DON AMBROSE

CREATIVE EMERGENCE, ORDER, AND CHAOS: GRAPPLING WITH THE COMPLEXITY OF COMPLEXITY THEORY

Complexity theory encompasses promising, interdisciplinary attempts to understand the complex dynamics of exquisitely interconnected, dynamically evolving systems. In today's increasingly complex, turbulent world, excessively simplistic, reductive approaches to theory development, research, and practical application increasingly come up short when applied to complex problems. Fortunately, complexity theory can provide helpful correction, overriding the dogmatism that ensues from shortsighted, superficial explanations of nettlesome phenomena. Nevertheless, given its intricacy, attempts to understand and apply complexity theory also can fall prey to dogmatic misconceptions. The chapters in this volume represent insightful attempts to correct some of these misconceptions while finding ways to apply complexity theory to problems and opportunities in transdisciplinary work, general education, STEM education, learner diversity, social-emotional development, organisational leadership, urban planning, and the history of philosophy. More opportunities for creative thought and action in these domains arise from the analyses.

THE DUAL-EDGED SWORD OF SIMPLISTIC REDUCTIONISM

There is growing recognition that reductive treatments of complex phenomena have enabled considerable progress, especially in the natural sciences, while also leading us into dead ends. For example, in a sweeping, interdisciplinary investigation of complexity, leading thinkers from a wide variety of fields recently grappled with the tension between the need to simplify phenomena and the need to recognise and embrace complexity. The editors of the volume explained:

> The spectacular progress in particle and atomic physics, for example, comes from neglecting the complexity of materials and focusing on their relatively simple components. Similarly, the amazing advances in cosmology mostly ignore the complications of galactic structure and treat the universe in a simplified, averaged-out, approximation. Such simplified treatments, though they have carried us far, sooner or later confront the stark reality that many everyday phenomena are formidably complex and cannot be captured by traditional reductionist approaches. (Lineweaver, Davies, & Ruse, 2013, p. 3)

D. Ambrose et al. (Eds.), A Critique of Creativity and Complexity, 3–15.

These warnings about excessive reductionism came from a group dominated by natural scientists including leading thinkers from astrophysics, biology, evolutionary paleobiology, cosmology, physics, astronomy, mechanical engineering, and the philosophy of science, among others.

Similar cautions arise in other disciplines. For example, economics is extremely influential in our everyday lives because it underpins the workings of our financial system, and of globalised capitalism more generally. However, there have been vigorous criticisms of the rational actor model that dominates standard, neoclassical economic theory (see Ambrose, 2012a, 2012b, 2012c; Konow & Earley, 2007; Madrick, 2011; Marglin, 2008; Schlefer, 2012; Stiglitz, 2010, 2012; Stiglitz, Sen, & Fitoussi, 2010). The excessively sanitised, hyper-reductive model portrays humans as highly rational beings who make solely self-interested decisions based on perfect information sets. The model works well as a driver for empirical and theoretical work in economics but it doesn't map onto the world very well because the typical human injects considerable irrationality into his or her decision-making, is not entirely self-interested (unless he or she is a psychopath), and rarely has access to anything near a complete set of information for complex decisions. Arguably, the inadequacies of this oversimplified theoretical model contributed strongly to the 2008 economic collapse and to other serious, high-impact economic distortions.

Behaviorism, which dominated psychology in the mid-20th century, represents another example of temporarily productive but excessively sanitised, reductive theory. The behaviourist framework exiled the nettlesome complexities of the mind (anything that could not be measured with precision) to confinement within a metaphorical, cranial black box in attempts to mimic the hypothetico-deductive precision of empiricism in the natural sciences. The paradigm generated progress in psychology but eventually led theorists and researchers into increasingly barren territory. This led to its replacement by cognitive science—an energetic but still flawed new paradigm that was open to more diverse investigative methodologies and more authentic theoretical portrayals of the brain-mind system (see Ambrose, 2003, 2009a).

In yet another example, Bleakley (2010) made the case that effective medical education requires more tolerance of the ambiguity that arises from the complex, dynamic biological and technical systems medical practitioners repeatedly confront in their work, and that this tolerance can arise from capitalising on team learning. The distributed cognition that can arise from ambiguity embracing teamwork can enable medical professionals to diagnose and treat more effectively; however, the dominant model of medical education works against understanding of complex, adaptive medical systems because medicine is ideologically grounded in notions of excessive individualism and the acquisition of discrete knowledge elements.

TRAPPED WITHIN METAPHORS

These rigid theoretical frameworks arise from dogmatic entrapment within one of several root-metaphorical world views. The prominent philosopher Stephen Pepper

(1942) analysed deep-level influences on human thought and action and categorised these influences into world hypotheses, which included mechanism, organicism, contextualism, and formism. As scholars later used these frameworks for analyses of phenomena in various disciplines, the world hypotheses became known as world views (see Ambrose, 1996, 1998a, 1998b, 2000, 2009c, 2012b, 2012d; Cohen & Ambrose, 1993; Dombrowski, Ambrose, Clinton, & Kamphaus, 2007; Gillespie, 1992; Heshusius, 1989; Overton, 1984; Terry, 1995). Each world view is rooted in a metaphor that implicitly shapes thought and action. Each root metaphor structures the development of philosophical, theoretical, methodological, and practical tenets that guide the work of academics and professionals. All of this occurs at very deep, implicit levels and thinkers rarely are aware that their minds are trapped firmly, even dogmatically, within a metaphor.

As with peeling away the layers of an onion, we can peel away layers of implicit conceptual influence to get down to the root metaphor that simultaneously makes us somewhat effective as theorists, methodologists, or practitioners, but also somewhat ineffective because the metaphorical entrapment prevents perception of other options. For example, mid-20th century teachers who excessively used reward and punishment to manipulate their students' actions may not have realised that they were guided by the advice of psychologists whose thoughts were dominated by behaviourist theory. Many if not most of those psychologists did not realise that the behaviourist theory shaping their work was rooted in the positivist research paradigm. Many philosophers of science who promoted positivism likely did not realise that their philosophical framework was rooted in the mechanistic world view.

This lack of awareness that our thought is rooted down through multiple levels of analysis illustrates one of the strongest reasons for the ubiquity of dogmatism in human thought and action. Dogmatic idea frameworks force us to think more superficially, narrowly, and in more shortsighted ways than we should (for more on dogmatism see Ambrose, 2009b; Ambrose, Sternberg, & Sriraman, 2012; Ambrose & Sternberg, 2012). Table 1 shows the four world views, their root metaphors, the conceptual tenets that emerge from the metaphors, and examples of influences each world view has exerted in academia.

While a very simple system such as a simple machine can be investigated effectively through the lens of a single world view, complex systems nested within complex, multi-layered contexts are far too intricate for us to understand through a single conceptual lens, hence, we see the dogmatic folly of excessive adherence to the rational actor model in neoclassical economic theory, or the behaviourist model of mind in mid-20th century psychology. Pepper (1942) metaphorically illustrated the need for navigation through multiple world views:

> Post-rational eclecticism is simply the recognition of equal or nearly equal adequacy of a number of world theories and a recommendation to not fall into the dogmatism of neglecting any one of them. . . . Four good lights cast fewer shadows than one. (p. 342)

Table 1. Root-metaphorical world views as alternative conceptual frameworks for investigation of complex phenomena.

World View	Root Metaphor	Basic Tenets (what the world view emphasises)	Examples of Influence in Academia
Mechanism	Machine	Reduction of the whole to its component parts; precision; detail; linear causality; objectivity	Psychologists reducing intelligence to a precisely measurable IQ score
Organicism	Organism developing through stages toward a particular end	Coherence and totality of systems (the whole transcending its parts); integrative connections; long-term development	Interdisciplinary work (integrating knowledge across disciplines); much theorising about child development
Contextualism	Ongoing event within its context	Contextual influences; unpredictable emergence of novelty	Cognitive scientists studying the context-embedded mind (contextual influences on thought patterns)
Formism	Ubiquitous similarity (e.g., Plato's ideal forms)	Search for patterns of similarity in diverse phenomena	Complexity theorists studying patterns of similarity in the dynamics of complex adaptive systems such as human brains, national economic systems, fractal mathematics

Given the increasing recognition of the intricate complexity in complex adaptive systems, these four good lights are needed now more than ever before. Complexity theorists have revealed a wide array of baffling phenomena that show up as patterns in exquisitely complex systems (see Anteneodo & da Luz, 2010; Bleakley, 2010; Boedecker, Obst, Lizier, Mayer, & Asada, 2012; Chen, 2010; Fontdevila, Opazo, & White, 2011; Gershenson, 2012; Kelso, 1995; Lizier, 2012; Mazzocchi, 2012; Miller & Page, 2007; Morowitz, 2004; Schneider & Somers, 2006; Watts, 1999). For example, the innumerable elements of a complex, adaptive system can spontaneously self-organise into intricate, beautiful, and evolutionarily advantageous patterns. The dynamic tension between frustrating chaos and stultifying order can give rise to productive complexity. Also, intriguing behavioural and structural similarities can be seen in very diverse complex systems.

Understanding complex, adaptive systems brings to mind the old Sufi parable of the blind men and the elephant. Similar to the blind men in the fable, an investigator

employing the conceptual lens of a single world view might grasp a seemingly crystal-clear glimpse of a portion of the behaviour and evolving structure of a complex adaptive system, such as a creative individual, but could never hope to understand it in its entirety. For example, a mechanistic neuroscientist can clarify the electrochemical communication processes within a neural network within the brain of a creative person but will have great difficulty perceiving the ways in which those neural networks are influenced by subtle changes in other biological subsystems within the body, or by minor shifts in the environmental context that influence the person who owns that brain. A contextual mind theorist would have a better chance to understand environmental influences but would lack the precision and clarity provided by the mechanistic researcher who reveals insights about the electrochemical processes. Moreover, the long-term developmental perspective provided by an organicist developmental psychologist who looks at creativity as an integrative, lifetime process instead of an instantaneous light bulb moment of inspiration (e.g. Gruber, 1989) also is necessary to understand the creative work of the individual in its totality. The more perspectives from diverse disciplines that can be brought together and synthesised, the better, although such synthesising admittedly is a daunting challenge.

While it likely is impossible for a group of theorists and researchers to gain anything near complete understanding of complexity and creativity, an ambitious group can make some progress toward that goal. Our collaborators in this project recognise the intricacies involved in wrestling with the nuances of complex adaptive systems. The composition of our investigative team reflects this recognition. We include theorists, researchers, and professionals from diverse disciplines. Our collective expertise encompasses dimensions of gifted education, creative studies, educational philosophy, mathematics and the sciences, English literature, the history of philosophy, urban planning, and interdisciplinary work. Consequently, the contributors to this volume have shed some illumination on complex creativity by employing Pepper's (1942) four good lights.

AN OVERVIEW OF THE CONTENTS IN THE VOLUME

The first section of the book applies various constructs from complexity theory to teaching and learning in mathematics and the sciences. In recent years policymakers, citizens, and educators have paid considerable attention to the need for, and enhancement of, STEM expertise. Unfortunately, shortsighted educational reform initiatives preempt the development of complex understanding and higher-order thinking throughout the K-16 curriculum, including in the STEM disciplines (Berliner, 2006, 2012; Ravitch, 2010, 2013). Our contributors in this section suggest some ways to reinvigorate STEM complexity.

Bernard Sarrazy and Jamilla Novotna show how complexity theory can be employed to explore the creative versus reproductive dimensions of mathematics education in their chapter, *Learning: Creation or Re-creation? From Constructivism*

to the Theory of Didactical Situations. They analyse studies of conditions and processes conducive to creative learning within complex contexts. More specifically, they reveal in-depth analyses of developmental dynamics and the ways in which those dynamics can include emergent properties based on complex pedagogical and creative interactions. Essentially, the teaching of mathematics entails the artful establishment of promising conditions for the emergence of creative mathematics understanding. Ultimately, they show that there should be less interest in creation as such than about pedagogical and didactical conditions conducive to its emergence in mathematics learning. The mission of mathematics educators should be to create environmental contexts that enable mathematical creativity.

In her chapter, *Investigating Mathematical Creativity in Elementary School Through the Lens of Complexity Theory,* Esther Levenson used results from empirical observations in classrooms in the city of Tel Aviv, Israel to analyse dynamics of mathematics learning through the lens of complexity theory. Focusing on student interactions with materials, other students, and teachers, Levenson discovered ways in which ideas emerged and were developed. She found that creativity, as it is manifested in the classroom, entails complex, unpredictable, mutual adaptation of all players within the complex adaptive system of the classroom. On the one hand, the teacher and the students are all present in the same lesson and there is a collective experience. On the other hand, different individuals experience instruction in different ways. This chapter outlines the dynamic interaction and interdependence of classroom participants, as well as the tension between pursuing both stability and change. In essence, the author explains how the results of these swirling forces and some principles of complexity (i.e., internal diversity, redundancy, decentralised control) can promote or inhibit mathematical creativity.

Steve Coxon, takes us into an intriguing aspect of science and technology with his chapter titled *On the Edge of Chaos: Robots in the Classroom.* He begins by discussing the role of robots in our world and then turns to the value of robotics as a learning opportunity. Coxon does this by contrasting the processes of robotics with the structure and dynamics of traditional education. He describes the history and nature of educational robotics programs and outlines a variety of current robotics offerings. While making it clear that robots are nowhere near as complex as biological systems, he argues that they allow for enormous cognitive complexity when it comes to students building and using them. He keeps us informed about the research into the effectiveness of robotics as an educational strategy. He also establishes some similarities between large-scale political-democratic dynamics on the edge of chaos and the instructional and learning processes in robotics. Learning is much more dynamic and productive at this edge where there is balance between orderly, authoritarian control and anarchic chaos.

In recognition of the strong, interdisciplinary nature of scholarship addressing complex adaptive systems our next section brings together interdisciplinary

perspectives on creative complexity. Here we include a broad survey of complexity theory in multiple disciplines as well as more specific applications to organisational leadership, environmental sustainability, and urban planning.

Don Ambrose employs a specific construct from complexity theory to generate a very broad-scope exploration in the chapter, *The Ubiquity of the Chaos-Order Continuum: Insights from Diverse Academic Disciplines.* The interdisciplinary science of complexity is revealing ways in which complex adaptive systems tend to oscillate along a continuum between the extremes of chaos and order. Productive, creative complexity occasionally becomes available when a fine balance emerges from the tension between chaos and order on the continuum. While there is some potential for misinterpretation of this construct, the dynamics of the continuum are applicable to a wide variety of phenomena. This interdisciplinary analysis reveals some ways in which excessive order, excessive chaos, and productive complexity can emerge in human thought and action. Some examples include the tensions between relativism and authoritarianism in identity formation and moral development; laissez-faire market utopianism and centralised regulation in economic systems; relativistic pluralism and universalist monoculture in the culture wars; anarchy and rigid, scientific management in organisational dynamics; incremental wandering and the lure of completeness in the philosophy of science; and the fractured-porous and unified-insular structure and dynamics of academic disciplines. Thematically guided interdisciplinary exploration, dialectical thinking, and the logic of the included middle are proposed as antidotes to entrapment within the counterproductive regions of the chaos-order continuum.

In her chapter, *Creative Complexity in Organisational Leadership,* Liza Watson discusses creativity and learning in organisations and some ways leadership comes into play in these dynamics. Leadership theories are considered in light of the dynamics of the chaos-order continuum. Watson also contemplates these leadership dynamics while analysing their fit with the industrial age that we are leaving and the knowledge era in which we are currently immersed. In essence, these dynamics revealed by complexity theory can be difficult for individuals and organisations to handle because they can be disruptive even while they provide opportunities for creative organisational progress.

Marna Hauk argues that priorities must change if the world is to shift from degenerative environmental destruction to regenerative sustainability. In her chapter, *Complex Regenerative Creativity,* Hauk shows that predominant analytic and deterministic methods usually provide knowledge of parts and mechanisms, but they rarely yield adequate answers. Creativity enters the process in the key role of assembling diverse parts, often in unexpected ways. Regenerative design involves both art and science not separately but merging together. The theoretical framework in this chapter employs complexity theory emphasising regenerative creativity as domain-general and transdisciplinary in nature. The framework produces ethical novelty inspired by complex, natural patterns.

Todd Juhasz illustrates the broad applicability of complexity theory in his chapter, *Pareto Optimum Efficiency Between Chaos and Order when Seeking Consensus in Urban Planning.* Based on his experience as an urban planner with transdisciplinary expertise encompassing the biological sciences, architecture, and management, Juhasz establishes a comparison between two case studies of major urban planning projects in two important American cities, one on the East Coast and one on the West Coast. One of these projects suffered from frequent, serious problems and was completed with minimal success. The other project proceeded with fewer problems and led to very successful outcomes. The comparison reveals that successful urban planning and implementation requires artful negotiation to keep the process from disintegrating toward excessive chaos or becoming trapped within excessive order. In contrast, careful, artful urban planning generates a productive balance between chaos and order, which leads to complex yet effective results. Recommendations for the education of students in the urban planning profession are provided.

Rounding out this exploratory, interdisciplinary section, Peter Pruim takes us on a philosophical excursion in his chapter, *Subjectivity, Objectivity, and the Edge of Chaos.* His analysis has two stages. First, he uses the of edge-of-chaos heuristic to classify general epistemological positions. At the extreme of order are the epistemology of the Rationalists and all irrational ideologies where no experience is allowed to count against fundamental principles. At the extreme of chaos are various forms of radical empiricism, including positivism, where reality is identified with experience, which is ever changing and different for every observer and so generalisable theorising is difficult. At the edge of chaos is the sort of empiricism promoted by Quine and Susan Haack, in which the two dogmas of empiricism are replaced by balancing theoretical coherence with observational adequacy. In the second stage of the analysis, Pruim uses this heuristic to describe the history of philosophy of mind: Cartesian dualism, materialist identity theory, materialist functionalism, eliminativism, Wittgenstein and behaviourism, neurophilosophy, and the current scene in cognitive science.

The next section of this book returns us to the nature and nuances of the educational system. It begins with a philosophical analysis of educational purposes and processes. After that, we include more specific insights about the promise of complexity theory in education, from the tension between modernism and postmodernism in diverse forms of expression, to the creativity it reveals in a project blending Shakespearean literature and the performing arts, to the promise of dual exceptionality as a creative advantage, to creative mentorship of new professionals as they make their way into complex work environments.

In their chapter, *Expansive Notions of Coherence and Complexity in Education,* Bryant Griffith and Kim Skinner argue that our culture is embedded within a dynamic tension between coherence and complexity, and that tension generates conceptual chaos. Griffith and Skinner employ complexity theory as a tool for critiques of the excessively mechanistic approaches that dominate education today. They bring into play conceptions of modernism and postmodernism while

looking at ways in which human interactions and context tend to be ignored and marginalised. It is these interactions and contextual influences that enliven education and make it too complex for mechanistic approaches alone to handle. Appreciating and capitalising on epistemological diversity is a theme in the chapter. The authors make room for various forms of cognitive diversity, including domain-specific cognitive frameworks. They also use research findings to illustrate ways in which students can be encouraged to engage in higher-order thinking conducive to complex understandings of text.

Jeffrey Bloom provides a panoramic overview of analyses of complexity in diverse phenomena in his chapter titled *Complexity, Patterns, and Creativity.* Deriving insights from the history of creativity research and from extensive investigations of complex adaptive systems, Bloom uses this analysis as a basis for considering ways in which creativity emerges and complex patterns form. He pays special attention to scientific phenomena, especially the formation and utility of meta-patterns that underpin and sustain the structure and function of complex systems throughout nature. Implications for education arise from the analyses. Especially pertinent are his recommendations for preserving creativity in learning, and for developing a stronger grasp on the pernicious effects of superficial, dogmatic school reform initiatives such as No Child Left Behind and the Common Core standards.

Kathleeen Pierce provides an example of socially generated, emerging complexity in her chapter, *A Shakespeare Festival Midwives Complexity.* She explains how preparation for participation in a Shakespeare festival performance creates a community of practice among secondary school students who work along the chaos-order continuum. Procedures employed in the management of the festival seem to provide just the right amount of constraint to nurture complex thinking without inhibiting students' creativity in interpreting Shakespeare and designing an original 20-minute performance from his plays. The festival day itself provides a series of workshop sessions in theatre arts where students quickly learn new skills, play, and practice in the company of students from other schools. The festival design imposes order and allows for chaos in each of the workshops before complexity emerges in the form of new competencies developed in collaboration with new acquaintances.

Jack Trammell has us think about an issue that straddles the fields of gifted education and special education in his chapter, The Anthropology of Twice Exceptionality: Is Today's Disability Yesterday's, or Tomorrow's, Evolutionary Advantage? A Case Study with ADD/ADHD. Some anthropologists and psychologists suggest that the ADD/ADHD arrangement of the prefrontal cortex may have been an evolutionary advantage 20,000 years ago when humans had a greater need to respond rapidly to stimuli in the environment and to consider creative, nonlinear approaches to problem solving. In today's world, that same brain arrangement is often treated as a disability and the potential giftedness associated with it is overlooked. Trammell briefly examines the historical etiology of ADD/ADHD, considers current neuroanatomical perspectives, and suggests that the degree to which the brain arrangement is considered medically disabling is problematic. He then shows how conceptions of

ADD/ADHD as a disability are being transformed. Finally, he proposes that the concept of twice exceptionality itself actually may be a misinterpretation of a rapidly evolving human brain in which today's disability can be yesterday's, or tomorrow's, special ability.

In the chapter, *Mentoring the Pupal: Professional Induction Along the Chaos-Order Continuum,* Kathleen Pierce employs the chaos-order continuum again, this time to analyse the difficult problems beginning professionals face when making the transition into a complex profession. She shows how beginners in schools and universities often have great problems adjusting and getting up to speed with highly complex professional demands even though those institutions often have established formal mentorship programs. Thinking about the ways in which these experiences oscillate along the chaos-order continuum helps us see how the immense difficulty arising from rapid immersion in highly complex, multilayered processes and contexts establishes chaotic conditions in the beginner's mind while the excessive order of the bureaucratic procedures typical of induction processes represents excessive order on the continuum. According to Pierce, nuanced mentorship can enable beginning professionals to find a productive balance between these extreme conceptual positions where they can begin to enjoy the fruits of professional complexity.

Our final section provides a look at the social-emotional dimensions of complex creativity. There is increasing recognition that high-level cognition incorporates emotional ingredients, especially when it comes to creative work. These emotional ingredients can be injected through the influence of productive relationships, recognition of the need for cognitive restructuring and integration, and awareness of barriers that can distort the emotional elements of thought.

Michelle Jordan and Reuben McDaniel emphasise the importance of social dynamics in their chapter, *Helping Students Respond Creatively to a Complex World.* They begin by taking aim at the persistent dominance of conceptual frameworks saturated with scientific determinism when it comes to influence over educational philosophy and practice. After addressing that pressing issue they posit knowledge of complex adaptive systems as an alternative framework. They go on to explain how this alternative reveals dynamic complexity in a wide range of phenomena pertaining to education and creativity. They also provide advice about how to help students navigate the contextual intricacies revealed by their analysis. Some of this advice includes developing ways to help young people tolerate and embrace the fundamental uncertainty of complex environments while capitalising on the potential embedded in dynamic relationships. Jordan and McDaniel also provide a wide variety of examples of practical, creative strategies that can be used in classrooms to generate better understanding of system dynamics.

In her chapter, *Toward the Pattern Models Of Creativity: Chaos, Complexity, Creativity,* Krystyna Laycraft provides a new approach to the study of creativity in adolescents and young adults engaged in complex, creative endeavors by combining the idea of self-organisation with theories of emotions. Employing

qualitative research methods she found some differences in the creative work of young people, but also discovered common phases such as differentiation/chaos, integration/complexity, and dissipative structures/creativity (products of creativity in the forms of new movements, new writings, and new paintings). Creativity of the young people under study was intertwined with strong emotions of interest, joy, and acceptance. These dynamics encouraged global, open, and exploratory modes of attention, stimulated thinking, and enriched imagination. All of this deepened emotions, leading to more curiosity, enthusiasm, delight, passion, resourcefulness, and love. Creative individuals became more sensitive, more open, and receptive to their internal and external worlds. They seemed to become more resourceful, imaginative, empathic, and spiritual.

Ann Gazzard concludes this section, and the volume, with her chapter, *Emotions, Complexity, and Intelligence.* She shows how the edge of chaos hypothesis from complexity theory can elucidate our understanding of emotional intelligence, in particular its foundation in the early childhood years. She draws insights from psychology, neuroscience, and other fields to shed light on the complex dynamics of emotional development and barriers that suppress or distort that development. Based on syntheses of these insights, she concludes with recommendations for enhancing and strengthening emotional intelligence in young children.

While our motley coalition of investigators from multiple academic and professional fields has employed analytic insights from Pepper's (1942) four good lights, we certainly have not covered all of the conceptual territory relevant to the nature of complex adaptive systems. That territory simply is far too expansive to grasp in a single project and much more can be done in future investigations. Others have developed important insights about the creativity-complexity theory nexus (e.g., Richards, 2001, 2010; Schuldberg, 1999; Sterling, 1992) and we hope that our project augments their work. Our primary purpose has been to expand awareness of the promise and intricacies of the meeting place between complexity theory and creative effort. We encourage future development of theory and research along these lines.

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