

Anarchy and Anarchism

Towards a Theory of Complex International Systems

The use of 'anarchy' in international relations theory appears very different from its incarnations in political philosophy. Whilst realist scholars have used anarchy to describe a condition of absence of centralised political authority in which states wield differential power, political philosophers in the anarchist tradition have mounted a critique of the coercive and compulsory powers of states themselves. This paper argues however, that these usages are not incompatible, and suggests a radical reconceptualisation of 'anarchy' in international relations theory using insights from complexity theory.

Waltz made one good observation about the study of international systems: that there are 'forces at play at the international, and not at the national, level' (1979: 71). In other words, systems are more than the sum of their component parts. Complexity theorists would describe this feature as emergence, the manifestation of global level structures from micro level processes. Like Waltz, we consider that the international system has 'emergent features', and provide a helpful counter to statism as the 'universal myth' of political understandings of the world. Yet Waltz's analysis was extremely limited. He regarded anarchy as a static condition limiting the actions of states, and saw the international system as insulated from its surrounding environment.

We would describe the international system as a complex adaptive system, which has a tendency to self-organisation. A key insight from complexity theory is that non-hierarchical systems can develop organisation without a specific orderer. Furthermore, in distinct contrast to Waltz, we argue that the international system has to be seen as embedded within a range of physical systems, and other social systems including those which reproduce a range of (gendered, racial, class-based, colonial) relations of domination. We advocate the use of the term panarchy (derived from Gunderson and Holling), to describe this multi-layered and overlapping net of systems. This re-working of systems theory has echoes in the history of anarchist thinking and anarchist social ecologism.

Keywords: complexity theory, anarchy, international systems, intersectionality, social domination

The purpose of this paper is to bring together insights from complexity and anarchist thinking to develop an alternative means of considering international relations. While these two bodies of thought might not at first instance seem to be compatible, we argue that there are considerable areas of overlap. In particular both explore the possibilities for the development of order without a specific source of authority. An anarchist view of society is of one ‘which organizes itself without authority.’¹

Complexity theorists describe this as self-organisation, whilst an equivalent from anarchist theory would be Kropotkin’s notion of mutual aid. A particular problem for anarchism as a form of political analysis has been that statism is a ‘universal myth’ of

¹ Colin Ward, cited in Peter Marshall, *Demanding the Impossible: A History of Anarchism* (London: Harper Collins, 1992), 42.

modernity, and bedrock of understandings of the world in the contemporary social sciences.² We will suggest that complexity approaches to political systems undermine the credibility of a realist analytic focus on states as actors.

The paper takes Waltz as a starting point as a means of developing a broader approach to theorising international relations. We start with a discussion of Waltz's Neorealist model, because while in some senses he anticipates elements of a complexity approach, this is only in a very restricted sense. The second section combines concepts drawn from complexity thinking with elements of anarchism. We argue that both anarchist theorisation and anarchist politics are compatible with complex systems analysis. Similarly to other critical approaches in international relations, most notably Marxism(s) and feminisms, anarchists understand the world as constituted by social hierarchy and institutionalised oppression and domination. Most contemporary anarchists claim to be opposed to a range of dominations that they see as interlinked and interdependent. Complex systems approaches enable an understanding of different kinds of systems - those of relations of social domination and those of institutions and related processes, which co-constitute each other. A third section applies these to thinking about international systems.

The international system as anarchic: the contribution of Waltz

Waltz's systemic theory is developed in two contributions to the study of International Relations.³ In *Man, the State, and War* Waltz examined different

² Harold Barclay, *The State* (London, Freedom Press, 2003), 11.

explanations of why war was a persistent feature of human existence. He argued that previous explanations of war could be focussed at one of two levels (or ‘images’): the level of ‘man’ – which argued that war occurred due to human nature (the classical Realist account); or at the level of the state – certain types of state were more prone to conflict than others (for Marxists, capitalist states, and for liberals, non-democracies). Waltz argued that, although these theories could provide explanations for particular wars, they could not provide a general explanation for war. To do this, analysis at a third level would be required. This level was the international system, which provided a ‘permissive’ cause of war – wars happened because there was nothing in an anarchic system to prevent them.⁴ While *Man, the State, and War* made the argument that an analysis of the international system was needed, it did not proceed very far in defining what an international system actually was. This task was taken up in *Theory of International Politics*. The purpose of *Theory of International Politics* was to provide an analysis of what actually constituted the international system, and what impacts such a system had on the behaviour of states. Contrary to much of the criticism of Waltz’s work, he did not claim that an explanation of all state behaviour could be found at the systemic level, only that ‘elegant definitions of structure enable one to fashion an explanatory system having only a few variables.’⁵

In order to understand the effects of the international system, Waltz argued that it had to be defined in terms that did not include a description of the units – to do

³ Kenneth N. Waltz, *Man the State and War: A theoretical Analysis* (New York: Columbia University Press, 1959); *Theory of International Politics* (New York: Random House, 1979).

⁴ Waltz, *Man the State and War*, 233-4.

⁵ Kenneth N. Waltz, ‘Reflections on *Theory of International Politics*: A Response to my Critics’, in *Neorealism and its Critics* ed. Robert O. Keohane (New York: Columbia University Press, 1986), 330.

so would be, in Waltz's terminology, *reductionist*.⁶ Including an analysis of the units would mean that it would not be possible to differentiate between what were unit level effects and what were system level effects.⁷ Waltz claimed that all previous systemic theories had been reductionist, and therefore not truly systemic, for this reason. Waltz argued that all political systems comprised three elements: an ordering principle; the characteristics of the units; and the distribution of capabilities. The ordering principle described the relationship between the units – this could be either hierarchic, or anarchic. Domestic political systems are characterised as hierarchic systems in that the units are organised in levels of greater or lesser power, with those units higher up the hierarchy able to command those lower down. By contrast, international systems are anarchic. Although some states are more powerful than others, there is no over-arching government able to impose its will on states. The ordering principle is the key element of Waltz's account as it determines all that follows in terms of the theory. Furthermore, a key assumption is that not only is anarchy the 'absence of government', it is also 'associated with the occurrence of violence'.⁸ Anarchy not only describes the ordering principle of the international system, it also dictates the key form of state activity. 'Self-help is necessarily the condition of action in an anarchic system'.⁹

Although a discussion of the character of the units might appear to contravene Waltz's position on reductionism, Waltz argues that in anarchic systems all the units have to fulfil the same functions – they are 'functionally undifferentiated'.¹⁰ This

⁶ Waltz, *Theory*, 18.

⁷ *Ibid.*, 79.

⁸ *Ibid.*, 102.

⁹ *Ibid.*, 111.

¹⁰ *Ibid.*, 97.

contrasts with hierarchic systems, where the units can specialize in different activities. In international systems all the units are sovereign, and have to self-help – there are no other units to which they can turn for support if attacked. As all the units have to fulfil the same functions this level ‘drops out’ of the analysis and the reductionist error is not perpetrated. The ‘distribution of capabilities’ likewise might seem to open up the reductionist trap, apparently requiring an analysis at the unit level. However Waltz claims that it is not the power level of individual units that is important, but the way that power is dispersed across the system – hence it is a system-wide, rather than a unit-level, quality.¹¹

The distribution of capabilities is the most noteworthy part of Waltz’s account of system, as it is the only element liable to change. In anarchic systems, according to Waltz, the units will always be undifferentiated, and their primary feature will be the requirement of self help, and a change of the ordering principle from anarchy to hierarchy would be a change *of* the system, rather than a change *in the* system. The only way this would occur is through the emergence of a world government, an event that Waltz finds unlikely. More likely is a change *in* the system, as a result of variations in the distribution of capabilities. This leads to what is perhaps Waltz’s major contribution – the analysis of polarity, and in particular what type of system is most stable. Much of *Theory of International Politics* is devoted to arguing that a bipolar system is more stable, and preferable to a multi-polar system. The apparent durability of the Cold War bipolar system would have seemed to confirm this view when the book was published in 1979. Unipolar systems are not considered

¹¹ Ibid., 98.

specifically, though Waltz's more recent works have (not surprisingly!) addressed this issue, and he has argued that unipolarity is unlikely to persist.¹²

Waltz's contribution was his attempt to isolate what constitute system level forces; in a sense, to analyse what the term 'international' means. However this focus also opened his work up to a major criticism – without an analysis of the unit level it was difficult to see how we might understand change.¹³ Neorealism was unable to predict the end of the Cold War (a change in the system), nor to provide an account of how it happened. A change of system, which for Waltz would mean the development of a world government, was not conceivable. For Waltz then, the term anarchy, as a descriptor of the international system, is linked to the popular stereotype of relative chaos and disorder; only stabilised by a particular kind of hierarchy – bipolarity. We turn now to complexity theory, and anarchist political theory within which there is pattern and order without hierarchy.

Complex systems and anarchism

'Complexity science' or 'complexity theory' are catch-all terms to describe a variety of approaches emerging from the sciences and more recently applied in the humanities and social sciences to support a range of eclectic positions. The notion of 'system' has incurred severe criticism within the social sciences, often being held

¹² Kenneth N Waltz, 'Structural Realism after the Cold War', *International Security* 25, no. 1(2000) 5-41.

¹³ See, for example, Friedrich Kratochwil, 'The Embarrassment of Changes: Neo-Realism as the Science of Realpolitik without Politics', *Review of International Studies* 19, No. 1 (1993): 63-80.

unable to account for the dynamic qualities of social relations and often dramatic processes of change, or unable to account for unpredictable and complicated patterns of change. Complexity theory offers us however, a way to rework the concept of system which overcomes some of the problems encountered by international systems theorists such as Waltz.

In complexity science, natural systems are understood to exist in a web of connections with other systems and are internally complex. The term 'emergent properties' describes specific properties that emerge at a certain level of systemic complexity; but which are not apparent at lower levels. This is a non-reductionist position in which phenomena cannot be reduced to the sum of their parts but gain their character from interaction. Thus in ecology for example, systems are understood as communities of organisms which link together in a network.¹⁴ Complexity scientists often speak of systems as 'nested', with larger scale systems enclosing myriad smaller scale systemic processes.¹⁵ One of the most common and simple elements of the complexity notion of system is the distinction between a system and its environment which is simply that the system has boundaries, is delimited and distinguishes itself from its environment, that is, everything which is outside it.¹⁶ Although distinct, systems interact with one another in a way which has been referred

¹⁴ Frijtof Capra, *The Web of Life: A New Synthesis of Mind and Matter* (New York: Harper Collins, 1996), 34-5.

¹⁵ C.S. Holling, Lance H. Gunderson, and Garry D. Peterson, 'Sustainability and Panarchies' in *Panarchy: Understanding Transformations in Human and Natural Systems* eds. Lance H. Gunderson and C.S. Holling (Washington: Island Press, 2002), 68-9.

¹⁶ Capra, *The Web of Life*.

to as ‘coupling’.¹⁷ Coupled systems may themselves be self-reproducing, so they may come to depend on each other for the preservation of their identities.

Systems have ‘autopoiesis’ and are self-making, self-reproducing, self-defining or regulating. A system then, has internal processes which internally connect its elements and actively reproduce the system as a whole. A controversial and well-known model is earth systems science. James Lovelock developed the hypothesis that the earth was a ‘superorganism’ able to regulate its own temperature.¹⁸ A vast network of feedback loops bring about such regulation, and link together living and non-living systems. Regulation also takes place through ‘sybiogenesis’ – the merging of different species in complex arrangements and developments of co-operation and creativity.¹⁹ In this model, the earth constitutes a single system within which multivariate networks of systems exist, implicating all species, in sybiogenic relations assuming multiple forms. So there are different levels of organized complexity here, and social and natural systems are interlinked.

A further property of a complex system is the tendency to fluctuate between periods of linearity and non-linearity. This has enormous implications for the analysis of cause and effect and for social analysis in general. According to Beaumont in non-linear systems ‘inputs may vary widely and unpredictably from output’.²⁰ In linear relations there is a proportionate and non-varying relationship between cause and

¹⁷ Humberto R. Maturana and Francisco J. Varela, *Autopoiesis and Cognition: The Realization of the Living* (Dordrecht: Kluwer Academic, 1980), 109.

¹⁸ James Lovelock, *Ages of Gaia: A biography of our Living Earth*, 2nd edn. (Oxford: Oxford University Press, 2000), 15.

¹⁹ Lynn Margulis, and Dorion Sagan, *Microcosmos* (New York: Summit, 1986), 119.

²⁰ Roger Beaumont, *The Nazis’ March to Chaos: The Hitler Era Through the Lenses of Chaos-Complexity Theory* (Westport CO: Praeger, 2000), 9.

effect. In the simplest of terms if $a=b$, then $2a = 2b$. If I throw a ball twice as hard it will go twice as far. In non-linear relations such a direct relationship does not exist, and the connection between cause and effect is much harder to appreciate. The major implication of this is that very minor causes can create very major effects. The classic example of this was the question raised by the meteorologist Edward Lorenz – could a butterfly flapping its wings in Brazil cause a tornado in Texas? The term used by complexity theorists to describe this phenomena is ‘sensitivity to initial conditions’: very minor changes in the initial conditions of a system can result in markedly differing end points.

Systems are also ‘open’ because they utilize a continual flux of matter and energy in order to remain alive, whilst also exhibiting closure in maintaining a (relatively) stable form.²¹ One of the most influential theorists has been Ilya Prigogine who found in apparently chaotic situations far from chemical equilibrium, that coherent, structured, ordered patterns emerged.²² Changes are processed by systems through feedback loops which synthesize new information and result in the dynamic qualities of systems. Feedback can result in stability, or if there is positive feedback and a change is reinforced rather than dampened down, dramatic shifts can take place and a system can be said to have become ‘path dependent’. However, the instability of these dynamic systems means that even a path dependent system cannot be understood to be developing along a linear trajectory. Rather, systems can bi-furcate, and shift to new paths, they may dissipate or re-order themselves and perhaps move

²¹ Ilya Prigogine, ‘The Philosophy of Instability’, *Futures* 21 no. 4 (1989): 396-400.

²² Ilya Prigogine, and Isabelle Stengers, *Order Out of Chaos: Man’s New Dialogue with Nature*. (New York: Bantam, 1984), 146.

on to a higher level of complexity. Natural systems are characterized in this view by constant change, some of it abrupt, all of it unpredictable.²³

Systems change through interaction and complexity scientists have used a notion of co-evolution to describe how systems complexly adapt to their environment. Rather than simply impacting on one another (as implied by a hierarchical model of system) systems have complex reactions to relations with other systems (due to the presence of their own internal systemic features). All individual interacting systems, often of different levels of complexity and scale are changed in their interaction. Stuart Kauffman uses the concept of 'fitness landscape' in understanding the complex co-evolution of species, arguing that the environment or 'landscape' each system faces is altered as a result of changes in all the various other systems that collectively constitute the landscape.²⁴

These concepts may be usefully developed in the study of social and political life. They allow for differentiated systems, with various layers and levels of emergent properties and powers, and do not presume that relationships between levels are fixed or hierarchical in character. In addition, there is the presumption that systems interrelate, overlap each other, may exist within each other and are co-constitutive. There is no presumption of stasis, but rather, the notion that systems are constantly

²³ C.S. Holling, Lance H. Gunderson, and Donald Ludwig, 'In Quest of a Theory of Adaptive Change' in *Panarchy: Understanding Transformations in Human and Natural Systems* eds. Lance H. Gunderson and C.S. Holling (Washington: Island Press, 2002), 14.

²⁴ Stuart Kauffman, *The Origins of Order: Self-organization and Selection in Evolution* (Oxford: Oxford University Press, 1993); Stuart Kauffman, *At Home in the Universe: The Search for Laws of Self-organization and Complexity* (London: Viking, 1995).

making and remaking themselves, and may, given their inevitable interactions with other systems, change and shift radically.

Order vs hierarchy: Mutual Aid and social domination

Anarchy has been the defining feature of Realist and Neorealist accounts of international relations. Related back to Hobbes' notion of a life that is nasty, brutish and short in a 'state of nature', and influenced by a view, based on a partial reading of Darwin, that nature comprises a struggle for the survival of the fittest. As we have seen, a key insight of complexity approaches is the notion of self-organisation – that order can arise without a specific orderer. Here there is a considerable overlap with key anarchist contributions to the study of politics, and the possibility of viewing international politics and the organisation of the international system from a different perspective.

Central here is the work of Peter Kropotkin, and in particular his book *Mutual Aid*.²⁵ In addition to his work as a political theorist and revolutionary, Kropotkin was a geographer and a biologist. His experiences in Eastern Siberia and Northern Manchuria led him to challenge the ways in which Darwin's theory of evolution had been interpreted. Kropotkin argued that the metaphor of the survival of the fittest had become the central way in which evolutionary theory had been explained, especially by Herbert Spencer and TH Huxley in Britain. Thinkers such as Huxley and Spencer used a Darwinian notion of a process of evolutionary selection in biology to bolster a view of social selection in terms of bourgeois meritocracy. For Kropotkin, such theorizations had a flawed scientific foundation and were clearly political in their

²⁵ Peter Kropotkin, *Mutual Aid: A Factor of Evolution* (London: Freedom Press, 1987 [1902]).

implicit support for competitive capitalism.²⁶ The focus on the competitive aspect of evolutionary theory over-stated one aspect of evolution, while ignoring others, in particular the significance of co-operation within species. Kropotkin claimed that ‘sociability is as much a law of nature as mutual struggle.’²⁷ Starting with an examination of (non-human) animals Kropotkin claimed that ‘natural selection continually seeks out the ways precisely for avoiding competition as much as possible.’²⁸ He noted how few animal species exist by directly competing with each other compared to the numbers who do practice mutual aid, and noted that those who do are the ones that are likely to experience the best evolutionary prospects. Given this history it is therefore unlikely that humans, ‘a creature so defenceless ... at his beginnings’ should have flourished so successfully without co-operation.²⁹ Sociability is inherent in the success of humans as a species ‘man did not create society; society existed before man.’³⁰ Drawing upon the work of anthropologists, and the observations of Darwin himself,³¹ Kropotkin argued that from the earliest times human beings were social rather than individualistic. Studying the development of medieval cities, Kropotkin remarked on the notable similarities between them, despite the different circumstances from which they occurred, each the ‘varying result of struggle between various forces which adjusted and re-adjusted themselves in conformity with their relative energies, the chances of their conflicts, and the support

²⁶ David Miller, *Anarchism* (London: Dent, 1984), 72.

²⁷ Kropotkin, *Mutual Aid*, 24.

²⁸ *Ibid.*, 72.

²⁹ *Ibid.*, 74.

³⁰ Peter Kropotkin, *The State: Its Historic Role* (London, Freedom Press, 1987).

³¹ In *The Descent of Man*.

they found in their surroundings.’³² Complexity theorists would see this as an example of co-evolution – systems developing as a result of interactions with their environment. Moving on to his own time period, despite attempts by the state to eradicate all forms of mutual aid, Kropotkin found many examples of sociability within social arrangements. The appearance of labour unions is one key example, including the frequent examples of co-operation between unions during times of hardship. Other examples include friendly societies, the lifeboat association, various other societies, brotherhoods, alliances. Mutual aid has been, Kropotkin argues, a feature of human existence that has widened its reach, ultimately potentially to the whole human species, whilst at the same time being refined.³³

There is much in Kropotkin’s analysis that could be equated to the central complexity concepts that we have previously described. The notion of mutual aid appears to be an organising force across a range of species, as a ‘factor of evolution’ – it is not specifically a human attribute, but one which has enabled a range of species to flourish. This would equate closely to the notion of self-organisation in complexity theory. Self-organisation points to the tendency of units to interact with each other to produce ever more complex systems. These interactions produce emergent features, which can be seen in Kropotkin’s works as the appearance of ever more complex forms of social organisation, involving co-operation between the individuals concerned. *Mutual Aid* stressed the process of evolution as one where successful adaptation and exploitation of evolutionary niches is secured by species’ propensity for co-operation and solidarity.³⁴ This is a very similar notion to what contemporary

³² Kropotkin, *Mutual Aid*, 154.

³³ *Ibid.*, 234.

³⁴ R. van Duyn, *Message of a Wise Kabouter* (London: Duckworth, 1969), 21.

microbiologist Lyn Margulis calls ‘symbiogenesis’, a notion used extensively in complexity biology.³⁵

Hence both ‘mutual aid’ and complexity theory see the possibility of order without a sovereign body. This order can be spontaneous and progressive. As Marshall notes, anarchists ‘consider society to be a self-regulating order which develops best when least interfered with.’³⁶ The core of Kropotkin’s work was a critique of the state of nature as perceived by Hobbes, and he noted that ‘the Hobbesian philosophy has plenty of admirers still.’³⁷ Life in various forms was not a war of all against all, and while conflict was apparent across the animal world, this was only the part of the story, and there was also a story to be told from a perspective of co-operation.

In addition, Kropotkin’s political theory follows trajectories of changes in social relations, institutions and processes through a historically evolutionary model in which societies move through stages and points, acquiring increased complexity and diversity.³⁸ His intension was not only to show the interrelation between social and ecological changes, and the continued significance of ‘mutual aid’ but also to set out the co-evolved properties of systemic relations of social domination. For example,

³⁵ Lynn Margulis and Dorion Sagan, *Acquiring Genomes: A Theory of the Origins of Species* (New York: Basic Books, 2002), 205; also Stuart Kauffman, *At Home in the Universe: The Search for Laws of Self-Organization and Complexity* (Oxford: Oxford University Press, 1993). For a critique of Margulis and a rather different version of co-evolution see Scott F. Gilbert, ‘The Genome in its Ecological Context: Philosophical Perspectives on Interspecies Epigenesis’, *Annals of the New York Academy of Science* 981 (2002): 202-18.

³⁶ Marshall, *Demanding the Impossible*, 13.

³⁷ Kropotkin, *Mutual Aid*, 75.

³⁸ Miller, *Anarchism*, 182.

Kropotkin provides an historical account of the emergence of the modern political system from the medieval period in Europe wherein there is a coalescing of military elites with new forms of judicial authority, and a breaking down of ‘primitive village communities’. This political system is also a product of the dynamics of feudal class relations and is a class-based structure that is seized by the emerging bourgeoisie with the development of capitalism.³⁹ Kropotkin does not consider class to be the only factor in establishment of social domination; also important is the ‘Triple Alliance’ of the state with the institutions and practices of military power with judicial and (Christian) religious authority.⁴⁰ The development of capitalism as a system is co-constituted with the development of modern political institutions and relations. Thus the co-evolution of social/natural systems in Kropotkin’s account is not without politics. Rather, Kropotkin also maps a range of sets of oppressive relations and institutional systems. These insights are compatible with a complexity understanding of social relations as both multiple and systemic.

Many of Kropotkin’s ideas are elaborated in the work of the prolific Murray Bookchin, who has been instrumental in linking anarchism to green social and political thought in his advocacy of ‘social ecology’. In his best known work, Bookchin gives an account of the emergence of social hierarchies emerge with, first, the oppression of women, proceeding to the exploitation and oppression of other groups of humans, socially stratified according to age, ‘race’, class and sexuality.⁴¹ Bookchin argues these oppressions adopt different forms (social institutions and

³⁹ Kropotkin, *The State*, 17-21.

⁴⁰ *Ibid.*, 33.

⁴¹ Murray Bookchin, *The Ecology of Freedom: The Emergence and Dissolution of Hierarchy* (Edinburgh: AK Press, 2005 [1991, 1982])

practices) and degrees of severity across different cultures and over time. The notion of overlapping and intersected forms of social domination which are systemic and co-constituting is clearly compatible with a complex systems analysis of social domination. In addition, Bookchin's understanding of the hybridized and amorphous nature of contemporary political systems embedded firmly in the social fabric and constantly in the processes of arranging and rearranging social life – maintaining themselves – can be given a complexity reading.⁴²

Bookchin work extends some of the themes from Kropotkin, elaborating the ways in which social hierarchies are embedded in environmental contexts with which we 'co-evolve'.⁴³ For Bookchin, what 'makes unity and diversity in nature more than a suggestive ecological metaphor for unity and diversity in society, is the underlying fact of wholeness'.⁴⁴ However, Bookchin has long been keen to distinguish the specific characteristics of human sociality from those of 'natural' ecosystems. Whilst Bookchin cites Kropotkin as a source of inspiration, he expresses scepticism over his portrayal of mutual aid in the non-human world. Bookchin clearly sees a process of change active in evolutionary processes that complexity theorists would recognise: 'evolution is an ever-differentiating process in which increasingly complex organisms emerge from relatively simple ones – a process in which life, generally speaking, becomes ever more complex, ever more neurally flexible, and increasingly differentiated.'⁴⁵ Furthermore he points to the significance of processes that

⁴² Bookchin, *Ecology of Freedom*, 191-200.

⁴³ See for example, Murray Bookchin, *Post-Scarcity Anarchism* (Berkeley, Ca., Ramparts, 1971), 58-60; *The Modern Crisis* (Philadelphia, New Society, 1986), 26 and *Ecology of Freedom*, 88-91.

⁴⁴ Murray Bookchin, *The Modern Crisis* (Philadelphia, New Society, 1986), 60.

⁴⁵ Bookchin, *Ecology of Freedom*, 30.

complexity theorists would describe as co-evolution to indicate the importance of the inter-linked developments between species which evolve ‘in creatively interactive relationships with a great variety of plants and animals.’⁴⁶

Humans as a species have developed to an exceptional degree such that they have produced a ‘second nature’ a uniquely human culture, a wide variety of institutionalized human communities, an effective human technics, a richly symbolic language, and a carefully managed source of nutriment.⁴⁷ This is a development out of ‘first nature’, or ‘nonhuman nature’. An important distinction that has emerged between human and non-human nature is hierarchy, ‘institutionalized and highly ideological systems of command and obedience’, which are an ‘exclusive characteristic of second nature.’⁴⁸ Hierarchy is not a defining feature of second nature, but one that has emerged historically. Earlier, organic societies were non-hierarchic, and characterised by usufruct and complementarity, or mutualism, where care was taken for all members of society, without attributing particular status to differences between its members.⁴⁹ Over time hierarchic relations emerged related primarily to gender, age and lineage, developing into the range of hierarchic distinctions that typify the contemporary world. The creation of an ecological society would involve the dissolution of these hierarchies, which would contribute to a re-orientation between second and first natures. Our current malaise is a result of an evolutionary

⁴⁶ Murray Bookchin, *The Murray Bookchin Reader*, ed. Janet Biehl, (London: Cassell, 1997), 45.

⁴⁷ Murray Bookchin, *The Philosophy of Social Ecology: Essays on Dialectical Naturalism* (Montreal: Black Rose Books, 1990), 162.

⁴⁸ Bookchin, *Ecology of Freedom*, 24.

⁴⁹ *ibid.*, 26.

history containing two competing logics – that of spontaneous mutualistic ecological differentiation, and that of social domination.⁵⁰

In some ways, complexity theory is a latent presence in Bookchin's work. Similarly to Kropotkin, he considers that nature is unified despite its diversity, and species exist in relations of mutual interdependence and co-operation.⁵¹ Bookchin considers hierarchy to be imposed upon human society, and like Kropotkin, thinks it is falsely attributed to the natural environment for political ends. The concept of co evolution runs through both *Mutual Aid* and *The Ecology of Freedom*, and Kropotkin's representation of 'life' in terms of multi-leveled and nesting systems, or 'federations' of life forms, informs both Bookchin and a range of contemporary social theorists.⁵² *The Ecology of Freedom* outlines an evolutionary model of human social development. Bookchin suggests social hierarchy emerged in the early Neolithic period with the establishment of rudimentary forms of government and the development of warrior groups to protect and extend territory. In his descriptions of evolutionary patterns and pathways, Bookchin considers that:

The universe bears witness to an ever-striving developing - not merely 'moving' substance, whose most dynamic and creative attribute is its ceaseless capacity for self-organization into increasingly complex forms.⁵³

⁵⁰ Andrew Light, 'Bookchin and/as social ecology', in *Social Ecology After Bookchin* ed. Andrew Light (New York/London, The Guilford Press, 1998), 7.

⁵¹ Bookchin, *The Modern Crisis*, 26.

⁵² See for example, Donna Haraway, *When Species Meet* (Minneapolis/London: University of Minnesota Press) 42

⁵³ Bookchin, *Ecology of Freedom*, 458.

Drawing on complexity microbiologist Lynn Margulis, Bookchin argues for symbiotic relations in ‘nature’ between systems of land, sea and atmosphere, and forms of evolutionary cooperation/co adaptation.⁵⁴ We participate in the evolutionary process, co-evolving with our environments and other species. However, whilst complexity science is not teleological, Bookchin’s use of it is very much shaped by his Enlightenment narrative which tells of an evolution to a higher level of complexity and consciousness culminating not just in ever increasing diversity, but in a state of ‘free nature’ in which intra human hierarchies are dissolved and the domination of the environment is no more. Bookchin bases his evolutionary hypothesis, from which much of his analysis of interrelated domination is derived, on a linear and in many ways predetermined model which is not fully borne out by the scientific theories he draws upon in its development. Glen Albrecht uses contemporary complexity science to defend Bookchin’s understanding of directionality in nature. However, and interestingly, Bookchin’s evolution does not have the nuance of Kropotkin’s earlier thesis, and Albrecht does not tackle the political difficulties Bookchin has with complexity.⁵⁵

Thus while Bookchin certainly seems to be influenced by complexity thinking in terms of the language and concepts he uses, he is critical of systems thinking in general. In a critique of Capra, he states that ‘theories of indeterminacy and probability in physics are rendered coequal with human autonomy and social freedom without the least regard for the fact that the human domain is marked by a staggering complexity of social institutions, wayward individual proclivities, diverse cultural

⁵⁴ Lynn Margulis’s *Symbiosis in Cell Evolution* (San Francisco: W.H. Freeman and Co., 1981) was then current.

⁵⁵ Glen A. Albrecht, ‘Ethics and Directionality in Nature’, in Light, *Social Ecology*, 94-113.

traditions, and conflicting personal wills.’⁵⁶ In short, the social world is different. As Robyn Eckersley points out, Bookchin’s view of evolution preserves a deep-seated division between humanity and ‘nature’ and is highly anthropocentric.⁵⁷ An approach and practice which emphasises mutuality and diversity rather than an objective ‘logic of evolution’ is more appropriate. For Bookchin, complexity is teleological. The incredible self-organised growth of planetary life is based on symbiosis, which Bookchin uses to describe this natural evolutionary co-operation. However, hierarchy and social domination are human affairs. Some of Bookchin’s arguments for the insuperable line between human and non-human natures are undermined by contemporary work in ethology (which, on the other hand, is quite compatible with Kropotkin’s earlier insights).⁵⁸

Bookchin also seems to be concerned that complexity theory does not entail a particular political project when he observes with reference to Prigoginian systems theory that ‘a system of positive feedback allows for no concept of potentiality.’⁵⁹ In many ways, this concern is founded, as the ambiguities and different trajectories in scientific complexity theory have meant that it has been appropriated by kinds of social and political theorizing (such as postmodernism) to which Bookchin is so

⁵⁶ Bookchin, *Philosophy of Social Ecology*, 151

⁵⁷ Robyn Eckersley, ‘Divining Evolution: The Ecological Ethics of Murray Bookchin’, in Light, *Social Ecology*, 58-91.

⁵⁸ See for example, Marc Bekoff, *Minding Animals: Awareness, Emotions and Heart* (Oxford, Oxford University Press, 2002).

⁵⁹ Bookchin, *Philosophy of Social Ecology*, 192 n.15.

implacably hostile.⁶⁰ Yet some complexity positions have been usefully deployed by those analysing the politics of domination and arguing for change.⁶¹ Various contemporary political ecologies see human communities in a complex network of relations with non-human nature - relations characterised by reciprocity and interdependency, and also importantly, by exploitation and domination. Complexity theory can help us to consider intermeshing multiple systems as both analytically distinct, whilst being also, mutually constitutive. The domination of non-human nature is a system of exploitative relations, that overlaps and interlinks with other systems of power and domination based on gender, capital, ethnic hierarchy and so on.

In addition to a conception of different systems of social domination that are complex and intersected, it is important to capture the scales and levels of different kinds of systems. Both Kropotkin and Bookchin may have found the notion of 'panarchy' rather useful. This draws in ecosystems, political, economic and social systems, alongside a notion of local, specific human cultural systems (Holling et al. 2002c, p. 72).⁶² Panarchies are living systems, conceived of as internally dynamic and historically non-static structures which develop mutually reinforcing relationships which are co-constitutive and adaptive. It is not only panarchies involving human systems which demonstrate decision making properties, rather a huge variety of non-

⁶⁰ For an account of the use of 'chaos' orientated approaches in complexity science and its use in the development of postmodern theory see Katharine N. Hayles, ed., *Chaos and Order: Complex Dynamics in Literature and Science* (Chicago, Chicago University Press, 1991).

⁶¹ See for example Sylvia Walby, 'Complexity theory, systems theory and multiple intersecting social inequalities.' *Philosophy of the Social Sciences*, 2007, 37 (4), 449-470.

⁶² C. S. Holling, et al., 'Sustainability and panarchies'.

human animals make collective decisions and engage in individual decision making behaviour with a cumulative systemic effect.⁶³ Living systems of humans, non-human animals and plants develop self-organised interactions with physical processes. These self-organised interactions do not result in stability. Rather, systems may be vulnerable – ecosystems may collapse or be undermined by human endeavours, political systems may be vulnerable due to the collapse of natural systems on which populations depend for resources. Importantly also, systems in interaction are themselves complex systems with their own emergent properties.⁶⁴ This kind of theorizing allows for some qualitative and quantitative differences between ‘natural’ and ‘social’ systems, in particular, because the self-organizing properties of intra human systems outstrip those of natural systems.⁶⁵ Whilst social and natural systems may be shaped and structured by similar processes, social systems have properties of consciousness and reflexivity. They also reproduce and develop formations of social power, which, like capitalism, patriarchy and so on, are usefully understood as complex adaptive systems.

International politics as complex systems

⁶³ *ibid.*, 72-87.

⁶⁴ C. S. Holling, Stephen R. Carpenter, William A. Brock and Lance H. Gunderson, ‘Discoveries for sustainable futures’, in *Panarchy: understanding transformations in human and natural systems* eds. Lance H. Gunderson and C.S. Holling (Washington, Island Press, 2002), 411.

⁶⁵ Frances Westley, Stephen R. Carpenter, William A. Brock, C.S. Holling, and Lance H. Gunderson et al. ‘Why systems of people and nature are not just social and ecological systems’ in *Panarchy: understanding transformations in human and natural systems* eds. Lance H. Gunderson and C.S. Holling, eds.. (Washington, Island Press, 2002), 104-5.

As we have seen in the previous section there are considerable overlaps and complementarities between complex and anarchist thinking. Combining insights from these two approaches offers different ways of thinking about connections and linkages in international politics. It offers a framework with which to examine interlinked and multileveled relations, between different scales of activity and processes and the ways in which systems reproduce and change. This section examines the contribution that concepts derived from complexity and anarchist approaches can be applied to thinking about international systems. A number of features of complex systems are relevant to the study of international systems; in particular we examine the interconnected notions of self-organisation, emergence, non-linearity, and bifurcation. We relate these to Waltz's work to illustrate his failure to produce a complex systems approach to the study of international relations – this will help clarify what would be included in such an approach.

Complexity understandings of systems undermine the realist conception of states as solid 'billiard balls', relatively unchanged by the process of interacting with each other and with the international system. For complexity theorists, systems are self-organising to the extent that the features of a system can be modelled without reference to factors outside the system. This does not mean that a system is closed and that it has no relationship with other systems – for complexity theorists, particularly within the social sciences, a key feature of systems analysis is such interaction. However complexity theorists suggest that a particular system can be analysed by considering the interaction of its parts independently from other systems. An international system would appear to be a paradigmatic example of a self-organising system, in that under anarchy there is no overall direction to the system. What patterns and regularities there are, materialize from the actions of the units.

Emergence has been described as ‘the process by which patterns or global-level structures arise from local-level processes’.⁶⁶ In other words these are features that can only be explained by an examination of a system as a whole. There are features which cannot be evaluated purely from an examination of the interactions of the parts. When units inter-act in a complex system properties can be seen to be present which are not manifest at the unit level. This is, of course, a feature of much systems analysis, and formed the centre point of Waltz’s approach to the study of systems. However, complexity theorists are much more ready to collapse the levels of analysis than Waltz’s approach, and see the inter-connections between different levels (or in the complexity approach, nested systems) as central to analysis. Waltz saw the international system as a closed system which, at least in analytical terms, could be sealed off from other levels. Where Waltz and complexity approaches agree is that there are systemic features which emerge from interaction, and cannot be investigated solely at the unit level. Robert Jervis described these as ‘system effects’, though his (complexity-influenced) approach to the study of systems focussed on interactions rather than emergent properties.⁶⁷

What might be the emergent properties for an international system? We would argue that three types of emergent properties might be apparent. First, those associated with institutional structures. All international systems have developed sets of norms, rules, and even supra-governmental organisations to oversee their interactions. Most accounts of international organisation would point to a rapid

⁶⁶ Kevin Mihata, ‘The Persistence of “Emergence”’ in *Chaos, Complexity, and Sociology: Myths, Models, and Theories* eds. Raymond A. Eve, Sara Horsfall, and Mary E. Lee (London: Sage, 1997), 31.

⁶⁷ Robert Jervis, *System Effects: Complexity in Social and Political Life* (Princeton NJ: Princeton University Press, 1997), 17.

acceleration in the levels of institutions in the international system since the start of the nineteenth century – from the loose knit Concert of Europe to a world presided over by international law, and international organisations such as the United Nations and the World Trade Organisation. For many complexity thinkers the deepening web of institutional arrangements would be unsurprising. These institutional properties would be close to the analysis of international systems provided by Wendt, and his view of changing international cultures would mirror this pattern of increasing complexity.⁶⁸ However, most complexity thinkers would reject his view that a world state is *inevitable*.⁶⁹

Emergent properties can also be seen in relational terms. Waltz's discussion of polarity and the different character of international systems would apply here. We would seek, however, to expand the range of relations analysed to also incorporate economic, ideological, patriarchal, and political forms of domination, exploitation and exclusion. Wallerstein's account of a capitalist world economy would provide a starting point for an analysis of systemic economic relations. The capacity to generate, propagate and impose ideological positions on the organisation of society would also be included under this heading.

A further property of complex systems is the tendency to fluctuate between periods of linearity and non-linearity. This has enormous implications for the analysis of cause and effect and for social analysis in general. According to Beaumont in non-

⁶⁸ Alexander Wendt, *Social Theory of International Politics*, (Cambridge: Cambridge University Press, 1999).

⁶⁹ Alexander Wendt, 'Why a World State is Inevitable', *European Journal of International Relations*, 9 no. 4(2003): 491-542.

linear systems ‘inputs may vary widely and unpredictably from output’.⁷⁰ Waltz’s *Theory of International Politics* provides a clear example of a linear account of international relations – a bipolar world will be very stable, a multi-polar one less so. In other words, there is a direct relationship between the number of great powers and international outcomes, between cause and effect. However, International History is replete with instances of comparatively minor events leading to major outcomes. A classic example might be the assassination of Archduke Ferdinand in Sarajevo that leads to a series of convulsions that engulfed the world for over 40 years. Pascal’s view that the history of the world would have been significantly different had Cleopatra’s nose been shorter makes a similar point.

Closely related to the notion of non-linearity is the concept of bifurcation. Capra describes bifurcations as ‘critical points of instability’.⁷¹ They are critical in the sense that they can mark crucial turning points in the trajectory of a system. As such they have the potential to lead to a major change in the characteristics of the system. As Byrne argues, ‘systems which have a chaotic dynamic develop through a pattern of bifurcations’.⁷² Another key characteristic of bifurcation points is that ‘very small differences in control parameter values determine which path the system will follow’ – in other words non-linearity becomes more significant, small changes can have a

⁷⁰ Roger Beaumont, *The Nazis’ March to Chaos: The Hitler Era Through the Lenses of Chaos-Complexity Theory* (Westport CO: Praeger, 2000), 9.

⁷¹ Fritjof Capra, (2007) ‘Complexity and Life’, in *Reframing Complexity: Perspectives from North and South* eds. Fritjof Capra, Alicia Juarrero, and Pedro Sotolongo (Mansfield MA: ISCE Publishing, 2007): 14.

⁷² David Byrne, *Complexity Theory and the Social Sciences* (London: Routledge, 1998), 170.

greater impact.⁷³ Furthermore bifurcation points indicate that a system can develop in more than one direction, and *it is very hard to predict what path will be taken*.

In terms of international systems a bifurcation point could result (in Waltzian terms) in a change *in* the system, or a change *of* the system. The end of the Cold War was a bifurcation point, with the collapse of the Soviet Union resulting in a change in the system, from polarity to bi-polarity. Wallerstein argues that we are now in a non-linear period of international relations which will lead to a bifurcation point which will result in a change *of* the system – from the Modern World-System to some kind of alternative.⁷⁴

Complexity theorists are also concerned to analyse feedback mechanisms. Jervis describes feedback as: ‘A change in an element or relationship often alters others, which in turn affect the original one’.⁷⁵ Traditionally international relations theorists have focussed on ‘negative feedback’. These are the actions which bring a system back into equilibrium. A central heating thermostat is the classic, non social science, example of a negative feedback system. As a room cools a switch is operated in the thermostat to switch a central heating boiler on which heats the room up again. Such systems are usually described as homeostatic: they always return to an equilibrium position. For realist theorists such as Morgenthau and Waltz the international system is homeostatic as they expect a balance of power (an equilibrium position) to always emerge. If the balance of power is disrupted then negative

⁷³ *ibid.*

⁷⁴ Immanuel Wallerstein, *The Uncertainties of Knowledge* (Philadelphia PA: Temple University Press, 2004), 104.

⁷⁵ Jervis, *System Effects*, 125.

feedback (such as war, or changes in alliances) will occur to return the system to a balanced position.⁷⁶

Complexity theorists retain an interest in negative feedback, but also point to the significance of positive feedback – those effects which take a system further away from an equilibrium point. In the example of a central heating system, the equivalent would be the thermostat setting off a cooling system, which would make the room even cooler, rather than a heating system which would warm the room up. In international relations positive feedback has become associated with the term ‘blowback’, and an archetypal example would be the US funding of the Mujahedin to fight the Soviet-backed government in Afghanistan in the 1980s. Some claim this led to the establishment of the Taliban government in Afghanistan which was highly implicated in the plot to attack the US on September 11th 2001.⁷⁷ The notion of positive feedback has also become linked to the patterns of climate change. There are concerns amongst scientists that as the earth warms stores of carbon dioxide and other greenhouse gases will be released into the atmosphere from frozen peat bogs or the oceans, which will lead to even higher levels of greenhouse gases and even more rapid climate change. Positive feedback takes a system further away from its

⁷⁶ Waltz, *Theory*, 116-123; Hans J. Morgenthau, *Politics Among Nations: The Struggle for Power and Peace*, 5th edn. (New York: Alfred A. Knopf, 1973), 186.

⁷⁷ According to Chalmers Johnson, the term blowback, in this sense, was first used by the CIA to indicate ‘unintended and unexpected negative consequences of covert special operations operations’. In Johnson’s view ‘the attacks of September 11 are blowback in a direct line of descent from 1979’. See Chalmers Johnson, *Blowback: The Costs and Consequences of American Empire* (London: Time Warner, 2002), xi-xii.

equilibrium point, and the further a system is from equilibrium the more likely it is to display non-linear behaviour.⁷⁸

The implications of non-linearity, sensitivity to initial conditions and bifurcation are highly significant for the study of international relations. As Elliott and Kiel argue ‘Nonlinear dynamics and the related sciences of complexity lead us to question the extent to which we may be capable of both prediction and control in social and policy systems’.⁷⁹ Put simply, while perhaps theoretically possible, the features of complex systems suggest that it is very difficult to make predictions about what future trajectories the international system will take. During linear phases of stability (such as the Cold War) prediction may be possible, but during non-linear phases it is most likely that unexpected outcomes will occur, with large changes to or within systems, and unpredictable relationships between causes and events (for example, small events having major impacts, and major events perhaps little impact). In other words the kind of activities and expectations that can be had for the study of international relations may have to change. As Capra notes:

‘we can still make very accurate prediction, but they concern the qualitative features of the system’s behavior rather than the precise values of its variables at a particular time. Nonlinear dynamics thus represents a shift from quantity

⁷⁸ Martin Heimann & Markus Reichstein, ‘Terrestrial ecosystem carbon dynamics and climate feedbacks’, *Nature* 451 (17 January 2008): 289-292.

⁷⁹ Euel Elliott, and L. Douglas Kiel, ‘Nonlinear Dynamics, Complexity and Public Policy: Use, Misuse, and Applicability’, in *Chaos, Complexity and Sociology: Myths, Models, and Theories* eds. Raymond A. Eve, Sara Horsfall, and Mary E. Lee (London: Sage, 1997), 68.

to quality. Whereas conventional mathematics deals with quantities and formulas, complexity theory deals with quality and pattern'.⁸⁰

We can say what a system looks like rather than necessarily where it is going. This might be considered a considerable weakness of complexity approaches. However we would argue that it might be more appropriate to accept that, with complex social systems, we have to expect the unexpected, than to adopt theoretical positions, which while claiming to have predictive capabilities, are extremely unlikely to be accurate (due to the problems of assessing all the factors in social systems, and the difficulty of modelling non-linear relations).

Conclusion

We have argued that complexity theory enables a number of important theoretical moves in the understanding of international politics and analysis of multiple social dominations. Whilst anarchy has been the defining feature of Realist and Neorealist accounts of international relations, political anarchism and the insights of complexity theory provide us with a very different understanding of politics and organisation – the possibility of the emergence of order, without an orderer. This undermines the Hobbesian pre-occupation of much International Relations theory influenced by a view that nature comprises a struggle for the survival of the fittest and that 'clubs are trumps' in the international political system.

⁸⁰ Capra, 'Complexity and Life', 13.

Common to complexity theories and the majority of international relations approaches, is the claim that there is a value to studying the systemic level. Waltz saw states as the key units of the international system, un-differentiated and relatively permanent as a political form. In contrast, complexity theorists would regard states and the international system as in a constantly changing relationship, each developing in respect to the other. A complexity approach would describe these as emergent features of the international system. In addition, in complexity, the state and international political system can be seen as a particular form of organisation – quintessentially, but perhaps not inevitably, human.

However, an important and useful difference between complexity and established systems thinking in the social sciences concerns the question of linearity and non-linearity. Our international political context is characterized by significant continuity, despite apparent turbulence. It is also characterised by sudden, dramatic and unexpected changes, localized events with differentiated impact around the globe. Complexity concepts allow international relations to move beyond hierarchical forms of theorizing by adopting a more flexible approach to the kinds of connections within and between each levels of system. It also enables us to analyze different processes of relations and of change. The international system is embedded/nested within the environmental system, and its development cannot be analysed independently. Complexity theorists would describe this co-constitution as of co-evolution – systems adapt to their environments, and to other systems.

In the work of anarchist social ecologists such as Kropotkin and Bookchin, the notion of emergent order and the embedding of social and political systems within ‘natural’ systems are fore grounded. What is perhaps most significant in terms of their placing in the anarchist tradition however, is their analysis of social and political

systems as those of hierarchy and domination which usurp, distort and reconfigure the emergence of patterns of order without an orderer. For Kropotkin, and particularly for Bookchin, a range of intra-human forms of social domination shape our relations with non-human natures. Complexity theory, with its notions of co-existing, interrelated, multi-levelled and co-constituted systems enables the capture of the ontological depth of relational systems of social domination (of class, race, ethnicity, gender and so on) and their interaction or intersection. It usually also assumes the co-constitution and co-evolution of social with natural systems. Complexity reinvents our understanding of systems, such as that we might speak of panarchies, configurations both social and natural, which are dynamic, non-linear and unpredictable. We have suggested here, that this enables both a better understanding of the *complicated* formations and processes of international politics, and that anarchist theorisation and anarchist politics is compatible with complex systems analysis.