

“The truth of our scattering”: (Post)Human Complexity in Richard Powers’ *The Echo Maker*

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At ease with drawing connections between such diverse subject matter as genetics and virtual reality or chemotherapy and corporate history, the ten Richard Powers novels published between 1985 and 2009 read like an encyclopaedic account of contemporary science. While not all of these texts are explicitly about scientists and their research, they do all apply scientific concepts to the process of understanding individual consciousness and interpersonal relations. More specifically, Powers’ writing is influenced by – and consistent with the principles of – the field known variously as complex systems theory, complexity theory or the science(s) of complexity.¹ Trey Strecker has suggested that “more consistently than any other American novelist, Powers’ writing foregrounds a passionate interest in the life sciences, in particular, the dynamics of complex adaptive systems.”² Research into scientific complexity involves the study of these systems: collections of many independent yet interacting agents that spontaneously self-organise, giving rise to sophisticated and coordinated ‘emergent’ behaviour at the level of the system as a whole. In accordance with the principles of complexity theory, Powers’ fiction displays the certainty that systems should be studied in their entirety and in the context of their environment rather than through a reductionist analysis of isolated parts. Whether addressing how the brain gives rise to

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conscious thought, or how the emergent culture of the internet feeds back to influence the societies that produced it, complexity theory is also concerned with the relationships that exist between different system levels – between part and whole or between local and global – and, in addition, the ways in which systems interact with each other. Powers suggests that this change of perspective is at the heart of his fiction and is furthermore an area of investigation in which literature can play a vital role. He writes that story alone “can refract vast, voiced, complex interactions between local and global that no single discipline can know inclusively or pretend to master.”³

In *The Web of Life*, Fritjof Capra argues that “all systems thinking is environmental thinking,” since it forces people to think contextually, moving the focus away from objects to the relationships between them.⁴ Contextual thinking is at the heart of Powers’ most overtly environmental novel, *The Echo Maker* (2006), which sets the personal story of one character’s recovery from serious brain injury against a large-scale battle between conservationists and developers regarding the future of Nebraska’s Platte River. As our attention is forced to oscillate between parallel narrative lines, containing themes (brain damage and ecotourism) which at first seem only circumstantially connected, repeated juxtaposition encourages the reader to merge these two issues into a single narrative system. As the story progresses, deep underlying similarities between minds and ecosystems begin to emerge. We learn that conservationists perceive the wetlands along the Platte River as complex and fragile; their language echoing that of the doctors who attend Mark Schluter, whose injuries thus seem to foreshadow the threat of harmful real estate development. Following the accident that nearly kills him, Mark’s thought processes “change to flying things as they hit the air”, figuratively becoming the river’s population of flocking cranes poised on the verge of extinction.⁵ Charles B. Harris writes that “in a feat of metaphorical dexterity, Powers’ fiction fuses the synaptic networks that constitute the self with the

biosphere's densely textured, interacting ecosystems."⁶ This feat of dexterity is more than mere literary ornamentation. In *The Echo Maker*, Powers draws upon the science of agent-based complex systems to investigate the possibility that the emergence of selfhood mirrors (or echoes) the emergent patterns of ecosystemic order. The homology which he creates between mind and ecosystem in this text is based upon real similarities of agent interaction and emergent behaviour. It also performs an important function within the narrative, leading us to question not only where we should draw the line between species self-interest and larger environmental concerns, but also how we initially came to arrive at fixed definitions of 'species', 'self' and 'other'.

The Echo Maker is not the first Richard Powers novel to deal with issues of complexity and environmentalism. Both Trey Strecker and Scott Hermanson have written at length about the relationship between *The Gold Bug Variations* (1991) and the sciences of chaos and complexity, praising in particular the way in which the highly patterned and recursive structure of the text reflects that of the nonlinear systems foregrounded within the narrative.⁷ Strecker also suggests that the "complementary subsystems" of scientific information and narrative intertwine in this text to form an "interconnected, integrated ecological whole," which he terms a "narrative ecology."⁸ In this earlier novel, the somewhat incongruous comparison made between musical notes and human genes as agents generating emergence sets a precedent for the equally unlikely pairing of sandhill cranes and humans later proposed in *The Echo Maker*. Both texts illustrate Powers' enthusiasm for using unusual analogies to inspire new perspectives on the familiar. In addition, by exploring the nonlinearity and unpredictability of nature's systems, *The Gold Bug Variations* makes it clear that "an insignificantly small alteration, whose logic is impeccable in isolation, can have unforeseen consequences that multiply out of control when dropped in the middle of a complex system."⁹ This awareness, along with the novel's assertion that humanity's attitude

towards nature should be “wonder” rather than attempted “control”, foreshadows the stance towards development and ecological harm which Powers takes in the later text.

In “Making the Rounds”, Powers suggests that his writing owes much to systems theory, which through a concern with complex and nonlinear ‘wholes’ insists that “real world phenomena, far from being understandable in isolation, are always open to and in constant interaction with an endlessly extensible network of contexts and enveloping environments.”¹⁰ In particular, he talks about the connection between his work and the ‘systems novel’, a concept first formulated by Tom LeClair in 1987 to describe novels which use “demanding linguistic strategies in order to imitate living systems [...] to give the medium of the text the illusion of reciprocal simultaneity, growth to complexity, an ecosystemic plenitude.”¹¹ As a kind of literary analogy to systems theory, this type of novel makes clear that “the individual human cannot be adequately understood solely as an autonomous, self-expressing, self-reflecting entity, but must be seen as a node on an immensely complex network of economic, cultural, historical, and technical forces.”¹² While stating that he does not believe that his books “have ever fit comfortably into the framework that LeClair initially envisioned”, Powers suggests that a simplistic definition of what a systems novel is or should be would run counter to the project’s anti-reductive purpose.¹³ He concludes that if he were to revise the systems novel concept in the light of the two decades which have passed since the term was first used, then the novel thus described would be a kind of “bastard hybrid”, forcing the reading self into “constant reciprocal renegotiations by always insisting that no level of human existence means anything without all the others.”¹⁴

The Echo Maker is thoroughly consistent with Powers’ interpretation of what a systems novel should be, suggesting as it does that any consideration of the individual subject must go beyond the self we see at eye level, down to the smallest genetic component and out to the largest environmental context. In a 2008 interview with Scott Hermanson, Powers

affirmed his interest in “throwing open what we mean by character,” so that our perception of what constitutes selfhood travels “all the way down into levels as low as brain chemistry and all the way up into levels as complex as geopolitics and global history.”¹⁵ Deconstructing the character of Mark Schluter into the many interconnected parts that together support the emergence of consciousness, Powers uses the subject of brain damage to illustrate that what we think of as a single, whole ‘self’ is actually dependent on the interplay of countless separate subsystems at lower levels. As well as taking us down to the level of neurons and synapses, he also creates the suggestion that humanity extends outwards beyond the boundaries of the skin, using the wetland environment in which the novel is set to connect Mark into a wider system of species interaction. The sustained comparison between brain damage and ecological harm in this novel exposes both the brain and the wetlands as finely tuned systems, similar in their manner of functioning and profoundly interconnected. Powers seeks to make people aware of “the million supporting links” that keep them alive, thereby highlighting a duty of care toward other species.¹⁶

The main events of the plot are set against the return of around half a million sandhill cranes to Nebraska’s Platte River, where they make a stop on their annual migration. This is a real-life occurrence: every year hundreds of tourists descend upon the town of Kearney, Nebraska to observe the countless ribbons of birds coming in to land as dusk falls. It was stumbling across this spectacle one evening while driving from Illinois to Arizona that initially inspired Powers to write the novel. In an interview with *The Believer* magazine he recalls that passing through central Nebraska near sunset he saw “this carpet of birds, three foot tall, spreading in all directions,” a sight which was so striking that it almost caused him to drive off the road.¹⁷ The next day he went for a closer look and observed the birds “dancing and singing in an enormous, weirdly intelligent, communal act.” Setting the novel in this particular location has a certain symbolic significance since Kearney is located “near

to the geographical center of the United states”, an area which is crossed not only by major human migration routes like Interstate 80, but also by “the Central Flyway, that continent-sized hourglass used by millions of migratory birds”. This overlaying of crane and human creates a parallel between the two species which is reinforced by structural similarities in both the events of the narrative and the form of the novel.

The connections between cranes and humans in *The Echo Maker* are made on two levels, that of the individual and that of the collective. Individually, the cranes are shown to possess what we might term human features such as memory, self-sacrifice, learning and love. Karin Schluter relates that “they mate for life. Follow their partners every year for thousands of miles. Raise their young together. Fake a broken wing to lure a predator away from their chicks. Even sacrifice themselves to save their young.”¹⁸ These similarities cause Karin to conclude that the birds are not just similar to humans, but actually bound to us by ties of kinship, since “those birds danced like our next of kin, looked like our next of kin, called and willed and parented and taught and navigated all just like our blood relations.”¹⁹ For a brief section at the beginning of the novel’s fourth section, Powers actually focalises the narrative through the perceptions of a crane family during their migration, the very terms of kinship used – “parents”, “home”, “father” – as well as emotive terms like “panic”, “scream” and “trauma”, emphasising their status as ‘non-human persons’ whose journey parallels or echoes Karin’s migration back to her childhood home.²⁰ Following his accident and brain injury Mark Schluter contracts a condition called Capgras, which is important to the novel’s ecological message because it is a type of misrecognition syndrome. Though part of Mark’s brain visually recognises Karin as his sister, the emotional connection to the image has been lost, forcing his brain to conclude that she is merely an actress pretending to be his sister. During the latter half of the novel Karin will accuse humanity of collective Capgras for a corresponding failure to emotionally connect with the cranes and to realise an obligation of

care towards them.²¹

Powers also envisions the cranes as a collective, allowing him to draw structural parallels between migrating birds and the human brain. Formed from a large number of interacting agents, the human mind, a flock of birds and the Nebraska wetlands are all types of complex system. M. Mitchell Waldrop defines complex adaptive systems as “groups of agents seeking mutual accommodation and self-consistency [which] somehow manage to transcend themselves, acquiring collective properties such as life, thought and purpose that they might never have possessed individually.”²² These collective properties arise solely from agent activity within the system and not as the result of a controlling outside force; furthermore, no single agent has control over whole system function or total knowledge of the system. When “flying birds adapt to the actions of their neighbours, unconsciously organising themselves into a flock”, they become agents interacting to produce an emergent pattern of organisation. As a collective, the flock is able to perform purposeful actions like avoiding predation with a degree of sophistication that far exceeds the capability of any single bird acting alone. These large-scale complex patterns are not ‘designed’ by any individual, but instead emerge spontaneously from the local interactions of numerous agents within the system, just as the complex pattern of consciousness emerges from the simple on/off firing of synapses in the brain. In *The Echo Maker*, the migration of the cranes is described as a “self-organizing return” and the formation which the birds make once in the air is a “self-forming v.”²³ No single bird leads them and no control is imposed by a higher authority; together they function as a unified system, which every year traces “one single, continuous loop of plains, mountains, tundra, mountains, plains, desert, plains.”²⁴

Brain damage and environmental threat are used by Powers to expose the nature of each system, so that entities which were thought to be fixed, singular and whole are instead revealed to be assemblies of parts, continually moving, adapting, and changing over time.

Following Mark's accident, Karin relates how she "watched him return, hour by hour," through a gradual and unconscious process which mirrors the "blind, self-organizing return" of the cranes.²⁵ Mark is seen to reconstruct his sense of selfhood in a way which supports comparisons between the structure of the brain and that of an ecosystem: rather than a single, indivisible 'self' he is seen as multiple and in process, described as "piecing himself back together."²⁶ While lying in his hospital bed he claims that "his parts came back to him [...] his body, countless microscopic creatures banded together in need." Continuing the biological analogy, Mark's pre-conscious brain is compared to "a whale in the street [...] a beached creature blocks long", while his interacting neurons appear as "tiny land-born lives" which drift back, gradually "reclaiming their crushed homes."²⁷ Dr. Weber, the book's cognitive neurologist, makes clear the proposed link between human brain-function and the kinds of biological organisation found elsewhere in the natural world by suggesting that in regard to brain function, humans are "like coral reefs [...] complex yet fragile ecosystems."²⁸

Outside of the novel, scientists in the field of complexity science have talked about brains as systems of interacting agents which mirror systems found elsewhere in the natural world. The language which Powers uses to describe the early stages of Mark's recovery echoes that used by Chris Langton (an Artificial Life specialist associated with the Santa Fe Institute for Complexity Studies), who, when narrating his own experience of minor brain damage following a hang-gliding accident, writes that: "I had this weird experience of my mind coming back [...] it was as if you took an ant colony and tore it up, and then watched the ants come back together, reorganize, and rebuild the colony."²⁹ Ant colonies, like bird flocks, are often cited as examples of emergent complexity. In *Complexity: A Guided Tour*, Melanie Mitchell (another faculty member at the Santa Fe Institute), writes that "colonies of social insects provide some of the richest and most mysterious examples of complex systems in nature." Scientists still do not fully understand how a colony of ants is able to act as a single

entity, adapting to changing circumstances such as floods or predator attacks.³⁰

Dr. Weber suggests that cases of brain damage like Mark's "call into question the solidity of the self," since they illustrate that *all* minds are composed of "hundreds of separate subsystems," interacting to produce the feeling of "a continuous, indivisible whole."³¹ In this novel, selfhood equates to the story which consciousness narrates in order to make us feel whole: it is the "single solid fiction" that beats "the truth of our scattering."³² In an attempt to represent formally the scattering which lies beneath consciousness the first section of text attributed to Mark Schluter following his accident is without any coherent narrative progression or defined sentence structure; fragments of text are juxtaposed in a looping and repetitive manner which resembles free verse more than traditional prose. Luc Herman and Bart Vervaeck write that "there is no conventional chronology here," since Mark's pain, the river, aspects of the crash and subsequent hospitalisation are all distributed widely across the passage as a whole.³³ This nonlinear distribution of text echoes the nonlinear nature of the brain as a complex system. However, one consequence of this linguistic style is that we are initially unable to distinguish whether it is Mark's voice or that of the Nebraska wetlands which is being presented. For example, the section begins: "A flock of birds, each one burning [...] Hot red specks take flesh, nest there, a body part, part body."³⁴ We may eventually conclude that birds function here as a metaphor for the movement of pain signals 'burning' through Mark's damaged nervous system, yet this phrase could refer equally well to the return of the cranes with their "blood-red head(s)." This narrative ambiguity signals Powers' attempt to reflect through form the fundamental similarity between the emergent 'wholes' of humans and ecosystems which features so heavily within the novel's content. Powers suggests that the style of prose used during this section is both "an attempt to recreate... [the] return from a complete loss of conscious mental functioning" and "a recapitulation of the original process of self-assembly."³⁵ This and other early sections which

are reminiscent of a stream-of-consciousness signal a significant stylistic break for Powers. In an interview with Stephen J. Burn, he refers to this kind of prose as “double-voiced interiority presented as if it were externally narrated.”³⁶ In another interview, this time with Jill Owens, he refers to it as “a close limited third-person focalization,” which lies between traditional third-person narration and stream-of-consciousness, thus creating the effect of a “hybridized inside/outside voice” or “double-voicing.”³⁷ The initial confusion between Mark’s consciousness and the wetlands which results from this experimentation with language means that, as Herman and Vervaeck write, “Mark does not seem to mirror the cranes as much as he seems to coincide with them.”³⁸

Continuing and deepening this sense of two species coinciding is the idea that the brains of humans and birds share a common ancestry, a suggestion which is made at several points during the novel. When Mark contemplates the possibility of brain transplants between cranes and humans, conservationist Daniel Riegel wants to reply: “no need to swap. Already there, inherited. Ancient structures, still in ours.”³⁹ Powers also contemplates the existence of cranes in folk tales and myth, in which: “cranes are souls that once were humans and might be again, many lives from now. Or humans are souls that once were cranes and will be again, when the flock is rejoined.”⁴⁰ Charles B. Harris suggests that Powers wants to represent the human brain as “a networked ecology that mirrors the networked ecology of all life, including birds, the core parts of whose brains are still contained in our own.” He adds that “cranes, if not quite our next of kin, are distant relatives nonetheless, sharing genetic links with us [...] reaching back three billion years through common ancestors.”⁴¹

In his interview with *The Believer* magazine, Powers highlights that the choice of the term ‘echo maker’ in the novel’s title refers to the Ojibwa-Anishinabe name for the sandhill crane, yet he also makes it clear that this term can also be applied to humans. Through Weber’s neurological research, Powers is able to point out the existence of mirror neurons

within the brain which fire in the same manner whether the body is performing an action or merely seeing this action performed by another. These neurons are provided as evidence of “the neurological basis of empathy”, since in a very real way our brains can be said to mirror or ‘echo’ the minds of others. Humans are “brain maps, mapping other mapping brains,” or “matter that mapped other matter,” something which allows us to construct “theories of other minds.”⁴² Charles B. Harris suggests that since we are programmed not only to mimic the actions of others, “but literally to feel their emotional states” then “in a most literal sense ... we are echo makers, wired to care.” To ‘echo’, within the context of this novel, however, refers not only to the process of reflecting or mirroring, but also to the act of doubling or simulation. Mirror neurons and Capgras syndrome are each other’s counterpoint: empathy and connection versus solipsism and endless fragmentation. Margaret Atwood suggests that since Capgras Syndrome “makes the sufferer think that his nearest and dearest have been spirited away and replaced with cunning facsimiles of themselves” we can say that “Mark [...] becomes a sort of echo maker.”⁴³ Mark replaces his relations with simulations who appear as poor copies (or echoes) of the original, but there are also many other examples of echoing from other characters too. Karin observes that those people arguing over the future use of wetlands “circled, doubling each other, doubling themselves, squaring off against phantom combatants”, a situation which expands upon the novel’s accusation of collective Capgras.⁴⁴

Capgras is represented primarily as a debilitating medical condition, yet there is also a sense in which it is a universal human mental state, since all minds function by creating internal simulations of people and events. Karin argues that even love is a form of Capgras since it involves “making and denying others, at random”, while Weber’s many case studies set out to prove that all minds exist on a spectrum of brain damage.⁴⁵ Through Mark’s changing attitude towards animals we see the development of a kind of Capgras long before

his accident. As a child Mark shows great concern for animals, creating stories about a country without humans called 'Animalia' and helping to nurse injured animals back to health. However, as an adult Mark works as an engineer for Iowa Beef Processors and verbally justifies this significant change in attitude by claiming that "everybody eats the damn animals; somebody has to kill them. And that's not even him."⁴⁶ Having once considered animals as equals, Mark subsequently becomes complicit with their deaths. By repressing or denying feelings of kinship, he moves from the perspective of animals possessing personhood to a view of animals as objects for human use. However, Karin complicates this subject-object relation between humans and animals by noting that her first memory of her brother Mark is as "a lump of meat wrapped in a blue baby blanket."⁴⁷ Joseph Tabbi highlights that "living and working within a system demands a certain ignorance of its supporting or constraining structures", and that "to render visible the process through which certain decisions and past practices become automatic, the whole structure of repressed functioning [...] is the environmental project that underlies every Powers novel."⁴⁸ By complicating oppositions between self and other Powers throws into question assumptions about species difference which have become accepted within certain societies, such as the right to eat other animals.

In *The Gold Bug Variations*, scientist Stuart Ressler suggests that "advantage, self-interest, short term gain are the only forces that carve a population," with the logical conclusion being the arrival of "a species so clever it overruns its niche, bringing down the whole round robin."⁴⁹ However, in addition to competition, Powers often highlights the pervasive influence of cooperation throughout global ecology, particularly among those species more successful than humanity at maintaining a sustainable balance with their environment. In *The Gold Bug Variations* we see "joint solutions [to survival] everywhere". Species are seen to depend upon each other for survival, such as "flowers inscribed with

ultraviolet runways, detectable only by particular bees,” or “lichen, a single plant formed of two organisms that feed and water each other, breed and reproduce together.”⁵⁰ In *The Echo Maker*, man is described as the animal “perpendicular to all the others” who “flies at right angles to the seasons,” and it is this disconnection between humanity and the rest of nature which the novel seeks to remedy. Interdependence, evolved over millennia of chance mutation and natural selection, is also seen as immensely vulnerable to human intervention. In *The Gold Bug Variations*, Ressler points to the damage we inflict upon the ecosystem by thinking that we can “improve” nature through genetic engineering, with the most likely result being “ecological imbalance [...] unpredictable, irreversible environmental mayhem.” Since ecosystems are complex and full of nonlinear connections small changes can have often large and unpredictable effects. Ressler warns of “the danger of intervening in systems too complex to predict,” and suggests that “life is an immensely turbulent system [where] small changes produce large swings in outcome.”⁵¹

Though brains and ecosystems are presented as immensely fragile, Powers also addresses the extraordinary plasticity of the brain (and by extension the wider ecosystem) in adapting even to harmful change, with the purpose of retaining its systemic organisation or ‘identity’. The existence of multiple agents in a complex system means that there are multiple potential sites where damage can occur, but the high level of nonlinear interconnectivity which exists between the agents also makes the system able to adapt, so that something, however unrecognisable, can continue. Weber notes that “the self’s whole end was self-continuation” by whatever means necessary.⁵² Powers creates a connection between mind and environment by his speculation that the biosphere, too, will adapt in order to survive the damaging actions of humans. He writes that “nature and its maps will use the worst that man can throw at it,” and that following our extinction “nothing will miss us [...] cranes or something like them will trace rivers again.”⁵³ In *The Echo Maker*, environmental damage

has enhanced the spectacle of the cranes' dance, crowding them into a smaller space and increasing their pull as a tourist attraction. Similarly, brain damage has transformed Mark into a medical spectacle, drawing Dr. Weber across America for the experience of 'seeing' him rather than the attempt to cure him. Both tourists and Weber are criticised for their lack of true empathy, for considering the object of their gaze only to the extent that it reflects upon them, and for the false separations that they impose between themselves and the systems which they observe. Similarly at fault is developer Robert Karsh, who can claim that his plans to build accommodation for "crane-peepers" serves "environmental principles" because he views environmental preservation as a capitalist venture and nature itself as a resource for human gain. Karsh argues that "the whole point of conservation [is] to protect nature for our appreciation."⁵⁴ Courtesy of habitat destruction, the gathering of cranes has become "one of the biggest spectacles going", an object of aesthetic amusement rather than a symptom of the harm inflicted upon an intricate web, any change in which will eventually change us.

By suggesting that we are one of many interlocked, nested systems, and that as a species we are in process rather than fixed, *The Echo Maker* forces us to question how we define 'the human' and what we designate as 'other'. This same issue also occurs in many of Powers' previous novels. In *Galatea 2.2* (1995) there is an artificial intelligence named Helen who becomes more and more 'real' to the main protagonist as his relationships with other people begin to seem more and more simulated. Eventually the narrator concludes that "everything's projection" since "you can live with a person your entire life and still see them as a reflection of your own needs."⁵⁵ In *Gain* (1998), he writes the biography of a limited-liability corporation, which is in the eyes of the law "a single, whole, and statutorily enabled person."⁵⁶ *Plowing the Dark* (2000) strays once again into non-biological personhood by suggesting that "the computer alters the human," that "it's our compliment, our partner." The characters in this novel also suggest that computer mediated virtual reality "redefines what it

means to be human.”⁵⁷ All of these novels disrupt accepted definitions of ‘humanity’ and ‘personhood’, whilst simultaneously questioning the ethical limits of scientific, technological and corporate intervention in nature. Insights gained from complex systems theory allow Powers to create productive analogies between humanity and other kinds of biological, social or information systems, which he then uses to deconstruct assumptions about species difference.

In *Cognitive Fictions*, Joseph Tabbi highlights that “Powers’ work has been eagerly claimed by literary humanism as a sustained attempt to reintegrate the alienated self and reassert wholeness in the face of an increasingly fragmentary reality.”⁵⁸ However, situating Powers in relation to the competing discourses of humanism and posthumanism is difficult. Though the contextual aspect of systems theory involves looking at collections of diverse agents as ‘wholes’, internal conflict between those agents and uncertain borders between systems and their external environment mean that *The Echo Maker* is able to embrace – though not without qualification – the necessarily ‘fragmentary’ nature of human biological reality. By extending the borders of ‘the human’ out beyond the skin and encouraging respect for other species based upon their resemblance to us, this novel does in some sense reassert the importance of ‘the human’ as a concept. Powers still has faith in the potential of human nature to achieve great things, and though the argument is one of ‘moral obligation’ rather than ‘rights’ he still believes that humanity should attempt to shape the world. At the close of the novel, Karin Schluter concludes that the “river needs her”, that it needs her to “work, try to return the river to those we’ve stolen it from.”⁵⁹ While maintaining some humanist concerns, through his use of complexity theory Powers simultaneously becomes aligned with *posthumanism*, if we consider the posthuman, not as ‘transhuman’ technological enhancement, but as a process of redefining what it means to be human in the twenty-first century.⁶⁰ In an argument which has a particular resonance for this reading of *The Echo*

Maker, Tony Davies suggests that the ultimate aim of any conception of the posthuman is to raise the awareness that:

Humanity is neither a given essence nor an achievable end, but a continuous and precarious process of becoming human, a process that entails the inescapable recognition that our humanity is on loan from others, to precisely the extent that we acknowledge it in them.⁶¹

In *The Echo Maker*, there can be no fixed point of recovery for Mark that would signal a return to normality because as a complex system the brain is “a set of changes for mirroring change.”⁶² The process of ‘becoming human’ is continual and common to all characters, since the interaction of the brain’s internal agents and their reaction to environmental stimulus means that our emergent sense of self is forever adapting to new conditions. Through shared processes of emergence, the profoundly entangled systems of ‘human’ and ‘biosphere’ are both, in effect, “every second being born.”⁶³

Posthumanism and complexity theory have a shared history; we can trace both their origins back to the Macy Conferences which took place in New York from 1946 to 1953.⁶⁴ Therefore it seems appropriate that the idea of humanity as something hybrid, multiple and continually ‘in process’ should have a prominent place within both discourses. In *When Species Meet*, Donna Haraway claims that “every species is a multispecies crowd”, formed by processes of co-shaping and coevolution.⁶⁵ Though closely associated with posthumanism through “The Cyborg Manifesto”, Haraway now shies away from the ‘posthumanist’ label since “urgent work still remains to be done in reference to those who must inhabit the troubled categories of woman and human.”⁶⁶ Instead of advocating either humanism or posthumanism, terms which are both problematic in their own way, she proposes that we consider instead a kind of “non-humanism” where “species of all sorts are in question” and where “co-constitutive companion species and coevolution are the rule, not the exception.”⁶⁷ This territory would seem to be the place where Richard Powers could most comfortably be situated as an author, since throughout *The Echo Maker* he seeks to redefine ‘the human’ as a

distributed complex system, intricately connected (and analogous to) the wider ecosystem of which it is a part, thus prompting a renewed interrogation of our ethical obligations towards the environment from the perspective of a common history and shared ontological status.

1. For a full account of complexity theory including the history of its development at the Santa Fe Institute and a more detailed explanation of the term 'complex adaptive system', see:
Roger Lewin, *Complexity: Life at the Edge of Chaos*, (London: Phoenix, 1992), and M. Mitchell Waldrop, *Complexity: The Emerging Science at the Edge of Order and Chaos* (New York: Simon & Schuster, 1992).
2. Trey Strecker, "Self-Organization and Selection in Richard Powers's *The Gold Bug Variations*," *Critique* Vol. 45 (Spring 2004): 227.
3. Richard Powers, "Making the Rounds," in *Intersections: Essays on Richard Powers*, ed. Stephen J. Burn and Peter Dempsey (Champaign: Dalkey Archive, 2008), 309.
4. Fritjof Capra, *The Web of Life: A New Scientific Understanding of Living Systems* (New York: Doubleday, 1996), 37.
5. Richard Powers, *The Echo Maker* (New York: Picador, 2006), 20.
6. Charles B. Harris, "The Story of the Self: *The Echo Maker* and Neurological Realism," in *Intersections: Essays on Richard Powers*, ed. Stephen J. Burn and Peter Dempsey (Champaign: Dalkey Archive, 2008), 238.
7. Scott Hermanson, "Chaos and Complexity in Richard Powers's *The Gold Bug Variations*," *Critique* 38.1 (Fall 1996).
8. Strecker, "Self Organization and Selection," 230.
9. Richard Powers, *The Gold Bug Variations* (New York: Harper Perennial, 1991), 589.
10. Richard Powers, "Making the Rounds," 305.
11. Tom LeClair, *In the Loop: Don DeLillo and the Systems Novel* (Urbana: U of Illinois P, 1987), 18.
12. Richard Powers, "Making the Rounds," 305.
13. LeClair talks of systems novels as large, 'mastering' works composed primarily of dialogue.
14. *Ibid.*, 308.
15. Scott Hermanson, "Home: A Conversation with Richard Powers and Tom LeClair," *Electronic Book Review* (2008): par. 8, <http://www.electronicbookreview.com/thread/fictionspresent/corporate>.
16. Powers, *The Echo Maker*, 54.
17. "The Brain is the Ultimate Storytelling Machine and Consciousness is the Ultimate Story," *The Believer* (Feb 2007), http://www.believermag.com/issues/200702/?read=interview_powers.
18. Powers, *The Echo Maker*, 424.
19. *Ibid.*, 348.
20. *Ibid.*, 278.
21. *Ibid.*, 347.
22. Waldrop, *Complexity*, 11.
23. Powers, *The Echo Maker*, 278 & 28.
24. *Ibid.*, 98.

25. Ibid., 20 & 278.
26. Ibid., 17.
27. Ibid., 42-43.
28. Ibid., 186.
29. Waldrop, *Complexity*, 209.
30. Melanie Mitchell, *Complexity: A Guided Tour*, (Oxford: Oxford University Press, 2009), 5.
31. Powers, *The Echo Maker*, 171.
32. Ibid., 164.
33. Luc Herman and Bart Vervaeck, "Capturing Capgras: *The Echo Maker* by Richard Powers," *Style* 43.3 (Fall 2009): 422.
34. Powers, *The Echo Maker*, 10.
35. Jill Owens, "Richard Powers' Narrative Impulse," *Powell's Books*, accessed July 2009, <<http://www.powells.com/authors/richardpowers.html>>.
36. Stephen J. Burn, "An Interview with Richard Powers," *Contemporary Literature* 49.2 (2008): 175.
37. Owens, "Richard Powers' Narrative Impulse."
38. Herman and Vervaeck, "Capturing Capgras," 468.
39. Richard Powers, *The Echo Maker*, 416.
40. Ibid., 182.
41. Harris, "The Story of the Self," 436.
42. Powers, *The Echo Maker*, 355 & 364.
43. Margaret Atwood, "In the Heart of the Heartland," *New York Review of Books*, December 21, 2006, <http://www.nybooks.com/articles/archives/2006/dec/21/in-the-heart-of-the-heartland/>.
44. Richard Powers, *The Echo Maker*, 347.
45. Ibid., 268.
46. Ibid., 66 & 154.
47. Ibid., 20.
48. Joseph Tabbi, *Cognitive Fictions*, (Minneapolis: University of Minnesota Press, 2002), 58.
49. Richard Powers, *The Gold Bug Variations*, 224.
50. Ibid., 252 & 324.
51. Ibid., 409-410.
52. Richard Powers, *The Echo Maker*, 301.
53. Ibid., 443.
54. Ibid., 346.
55. Richard Powers, *Galatea 2.2*, (New York: HarperPerennial, 1995) 315.

56. Richard Powers, *Gain*, (London: William Heinemann, 1998) 518.
57. Richard Powers, *Plowing the Dark*, (London: Vintage, 2002) 159-160.
58. Joseph Tabbi, *Cognitive Fictions*, 62.
59. Richard Powers, *The Echo Maker*, 408.
60. N. Katherine Hayles discusses Galatea 2.2 in relation to the discourse of posthumanism in:
N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*, (Chicago: U of Chicago P, 1999).
61. Tony Davies, *Humanism*, (Abingdon: Routledge, 2008).
62. Richard Powers, *The Echo Maker*, 382.
63. *Ibid.*, 450.
64. For an explanation of posthumanism and its connection to systems theory see:
Cary Wolfe, *What is Posthumanism?*, (Minneapolis: U of Minnesota P, 2010), xii.
For examples of a hybrid, multiple and 'in process' reading of the (post)human see Haraway and Hayles.
65. Donna J. Haraway, *When Species Meet*, (Minneapolis: U of Minnesota P, 2008), 165.
66. *Ibid.*, 17.
67. *Ibid.*, 220.

Bibliography

- Atwood, Margaret. "In the Heart of the Heartland." *New York Review of Books*. December 21, 2006. <http://www.nybooks.com/articles/archives/2006/dec/21/in-the-heart-of-the-heartland/>.
- Burn, Stephen J. "An Interview with Richard Powers." *Contemporary Literature* 49.2 (2008): 164-179.
- Davies, Tony. *Humanism*. Abingdon: Routledge, 2008.
- Capra, Fritjof. *The Web of Life: A New Scientific Understanding of Living Systems*. New York: Doubleday, 1996.
- Haraway, Donna J. *When Species Meet*. Minneapolis: U of Minnesota P, 2010.
- Harris, Charles B. "The Story of the Self: The Echo Maker and Neurological Realism." in *Intersections: Essays on Richard Powers*, edited by Stephen J. Burn and Peter Dempsey, 230-259. Champaign: Dalkey Archive, 2008.
- Hayles, N. Katherine. *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*. Chicago: U of Chicago P, 1999.
- Herman, Luc., and Bart Vervaeck. "Capturing Capgras: *The Echo Maker* by Richard Powers." *Style* 43.3 (Fall 2009): 407-428.
- Hermanson, Scott. "Chaos and Complexity in Richard Powers's *The Gold Bug Variations*." *Critique* 38.1 (Fall 1996): 38-51.
- . "Home: A Conversation with Richard Powers and Tom LeClair." *Electronic Book Review* (2008): par. 8.
<http://www.electronicbookreview.com/thread/fictionspresent/corporate>.
- LeClair, Tom. *In the Loop: Don DeLillo and the Systems Novel*. Urbana: U of Illinois P, 1987.

- Lewin, Roger. *Complexity: Life at the Edge of Chaos*. London: Phoenix, 1992.
- Mitchell, Melanie. *Complexity: A Guided Tour*. Oxford: Oxford University Press, 2009.
- Owens, Jill. "Richard Powers' Narrative Impulse." *Powell's Books*. Accessed July 2009.
 <<http://www.powells.com/authors/richardpowers.html>>.
- Powers, Richard. *Galatea 2.2*. New York: HarperPerennial, 1995.
- . *Gain*. London: William Heinemann, 1998.
- . "Making the Rounds." in *Intersections: Essays on Richard Powers*, edited by Stephen J. Burn and Peter Dempsey, 305-310. Champaign: Dalkey Archive, 2008.
- . *Plowing the Dark*. London: Vintage, 2002.
- . *The Echo Maker*. New York: Picador, 2006.
- . *The Gold Bug Variations*. New York: Harper Perennial, 1991.
- Strecker, Trey. "Self-Organization and Selection in Richard Powers's *The Gold Bug Variations*." *Critique* 45.3 (Spring 2004): 227-245.
- Tabbi, Joseph. *Cognitive Fictions*. Minneapolis: University of Minnesota Press, 2002.
- Waldrop, M. Mitchell. *Complexity: The Emerging Science at the Edge of Order and Chaos*. New York: Simon & Schuster, 1992.
- Wolfe, Cary. *What is Posthumanism?*. Minneapolis: U of Minnesota P, 2010.
- The Brain is the Ultimate Storytelling Machine and Consciousness is the Ultimate Story." *The Believer*. (Feb 2007).
http://www.believermag.com/issues/200702/?read=interview_powers.