COMPLEXITY IN SOCIAL WORK

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RICK HOOD

SAGE

Los Angeles | London | New Delhi
Singapore | Washington DC | Melbourne

SAGE

Los Angeles | London | New Delhi
Singapore | Washington DC | Melbourne

SAGE Publications Ltd
1 Oliver's Yard
55 City Road
London EC1Y 1SP

SAGE Publications Inc.
2455 Teller Road
Thousand Oaks, California 91320

SAGE Publications India Pvt Ltd
B 1/I 1 Mohan Cooperative Industrial Area
Mathura Road
New Delhi 110 044

SAGE Publications Asia-Pacific Pte Ltd
3 Church Street
#10-04 Samsung Hub
Singapore 049483

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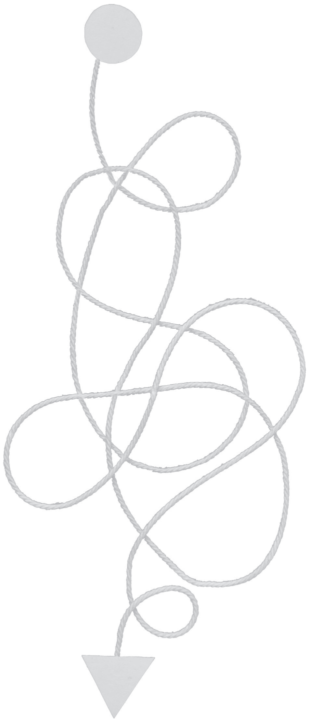
INTRODUCTION: WHAT IS COMPLEXITY?



CHAPTER SUMMARY

This introductory chapter will define and explain the concept of complexity. It starts with a discussion of what makes social work complex and the difference between complex and complicated problems. Characteristics of complex systems are then explained along with some of the main principles of complexity theory. The links between concepts of complexity and risk are discussed. The chapter concludes with a précis of the structure and layout of the book.

INTRODUCTION

Social workers are constantly aware of complexity. Their professional remit, after all, is the messy reality of life. To practise as a social worker is to deal with the uniquely problematic interface between each individual and the world around them. Most social workers would say their work is far from predictable and often bears scant resemblance to academic models and theories. Experience teaches them to accept uncertainty and to tolerate risk without becoming panicked or paralysed.

Social workers are regularly asked to find solutions to intractable situations, navigate ethical and legal dilemmas, and provide services to those who do not want them. To accomplish these and many other tasks, they draw on an eclectic body of knowledge that stretches beyond their own academic discipline to incorporate elements of psychology, sociology and bio-medical science, as well as the law. So – one might indeed say that social work is a complex undertaking!

But what does complexity really mean? And is the complexity of their work something social workers need to know more about? These two questions underlie the topics covered in this book. Its focus is on thinking about complexity in practice rather than explaining scientific and mathematical theories in great detail. However, it will be important for readers to grasp some of the basic principles of complexity in order to understand fully the connections and applications made in later chapters. This introductory chapter will therefore seek to define and explain complexity, starting with conventional understandings of the term before exploring insights from theories of complex systems. The chapter concludes by outlining the topics covered in the rest of the book.

What do we mean by complexity?

Conventional understandings of the term 'complex' tend to stress the idea of difficulty. However, when we look more closely at how the term is used, we can begin to see what it is about complexity that makes things difficult.

Wicked problems

Most social workers will be able to highlight certain pieces of work that they regard as especially complex. When practitioners are asked what makes their cases complex, often they point to the difficulty of solving the problem, or more likely the set of problems, with which they are presented. 'There's so much going on it's hard to know where to start' is one way of paraphrasing this sentiment. It could be argued that social workers in these cases find themselves confronted with what Rittel and Webber (1973) call 'wicked problems'. According to Hood et al. (2016a) such problems are characterised as follows:

- They have no definitive formulation
- They relate to multiple issues, so it may be difficult to recognise when an end-point has been reached
- They have a unique configuration, so a 'solution' may not work in other cases

Arguably, all problems in social work conform to this description; some situations just make us more aware of their 'wicked' characteristics than others. This is an important point that we shall return to later in the chapter.

Complex or complicated?

One way of understanding complex problems is to think about what makes them different from a complicated technical problem. An example of a technical problem that many people have experienced is a car engine that refuses to start. Unless it is something relatively straightforward, such as a dead battery, a car engine is too complicated for most people to repair on the spot. They will need the help of a car mechanic. The mechanic should be able to obtain all the necessary information to understand what is wrong with the engine, and formulate what needs to be done. There is a clear measure of success and an end-point to the intervention, i.e. the car should start and not cut out. If the solution works, then it should apply to all similar problems in the future. These points all differ fundamentally from the characteristics of wicked problems that were identified above.

What is it about the car engine that makes it a complicated rather than a complex problem? In essence, an engine is an intricate assembly of components, whose properties and connections to each other are largely determined by the laws of physics. The individual parts of an engine do not move independently or decide how to interact with each other. If they change the way they behave, it is through wear and tear or accidental damage rather than because their intentions have changed or because of an unconscious shift in attitudes. In other words, car engines cannot feel, think or reflect on what they do. They can neither adapt to their environment nor evolve new ways of performing their function. All this means that an engine should behave predictably as long as our theoretical model of how it works is accurate *and* we have comprehensive information about its current state.[1]

In contrast, consider a complex human problem that all social workers will come across at some point in their work (as well as in their personal lives), which is the experience of loss (Currer, 2007). Most obviously there is great variation both in the nature and perception of loss as well as our response to it. The significance of any loss is unique to the person and their circumstances at a particular time and in a given social and cultural context. In order to find out what a loss means to someone, discussion and dialogue are needed, not to say considerable interpersonal skills on the part of the professional. Equally, the professional's own experience of loss will have a bearing on how she is able to work with and relate to the service user. While there are certainly theories that help professionals to recognise and think about these issues, no social worker could use them to try and 'repair' a grief-stricken human being in the same way as a car engine.

Interactions and dynamics

Complex situations, unlike complicated ones, tend to come up with unusual or unexpected types of behaviour, or behaviour that is hard to understand in its current context.

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[1]This is not to say that fixing a car engine is easy – on the contrary complicated problems are also difficult, which is why car mechanics are rarely short of work.

That brings us to another aspect of complexity that social workers often deal with, namely the patterns or 'dynamics' of relationships between people. This issue can be interpreted and understood in various ways. For example, interactions between certain members of a family may be very antagonistic, so that social workers worry about an escalation of abuse or violence. On the other hand, there may be collusion and resistance to professional scrutiny, which presents an altogether different set of challenges. Whatever the specific situation, the importance of these patterns tells us that complexity in social work is often about relationships. These are rarely predictable and may not correspond to the information that professionals have. Moreover, as soon as they start working with people, social workers become part of the dynamics they are trying to understand and influence.

REFLECTIVE EXERCISE 0.1

- Think about a complex piece of work that you have undertaken recently. Jot down three or four things that made it complex.
- Do you see any parallels between what you wrote and the points made in this chapter so far?

Systems

At this point it may be worth recapping where we have got to with our initial definition of complexity. So far, we know that when people use the word 'complex' they often refer to situations in which it is difficult to state exactly what is going on or to predict what will happen next. In other words, the relationship between cause and effect is not entirely clear. We also know that this has a lot to do with interactions between people who are free to act and think independently but are also closely connected to each other in various ways, e.g. in families, communities, and societies.

Some readers may already be thinking that this sounds a lot like systems theory. And indeed it is! The rest of this introductory chapter will clarify the relationship between complexity and systems ideas, with an unsurprising focus on theories of complex systems. Our working definition of complexity is as follows:

> Complexity is a set of principles about social events and behaviour that derive from scientific theories of complex adaptive systems. These principles help to explain the challenges of working with complex human problems, and therefore point towards appropriate professional and organisational approaches.

The next step in our exploration of complexity is therefore to outline and critique some basic ideas from systems theory before considering how complex systems differ from other types of system.

Basic systems ideas

On a basic level, systems can be conceptualised in terms of structure, processes, feedback loops, and states.

- *Structure*: Systems are structured as a network of interconnected components (or 'agents') that exchange energy and information within a boundary. If nothing can pass across the boundary then the system is said to be 'closed', whereas if the boundary is permeable then the system is 'open'.
- *Processes* are the characteristic ways in which energy is transferred, not only between parts of the system but also between the system as a whole and its environment. For example, 'inputs' are absorbed from the environment into the system, whereas 'outputs' pass out of the system into the environment.
- *Feedback loops* occur when the system's output affects the environment, which in turn provides the system with information about the results of its activity. A simple example of a feedback loop is when a thermostat switches on the radiator in a room that has got cold. As the room warms up, the thermostat responds to information from its sensors and turns the heating off again when the desired temperature has been reached.
- *State*: The feedback loop described above keeps the room in a 'steady state', i.e. not too warm and not too cold. In this sense, 'state' refers to how the system as a whole changes or stays the same over time. Note that this type of feedback is called 'negative feedback' because its purpose is to alert the system to any deviation (above or below) from the desired state.

A key assumption in many systems theories is that systems try to maintain a steady state or 'equilibrium'. If we conceive of living beings as systems, then 'state' may be more appropriately thought of in terms of health, wellbeing, identity, or purpose. These are holistic concepts that are hard to define purely in terms of their individual components, however many we try to list. The whole system is therefore more than just the sum of its parts – the principle of 'non-summativity' (Payne, 2015: 145). Furthermore, since all the parts of a system interact with each other, changes in one part of the system will affect all the others. This means that feedback loops can also occur within a system, so that a system can change through its internal processes as well as in response to its environment. For example, a physical injury may have psychological effects and eventually lead to a change in perceived wellbeing. This is an important issue in complex systems, as we shall see.

Systems ideas have had great influence on social work practice, notably through theories of ecological systems (Bronfenbrenner, 1979), helping systems (Pincus and Minahan, 1973), and family systems (Minuchin, 1974). Their contribution has been to focus attention on interactions and patterns of relationships, both within and outside of the family, as well as highlighting the importance of environmental context for people's development through the life-course (Gitterman and Germain, 2008). Systems theories have therefore helped to balance the psychodynamic emphasis on behaviour as determined by inner psychological drives. Social workers are encouraged to accept that there are multiple pathways for people to achieve a given outcome, and that similar circumstances can lead to divergent outcomes for different people (Baltes, 1987).

Critique of systems theory

These are all important insights. Nonetheless, there are some problematic assumptions inherent in many variants of systems theory, which are relevant to our understanding of complexity.

First, it is often assumed that systems tend towards equilibrium. Achieving and maintaining stability therefore becomes an implicit aim of intervention. This applies even when the goal is change, e.g. in a family's patterns of behaviour, since the idea is that a desirable equilibrium is substituted for an undesirable one. A key problem with this assumption, as we shall see shortly, is that complex systems operate 'far from equilibrium' and will therefore confound our expectations of stability. The emphasis on stability also makes it hard to understand how and why new patterns of behaviour emerge; many applications of systems theory therefore fail to provide a satisfactory account of creativity and innovation (see Stacey, 2007).

Another objection to 'standard' systems theory concerns the assumption that a system's parts should all contribute to its overall function or purpose. A breakdown in the cohesive relationship between the parts and the whole is seen as detrimental to the system's functioning, e.g. when an organ fails the body falls ill. While this 'functionalist' perspective seems straightforward in a physical or biological context, such as the human body, when applied to social settings it arguably downplays the existence of competing interests and the significance of power relationships and conflict in human societies. Indeed, from a functionalist perspective, disorder and conflict are seen as problematic because they disrupt equilibrium. While this is understandable in many respects, disturbance of some kind is often a prelude to change in the positive sense; for example, a short-term crisis in the life of a drug addict may prompt them to seek treatment for their addiction, which could have long-term benefits. Episodes of turmoil are therefore characteristic of systems that adapt and evolve (Prigogine and Stengers, 1984). There may also be hidden ideological content to the notion that individuals are part of a social system whose stability is paramount (see Dominelli, 2002, on 'maintenance approaches' to social work).

Finally, the idea that systems have boundaries implies that the characteristics and behaviour of a given system can be observed from an objective standpoint outside that boundary (Stacey, 2007). There are reasons to be sceptical of this assumption, particularly in social contexts where it may be hard to identify where one system stops and another begins. Social ecological theories such as Bronfenbrenner's (1979) conceive of individuals as being embedded in a series of 'nested' systems that represent different aspects of their environment. Although such frameworks emphasise openness and interconnection, they also imply that individuals are contained and stabilised at the heart of this nested structure so that analysis is directed at the system itself. The problem is that there is no vantage point outside of the system from which to observe and assess what is going on 'inside'. On the contrary, any would-be observer is herself involved in and contributing to what she is purporting to analyse. In everyday terms, the abstract notion of 'the system' or 'systems' tends to collapse into the messy dynamics of social interaction (Stacey, 2007).

Complex systems

Having outlined and critiqued some of the basic principles of systems theory, we are now in a position to explore the characteristics of complex systems. Before doing so, it is important to note that complexity is a diverse, multi-disciplinary field that encompasses mathematics and the natural sciences, as well as social sciences and applied disciplines such as social work. What follows is necessarily a concise summary and readers who are interested in finding out more about complexity theory are directed towards the writers cited below.

Starting point: Equilibrium systems

Mowles (2014) draws on Stacey (2007) and Allen (1998) to outline how theoretical models of systems have gradually incorporated complexity. His starting point is the 'equilibrium system' that has already been discussed above and which derives from classical physics. The basic model of such a system is a bit like a pocketless billiards table with some balls on it (see Figure 0.1). All the entities in the system have the same characteristics, i.e. all the balls are the same shape and weight. Cause and effect are linear so that a given input leads to a direct and measurable change in system behaviour, i.e. players can more or less predict what will happen when they strike one of the balls with a cue.[2] Without further inputs from the environment, the system will move towards equilibrium, i.e. the balls will come to a halt.

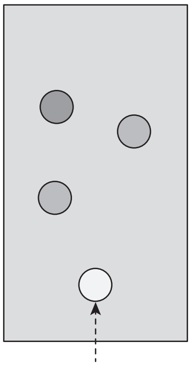

Figure 0.1 Example of an equilibrium system: balls on a billiards table

[2]Nonetheless, it would be impossible even for the most well-informed billiards player to predict *exactly* where the balls will end up.

Stage One: Non-linear systems

The first step away from this classical model of a system is to take away the assumption of equilibrium. Instead, the results of one interaction feed into the next interaction in a cumulative fashion. This leads to 'non-linear' behaviour, which Elliot and Kiel (1997: 66) define as 'feedback in which internal or external changes to a system produce amplifying effects'. It is as if the balls on the billiards table, once set in motion, do not come to a rest but continue moving around the table in a way that constantly builds on their own speed and direction. Note that this constitutes 'positive feedback' as opposed to negative feedback: it is as if a thermostat were set to turn up the heating when the temperature rises!

Mathematical equations that model non-linear dynamics show that small changes in their original state (e.g. the position of the balls or the force of the cue strike) can significantly affect outcomes, a characteristic known as sensitivity to initial conditions, or the 'butterfly effect'. Such equations explore what is known as 'mathematical chaos' and their significance lies in the nature of the iteration itself, i.e. the values that govern feedback within the system. Some values produce stable, predictable patterns of movement, whereas others lead to wildly fluctuating, unpredictable behaviour. However, certain values create movement that is paradoxically *both* stable *and* unstable, and this is seen as characteristic of complex systems, whose non-linear behaviour is not chaotic but lies 'at the edge of chaos' (Waldrop, 1994).

Stage Two: Self-organising systems

According to Mowles (2014), the second step towards modelling a complex system is to remove the assumption that interactions between entities can be calculated as a statistical average. This is because non-linearity applies not only to the interaction between entities within the system but also to how the system interacts with its environment. Systems that are far from equilibrium move towards a critical state of disorderly change, at which point they can suddenly shift to a new and orderly pattern of behaviour.

An example from the field of thermodynamics is the way molecules in a layer of silicone oil behave when heat is carefully applied under laboratory conditions; as the temperature exceeds a critical value, a honeycomb pattern of convection currents forms where previously there was only a featureless liquid (Coveney and Highfield, 1995: 155). Going back to our billiards analogy, imagine that balls in one half of the table were sent whizzing round randomly and suddenly all of them moved together into a hexagon! Such orderly structures are said to 'self-organise' out of the disorder created by an influx of energy from outside the system. Ilya Prigogine called them 'dissipative structures' because the system can only maintain its critical distance from equilibrium by dissipating a minimum amount of energy into the environment (Prigogine and Lefever, 1973: 125).

Stage Three: Complex adaptive systems

The final stage in modelling a complex system is to simulate the behaviour of agents who have intention and volition. Imagine, for example, that the balls on our billiards table actively tried to get out of each other's way. The challenge then is to understand how local interactions between agents give rise to wider global patterns of behaviour. As an illustration of this process, Reynolds (1987) designed a computer program in which individual bits of code (called 'boids') are given three simple rules of interaction:

- Separation: maintain an equal distance from neighbouring boids
- Alignment: match the velocity and direction of local boids
- Cohesion: move towards where the population of boids is densest

More sophisticated rules can also be added, such as steering to avoid obstacles or away from predators. When the program is presented visually, the result is flocking behaviour that closely resembles that of birds in the natural world.[3] The crucial point here is that the global flocking pattern is not programmed or designed in any way, but emerges from the local interactions of individual agents (boids) following their rules. This is the principle of *emergence*, defined by Jeffrey Goldstein as 'the arising of novel and coherent structures, patterns, and properties during the process of self-organization in complex systems' (Goldstein, 1999: 49).

Agent-based models such as the boids program, which exhibit emergent properties, are examples of 'complex adaptive systems' (CAS). However, a key limitation of the systems considered so far is that all the agents are homogenous, i.e. they all share the same characteristics, whether they are molecules in a liquid or boids in a flocking simulation. As Mowles (2014) points out, this limits their applicability to social life, 'where all human beings are unique, and even the simplest rules are open to misinterpretation' (Mowles, 2014: 166). More sophisticated versions of CAS therefore assume heterogenous agents, i.e. with distinct characteristics and behaviour. Such systems have a high degree of interconnection *and* differentiation, which enables them to transform and evolve in creative and unexpected ways. CAS models of Darwinian evolution, for example, have shown how group processes such as competition and cooperation emerge from the conditions that drive natural selection (Ray, 1992). It has therefore been argued that social systems in the natural world, such as termite colonies, but also in the human world, such as stock market fluctuations, are real-life examples of complex adaptive systems (Coveney and Highfield, 1995).

[3]You can see a video and explanation of the boids flocking simulation here: www.youtube.com/watch?v=QbUPfMXXQIY

Summary

In summary, complexity theory can be understood as a conceptual framework for the behaviour of complex systems. Its origins lie in mathematical chaos models developed in the natural sciences to explain non-linear behaviour in a range of phenomena. However, complex systems are not chaotic. They are composed of a large number of interconnecting parts, which between them generate a constant flux of interactions and feedback that generates instability. Unlike 'classical' systems,

Table 0.1 Principles of complexity

Principle	**Meaning**	**Implications**
Non-linearity	The relationship between cause and effect is disproportionate, e.g. a small change in one variable can have a very large effect on outcomes.	Change is unpredictable and cannot be controlled and manipulated simply by changing a known variable to produce a particular outcome. Lack of predictability does not mean that we cannot explain complex behaviour, but cause and effect may only be evident with hindsight. Interventions are likely to have unintended consequences.
Self-organisation	At critical points of instability, systems may spontaneously organise themselves into new structures and behaviours that could not have been predicted from their previous state.	Seemingly minor events and incidents may escalate situations and lead to sudden and unexpected changes in behaviour. Apparent order and stability may disguise the potential for volatile change. A period of heightened instability and uncertainty may be necessary for fundamental change to occur.
Emergence	Self-organising local interactions produce global patterns of behaviour without this being at all planned or designed.	The key drivers of change are relationships and interactions on a localised, everyday level, rather than grand designs implemented on a global scale. Since structural change emerges through processes of interaction and feedback, agents can exert influence through their relations with others. However, the exact nature and degree of this influence cannot be known in advance.
Evolution	Systems operating far from equilibrium periodically experience upheaval and transformation as a way of adapting to their environment and avoiding decay and obsolescence.	Novelty and innovation are the hallmarks of complex change, and often emerge in conditions of instability and disorder. Interventions can give rise to creative outcomes that they were not intended to produce.

complex systems do not settle into equilibrium, but continually adapt and evolve, organising themselves in a state of critical disorder that is 'far from equilibrium' (Cilliers, 1998: 4). The behaviour of such systems is explained in Table 0.1 in terms of four key principles: non-linearity, self-organisation, emergence, and evolution.

Complexity in the social world

Scientific theories of complex systems have met with considerable interest within the social sciences (Byrne, 1998; Kiel and Elliot, 1996; Stewart, 2001; Eve et al., 1997). However, applying complexity principles to social contexts raises a number of issues. It cannot be assumed that societies can simply be modelled as the same type of complex adaptive systems found in physics or biology, nor that such behaviour can be observed and represented using the same methods (Carter and Sealey, 2009).

A crucial way in which social systems differ from systems in the natural world is in the role played by human subjectivity, intention, and agency. As Harvey and Reed (1996) point out, there is a risk of 'treating humanly produced conventions, institutions and historically complex events as though they were natural objects governed by recurrent processes and universal laws' (Harvey and Reed, 1996: 314). Furthermore, we cannot stand outside society to decipher its underlying rules, since we are part of society.[4] Understanding the social world involves a greater degree of reflexivity and self-awareness than does the physical world, not just because of the onus on interpretation but also because of the capacity of social actors to shape the world around them (see Chapter 5).

What Waldrop (1994) called the 'emerging science' of complexity has contributed to various philosophical and methodological debates around social research (Harvey and Reed, 1996). Writers such as Cilliers (1998, 2005) and Byrne (1998, 2009b) have presented complexity theory as a challenge to positivist social science, with its focus on generalisable causal laws, empirical regularities, and the objective, value-free scientist. Cilliers (1998), for example, argues that complexity could be seen as a paradigm shift towards a new kind of 'postmodern' science that emphasises reflexivity, interconnection and distributed networks of meaning. Some researchers, including the author of this book, have advocated a 'complex realist' approach to the study of social phenomena (Hood, 2012; Byrne, 2009b; Harvey and Reed, 1996). This approach views complexity through the lens of scientific realism, which explains scientific method as a search for the causal mechanisms that generate events. Configurations of cause and effect are constantly variable and interactive, so that the outcomes of an intervention are never entirely predictable: mechanisms produce only 'tendencies' that can be counteracted by others. The realist approach to research is discussed further in Chapter 7.

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[4]Indeed quantum theory has shown that similar effects apply in the physical world of subatomic particles, where the act of observation itself helps to constitute the reality that is observed (see Barad, 2007).

Complexity and technical rationality

The principles of complexity tell us that there are limits to the extent to which we can predict and control events – both in the natural world as well as in human affairs. This insight contributes to a critique of 'technical rationality', an approach to knowledge and practice that continues to be very influential in social work as well as in other applied disciplines (Schön, 1991). Technical rationality is characterised by:

- A linear view of causality in terms of proximal cause and effect, the nature of which can be identified through scientific method
- The reduction of complex situations into a series of technical problems, whose solution is to be found in formal scientific knowledge
- An emphasis on detailed procedures and practice guidelines, in order to ensure consistent application of knowledge to problem-solving and decision-making

Each of these elements is problematic from a complexity perspective. The assumption of linear causality ignores important system effects such as feedback, self-organisation, and emergent properties. A narrow emphasis on individual or isolated problems ignores the way in which multiple elements interact and combine to produce system events. Finally, seeing professional practice purely in terms of systematically solving 'well-formed instrumental problems' (Schön, 1987: 3) misunderstands the way that human problems as well as solutions are negotiated and socially constructed, and the extent to which professional expertise is built on practical experience as well as theoretical knowledge (Hood et al., 2016a). Going back to our discussion of wicked problems at the beginning of the chapter, is it appropriate to go about understanding and alleviating the distress of a bereaved client in the same way as one might work out how to fix a car engine?

According to Kinsella (2007: 104), 'the technical-rational approach to decision-making is normative in professional life in Western society'. It tends to be associated with managerial control of professional activity (Freidson, 2001), and as such is often contrasted with approaches that put more emphasis on professional expertise, reflexivity, and discretion (Webb, 2001; Schön, 1991). In a well-known metaphor, Schön describes the 'high hard ground' of technical rationality as overlooking the 'swamp' of real-life situations:

> On the high ground, manageable problems lend themselves to solution through the application of research-based theory and technique. In the swampy lowland, messy, confusing problems defy technical solution. (Schön, 1987: 3)

Complexity theory provides a useful conceptual framework to understand this apparent dichotomy. For example, Hassett and Stevens (2014) draw on complexity ideas to criticise what they see as largely linear approaches to child protection over the past 50 years, including an 'increasing emphasis on controls and proceduralised responses' (Hassett and Stevens, 2014: 97). A more detailed analysis is found in Munro (2010), who uses systems theory to explain why excessive prescription of child protection practice ends up constraining the expertise needed to carry out complex work. In the field of youth justice, Case and Haines (2014) have criticised the tendency to explain young people's offending behaviour as the 'linear, proportional and deterministic outcome of exposure to "risk factors"', ignoring the 'unpredictability, context-dependence and multidimensionality of the young people and behaviours targeted by the [Youth Justice System]'. They argue that a simplistic understanding of risk factor research in turn leads to a static and decontextualised risk assessment process (Asset) based largely on the aggregation of rating scales (see Chapter 3).

The point of this type of critique is not just to expose the flaws in current approaches but to highlight more appropriate ones. For example, Case and Haines (2014) go on to describe a revised assessment framework (AssetPlus) developed by the Youth Justice Board to allow a more dynamic and flexible assessment of a young person's life circumstances. The chapters in Part 1 of this book focus on a number of practice issues for working with complexity in social work. Other applications of complexity theory discussed in this book include research and evaluation (Chapter 7), organisational structure and management (Chapter 8), and the analysis of policy systems (Chapter 9).

Complexity, risk and uncertainty

Since the concept of risk is central to assessment and intervention in social work (see Chapters 3 and 4), it is worth noting some important distinctions and connections between complexity and risk in professional practice. Complexity is bound up with causal relationships, i.e. how events and behaviour arise out of a given set of conditions. An important consequence of complexity is that there are limits to how well we can *predict* what future events and behaviour will look like. Any predictions we make have an element of uncertainty, which is unavoidable no matter how good our information and which rapidly increases over time. This is illustrated by a familiar example of predictive difficulty, the weather forecast, which these days is facilitated by an array of sophisticated technology including complex computer models of weather systems. Despite this, while we might consider the forecast to be fairly reliable for tomorrow, most people would have little or no confidence in predictions for a month's time.

Uncertainty about the future is obviously important when it comes to risk, which is about predicting the *probability* and *severity* of a given outcome in the future. Usually risk predictions are about adverse events although this is not necessarily the case. For example, a gambler may bet money on getting a double-six on his next roll of two dice. His probability of success is 1/36, which is a formal expression of how many times one could expect a double-six to appear in successive rolls of the dice. Severity in this instance is represented by the gain for guessing correctly or the loss incurred by betting on the wrong result. A crucial point here is that the calculations of probability and severity, which lie at the heart of most risk analysis, assume a linear approach to reducing uncertainty. We know each die has six sides and rolls in a random way and so our predictions can rely on statistical averaging over time. However, this is not really feasible in complex systems – imagine if after a certain number of rolls we suddenly see the dice clumping together or evolving additional sides!

Complexity therefore inserts an extra element of uncertainty into risk analysis, which cannot be reduced to statements of probability. It therefore undermines conventional ideas about prediction. This is disconcerting for frontline practitioners, who are frequently tasked with two kinds of risk calculations: first, to predict what type of (usually negative) outcomes are likely to happen if nothing is done about a situation, and second to know what type of (hopefully positive) outcomes will result from an intervention. Linear risk models, based on correlations between risk factors and outcomes in large populations, are designed to help professionals compensate for the cognitive biases that affect 'intuitive' decision-making in conditions of uncertainty (Munro, 2008; Kahneman et al., 1990). However, such models do not (nor do they pretend to) predict outcomes in individual situations because they are based on correlational findings rather than causal explanations (see Chapter 7). Arguably this distinction is ignored by technical-rational approaches to risk, as discussed in Chapter 3.

Critique of complexity theory

Complexity ideas have been contested in various ways. In particular, the assumption that society can be understood in terms of complex systems has attracted criticism. Stewart (2001) argues that social processes and phenomena cannot be modelled as some sort of complex adaptive system, and so most complexity models, 'while having validity for some analytic tasks, cannot substantially account for the events and particularities of the social world' (Stewart, 2001: 341). Furthermore, Stacey (2007) points out that the concept of a social system adopts contradictory ideas about human cognition and volition: behaviour 'inside' the system is considered to be determined by systemic processes but these processes can be deciphered by rational individuals on the 'outside'. Stacey argues instead that social complexity should be understood in terms of responsive processes of human interaction and identification (see Chapter 8).

Complexity theory can be criticised for lacking explanatory power, given the limits it places on predicting and controlling behaviour in complex systems (Thelen and Smith, 1994; Nybell, 2001). In positivist terms it appears more useful as a tool of hindsight than as a way of generating testable hypotheses. There also continues to be debate about how readily the conceptual language of complexity (non-linearity, emergence, and so on) can be transferred to social contexts. Gerrits and Verweij (2015) suggest that the complexity sciences are 'more a set of ideas than a theoretical framework', ideas which furthermore are difficult to operationalise, i.e. turn into properties and behaviour that can be observed and measured. Thrift (1999) suggests talking about 'complexity metaphors' rather than complexity theory, pointing out ways in which these metaphors have already influenced scientific and cultural discourse in the Western world.

Structure of this book

Complexity lends itself both to a 'micro' and a 'macro' perspective; social workers deal on an individual level with complex cases, while managers, policymakers, and researchers deal with complex systems on a wider scale. The book is therefore divided into two parts. The six chapters in Part 1 examine some of the key challenges of working with complex cases in social work. The three chapters in Part 2 explore some of the implications of complex systems in the broader context of research, policy, and service delivery.

Chapter 1 considers the concept of need, which is central to many areas of social work practice. It starts by discussing how need is generally understood by professionals, with reference to Maslow's hierarchical model, and explores some dilemmas around identification and response. The chapter then examines the significance of complex needs, which usually take the form of multiple problems that intersect with each other and pose a challenge for services designed around professional specialisms. Some comments are made on the link between need and risk, before focusing on implications for social work assessment. Case studies are used to illustrate the importance of constructing hypotheses and exploring competing explanations of need.

Chapter 2 explores the nature of uncertainty and change in complex cases. It begins with the process of change, which underlies the aims and outcomes of social work interventions. Two principal areas of uncertainty are then considered. First, complexity undermines the extent to which we can predict what will happen either with or without a given intervention. Second, the critical instability associated with complexity can produce volatile dynamics that are challenging to manage, or a frustrating sense that underlying issues are being allowed to drift. The chapter proceeds to examine the most prevalent response to these issues, which is to reduce uncertainty by reframing complex situations as a series of solvable technical problems. Finally, attention is drawn to the importance of developing professional expertise and resilience in order to work with complexity.

Chapter 3 considers the challenges associated with making judgements and decisions in social work. The question of what constitutes a justifiable decision is discussed in terms of rationality, ethicality, and reasonableness. Analytic and intuitive approaches to decision-making are compared before exploring some of the cognitive biases that can unwittingly affect professional judgement, including confirmation bias, hindsight error, and the rule of optimism. The discussion then moves on to judgements about harm, which involve a probabilistic analysis based on predictive risk factors and draw a combination of clinical, consensus-based, and actuarial approaches to risk assessment. Finally, there is a discussion of bounded rationality, which suggests that heuristic models continue to be useful in complex situations where there is pressure to make decisions quickly and with limited information.

Chapter 4 focuses on the relationship between social workers and their clients. Initial considerations include the significance of relationships within the social work role and the skills required to build and maintain relationships with people in order to help them to achieve positive change. These ideas are integrated into an account of the 'helping relationship' drawing on the counselling theories of Rogers and Egan.

The chapter then outlines some key psychodynamic concepts for understanding the underlying dynamics of practitioner – client interactions and behaviour, including transference and counter-transference, containment, and holding. There follows a discussion of complexity in relationship-based practice, which includes working with strong feelings, understanding and addressing resistance, and managing dilemmas and transitions in long-term work.

Chapter 5 examines the role of reflection in helping social workers to understand and manage complexity. It begins with some overarching theories and concepts from the work of John Dewey and Donald Schön before exploring what is meant by reflective practice and critical reflection in social work. There follows an account of key areas for reflection, such as emotions, ethical dilemmas, and power dynamics, with common applications and tools designed to help practitioners to think about these issues. The chapter concludes by putting the reflective process in a wider institutional context, outlining the concept of the learning organisation and the importance of supervision for reflective practice.

Chapter 6 examines interprofessional working as a response to complex needs. It starts by outlining the policy context to specialisation and professionalisation in the welfare state, and the move towards greater managerial control of professional work along with efforts to foster partnership and integration across agency boundaries. Theories of collaboration are then explored, including interprofessional education, continuum and gestalt models, ecological and organisational perspectives, and teamwork. Approaches to interprofessional ethics are followed by a discussion of conflict and consensus in collaborative contexts. Psychodynamic concepts are then applied to the role of anxiety in shaping patterns of communication and collaboration in institutional contexts. The chapter concludes by exploring some key areas of interprofessional expertise for social workers, including knowledge, communication, negotiation and reflective practice.

Chapter 7 considers the challenges faced by researchers and evaluators in producing scientifically robust explanations of complex social phenomena. Social work is described as an applied field of practice and research, which draws eclectically from a range of academic disciplines and approaches to the pursuit of knowledge. This leads to a consideration of research paradigms, of which scientific realism is argued to be the one that engages most comprehensively with the problem of complexity. The main principles of realist research are outlined and linked to a critique of the dominant positivist paradigm, before proceeding to discuss some of the methods commonly employed in realist designs. Particular attention is given to realist evaluation and realist synthesis, which provide an alternative to experimental field trials and meta-analysis as the standard approach to 'what works' in social work and related fields. The chapter concludes by examining some limitations of the realist approach and alternative ways of researching complexity.

Chapter 8 turns to the implications of complexity for the management and administration of social services. Such services are accountable to a number of stakeholders, including taxpayers and elected officials. However, their ultimate purpose is to address the needs of their users. Demand for a service will tend to have a predictable and unpredictable element, and the challenge is to organise services to meet both types of demand as quickly and efficiently as possible. In systemic terms, services need to have the ‘requisite variety’ to deal with the complexity of demand. Effective provision means trying to place the expertise needed to solve problems near the ‘front’ of the system where users first come into contact with services.

Chapter 9 broadens the scope of analysis to consider what complexity means for social policy. It begins by exploring non-linear effects in a range of policy areas, including housing, social care, and public health interventions. The chapter then turns to the development of risk regulation regimes, which are increasingly important in social work. Proceduralisation and blame culture are linked to a growing preoccupation with institutional risk, particularly among statutory agencies, driven in part by a scandal–reform cycle in politically sensitive areas such as child protection. Different policy approaches to human error are compared, drawing on the ideas of socio-technical systems to explore the interface between policy and research evidence. The chapter concludes with a discussion of top-down and bottom-up approaches to policy implementation and the importance of stimulating innovative solutions to complex social problems.

The final chapter looks ahead to the future of social work in a fast changing policy and practice environment. Some broad implications are drawn from the topics discussed in the book. Complex problems often create a sense of disconnect between citizens, social workers, managers, and policymakers. This is partly because paradoxical patterns of interaction and intention are a feature of complex behaviour. It is argued that current models of policy and practice have become highly intolerant of paradox and are skewed towards analytic approaches that rely on processing ever greater quantities of data. Shifting the balance towards systems thinking may prove a difficult culture shift in many social work settings but is essential for a people-centred profession.