Shakespeare and Complexity Theory

In this new monograph, Claire Hansen demonstrates how Shakespeare can be understood as a complex system, and how complexity theory can provide compelling and original readings of Shakespeare’s plays. The book utilises complexity theory to illuminate early modern theatrical practice, Shakespeare pedagogy, and the phenomenon of the Shakespeare ‘myth’. The monograph re-evaluates Shakespeare, his plays, early modern theatre, and modern classrooms as complex systems, illustrating how the lens of complexity offers an enlightening new perspective on diverse areas of Shakespeare scholarship. The book’s interdisciplinary approach enriches our understanding of Shakespeare and lays the foundation for complexity theory in Shakespeare studies and the humanities more broadly.

Claire Hansen is a researcher on the Shakespeare Reloaded Project at the University of Sydney.
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Claire Hansen
To my family
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Introduction
Shakespeare, the System

Be calm, good wind, blow not a word away
Till I have found each letter in the letter[.]¹

[If this letter speed
And my invention thrive, Edmund the base
Shall top the legitimate.²

In *King Lear*, letters not only communicate but effect action. Importantly, that action is never predictable. If Edmund’s forged letter thrives, it will upset the play’s systems of hierarchy and primogeniture. As his—and other—plots within *King Lear* unfold, the trajectory of written letters becomes increasingly unpredictable. A nonlinear network of letters shapes the fates of *King Lear*’s characters in unexpected and complex ways. Shakespeare’s use of letters, argues Alan Stewart, ‘tends to undermine stability.’³ In *King Lear*, a ‘network of letters’ resembles—in the words of Julia Ritter—‘an intricate web of plots and counterplots which depends precariously upon the missives’ sometimes faulty and often unpredictable journeys between senders and recipients.’⁴

Similarly unpredictable networks of letters are discernible in many of Shakespeare’s plays (all but five of the First Folio plays, in fact⁵): Arthemidorus’ prophetic warning in *Julius Caesar*;⁶ the ‘sweet scrolls’ that ‘fly about the streets of Rome’ in *Titus Andronicus*;⁷ and the letter given to Antonio by Portia in the final scene of *The Merchant of Venice*, with her cryptic comment that he ‘shall not know by what strange accident / I chanced on this letter.’⁸ *A Midsummer Night’s Dream* proves one of the few plays in which letters are absent; paper and ink replaced by the supernatural fairy interventions which utilise the media of petals and the juice of the love-in-idleness flower.⁹

Letters are tangible, physical embodiments of potential: they can generate interactions between writer and recipient as well as with the mediating forces that engage with or interrupt the intended linear transmission process. Early modern letter-writing was ‘a complex (often collaborative rather than solitary) activity’ of ‘a multi-agent nature’, involving layers of input and multiple hands.¹⁰ Early modern letters emerge
out of systems, but as a form of interaction, also work to maintain and produce those systems. Letters, of course, rely integrally on one major complex system: language. As Gary Taylor and John V. Nance remind us, languages ‘are systemic’. Further, literacies in early modern England were ‘multiple, variable, subject to redefinition’, with different type fonts and script forms shaping ‘different experiences of literacy’.

Beyond language and literacies, letters also rely upon the interactions of many other systems. These include the pedagogical systems that educate (to varying extents) the writer, messenger and recipient, as well as the systems that produce the paper, penknife, ink, ‘pounce for blotting’ and calendar for dating, wax and seals (including the ecological and agricultural systems which provide ‘the gall in ink, the goose from which the quill is plucked’). The system of delivery in Shakespeare’s England was more of a ‘messy, ad hoc arrangement of messengers’ than a formalised ‘system’, including a ‘network of royal “standing posts”’. More broadly, we must include the vagaries of the social, political and environmental systems through which the letters must traverse; and of course, the complex systems of the writer’s and recipient’s brains, their histories and memories.

Shakespeare’s network of letters in the fictional playworld of King Lear and throughout his corpus provides an apt metaphor for the integration of Shakespeare’s plays in our own real world. His plays circulate like the letters within them – interrupted and altered, reinterpreted, edited, adapted, re-read, performed and re-performed – interacting with an idea (always imagined) of the letter’s sender but in no sense controlled or limited by the sender’s supposed intentions. Even a letter’s ‘reception’ – a deceptively passive term – contains a dynamic process: Stewart describes the reception of a letter as ‘a complex performance of which reading of the text is only one part’. Eve Rachele Sanders and Margaret W. Ferguson articulate how early modern readers interacted with content: arguing, emending, correcting, cutting and adding, as well as forming ‘associations and at times larger social networks through their reading.’ Daybell argues that reading – like the process of composition – was often collaborative. The recipients of the letters are also continually changing as different audiences engage with and reinterpret them. From these interactions emerge equally unpredictable phenomena that feed back into the letter’s (or play’s) network, further altering and enriching its behavioural patterns. Shakespeare’s use of letters throughout his plays thus does far more than communicate information essential to the progression of the narrative – just as his plays do far more than tell a story. The letters are a microcosmic example of the macrocosmic system of Shakespeare.

Like most communication networks, Shakespeare is complex. Whether you examine one metaphor, one prop (like a letter), one play, or his entire oeuvre, at every level Shakespeare unfolds in surprising
and intricate ways. When we refer to Shakespeare, study his works, or watch his plays, we understand that his name refers to one individual and that individual’s corpus. But it is also far more complex than this: we apply the term Shakespeare to a range of manifestations, creating ‘a multiplicity’ of Shakespeares. Shakespeare is a ‘proliferating knot of times and places’. His presence in academia, education, performance, popular culture, history and politics comprises a dense, layered, interconnected network of parts. Within these broad fields and discourses are innumerable interactions that (re)create Shakespeare through ongoing, dynamic processes. Such interactions are impossible to quantify or exhaustively account for; they amount to ‘a heterogeneous swarm of interconnecting, interdependent, complex, nonlinear relationships.’ These ceaseless interactions and countless others are Shakespeare – they constitute and regenerate this shape-shifting system. This identification of Shakespeare as complex recognises the complexity inherent within the subject; it does not retrospectively introduce it. Shakespeare, in all its manifestations – as play, language, performance, historical subject, individual, fictitious playworld, contemporary phenomenon, digital incarnation, field of study – is a complex system. In fact, upon closer inspection, Shakespeare comprises a nest of complex systems. Complexity theory – the study of complex systems – is a dynamic new framework that radically reimagines the Shakespeare system and our attempts to investigate it. Complexity theory recognises the way that interactions create and sustain open, dynamic systems. Essentially, complexity theory helps us to understand how the world works. It identifies systems in our natural and social worlds that exhibit complex behavioural patterns and examines how they operate. Complexity theory is particularly useful for biological and social systems because ‘[l]iving systems – organisms, communities, coevolving ecosystems – are the paramount example of organised complexity.’ As complexity theory centres on how parts interact, it illustrates not any one particular element or area of Shakespeare studies but, rather, is more useful for an examination of the interactions between aspects of Shakespeare. This approach is therefore based on a systemic, relational ontology. My use of complexity theory has three objectives. First, I identify Shakespeare – and the many subsystems within the scope of Shakespeare studies – as a complex system. Second, I use complexity theory to explore the ongoing regeneration of Shakespeare through the interaction of parts. In doing so, complexity theory proves an enlightening lens for the analysis of Shakespeare’s plays, as well as various other subsystems at work within the broader Shakespeare system: from early modern cultural practices to the structure and behavioural patterns of co-authorship in the period; and to modern-day pedagogical systems and the manifestations of Shakespeare in twenty-first century culture. Third, I seek to contribute to the field of complexity theory by refining
its application and extending its reach into the humanities. My aim is to demonstrate how complexity theory may be of value to Shakespeare studies, and conversely, how its use might refine the implementation of complexity theory in the humanities.

This might elicit the criticism that ‘anything’ can be tried on Shakespeare, and that novel theories are applied simply for the sake of novelty. Complexity theory needs to be able to account for itself and hypothesise the benefits it may provide to Shakespeare scholarship. However, here complexity provides a challenge rather than a benefit: complexity theory interrogates how Shakespeare and his associated field of study are actually constituted. If we ask how complexity theory is relevant to Shakespeare, the answer lies in the fact that a complexivist approach seeks to know what precisely is meant by ‘Shakespeare’. If we accept that Shakespeare is a complex system (containing myriad other complex systems), then the question becomes not whether complexity theory is relevant for Shakespeare studies but how do we understand the systems his name encompasses? Complexity theory is thus relevant for Shakespeare studies because it interrogates what we mean by ‘Shakespeare’.

In each chapter of *Shakespeare and Complexity Theory*, I focus on one subsystem within the broader Shakespeare system, taking one of 13 characteristics identified in Chapter 1 as my central focus, and pairing this with a Shakespeare play and a particular method or mode of using complexity theory (see Table I.1).

**Chapter Overview**

This structure is designed to interrogate the behaviour of complex systems, reconceptualise Shakespeare’s texts by examining their complex behavioural patterns, offer illuminating perspectives on narrative, pedagogical, theatrical and cultural subsystems, and explore different ways

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**Table I.1 Shakespeare and Complexity Theory**

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of using complexity theory in order to develop implementation strategies for the humanities.

Chapter 1 functions as a standalone introduction to complexity theory, interweaving Shakespeare studies, literary studies and the humanities with this new theory. The list of complex characteristics is designed for extension into areas of inquiry beyond the boundaries of this book. This chapter also identifies latent or implicit complexivism in early modern scholarship. In Chapter 2, early modern dance – which is often under-theorised within the study of A Midsummer Night’s Dream – is given renewed vitality through complexity’s concept of ‘bounded instability’ or ‘the edge of chaos’. Likewise, this vague and under-researched concept is interrogated and refined through this implementation, which also embraces metaphorical extension as valid and essential for literary studies. In the third chapter, I investigate a play-text’s self-organising nature and critique how we conceptualise co-authorship in Titus Andronicus. The focus of the book expands from the internal world of the play’s narrative to the construction of the play itself as a complex system. Chapter 4 tackles the unrealised learning potential latent in a classroom’s unexpected or unpredictable moments and in The Merchant of Venice. It embeds the complex system of a play within a contemporary educational system, and uses data drawn from class observations and interviews to explore the role of the unpredictable in Shakespeare education. The final chapter identifies and traces the behavioural patterns of ‘attractors’ in two systems: the Shakespeare system as it localises in the town of Stratford-upon-Avon, and the political system of Julius Caesar.

The systems of interest in this book move gradually from the microscopic to the macrocosmic, and include: the internal systems of the fictional playworld; the entire play as a system in its own right; the early modern theatrical system; the educational systems that teach Shakespeare’s plays; and the global cultural system that creates and perpetuates the concept of Shakespeare. This can also be seen as different levels nested within each other: the narrative level; meta-narrative and historical level; pedagogical level; and finally the cultural level. Always the macrocosmic is in dialogue (either directly or through mediated interactions) with other system levels, scales and parts, because the macrocosmic is a product of the interactions of the lower levels.

These nested levels work much the same way as the letters that populate Shakespeare’s plays. Letters, like the systems and subsystems that comprise the phenomena of Shakespeare, emerge as ‘multifaceted and layered forms’.22 The smallest unit of a letter might be an alphabetical letter – as Julia says in The Two Gentlemen of Verona, we can find ‘each letter in the letter’ – while a written letter is itself one unit of a play’s broader communication network, and one prop within the theatre company’s arsenal, and one infinitesimally small part of early modern England’s complex, shifting, dynamic culture. The value of complexity
theory in Shakespeare studies resides in its ability to tackle each of these
levels; it offers a remarkably adaptive and dynamic framework applicable

to the wildly diverse agents of Shakespeare, the system.

Notes

9 Lisa Hopkins makes a similar manoeuvre in considering the function of certain props as ‘analogous to those’ of letters, such as the handkerchief in *Othello*. Lisa Hopkins, ‘Reading Between the Sheets: Letters in Shakespearean Tragedy’, *Critical Survey* 14, no. 3 (2002): 10.
1 The Characteristics of Complexity

Complexity theory is a way of seeing the world that is flourishing in a variety of disciplines in the sciences and the arts. As complex systems are ‘usually associated with living things’, complexity theory is deployed to explore a diverse range of phenomena from the creation of life to the aggregation of the slime mould, from the organisation of business corporations to the reshuffling of carbon atoms in a sea urchin embryo. Complexity theory can be applied ‘to cosmic, galactic, stellar, planetary, chemical, biological, and social systems’. It is widely applicable because the principles of complexity apply to systems, not to the content of those systems: ‘What matters are the relationships, not the content matter.’ The modelling of complex systems applies to the relationships between component parts, not to the physical manifestation of the parts themselves. This is why the sciences of complexity are ‘nomadic’; they are applicable in various fields.

Given that the study of complexity theory is concerned with the identification and investigation of complex systems, it is worth first clarifying the meaning of ‘system’. The word may be misleading due to its familiar connotations of mechanistic order and regularity. Labelling a sophisticated phenomenon (such as weather patterns, ecosystems or the human brain) a complex ‘system’ can imply that the phenomenon is structured by some kind of predetermined plan. We need to be clear about the difference between a ‘system’ and a ‘complex system’. Not all systems are complex; some may be simply complicated. Adrian Mackenzie explicitly warns against the ‘generality’ of complexity theory, arguing that:

The generalisation of complexity into a world-view turns thought in circles on itself. It becomes a movement that goes nowhere because it encounters no obstacles and takes no risks: ‘everything is complex’.

While it is possible to use complexity theory as a way of seeing the world across many disciplines and areas of life, it does not follow that all systems encountered must be complex. The chief difference between a generic idea of ‘system’ and a complex system is the system’s method of organisation. The primary understanding of a system is: ‘a whole
The Characteristics of Complexity

composed of parts in orderly arrangement according to some scheme or plan.\(^8\) However a complex system’s ‘orderly arrangement’ does not derive from a predetermined scheme or plan: it is ordered by the unpredictable interaction of its parts. These interactions must be dynamic, because a complex system is made up of elements that exert influences upon each other and, in the process, effect changes in themselves and others.\(^9\) The importance of interactions to a system’s complexity cannot be overstated. In fact, ‘the lack of dependence on any feedback or interactions between objects will make the overall system non-complex’.\(^10\)

In its simplest form, then, a non-complex system is a grouping of related parts, ideas, or phenomena, which are organised by some kind of scheme or plan. By contrast, a complex system is identifiable by its unique organising pattern. Complex systems are self-organising, dynamic, evolving networks that operate without any centralised control. They are organised spontaneously and are composed of ongoing interactions between different parts. Despite being part of a complex system, these interacting parts may behave in quite simple ways: simple interactions can produce more complex behaviours and structures.\(^11\)

It is these interactions – sometimes simple, yet also unpredictable, diverse and numerous – which constitute the system itself, and the phenomena that emerge from these exchanges enable the system to continue developing.

This concept of ‘emergence’ is the reason why complexity theory privileges the interactions of a system’s elements, as it is not in the parts but in their relationships that the system’s complexity emerges: ‘components of a system through their interaction “spontaneously” develop collective properties or patterns’.\(^12\) Although emerging from a complex system’s micro-dynamics, emergent phenomena cannot be reducible to them.\(^13\) This emergence is related to the system’s ability to spontaneously produce order out of chaotic and disorganised behavioural states. Complex systems can vary from stable to increasingly disordered phases. When a system becomes highly disordered, it enters a phase called ‘bounded instability’ or ‘the edge of chaos’.\(^14\) At such points, a system is far more likely to produce new, creative phenomena and behaviours that may drastically change the system or parts of it. The chaotic state thus generates new forms of order.

The 13 Characteristics of a Complex System

The following characteristics of complex systems provide the foundation of complexity theory’s key concepts, upon which this book is built. As well as offering a guide to the key characteristics of complexity incorporated throughout, these characteristics also function as a standalone list that will be applicable for readers wishing to utilise complexity theory in their own studies or fields. It offers a base for
developing a working understanding of complex systems. These characteristics build on Paul Cilliers’ formative list, which has been influential in complexity studies.\textsuperscript{15}

1 Complex systems are composed of many parts, elements, agents, or individuals (these may include living and non-living things). In this way a complex system can be thought of as ‘decentralised’ or distributed across its component parts.

2 A complex system is generated by a specific type of interactivity: the parts must interact in what Cilliers calls ‘dynamic’ and ‘rich’ ways – in other words, the system’s parts influence and are influenced by each other. The interaction is usually localised, and may comprise communication between individuals, groups and the environment.\textsuperscript{16}

3 The interactions – and system patterns more broadly – are non-linear. Their behaviour can appear unpredictable and consequences of the system’s interactions can be disproportionate.

4 A complex system is sustained by positive (turbulent) and negative (stabilising) feedback. In essence, the system’s interactions or output feed back into the system, creating interaction loops. Both positive and negative feedback are necessary for the system. Positive feedback ‘generally promotes changes in a system’,\textsuperscript{17} and can also be referred to as turbulence or perturbation. Negative feedback is behaviour that works to counteract turbulence experienced by a system.\textsuperscript{18}

5 Complex systems are open – which means they interact with their environment. This makes it very difficult to define the system’s borders. What we identify as belonging to the system or to the system’s context is dependent upon the objectives and perspectives of the researcher.\textsuperscript{19} An examination of any complex system is thus also a ‘form of worldmaking’.\textsuperscript{20} The system is inevitably a ‘conceptual construction’ or a model that is similar to but not the same as the reality it models.\textsuperscript{21}

6 Complex systems require instability to survive. In fact, although such systems can behave in ordered, semi-ordered, or highly disordered ways, a certain point between organisation and chaos is understood to be the most productive and beneficial for the system. Complex systems can ‘achieve a “poised” state near the boundary between order and chaos, a state which optimises the complexity of tasks the systems can perform and simultaneously optimises evolvability’.\textsuperscript{22} This liminal state is called either ‘the edge of chaos’ or ‘bounded instability’.\textsuperscript{23}

7 A system has a history. The past is co-responsible with the present for the system’s behaviour.

8 Every element or part within a system is ignorant of the behaviour of the system as a whole. An individual only understands the system insofar as they understand their local interactions. The complexity
The Characteristics of Complexity

of the system is not produced by any individual’s knowledge or design but as a result of the interactions between elements or parts.

A complex system is multilayered, comprising many levels or scales of interaction. A system’s levels can be understood spatially and temporally – they indicate both the size and age of the system. This complex ‘hierarchy’ of levels can run from atoms to molecules, tissues to organisms, populations to communities. This enables multiple perspectives on a system: from a macrocosmic view to a microcosmic or local perspective, to anywhere between ‘the molecular and the macro’. A system’s levels are therefore conceptualised through the observer’s proximity to the system. The field of neurobiology provides a useful example: the microscopic layer of neurobiology (cellular electrophysiology) is examined by the ‘hard’ sciences, while the macroscopic level (the study of the human psyche) is examined by the ‘soft’ sciences.

But this is not to say that complex systems are organised through a stratified system structure: levels are actually mutually dependent. Lower-level interactions produce the macrocosmic behavioural patterns, which feed back into the system. Ilya Prigogine and Isabelle Stengers describe how ‘macroscopic structures emerging from micro events would in turn lead to a modification of the micro mechanisms’. Complex systems cannot be understood at any one level; the benefit of understanding an object of study as a dynamic system is that it ‘allows us to keep a range of levels of analysis in play without privileging any one’. In identifying micro-level, intermediate, and macro-level interactions, as well as interactions across levels and temporal scales, complexity theory ‘can help to provide a meta-perspective from which to connect the various levels of mind, brain, society, ecology and climate’.

A complex system is characterised by ‘self-similarity’, or shared similarities across each scale or level. Complex structures tend to ‘look more or less unchanged as you peer at them more and more closely, zooming in as though ramping up the magnifying power of a microscope’. Fractals are one way to conceptualise the self-similarity of a complex system’s levels. Fractals keep ‘the same form under different levels of magnification, which is to say, under changes of scale’. Fractals are found in diverse phenomena, from the branching of trees to the structure of human lungs, from river systems to the stock market. In all of these examples, fractal patterns recur across multiple scales. Gabriel Egan argues that the early modern concept of the ‘Great Chain of Being’ actually ‘prefigures the notion of self-similarity from complexity theory’. Egan suggests that the Chain of Being demonstrates ‘a continuous scale of differences between entities’. Robert N. Watson suggests that Shakespeare was well aware of patterns of self-similarity; he contends that the
playwright noticed ‘that the world occurs in mysterious orders of scale and fractal symmetries ... which his art often manages to replicate’.36

A complex system is created and maintained by ‘self-organisation’, which refers to the creation of the macroscopic levels of the system through the interactions of the lower level components.

Self-organisation is a process in which pattern at the global level of a system emerges solely from numerous interactions among the lower-level components of the system. Moreover, the rules specifying interactions among the system’s components are executed using only local information, without reference to the global pattern. ... In short, the pattern is an emergent property of the system, rather than a property imposed on the system by an external ordering influence.37

Self-organisation emphasises the importance of a complex system’s interactions: it is a system’s dynamic, rich, nonlinear, (mainly) local interactions that self-organise the system. The system as a whole does not organise its parts, the parts organise the system.

Emergence is one of the most defining characteristics of a complex system; it is the process by which a system produces new phenomena through the interaction of its parts. Emergence refers to the production of ‘novel and coherent’ patterns or structures through the self-organising interactions of a complex system.38 This phenomenon exemplifies that, for complex systems, the whole is more than the sum of its parts: emergence cannot be reduced to the system’s individual components.39

The behaviour of a system is largely determined by its attractor. An attractor is the system’s preferred behavioural state, and to which it will converge over time.40 There are different types of attractors and each produces different system patterns: a stable or fixed-point attractor creates stable, reiterative patterns; a periodic attractor enables more system change; and a chaotic or strange attractor is aligned to bounded instability.

These 13 characteristics summarise the key behavioural patterns of a complex system. They are also evident in the patterns of letters in Shakespeare’s plays (see the Introduction). The network of communications embodied in Shakespeare’s letters is distributed across both human and non-human parts (Characteristic 1). The letters act as a vehicle for rich, dynamic communication and interaction, which is essential to the system (Characteristic 2). These interactions are nonlinear (Characteristic 3): a letter’s unpredicted loss or rerouting generates disproportionate consequences for the broader system. The interception of Goneril’s letter