

## CHAPTER TWO

# PERFORMING IMAGINATIVE INQUIRY: NARRATIVE EXPERIMENTS AND RHIZOSEMIOTIC PLAY

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In this semi-autobiographical essay I explore the representation and performance of imaginative inquiry practices in educational inquiry and other disciplines, with particular reference to ‘thought experiments’ in the natural sciences and comparable practices in the arts, humanities, and social sciences. I will share a number of experiences of writing as a mode of educational inquiry, with particular reference to narrative experiments inspired by Gilles Deleuze and Félix Guattari’s figuration of the rhizome – a process I characterize as *rhizosemiotic play* – and demonstrate the generativity of intertextual readings of selected fictions in catalyzing them.

### **Story and narrative theory**

*The Left Hand of Darkness* is a critically acclaimed novel by Ursula Le Guin (1969) and is often referred to as one of the first major works of feminist science fiction (or SF<sup>1</sup>, to use a term I prefer). The novel’s first-person narrator is an envoi from a galactic federation to the planet Gethen, and he begins by stating: “I’ll make my report as if I told a story, for I was taught as a child that Truth is a matter of the imagination. The soundest fact may fail or prevail in the style of its telling” (Le Guin, 1969, p.9).

I begin with this brief quotation from one of my favorite storytellers because it (and the story it introduces) encapsulates some of the key

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<sup>1</sup> I follow Donna Haraway (1989, p.5) in using the signifier SF to designate ‘an increasingly heterodox array of writing, reading, and marketing practices indicated by a proliferation of “sf” phrases: speculative fiction, science fiction, science fantasy, speculative futures, speculative fabulation’.

concepts that have informed and guided my practice as a curriculum scholar and educational research methodologist for more than two decades, namely, *story*, *imagination*, and *fiction* (with particular reference to SF and the ambiguous relations of ‘fact’, ‘truth’ and fiction). I will briefly explain how I think about and use each of these concepts before demonstrating in more detail how I have most recently performed narrative experiments in educational inquiry by deploying imaginative reading and writing practices that I characterize as ‘rhizosemiotic play’.

The elemental significance of stories in human experience is succinctly conveyed in two brief lines from Muriel Rukeyser’s (1968, p.115) poem, *The Speed of Darkness*:

The universe is made of stories,  
not of atoms.

In other words, for many purposes in social (and educational) inquiry, the worlds we inhabit (perceptual, existential, phenomenal, imagined, virtual, etc.) can usefully be understood as being made of stories. The idea that the universe is made of atoms is just one of those stories.

I should emphasize that my methodological interests in story and narrative diverge from what Michael Connelly and Jean Clandinin (1990) call ‘narrative inquiry’ – an approach to teacher education and teacher professional development that focuses on personal storytelling and that has become popular in many countries, especially Canada and the USA. Connelly and Clandinin argue that much of what we claim to ‘know’ in education comes from telling each other stories of educational experience, and narrative inquiry is thus concerned with analyzing and criticizing the stories we tell and hear and read in the course of our work – children’s stories, teachers’ stories, student teachers’ stories, and our own and other teacher educators’ stories. My initial enthusiasm for Connelly and Clandinin’s conception of narrative inquiry was relatively short-lived, principally because I found their silence on the implications of poststructuralism and deconstruction for narrative-based research to be indefensible. This silence persists in their subsequent work (see, for example, Clandinin & Connelly, 2000).

The uses to which I have put concepts of story and narrative in educational inquiry are more aligned with the so-called ‘narrative turn’ in the social sciences from the mid-1970s onwards, during which narrative theory migrated from literary studies to many other disciplines (see, for example, Louis Mink, 1974; Donald Polkinghorne, 1988; Laurel Richardson, 1990; Richard Rorty, 1979; Lawrence Stone, 1979). As Kenneth Knoespel (1991, pp.100-1) writes:

Narrative theory has challenged literary critics to recognize not only the various strategies used to configure particular texts within the literary canon, but to realize how forms of discourse in the natural and human sciences are themselves ordered as narratives. In effect narrative theory invites us to think of all discourse as taking the form of a story.

My initial response to this invitation was to examine the ways in which the discourses of curriculum areas in which I have a special interest – environmental education and science education – are configured as stories, with particular reference to poststructuralist questioning of narrative authority in the sciences and other disciplines. Many of these inquiries were framed by my practical interests in appraising the adequacy of the conventional narrative strategies used by science and environmental educators in their work and with exploring possible ways of expanding their range and variety (see, for example, Gough, 1991, 1993a, 1993b, 1994b)

### **Fictions, ‘facts’ and ‘truth’**

These initial inquiries led me to explore ways in which the types of stories we usually classify as fiction – and the modes of storytelling that produce them – might inform reading and writing in educational research (see, for example, Gough, 1994a, 1996, 1998, 2001, 2002). The question at issue here is whether it is possible, at least in principle, to establish intersubjectively reliable distinctions between ‘fiction’ on the one hand and particular constructions of ‘reality’ that we can call ‘factual’ or ‘truthful’ on the other. Although it is defensible to assert that reality exists *beyond* texts, much of what we think of as ‘real’ is – and can only be – apprehended *through* texts. For example, most of what we call history is inaccessible to us except in textual form. Furthermore, much of what we call ‘direct’ experience is mediated textually and intertextually (see Gough, 1993c). What is at issue here is not *belief* in the real but confidence in its representation. As Richard Rorty (1979, p.375), puts it, “to deny the power to ‘describe’ reality is not to deny reality” and “the world is out there, but descriptions of the world are not” (Rorty, 1989, p.5).

In other words, the conventional binary opposition of reality and fiction – and other binaries implied by this opposition, such as fact/fiction and real/imaginary – does not mean that it is possible to distinguish clearly between textual representations of the world ‘out there’ and other worlds constructed in texts. My own doubts about the referential adequacy of such binaries do not constitute an antirealist position but, rather, contribute to

my distrust of storytelling practices that seem to be motivated by what Sandra Harding (1993, p.193) calls “the longing for ‘one true story’ that has been the psychic motor for [modern] Western science”. Desires for ‘one true story’ have driven the construction of narrative strategies in which fact and fiction are mutually exclusive categories and particular kinds of facts, such as ‘scientific facts’ and ‘historical facts’, are equated with ‘reality’ – claims to ontological status for the worlds that scientists and historians imagine.

Fact and fiction are much closer, both culturally and linguistically, than these narrative strategies imply. A fiction, in the sense in which it derives from *fictio*, is something fashioned by a human agent. The etymology of ‘fact’ also reveals its reference to human action; a fact is the thing done, ‘that which actually happened’ (*OED*), the Latin *factum* being the neuter past participle of *facere*, do. In other words, both fact and fiction refer to human performance, but ‘fiction’ is an active form – the act of fashioning – whereas ‘fact’ descends from a past participle, a part of speech that disguises the generative act. Facts are testimonies to experience and, in Linda Hutcheon’s (1989, p.57) words, are “events to which we have given meaning”. Thus, historical facts are the testimonies that historians make from their experiences of using disciplined procedures of evidence production and interpretation to *construct* meaning – to *produce* events that are meaningful within their traditions of social relationships and organisation. Similarly, scientific facts are testimonies to the experiences of scientists as they use their specialized technologies to generate and inscribe data. Donna Haraway (1989, p.4) demonstrates how closely fact and fiction can be related in her description of biology as a narrative practice:

Biology is the fiction appropriate to objects called organisms; biology fashions the facts ‘discovered’ from organic beings. Organisms perform for the biologist, who transforms that performance into a truth attested by disciplined experience; i.e., into a fact, the jointly accomplished deed or feat of the scientist and the organism... *Both* the scientist and the organism are actors in a story-telling practice.

Performing educational inquiry as ‘actors in a story-telling practice’ means, in part, seeing fact and fiction as mutually constitutive – recognizing that facts are not only important elements of the stories we fashion from them but also that they are given meaning by the storytelling practices which produce them.

Thus, I argue that the binary opposition of fact and fiction is itself a fiction – a story fashioned to rationalize the strategies used by modernist

researchers in the sciences and social sciences to produce facts. Rather than thinking in these terms, I suggest that there may be some virtue in reconceiving *all* the stories we tell in education as fictions – as stories fashioned for particular purposes – especially those that most resolutely proclaim that they are ‘factual’. As Le Guin (1989, p.44-5) writes:

Fiction in particular, narration in general, may be seen... as an active encounter with the environment by means of posing options and alternatives, and an enlargement of present reality by connecting it to the unverifiable past and the unpredictable future. A totally factual narrative, were there such a thing, would be passive: a mirror reflecting all without distortion... but fiction does not reflect, nor is the narrator’s eye that of a camera... Fiction connects possibilities... and by doing so it is useful to us.

If we think of all stories of educational inquiry as being fictions, we may be less likely to privilege without question those that pretend not to be, and more likely to judge each story on its particular merits in serving worthwhile purposes in education.

### **Thought experiments**

The academic curricula and research protocols that predominate in most education systems and institutions in modern, Western, industrial nations (and in systems and institutions modeled on them) tend not to teach learners that “truth is a matter of the imagination”, despite the crucial roles that imagination (literally the ability to produce images in one’s mind) has played in the development of many disciplines. For example, *thought experiments* have been particularly significant in the history of the physical sciences. The term ‘thought experiment’ came to the English language in the late-19<sup>th</sup> or early-20<sup>th</sup> century through translations of papers by the Austrian physicist Ernst Mach (1897, 1905) in which he used the mixed German-Latin word *Gedankenexperiment* (literally, experiment conducted in the thoughts).<sup>2</sup> Some philosophers now use the term in a relatively narrow sense. For example, Roy Sorensen (1992, p.255) defines a thought experiment as “an experiment that purports to achieve its aim without benefit of execution”, which might be because circumstances preclude physical testing procedures. Other writers, such as James Brown (2004, p.1126), prefer a looser characterization:

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<sup>2</sup> Some authors (e.g. Martin Cohen, 2005, p.55) credit Mach with coining *Gedankenexperiment*, but Johannes Witt-Hansen (1976) clearly establishes that Danish physicist and chemist Hans Christian Ørsted used the term in 1811.

It's difficult to say precisely what thought experiments are. Luckily, it's also unimportant. We know them when we see them, and that's enough to make discussion possible. A few features are obvious. Thought experiments are carried out in the mind and involve something akin to experience; that is, we typically see something happening in a thought experiment. Often there is more than mere observation. As in a real experiment, there might be calculating, some application of theory, guesswork, and conjecture. The best way to get a grip on what thought experiments are is to simply look at lots of examples.

Some of the best-known examples of thought experiments are those performed by the innovative physicists who pioneered what we might now call postmodern physics in the late-19<sup>th</sup> and early-20<sup>th</sup> centuries. As Aspasia Moue, Kyriakos Masavetas and Haido Karayianni (2006, p.61) note, these experiments were often the subjects of conversations or correspondence with each other, and were used to get their points across and to dramatize the revolutionary and/or paradoxical aspects of their theoretical discoveries or explanations. Erwin Schrödinger's cat (quantum mechanics) and Albert Einstein's elevator (general relativity) and train (special relativity) are now understood as significant 'events' in the histories of these disciplines. Since the term 'thought experiment' entered the English language, it has been applied retrospectively to similarly significant speculations in physical science, including James Maxwell's demon (thermodynamics, circa 1871), Galileo Galilei's free fall experiment (disproving Aristotle's theory of gravity, circa 1638), and Simon Stevin's inclined plane (geometry and physics, circa 1583).<sup>3</sup> These scientific thought experiments are a species of fiction – stories fashioned along the lines of "let's say this or that is such and so, and see what happens..." (Le Guin, 1979, p.156) and they thus work in the way that Le Guin characterizes fiction above: they connect possibilities and by doing so are useful to us.

Despite the ubiquity and utility of thought experiments in the history and philosophy of science, science education textbooks and curricula rarely foreground their significance and, where they do, tend to diminish their imaginative dimensions. Recent studies in the UK (see, for example, Gilbert & Reiner, 2000; Reiner, 1998; Reiner & Gilbert, 2000) suggest that school and university physics textbooks tend to conflate thought *experiments* with thought *simulations*. In simulations, the behavior of a physical phenomenon is illustrated rather than tested, theory is taken for granted and embedded rather than being tentative and emergent, and the

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<sup>3</sup> See Brown (1991) for descriptions of these and other thought experiments in the natural sciences.

outcome is assumed rather than anticipated (this distortion of an important concept in science is similar to the distortion than many science teachers and textbooks reproduce by persistently representing *demonstrations* of physical phenomena – such as a heating a bimetallic strip until it bends – as ‘experiments’).

It should be clear that thought experiments are not only the province of science. As Le Guin (1979, p.156) points out, many SF stories can be read as thought experiments. Thus, for example, in *Frankenstein* Mary Shelley (1992/1818) writes: let us say that a young doctor creates a human being in his laboratory... In *Dune*, Frank Herbert (1968/1965) writes: let us say that massive desertification threatens a planet very like Earth... In *The Left Hand of Darkness*, Le Guin (1969) writes: let us say that humans are androgynous... Le Guin (1979, p.156) also insists that such thought experiments are neither extrapolative nor predictive – their form is not, “if this goes on, this is what will happen” – but, rather, are attempts to produce alternative representations of present circumstances and uncertainties; within stories so conceived, “thought and intuition<sup>4</sup> can move freely within bounds set only by the terms of the experiment”:

The purpose of a thought-experiment, as the term was used by Schrödinger and other physicists, is not to predict the future – indeed Schrödinger’s most famous thought-experiment goes to show that the ‘future,’ on the quantum level, *cannot* be predicted – but to describe reality, the present world.

Science fiction is not predictive; it is descriptive (emphasis in original).

Thought experiments in science and literature are not only comparable imaginative practices, but also – in some circumstances at least – may be complementary in other ways. For example, in *Chaos Bound: Orderly Disorder in Contemporary Literature and Science*, Katherine Hayles (1990, p.xi) examines the late twentieth-century preoccupation with nonlinear dynamics in both literature and science and demonstrates how different disciplinary traditions may simultaneously be informed by “isomorphic paradigms”:

{D}ifferent disciplines, sufficiently distant from one another so that direct influence seems unlikely,... nevertheless focus on similar kinds of problems [at] about the same time and base their formulations on isomorphic assumptions.... Different disciplines are drawn to similar problems because the concerns underlying them are highly charged within

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<sup>4</sup> On the role of intuition in scientific thought experiments see Brendel (2004).

a prevailing cultural context. Moreover, different disciplines base the theories they construct on similar presuppositions because these are the assumptions that guide the constitution of knowledge in a given episteme. This position implies, of course, that scientific theories and models are culturally conditioned, partaking of and rooted in assumptions that can be found at multiple sites throughout the culture.

More recently, David Butt (2007) has shown that Ferdinand de Saussure and Albert Einstein were engaging in similar epistemological projects at around the same time, with Saussure introducing the principle of relativity of sign systems just as Einstein was introducing the principle of relativity of time and space. Butt also demonstrates that the texts of certain modernist poets (e.g. Wallace Stevens, Kenneth Slessor) and novelists (e.g. D.H. Lawrence) enact similar linguistic thought experiments to those conducted by Einstein and other theoretical physicists of his era.

During the past 4-5 years I have become more aware of the similarities between thought experiments (in science and literature) and the 'narrative experiments' I have attempted to perform and represent in educational inquiry. In the remainder of this essay, I will demonstrate some of the imaginative reading and writing practices that have been generative for me (and, apparently, for my peers).

### **Narrative experiments and rhizosemiotic play**

My approach to any question, problem or issue of educational inquiry is now shaped by my methodological disposition to produce texts of the kind that Laurel Richardson (2001) calls "writing-stories" and that I call "narrative experiments" (Gough, 2004a). Richardson (2001, p.35) argues (persuasively in my view) that:

*Writing is a method of discovery*, a way of finding out about yourself and your world. When we view writing as a *method*, we experience 'language-in-use,' how we 'word the world' into existence ... And then we 'reword' the world, erase the computer screen, check the thesaurus, move a paragraph, again and again. This 'worded world' never accurately, precisely, completely captures the studied world, yet we persist in trying. Writing as a method of inquiry honors and encourages the trying, recognizing it as emblematic of the significance of language (emphases in original).

Like Richardson (2001, p.35), "I write because I want to find something out. I write in order to learn something that I did not know before I wrote it", and I increasingly find it generative to bring objects of

inquiry into intertextual play with Deleuze and Guattari's geophilosophy and 'fictions' in the broadest sense of the term. I use the term 'essay' here both as a verb – to attempt, to try, to test – and as a noun. In theoretical inquiry an essay can serve similar purposes to an experiment in empirical research – a methodical way of investigating a question, problem or issue – although I find more appropriate analogies for my work in the experimental arts than in the experimental sciences.<sup>5</sup> Both 'essay' and the related term 'assay' come to English speakers through the French *essayeur* from the Latin *exigere*, to weigh. Thus, I write essays to test ideas, to 'weigh' them up, to give me (and eventually, I hope, my colleagues) a sense of their worth.

In order to demonstrate how I go about writing "to find something out" I will focus on a process that I have deployed in three narrative experiments inspired by Deleuze and Guattari's (1987) figuration of the rhizome – a process that I characterize as *rhizosemiotic play*. My 'reports' of these experiments are available elsewhere (Gough, 2004b, 2006, 2007), and my intention here is simply to demonstrate some textual strategies that I use to perform such experiments, with particular reference to the generativity of intertextual readings of selected fictions in catalyzing them.

## Deleuze and Guattari's geophilosophy

Deleuze and Guattari (1994, p.5) map the "geography of reason" from pre-Socratic times to the present, a geophilosophy describing relations between particular spatial configurations and locations and the philosophical formations that arise in them. "Philosophy", they say, "is the discipline that involves creating concepts" through which knowledge can be generated. As Michael Peters (2004) points out, this is very different from the approaches taken by many analytic and linguistic philosophers who are more concerned with the *clarification* of concepts.

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<sup>5</sup> For example, in a 1950 interview, the abstract expressionist painter Jackson Pollock was asked: "Then you don't actually have a preconceived image of a canvas in your mind?" He replied: "Well, not exactly – no – because it hasn't been created, you see. Something new – it's quite different from working, say, from a still life where you set up objects and work directly from them" (quoted in Pinar, 1994, p.7). Richardson (2001, p.35) makes a parallel point about writing as research: "I was taught... as perhaps you were, too, not to write until I knew what I wanted to say, until my points were organized and outlined. No surprise, this static writing model coheres with mechanistic scientism, quantitative research, and entombed scholarship".

Deleuze and Guattari (1987) created a new critical language for analyzing thinking as flows or movements across space. Concepts such as *assemblage*, *deterritorialisation*, *lines of flight*, *nomadology*, and *rhizome/rhizomatics* clearly refer to spatial relationships and to ways of conceiving ourselves and other objects moving in space. For example, Deleuze and Guattari (1987, p.23) distinguish the “sedentary point of view” that characterizes much Western philosophy, history and science from a nomadic subjectivity that allows thought to move across conventional categories and move against ‘settled’ concepts and theories. They also distinguish “rhizomatic” thinking from “arborescent” conceptions of knowledge as hierarchically articulated branches of a central stem or trunk rooted in firm foundations. As Umberto Eco (1984, p.57) explains, “the rhizome is so constructed that every path can be connected with every other one. It has no center, no periphery, no exit, because it is potentially infinite. The space of conjecture is a rhizome space”.

In a world of increasingly complex information/communication/knowledge technologies, the space of educational inquiry is also becoming a ‘rhizome space’ that is more hospitable to nomadic than to sedentary thought. Rhizome is to a tree as the Internet is to a letter – networking that echoes the hyperconnectivity of the Internet. The structural reality of a tree and a letter is relatively simple: a trunk connecting two points through or over a mapped surface. But rhizomes and the Internet<sup>6</sup> are infinitely complex and continuously changing.

## **RhizomANTics**

I began “RhizomANTically becoming-cyborg: performing posthuman pedagogies” (Gough, 2004, p.253) as follows:

Make a rhizome. But you don’t know what you can make a rhizome with, you don’t know which subterranean stem is going to make a rhizome, or enter a becoming, people your desert. So experiment (Deleuze & Guattari, 1987, p.246).

So I shall. This paper is a narrative experiment inspired by Deleuze and Guattari’s (1987) figuration of the rhizome. It is a textual assemblage of

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<sup>6</sup> See, for example, the Burch/Cheswick map of the Internet available at <http://tiny.cc/3mo3d> Accessed 21 April 2010.

popular and academic<sup>7</sup> representations of cyborgs that I hope might question, provoke and challenge some of the dominant discourses and assumptions of curriculum, teaching and learning.

Emboldened by Deleuze's penchant for inventing new terms for his figurations,<sup>8</sup> I have coined the term 'rhizomANTic' (sometimes 'rhizomantic') to name a methodological disposition that connects Deleuze's rhizomatics, ANT (actor-network theory), and Donna Haraway's (1997, p.16) 'invented category of semANTics, *diffractions*' (my caps.).<sup>9</sup> Diffraction is 'an optical metaphor for the effort to make a difference in the world', which Haraway (1994) also represents by the activity of making a 'cat's cradle' – a metaphor that imagines the performance of sociotechnical relations as a less orderly and less functionalist activity than the word 'network' often conveys. As my reference to Haraway's work suggests, my engagement with ANT leans towards those aspects of the theory that John Law (1999) characterizes as 'after-ANT'. In an annotated bibliography on Law's ANT Resource Home Page, he refers to Haraway's (1997) *Modest\_Witness@Second\_Millennium.FemaleMan@Meets\_OncoMouse*™ as 'the best-known example of the different and partially related radical feminist technoscience alternative to actor-network theory. The "after-ANT" studies in this resource in many cases owe as much or more to Haraway as to ANT itself'.<sup>10</sup>

I also use the term rhizomantic because much of this essay is about ants.

Why ants? Ants came to my rescue when I was struggling to expand a hastily written abstract into a presentable conference paper. My abstract, titled "Becoming-cyborg: performing posthuman pedagogies", did little more than point to the proliferation of cyborg bodies and identities in sites of educational practice and signal my intention to draw on theoretical frameworks provided by Deleuze and ANT to explore the pedagogical implications of this proliferation. I wrote (with unwarranted confidence) that my paper would "demonstrate how a becoming-cyborg teacher might deploy popular and theoretical conceptions of cyborgs as heuristics in educational work", but I had very few ideas about how I might do this.

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<sup>7</sup> I use the terms 'popular' and 'academic' to register my perceptions of difference across sites of cultural production, not to inscribe a binary distinction (fn. in original).

<sup>8</sup> Rosi Braidotti (2000: 170) argues that "the notion of 'figurations' – in contrast to the representational function of 'metaphors' – emerges as crucial to Deleuze's notion of a conceptually charged use of the imagination" (fn. in original).

<sup>9</sup> Drawing attention to the ANT in semantics is gratuitous, but if I don't someone else will (fn. in original).

<sup>10</sup> <http://tiny.cc/m9p3w> (fn. in original; access confirmed 21 April 2010).

In searching recent literature on cyborgs and education I found “A manifesto for cyborg pedagogy?” by Tim Angus, Ian Cook and James Evans (2001), an account of teaching a university course that was explicitly grounded in ANT. I was impressed by the authors’ thoughtful theorizing of cyborg pedagogy but I was curious as to how Deleuzean (con)figurations might ‘add value’ to their approach. That was when the ants appeared – from several directions simultaneously. In retrospect, I can only surmise that my frequent reading of the acronym ‘ANT’ brought them out of the recesses of my memory into the forefront of my consciousness.

I recalled the theoretical ants in Deleuze and Guattari’s (1987, p.22) recollections of writing *A Thousand Plateaus* – “we watched lines leave one plateau and proceed to another like columns of tiny ants” – and in Patricia O’Riley’s (2003, p.27) description of rhizomes as being “like crabgrass, ants, wolf packs, and children”. I recalled my son’s fascination with the game SimAnt in the mid-1990s and the giant mutant ants from movies such as *Them!* (1951) and *Empire of the Ants* (1977). But the ants that clamored more insistently for my attention were those that populated some of my favorite fictions, such as H.G. Wells’ (1905) *The Empire of the Ants*, Bernard Werbers’ (1991) *Les Fourmis* trilogy, Philip K. Dick’s (1991/1969) short story, “The electric ant”, and Rudy Rucker’s (1994) novel, *The Hacker and the Ants*.

The most generative fictional ant came from Jerry Prosser’s (1992) graphic novel, *Cyberantics*, which purports to be an annotated version of an illustrated children’s book written by an eccentric cyberneticist as a report of his achievements in building (and setting loose) a cybernetic ant. *Cyberantics* is an ingenious (and very amusing) *metafiction*, a story that, in Patricia Waugh’s (1984, p.2) words, “draws attention to its status as an artifact in order to pose questions about the relationship between fiction and reality”. As a metafiction *Cyberantics* functions as a complex system generating multiple interpretations and displays the properties that contemporary science calls chaos and complexity. Thus, it explores and illustrates, in a form accessible to children and adults alike, an important correspondence between postmodern science and literature. As Peter Stoicheff (1991, p.85) writes, “metafiction and scientific chaos [and I would add *scientific complexity*] are embraced by a larger revolution in contemporary thought that examines the similar roles of narrative, and of investigative procedure, in our ‘reading’ or knowledge of the world”. *Cyberantics* can therefore be understood as an alternative representation of a postmodern science education text. It embeds stories of modern science, a delightful children’s story, and a satire suitable for children and adults,

within a complex and complicating metafiction that inhabits a conceptual space shared by much postmodernist science and poststructuralist cultural theorizing.

I realised that *Cyberantics* exemplifies what is missing from Angus et al.'s (2001) manifesto for cyborg pedagogy: their work is *cyber* without the *antics*, that is, it lacks the art, paradox and humor that might motivate us to imagine and invent maps of networks that *experiment* with the real rather than provide mere tracings of it. It is rewarding to note that the authors of this manifesto have also found this critique to be generative in their own further work (Evans et al., 2008).

Without *Cyberantics* I doubt that I would have coined 'rhizomatic' or appreciated the interpretive possibilities of this neologism. As soon as I wrote the word 'rhizomatic' as 'rhizomANTic' I realized that it signified concisely my suspicion that ANT cannot wholly be accommodated by rhizomatics – it fits, but it sits a little awkwardly and uncomfortably. I was then able to demonstrate the extent of this fit by comparing Haraway's and actor-network theorists' approaches to writing cyborgs with each other and with the implications of Deleuze and Guattari's work.

### **Fictions as catalysts of rhizosemiotic play**

It is beyond the scope of this chapter to describe the two other examples of rhizosemiotic play to which I refer above. Nevertheless, I want to emphasize that 'fictions' – in a broad sense – were again crucial. "Shaking the tree, making a rhizome: towards a nomadic geophilosophy of science education" (Gough, 2006) was inspired by Peter Gabriel and Youssou N'Dour's (1989) song, "Shaking the tree", which celebrates the women's movement in Africa, and led me to imagine rhizomes "shaking the tree" of modern Western science education by destabilizing arborescent conceptions of knowledge. Other 'fictions' animating this essay include Salvador Dali's witty sculpture, *Homage to Newton*, and Amitav Ghosh's (1997) *The Calcutta Chromosome: A Novel of Fevers, Delirium, and Discovery*, an SF thriller that imagines a counter-history (and counter-science) of malaria. This essay too has evidently been generative for my peers (see, for example, Margaret Somerville, 2008).

Similarly, "Changing planes: rhizosemiotic play in transnational curriculum inquiry" (Gough, 2007), was inspired by Ursula Le Guin's (2004) collection of linked SF stories, *Changing Planes*. Le Guin's pun ('planes' refers both to airplanes and to planes of existence) helped me to 'play' with Deleuze and Guattari's argument that modes of intellectual inquiry need to account for the planes of immanence upon which they

operate – the preconceptual fields presupposed by the concepts that inquiry creates. Curriculum inquiry currently operates on nationally distinctive planes of immanence, and I speculate that the internationalisation of curriculum studies might, therefore, require curriculum scholars to be able to *change planes* – to move between one plane of immanence and another and/or to transform their own planes.

Each of these essays takes seriously Deleuze's (1994, p.xx) assertion that a philosophical work should be "in part a kind of science fiction". However, as I hope I have demonstrated here, taking Deleuze 'seriously' does not prevent a writer from having a little fun.

### **A pause in the middle of things: rhizosemiosis and rhythm**

Deleuze and Guattari (1987, p.25) explain that rhizomes have no beginnings or ends but are always in the middle: beginnings and ends imply a linear movement, whereas working in the middle is about "coming and going rather than starting and finishing". I agree with Elizabeth St. Pierre (1997, p.176) that

we must learn to live in the middle of things, in the tension of conflict and confusion and possibility; and we must become adept at making do with the messiness of that condition and at finding agency within rather than assuming it in advance of the ambiguity of language and cultural practice.

Thus, I have no desire to 'conclude' this essay but will simply pause "in the middle of things" to reflect briefly on my "finding agency" within the ambiguities of language and cultural practice represented and performed by thought experiments, narrative experiments, and rhizosemiotic play.

To reiterate Brown's (2004, p.1126) comments on thought experiments in science, it is "difficult to say precisely what thought experiments are", and I would say the same for the narrative experiments I perform. But some of the features of thought experiments (in science) to which Brown refers are also apparent in my narrative experiments, which "are carried out in [my] mind" and "involve something akin to experience"; that is, I "typically see something happening" (rhizomes shooting, ants roaming), but "there is more than mere observation". As in a scientific experiment, there is usually "some application of theory, guesswork, and conjecture". I agree with Brown that "the best way to get a grip on what [narrative]

experiments are is to simply look at lots of examples”, and I invite readers to peruse in further detail those I have referred to here, among others.<sup>11</sup>

Some of the finest and most inspiring examples of narrative experiments are those performed by great novelists, and their reflections on their own writing processes can be illuminating. For example, Virginia Woolf (1980, p.247) wrote to Vita Sackville-West in 1926:

Style is a very simple matter: it is all *rhythm*. Once you get that, you can't use the wrong words. But on the other hand here I am sitting after half the morning, crammed with ideas and visions, and so on, and can't dislodge them, for lack of the right rhythm. Now this is very profound, what rhythm is, and goes far deeper than words. A sight, an emotion, creates this wave in the mind, long before it makes words to fit it; and in writing (such is my present belief) one has to recapture this, and set this working (which has nothing apparently to do with words) and then, as it breaks and tumbles in the mind, it makes words to fit it. But no doubt I shall think differently next year.

At present I could say that ants created a wave that broke and tumbled in my mind – and I made words to fit it – but no doubt I too shall think differently next year (or even sooner).

## References

- Angus, Tim, Cook, Ian, & Evans, James. (2001). A manifesto for cyborg pedagogy? *International Research in Geographical and Environmental Education*, 10(2), 195-201.
- Braidotti, Rosi. (2000). Teratologies. In Ian Buchanan & Claire Colebrook (Eds.), *Deleuze and Feminist Theory* (pp. 156-172). Edinburgh: Edinburgh University Press.
- Brendel, Elke. (2004). Intuition pumps and the proper use of thought experiments. *Dialectica*, 58(1), 89-108.
- Brown, James Robert. (1991). *The Laboratory of the Mind: Thought Experiments in the Natural Sciences*. London: Routledge.
- . (2004). Peeking into Plato's heaven. *Philosophy of Science*, 71(5), 1126-1138.
- Butt, David. (2007). Thought experiments in verbal art: examples from Modernism. In Donna R. Miller & Monica Turci (Eds.), *Language and Verbal Art Revisited: Linguistic Approaches to the Study of Literature* (pp. 68-96). London: Equinox.

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<sup>11</sup> For a more complete list of my narrative experiments go to <http://tiny.cc/rvoon>

- Clandinin, D. Jean, & Connelly, F. Michael. (2000). *Narrative Inquiry: Experience and Story in Qualitative Research*. San Francisco: Jossey-Bass.
- Cohen, Martin. (2005). *Wittgenstein's Beetle and Other Classic Thought Experiments*. Oxford: Blackwell.
- Connelly, F. Michael, & Clandinin, D. Jean. (1990). Stories of experience and narrative inquiry. *Educational Researcher*, 19(5), 2-14.
- Deleuze, Gilles. (1994). *Difference and Repetition* (Paul Patton, Trans.). New York: Columbia University Press.
- Deleuze, Gilles, & Guattari, Félix. (1987). *A Thousand Plateaus: Capitalism and Schizophrenia* (Brian Massumi, Trans.). Minneapolis: University of Minnesota Press.
- Deleuze, Gilles, & Guattari, Félix. (1994). *What is Philosophy?* (G. Burchell & H. Tomlinson, Trans.). London: Verso.
- Dick, Philip K. (1991/1969). The electric ant. In *We Can Remember It For You Wholesale: Volume 5 of the Collected Stories of Philip K. Dick* (pp. 290-308). London: Grafton.
- Eco, Umberto. (1984). *Postscript to The Name of the Rose* (William Weaver, Trans.). New York: Harcourt, Brace and Jovanovich.
- Evans, James, Cook, Ian, & Griffiths, Helen. (2008). Creativity, group pedagogy and social action: a departure from Gough. *Educational Philosophy and Theory*, 40(2), 330-345.
- Gabriel, Peter, & N'Dour, Youssou. (1989). Shaking the tree [Song]. London/Paris: Peter Gabriel Ltd/Editions Virgin Musique.
- Ghosh, Amitav. (1997). *The Calcutta Chromosome: A Novel of Fevers, Delirium and Discovery*. New York: Avon Books.
- Gilbert, John, & Reiner, Miriam. (2000). Thought experiments in science education: potential and current realization. *International Journal of Science Education*, 22(3), 265-283.
- Gough, Noel. (1991). Narrative and nature: unsustainable fictions in environmental education. *Australian Journal of Environmental Education*, 7, 31-42.
- . (1993a). Environmental education, narrative complexity and postmodern science/fiction. *International Journal of Science Education*, 15(5), 607-625.
- . (1993b). *Laboratories in Fiction: Science Education and Popular Media*. Geelong: Deakin University.
- . (1993c). Neuromancing the stones: experience, intertextuality, and cyberpunk science fiction. *Journal of Experiential Education*, 16(3), 9-17.

- (1994a). Narration, reflection, diffraction: aspects of fiction in educational inquiry. *Australian Educational Researcher*, 21(3), 47-76.
  - (1994b). Playing at catastrophe: ecopolitical education after poststructuralism. *Educational Theory*, 44(2), 189-210.
  - (1996). Textual authority in Bram Stoker's *Dracula*; or, what's really at stake in action research? *Educational Action Research*, 4(2), 257-265.
  - (1998). Reflections and diffractions: functions of fiction in curriculum inquiry. In William F. Pinar (Ed.), *Curriculum: Toward New Identities* (pp. 94-127). New York: Garland.
  - (2001). Learning from *Disgrace*: a troubling narrative for South African curriculum work. *Perspectives in Education*, 19(1), 107-126.
  - (2002). Fictions for representing and generating semiotic consciousness: the crime story and educational inquiry. *International Journal of Applied Semiotics*, 3(2), 59-76.
  - (2004a). Read intertextually, write an essay, make a rhizome: performing narrative experiments in educational inquiry. In Heather Piper & Ian Stronach (Eds.), *Educational Research: Difference and Diversity* (pp. 155-176). Aldershot: Ashgate.
  - (2004b). RhizomANTically becoming-cyborg: performing posthuman pedagogies. *Educational Philosophy and Theory*, 36(3), 253-265.
  - (2006). Shaking the tree, making a rhizome: towards a nomadic geophilosophy of science education. *Educational Philosophy and Theory*, 38(5), 625-645.
  - (2007). Changing planes: rhizosemiotic play in transnational curriculum inquiry. *Studies in Philosophy and Education*, 26(3), 279-294.
- Haraway, Donna J. (1989). *Primate Visions: Gender, Race, and Nature in the World of Modern Science*. New York: Routledge.
- (1994). A game of cat's cradle: science studies, feminist theory, cultural studies. *Configurations: A Journal of Literature, Science, and Technology*, 2(1), 59-71.
  - (1997). *Modest\_Witness@Second\_Millennium.FemaleMan©\_Meets\_OncoMouse™: Feminism and Technoscience*. New York and London: Routledge.
- Harding, Sandra. (1993). Introduction: Eurocentric scientific illiteracy – a challenge for the world community. In Sandra Harding (Ed.), *The 'Racial' Economy of Science: Toward a Democratic Future* (pp. 1-22). Bloomington and Indianapolis: Indiana University Press.

- Hayles, N. Katherine. (1990). *Chaos Bound: Orderly Disorder in Contemporary Literature and Science*. Ithaca NY: Cornell University Press.
- Herbert, Frank. (1968/1965). *Dune*. London: New English Library.
- Hutcheon, Linda. (1989). *The Politics of Postmodernism*. London and New York: Routledge.
- Knoespel, Kenneth J. (1991). The emplotment of chaos: instability and narrative order. In N. Katherine Hayles (Ed.), *Chaos and Order: Complex Dynamics in Literature and Science* (pp. 100-122). Chicago: University of Chicago Press.
- Law, John. (1999). After ANT: topology, naming and complexity. In John Law & John Hassard (Eds.), *Actor Network Theory and After* (pp. 1-14). Oxford: Blackwell.
- Le Guin, Ursula K. (1969). *The Left Hand of Darkness*. New York: Ace.
- . (1979). *The Language of the Night: Essays on Fantasy and Science Fiction*. New York: Berkley Books.
- . (1989). Some thoughts on narrative. In *Dancing at the Edge of the World: Thoughts on Words, Women, Places* (pp. 37-45). New York: Grove Press.
- . (2004). *Changing Planes*. London: Victor Gollancz.
- Mach, Ernst. (1897). Über Gedankenexperimente. *Zeitschrift für Physikalischen und Chemischen Unterricht*, 10, 1-5.
- . (1905). Über Gedankenexperimente. In *Erkenntnis und Irrtum. Skizzen zur Psychologie der Forschung* (pp. 183-200). Leipzig: Verlag von Johann Ambrosius.
- Mink, Louis O. (1974). History and fiction as modes of comprehension. In Ralph Cohen (Ed.), *New Directions in Literary History* (pp. 107-124). Baltimore: The Johns Hopkins University Press.
- Moue, Aspasia, Masavetas, Kyriakos, & Karayianni, Haido. (2006). Tracing the development of thought experiments in the philosophy of natural sciences. *Journal for General Philosophy of Science*, 37(1), 61-75.
- O'Riley, Patricia A. (2003). *Technology, Culture, and Socioeconomics: A Rhizoanalysis of Educational Discourses*. New York: Peter Lang.
- Peters, Michael. (2004). Geophilosophy, education and the pedagogy of the concept. *Educational Philosophy and Theory*, 36(3), 217-231.
- Pinar, William F. (1994). *Autobiography, Politics and Sexuality: Essays in Curriculum Theory 1972-1992*. New York: Peter Lang.
- Polkinghorne, Donald E. (1988). *Narrative Knowing and the Human Sciences*. Albany: State University of New York Press.

- Prosser, Jerry, & Geary, Rick. (1992). *Cyberantics*. New York: Dark Horse Comics.
- Reiner, Miriam. (1998). Thought experiments and collaborative learning in physics. *International Journal of Science Education*, 20(9), 1043-1058.
- Reiner, Miriam, & Gilbert, John. (2000). Epistemological resources for thought experimentation in science learning. *International Journal of Science Education*, 22(5), 489 - 506.
- Richardson, Laurel. (1990). Narrative and sociology. *Journal of Contemporary Ethnography*, 19(1), 116-135.
- . (2001). Getting personal: writing-stories. *International Journal of Qualitative Studies in Education*, 14(1), 33-38.
- Rorty, Richard. (1979). *Philosophy and the Mirror of Nature*. Princeton NJ: Princeton University Press.
- . (1989). *Contingency, Irony, and Solidarity*. Cambridge MA: Cambridge University Press.
- Rucker, Rudy. (1994). *The Hacker and the Ants*. New York: Avon Books.
- Rukeyser, Muriel. (1968). *The Speed of Darkness*. New York: Random House.
- Somerville, Margaret. (2008). A place pedagogy for 'global contemporaneity'. *Educational Philosophy and Theory*, 40 (Online at <http://tiny.cc/vvcdqj>).
- Sorensen, Roy A. (1992). *Thought Experiments*. New York: Oxford University Press.
- St. Pierre, Elizabeth A. (1997). Methodology in the fold and the irruption of transgressive data. *International Journal of Qualitative Studies in Education*, 10(2), 175-189.
- Stoicheff, Peter. (1991). The chaos of metafiction. In N. Katherine Hayles (Ed.), *Chaos and Order: Complex Dynamics in Literature and Science* (pp. 85-99). Chicago: University of Chicago Press.
- Stone, Lawrence. (1979). The revival of narrative: reflections on a new old history. *Past and Present*, 85, 3-25.
- Wauth, Patricia. (1984). *Metafiction: The Theory and Practice of Self-Conscious Fiction*. London: Methuen.
- Witt-Hansen, Johannes. (1976). H.C. Ørsted, Immanuel Kant and the thought experiment. *Danish Yearbook of Philosophy*, 13, 48-65.
- Woolf, Virginia. (1980). *The Letters of Virginia Woolf, Volume 3, 1923-1928* (Joanne Trautmann Nigel Nicolson, Eds.). London: Hogarth Press.