9

Systems Thinking and Practice for Action Research

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This chapter offers some grounding in systems thinking and practice for doing action research. There are different traditions within systems thinking and practice which, if appreciated, can become part of the repertoire for practice by action researchers. After exploring some of these lineages the differences between systemic and systematic thinking and practice are elucidated – these are the two adjectives that come from the word 'system', but they describe quite different understandings and practices. These differences are associated with epistemological awareness and distinguishing systemic action research from action research. Finally, some advantages for action research practice from engaging with systems thinking and practice are discussed.

My primary purpose in this chapter is to introduce, albeit briefly, some of the different traditions within systems thinking and practice and to explore what action research (AR) practitioners may find useful by engaging with these traditions.

The history of systems thinking and practice can be explained in many different ways. Anyone can be a systems thinker and practitioner, but the narratives that are told are generally about those with recognized expertise. My perspective is that many well-known systems thinkers had particular experiences which led them to devote their lives to their particular forms of systems practice. So, within systems thinking and practice, just as in other domains of practice, there are different traditions, which are perpetuated through lineages.

After exploring some of these lineages I elucidate how systemic and systematic thinking and practice are different – these are the two adjectives that come from the word 'system' but they describe quite different understandings and practices. These differences are associated with epistemological awareness, which is required, I claim, for moving effectively between systemic and systematic thinking and practice. I ground this claim in my own experience of doing AR which has led me to distinguish systemic action research from action research.

Finally, I suggest some advantages I, and others in the systems traditions, have found useful for AR from engaging with systems thinking and practice.

SYSTEMS TRADITIONS AND LINEAGES

Scene Setting

The word 'system' comes from the Greek verb *synhistanai*, meaning 'to stand together' (the word 'epistemology' has the same root). A system is a perceived whole whose elements are 'interconnected'. Someone who pays particular attention to interconnections is said to be systemic (e.g. a systemic family therapist is someone who considers the interconnections amongst the whole family; the emerging discipline of Earth Systems Science is concerned with the interconnections between the geological and biological features of the Earth). On the other hand, if I follow a recipe in a step-by step manner then I am being systematic. Medical students in courses on anatomy often take a systematic approach to their study of the human body – the hand, leg, internal organs etc. – but at the end of their study they may have very little understanding of the body as a whole because the whole is different to the sum of the parts, i.e. the whole has emergent properties (Table 9.1). Later I explain how starting off systemically to attempt to change or improve situations of complexity and uncertainty means being both systemic and systematic.

Many, but not all, people have some form of systemic awareness, even though they may be unaware of the intellectual history of systems thinking and practice as a field of practical and academic concern. Systemic awareness comes from understanding:

(i) 'cycles', such as the cycle between life and death, various nutrient cycles and the water cycle – the connections between rainfall, plant growth, evaporation, flooding, run-off, percolation etc. Through this sort of systemic logic water availability for plant growth can ultimately be linked to the milk production of grazing animals and such things as profit and other human motivations. Sometimes an awareness of connectivity is described in the language of chains, as in 'the food chain', and sometimes as networks, as in the 'web of life'. Other phrases include 'joined up', 'linked', 'holistic', 'whole systems', 'complex adaptive systems' etc;

(ii) counterintuitive effects, such as realizing that floods can represent times when you need to be even more careful about conserving water, as exemplified by the shortages of drinking water in the New Orleans floods that followed hurricane Katrina in 2005; and

(iii) unintended consequences. Unintended consequences are not always knowable in advance but thinking about things systemically can often minimize them. They may arise because feedback processes (i.e. positive and negative feedback) are not appreciated (Table 9.1). For example the designers of England's motorways did not plan for what is now experienced on a daily basis – congestion, traffic jams, emissions, etc. These unintended consequences are a result of the gaps in thinking that went into designing and building new motorways as part of a broader 'transport system'.

As I intimated earlier, many people either implicitly or explicitly refer to things that are interconnected (exhibit connectivity – Table 9.1) when they use the word 'system'. A common example is the use of 'transport system' or 'computer system' in everyday speech. As well as a set of interconnected 'things' (elements), a 'system' can also be seen as a way of thinking about the connections (relationships) between things – hence a process. A constraint to thinking about 'system' as an entity and a process is caused by the word 'system' being a noun – a noun implies something you can see, touch or discover, but in contemporary systems thinking more attention is paid to the process of 'formulating' a system as depicted in Figure 9.1. This figure shows someone who has formulated or distinguished a system of interest in a situation, i.e. a process. In the process a boundary judgement is made which distinguishes a system of interest from an

Table 9.1 ***Definitions of some generalized systems concepts likely to be experienced when encountering a system practitioner or for co-option into your own action research projects***

Concept	*Definition*
Boundary	The borders of the system, determined by the observer(s), which define where control action can be taken: a particular area of responsibility to achieve system purposes
Communication	(i) First-order communication is based on simple feedback (as in a thermostat) but should not be confused with human communication, which has a biological basis
	(ii) Second-order communication is understood from a theory of cognition which encompasses language, emotion, perception and behaviour. Amongst human beings this gives rise to new properties in the communicating partners who each have different experiential histories
Connectivity	Logical dependence between components or elements (including sub-systems) within a system
Difficulty	A situation considered as a bounded and well defined problem where it is assumed that it is clear who is involved and what would constitute a solution within a given time frame
Emergent properties	Properties which are revealed at a particular level of organization and which are not possessed by constituent sub-systems. Thus these properties emerge from an assembly of sub-systems
Environment	That which is outside the system boundary and which affects and is affected by the behaviour of the system; alternatively the 'context' for a system of interest
Feedback	A form of interconnection, present in a wide range of systems. Feedback may be negative (compensatory or balancing) or positive (exaggerating or reinforcing)
Hierarchy	Layered structure; the location of a particular system within a continuum of levels of organization. This means that any system is at the same time a sub-system of some wider system and is itself a wider system to its sub-systems
Measure of performance	The criteria against which the system is judged to have achieved its purpose. Data collected according to measures of performance are used to modify the interactions within the system
Mess	A mess is a set of conditions that produces dissatisfaction. It can be conceptualized as a system of problems or opportunities; a problem or an opportunity is an ultimate element abstracted from a mess
Monitoring and control	Data collected and decisions taken in relation to measures of performance are monitored and controlled action is taken through some avenue of management
Networks	An elaboration of the concept of hierarchy which avoids the human projection of 'above' and 'below' and recognizes an assemblage of entities in relationship, e.g. organisms in an ecosystem
Perspective	A way of experiencing which is shaped by our unique personal and social histories, where experiencing is a cognitive act

(Continued)

Table 9.1 *(Continued)*

Concept	*Definition*
Purpose	What the system does or exists for; the raison d'être which in terms of a model developed by people is to achieve the particular transformation that has been defined
Resources	Elements which are available within the system boundary and which enable the transformation to occur
System	An integrated whole whose essential properties arise from the relationships between its parts; from the Greek *synhistanai*, meaning 'to place together'
System of interest	The product of distinguishing a system in a situation, in relation to an articulated purpose, in which an individual or a group has an interest (a stake); a constructed or formulated system, of interest to one or more people, used in a process of inquiry; a term suggested to avoid confusion with the everyday use of the word 'system'
Systemic thinking	The understanding of a phenomenon within the context of a larger whole; to understand things systemically literally means to put them into a context, to establish the nature of their relationships
Systematic thinking	Thinking which is connected with parts of a whole but in a linear, step-by-step manner
Tradition	Literally, a network of pre-understandings or prejudices from which we think and act; how we make sense of our world
Transformation	Changes, modelled as an interconnected set of activities which convert an input to an output which may leave the system (a 'product') or become an input to another transformation
Trap	A way of thinking which is inappropriate for the situation or issue being explored
Worldview	That view of the world which enables each observer to attribute meaning to what is observed (sometimes the German word Weltanschauung is used synonymously)

(*Source*: adapted from Wilson, 1984; Capra, 1996; and Pearson and Ison, 1997)

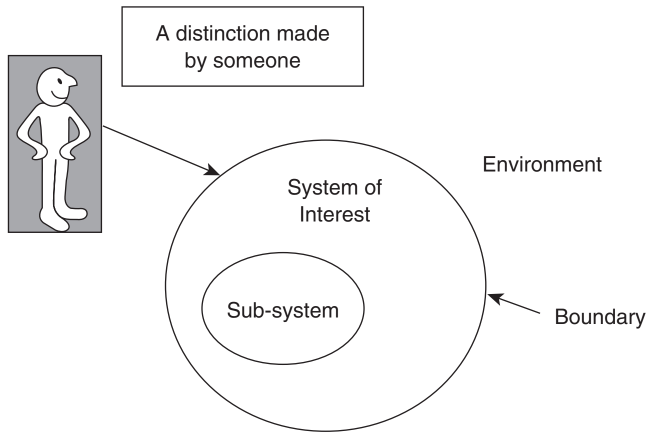

Figure 9.1 ***Key elements of systems practice as a process which result from systems thinking within situations experienced as complex***

environment. It follows that because we each have different perspectives and interests (histories) then it is likely that we will make different boundary judgements in the same situation, i.e. my education system will be different to yours because we see different elements, connections and boundary. Contemporary systems practice is concerned with overcoming the limitations of the everyday use of the word 'system' as well as seeing the process of formulating systems of interest as a form of practice that facilitates changes in understanding, practice and situations.

Systems thinking embraces a wide range of concepts which most systems lineages have as a common grounding (Table 9.1). Thus, like *other* academic areas, 'systems' has its own language, as shown in Table 9.1. At this point it is worth noting that I have already used the word 'system' in a number of different ways: (i) the everyday sense when we refer to the 'problem with the system'; (ii) a 'system' of interest which is the product of a process of formulating or constructing by someone (Figure 9.1); (iii) the academic area of study called 'systems' and (iv) a systems approach – practice or thinking which encompasses both systemic and systematic thinking and action.

I now provide a brief overview of the history of systems thinking and practice which gives rise to the traditions of understanding out of which systemists think and act. This account is by no means comprehensive and reflects my own perspective on this history.

HISTORY AND OUR TRADITIONS OF UNDERSTANDING

Some historical accounts of systems lineages start with the concerns of organismic biologists who felt that the reductionist thinking and practice of other biologists was losing sight of phenomena associated with whole organisms (von Bertalanffy, 1968 [1940]). Organismic or systemic biologists were amongst those who contributed to the interdisciplinary project described as 'general systems theory' (GST; von Bertalanffy, 1968 [1940]). Interestingly, 'systemic biology' is currently enjoying a resurgence (O'Malley and Dupré, 2005). Other historical accounts start earlier – with Smuts' (1926) notion of practical holism – or even earlier with process thinkers such as Heraclitus who is reputed to have said: 'You cannot step into the same river twice, for fresh waters are ever flowing

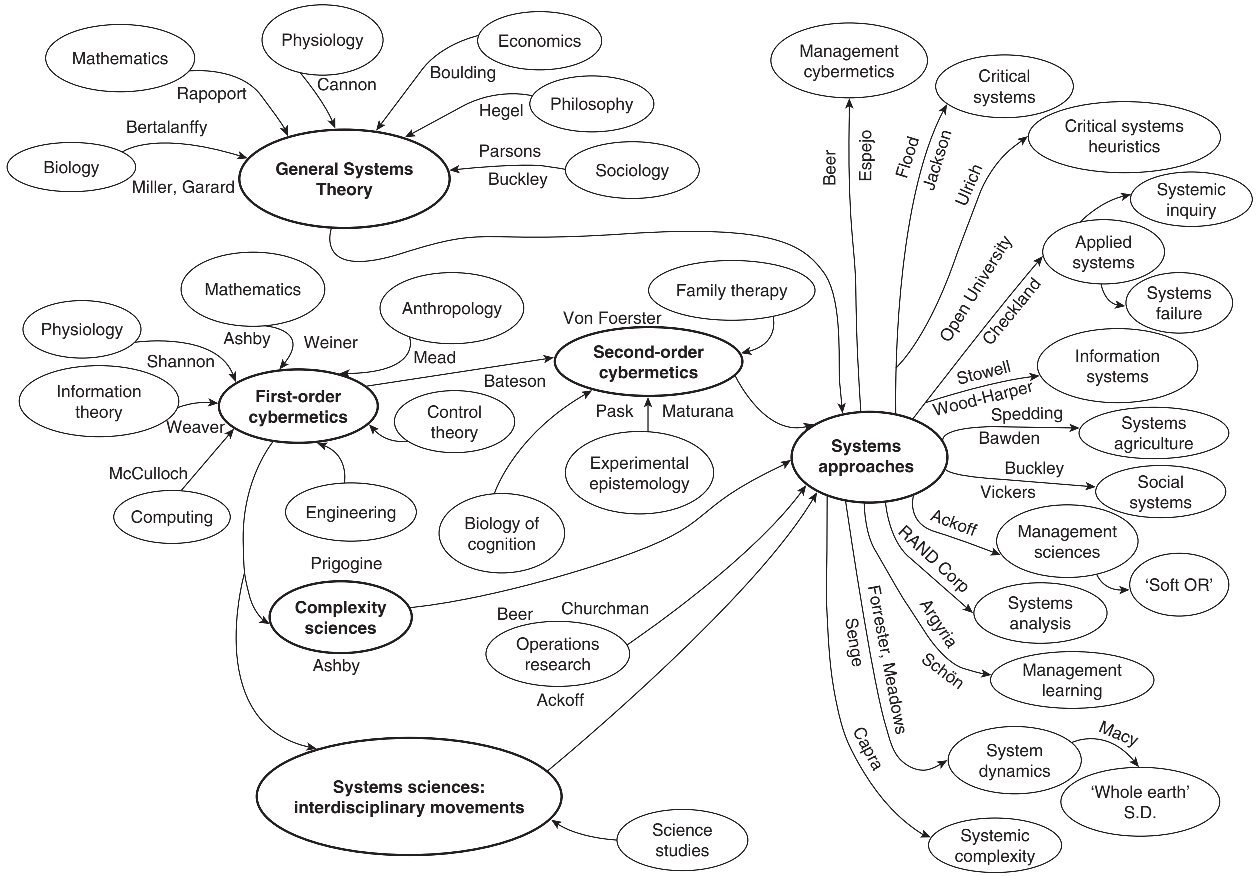

Figure 9.2 ***A model of different influences that have shaped contemporary systems approaches***

in upon you.' Figure 9.2 gives an account of some of the influences that have given rise to contemporary systems approaches. Other historical accounts can be found in Checkland (1981), Flood (1999, 2001/2006), Francois (1997), Jackson (2000) or on Principia Cybernetica (2006).

In Figure 9.2 I identify five formative clusters that give rise to contemporary systems approaches. It is not possible to describe all these influences nor approaches in detail. Some of the motivation for the 'GST project' in interdisciplinary synthesis can be explained by the realization in many disciplines that they were grappling with similar phenomena. This project had its apotheosis in the interdisciplinary Macy conferences in the 1940s and 1950s which did much to trigger new insights of a systems and cybernetic nature and subsequently a wide range of theoretical and practical developments (see Heims, 1991). So, although GST, as an intellectual project, has not been sustained it has nonetheless left a rich legacy (Capra, 1996).

For example, Checkland (1981: 152) establishes a connection with Kurt Lewin's view of 'the limitations of studying complex real social events in a laboratory, the artificiality of splitting out single behavioural elements from an integrated system' (see also Foster, 1972). Checkland goes on to say: 'this outlook obviously denotes a systems thinker, though Lewin did not overtly identify himself as such' (p. 152). A central idea in Lewin's milieu was that psychological phenomena should be regarded as existing in a 'field': 'as part of a system of coexisting and mutually interdependent factors having certain properties as a system that are deducible from knowledge of isolated elements of the system' (Deutsch and Krauss, 1965, quoted in Sofer, 1972). Whilst Lewin may not have overtly described himself as a systems thinker, he was nonetheless a member of the Macy conferences 'core group'. He attended the first two conferences but died in 1947, shortly before the third conference, and his influence was lost to the group (especially his knowledge of Gestalt psychology).[1]

The next two clusters (Figure 9.2) are associated with cybernetics, from the Greek meaning 'helmsman' or 'steersman'. The term was coined to deal with concerns about feedback as exemplified by the person at the helm responding to wind and currents so as to stay on course. A key image of first-order cybernetics is that of the thermostat-controlled radiator – when temperatures deviate from the optimum, feedback processes adjust the heat to maintain the desired temperature. Major concerns of cyberneticians were that of communication and control (Table 9.1). As outlined by Fell and Russell (2000), the first-order cybernetic 'idea of communication as the transmission of unambiguous signals which are codes for information has been found wanting in many respects. Heinz von Foerster, reflecting on the reports he edited for the Macy Conferences that were so influential in developing communication theory in the 1950s, said it was an unfortunate linguistic error to use the word 'information' instead of 'signal' because the misleading 'idea of 'information transfer' has held up progress in this field (Capra, 1996). In the latest theories the biological basis of the language we use has become a central theme' (see first- and second-order communication in Table 9.1).

Fell and Russell (2000: 34) go on to describe the emergence of second-order cybernetics in the following terms: 'second-order cybernetics is a theory of the observer rather than what is being observed. Heinz von Foerster's phrase, "the cybernetics of cybernetics" was apparently first used by him in the early 1960s as the title of Margaret Mead's opening speech at the first meeting of the American Cybernetics Society when she had not provided written notes for the Proceedings (van der Vijver, 1997)'.

The move from first- to second-order cybernetics is a substantial philosophical and epistemological jump as it returns to the core cybernetic concept of 'circularity', or recursion, by recognizing that observers bring forth their worlds (Maturana and Poerkson, 2004; Von Foerster and Poerkson, 2004). Von

Foerster (1992), following Wittgenstein, put the differences in the following terms: 'Am I apart from the universe? That is, whenever I look am I looking through a peephole upon an unfolding universe [the first-order tradition]. Or: Am I part of the universe? That is, whenever I act, I am changing myself and the universe as well [the second-order tradition]' (p. 15). He goes on to say that 'Whenever I reflect upon these two alternatives, I am surprised again and again by the depth of the abyss that separates the two fundamentally different worlds that can be created by such a choice: Either to see myself as a citizen of an independent universe, whose regularities, rules and customs I may eventually discover, or to see myself as the participant in a conspiracy whose customs, rules and regulations we are now inventing' (p. 15). It is worth making the point that understandings from second-order cybernetics have been influential in fields as diverse as family therapy and environmental management. Some authors equate a second order cybernetic tradition with radical constructivism, although not all agree.

Operations research (OR) is another source of influence on contemporary systems thinking and practice. OR flourished after the Second World War based on the success of practitioners in studying and managing complex logistic problems. As a disciplinary field it has continued to evolve in ways that are mirrored in the systems community.

A recent set of influences have come from the so-called complexity sciences (Figure 9.2), which is a lively arena of competing and contested discourses. As has occurred between the different systems lineages, there are competing claims within the complexity field for institutional capital (e.g. many different academic societies have been formed with little relationship to each other), contested explanations and extensive epistemological confusion (Schlindwein and Ison, 2005). However, some are drawing on both traditions to forge exciting new forms of praxis (e.g. McKenzie, 2006).

Other recent developments draw on interdisciplinary movements in the sciences, especially in science studies. These include the rise of discourses and understandings about the 'risk' and 'networked' society (Beck, 1992; Castells, 2004), and associated globalization which has raised awareness of situations characterized by connectedness, complexity, uncertainty, conflict, multiple perspectives and multiple stakeholdings (SLIM, 2004a). It can be argued that this is the reformulation and transformation of an earlier discourse about the nature of situations that Ackoff (1974) described as 'messes' rather than 'difficulties' (Table 9.1), Shön (1995) as the 'real-life swamp' rather than the 'high-ground of technical rationality', and Rittel and Webber (1973) as 'wicked' and 'tame' problems. A tame problem is one where all the parties involved can agree what the problem is ahead of the analysis and which does not change during the analysis. In contrast, a wicked problem is ill-defined. Nobody agrees about what, exactly, the problem is. Schön, Ackoff and Rittel all had professional backgrounds in planning so it is not surprising that they encountered the same phenomena even if they chose to describe them differently.

An example of such a situation from my own work is that of water catchments; a 'catchment' (or watershed) has been historically regarded as a description of a biophysical entity, but today there are few catchments which do not have mixed forms of human activity (urban development, farming, extraction, mining etc.) interacting with biophysical or ecosystem functions. Catchments could thus be said to be socially constructed. On a global basis there is a shortage of water in relation to human-derived demands and often the quality of water available is no longer fit for purpose. In such situations more scientific knowledge can increase, rather than ameliorate, complexity and uncertainty, yet there is also a need to 'manage' catchments. This is the type of situation where systems thinking and practice and AR come together most fruitfully (SLIM, 2004a).

Table 9.2 ***The 'hard' and 'soft' traditions of systems thinking compared***

The hard systems thinking tradition	*The soft systems thinking tradition*
oriented to goal seeking	oriented to learning
assumes the world contains systems that can be engineered	assumes the world is problematical but can be explored by using system models
assumes system models to be models of the world (ontologies)	assumes system models to be intellectual constructs (epistemologies)
talks the language of 'problem' and 'solutions'	talks the language of 'issues' and 'accommodations'
Advantages	**Advantages**
allows the use of powerful techniques	is available to all stakeholders including professional practitioners; keeps in touch with the human content of problem situations
Disadvantages	**Disadvantages**
may lose touch with aspects beyond the logic of the problem situation	does not produce the final answers; accepts that inquiry is never-ending

(Adapted from Checkland, 1985)

IMPLICATIONS FOR ACTION RESEARCHERS

Developments in systems thinking and practice have gone on in parallel – sometimes with mutual influences, sometimes in isolation – with other academic trends such as the emergence of discourse theory or post-structuralism or concerns with reflexivity, to name but a few. This should not pose problems for action researchers, rather it should offer more choices for practice. Awareness of the different systems traditions, the praxes that have evolved, their constituent concepts (e.g. Table 9.1) and the techniques, tools and methods that are used are all available for an action researcher to enhance their own repertoire.

One of the key concepts in systems is that of levels or layered structure (Table 9.1); this concept illuminates an important aspect of systems practice, the conscious movement between different levels of abstraction. In the next section I explore how it is possible, with awareness, to move between the systemic and systematic.

Not all the systems approaches depicted in Figure 9.2 have been influenced by the distinctions I have made; each has tended to focus on particular key systemic concerns, e.g. patterns of influence and the dynamics of stocks and flows in systems dynamics; critical theory and Habermasian understandings in critical systems approaches; phenomenology and interpretivism in applied 'soft systems', to name but a few. Those within each approach have generally evolved their own forms of praxis. Engagement with the different systems traditions also requires an ability to make epistemological distinctions – to be epistemologically aware. I explain why this is important in the next section.

SYSTEMIC AND SYSTEMATIC THINKING AND ACTION

Exploring the Systemic/Systematic Distinction

When Checkland and his co-workers, beginning in the late 1960s, reacted against the thinking then prevalent in systems engineering and operations research (two lineages depicted in Figure 9.2), and coined the terms 'hard' and 'soft' systems (Table 9.2), the case for epistemological awareness within systems began to be made apparent.

Systems practitioners, such as Checkland, found the thinking associated with goal-oriented behaviour to be unhelpful when dealing with messes and this resulted in a move away from goal-oriented thinking towards thinking in terms of learning, i.e. the purpose of formulating a system of interest as depicted in Figure 9.1 moves from naming, describing or discovering systems to orchestrating a process of learning which can lead to changes in understandings and practices. The epistemological shift was from seeing systems as 'real world entities' to models or devices employed in a process of action learning or research, i.e. the primary skill shifted to one of being able to build and use systemic models as epistemological devices to facilitate learning and change based on accommodations between different interests. 'Hard' systems approaches had typically been used within the lineage of 'systems engineering' which when it came to building bridges was fine, but when these people turned their attention to social issues it was not so easy to engineer new 'social systems' – in fact it proved dangerous to do so, with significant unintended consequences (a recent example is the attempt by the New Labour government in the UK to 'engineer' performance based on targets).

In our work at the Open University, driven by the need to develop effective pedagogy for educating the systems practitioner, we have rejected the hard/soft distinction because we experience it as perpetuating an unhelpful dualism – a self negating either/or. This is manifest, particularly among technology and engineering students, as 'hard approaches' (often quantitative) being perceived as more rigorous than 'soft'. Instead we employ the adjectives that arise from the word system: systemic thinking, thinking in terms of wholes and systematic thinking, linear, step-by-step thinking, as described earlier. Likewise, it is possible to recognize systemic practice and systematic practice. Together these comprise a duality – a whole rather than an unhelpful dualism (the Chinese symbol for yin and yang is a depiction of a duality – together they make a whole). Table 9.3 summarizes some of the characteristics that distinguish between systemic and systematic thinking and action.

The construction of Table 9.3 may suggest that the systemic and systematic are either/or choices. Historically, for many, they appear to have been. However, the capacity to practise both systemically and systematically gives rise to more choices if one is able to act with awareness. Awareness requires attempting to know the traditions of understanding out of which we think and act, including the extent of our epistemological awareness. I also refer to this as the 'as if' attitude, e.g. the choice can be made to act 'as if' it were possible to be 'objective' or to see 'systems' as real. Such awareness allows questions like: What will I learn about this situation if I regard it as a system to do X or Y? Or if you are a biologist, asking: How might I understand this organism if I choose to understand it as a system? Adopting an 'as if' approach means that one is always aware of the observer who gives rise to the distinctions that are made and the responsibility we each have in this regard. The systemic and systematic distinctions can be linked to the different traditions in systems – the systematic is akin to the first-order cybernetic tradition and the systemic builds on second-order traditions (Figure 9.2). Being able to work within both the systemic and systematic traditions is only possible with epistemological awareness.

My systemic and systematic distinctions extend the conclusions of Dent and Umpleby (1998) in their analysis of the underlying assumptions of systems and cybernetic traditions; they regard 'systems and cybernetics' as a collective worldview in which one strand is emerging with major assumptions about constructivism, mutual causation and holism and a traditional worldview comprising major assumptions of objectivism, linear causation and reductionism.

EPISTEMOLOGICAL AWARENESS

Epistemology is the study of how we come to know; within second-order cybernetics

Table 9.3 ***A summary of the characteristics that distinguish the epistemological basis of systemic thinking and action and systematic thinking and action***

Systemic thinking	*Some implications for AR*	*Some implications for AR*
Properties of the whole differ and are said to emerge from their parts, e.g. the wetness of water cannot be understood in terms of hydrogen and oxygen.	The whole can be understood by considering just the parts through linear cause–effect mechanisms.	It is helpful to surface understandings about causality amongst participants in AR projects – using multiple cause diagramming is one way to do this; a choice can be made to see AR as a process of managing for emergence or to meet predetermined goals.
Boundaries of systems are determined by the perspectives of those who participate in formulating them. The result is a system of interest.	Systems exist as concrete entities; there is a correspondence between the description and the described phenomenon.	Awareness and choice are key concerns; awareness of the limitations of the everyday use of the word 'system' can help practice, especially surfacing boundary judgements.
Individuals hold partial perspectives of the whole; when combined, these provide multiple partial perspectives.	Perspective is not important.	Has implications for who participates in AR and how different perspectives are managed in the process of AR.
Systems are characterized by feedback – may be negative, i.e. compensatory or balancing; or positive, i.e. exaggerating or reinforcing.	Analysis is linear.	Draws attention to the dynamics in a situation and how these may be understood differently by different participants. Need to avoid confusion between the (now) everyday notion of feedback and how it is understood cybernetically (Table 9.1)
Systems cannot be understood by analysis of the component parts. The properties of the parts are not intrinsic properties, but can be understood only within the context of the larger whole through studying the interconnections.	A situation can be understood by step-by-step analysis followed by evaluation and repetition of the original analysis.	For AR both have their place – it is useful to be aware of when and why it might be useful to begin, or act, systemically or systematically; starting off systemically will usually take you to a different place than starting off systematically.
Concentrates on basic principles of organization.	Concentrates on basic building blocks.	Involves shifting between process thinking and thinking in terms of objects or entities e.g. how do objects arise? What are relationships between entities?
Systems are nested within other systems – they are multi-layered and interconnect to form networks.	There is a foundation on which the parts can be understood.	Involve different ways of thinking about relationships.
Contextual.	Analytical.	Lead to different starting points and processes.
Concerned with process.	Concerned with entities and properties.	Both are relevant to AR.
The properties of the whole system are destroyed when the system is dissected, either physically or theoretically, into isolated elements.	The system can be reconstructed after studying the components.	May have implications for project managing in AR or how a study is set up.

(Continued)

Table 9.3 *(Continued)*

Systemic thinking	*Some implications for AR*	*Some implications for AR*
The espoused role and the action of the decision-maker is very much part of an interacting ecology of systems. How the researcher perceives the situation is critical to the system being studied.	The espoused role of the decision-maker is that of participant-observer. In practice, however, the decision-maker claims to be objective and thus remains 'outside' the system being studied.	In systemic action the AR role is that of participant-conceptualizer or co-conceptualizer; in systematic AR concern is primarily with understanding the action of others.
Ethics are perceived as being multi-levelled as are the levels, of systems themselves. What might be good at one level might be bad at another. Responsibility replaces objectivity in whole-systems ethics.	Ethics and values are not addressed as a central theme. They are not integrated into the change process; the researcher takes an objective stance.	It is not possible to reconcile 'objectivity' with ethicality and responsibility in the doing of AR – they belong to different traditions (not to be confused with doing some things systematically within a systemic framing).
It is the interaction of the practitioner and a system of interest with its context (its environment) that is the main focus of exploration and change.	The system being studied is seen as distinct from its environment. It may be spoken of in open-system terms but intervention is performed as though it were a closed system.	It is possible to think of all AR projects 'as if' they were systems to do ….; this would be a systemic approach whereas a systematic position might see an AR project 'as a' system.
Perception and action are based on experience of the world, especially on the experience of patterns that connect entities and the meaning generated by viewing events in their contexts.	Perception and action are based on a belief in a 'real world', a world of discrete entities that have meaning in and of themselves.	An awareness of epistemology is important to carry in AR practice.
There is an attempt to stand back and explore the traditions of understanding in which the practitioner is immersed.	Traditions of understanding may not be questioned although the method of analysis may be evaluated.	The AR practitioner is part of the situation and calls for a reflexive attitude

(Adapted from Ison and Russell, 2000)

knowledge is not something we have but arises in social relations such that all knowing is doing. From this perspective epistemology is something practical that is part of daily life. It is known (Perry, 1981; Salner, 1986) that personal change in epistemic assumptions is absolutely essential to any major breakthroughs in decision-making based on understanding and applying systems theories to practical problems. If, as Salner has found, many people are not able to fully grasp relatively simple systemic concepts (such as non-linear processes, or self-reflexive structures), they will not be able to rethink organizational dynamics in terms of 'managing' complexity without substantial alteration in the worldviews (their 'applied' epistemology).

Salner (1986), drawing on earlier work by Perry (1970, 1981) and Kitchener (1983), describes the prevailing theory on epistemic learning as involving the deliberate breaking down and restructuring of mental models that support worldviews. She acknowledges that this is not easy. Prigogine provides an additional lens on this theory in his discussion of 'dissipative structures' (Prigogine and Stengers, 1994). This theory provides a model of the dynamics of epistemic learning: each learner goes through a period of chaos, confusion and being overwhelmed by complexity before new conceptual information brings about a spontaneous restructuring of mental models at a higher level of complexity, thereby allowing a learner to understand concepts that were formally opaque. The shifts in understanding that concern these authors require circumstances in which there is genuine openness to the situation rather than a commitment to the conservation of a theory, explanation or epistemological position (e.g. objectivity) which is abstracted from the situation. Above all else it requires awareness that we each have an epistemology (or possibly multiple epistemologies).

Tensions and conflicts that arise in AR practice can often be attributed to differences in epistemology, although this cause may not be acknowledged or practitioners may not even have the language to speak about it. A key component of AR projects is often some form of experiential learning – the Kolb (1983) learning cycle is often held up as an exemplar of an action research approach – but rarely is 'experience' understood in theoretical terms. Within the second-order tradition, experience arises in the act of making a distinction. Thus, another way of describing a tradition is as our experiential history. To do this requires language – if we did not 'live in' language we would simply exist in a continuous present, not 'having experiences'. Because of language we are able to reflect on what is happening, or in other words we create an object of what is happening and name it 'experience' (Helme, 2002; Maturana and Varela, 1987; Meynell, 2003, 2005; Von Foerster, 1984).

USING THE SYSTEMIC/SYSTEMATIC DISTINCTIONS IN ACTION RESEARCH

The example I use is a project working with stakeholders in the semi-arid pastoral zone of New South Wales, Australia (Ison and Russell, 2000). We used our understanding of systems thinking and systemic action research (AR based in the systemic understandings depicted in Table 9.3) to develop an approach to doing R&D (research and development) relevant to the context of the lives of pastoralists in semi-arid Australia. Our experience had been that many action researchers, whilst espousing a systemic epistemology, often in practice privileged a systematic epistemology without awareness that that was what they were doing, i.e. in practice they wished to conserve the notion of a fixed reality and the possibility of being objective (Table 9.3).

An outcome of our project was the design of a process to enable pastoralists to pursue their own R&D activities – as opposed to having someone else's R&D outcomes imposed on them. Our design was built around the notion that, given the right experiences, people's enthusiasms for action could be triggered in such a way that those with similar enthusiasms might work together. We understood enthusiasm as:

- a biological driving force (enthusiasm comes from the Greek meaning 'the god within'. Our use of 'god' in this context has no connection with organized religion – our position was to question the commonly held notion that 'information' comes from outside ourselves rather than from within in response to non-specific triggers from the environment);
- an emotion, which when present led to purposeful action;
- a theoretical notion;
- a methodology – a way to orchestrate purposeful action.

We spent a lot of time designing a process that we thought had a chance to trigger people's enthusiasms. Our process did in fact enable people's enthusiasms to be surfaced and led to several years of R&D activity on the part of some pastoralists, supported by ourselves but never determined by us (see Dignam and Major, 2000, for an account by the pastoralists of what they did). The process we designed did not lead to R&D actions (purposeful activity) in any cause and effect way, rather the purposeful activity taken was an emergent property of people's participation in the systemic, experiential learning process that we had designed. Our work has led to a four-stage model for doing systemic action research grounded in second-order cybernetic understandings (Figure 9.2). In summary these were:

(i) Stage 1: Bringing the system of interest into existence (i.e., naming the system of interest);
(ii) Stage 2: Evaluating the effectiveness of the system of interest as a vehicle to elicit useful understanding (and acceptance) of the social and cultural context;
(iii) Stage 3: Generation of a joint decision-making process (a 'problem-determined system of interest') involving all key stakeholders;
(iv) Stage 4: Evaluating the effectiveness of the decisions made (i.e., how has the action taken been judged by stakeholders?).

The way we went about designing the process (i.e of doing each stage) is described in detail in Russell and Ison (2000). The enactment of the four stages requires awareness of the systemic/systematic distinctions in action, i.e. as practice unfolds – they are not just abstracted descriptions of traditions. Our experience is that this is not easy as our early patterning predisposes us to take responsibility for someone else (tell them what to do), to resort to an assumption about a fixed reality and to forget that my world is always different from your world. We never have a common experience because even though we may have the same processes of perceiving and conceptualizing it is biologically impossible to have a shared experience – all we have in common is language (in its broadest sense) with which to communicate about our experience.

From my perspective systems thinking and practice are a means to orchestrate a particular type of conversation where conversation, from the Latin, *con versare*, means to 'turn together' as in a dance. To engage, or not, with systems thinking and practice is a choice we can make.

SOME ADVANTAGES FROM ENGAGING WITH SYSTEMS THINKING AND PRACTICE FOR AR

Many action researchers, including Kurt Lewin, have been influenced by systems thinking, but what is not always clear is the extent to which this is done purposefully – with awareness of the different theoretical and practical lineages depicted in Figure 9.2. I have already suggested that engaging with systems offers a set of conceptual tools which can be used to good effect in AR (e.g. Table 9.1). There are other potential advantages for AR practitioners. Firstly, systemic understandings enable reflections on the nature of research practice, including AR practice itself. This, I suggest, can be understood by exploring *purpose* (Table 9.1). Secondly, there is a rich literature of how different systems approaches or methodologies, including systems tools and techniques, have been employed within AR projects to bring about practical benefits for those involved (e.g.

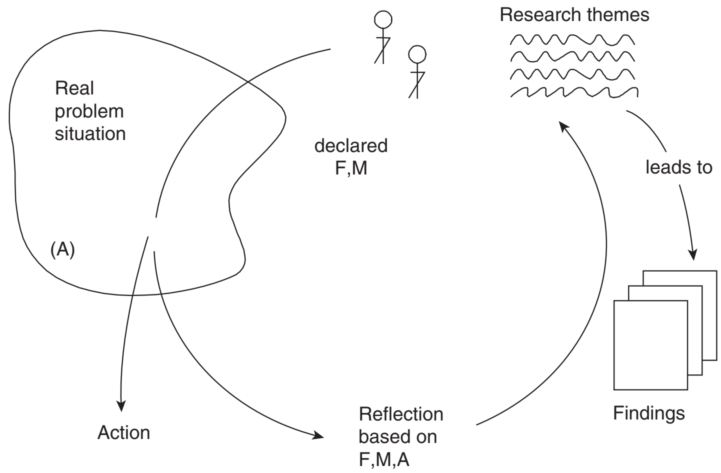

Figure 9.3 ***The cycle of action research based on a declared framework of ideas (F) and methodology (M) and area of application (A) and articulated research themes*** **(*Source*: Holwell, 2004, following Checkland and Holwell 1998)**

Checkland and Poulter, 2006). I explore some of these potential benefits in this final section.

Researching in Action Research

The distinctions between what constitutes research (within the phrase systemic action research or action research) and how it might be differentiated from 'inquiry' or 'managing' is, I suggest, contested.[2] AR has been a concern within the 'applied systems' lineage (Figure 9.2) for over 30 years (Checkland and Holwell, 1998a); within this lineage Holwell (2004) proposes three concepts that constitute action research as legitimate research: recoverability, iteration, and the purposeful articulation of research themes (Figure 9.3). She exemplifies her claims with a description of 'a program of action research with the prime research objective of understanding the … nature of the contracting relationship [within the UK National Health Service] with a view to defining how it could be improved' (p. 5). The project was 'complex in execution, including several projects overlapping in time' covering work from different bodies of knowledge, and was undertaken by a seven-member multidisciplinary team with different intellectual traditions. The issues explored crossed many organizational boundaries; the work was done over a four-year period and followed a three-part purposeful but emergent design (Checkland and Holwell, 1998b).

Within the Checkland and Holwell lineage they emphasize that the research process must:

(i) be recoverable by interested outsiders – 'the set of ideas and the process in which they are used methodologically must be stated, because these are the means by which researchers and others make sense of the research' (Holwell, 2004: 355);
(ii) involve the researcher's interests embodied in themes which are not necessarily derived from a specific context. 'Rather, they are the longer term, broader set of questions, puzzles, and topics that motivate the researcher [and] such research interests are rarely confined to one-off situations' (Holwell, 2004: 355) (I assume here they might also claim that themes can arise through a process of co-research or 'researching with' – see McClintock, Ison and Armson (2003) – and thus can be emergent as well);
(iii) involve iteration, which is a key feature of rigor, something more complex than repetitions of a cycle through stages 'if thought of in relation to a set of themes explored over time through several different organizational contexts' (Holwell, 2004: 356); and
(iv) involve the 'articulation of an epistemology in terms of which what will count as knowledge

from the research will be expressed' (Checkland and Holwell, 1998b: 9). They further claim that the 'literature has so far shown an inadequate appreciation of the need for a declared epistemology and hence a recoverable research process' (p. 20). Likewise Russell (1986) claimed that what was lacking in almost all research calling itself action research was an adequate and thus useful epistemology.

What is at issue here are the differences between what I have called big 'R' (a particular form of purposeful human activity) and little 'r' research (something that is part of daily life, as is learning or adopting a 'researching or inquiring' attitude) although the boundaries are not always clear. Take recoverability. How in practice is this achieved? The most common form is to write an account of what has happened, ensuring that certain elements of practice and outcome, including evidence, are described (e.g. FMA in Figure 9.3). But writing is itself a form of purposeful practice, done well or not well as the case may be, which is always abstracted from the situation – it is always a reflection on action and is never the same as the actual doing. Of course recoverability could be achieved by other means – by participation (i.e. apprenticeship and the evolution of 'craft' knowledge) or through narrative, which may or may not be writing. It seems to me the key aspiration of recoverability is to create the circumstances where an explanation is accepted (by yourself or someone else) and as such to provide evidence of taking responsibility for the explanations we offer. It has a 'could I follow a similar path when I encounter a similar situation' quality about it. The alternative, as Von Foerster (1992) puts it, is to avoid responsibility and claim correspondence with some external or transcendental reality. For me the core concerns for AR practice are: (i) awareness; (ii) emotioning; and (iii) purposefulness.

In my own case I came to action research through my awareness that my traditional discipline-based research was not addressing what I perceived to be the 'real issues' – in terms elegantly described by Shön (1995), I had a crisis of relevance and rejected the high ground of technical rationality for the swamp of real-life issues. Warmington (1980) was a major initial influence but my purpose was to do more relevant big 'R' research – for which I sought and successfully gained funding (Potts and Ison, 1987). It was during subsequent work on the CARR (Community Approaches to Rangelands Research) project, as reported in Ison and Russell (2000), that my own epistemological awareness shifted – something that I claim is necessary for the shift from action to systemic action research (Table 9.3). My experience is that such a shift has an emotional basis; thus the researcher can be seen as both chorographer (one versed in the systemic description of situations) and choreographer (one practised in the design of dance arrangements) of the emotions (Russell and Ison, 2005).

As acknowledged in the distinctions between participatory action research and action science (Agyris and Schön, 1991; Dash, 1997) and first, second and third person inquiry (Reason, 2001), there is a need to be clear as to who takes responsibility for bringing forth a researching system. Any account of big 'R' research needs to ask the question. who is the researcher at this moment in this context? Is it me, us or them? Answers to this question determine what is ethical practice, bounding, for example, what is mine from what is ours and what is yours (e.g. Bell, 1998; Helme, 2002; SLIM, 2004b).

Being Purposeful

Within systems traditions two forms of behaviour in relation to purpose are distinguished. One is *purposeful* behaviour, which Checkland (1981) describes as behaviour that is willed – there is thus some sense of voluntary action. The other is *purposive* behaviour – behaviour to which someone can attribute purpose. Following the logic of the purposeful and purposive distinctions, systems that can be seen to have an imposed purpose that they seek to achieve are called purposive systems and those that can be seen to articulate their own purpose(s) as well as seek them are purposeful systems. One of the key features attributed to purposeful systems is that the people in them can pursue the same purpose, sometimes called a *what*, in different environments by pursuing different behaviours, sometimes called a *how*. Note that I have deliberately not used the term goals, because of the current propensity to see goals as quite narrowly defined objectives. Certainly this was the way they were interpreted in the systems engineering tradition of the 1950s and 1960s and in the traditional OR paradigm (Figure 9.2; Table 9.2). My understanding of purposefulness is not a commitment to a deterministic form of rationalism because I recognize that in our daily living we do what we do and then, in reflection, make claims for what was done.[3] Being rational is a particular emotional predisposition; in doing big 'R' research it makes sense to me to act *as if* sustained rationality were possible. As I outlined earlier, an *as if* attitude signals epistemological awareness, a taking of responsibility, and is a means to avoid unhelpful dualisms.

So another feature of systemic action research is the extent to which there is some purposeful engagement with the history of systems thinking. If a system is conceptualized as a result of the purposeful behaviour of a group of interested observers, it can be said to emerge out of the conversations and actions of those involved. It is these conversations that produce the purpose and hence the conceptualization of the system. What it is and what its measures of performance are will be determined by the stakeholders involved. This process has many of the characteristics attributed to self-organizing systems; its enactment can, in reflection, usefully be considered as a 'learning system' (Blackmore, 2005).

Being aware of purpose and being able to ask about and articulate purposes can be a powerful process in AR.

Using Systems Tools, Techniques and Methods in AR

Within systems practice, a tool is usually something abstract, such as a diagram, used in carrying out a pursuit, effecting a purpose, or facilitating an activity. Technique is concerned with both the skill and ability of doing or achieving something and the manner of its execution, such as drawing a diagram in a prescribed manner. An example of technique in this sense might be drawing a systems map to a specified set of conventions.

Several authors and practitioners have emphasized the significance of the term methodologies rather than methods in relation to systems. A *method* is used as a given, much like following a recipe in a recipe book, whereas a *methodology* can be adapted by a particular user in a participatory situation. There is a danger in treating methodologies as reified entities – things in the world – rather than as a practice that arises from what is done in a given situation. A methodology in these terms is both the result of and the process of inquiry where neither theory nor practice take precedence (Checkland, 1985). For me, a methodology involves the conscious braiding of theory and practice in a given context (Ison and Russell, 2000). A systems practitioner, aware of a range of systems distinctions (concepts) and having a toolbox of techniques at their disposal (e.g. drawing a systems map) as well as systems methods designed by others, is able to judge what is appropriate for a given context in terms of managing a process (Table 9.4). In Table 9.4 I list a range of diagramming tools which are introduced to systems students in OU courses as a means of engaging with complex situations. We have found these effective components of a systems practitioner's set of 'tools'; they can be used equally effective in AR.

Behind all systems methods there has generally been a champion, a promoter aided by countless co-workers, students, etc. To paraphrase the French sociologist of technology, Bruno Latour: we are never confronted with a systems method, but with a gamut of weaker and stronger associations; thus understanding what a method is, is the same task as understanding who the people are. This is the logic that underpins Figure 9.2.

A method, like any social technology, depends on many people working with it, developing and refining it, using it, taking it up, recommending it, and above all finding it useful. But not all technologies that succeed

Table 9.4 ***Some forms of systems diagramming taught to Open University systems students for engaging with situations of complexity and the systems concepts associated with each (see Table 9.1)***

Diagram type	*Purpose*	*Systems concepts employed or revealed*
Systems map	To make a snapshot of elements in a situation at a given moment	• Boundary judgements • Levels – system, sub-system, supra-system • Environment • Elements and their relationships
Influence	To explore patterns of influence in a situation; precursor to dynamic modelling	• Connectivity via influence • System dynamics
Multiple cause	Explore understandings of causality in a situation	• Worldview about causality • Positive and negative feedback
Rich pictures	Unstructured picture of a situation	• Systemic complexity • Reveals mental models and metaphors • Can reveal emotional and political elements of situation
Control model	To explore how control may operate in a situation	• Feedback • Control action • Purpose • Measures of performance

are the best – it depends on who builds the better networks, particularly of practitioners. As you experience the use of a particular systems method and strive to make it a methodology, it is important to reflect on it critically – to judge it against criteria meaningful to you but above all to judge it in relation to your practice of it. It will be your experience of using an approach in a situation to which it fits that matters.

CONCLUSION

I have outlined some of the lineages which give rise to different forms of systems practice and what I consider to be involved in being systemic or systematic in relation to AR. For me, what we judge to be systems practice arises in social relations as part of daily life, but only when a connection has been made with the history of systems thinking as depicted in (but not restricted to) Figure 9.2. In practical terms systems practice can arise when we reflect on our own actions and make personal claims (purposeful behaviour) or when others observe actions that they would explain in reference to the history of systems thinking (purposive behaviour). From this perspective what is accepted (or not accepted) as systems practice arises in social relations as part of the praxis of daily living. With this explanation someone who at first knew little of the history but had experiences of systems practice, appreciative inquiry, participatory action research, collaborative inquiry etc. as having many similarities could, through inquiry which linked with the histories, or lineages, begin to make finer distinctions of the sort that practitioners from each of these traditions had embodied. That is, I can recognize that in their doings different practitioners are bringing forth different traditions of understanding. In recognizing systems practice it would be usual that some engagement with, and use of, the concepts listed in Tables 9.1, 9.2 or 9.3 would be experienced.

NOTES

1 Magnus Ramage kindly drew my attention to a nice anecdote from a conversation between Margaret Mead and Gregory Bateson (both Macy

attendees), suggesting that Lewin's initial participation but early death was directly responsible for the introduction of 'feedback' into popular vocabulary in its rather loose sense – http://www.oikos.org/forgod.htm. Lewin is also sometimes described as a teacher of Chris Argyris (e.g. by Umpleby and Dent, 1999), but Lewin simply taught an undergraduate module that Argyris attended along with lots of others.

2 As evidence of this I cite the animated discussions within a forum run by Peter Reason and Fritjof Capra at the 2005 UK Systems Society Conference in Oxford.

3 For example, I would claim that intention arises in reflection and is not an a priori condition.

ACKNOWLEDGMENT

Figure 9.3 reprinted with permisson.

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