyone, in principle, can prove or disprove the matters. But when the viewer says "I immerse myself in that world", and "when it's over I'm just myself again," the statements are intrinsically self-referent, and incapable of proof or disproof by traditional scientific rules.

The use by Stephenson of the term “concrete” is relevant here. Broadly, by “concrete” is meant ‘confrontables’, that is, ‘spatiotemporal things and events’ as against ‘hypothetical entities’ (Delprato & Brown, 2002:144). The point of view of a person, their beliefs, feelings, ideas, opinions, and so forth are all communicable (Stephenson, 1969). In this regard, what people have to say for themselves, or ‘may say about this-or-that as matters of their opinion’ (Stephenson, 1969:69) are concrete or confrontable subjective behaviours. Thus, the term “behaviour” is important for understanding the type of science advanced by Stephenson and which he fully embeds in Q method - as will be shown subsequently. In addition, a basic tenet of Q methodology is that ‘subjectivity arises from persons and not groups’ (Smith, 2001:334). Stephenson (1953, 1978) calls attention to subjectivity as the point of view or opinion of a total thinking, feeling, and behaving person in changing interactions from situation to situation (see Smith, 2001).

An experimental psychologist who initially trained as a physicist in the positivist tradition, and was forced, as he put it, ‘to think of methodologies’ (Stephenson, 1993/1994:3), Stephenson (1986:39) developed Q methodology with the idea in mind that ‘problems in nature can be examined subjectively’ (Stephenson, 1986:39). In other words, Stephenson had in mind a general subjective science to complement objective science. In thinking through the idea of Q methodology as science, I identified that there were at least four possible kinds of science that could come into play. These four kinds are represented in Table 6 below.

In looking at this schema of science I have put together, of these four forms that a general science might take, which I label (below), the second, “objective-subjective” is how Stephenson envisaged Q methodology. In other words, he devised a way to work with objective facts, beginning with the empirical fact that people have opinions, under experimental conditions, from a subjective standpoint. It follows that in order to understand Q methodology it does not suffice to think of it in the limited sense of “the study of subjectivity”. Granted, such a science is used for the study of subjectivity (attitudes, values, beliefs, ideas, perceptions, judgements, feelings, meanings and so forth), but the possibilities expand in terms of subject matter insofar as the scope of subjective science is immensely wide, in principle if not in fact. All kinds of things, including, for instance, the problems of the public that manifest in the

context of experience are open to systematic subjective study with the use of objective material.

Kind of science	Working with...
Subjective-subjective	Subjective material examined subjectively
Objective-subjective	Objective material examined subjectively
Subjective-objective	Subjective material examined objectively
Objective-objective	Objective material examined objectively

Table 6: Four possible kinds of science

In order to appreciate the systematic nature of Stephenson’s subjective science it is worth noting that among all the sciences, quantum methodology of science is likely to be the closest in form to Q methodology. Stephenson (e.g., 1983, 1988/1989, 1995/1996) elaborates this view in his writings. He tells us that Q methodology has a ‘foundation in quantum theory’, in the ‘mathematical similarity between factor analysis and quantum mechanics’ (Stephenson, 1995/1996:1). It is not the intention of this thesis to engage with the (advanced) mathematical similarity between Q methodology-based factor analysis and quantum mechanics. However, the similarity between doing a Q methodology experiment and a quantum-type experiment is of interest here.

Much like quantum science

The similarity is shown in specific relation to the Copenhagen Interpretation of quantum mechanics and the set-up of the quantum “double-slit” experiment involving light. Light (photons, or atoms, or electrons) is shone on a screen with two slits in it

that allow light to pass through to a second screen that results in a pattern *made by the light* as it passes through the experiment (see Figure 17).



Figure 17: The Copenhagen explanation

Source Al-Khalili (2003: 135)

This key experiment involving the behaviour of light has led to different and conflicting interpretations of quantum mechanics in the attempt to understand and give a convincing explanation of why quantum scientists get the experimental results they do. Yet, physicists use quantum mechanics without a settled explanation for why it works (Al-Khalili, 2003; Gribbin, 1996). A way to envisage doing a Q methodology experiment is to think of the Q experiment as a kind of *prope*-quantum experiment (*prope* - Latin for “beside” or “near”) involving a subjective system and not light, that is, a quantum system.

In simple terms, the diagram in Figure 17 shows the quantum experimental situation according to the Copenhagen Interpretation. It shows a light source, and the projection of light onto the screen (the measurement) which reveals the pattern made by the light (the result of the measurement). The diagram depicts a curtain (“the quantum curtain”) obscuring what goes on between the light source and the pattern that is made by the light passing through the experiment (Al- Khalili, 2003:135). The Copenhagen Interpretation does not give an unambiguous and clear cut explanation of the behaviour of light behind the curtain as much as offer an interpretation of what quantum theory means (Gribbin, 1996).

Basically, the Copenhagen Interpretation tells us that since we cannot know what goes on behind “the quantum curtain” without affecting the results we can only talk about what we can see. What we can see is the interference pattern on the screen (the measurement). As expressed by Jim Al-Khalili (2003:138-139) ideas that comprise the Copenhagen Interpretation include:

We can never describe a quantum system independently of a measuring apparatus. It is meaningless to ask about the state of the system in the absence of the measuring device, since we can only ever learn something about the system if we take it in conjunction with the device we use to look at it.

The role of the observer is central. Since the observer is free to choose what type of measurement to make (the position or momentum of a particle) then the quantum entity cannot be said to have these properties until we look. The quantum entity remains suspended in a superposition⁷ until we decide what we wish to measure. In this way, certain properties of the quantum system are only endowed with reality at the moment of measurement.

The act of measurement brings about a sudden jump in the state of the measured system from a combination of potential properties to one actual outcome.

All that can be commented upon are the results of measurements.

In short: ‘All that can be said is that an experiment is set up in a certain way, and certain measurements are made, then you will see certain results’ (Gribbin, 1996:14;

⁷ The idea of superposition is a general property of waves. An illustration of superposition given by Al-Khalili (2003:81) is as follows: “If two stones are dropped in a pond close to each other the ripples will spread out and meet, forming a superposition that has a pattern very different to the two sets of concentric waves, due to interference.

Gribbin references this statement as Bohr's summation of the Copenhagen view). Here is a good place to note that this statement resembles Peirce's pragmatic maxim, viz., 'If I act in manner *x*, then I will have experiences of the sort *y*' or 'If I want to experience *y*, then I will act in manner *x*' (Moore, 1961). Furthermore, the logic of the statement attributed to Bohr approximates, for instance, the logic intrinsic to the farming practice of the Andean potato farmers, which I (re)express here as: if the constellation Pleiades appears in a certain way, and certain observations are made, then we will act in manner *x* in order to experience *y*. Again, as far as I know, abduction is not referred to in accounts of quantum methodology of science (e.g., Heisenberg's (1999), *Physics and Philosophy*). Nevertheless, the Copenhagen Interpretation points to an abductive discovery practice at play in the development of quantum mechanics. In quantum physics, the quest for the best explanation of the underlying structure of quantum phenomenon continues.

The double slit effect in the Q experiment is formed by the person (source) making choices among alternatives under specified conditions ("most agree"/ "most disagree"). The outcome of the Q experiment is a Q sort (the measurement) that results in a pattern in the form of a distributed set of numbered statements rendered by the behaviour of a total thinking, feeling, and behaving person. In the case of Q methodological studies where multiple persons are asked to operate under the same condition of instruction, each person's participation replicates the same experiment with an outcome 'which is in no way dependent upon the outcome of the other experiments' (Brown, 1995:2). The results of these measurements are submitted to correlation and factor analysis so that the researchers can see the structure or form or pattern of subjectivity that is a function of the experimental setting which involves a condition of instruction and the participant's lived life (Delprato & Brown, 2002). In this regard, subjectivity has an indeterminate aspect: 'We know in advance neither how many factors there will be nor what structure they will reveal' (Brown, 1993:135). The individuals provide the factors - their 'perspectives of existence' (Stephenson, 1986:47) as against the perspective of the researcher in hypothetico-deductive mode.

In the Q experiment, the equivalent of "the quantum curtain" relates to the idea of consciousness or the nature of mind or cognition and the process of knowing. Q

methodology is not concerned with what goes on in the mind of the individual as such and so replaces notions of ‘consciousness’ (Stephenson, 1995/1996:5) with the idea of communicability. As Stephenson (1995/1996:2) suggests: ‘whatever went on in the “mind” of the individual is captured directly by the Q sorts and measured instantly’. The measurements are made by the Q sorters themselves about their own point of view and involve means of human expression: ‘... it is axiomatic that only the person, himself, can measure his own subjectivity’ (Stephenson, 1981:47).

Thus, it is possible to understand Q methodology experiments in terms similar to the ideas of the Copenhagen Interpretation, replacing “quantum system” with “subjective system” and measurement “devices” with each person’s own operant subjectivity. By “operant” is meant ‘naturally occurring’ (Stephenson, 1981:3) in the particular situation. To borrow Brown’s (1980:6) way of putting it, a person’s behaviour indicates ‘what is operant in their case’, that is, their ‘conception of the way things stand’ (Brown, 1980:6) *vis-a-vis* the subject matter. The factors are ‘naturally occurring confrontable events’ as opposed to ‘hypothetical entities’; ‘objective for the persons who render them’ and for the researcher who interprets (Delprato & Brown, 2002:144). This notion of operantcy introduces a significant epistemological implication insofar as it is a common denominator for a variety of related points of view understood as behaviour in general. In effect, what this means is that the objective/subjective dichotomy as a methodology of science construct is replaced with the concept of operant subjectivity.

Essentially, a Q methodology investigation centres on the way in which subjectivity of the individual and together with other individuals ‘hangs together’ about the subject matter of interest (Stephenson, 1956:11). Stephenson tells us that revealed structures are the ‘nexus for the meaning of the situation’ (Stephenson, 1981:47), that is, what the situation means to the researcher and to the participant. Participants and the researcher ‘reach their own “understandings”, their own interpretations’ (Stephenson, 1980b:33). On this connection, it follows that in the method’s practice of science the researcher can participate in the Q experiment that they set up. By way of researcher participation, Q methodology confronts head on the issue for science of bias.

The question of bias (the distortion of findings) is central to the validity and reliability of findings. Robust science eschews bias. In Stephenson's subjective science, researcher participation is countenanced because it allows the researcher to see 'their own perspective on the same matters via the same procedures' and in 'the same observational field' (Brown, 1993:124). In other words, the researcher can perform a Q sort and replicate the experiment. By being a participant it is possible for the researcher, and anyone else who might care to look, to see where they are located in terms of the factors that reveal the underlying structure of points of view and concomitant conceptualisations. The question "why care to look?" is answered by Brown (1993:124) who points out that in all likelihood it is from 'that perspective' that interpretation of factors will be rendered.

Q methodology's likeness to quantum science makes the point that Q methodology differs in quite fundamental ways from other approaches to subjectivity and the study of opinion. These differences stem from Q method's origins in psychometrics involving factor analysis and the method's function as a practice of science. Criticisms of Q methodology can be traced to the method's origins (Brown, 1972).

Origins

Q methodology has its beginning in psychology and a re-think of classical factor theory (Stephenson, 1953; 1969; 1990b, 1993/1994). Classical factor theory refers to factor theory created by Charles Spearman (1904) (Stephenson, 1988/1989). Factor analysis is defined generally as a set of statistical techniques the aim of which is to simplify complex sets of data - a process that is best understood as an act of condensing - as an aid in conceptualisation (Gorsuch, 1974; Kline, 1994). As Stephenson (1977:8-9) put it, citing Sir Cyril Burt (1940), factor analysis 'merely enables us...to hold together in thought a definite but complex pattern of characteristics'. In his book, *Applied Factor Analysis*, Rudolph Rummel (1970:22) describes a prime use of factor analysis as a research technique in terms of: 'a screen through which data is sifted to bare underlying structure' with the aim to 'net unknown patterns of phenomena in the hope of making a catch of unsuspected influences at work in a domain'. Factor analysis in general has a history as a useful social science technique for studying situations and states of complexity (Stephenson, 1977).

Traditional factor analysis belongs in the category of R methodology. Broadly conceived, R methodology, which is rooted in positivism and hypothetico-deductive reasoning, refers to the statistical methods used for scientific research in the social sciences (Brown, 1972; Brown, Durning & Seldon, 2007; Brown & Robyn, 2004). R methods are ‘typified by survey techniques, Likert scales, and other devices that seek to measure a person’s opinion’ (Robbins & Krueger, 2000:637). In psychology in the 1930s and 1940s, R methodology was used for studies of personality traits (Stephenson, 1956). In the field of politics, with the advent of modern opinion polling in the 1930s (Gallup poll), R methodology became the dominant survey and public opinion research paradigm (Fitzgerald, 2008).

In a Letter to the Editor, *Nature*, 1935, Stephenson announced a new factor technique that differed from that of the traditional R methodology technique of factor analysis in which a population of n individuals is measured in m tests. He posited that n different tests (measurable material) were to be measured by m individuals. In other words: ‘Individuals were not to receive scores on objective tests ... but were to assign scores by comparing the “tests” with one another’ (Brown, 1978:2). The ‘meta theory of Q factors’ is how persons see things and how ‘this or that matters’ to them (Stephenson, 1969:80). This innovation involving factor technique provoked ‘a good deal of controversy’ (Brown, 1972:57) which eventually died away but left ‘Q methodology, method, and Q-sort technique’ (Brown, 1972:60) cast to the margins of “normal” science understanding of what logical inquiry is about (Brown, 2004; Smith, 2001).

As Brown (2011a) notes there is a common perception among critics that Q methodology is ‘irregular’ or not “regular” enough, particularly in its statistical technical aspects, which is a legacy of the original controversy. Brown (1972) gives a detailed and comprehensive account of the statistical technical aspects at issue which centred on correlation theory and the status of the Q data matrix in relation to the R data matrix. Brown (1972:58) notes: ‘To this day, it is widely believed that Q entails the correlating and factoring by rows the self-same matrix of data that in R is correlated and factored by columns’. Stephenson argued that this view of the Q data matrix, which was advanced by proponents of R methodology, was mistaken. For Stephenson, as Brown (1972:58) states:

... the correlation of columns in R analysis and the correlations of rows in Q analysis were incommensurate because they were to be based initially on two different matrices of data, and not because of any differences in statistical mechanics.

What Stephenson meant by those two matrices of data being incommensurable has to do with what is being measured, what is operational, the logical basis of the inquiry and what deductive and testing possibilities stem from factors that are reached (Brown & Robyn, 2004; Stephenson, 1956). In his paper *Methodology of trait analysis*, Stephenson (1956) provides an account of the differences between Q and R methodologies in those terms (see also Brown & Robyn, 2004). Stephenson's paper, which can be read as offering a theory of data, is a methodological critique of a paper by Raymond Cattell (1947) reporting on a study of personality traits organised around R method factor analysis.

As Stephenson (1956:5) tells us, in Cattell's study concern was with: 'students (X's), who assess their fellows (Y's) for the temperamental traits of the latter'. In terms of what is measured and the source of operations, Stephenson's analysis of the Cattell's study can be summarised as follows:

The factors are ... referred to the Y's, the subjects under observation, by the X'. This, I propose, is an operational mistake. The operations are not those of the Y-population, but of the X's (Stephenson, 1956:6).

In short, Stephenson's methodological analysis of the Cattell study suggests that the R method factors, rather than convey elements of temperament of the assessed (Y's) convey the assessors (X's) 'modes of regard' (Stephenson, 1956:5-8). In the process, R method factor analysis reduced the diversity and complex traits for study into a set of 'unrelated' and 'unrelatable' (Stephenson, 1956:6) fragments lifted from the 'so-called objective' frame of reference of the X's to constitute "temperamental traits". Hence, in the context of psychology, Stephenson advances the argument given in physics: 'what we observe is not nature in itself but nature exposed to our method of questioning' (Heisenberg, 1999:58).

Stephenson's analysis of Cattell's study is not a repudiation of R method: 'This is not to say that one learns nothing about the Y's in this way' (Stephenson, 1956:16). For Stephenson, R methodology, referred to as a 'mode of regarding others', is simply an

inappropriate ‘scientific system’ (Stephenson, 1956:16) to learn about human subjectivity. The differences between Q method and R method factor analysis manifest in what the factors reached mean in the scientific system. In Q method the factors reached provide a deductive framework that can lead to empirical tests by whatever methods may be sought (Stephenson, 1956). They are a starting point for inquiry centred on identifying the subjectivity of selected persons in regard to a particular issue, based on abductive logic as distinct from the hypothetico-deductive scientific system of the logical positivists (Stephenson, 1956).

Stephenson (1964a; 1964b) went on to propose that Q method, with its abductive logic, could be used for the measurement of public opinion and be applied to ‘complex controversy’ (Stephenson, 1964b:265). As he said:

It is suggested that the method is basic to political science, and that, applied to controversial complexes, it could replace a great deal of current effort to measure public opinion by large sampling procedures (Stephenson, 1964b:275).

Twenty-four years after Stephenson’s suggestion that Q method could be basic in political science, a paper by Dryzek (1988) in *The Journal of Politics* appeared with the title: *The mismeasure of political man*. This paper can be read as advancing in politics the kind of analysis of R methodology given by Stephenson in 1956 (see also Dryzek, 1990, chapters 8 and 9). In his criticism of opinion surveys used to investigate public opinion, rather than refer to “modes of regard”, Dryzek (1988:710) refers instead to ‘the discourse implicit in a scientific instrument’

Dryzek’s analysis introduces a postmodern rejection of positivism constituted in political discourse analysis and (among others) the works of Foucault in which the ‘hegemonic power of dominant discourses’ is emphasised (Dryzek, Clark & McKenzie, 1989:503). Dryzek (1988:713) argues that the familiar survey discourse and extensive use of opinion surveys contributes to ‘the legitimation of the prevailing political order and, conversely, stands in the way of a more discursive and participatory politics’, not least of all because survey methodology embodies an encounter ‘which is thoroughly structured and dominated by the survey designer’.

I note that in *The mismeasure of political man* Dryzek (1988:707-708) expresses a caveat of the work, viz., it does not: 'detail any alternative method for empirical scrutiny of political man'. However, he does suggest: 'approaches that take the subjectivity of interviewees seriously... such as Q methodology' (Dryzek, 1988:708) would be a candidate. It follows that Dryzek is acknowledged for having linked Q methodology to discourse analysis (Brown, 1993:127, see also Dryzek, Clark & McKenzie, 1989).

Q methodology and discourse analysis

Q methodology is increasingly viewed as a form of discourse analysis that provides a greater recognition of socio-political attitudes than the findings of conventional polls and surveys (Addams and Proops, 2000). As Stephenson's methodology 'extends out' from its origins into 'a range of social science applications' (Addams & Proops, 2000:ix) its efficacy tends to be viewed in instrumental terms. The efficacy of Q method and technique as a device for accessing subjectivity carries with it the implication that this device is "theory-neutral", enabling adjunctive use. However, such a view runs the risk, as John Dryzek, Margaret Clark & Garry McKenzie (1989: 502) say, of an 'impoverished' and 'truncated' version of Q methodology, in which Q methodology's own discourse embodied in Q method and technique can 'fade from the its users' consciousness' (Dryzek, 1988:708).

Jason Glynos, David Howarth, Aletta Norval, and Ewen Speed (2009) offer a review of six key approaches to discourse analysis. Their analysis of the varieties and methods of discourse analysis includes Q methodology as one of the six key approaches - also included are political discourse theory, rhetorical political analysis, discourse historical analysis, interpretative policy analysis, and discursive psychology. Glynos et al., (2009:5) note that discourse has taken on a range of meanings: '... from natural language, speech, and writing, to almost anything that acts as a carrier of signification, including social and political practices, to discourse as an ontological horizon'. As given in Glynos et al. (2009:8), 'each discourse rests on certain assumptions, judgements, and contentions that provide the basic terms for analysis, debate, agreement and disagreement about an object'. Discourse analytical approaches share Q methodology's concern with meaning and subjectivity, though

there are differences in how each approach conceptualises subjectivity (Glynos et al., 2009).

Dryzek, Clark, and McKenzie (1989) provide an account of a difference in meaning of subjectivity between political discourse analysis and Q methodology. The account given is in the context of a study the authors undertook looking at the relation of understandings, beliefs, and values of subjects to structures of international interaction and issues of Antarctica (Dryzek, Clark & McKenzie, 1989). The authors used Q methodology as the means of investigation. They state that Q methodology's contribution: '... stems from the fact that Q apprehends concourses through reference to their language' (Dryzek, Clark & McKenzie, 1989:502).

Loosely expressed, the difference in the conceptualisation of subjectivity is rooted in the emphasis in discourse analysis on language and discursive processes that structure meaning and identity, and in Q methodology, on self-referential behaviour and shared knowledge. In regards to subjectivity, the authors make clear that their discourse analysis approach does not grant 'ontological priority to individuals' but instead to language: 'language is prior to subjectivity' (Dryzek, Clark & McKenzie, 1989:503). The authors cite Foucault (1980) in order to clarify further the difference they recognise between discourse analysis and Q methodology. According to Dryzek, Clark and McKenzie (1989:503), Foucault argues: 'subjects are to a great extent the *creation* of the particular discourses – about mental health, sex, crime, religion, and so forth – within which they move'. In Q methodology, however, the idea is that discourses are in part the creation of subjects who share knowledge with self-reference (Stephenson, 1980). The authors agree with Foucault and recognise, as they said:

... that individual subjectivity is partly the creation of the operant structure of the concourses in which the individual moves. And so that operant structure has an ontological standing on par with the subjects participating in the concourse (Dryzek, Clark & McKenzie, 1989:503).

The difference in conceptualisations of subjectivity can lead to different meanings. In the context of their study, Dryzek, Clark and McKenzie (1989:503) give an example of what individual subjectivity created by a discourse means:

... when a country such as India becomes interested in the issue of Antarctica, the relevant Indian officials do not introduce any novel or independent perspectives on the issues; instead, they craft an identity within the constraints of the possibilities made available by the operant structure of the Antarctic concourse.

In Q methodology, the conceiving of new ideas is intrinsic to individual subjectivity. While it may be possible that individual identity can be constituted by the operant structure of a concourse, Q methodology places emphasis on the possibilities of individual subjectivity, made available to others through communicative behaviour, introducing novel or independent perspectives on issues, which may or may not be shared by others. It is understandable that the concept of concourse comes to the fore in discourse analysis since it refers to an assemblage of statements of opinion. However, in Stephenson's system of science concourse functions as a statistical concept. In Q methodology, rather than concourse the concept of "conscire" would translate better into the idea of having ontological standing on par with the subjects.

Dryzek, Clarke, and McKenzie (1989:503) recognise in Q methodology a 'well-developed paradigm for the study of human subjectivity' compatible with the aims of discourse analysis. Moreover, they suggest that this compatibility does not mean that Q methodology 'should be viewed as a mere adjunct of formal theory' in which subjectivity is missing, used by analysts to correct 'a blindspot' in their mode of analysis (Dryzek, Clarke and McKenzie, 1989:502). Q methodology can "stand alone" as an analytic strategy.

In the literature on Q methodology are ample examples of empirical studies, on specific topics, in diverse fields (for example, media studies, political science, health, conflict resolution and environmental studies) utilising the methodology to good effect (see Brown, 2003). Through its record of demonstrated use, it is difficult to claim that Q methodology lacks dependable revelatory power. However, the literature equally shows that Q methodology has a history of marginalisation seemingly inconsistent with its track record (Brown, 2004).

Noel Smith (2001) in his book, *Current Systems in Psychology*, devotes a chapter to Q methodology. He expresses the view that Q methodology 'was a revolution that psychology was not ready for', and adds that Stephenson's approach has 'outlived most of its critics but without being widely adopted' (Smith, 2001:322), at least in the

field of psychology where from the start the mainstream of the discipline evinced little enthusiasm for Stephenson's ideas (see also Brown, 2004; Good, 2010). It is perhaps not surprising that for a sustained period Q methodology was largely ignored, much like pragmatism, as room was made for the new positivist philosophies that came to dominate, for many hotly debated reasons, academic interest through the course of the 1930s, 1940s, and 1950s, with emphasis on the testing of theories and not the question of 'how did you first find your theory?' (see Popper, 1960:29).

The substantive concern in this next section is with the thinking embodied in Q methodology in respect of its abductive logic and its theory of knowledge.

Pragmatism, abduction, Q methodology link reaffirmed

Q methodology is a method of science that is observational, experimental, interactive and interrogative. Use is made of methods of experiment and observation but not the method of *a priori* reasoning. In Q methodology, the basic concern is with eliciting the 'factualities' (Stephenson, 1998:85) of 'complex subjectivity' (Stephenson, 1985:43) in terms of its basic structure in space and time. The technique can be described as projective in terms of the behaviour of the participants and the method as abductive in terms of the behaviour of the researcher (Stephenson, 1977, 1961a).

Stephenson (1977:13) recognised that abduction, as had been enunciated by Peirce, afforded the study of 'complex states and situations'. In addition, Stephenson (1961b:13) appreciated that factor analysis provided 'the first concrete exemplification' of Peirce's logic of abduction insofar as 'factorists ... found their factors first, and then sought to explain them' (Stephenson, 1977:12). But, as Stephenson (1977:12) wrote: 'it was another matter to explain the factor so reached'. He adds, 'What the factor analysis achieved was to indicate, substantially, which of some initial postulates, or concepts, or "constructs" were applicable' to the matters at issue in the concrete situation (Stephenson, 1977:12). The word "applicable" can be read as a synonym for operant. In other words, factor analysis indicates which conceptions of "the way things stand" are actual in the particular situation.

As an example of an abductory methodology of science, in Q methodology emphasis in practice is on discovering what was previously unknown or unsuspected about a complex situation. Stephenson (1977:12) tells us, that rather than beginning with

theories and concepts, providing operational definitions for these, and testing them, as is the case with R methodology, the concern in Q methodology is with facts about human behaviour which ‘cannot be predicted or deduced’ (Stephenson, 1961b:9). Consistent with the logic of abduction, explanation can only be given ‘after the facts have been observed’ (Stephenson, 1961b:12), and then, the way is open for exploring matters further: ‘deductions drawn, and methods sought for putting these to empirical test’ (Stephenson, 1956:7).

Hence, the import of the comment attributed to Stephenson: ‘I’m just a social scientist who lets neither psychology nor sociology nor statistics get in the way of insights into the complex matters at issue’. Stephenson, as Brown (1995:3) points out, was not ‘anti-science’ but ‘was critical of science for excluding subjectivity.’ Stephenson does not mean that he rejected the sciences of psychology, sociology, or statistics. Rather, he alludes to his acceptance of abduction as a logic of indeterminacy and open inquiry and rejection of hypothetico-deductivism and closed inquiry for Q methodological studies (Stephenson, 1988/1989). Thus in Q methodology, technique and method are instrumental to a scientific practice held primarily as an act of discovery of hypotheses to explain facts (Stephenson, 1961a).

The explicit use of abduction exemplifies a break with ‘the scientific habits of reductive acts and deduction’ (Stengers, 2004:96) which, as mentioned earlier, some current complexity thinkers have argued is a fundamental necessity for an effective study of complexity.

In this next section, I look more closely at the general idea of knowledge that along with the logic of abduction is placed at the heart of Q methodology.

Conscire theory of knowledge

The concept

Drawing on C. S. Lewis’s (1967) *Studies in Words*, in *Consciring: A General Theory for Subjective Communicability*, Stephenson (1980b) outlines a brief genealogy of conscience and consciousness; two words with the same Latin root as *conscire*.

“Conscire” means:

I share (with someone or with myself) the knowledge that ... or, simply, I know together with ... (someone) (Stephenson, 1980b:7).

Here, I draw from Smith's (2001:330-331) brief summary of what Stephenson has to say about the shifts in meaning from a once general-purpose term for "knowing" to the now differentiated meanings of "conscious of something" (of fact, of external circumstances) and of private or subjective knowledge. Conscire gained the connotation of "be privy to", of a shared secret or a conspiracy. In its root meaning, the noun "conscience" refers to this connotation of conscire. In the seventeenth century, the birth of modern science, Rene Descartes made "consciousness" (a private knowledge) a synonym for consciring. Hence, consciousness became the secrecy, and for modern science the thing or experience that science has yet to explain (See Capra, 2002).

With some light shed on the genealogy of conscience and consciousness, Stephenson applies the concept of conscire to all knowledge as a basic premise of Q methodology. He writes: 'We shall bring all knowledge under the one rubric of communicability, conceived as conscire, "shared knowledge"' (Stephenson, 1980b:7). From this central premise stems the postulate of communicability in Q methodology, expressed by Stephenson (1980b:15) as follows: '... all, and we mean all, subjectivity is rooted in conscire, in the common knowledge, the sharable knowledge known to everyone in a culture'.

The epistemological thinking behind this postulate is attributed by Stephenson (1995/1996) to Niels Bohr and the influence of the work of James on Bohr's ideas. Stephenson refers to Bohr's (1950) paper *On the Notions of Causality and Complementarity*, and to James' (1891) text *The Principles of Psychology*. Bohr proposed a "new" epistemology in which, according to Stephenson (1995/1996:8), 'subjectivity is real, a fact, the essence of reality.' Stephenson (1995/1996:9), then notes that in Bohr's view this new epistemology, which allowed us 'to see that all experience in science, philosophy, art or whatever', in order to be useful to society, '... must be capable of being communicated by human means of expression...' (Stephenson, 1995/1996:9, citing Holton, 1973:136).

From the text it is unclear whether Bohr's view connecting the so-called new epistemology to "all experience in science, philosophy, and art" extends to encompass

“or whatever” or whether this catch-all term has been added by Stephenson. Nevertheless, for the purpose of understanding Q methodology, the catch-all phrase of “or whatever” is significant. How Stephenson defines and elaborates “*whatever*” is touched on next.

Common knowledge

Stephenson’s writings indicate that he adhered to a view that modern science could-but-does not represent the “Long Arm of Common Sense” (a phrase attributed to Gustav Bergmann in Haack, 2005:247). Such a view is conveyed, for example, in: *Foundations of Communication Theory* (1969); *Concourse Theory of Communication* (1978); *Conscience and Consciousness* (1980a), *Consciring: A General Theory for Subjective Communicability* (1980b), and the series *Protoconkursus: The Concourse Theory of Communication* (1986). These texts by Stephenson make a sustained critique of modern science. In this critique, Stephenson mounts a challenge to any science that would exclude the domain of subjectivity from the scope of scientific knowledge. He makes a compelling case for the view that the dominant approaches may have scant knowledge of the familiar things around us. It is a perspective strongly reminiscent of systems of knowledge concatenation advanced by James: the widest knower that exists may yet remain ignorant of much that is known to others.

In Stephenson’s (1980b:14) terms, on this point:

With modern science, steps were taken to replace common sense by objective fact, but the resulting knowledge is not common knowledge. It is special knowledge ... Meanwhile, we are left with no scientific knowledge about the familiar things everywhere around us.

In other words, even though scientific knowledge is intended to be about reality, however conceived, the so called “special” sciences have divorced themselves from sharable knowledge, the common knowledge, about the world as it is given in concrete human experience. Stephenson (1961a:3) alerts us to the nature of what is “given” when he writes: ‘and what is given are pots and pans, Toms and Harrys, ideas and feelings *of people*, and the like’ (Stephenson, 1961a:3). In these plain terms Stephenson is indicating that we are all proponents of knowledge (see Stephenson, 1986). In introducing *Conscience and Consciousness*, Brown (1980) provides a

succinct statement of Stephenson's argument. It is significant that sharable knowledge is about familiar things and events 'as opposed to the expert's knowledge of the uncommon, the latter being unsharable except following formal learning' (Brown, 1980:73). In the way Wolf (2007:88) puts it in her introduction to Stephenson's text, *Consciring: A General Theory for Subjective Communicability*, his approach 'sets "sharing knowledge" against modern science', that is, Stephenson engages in an epistemological rethinking of Cartesian knowledge.

In his reclamation, Stephenson elaborates consciring, in which everyday experience is in view, as a human behaviour with intrinsic features of subjectivity, communication, and complexity. Subjectivity is an intrinsic feature of consciring since it is a person and not a group who is sharing knowledge, either with other persons or to themselves: 'It is "me" who enters into shareable knowledge with self-reference' (Stephenson, 1980a:78). 'It is me who is speaking my own mind' (Stephenson, 1969:73). According to Stephenson (1969:69) the act of subjective communication mediates 'between different points of view (or so called 'minds'), or between different aspects of a person's own point of view ('mind')'. In this way, consciring elicits complexity. Consciring generates a network of communications among individuals which connect our experience of everyday events, issues, concerns and their intelligibility.

Bearing in mind that consciring is not simply talk, but a process of knowing, of conceiving ideas (transitory thought), and of individuals speaking their own mind, from consciring a body of opinion emerges about a topic, a situation, or an event. For Stephenson (1969:70), this is the domain of subjective science: 'The concern, therefore, is with informal or other forms of conversational possibilities, looked at from the subjective standpoint of the individual.' He adds, '... the subjective communication possibilities of a person can be regarded as at the interface between different aspects of self and the non-subjective world of events and objects outside the person' (Stephenson, 1969:70). Thus, with Q methodology we can inquire into consciring and the common knowledge embodied in a system of subjective social rationality using the material of shared knowledge, namely self-referent statements of opinion (Stephenson, 1969:73).

In sum, Stephenson's use of the concept of conscire invokes the point of view of a many formulation of concatenate knowing articulated by James; the view that

knowing is a characteristic of life and everyday reality, and that all human thought gets verbally built out and made available for everyone, making it possible to work things out together. Viewed as a general theory of knowledge, Stephenson's interpretation of conscire is not only reminiscent of the pragmatist tradition of complexity thinking but is also similar to the more recent philosophical theorisations of transdisciplinarity. For example, Stephenson's view touches on the idea mentioned by Klein (2004:4-5) that complex social problems do not originate with science, but are 'external developments in *Lebenswelt*, the living world'. In these terms, Q methodology represents a general method for undertaking systematic inquiry in this complex social context for the purpose of comprehending as Wolf (2007:88) puts it: 'social truths and thereby contribute most centrally to the knowledge society needs'. Such comprehension relies on tapping the subjective structures or pattern of opinion for complex situations.

The concept of concourse

The theory of subjective communicability, which I have treated as the conscire theory of knowledge, leads to the concept of "concourse" from the Latin *concursum* meaning "a running together", as the basis upon which to determine structures of subjectivity. Given in Stephenson (1986:52), the concept of concourse corresponds to Martin Brouwer's (1967) 'mycelium model for mass communication'. Brouwer's mycelium model concerns 'the ramifying networks of public conversation (the common conversation of people in a culture)' (Stephenson, 1969:68-69). About Brouwer's mycelium model Stephenson (1980:52) noted:

... what people are talking about informally, or could talk about to others or to themselves, objectively regarded, looks like a highly complex, chaotic, tangled skein of innumerable criss-crossing networks between people.

As Stephenson (1978:25) makes clear, concourse is a 'statistical conception' of the material of shared knowledge, that is, the self-referent statements of opinion about a situation. As given in Stephenson (1986:37):

A universe of statements for any situation or context is called a concourse, and refers to conversational and not merely informational possibilities, and is arrived at empirically for every concept, every declarative statement, every wish, and every object in nature when viewed subjectively, etc.

In *Concourse Theory of Communication*, Stephenson (1978:23-25) posits his concept of concourse in terms of eight assumptions and postulates, which, in an abridged form, are as follows (see *Operant Subjectivity*, 1986, 9(2)):

Subjective communication is grounded in statistical quantities of ‘statements’ about a situation.

Each ‘statement’ of a concourse is equiprobable and equipotential *a priori*.

All ‘statements’ of a concourse have self-referent possibilities.

Concourses concern meanings, not facts.

All subjective communication is reducible to concourses, whether in the sciences, the arts, or any other domain.

That complex subjective situations are so reduced is not to be taken as a reductionist assumption.

The number of concourses is infinite.

Concourses are empirically grounded.

Concourses can be assembled ‘from face -to-face conversations, from writings, from any situation or course’ (Stephenson, 1978:23), in which communicability/consciring is involved. It is on the basis of this concept of concourse that Q method proceeds.

It is possible to view Q method in Stephenson’s system of science as a method of doing questioning, thinking, and knowing that may serve as a paradigmatic case demonstrating complexity thinking. The summary that follows conveys a standard account of Q method without an in-depth theoretical, technical, and statistical treatment. My aim at this point is to highlight the transformative aspect of the methodology with some more light shed on how it is possible for Q method to be used adjunctively or transformatively.

Q method

To ground the account of Q method, I draw on the small Q methodological study of the points of view of Sickness and Invalids’ Benefit clients on the topics of: well-being, employment, and independence. This study was undertaken by the New

Zealand Ministry of Social Development's Centre for Social Research and Evaluation in conjunction with the School of Government of Victoria University of Wellington in 2004. This research project was part of the New Zealand Ministry of Social Development's policy work programme looking at a wide range of issues concerning welfare benefit design and delivery. The particular policy issue related to the growth in numbers of the working-age population receiving Sickness Benefit or Invalids' Benefit. The numbers of people in receipt of incapacity benefits had doubled over the decade 1992-2002. In this regard, New Zealand's experience was not unique. Since the 1970s, other developed countries also showed a persistent rise in the proportion of the working age population claiming incapacity benefits (Peace, Wolf, Crack, Hutchinson & Roorda, 2004).

Since at least 1995, successive New Zealand governments have set about trying to move people "off benefit" and "into paid work" out of a concern about both the economic costs and the costs to social wellbeing. So far, despite a series of government initiatives since the mid-1990s, the problem being addressed and talked about by public officials as "welfare dependency", has proven to be "wicked, that is, difficult to solve and a highly contentious public policy issue.

The idea of welfare dependency is a long-standing analytic discourse that has informed policy analysis on welfare reform in a number of states including New Zealand (Fraser & Gordon, 1994). My point is not to rehearse this analysis but point to the possibility that policy analysis based on the argument of welfare dependency continues in the vein of standard positivist evidentiary and justificatory analysis whereby a pre-existing discourse frames the problem and ideas of what would act on the problem.

In 2003, the New Zealand Ministry of Social Development embarked on a work programme of research projects into drivers behind the growth in Sickness Benefit and Invalids' Benefit client numbers, with policy attention paid to those in long-term receipt of such benefits (Lunt, 2006). Against this background, the Q methodological study had two aims. One aim was to develop a complex picture of clients' views and the other aim was to assess the extent to which clients' views highlight insights that are relevant to the policy analysis concerned with the question of welfare system design (Peace, Wolf, Crack, Hutchinson & Roorda, 2004:1).

The Sickness Benefit and Invalids' Benefit study, like the van Eeten Schiphol Airport study, followed the procedures of Q method rigorously. The difference between the Schiphol case and the Sickness Benefit and Invalids' Benefit study is that van Eeten brought a narrative-based approach to the particular “wicked” problem and used Q method to capture the narratives, whereas in the case of the Sickness Benefit and Invalids' Benefit project, the researchers consciously exploited Q methodology as a stand-alone research strategy for their project. Rather than have a pre-existing analytical framework for doing policy thinking, the researchers were tapping social rationality, the system of subjectivity, knowing, and opinion, for a conceptual frame - one that captured complexity.

Basic procedure

The basic procedure of Q method can be thought of as three phases of an experimental research design comprising preparation, measurement, and analysis and interpretation.

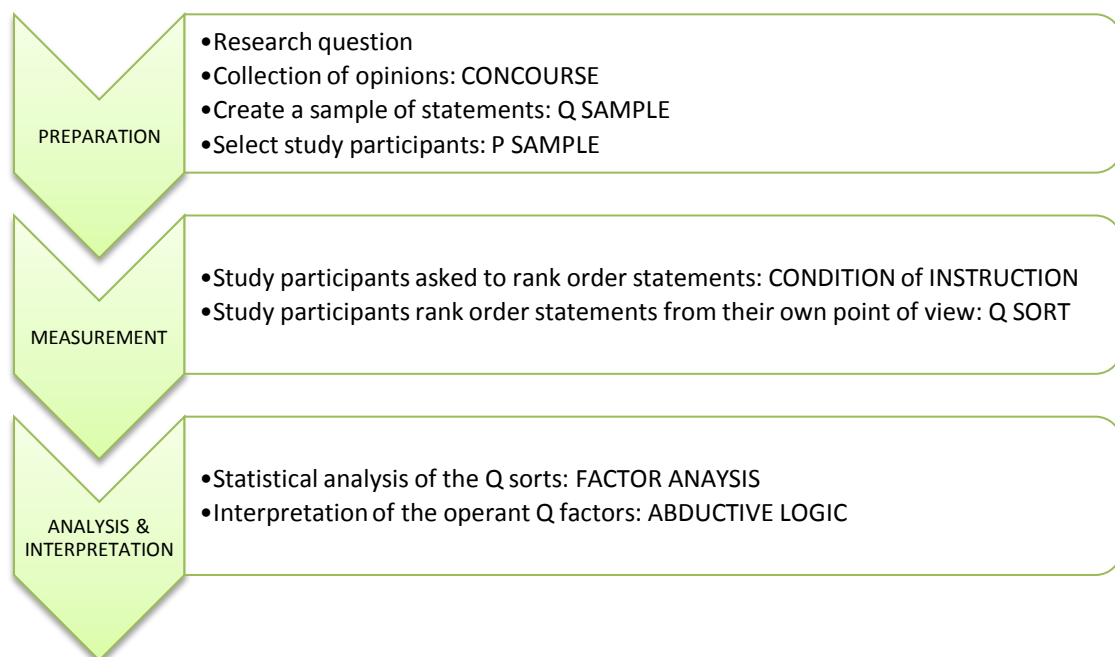


Figure 18: Basic procedure of Q method

Source: adapted from Amin (2000:411)

These three phases involve eight major steps centred on identifying the concourse, creating a sample of the concourse, selecting the people to carry out the Q sort (P sample), administrating the Q sort, statistical analysis of the sorts, and interpretation of the Q factors (Brown, Durning & Seldon, 2008). A summary of the major steps derived mainly from Brown (1993, 91-129), Brown et al., (2007:722-724), and Helen Addams (2000:14-40) runs as follows:

1) Preparation:

Identifying the concourse:

Any topic of interest to people in general or to individuals in specific roles generates conversation. This conversation occurs in ordinary language, and it may appear in discussions or arguments, in e-mails and blogs, in newspapers, magazines, books, and in other forms of communication. The researcher identifies to the extent possible the communication on the topic of interest, usually in the form of statements or pictorial, photographic, or musical artefacts. This can be done, for example, by interviewing people likely to be engaged in communicating about the topic; and or from collecting statements from written sources. Since concourses are infinite in extent and number, in order to sample you have to have an “estimation” of the concourse. Depending on the topic, the researcher will collect dozens to hundreds of expressions of opinions, assertions, and arguments related to the topic (Brown et al, 2007). This “big set” of statements or artefacts, which is then reduced to the actual Q-set, does not comprise the concourse so much as estimate it (see Wolf & Stainton, 2011).

In the case of the Sickness and Invalids’ Benefit study, researchers used a range of sources of commentary on the topic of well-being, employment and independence (policy documents, political manifestos, focus groups and telephone interviews with clients and former clients, published studies, and media reports) to identify and estimate the concourse of interest. Approximately 400 statements about well-being, employment, and independence as expressed by, or about, Sickness Benefit and Invalids’ Benefit clients were compiled (Peace et al., 2004:7).

Sampling the concourse:

After the concourse has been documented, the researcher draws a representative sample from it. This representative sample can best be thought of as a specimen of the concourse, that is, a small sample of the whole set of statements rather than a sample which is representative of proportions of the population from which it is drawn (“kinds” rather than “proportions”). The goal of the researcher is to capture the full diversity and complexity of the different views contained within the concourse.

Typically, the researcher is guided in the selection of a sample by a framework that has been formulated to model dimensions that may be considered important elements of the topic. Stephenson (1993/1994:7-11) gives an account of the thinking and how practically to go about the formulation of such a framework based on the research method of Ronald A. Fisher (1935) who developed sample theory. The sample must include enough statements to fully represent the diversity of the concourse, but not have so many statements that it cannot be used effectively in the sorts to be administered. Depending on the topic, 20-50 statements are usually sufficient (Brown et al., 2007).

In the case of the Sickness Benefit and Invalids’ Benefit study, 43 statements were selected to represent the full range of ideas evident in the initial set of statements. The sampling framework formulated by the researchers to ensure that in the process of reducing the size of the initial set of statements, significant orientations that were present were not lost, consisted of two related dimensions: “main themes at issue” in the concourse and “instrumentality”. The researchers determined five themes against which the 400 statements in the concourse could be arraigned to determine which statements most clearly represented the themes:

1. How the benefit system responds to or interacts with clients.
2. How society responds to or interacts with clients.
3. What the benefit system does that affects wellbeing, employment, and independence.
4. What affects wellbeing, employment, independence that does not derive from the benefit system.
5. Employment issues.

The second dimension of instrumentality was to ensure that statements were representative of each theme. This dimension had two levels, “instrumental” and “non-instrumental” (Peace et al., 2004:8). The instrumental elements included those things that emanated from the individuals themselves. The non-instrumental elements were those that were imposed externally. Researchers also examined the statements for a balance between ‘negatively and positively cast views’ (Peace, et al., 2004:8).

Selecting the sorters:

The selection of the people to complete a Q sort is termed the “P sample”. If the study focuses on a topic of concern largely to a specific part of a community or organisation, every person of interest can be included. For example, in Donner’s (2001:24) illustration of the use of Q method the topic of concern was the position and strategic priorities of the Social Development Family (SDV) within The World Bank and involved SDV managers. Alternatively, if the study addresses a broader topic affecting a larger group of people and interests (for example, the van Eeten study), the selection of participants should be designed to make sure that the full but not necessarily representative range of opinions and positions is represented in the P sample (Brown et al., 2007).

In the case of the Sickness Benefit and Invalids’ Benefit study, 20 participants were recruited for the study – all were receiving either the Sickness or Invalids’ Benefit and all declared an interest in being in part-time or full-time work. The recruitment was done by way of: an invitation posted to an online forum on disability issues; approaches to local advocacy groups; distributed information on participation to clients that fitted the research requirements; snowballing (contacting with participants once they were recruited); and word-of-mouth amongst personal contacts (Peace, et al., 2004:25).

2) Measurement:

Q sorting:

A Q sort results when the researcher asks a selected person to place the statements comprising the Q sample in rank order. In this way, Q sorters are responding to the concourse and “filling in” or claiming their view. The researcher provides:

- a) A Q sort deck, which consists of all Q sample statements written on separate cards that have been randomly numbered.
- b) Instructions on how the cards should be ranked; the sorter may be asked to place the cards along a continuum (for example beginning with -4 and ending in +4 with 0 as a mid-point) following a quasi-normal distribution.
- c) Instructions on the conditions governing the sort; for example the sorter may be asked to rank the statements according to 'most agree' and 'most disagree'.

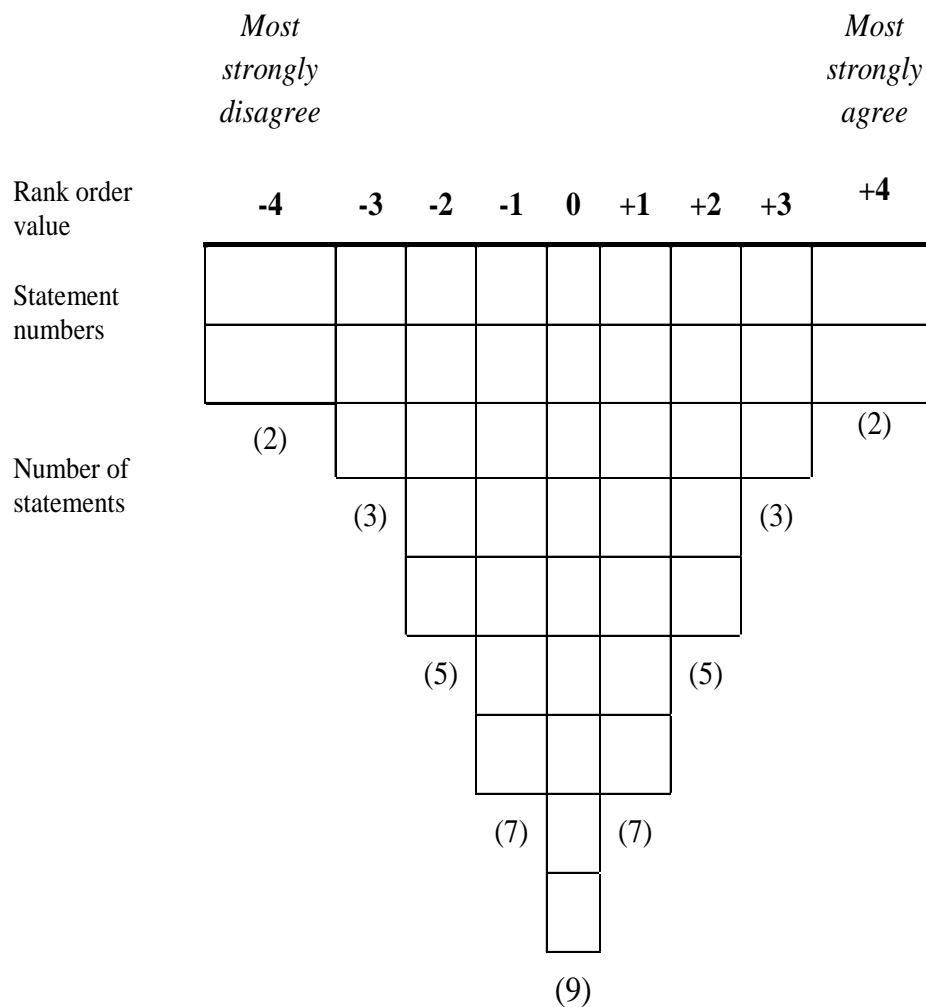


Figure 19: Q sorting structure for 43 statements

Source: Adapted from Peace, Wolf, Crack, Hutchinson, & Roorda (2004:31)

In the case of the Sickness Benefit and Invalids' Benefit study, participants were asked to array the numbered statement cards on the sort deck in front of them from -4

to +4 and then copy the number of each statement onto the provided record sheet in the order laid out on the table. The record sheet showed the quasi-normal distribution with the rating scale for the 43 statements. A completed sort would be filled in on a template that is demonstrated in Figure 19 above. The condition of instruction, in the Sickness and Invalids' Benefit study, was to sort on the basis of whether they 'agree or disagree with the ideas expressed more strongly than the other statements based upon their own views or understanding' (Peace et al., 2004:30).

3) Analysis and Interpretation:

Analyzing the Q sorts:

The researcher analyses the Q sorts with the aid of three sets of statistical procedures: correlation, factor analysis, and the computation of factor scores.

It should be noted that factor analysis, the goal of which is to identify a limited number of independent factors that adequately account for the observed correlations, has a reputation for being a daunting statistical procedure due to the 'intricate' (Kline, 1994:1) nature of the mathematics. Specific statistical software is available to generate the tables of statistical information needed for the analysis and interpretation of factors. Thus, Brown (1993:110) points out that for non-mathematicians it is not a necessity to understand factor analysis in all of its mathematical detail, although a minimal understanding is required, for example: understanding of the goals and steps in a factor analysis process, an awareness of alternative factor-analytic procedures in order to make choices in the process of analysis that are appropriate to the nature of the study being undertaken, as well as sufficient understanding to make sense of the tables of data generated by the software. To this end I have graphically outlined the key statistical procedures involved in the Q method factor analysis (see Figure 20). Software packages for Q method such as PCQ or PQMethod (freeware) are available through the Q methodology website⁸.

⁸ <http://www.qmethod.org>

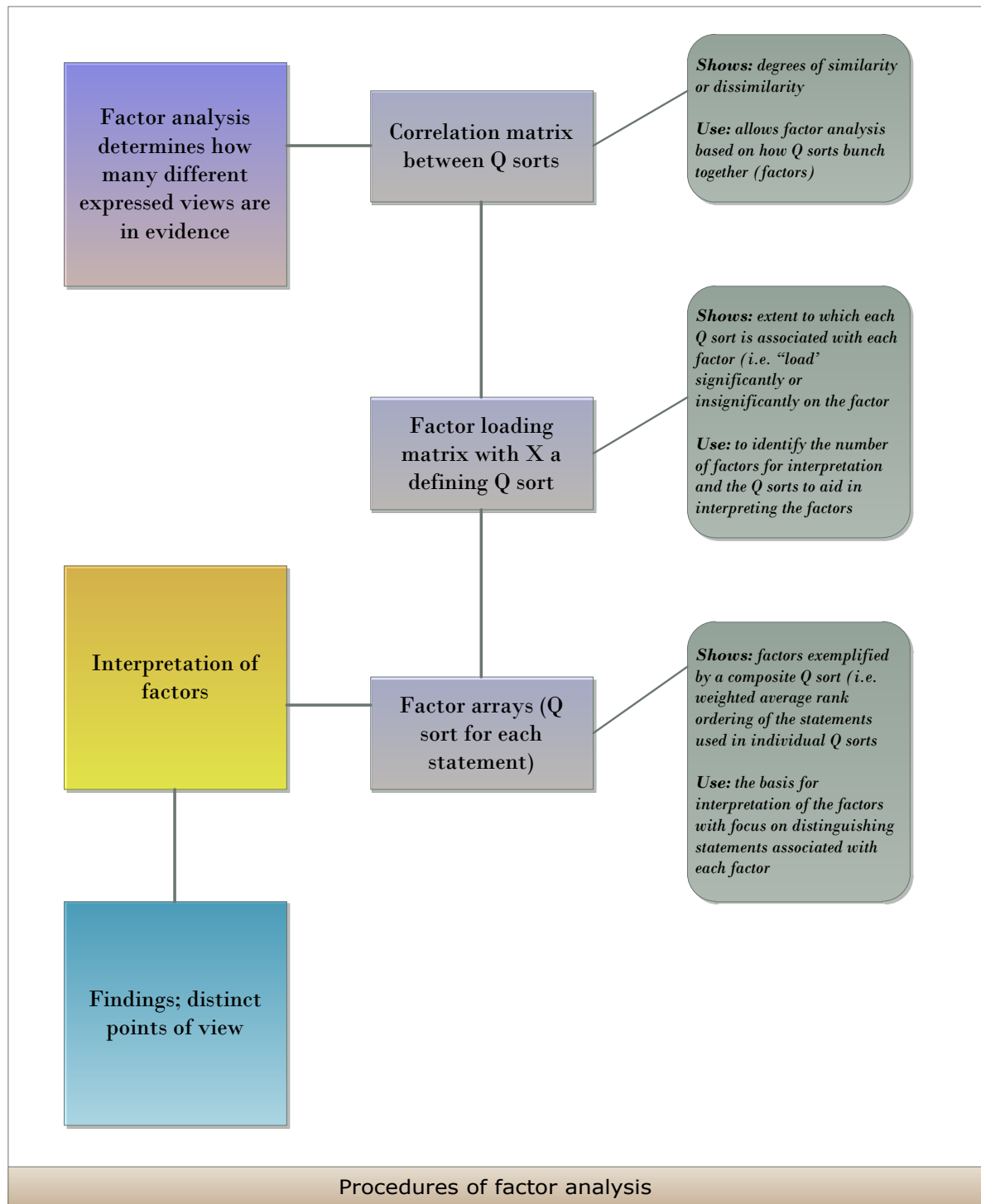


Figure 20: Statistical procedures of factor analysis

Factor analysis is applied to correlations between variables. In Q methodology factor analysis the participants' expressed points of view are being correlated and subsequently factored. Q sorts that are highly correlated with one another but uncorrelated with others may be considered to have a "family" resemblance or in

Jamesian terms, “be of a kind” (Brown, 1993). Q-based factor analysis is designed to simplify correlation matrices and reveal how many different factors or points of view there are, with those persons sharing a common view defining the same factor. As Brown (1993:111) emphasizes, the number of factors is: ‘wholly dependent on how the Q sorters actually performed’ and not on how many Q sorts were performed.

A factor loading that is indicative of a significant (meaningful) relationship between the study participant’s Q sort and the factor type is determined for each Q sort, with -1 indicating complete disagreement, +1 full agreement, and 0 indicating no relationship between the study participant’s Q sort and the factor type. These loadings tell the researcher whether a Q sort can aid in interpreting the factor or not (Addams, 2000).

It is assumed in factor analysis generally that initial factors will be rotated in order to achieve a “cleaner” definition of each factor, that is, the aim is to obtain a “simple structure” to aid examination of each factor in its structure and relevance to the purpose of the study. In statistical terms: ‘it is “simple” since each variable loads on as few factors as possible’ (Gorusch, 1974:164). The most common method is the varimax method of orthogonal rotation which results in uncorrelated factors (attempts to minimise the number of variables with high loadings on each factor) (Addams, 2000).

In Q methodology, a common method is to carry out rotations guided by abductive means through the use of the centroid method of analysis coupled with judgmental rotation rather than by programmed standardized methods (e.g. varimax). This abductive approach entails drawing on ‘impressions and any other bits of information at the researcher’s disposal’ (Brown, 1993), in conjunction with the theoretical concerns of the researcher. On this point, Brown (1993:116) observes:

There is an infinite number of ways in which the factors can be rotated (the varimax procedure is but one of these), and the investigator probes this space in terms of preconceived ideas, vague notions, and prior knowledge about the subject matter, but with due regard also for any obvious contours in the data themselves.

The choice of abductive method relies on graphic representations of unrotated factors whereby factors are plotted two by two, for example factor A against factor B, factor A against factor C, and so forth using the factor loadings for each Q sort as the

coordinates for the plots. In this way the researcher can see the appearance of patterns in the data; how Q sorts ‘blob’ and ‘bunch together’ (Stephenson, 1977) aiding thoughts about what to home in on as relevant, important, novel, and meaningful in the data. In other words, abductory rotation affords the power of judging spoken of by Stengers (2004) in her critique of neo-reductionist approaches whereby she argues against propensities to rely on ready-made instruments in lieu of exercising researcher skills of interrogation. After rotation, whether carried out visually (graphically) in the abductory mode or on the basis of the statistically derived varimax method, the presence of several independent (orthogonal) factors is evidence of distinct points of view.

In the case of the Sickness Benefit and Invalids’ Benefit study, the researchers retained five factors for detailed interpretation as the table in Figure 21 shows.

Table 1: Factor loadings and respondent characteristics

Qsort	Factor loadings*				
	1	2	3	4	5
1	−17	49	08	19	23
2	21	−06	64	−04	15
3	04	66	13	09	−29
4	63	23	−13	23	23
5	74	−18	10	18	−09
6	−13	27	30	04	72
7	11	42	41	−50	09
8	00	17	−12	77	01
9	70	16	−03	05	−28
10	60	−08	−49	07	16
11	01	61	−37	−13	31
12	17	68	03	05	17
13	10	04	−01	−03	71
14	59	01	43	−22	15
15	27	−10	−57	23	53
16	24	02	10	72	04
17	43	−03	12	59	16
18	−17	15	63	31	04
19	07	31	12	35	−20
20	59	20	−05	39	37

* **bold** indicates a “defining” sort.

Figure 21: Factor loading table with defining Q sorts in bold

Source: Peace, Wolf, Crack, Hutchinson, & Roorda (2004:9)

Interpreting the factors

The next step is to identify the distinguishing characteristics of each factor as an aid to conceptualising the points of view in evidence. In this regard, it is important to note that in Q methodology, interpretations are based on factor arrays and factor scores and not the factor loadings. Thus, the final step in the analysis of Q sorts leading to interpretation is to produce factor arrays by calculating factor scores. A factor score is the score gained by each statement in the Q sample as a weighted average of the scores given that statement by the Q sorts associated with the factor (Brown, 1993:117). What is sought is a composite Q sort that exemplifies the factor and is arrayed in the original Q sorting structure (see Brown, 1993; also, Addams, 2000; Gorusch, 1974).

Bearing in mind Stephenson's description of revealed factor structures as the 'nexus for the meaning of the situation' (Stephenson, 1981:47), on the one side of interpretation are the understandings possessed by the sorters and on the other side are the insights into those understandings obtained by the researcher through the process of factor interpretations. They may not necessarily be the same insights. In other words, the participant and researcher have claim to 'a point of view in a concourse' (Wolf, 2004:161). For the researcher, it is important to remember that in Q methodology interpretation is not about cause and effect explanations:

... Q methodologists do not follow the strategy of mechanistic science that involves reaching conclusions about hypothetical causal agents. Instead, the task of Q methodological research is to interpret factors in their own right and this means in terms of the sorter's lived experience. There is no search for causes-in-themselves (Brown, 2002:145, citing Stephenson, 1982).

According to Stephenson (1980b:13), interpretation is a matter of 'comprehending a continuum of consistent feeling from one end of the factor array to the other.' Wolf (2004:158) notes it is this continuum of feeling that the researcher tries 'to grasp as understanding'. In this way, the interpretation of the identified factors is a matter of abductive logic (Brown et al., 2007). Addams (2000:32) notes, for instance, that interpretation proceeds by 'continuously putting up possible explanations for the factor array until the best explanation is developed'. This is done by examining the array of scores for each factor to discern the overall pattern of thought reflected in the

interrelationships (consensual/divergent/neutral) of statements in the array, including how these compare (how they differ and how they are similar) with other factors in evidence (Brown et al., 2007; McKeown & Thomas, 1988). The researcher, then, is actively positing continuities, that is, abducting. By convention, the researcher presents descriptions of the structure of thought that exists for each factor, illustrated with selected statements and factor scores (Brown, et al., 2007).

Descriptive labels are attributed to each of the factors to reflect the dominant characteristic that runs through the conjunction of views. In the process of labelling what the factors show, attention is given also to the relevance of the pattern to the hypothesis-forming, that is, abductive function of Q methodology - what the different views point to in terms of new propositions, concepts, or hypotheses, and further research or courses of action. It is important to note that the findings should not be taken as somehow representative of the individuals who completed the Q sorts. Rather, the factors in evidence are arrived at through the behaviours of the study participants, illuminating structures, relations, or patterns or configurations of subjectivity in the concourse (Peace et al., 2004; see also Wolf, 2004).

In the case of Sickness Benefit and Invalids' Benefit study, the factor analysis and interpretation brought to light facts about an overall pattern of subjectivity rendered and shown to condense in a complex of five factors. An indicative and not the whole description provided by the researchers is given here of the five factors labelled as: "entitled to support"; "ready for work"; "victim of stigma"; "pragmatically hopeful"; and "grateful for the benefit system". Figure 22 shows the graphic used by the researchers, which underscores the point that these distinct factors sourced from the processes and subjectivity involved in social rationality are complex in the sense that individual Q sorts "hang together" as a factor and the factors, "modes of regard", hang together about the topic of clients' experience of the benefit system in a policy context of independence and employment.

In this picture, given is a differentiated picture of 'the knowing' about 'the way things stand' vis-à-vis the question (in this case) of client's experience of the benefit system in a policy context of independence and employment.

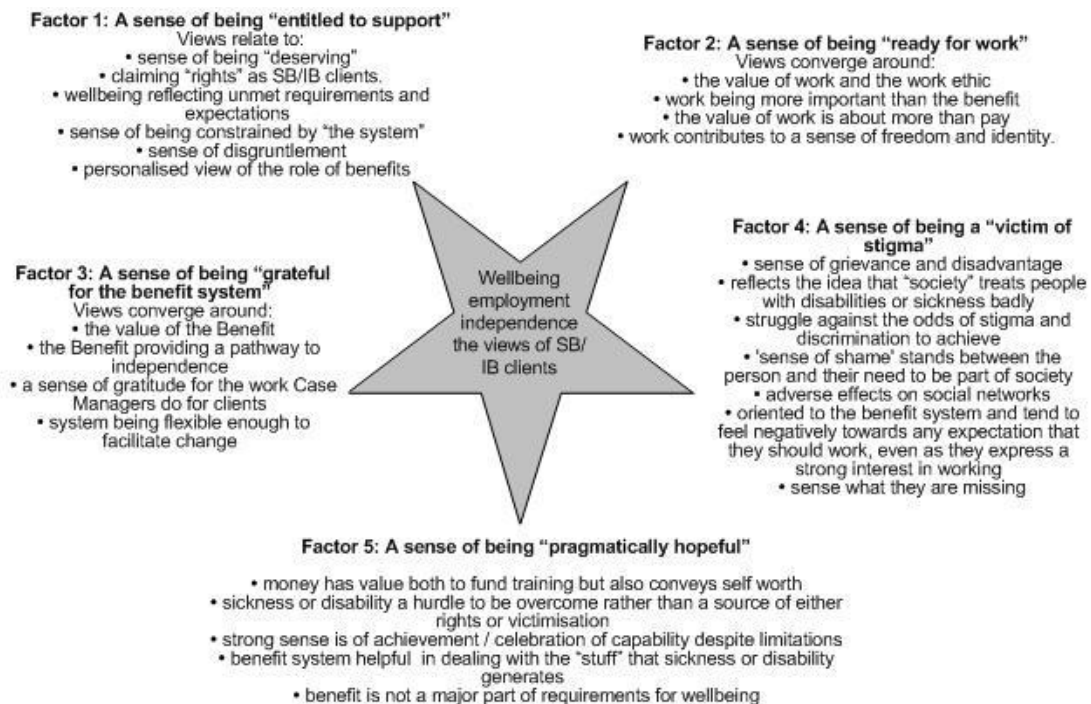


Figure 22: A complex of views on issues to be aware of in welfare design

Source: Peace, Wolf, Crack, Hutchinson, & Roorda (2004:11)

The use of findings

Peace et al., (2004:18) note that most observers would expect to find at least two distinct points of view. One of the expected views would mirror the basic premises of government's policy, in which wellbeing is associated with paid work and economic independence. The other point of view would mirror a benefit client sense that their wellbeing can be achieved when there is access to adequate support that meets people's needs and allows them to get on with their lives free from undue coercion to get back to work. Peace et al., (2004:18), observe: 'Both these views circulate at the benefit system/client interface but their veracity is never tested'. In their study, the researchers reported that while none of the factors were completely novel or unanticipated the distinguishing features of each factor revealed a more complex and nuanced interplay of concerns which cut across a propensity to see stereotypical polarities in Sickness Benefits and Invalids' Benefit population - for instance, 'those who are willing to work versus those who are reluctant to work' (Peace et al., 2004:21).

But Q methodology is not merely about demonstrating that patterns reached in subjectivity exist (Stephenson, 1980). It is important to emphasise, following Peirce, James, and Stephenson that abductive inquiry is ultimately about the use of acquired understanding in terms of meaning in a continuous process of inquiry. This continuous process of inquiry involves practices of abductive, deductive, and inductive inference. As Stephenson (1956:9) suggests, it is from the factors reached, that ‘the deductive and testing possibilities stem’. The factors provide a deductive framework, a fresh analytical perspective, on the basis of which the policy analysis can advance ‘with hypotheses that lead to new test conditions’ (Stephenson, 1956:8). This in essence, is what a complexity reading is all about.

In this regard, Q method can be used to plan a programme of policy research, evaluation, and analysis of a “wicked” problem based in opinion and, if carried through, culminating in tests of proof. The complex of factors, not simply each factor taken in isolation, has relevance for a complexity reading. It would involve the complex of factors as the measure of policy to be developed just as, for example, the complex of traffic is the measure of how to act when crossing the road.

The Sickness Benefit and Invalids’ Benefit study offered little in the way of surprises, but offered the potential to see the issue of well-being, employment, and independence in a new analytical perspective with leads on what to pay attention to and not overlook in policy analysis. I note, too, that the transformative potential of Q methodology was not fully realized. The findings of this study were not used in the formal policy analysis. Thus, the opportunity to explore the potential in policy analysis of the different practice of science based in the logic of abduction afforded by Stephenson’s methodology and introduce a change in analytic perspective rooted in social rationality did not arise. The researchers, enabled by Q methodology, engaged in subjective science up to the point of providing a deductive framework sourced from opinion, but not to the point in analysis of actual hypothetical treatment of the factor complex leading to testable propositions. Thus, although the study used Q methodology as a stand-alone strategy the innovative potential embodied by Stephenson’s system of science with its statistical, philosophy of science, and psychological principles, was missed.

On this point, I now turn to take stock of Q methodology in terms of its epistemological status.

Epistemological status

As Maureen Brown (2008:311) notes, Q methodology:

... can be viewed as a positivist method because it relies on quantitative tools to extract knowledge. Yet, it can also be viewed as an interpretivist method because it allows the subject to set the boundaries according to his/her viewpoint of the relevant issues. It is also constructivist in that it allows inter-subjective analysis. Finally it is appealing to critical postmodernists in that it is often used to expose underlying hidden contradictions for the purposes of change.

Q methodology lends itself for different reasons to each of the main epistemological paradigms of positivism, interpretivism and critical postmodernism, and also to transdisciplinary approaches. It would be a mistake to regard Q methodology as subsumed by any of these dominant approaches to knowledge. In the literature, it is clear that the relationship of Q methodology to alternative epistemologies is an on-going debate among proponents of Q methodology (See Hurd & Brown, 2004/2005), likely in part because Q methodology stands poised between paradigmatic positions as Brown (2008) indicates.

Furthermore, not all applications deploy Q methodology as a stand-alone strategy for research or policy analysis. Different models of using Q method have led to some confusion about what Q methodology entails (Brown, 2007). In studies that use Q methodology for adjunctive rather than transformative reasons it is to be expected that the selection of Q methodology for a subjective approach to research and analysis is justified on the grounds of the researcher's primary theoretical frame, for example discourse analysis as in the case of Dryzek, Clark and McKenzie (1989), or constructivism in human geography as in the case of Robbins and Krueger (2000). The focus of justification is generally on Q method and statistical technique. This limited focus means that accounts of Q methodology are prone to losing sight of the system of science, with its abductive logic and different practice of science, as a core difference of Q methodology from other approaches to knowledge. This view of science gives Q methodology special epistemological status that makes practical

analysis of complex issues based in opinion possible. Q methodology allows abductive study of subjective phenomena using objective material to provide knowledge.

Q methodology is a practice of science developed not to replace or repudiate objective methods of science. As a way of studying subjectivity and a way of tapping subjective reality, Q methodology serves as a path of knowledge for a wide range of problems. The methodology's coherent set of principles marks off Q methodology as a kind of new science of complexity in the epistemological stream of pragmatism; a stream with emphasis on a way to think, not on a way to know.

In terms of the epistemological stream of pragmatism, Q methodology is an illustration of the explicit mobilization of abductivity as the central research process. Q methodology's departure from Cartesian theory of knowledge invokes the complexity thinking of pragmatism centered on subjective life and processes of concatenated and synechistic knowing - a working together through interaction. The Q methodology view studies subjectivity by way of self-referential communicability based in conscurring. Concurring is a knowing, communicative, interactive, and signifying act of human behaviour.

In Q methodology, insofar as opinions are shared with others, issues of subjective concern are 'not synonymous with individuality' (Stephenson, 1979:28). In Q methodology is the recognition that subjective reality has complex form and structure, an "inner complexity" constituted at the individual level yet involving patterns of relations at a variety of scales and levels and of more than one kind, which factor analysis lays bare. Together, these views have resonance with the notion of systems of subjectivity spoken about by James: the point of view of a many involving, always, an individual knower and relations among individual knowers.

Q methodology mobilizes subjectivity, relations, experience, communication, and human behavior as specific operations in the investigative process. As an abductive form of science, Q methodology reinforces a unity of knowledge in which fact and opinion, objective and subjective, and social and individual are no longer diametrically oppositional terms. Significantly, the methodology seeks to elicit

insights from common sense-making able to be used as a source for conceptual frameworks in policy analysis, evaluation, and research.

Stephenson's science has many of the features sought after in the transdisciplinary stream of complexity thinking which are acted upon in a subjective science that does not adhere to the modernist notion of scientific rationality. In this way, Stephenson's science of subjectivity meets the criteria of a new science for work in the zone of complexity as depicted in Dent's (1999) diagram (see Figure 11) - the zone of subjective reality, indeterminism, mutual causality, and holism. Q methodology, by virtue of the centrality of the logic of abduction, is also an illustration of conjunctive thinking replacing disjunctive thinking as has been called for by some complexity theorists (e.g., Capra, 2002; Morin, 2005; Montuori, 2008).

Overall, through Q methodology Stephenson advances a way for policy analysts to acquire the knowledge spoken about by Rittel and Webber (1973) as necessary when faced with a "wicked" problem: in social processes and the rationality of stakeholders and citizens. Under Q methodology, this knowledge can be found in people's conspiring conjoined with the abductory, interactive behavior of the inquirer. Thus, in regards to understanding how Q methodology opens a new epistemological space in policy analysis, the key is to understand how Q methodology, with its abductive logic and focus on accessing subjectivity, works as a stand-alone research strategy.

Summary

In this chapter I have argued that Q methodology has an epistemological claim in the revalorization of opinion. The claim is a case for a different form of science. One that is part of a synechistic, concatenated and scientifically rational process premised on abduction, deduction, and induction. Further, this "new" science of subjectivity, founded in classical pragmatism, enables the possibility of a reading complexity opinion-based policy analysis that may endow the existing policy system with transformative capabilities, that is, the kind of complexity capability to change patterns of intractability in analysis associated with "wicked" problems. I have argued that this transformative power stems primarily from the abductive logic and theory of knowledge at the core of Q methodology that affords interactive open inquiry and new thinking.

Chapter 6: Conclusion

Introduction

The central claim of this thesis is that opinion may play an important role in policy analysis in contexts of complex, intractable situations. Existing knowledge was drawn on in several inquiries and the thesis worked from this combined knowledge base to consider the claim about the role of opinion in policy analysis and advice. The set of propositions are what account for and allow for the assessment of what the claim involves and relates to the epistemological efficacy of Q methodology. Overall, the argument of the thesis revalorises the idea that opinion matters in policy analysis.

Reading complexity is my elaboration of the claim as a difference of practice and part of that elaboration is that a new epistemological space opens in policy analysis. Q methodology is the means by which that new space can be accessed and reading complexity can take place. This epistemological space is marked out by classical pragmatism.

I can now elaborate reading complexity as the main contribution of this thesis by summarising what I did and why in the process of this study.

Summary

Theoretical point

Reading complexity in social policy contexts: the value of Q methodology is a theoretical piece of work. For an understanding of the character of this thesis much depends on understanding pragmatic inquiry derived from Peirce and his method. His method allows for a theoretical treatment of a question and discussion. Peirce referred to such theoretical treatment as abduction. Abduction leads to and culminates in propositions that can be put to empirical test by methods sought for doing this. So, this thesis is an abductive work that is open to hypothetical discussion and the possibility of further inquiry.

Starting point

My starting point was based on the Schiphol Airport expansion policy issue which had a history of public controversy. This was a seemingly “unresolvable conflict” the cause of which has been identified in the literature as a combination of: sustained conceptualisation of the policy problem, *viz.*, how to accommodate aviation growth of the airport while avoiding negative effects on the environment, and investigation/analysis through the use of conventional methods giving rise to intractable analysis (Kroesen & Bröer, 2009). I sought to investigate the efficacy of Q methodology in this specific case.

Research questions

Does Q methodology have potential because it meets a policy need, namely to make opinion available as a complement to other evidence knowledge and thus adds to understanding problems and solutions while remaining firmly within the prevailing evidence based epistemology – in other words does Q methodology have an adjunctive power and simply adds to what can be determined through existing practices embedded in policy analysis?

Or

Does Q methodology have potential because it opens up a new epistemological space for doing policy analysis, in which case, could it be claimed that Q methodology has transformative power to create a more sustained policy-analytic change?

These research questions stem from the use of Q methodology in van Eeten’s policy analysis, which was adjunctive, and from an extensive reading of Stephenson’s works conjoined with an equally extensive reading of Peirce, and then James. In those readings, the status of Q methodology as a stand-alone research/analysis strategy comes to the fore. To answer those research questions I formulated a set of nine propositions based on the primacy of an investigation that had an epistemological theme to it.

Arguments for the use of Q methodology in social science suffer from a relative lack of epistemological emphasis in defending or justifying use made of the methodology. This thesis recognises the epistemological position of Q methodology as a way of providing knowledge based in the abductive study of subjective phenomena using

objective material from which deductions can be drawn and put to test. The thesis goes on to examine each of the nine propositions through a series of discussions.

Discussions

The thesis has a discussion of why evidence-based policy analysis often fails when it is used to address “wicked” problems. This discussion is in the main a review of a body of literature that critiques conventional analysis for its failure on epistemological and practical levels. This literature suggests the positivist character of policy analysis and its methods create major limitations in the analysis of difficult, intractable, and complex policy issues.

Discussion links “wicked” problems to complexity thinking, and introduces the idea of “reading complexity” as necessary to analyse these “wicked” problems. This idea suggests that policy analysts need ways to understand complex issues not accessible through evidence-based policy analysis. An explanation is given based in Peirce’s and James’ theories of pragmatism, and ideas of synechism, concatenation, and supervenience as a way to understand complexity in human experience and the requirements for “reading” such complexity.

In discussion, an explanation of abductive logic and why this mode of thinking is an element of “reading complexity” based on ideas of complexity capability, common sense-making, and consiring is provided. Ways in which the concept of abduction relates to the concept of opinion in a practice of science and practices of everyday life are explored. Abduction as a common subjective mode of thinking has a knowledge-extending function in the investigative procedures of Stephenson’s subjective science. In addition, the thesis critiques the rejection of “opinion” in evidence-based policy analysis, and explains why, within Peirce’s pragmatic frame, opinion is essential for “reading complexity” because of its importance in an abductive approach to the analysis of difficult problems.

Discussion makes a connection between Peirce’s abduction, pragmatism, and Stephenson’s theory of knowledge. It examines how Q methodology, with its abductive logic and focus on individual subjectivity, provides a “stand-alone” method to read complexity in a way that is not possible with more familiar methods of social science based on deductive or inductive logic. Q methodology provides a means to

identify opinion and social subjectivity (e.g. public opinion) in relation to a particular issue. And, as the van Eeten case study shows, knowledge about social rationality concerning a “wicked” problem can contribute to new ways of thinking about the issue that can help bring about negotiated change.

That “there is an epistemological basis to the adjunctive and transformative capacity of Q methodology in the revalorization of opinion for policy purposes” frames the conclusion of this thesis. Q methodology can operate either at an adjunctive level of instrumental data, rendering opinion a mechanism for breaking deadlocks or at a transformative level that opens up a new epistemological space for doing policy analysis work that is opinion-based. Q methodology’s adjunctive capacity is that it can be harnessed to existing standard evidenced-based policy analysis capabilities for data gathering. Q methodology’s transformative capacity is that it can change analytic practice of policy analysis based in hypothetico-deductive logic to an abductive practice of analysis, introducing new capabilities of policy analysis when required.

Main contribution and concluding comments

The idea of “reading complexity” and Q methodology as a means of reading complexity that policy analysts may use to address analysis constitutes the main contribution that this thesis makes to knowledge. It allows a reconceptualization of what may be required in policy analysis to respond to complex social problems in new ways. In practical terms, “reading complexity” and Q methodology as the means for doing this affords the possibility to plan a continuous and coherent program of policy research, analysis, and evaluation based in opinion and a reading of what to pay attention to and not overlook in analysis.

My purpose in exploring Q methodology, opinion, and complexity thinking in the context of policy analysis was driven by a sense of the limitations of standard evidence-based policy analysis practice. Professor Meredith Edwards is the current Director of the National Institute for Governance at the University of Canberra. She has been both policy analyst and researcher. In Edwards (2004) discussion of social science research and public policy (see *Social Science Research and Public Policy: Narrowing the Divide*), although focused on the role of research in the policy process, her comments on the character of policy environments are useful here for their

articulation of the larger point of discussion in this thesis that concerns complexity capability in the policy process. Without going into Edward's discussion in any depth, a comment is restated here:

Policy environments are full of complexities, usually involving a diverse range of players coming from different perspectives and spawning a host of unexpected events. It is, therefore, very unlikely that circumstances would permit anything approaching classical rationality in the decision-making process (Edwards, 2004:7).

In making this comment, Edwards is alerting the social scientist to the nature of policy reality and at the same time confirms that among policy analysts it is acknowledged that the classical rational schema of policy development is an ideal not achieved in practice. The policy environment Edwards describes is the same form of environment described by James as the "the zone of formative processes" from which we can see "social twists" or unintended consequences and "wicked" problems in the making – that is, a zone of supervening relations in which, and in respect of human affairs, it matters "what comes together".

In this thesis I have argued that in evidence-based policy analysis there is a retreat from those complexities of the real world. On the one hand complexities are spoken about in terms of disrupting the rational order and process of policy making and concomitant elements of good policy analysis while on the other hand, in spite of the complexities that thwart such rationality, effort is put into a good policy process grounded in conventional, positivist scientific rationality, special skills, knowledge and perspectives. Notwithstanding the importance of expert/special knowledge and expert interpretations of evidence from a wide range of social science research in policy, it is still not clear what might be a viable alternative to classical rationality *vis-a-vis* the complexity of actual policy situations as described by Edwards, and for use in tackling complex, "wicked" problems in policy analysis.

We need an alternative way of thinking for making sense of the pervading context of complexity in which policy comes to be developed, conjoined with an approach by which we can navigate the complexity that scholars and practitioners recognize as the multiple points of view, with overlapping differences and similarities, of politicians, experts, public servants, interest groups, and citizens. Moreover, and as far as

possible, navigate and negotiate without the policy that comes to be developed being “simply askew” of this experiential context and the facts of complexity (Fraser, 1997).

The crux of my argument is that the difficulties of the policy environment and of policy analysis in that environment do not mean policy practitioners should always fall back on objective science as a template for reliable knowledge. Stephenson’s kind of science and Q methodology may offer a way out of a long-standing and intractable analytic impasse, the making of which is an epistemological argument of what counts as knowledge that has held sway since at least the 1930s. In order for a policy community to engage with these ideas will not be a simple task and will require confidence expressed as supportive infrastructure to enable the development of new methods and epistemological understandings in policy analysis.

Finally, the argument that there is a new epistemological space that could be opened up in the policy context provides an opportunity for policy analysts and for others with an epistemological interest to decide the degree and extent of what has been opened up, if the argument is sustained. The articulation of Q methodology’s manner of contribution to policy analysis and advice advanced in both its adjunctive and transformative terms provides a rationale for Q methodology in policy toolkits for use in research, analysis, and evaluation.

References

- Ackoff, R. L. (1974). *Redesigning the future: Systems approach to societal problems*. New York: Wiley.
- Addams, H. (2000). Q methodology. In H. Addams & J. Proops (Eds.), *Social discourse and environmental policy: An application of Q methodology* (pp. 14-40). Cheltenham, UK: Edward Elgar.
- Addams, H., & Proops, J. (Eds.). (2000). *Social discourse and environmental policy: An application of Q methodology*. Cheltenham, UK: Edward Elgar.
- Aliseda, A. (1997). *Seeking explanations: Abduction in logic, philosophy of science and artificial intelligence*. Unpublished doctoral dissertation, Stanford University, Stanford, California.
- Al-Khalili, J. (2003). *Quantum*. London: Weidenfeld & Nicolson
- Allen, P. M., & Varga, L. (2007). Complexity: The co-evolution of epistemology, axiology and ontology. *Nonlinear Dynamics, Psychology, and Life Sciences*, 11(1), 19-50.
- Amin, Z. (2000). Q methodology - A journey into the subjectivity of human mind. *Singapore Medical Journal*, 41(8), 410-414.
- Anderson, D. K. (2006). Mucking through the swamp: changing the pedagogy of a social welfare policy course. *Journal of Teaching in Social Work*, 26(1/2), 1-17.
- Andreewsky, E., & Bourcier, D. (2000). Abduction in language interpretation and law making. *Kybernetes*, 29(7/8), 836-845.
- Arendt, H. (1978). *The life of the mind*. New York: Harcourt Brace Jovanovich.
- Australian Productivity Commission (2010). *Strengthening evidence-based policy in the Australian Federation*. Melbourne: Australian Government Productivity Commission. Published proceedings of 'Strengthening evidence-based policy in the Australian Federation Roundtable'. Canberra, Australia, August 17-18.
- Australian Public Service Commission. (2007). *Tackling wicked problems: A public policy perspective*. Canberra: Australian Public Service Commission.
- Baggini, J., & Fosl, P.S. (2003). *The philosopher's toolkit: A compendium of philosophical concepts and methods*. Oxford: Blackwell.
- Bak, P. (1996). *How nature works: The science of self-organized criticality*. New York: Copernicus Press.
- Bankes, S., & Lempert, R. (2004). Robust Reasoning with Agent-Based Modeling. *Nonlinear Dynamics, Psychology, and Life Sciences*, 8(2), 259-277.

- Banks, G. (2009). *Challenges of evidence-based policy-making*. Canberra: Australian Public Service Commission, Australian Government Productivity Commission.
- Barabasi, A. L. (2005). Taming complexity. *Nature Physics*, 1, 68-70.
- Barton, J., Stephens, J., & Haslett, T. (2007). Action research: An exploration of its logic and relationship to the scientific method. In proceedings of the 13th Annual Australia and New Zealand Systems (ANZSYS) Conference, SystemicDevelopment: Local Solutions in a Global Environment, Auckland, New Zealand, December 2-5.
- Batty, M., & Torrens, P.M. (2005). Modelling and prediction in a complex world. *Futures*, 37, 745-766.
- Bernstein, R.J. (1997). Pragmatism, pluralism, and the healing of wounds. In L. Menand (Ed.), *Pragmatism: A reader* (pp. 381-401). New York: Vintage.
- Bertilsson, T. M. (2004). The elementary forms of pragmatism: On different types of abduction. *European Journal of Social Theory*, 7, 371-389.
- Biesta, G. (2007). Why 'what works' won't work: Evidence-based practice and the democratic deficit in educational research. *Educational Theory*, 57(1), 1-22.
- Bird, A. (2009). Thomas Kuhn. In E. N. Zalta (Ed.), *The Stanford encyclopedia of philosophy* (Fall 2009 ed.).
- Blaikie, N. (2000). *Designing social research*. Cambridge: Polity Press.
- Blair, A. (1999). *Facing the modern challenge: The third way in Britain and South Africa*. Speech at Parliament Building, Capetown, South Africa, January 8.
- Blank, R.M. (2002). What do economists have to contribute to policy decision-making? *The Quarterly Review of Economics and Finance*, 42, 817-824.
- Blunkett, D. (2000). *Influence or irrelevance: can social science improve government?* London: Department for Education and Employment. Reprinted in *Research Intelligence*, 71, pp. 12-21.
- Bohr, N. (1950). On the notions of causality and complementarity. *Science III*, 51-54.
- Bolton, J. (2010). Complexity theory and implications for policy development. *E:CO*, 12(2), 31-40.
- Brown, M. (2008). Illuminating risk with Q methodology: The complexity of trans-disciplinary information system integration. In L.F. Dennard, K.A. Richardson, & G. Morçol (Eds.), *Complexity and policy analysis: Tools and concepts for designing robust policies in a complex world*. (Exploring organizational complexity series 2, pp. 305-319). Goodyear, AZ: ISCE Publishing.

- Brown, S.R. (1972). A fundamental incommensurability between objectivity and subjectivity. In S.R. Brown & D.J. Brenner (Eds.), *Science, psychology, and communication* (pp. 57-94). NY: Teachers College Press.
- Brown, S.R. (1978). Technique of factor analysis: An historical note. *Operant Subjectivity*, 2(1), 1-3.
- Brown, S.R. (1980). *Political subjectivity: Applications of Q methodology in political science*. New Haven, CT: Yale University Press.
- Brown, S.R. (1989). A feeling for the organism: Understanding and interpreting political subjectivity. *Operant Subjectivity*, 12(3/4), 81-97.
- Brown, S. R. (1993). A primer on Q methodology. *Operant Subjectivity*, 14(3/4), 91-138.
- Brown, S.R. (1995, October, 1). Overview of Chapter 1 Q Methodology Network [Listserver], 12:11pm.
- Brown, S.R. (2003). Q methodology [Seminar in Public Policy Methods].
- Brown, S.R. (2004, March). *A match made in heaven: A marginalized methodology for studying the marginalized*. Paper presented at the International Research Seminar on Marginality and Welfare Democracy, Teleborg Castle, Vaxjo University, Sweden.
- Brown, S.R. (2005). Applying Q methodology to empowerment. In D. Narayan (Ed.), *Measuring empowerment: Cross-disciplinary perspectives* (pp.197-276). Washington, DC: The World Bank.
- Brown, S.R. (2007, November, 30). Re: Discourse and Q. Q Methodology Network [Listserver], 7:59am.
- Brown, S.R. (2011a, January, 5). Re: Qualitative analysis. Q Methodology Network [Listserver], 9:51pm.
- Brown, S.R. (2011b, January, 11). Re: Method or methodology? Q Methodology Network [Listserver], 8:33am.
- Brown, S.R. (2011c, January, 11). Re: Method or methodology? Q Methodology Network [Listserver], 2:11pm.
- Brown, S.R., Durning, D., & Selden, S. (1999). Q methodology. In G.J. Miller & M.L. Whicker (Eds.), *Handbook of research methods in public administration* (pp. 599-637). New York: Marcel Dekker.
- Brown, S.R., Durning, D., & Selden, S. (2007). Q methodology. In G.R. Miller & K. Yang (Eds.), *Handbook of research methods in public administration* (2nd ed.) (pp. 721-763). New York: Taylor & Francis.
- Brown, S. R., & Robyn, R. (2004). Reserving a key place for reality: Philosophical foundations of theoretical rotation. *Operant Subjectivity*, 27, 104:124.

- Brouwer, M. (1967). Prolegomena to a theory of mass communication. In L. Thayer (Ed.), *Communication: Concepts and perspectives*. Washington D.C.: Spartan Books.
- Brunner, R.D. (1991). The policy movement as a policy problem. *Policy Sciences*, 24, 65-98.
- Brunner, R.D. (1997). Introduction to the policy sciences. *Policy Sciences*, 30, 191-215.
- Brunner, R.D., & Ascher, W. (1992). Science and social responsibility. *Policy Sciences*, 25, 295-331.
- Buchler, J. (1939). *Charles Peirce's empiricism*. London: Kegan Paul, Trench, Trubner.
- Burt, C. (1940). *The factors of the mind*. London: University of London Press.
- Byrne, D. (1998). *Complexity theory and the social sciences: An introduction*. London: Routledge.
- Caplan, N. (1979). The two communities theory and knowledge utilization. *American Behavioral Scientist*, 22(3), 459-470.
- Capra, F. (1991). *The Tao of physics: An exploration of the parallels between modern physics and Eastern mysticism* (3rd ed.) Boston: Shambhala.
- Capra, F. (1997). *The web of life: A synthesis of mind and matter*. London: Harper Collins.
- Capra, F. (2002). *The hidden connections: A science for sustainable living*. London: Harper Collins.
- Cattell, R. B. (1947). Confirmation and clarification of primary personality factors. *Psychometrika*, 12, 197:200.
- Chapman, J. (2010). Lessons from a pluralist approach to a wicked policy issue. *Integral Review*, 6(1), 236-251.
- Checkland, P. (1981). *Systems thinking, systems practice*. Chichester: John Wiley.
- Checkland, P. (2000). Soft systems methodology: A thirty year retrospective. *Syst. Res. Behav. Sci*, 17, S11-S58.
- Chiasson, P. (2001). Abduction as an aspect of retroduction. *Digital encyclopedia of Charles S. Peirce*.
- Christman, P. (2004/2005). Factor C: 'Orthodoxy reinforced'. *Operant Subjectivity*, 28(1/2), 88-90.
- Churchman, C.W. (1971). *The design of inquiring systems*. New York: Basic Books.

- Cilliers, P. (1998). *Complexity and postmodernism: Understanding complex systems*. London: Routledge.
- Combes, H., Hardy, G., & Buchan, L. (2004). Using Q methodology to involve people with intellectual disability in evaluating person-centred planning. *Journal of Applied Research in Intellectual Disabilities*, 17, 149-159.
- Coveney, P., & Highfield, R. (1995). *Frontiers of complexity: The search for order in a chaotic world*. London: Faber & Faber.
- Daellenbach, H.G. (2002). *Hard OR, soft OR, problem structuring methods, critical systems thinking: A primer*. (Report; University of Canterbury). Christchurch, New Zealand: University of Canterbury.
- Dayton, B. C. (2000). Policy frames, policy making and the global climate change discourse. In H. Addams & J. Proops (Eds.), *Social Discourse and Environmental Policy* (pp.71-99). Cheltenham, UK: Edward Elgar.
- Davies, P. (2004, February 14). *Is evidence-based government possible?* Jerry Lee Lecture, 4th Annual Campbell Collaboration Colloquium, Washington D.C, 19 February.
- Davies, P. (2006). What is needed from research synthesis from a policy-making perspective? In J. Popay (Ed.), *Moving beyond effectiveness in evidence synthesis: Methodological issues in the synthesis of diverse sources of evidence* (pp. 97-103). London: National Institute for Health and Clinical Excellence.
- Davis, W. (1972). *Peirce's epistemology*. The Hague: Martinus Nijhoff.
- Deelstra, Y., Nooteboom, S.G., Kohlmann, H.R., van den Berg, J., & Innanen, S. (2003). Using knowledge for decision-making purposes in the context of large projects in The Netherlands. *Environmental Impact Review*, 23, 517-541.
- deLeon, P. (1994). Reinventing the policy sciences: Three steps back to the future. *Policy Sciences*, 27 (1), 77-95.
- deLeon, P. (1997). *Policy sciences and democracy*. Albany: State University of New York Press.
- deLeon, P. (1998a). Introduction: The evidentiary basis for policy analysis: Empiricist versus post positivist positions. *Policy Studies Journal*, 26 (1), 109-113.
- deLeon, P. (1998b). Models of policy discourse: Insights versus prediction. *Policy Studies Journal*, 26 (1), 147-161.
- Delprato, D. J. & Brown, S. R. (2002). Q methodology and the operant construct. *Operant Subjectivity*, 25(3/4), 139-147.

- Dennard, L., Richardson, K. A., & Morcol, G. (Eds.) (2008). *Complexity and policy analysis: Tools and concepts for designing robust policies in a complex world*. (Exploring organizational complexity series 2). Goodyear, AZ: ISCE.
- Dent, E. (1999). Complexity science: A worldview shift. *Emergence*, 1(4), 5-19.
- Denzin, N. K. (2009). The elephant in the living room: Or extending the conversation about the politics of evidence. *Qualitative Research*, 9(2), 139-160.
- Denzin, N. K., & Lincoln, Y. S. (Eds.) (2000). *Handbook of qualitative research*. Thousand Oaks, CA: Sage.
- Derrida, J. (1976). *Of grammatology*. Baltimore: John Hopkins University Press.
- Dewey, J. (1950). The pragmatic acquiescence. In G. Kennedy (Ed.), *Pragmatism and American Culture* (p. 52). Boston: D.C. Heath.
- Dewey, J. (1958). *Experience and nature*. New York: Dover.
- Dobrow, M. J., Goel, V., & Upshur, R. E. G. (2004). Evidence-based health policy: Context and utilisation. *Social Science & Medicine*, 58, 207-217.
- Donahue, A. K. (2004). Managerial perceptions and the production of fire protection. *Administration & Society*, 35, 717-746.
- Donaldson, S I., Christie, C., & Mark, M. M. (Eds.). (2009). *What counts as credible evidence in applied research and evaluation practice?* London: Sage.
- Donner, J. C. (2001). Using Q-sorts in participatory processes: An introduction to the methodology. In R. A. Krueger, M. A. Casey, J. Donner, S. Kirsch, & J. N. Maack, *Social analysis: Selected tools and techniques*. (Social Development papers 36, pp. 24-49). Washington, DC: World Bank, Social Development Dept.
- Driver, S., & Martell, L. (2000). Left, right and the third way. *Policy & Politics*, 28(2), 147-61.
- Dryzek, J. (1988). The mismeasure of political man. *The Journal of Politics*, 50(3), 705-725.
- Dryzek, J. (1989). Policy sciences of democracy. *Polity*, 12(1), 97-118.
- Dryzek, J. (1990). *Discursive democracy*. Cambridge, UK: Cambridge University Press.
- Dryzek, J. (2000). *Deliberative democracy and beyond*. Oxford: Oxford University Press.
- Dryzek, J. & Berejikian, J. (1993). Reconstructive Democratic Theory. *The American Political Science Review*, 87(1), 48-60.

- Dryzek, J., Clark, M. L. & McKenzie, G. (1989). Subject and system in international interaction. *International Organization*, 43(3), 475-503.
- Durning, D. (1999). The transition from traditional to postpositivist policy analysis: A role for Q methodology. *Journal of Policy Analysis and Management*, 18(3), 389-410.
- Durning, D. (2005). Teaching policy analysis in a complex world: The post-positivist route for programs in Asia and the Pacific. In J. Jabes (Ed.), *The role of public administration in alleviating poverty and improving governance* (pp. 677-698). Manila, Philippines: Asian Development Bank.
- Durning, D. (2006). Using Q methodology to resolve conflicts and find solutions to contentious issues. In R. Ahmed (Ed.), *The role of public administration in building a harmonious society* (pp. 601-620). Manila, Philippines: Asian Development Bank & Network of Asia-Pacific Schools & Institutes of Public Administration and Governance.
- Edwards, M. (2004). *Social science research and public policy: Narrowing the divide*. Occasional Paper 2/2004, policy paper 2. Canberra: Academy of the Social Sciences in Australia.
- Ellwood, D. T. (2003). From research to social policy and back again: Translating scholarship into practice through the starry eyes of a sometimes scared veteran. *Social Policy Journal of New Zealand*, 20(6), 6-28.
- Emmeche, C. (2004). At home in a complex world: Lessons from the frontiers of natural science. In K. V. H. Niekerk & H. Buhl (Eds.), *The significance of complexity: Approaching a complex world through science, theology and the humanities* (pp. 21-45). Aldershot, UK: Ashgate Publishing.
- English, W. (2009). *Public policy challenges facing New Zealand*. Speech to Institute of Public Administration New Zealand, Wellington, September 23.
- Evans, K. G. (1998). *Governance, citizenship, and the new sciences: Lessons from Dewey and Follett on realizing democratic administration*. Unpublished doctoral dissertation, Virginia Polytechnic Institute and State University, Blacksburg, Virginia.
- Fann, K.T. (1970). *Peirce's theory of abduction*. The Hague: Martinus Nijhoff.
- Fischer, F. (1990). *Technology and the politics of expertise*. London: Sage.
- Fischer, F. (1993). Citizen participation and the democratization of policy expertise: From theoretical to practical cases. *Policy Sciences*, 26(3), 165-187.
- Fischer, F. (1998). Beyond empiricism: Policy inquiry in postpositivist perspective: The evidentiary basis of policy analysis: Empiricist vs. postpositivist positions. *Policy Studies Journal*, 26(1), 129-147.
- Fischer, F. (2003). *Reframing public policy: Discursive politics and deliberative practices*. Oxford: Oxford University Press.

- Fisher, R. A. (1935). *Statistical methods for research workers*. London: Oliver and Boyd.
- Fitzgerald, T. (2008). Rethinking public opinion. *The New Atlantis* (Summer), 45-62.
- Flach, P., Kakas, A., & Ray, O. (2006). Abduction, induction, and the logic of scientific knowledge development. In P. Flach et al. (Eds.), *Proceedings of the ECAI'06 Workshop on Abduction and Induction in AI and Scientific Modelling* (pp. 21-23). Bristol, UK: University of Bristol, Dept. of Computer Science.
- Fleener, M. J., & Merritt, M. L. (2007). Paradigms lost? *Nonlinear Dynamics, Psychology, and Life Sciences*, 11(1), 1-18.
- Focht, W. (2002). Assessment and management of policy conflict in the Illinois River watershed in Oklahoma: An application of Q methodology. *International Journal of Public Administration*, 25, 1311-1349.
- Focht, W., & Lawler, J.J. (2000). Using Q methodology to facilitate policy dialogue. In H. Addams & J. Proops (Eds.), *Social discourse and environmental policy: An application of Q methodology* (pp. 100-122). Cheltenham, UK: Edward Elgar.
- Forrester, J.W. (1994). Systems dynamics, systems thinking, and soft OR. *System Dynamics Review*, 10(2), 245-456.
- Foucault, M. (1980). *Power/knowledge*. New York: Pantheon Books.
- Fraser, N. (1997). *Justice interruptus: Critical reflections on the "postsocialist" condition*. NY: Routledge.
- Fraser, N., & Gordon, L. (1994). A genealogy of dependency: Tracing a keyword of the U.S. welfare state. *Signs*, 19(2), 309-336.
- Funtowicz, S. O., & Ravetz, J. R. (1991). A new scientific methodology for global environmental issues. In R. Costanza (Ed.), *Ecological economics: The science and management of sustainability* (pp. 137-152). New York: Columbia University Press.
- Funtowicz, S. O., & Ravetz, J. R. (2003). Post-normal science: Report to International Society for Ecological Economics. In *Internet Encyclopedia of Ecological Economics*.
- Gallopín, G., Funtowicz, S., O'Connor, M., & Ravetz, J. (2001). Science for the twenty-first century: From social contract to the scientific core. *International Social Science Journal*, 168, 119-229.
- Gargan, J. J., & Brown, S. R. (1993). 'What is to be done?': Anticipating the future and mobilising prudence. *Policy Sciences*, 26, 347-359.

- Gershenson, C., & Heylighen, F. (2005). How can we think the complex? In K.A. Richardson (Ed.), *Managing organizational complexity: Philosophy, theory and application* (pp.47-62). Charlotte, NC: Information Age Publishing.
- Giddens, A. (1998). *The third way: The renewal of social democracy*. Cambridge: Polity Press.
- Giddens, A. (1999). *Reith lectures: Runaway world*. London: BBC Radio.
- Giddens, A. (2000). *The third way and its critics*. Cambridge: Polity Press.
- Gleick, J. (1998). *Chaos: Making a new science*. London: Vintage.
- Glynos, J., Howarth, D., Norval, A. & Speed, E. (2009). *Discourse analysis: varieties and methods*. London: UK National Centre for Research Methods, Economic and Social Research Council (ESRC).
- Goldman, I. (1999). Q methodology as process and context in interpretivism, communication, and psychoanalytic psychotherapy research. *The Psychological Record*, 49 (4), 589-604.
- Good, J. M. M. (2010). Introduction to William Stephenson's quest for a science of subjectivity. *Psychoanalysis and History*, 12(2), 211-243.
- Gorsuch, R. L. (1974). *Factor analysis*. Philadelphia: W. B. Saunders Company.
- Gribbin, J. (1996). *Schrodinger's kittens and the search for reality*. London: Phoenix.
- Gulbenkian Commission. (1996). *Open the social sciences: Report of the Gulbenkian Commission on the Restructuring of the Social Sciences*. Stanford, CA: Stanford University Press.
- Haack, S. (1975). The relevance of psychology to epistemology. *Metaphilosophy*, 6(2), 161-176.
- Haack, S. (2005). Not cynicism, but synechism: Lessons from classical pragmatism. *Transactions of the Charles S. Peirce Society*, 41(2), 239-254.
- Haack, S. (n.d.). Not cynicism, but synechism: Lessons from classical pragmatism. Retrieved from <http://www.as.miami.edu/phi/haack/SYNECHIS.pdf>.
- Haack, S. (2010). The differences that make a difference: William James on the importance of individuals. *European Journal of Pragmatism and American Philosophy*, 2, 1-10. (University of Miami legal studies research paper No. 2010-16).
- Hajer, M. (2003). Policy without polity? Policy analysis and the institutional void. *Policy Sciences*, 36, 175-195.
- Hajer, M., & Wagenaar, H. (Eds.). (2003). *Deliberative policy analysis: Understanding governance in the network society*. Cambridge: Cambridge University Press.

- Hanson, N. R. (1958). *Patterns of discovery: An inquiry into the conceptual foundations of science*. Cambridge: Cambridge University Press.
- Hanson, N. R. (1965). Notes toward a logic of discovery. In R.J. Bernstein (Ed.), *Perspectives on Peirce: Critical essays on Charles Sanders Peirce* (pp. 42-65). New Haven, CT: Yale University Press.
- Hare, R. M. (1984). Supervenience. *Proceedings of the Aristotelian Society, Supplementary Volumes*, 58, 1-16.
- Harman, G. (1965). The inference to the best explanation. *The Philosophical Review*, 74(1), 88-95.
- Hart, C. (1998). *Doing a literature review: Releasing the social science research imagination*. London: Sage.
- Head, B. (2010). Evidence-based policy: Principles and requirements. In *Strengthening evidence-based policy in the Australian Federation* (pp.13-26). Melbourne: Australian Government Productivity Commission. Published proceedings of 'Strengthening evidence-based policy in the Australian Federation Roundtable'. Canberra, Australia, August 17-18.
- Head, B., & Alford, J. (2008, March). *Wicked problems: The implications for public management*. Paper presented to the Panel on Public Management in Practice, 12th Annual Conference of the International Research Society for Public Management, Brisbane, Australia.
- Heineman, R. A., Bluhm, W. T., Peterson, S. A., & Kearny, E. N. (1990). *The world of the policy analyst: Rationality, values, and politics*. Chatham, NJ: Chatham House.
- Heisenberg, W. (1999). *Physics and philosophy: The revolution in modern science*. Amherst, NY: Prometheus Books.
- Held, D. (1980). *Introduction to critical theory: Horkheimer to Habermas*. Berkeley, CA: University of California Press.
- Henrickson, L., & McKelvey, B. (2002). Foundations of 'new' social science: Institutional legitimacy from philosophy, complexity science, postmodernism, and agent-based modelling. *PNAS*, 99(3), 7288-7295.
- Heylighen, F. (1988). Building a science of complexity. In H. A. Fatmi (Ed.), *Proceedings of the 1988 Annual Conference of the Cybernetics Society* (pp. 1-22). London: Cybernetics Society.
- Heylighen, F., Cilliers, P., & Gershenson, C. (2007). Complexity and philosophy. In J. Bogg, R. Geyer (Eds.), *Complexity, science and society* (pp. 117-134). Milton Keynes, UK: Radcliffe Publishing.
- Hintikka, J. (1998). What is abduction? The fundamental problem of contemporary epistemology. *Transactions of the Charles Peirce Society*, 34 (3), 503-533.

- Holland, J. H. (1995). *Hidden order: How adaptation builds complexity*. Cambridge, MA: Perseus Books.
- Hollinger, R. (1994). *Postmodernism and the social sciences: A thematic approach* (Vol. 4). Thousand Oaks: Sage.
- Holton, G. (1973). *Thematic origins of scientific thought: Kepler to Einstein*. Cambridge: Harvard University Press.
- Hookway, C. (2008). Pragmatism. In E.N. Zalta (Ed.), *The Stanford encyclopedia of philosophy* (Spring 2010 ed.).
- Horgan, T. (1993). From supervenience to superdupervenience: Meeting the demands of a material world. *Mind*, 102 (408), 555-586.
- Howe, K. R. (2008). Isolating science from the humanities. In N. K. Denzin & M. D. Giardina (Eds.), *Qualitative inquiry and the politics of evidence* (pp. 97-118). Walnut Creek, CA: Left Coast Press.
- Howlett, M. (2008, March). *Enhanced policy analytical capacity as a prerequisite for effective evidence-based policy-making: Theory, concepts and lessons from the Canadian case*. Paper prepared for the Workshop on Evidence-Based Policy, 12th International Research Symposium on Public Management, Brisbane, Australia.
- Hunt, M. (2007). *The story of psychology* (2nd ed.). New York: Anchor Books.
- Hurd, R. C., & Brown, S. R. (2004/2005). The future of the Q methodology movement. *Operant Subjectivity*, 28(1/2), 58-75.
- Innes, J. E. (1996). Planning through consensus building: A new view of the comprehensive planning ideal. *Journal of the American Planning Association*, 62(4), 460-472.
- Innes, J. E. & Brooker, D. E. (1999). Consensus building as role playing and bricolage: Toward a theory of collaborative planning. *Journal of the American Planning Association*, 65, 9-26.
- Ison, R., Armson, R., & Stowell, F. (2001). The submission revisited: Systems practice for managing complexity. *Systemist*, 23(SE), 30-58.
- Ison, R., & Stowell, F. (Eds.). (2001). Editorial: Introducing the systems practice for managing complexity network. *Systemist*, 23(SE), 2-4.
- Jackson, M. C. (2001). Critical systems thinking and practice. *European Journal of Operational Research*, 128, 233-244.
- James, W. (1890a). The importance of individuals. *Open Court*, 4, 2437-2440.
- James, W. (1890b). *The principles of psychology*. NY: Henry Holt & Co.

- James, W. (1891). *The principles of psychology* (two vols.). London: MacMillan and Co.
- James, W. (1907). *Pragmatism: A new name for some old ways of thinking*. Lectures delivered at the Lowell Institute in Boston in 1906 and at Columbia University in 1907. New York: Longmans, Green.
- James, W. (1909). *A pluralistic universe: Hibbert Lectures at Manchester College on the Present Situation in Philosophy*. New York: Longmans, Green.
- James, W. (1912). *Essays in radical empiricism*. New York: Longmans, Green.
- Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33(7), 14-26.
- Kauffman, S. (1996). *At home in the universe: The search for laws of self-organization and complexity*. New York: Penguin.
- Kickert, W. J. M., Klijn, E. H., & Koppenjan, J. F. M. (Eds.). (1997). *Managing complex networks: Strategies for the public sector*. London: Sage.
- Kitzinger, C. (1986). Introducing and developing Q as a feminist methodology: A study of accounts of lesbianism. In S. Wilkinson (Ed.), *Feminist social psychology* (pp.151-172). Milton Keynes, UK: Open University Press.
- Klein, J. T. (2004). Interdisciplinarity and complexity: An evolving relationship. *E:CO Special Double Issue*, 6(1-2), 2-10.
- Klein, R. (2003). Evidence and policy: Interpreting the Delphic oracle. *Journal of The Royal Society of Medicine*, 96, 429-431.
- Kline, P. (1994). *An easy guide to factor analysis*. London: Routledge.
- Knorr, K.D. (1977). Policymakers' use of social science knowledge: Symbolic or instrumental? In C.H. Weiss (Ed.), *Using social research in public policy making* (pp. 165-182). Lexington, MA: Lexington Books.
- Kroesen, M., & Bröer, C. (2009). Policy discourse, people's internal frames, and declared aircraft noise annoyance: An application of Q methodology. *Journal of the Acoustical Society of America*, 126(1), 195-207.
- Kuhn, T.S. (1970). The structure of scientific revolutions. *International Encyclopedia of Unified Science*, 2(2). (2nd ed.). Chicago: Chicago University Press.
- Kwakkel, J. H. (2008). The problem of uncertainty in airport master planning. *Airlines* [e-zine edition], 39, 1-4.
- Kwakkel, J. H., Walker, W. E., & Marchau, V. A. W. J. (2007, June). *Dealing with uncertainty in airport strategic planning*. Paper presented at the Air Transport Research Society World Conference, University of California, Berkeley, CA.

- Kwakkel, J. H., Walker, W. E., & Marchau, V. A. W. (2008). Adaptive policymaking for airport strategic planning. In P. Heider & P. Heijuen (Eds.), *Building networks for a brighter future*, (pp.1-6). Rotterdam: IEEE.
- Lackey, R. T. (2007). Science, scientists, and policy advocacy. *Conservation Biology*, 21(1), 12-17.
- Laszlo, A., & Krippner, S. (1998). Systems theories: Their origins, foundations, and development. In J.S. Jordan (Ed.), *Systems Theories and A Priori Aspects of Perception*. (pp.47-74). Amsterdam: Elsevier Science.
- Lee, R. (1993). Readings in the new science: A selective annotated bibliography. *Historical Social Research*, 18(1), 26-70.
- Levinson, H. S. (1996). Introduction. In W. James, *A pluralistic universe* (pp. v-xv). Lincoln, NA: University of Nebraska Press.
- Lewis, C. S. (1967). *Studies in words* (2nd ed.). Cambridge: Cambridge University Press.
- Lipton, P. (2004). *Inference to the best explanation* (2nd ed.). London: Routledge.
- Longino, H. (2011). The social dimension of scientific knowledge. In E. N. Zalta (Ed.), *The Stanford encyclopedia of philosophy* (Spring 2011 ed.).
- Lorenz, E. N. (1993). *The essence of chaos*. Seattle: University of Washington Press.
- Lubchenco, J. (1998). Entering the century of the environment: A new social contract for science. *Science*, 279, 491-497.
- Lunt, N. (2006). Sickness and Invalid's Benefits: New developments and continuing challenges. *Social Policy Journal of New Zealand*, 27, pp.83-101.
- Lynn, L. E. (1999). A place at the table: Policy analysis, its postpositivist critics, and the future of practice. *Journal of Policy Analysis and Management*, 18(3), 411-425.
- Lyons, M. (2005). Knowledge and the modelling of complex systems. *Futures*, 37, 711-719.
- Lyotard, J-F. (1984). *The postmodern condition: A report on knowledge*. Minneapolis: University of Minnesota Press.
- McDermott, J. J. (Ed.). (1977). *The writings of William James*. Chicago: Chicago University Press.
- McKaughan, D. J. (2008). From ugly duckling to swan: C.S. Peirce, abduction, and the pursuit of scientific theories. *Transactions of the Charles Peirce Society*, 44(3), 446-468.
- McKeown, B. F. (1998). Circles: Q methodology and hermeneutical science. *Operant Subjectivity*, 21, 112-138.

- McKeown, B. F., & Thomas, D. B. (1988). *Q methodology: Applications in the social sciences*. Thousand Oaks, CA: Sage.
- McLaughlin, B., & Bennett, K. (2010). Supervenience. In E. N. Zalta (Ed.), *The Stanford encyclopedia of philosophy* (Summer 2010 ed.).
- Magnani, L. (2004). Reasoning through doing: Epistemic mediators in scientific discovery. *Journal of Applied Logic*, 2, 439-450.
- Mainzer, K. (1997). *Thinking in complexity: The complex dynamics of matter, mind, and mankind* (3rd ed.). Berlin: Springer.
- Majone, G. (1989). *Evidence, argument and persuasion in the policy process*. New Haven, CT: Yale University Press.
- Marston, G., & Watts, R. (2003). Tampering with the evidence: A critical appraisal of evidence-based policy-making. *The Drawing Board: An Australian Review of Public Affairs*, 3, 143-163.
- Mason, R., & Mitroff, I. (1981). *Challenging strategic planning assumptions: Theory, cases, and techniques*. New York: John Wiley.
- Mautner, T. (Ed.). (2000). *The Penguin dictionary of philosophy* (Rev. ed.). London: Penguin.
- Maxwell, J. P. (2000). Managing conflict at the county level: The use of Q methodology in dispute resolution and strategic planning. *Public Administration Quarterly*, 24, 338-354.
- Meek, J. W. (2010). Complexity theory for public administration and policy. *E:CO*, 12(1), 1-4.
- Melrose, R. (1995). The seduction of abduction: Peirce's theory of signs and indeterminacy in language. *Journal of Pragmatics*, 23, 493-507.
- Menand, L. (Ed.). (1997). *Pragmatism: A reader*. New York: Vintage Books.
- Midgley, G. (2003). Science as systemic intervention: Some implications of systems thinking and complexity for the philosophy of science. *Systemic Practice and Action Research*, 16(2), 77-97.
- Miller, S., & Fredericks, M. (2003). The nature of 'evidence' in qualitative research methods. *International Journal of Qualitative Methods*, 2(1), article 4.
- Montuori, A. (2008). Foreword: Edgar Morin's path of complexity. In E. Morin, *On complexity* (pp. xvii-xliv). Cresskill, NJ: Hampton Press.
- Moore, E. C. (1961). *American pragmatism: Peirce, James and Dewey*. New York: Columbia University Press.

- Morçöl, G. (2000). New sciences for public administration and policy. In G. Morçöl & L.F. Dennard (Eds.), *New sciences for public administration and policy: Connections and reflections* (pp. 1-44). Burke, VA: Chatelaine Press.
- Morçöl, G. (2002). *A new mind for policy analysis: Toward a post-Newtonian and postpositivist epistemology and methodology*. Westport, CT: Praeger.
- Morçöl, G. (2005). A new systems thinking: Implications of the sciences of complexity for public policy and administration. *Public Administration Quarterly*, 29(3), 297-320.
- Morçöl, G. (2008). A complexity theory for policy analysis: An outline and proposals. In L. F. Dennard, K. A. Richardson & G. Morçöl (Eds.), *Complexity and policy analysis: Tools and concepts for designing robust policies in a complex world*. (Exploring organizational complexity series 2, pp.23-36). Goodyear, AZ: ISCE.
- Morin, E. (1992). From the concept of system to the paradigm of complexity. *Journal of Social and Evolutionary Systems*, 15(4), 371-385.
- Morin, E. (2005, June). *Restricted complexity, general complexity*. Paper presented at the Colloquim 'Intelligence de la complexite: epistemologie et pragmatique', Cerisy-La- Salle, France. (C. Gershenson, Trans.).
- Morse, J. (2006a). Biased reflections: Principles of sampling and analysis in qualitative inquiry. In J. Popay (Ed.), *Moving beyond effectiveness in evidence synthesis: Methodological issues in the synthesis of diverse sources of evidence* (pp. 53-60). London: National Institute for Health and Clinical Excellence.
- Morse, J. (2006b). Insight, inference, evidence, and verification: Creating a legitimate discipline. *International Journal of Qualitative Methods*, 5(1), Article 8.
- Moser, H. (1999). *Thick description and abduction: Paradigm change in social research*. Retrieved from Mulgan, G. (2001a). Systems thinking and the practice of government. *Systemist*, 23(SE), 23-29.
- Mulgan, G. (2001b). *Unreliable evidence?* Broadcast on BBC Radio 4 on 26 July 2001.
- Mulgan, G. (2003a). *Evidence and strategy: UK lessons*. PowerPoint presentation. Retrieved from <http://www.msd.govt.nz/documentsevents/strategic-social-policy/conference-03/geoff-mulgan.ppt>.
- Mulgan, G. (2003b, April). *Government, knowledge and the business of policy-making*. Presented to Facing the Future Conference, Canberra, Australia.
- Nagel, T. (1986). *The view from nowhere*. Oxford: Oxford University Press.
- National Audit Office. (2001). *Modern policy-making: Ensuring policies deliver value for money*. London: National Audit Office.

- Neilson, S. (2001). *Knowledge utilization and public policy processes: A literature review*. Ottawa: International Research and Development Centre. Available at www.idrc.ca/evaluation/
- New Zealand Ministry of Social Development. (2002) *New Zealand living standards 2000*. Wellington, New Zealand: Ministry of Social Development.
- New Zealand Ministry of Social Development. (2004). *Introduction to the Centre for Social Research and Evaluation/Te Pokapu Rangahau Arotake Hapori*. Wellington, New Zealand: Ministry of Social Development.
- New Zealand Ministry of Social Development. (2005) *Leading social development: Ministry of Social Development statement of intent 2005/06*. Wellington, New Zealand: Ministry of Social Development.
- New Zealand State Services Commission (1999). *Essential ingredients: Improving the quality of policy advice*. (Occasional paper 9). Wellington: New Zealand State Services Commission.
- Nicolis, G., & Prigogine, I. (1989). *Exploring complexity: An introduction*. New York: W. H. Freeman.
- Niekerk, K., & Buhl, H. (Eds.). (2004). *The significance of complexity: Approaching a complex world through science, theology and the humanities*. Aldershot, UK: Ashgate Publishing.
- Nutley, S., Davies, H., & Walter, I. (2003). Evidence-based policy and practice: Cross sector lessons from the UK. *Social Policy Journal of New Zealand*, 20, 29-48.
- Oakley, A. (2000). *Experiments in knowing*. Cambridge: Polity Press.
- Oakley, A. (2002). Social science and evidence-based everything: The case of education. *Educational Review*, 54(3), 277-286.
- Oldroyd, D. (1986). *The arch of knowledge: An introductory study of the history of the philosophy and methodology of science*. New York: Methuen.
- Opfer, D. V. (2009). *Research perspectives overview*.
- Opinion. (1982). In P. Hanks (Ed.), *Collins dictionary of the English language* (p. 1031). Sydney: William Collins Sons & Co.
- Organisation for Economic Cooperation and Development (OECD). (1998). *Environmentally sustainable transportation project: Report on phase 2*. Paris: OECD.
- Organisation for Economic Cooperation and Development (OECD), Global Science Forum. (2009). *Report on applications of complexity science for public policy: New tools for finding unanticipated consequences and unrealized opportunities*. Paris: OECD.

- Orlove, B., Chiang, C. H., & Cane, M. A. (2000). Forecasting Andean rainfall and crop yield from the influence of El Nino on Pleiades visibility. *Nature*, 403(6), 68-71.
- Orlove, B., Chiang, C. H., & Cane, M. A. (2002). Ethnoclimatology in The Andes. *American Scientist*, 90 (Sept.-Oct.), 428-435.
- Parsons, W. (2002). *From muddling through to muddling up: Evidence based policy making and the modernisation of British government*.
- Patton, M. Q. (2002). *Qualitative research & evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.
- Pawson, R. (2002). Evidence-based policy: In search of a method. *Evaluation*, 8(2), 157-181.
- Peace, R., Wolf, A., Crack, S., Hutchinson, I., & Roorda, M. (2004). *Wellbeing, employment, independence: The views of Sickness and Invalids' Benefit clients*. (Working paper; Centre for Social Research and Evaluation/Te Pokapu Rangahau Arotaki Hapori; 07/04). Wellington, New Zealand: Ministry of Social Development.
- Peirce, C.S. *Collected papers of Charles Sanders Peirce*, vols. 1-6, C. Hartshorne & P. Weiss (Eds.), vols. 7-8, A.W. Burks (Ed.). Cambridge, MA: Harvard University Press.
- Pitkin, H. (1981). Justice: On relating public and private. *Political Theory*, 9, 327-352.
- Popper K.R. (1959). *The logic of scientific discovery*. London: Hutchinson. (Original work *Logik der Forschung*, published 1935).
- Popper K. R. (1960). *The poverty of historicism*. London: Routledge.
- Prigogine, I., & Stengers, I. (1984). *Order out of chaos: Man's new dialogue with nature*. London: Bantam Books.
- Rahman, S.A. (1997). *Policymaking in the uncertain world of European civil aviation*. TNLI, October. Delft: RAND Europe.
- Ragin, C.C., Nagel, J., & White, P. (2004). *Workshop on Scientific Foundations of Qualitative Research*. Arlington, VA: National Science Foundation.
- RAND Europe (1997a). *Adaptive policies, policy analysis, and civil aviation policymaking*. DRU-1514-VW/VROM/EZ, January.
- RAND Europe (1997b). *Scenarios for examining civil aviation infrastructure options in the Netherlands*. DRU-1513-VW/VROM/EZ, January.
- Reichenbach, H. (1938). *Experience and prediction. An analysis of the foundations and the structure of knowledge*, Chicago:University of Chicago Press.

- Reichertz, J. (2007). Abduction: The logic of discovery of Grounded Theory. In A. Bryant & K. Charmaz (Eds.), *The Sage handbook of Grounded Theory* (pp. 214-228). London: Sage.
- Reilly, F. E. (1970). *Charles Peirce's theory of scientific method*. New York: Fordham University Press.
- Rescher, N. (1978). *Peirce's philosophy of science: Critical studies in his theory of induction and scientific method*. Notre Dame, IN: University of Notre Dame Press.
- Rescher, N. (2000). *Realistic pragmatism: An introduction to pragmatic philosophy*. Albany, NY: State University of New York.
- Rhoads, J. C. (2004/2005). Factor A: 'Orthodoxy upheld'. *Operant Subjectivity*, 28(1/2), 76-78.
- Richardson, K. A. (2007). Complex systems thinking and its implications for policy analysis. In G. Morçol (Ed.), *Handbook of decision making* (pp. 189-221). Boca Raton, FL: CRC Press.
- Richardson, K., & Cilliers, P. (2001). What is complexity science?: A view from different directions. *Emergence*, 3(1), 5-22.
- Rittel, H. W. J., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, 4, 155-169.
- Robbins, P. & Krueger, R. (2000). Beyond bias? The promise and limits of Q method in human geography. *Professional Geographer*, 52(4), 636-648.
- Roberts, N. (2000). Wicked problems and network approaches to resolution. *International Public Management Review*, 1(1).
- Rodenbücher, C. (2002). Amsterdam Schiphol Airport expands. *FLUG Revue*, 8 (August).
- Rooker, T. (2001). The pragmatism of knowledge: Quantum mechanics. *Bulletin of Science, Technology & Society*, 21(2), 119-128.
- Rorty, R. (2000). Pragmatism. *International Journal of Psychoanalysis*, 81, 819-823.
- Rummel, R. J. (1970). *Applied factor analysis*. Evanston, IL: Northwestern University Press.
- Salmond, A. (2003). To the Social Policy Research and Evaluation Conference. *Social Policy Journal of New Zealand*, 20, 1-5.
- Sanders, T. I., & McCabe, J. A. (2003). *The use of complexity science: A survey of Federal departments and agencies, private foundations, universities, and independent education and research centers*. Washington, DC: Center for Complexity and Public Policy.

- Santaella, L. (2005). Abduction: The logic of guessing. *Semiotica*, 153(1/4), 175-198.
- Sarantakos, S. (2005). *Social research*. (3rd ed.). Hampshire: Palgrave MacMillan.
- Schlindwein, S. L., & Ison, R. (2004). Human knowing and perceived complexity: Implications for systems practice. *E:CO*, 6(3), 27-32.
- Schön, D. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books.
- Schön, D. (1995). Knowing-in-action: The new scholarship requires a new epistemology. *Change*, 27, 26-34.
- Semetsky, I. (2004). The role of intuition in thinking and learning: Deleuze and the pragmatic legacy. *Educational Philosophy and Theory*, 36(4), 433-454.
- Shadish, W., Cook, T. & Leviton, L. (1991). *Foundations of program evaluation*. Newbury Park, CA: Sage.
- Shalin, D. N. (1993). Modernity, postmodernism, and pragmatist inquiry: An introduction. *Symbolic Interaction*, 16(4), 303-332.
- Shank, G. (1998). The extraordinary powers of abductive reasoning. *Theory and Psychology*, 8(6), 841-860.
- Smith, J. E. (1965). Community and reality. In R.J. Bernstein (Ed.), *Perspectives on Peirce: Critical essays on Charles Sanders Peirce* (pp. 93-119). New Haven, CT: Yale University Press.
- Smith, N.W. (2001). *Current systems in psychology: History, theory, research, and applications*. Belmont, CA: Wadsworth/Thomson Learning.
- Snider, K.F. (2000a). Expertise or experimenting?: Pragmatism and American public administration, 1920-1950. *Administration & Society*, 32(3), 329-354.
- Snider, K. F. (2000b). Rethinking public administration's roots in pragmatism: The case of Charles A. Beard. *American Review of Public Administration*, 30(2), 123-145.
- Snowden, D. (2005). *Multi-ontological sense-making: A new simplicity in decision making*.
- Solesbury, W. (2001). *Evidence based policy: Whence it came and where it's going*. (Working paper 1). London: UK Centre for Evidence Based Policy and Practice, Economic and Social Research Council (ESRC).
- Spearman, C.E. (1904). General Intelligence objectively determined and measured. *American Journal of Psychology*, 15, 201-293.
- Spencer, L., Ritchie, J., Lewis, J., & Dillon, L. (2003). *Quality in qualitative evaluation: A framework for assessing research evidence*. London: Government Chief Social Researcher's Office.

- Stainton Rogers, R. (1997/1998). Q and "going critical": Some reflections on the British dialect. *Operant Subjectivity*, 21, 19-26.
- Stapp, H. P. (1971). S-matrix interpretation of quantum theory. *Physical Review*, 3(6), 1303-1320.
- Steelman, T.A., & Maguire, L.A. (1999). Understanding participant perspectives: Q methodology in national forest management. *Journal of Policy Analysis and Management*, 18(3), 361-388.
- Stengers, I. (2004). The challenge of complexity: Unfolding the ethics of science: In memoriam Ilya Prigogine. *E:CO Special Double Issue*, 6, 92-99.
- Stephenson, W. (1935). Technique of factor analysis. *Nature*, 136, 297.
- Stephenson, W. (1953). *The study of behaviour: Q-technique and its methodology*. Chicago: University of Chicago Press.
- Stephenson, W. (1956). Methodology of trait analysis. *British Journal of Psychology*, 47, 5-18.
- Stephenson, W. (1961a). Scientific creed - 1961: Abductory principles. *The Psychological Record*, 11, 9-17.
- Stephenson, W. (1961b). Scientific creed - 1961: Philosophical credo. *The Psychological Record*, 11, 1-8.
- Stephenson, W. (1964a). Application of Q-method to the measurement of public opinion. *The Psychological Record*, 14, 265-273.
- Stephenson, W. (1964b). Operational study of an occasional paper on the Kennedy-Nixon television debates. *The Psychological Record*, 14, 475-488.
- Stephenson, W. (1965). Perspectives in psychology: XXIII definition of opinion, attitude and belief. *The Psychological Record*, 15, 281-288.
- Stephenson, W. (1969). Foundations of communication theory. *The Psychological Record*, 19, 65-82.
- Stephenson, W. (1977). Factors as operant subjectivity. *Operant Subjectivity*, 1(1), 3-16.
- Stephenson, W. (1978). Concourse theory of communication. *Communication*, 3, 21-40.
- Stephenson, W. (1980a). Conscience and Consciousness. *Operant Subjectivity*, 3(3), 74-82.
- Stephenson, W. (1980b). Consciring: A general theory for subjective communicability. In D. Nimmo (Ed.), *Communication yearbook 4* (pp. 7-36). New Brunswick, NJ: Transaction.

- Stephenson, W. (1980c). Factor analysis. *Operant Subjectivity*, 3(2), 38-57.
- Stephenson, W. (1981). Principles for the study of subjectivity. *Operant Subjectivity*, 4, 37-53.
- Stephenson, W. (1983). Quantum theory and Q-methodology: Fictionalistic and probabilistic theories conjoined. *Psychological Record*, 33, 213-230.
- Stephenson, W. (1985). Perspectives in psychology: Integration in clinical psychology. *Psychological Record*, 36, 41-48.
- Stephenson, W. (1986). Protoconcurus: The concourse theory of communication. *Operant Subjectivity*, 9(2), 37-58.
- Stephenson, W. (1988). William James, Niels Bohr, and complementarity: V – Phenomenology of subjectivity. *The Psychological Record*, 38, 203-219.
- Stephenson, W. (1988/1989). The quantumization of psychological events. *Operant Subjectivity*, 12(1/2), 1-23.
- Stephenson, W. (1990a). Fifty years of exclusionary psychometrics: I. Q technique. *Operant Subjectivity*, 13(4), 141-159.
- Stephenson, W. (1990b). Fifty years of exclusionary psychometrics: II. Developments. *Operant Subjectivity*, 13(4), 141-162.
- Stephenson, W. (1993/1994). Introduction to Q-methodology. *Operant Subjectivity*, 17(1/2), 1-13.
- Stephenson, W. (1995/1996). Quantum Theory Media Research: I. Reception analysis. *Operant Subjectivity*, 19(1/2), 1-11.
- Stephenson, W. (1998). Quantum theory meida research: II. Intentionality and acculturation. *Operant Subjectivity*, 21(3/4), 73-91.
- Stewart, A. F. (1997). *Elements of knowledge: Pragmatism, logic, and inquiry*. (Rev. ed.). Nashville, TN: Vanderbilt University Press.
- Stokey, E., & Zeckhauser, R. (1978). *A primer for policy analysis*. New York: W.W. Norton.
- Stone, D. (2002). *Policy paradox: The art of political decision making*. (Rev. ed.). New York: W.W. Norton.
- Strauss, A. L. (1984). *Qualitative analysis in social research: Grounded Theory methodology*. (Study Letter). Hagen, Germany: Fernuniversitat-Gesamthochschule.
- Strauss, A. L., & Corbin, J. M. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. London: Sage.

- Stricklin, M. (2004/2005). Factor C: 'Orthodoxy reinforced'. *Operant Subjectivity*, 28(1/2), 86-88.
- Stronach, I., Piper, H., & Piper, J. (2004). Re-performing crises of representation. In H. Piper & I. Stronach (Eds.), *Educational research, difference and diversity* (pp. 129-154). Aldershot, UK: Ashgate.
- Sutcliffe, S., & Court, J. (2005). *Evidence-based policymaking: What is it? How does it work? What relevance for developing countries?*
- Thorsen, A. A. (2008). *Teachers' priorities and beliefs: A venture in beliefs, methodologies, and insights*. Unpublished doctoral dissertation, University of Stavanger, Stavanger, Norway.
- Thrift, N. (1999). The place of complexity. *Theory, Culture & Society*, 16(3), 31-69.
- Toffler, A. (1984). Science and change. In I. Prigogine & I. Stengers, *Order out of chaos: Man's new dialogue with nature* (pp. xi-xxvi). London: Bantam Books.
- Torgerson, D. (1992). Reuniting theory and practice. *Policy Sciences*, 25, 211-224.
- Torgerson, D. (1997). Policy professionalism and the voices of dissent: The case of environmentalism. *Polity*, 29(3), 345-374
Cabinet Office. (1999a). The modernising government white paper. London: Cabinet Office.
- United Kingdom Cabinet Office. (1999a). *Professional policy making for the twenty first century*. London: Cabinet Office, Performance and Innovation Unit.
- United Kingdom Cabinet Office. (1999b). *The modernising government white paper*. London: Cabinet Office.
- United Kingdom Cabinet Office. (2000). *Adding it up: Improving analysis and modelling in central government*. London: Cabinet Office, Performance and Innovation Unit.
- United Nations Educational, Science and Cultural Organization (UNESCO). (1999, July). *Declaration on Science and the Use of Scientific Knowledge: Science for the twenty-first century: A new commitment: World Conference on Science*. Text adopted by World Conference on Science, Budapest, Hungary.
- United Nations Educational, Science and Cultural Organization (UNESCO). (2005). The International Forum on the Social Science-Policy Nexus. *International Social Science Journal*, 57(186), 741-744.
- United Nations Educational, Science and Cultural Organization (UNESCO). (2006). *International Forum on the Social Science-Policy Nexus: Final report*. Argentina and Uruguay, 20-24 February.
- Ulrich, W. (1994). *Critical heuristics of social planning: A new approach to practical philosophy*. New York: Wiley.

- Ulrich, W. (2001). The quest for competence in systemic research and practice. *Syst. Res. Behav. Sci.*, 18, 3-28.
- Urry, J. (2005). The complexity turn. *Theory, Culture & Society*, 22(5), 1-14.
- van Eeten, M. J. G. (1999). 'Dialogues of the deaf' on science in policy controversies. *Science and Public Policy*, 26(3), 185-192.
- van Eeten, M. J. G. (2000). Recasting environmental controversies: A Q study of the expansion of Amsterdam Airport. In H. Addams & J. Proops (Eds.). *Social discourse and environmental policy: An application of Q methodology* (pp. 41-70). Cheltenham, UK: Edward Elgar.
- van Eeten, M. J. G. (2001). Recasting intractable policy issues: The wider implications of the Netherlands civil aviation controversy. *Journal of Policy Analysis and Management*, 29(3), 391-414.
- Van Eeten, M. J. G. (2007). Narrative policy analysis. In F. Fischer, G. J. Miller, & M. S. Sidney (Eds.), *Handbook of policy analysis: Theory, politics and methods* (pp. 251-272). Boca Raton: CRC Press.
- van Excel, N. J. A., & de Graaf, G. (2005). *Q methodology: A sneak preview*.
- van Excel, N. J. A., de Graaf, G., & Rietveld, P. (2004). Getting from A to B: Operant approaches to travel decision making. *Operant Subjectivity*, 27, 194-216.
- Wagenaar, H. & Cook, S. N. (2003). Understanding policy practices: Action, dialectic and deliberation. In M. A. Hajer & H. Wagenaar (Eds.), *Deliberative policy analysis: Understanding governance in the network society*. Cambridge: Cambridge University Press.
- Walby, S. (2001). Against epistemological chasms: The science question in feminism revisited. *Signs*, 26(2), 485-509.
- Walby, S. (2004, Sept). *Complexity Theory, Globalisation and Diversity*. Paper presented to the conference of the British Sociological Association, University of York, 16-18 Sept. Retrieved from <http://www.lancs.ac.uk/fass/sociology/research/restopic.htm#complexity>
- Walby, S. (2007). Complexity theory, systems theory, and multiple intersecting social inequalities. *Philosophy of the Social Sciences*, 37(4), 449-470.
- Walker, W. E. (2000). Policy analysis: A systematic approach to supporting policymaking in the public sector. *Journal of Multi-Criteria Decision Analysis*, 9, 11-27.
- Walker, W. E., Harremoes, P., Rotmans, J., van der Sluijs, J. P., van Asselt, M. B. A., Janssen, P. & Krayen von Krauss, M. P. (2003). Defining Uncertainty: A conceptual basis for uncertainty management in model-based decision support. *Integrated Assessment*, 4(1), 5-15.

- Walker, W. E., & Marchau, V. A. W. J. (2003). Dealing with uncertainty in policy analysis and policymaking. *Integrated Assessment*, 4(1), 1-4.
- Welber, T., Tuler, S., Shockey, I., Stern, P., & Beattie, R. (2003). Participation by local government officials in watershed management planning. *Society and Natural Resources*, 16, 105-121.
- Weimer, D. L. (1998). Policy analysis and evidence: A craft perspective: The evidentiary basis of policy analysis: Empiricist vs. postpositivist positions. *Policy Studies Journal*, 26(1), 114-129.
- Weimer, D. L., & Vining, A. R. (1999). *Policy analysis: Concepts and practice* (3rd ed.). Upper Saddle River, NJ: Prentice Hall.
- Weiss, C. H. (Ed.) (1977). *Using social research in public policymaking*. Lexington, MA: Lexington Books.
- Willig, C. (2001). *Introducing qualitative research in psychology: Adventures in theory and method*. Buckingham: Open University Press.
- Williams, G. P. (1997). *Chaos theory tamed*. Washington, D.C: Joseph Henry Press.
- Welfare Working Group (2011). *Reducing long-term Benefit dependency: Recommendations*. Wellington: Victoria University of Wellington, Institute of Policy Studies.
- Wolf, A. (2004). The bones in a concourse. *Operant Subjectivity*, 27, 145-165.
- Wolf, A. (2005, May). *Insight in social science inquiry*. Paper presented at the Social Policy Research and Evaluation Conference, Wellington, New Zealand.
- Wolf, A. (2007). On conscurring. *Operant Subjectivity*, 30(3/4), 87-88.
- Wolf, A., & Stainton Rogers, W. (2011). Estimating the concourse and designing the Q set. *Pre-conference Workshop*. Birmingham: University of Birmingham.
- Woolley, J. T., & McGinnis, M.V. (2000). The conflicting discourses of restoration. *Society and Natural Resources*, 13, 339-357.
- Wynne, B. (2005). Reflexing complexity: Post-genomic knowledge and reductionist returns in public science. *Theory, Culture and Society*, 22(5), 67-94.
- Zukav, G. (2001). *The dancing Wu Li masters: An overview of the new physics*. New York: Perennial Classics.

