Beyond Simple Order: Complexity and Postmodern Politics

DONNA TRUEIT
University of Victoria

Introduction

This paper is a response to the allegation that work in the social sciences and humanities that draws its inspiration from complexity science is not "critical" in the political sense (Best and Kellner, 1999, 1997; Rahman, 2006). Such allegations contend that those using complexity science to inform their research in the social sciences and humanities reinscribe the dominant (positivist, scientific) discourse into cultural power structures. In some respects this allegation is legitimate – complexity *is* often used in a way that does nothing to unsettle the seemingly easy relationship between science, reason and representation. It is also a somewhat simplistic assertion, as complexity science *itself* unsettles the easy relationship between science, reason and representation (see, e.g., Cilliers, 1998) and therefore, has implications for what it means to be critical.

The tangled knot that twines science to reason and representation is historical and involves an understanding of cultural discursive practices, i.e., ways of thinking and speaking with each other, which is, also, ways of *being* with one another. I focus here on the concept of what it means to be critical because, as a discursive practice, critic/critique fits within a modernist frame and serves to maintain a particular rational order, that of the dominant discourse of modernism. In other words, order is achieved, in part, through critical discursive practices.

In this paper I explore the historically intertwined relationship of modern science and the rational concept of order embedded in modern discursive practices. I suggest that the concept of politics is closely aligned with rational ideas about order. Order is conceived as a system of relations. Although Newton's simple, mechanistic conception of order was disrupted by theories of relativity, evolution, and self-organizing adaptive systems, changes in discursive practices of reason and representation have lagged far behind.

I begin with Timothy Reiss's (1982) use of the terms, discourse, episteme and discursive practice. Following this I discuss the discourse dominant in, and representative of, a culture of modernism. In so doing I focus on some of the political problems associated with that discourse, suggesting that "critique," "critic," and "critical" are discursive practices all caught in a modernist frame. These are practices that use modernist logic/reason and play into a particular, existing political order. I then suggest that the project of the early pragmatists—in some ways, the first post-modernists—was an attempt to move beyond modernist discursive practices. The pragmatist vision of political engagement—*democracy*—moves beyond simple, linear, hierarchical order to "a new sense of order" (Doll, 1986), one that emerges through social interaction, through conversation (Rorty, 1979), a shift that necessarily entails a new appreciation of what is *reason-able.*

Discourse, Episteme and Discursive Practices: Historical Context

According to Reiss, discourse is "a visible and describable organization of signs called "thinking"; a "coherent set of linguistic facts organized by some enunciating entity" (p. 27). Episteme is "a way of knowing a particular order of reality" (p. 23), comprised of a network of "language and discourse bound up with particular characterizations of reason, will, human action and knowledge" (p. 59). Reiss refers to the analytico-referential episteme of modernism because this discourse uses conceptual analysis and refers to an objective reality. A discursive practice entails the supposition of a being, an "enunciating subject" (even though such being is of necessity itself produced by discourse), who acts with intentionality, whose use of discourse imposes order as it mediates between enunciating subjects or upon phenomena. Reiss terms this,

following Lévi-Strauss, an "ordering of the world by the mind" (p. 30). As a conceptualizing practice, the written word becomes the "means of visualizing the object" and at the same time, the presence of the enunciating subject disappears.

In his Foucauldian-style genealogy of the discourse of modernism, i.e., Euro-Western discourse, tracing the development of what he calls "analytico-referential" discourse, Reiss begins with Kepler and Galileo, with their use of the telescope, the optical device that enabled observation of the heavens. One becomes unconscious of the role of the telescope as one is looking through it; so too, one is unconscious of the way one *views* the world, thinks about it, speaks about it. The telescope, as a device, narrows the visual field, isolates the object, delimits one's view, providing boundaries as well as perspective. As the telescope "disappears," so too does one's awareness of any change occurring in one's thinking as an enunciating subject. But quite suddenly, it seems, as one views the world in this way, my awareness completely focused on that which is before me, my own sense of being is obfuscated.

Reiss explains that the discursive practices of modern science developed and came to prominence astonishingly quickly, within 100 years, after Johann Kepler's treatise recording heavenly observations while looking through a telescope (objectification). As a unique discursive practice, this text marks the first time that astronomical observations were separated from astrological beliefs. Kepler's observations were written to record precisely only what he saw as he looked through the telescope. Other scientists found Kepler's style of writing, so clearly focused on detailed observations, worthy of imitation. (p. 54). So began, says Reiss, the subject/object split that characterizes modern discourse.

The new sciences created excitement that extended beyond the newly developing disciplines of astronomy and physics, to speculation by philosophers about the capabilities of humans to discover more about God's creations, which was to know more about God, Himself. Through the conceptualizing discourse of modernism it was now "possible to turn an abstract system [of concepts] into a true knowledge of a real world, one taken as not ordered by man" (p. 54). Reasoning from concepts (derivative of Plato's ideal forms and Aristotle's categories), it was believed, one could know more of God's plan which was the natural

order of things. Reiss argues that science and the discourse of modernism developed concomitantly in Euro-Western cultures that saw the world as fully formed (created by the hand of God), waiting to be discovered; the order of the world was simple, exemplified by a belief in the Great Chain of Being, following from God down to the lowliest forms; one's place in the world was determined by this natural order.

The Discourse of Modernism: Ordering the World

Within certain epochs, certain epistemic privilege is accorded certain discursive practices. At the same time, other discursive practices are considered "absurd"—which is in part what creates and sustains a dominant discourse. For example, in the OED (online, etymology), the word "absurd" comes into common usage in the early 1600s meaning: "Out of harmony with reason or propriety; incongruous, unreasonable, illogical." Modern rational reason came to prominence is the 1600s. (It was absurd reasoning, however—not modernist reasoning—that led to theories of evolution, relativity of time, and quantum theory). Rabelais's *Gargantua and Pantegruel* of the 1600s marks a shift in discursive practices between language that was permitted and language that was absurd, that did not fit within an evolving Renaissance social system. At the end of the modern era, in these postmodern times, discursive practices have not yet shifted.

Timothy Reiss uses the metaphor of the telescope—situated between the viewing subject and the observed object— to illustrate the magical sleight-of-hand which occurs when *mimesis* is the ordering principle of modern discourse. We bring symbolic expression—and order— to that which is, through *mimesis*: "this is that." Mimesis implies "this" (word) represents "that" (object).

Mimesis carries with it the assumption that an objective, universal reality exists and can be represented symbolically. Embedded in the concept of mimesis is the connotation of exchange, that "this" is "that." Conversely, in this mimetic logical frame, "this" is sometimes obviously "not that," and thus arises the split that creates the dichotomies of (Western or Eurocentric) modernism. Many of the characterizing features of modernist discourse are by now well-known, but a partial list includes (i) a subject/object split, objectivity, leading to self/Other distinctions; (ii) a linear narration of causality. Causation, like "reality" is a holdover

from the rational reasoning of Greek metaphysical philosophy: for every effect —in an orderly (and closed) world—there is a cause; (iii) rational(-ism), variously presented as mathematical reasoning, logic with an excluded middle, binary logic, an either/or; (iv) reasoning from universalized concepts and concomitant devaluing of both history and context (situation); (iv) reification of concepts such as time. "Time" is endowed with simple values—constant, linear, and directional (as opposed to relative, non-linear, and dimensional).

Underlying modern discourse, organizing rational reason and representation, the organizing principle of mimesis (this is that) deceives us, *epistemically*, into believing that there is an objective reality represented by rational discourse and that poetry, as a form of representation is merely figurative. Mimesis is criticized strongly by Martin Heidegger (2002, pp. 40–41) as it influences modernist ideas foundational to education. Mimesis underlies an economy of exchange in education, between teacher and students: I, the teacher, give you, the student, a body of knowledge. If you give me back everything as a product of learning, I will give you 100%. In this example, in keeping with characteristics of modernist discourse, there is a subject (teacher)/object (student) split, reification of knowledge, mimesis in representation, a teaching/learning dichotomy, and the hierarchical ordering of teacher as "knower" and student as "not knowing" or empty vessel. In addition, the teacher is subjected to the category "Teacher," an abstraction and generalization into which he/she is thrown. The teacher is a mold for the production of students (also subjected by this production process). Since Aristotle, pedagogy has been based on rational abstraction and generalization, making discursive "equivalencies"—"this is that" (in Peters, 2002, pp. 34–36; see also Biesta, 2007).

As Heidegger's comments (above) on modern education make clear, the effect of mimesis in representation concerns equating of the one and the many (this is that)—not an "associating," but an equating of one's very "being" with an abstract concept. Through mimesis, the specific and particular *is* the conceptual or categorical. Reiss calls this the enumerating or pronouncing tendency of the discourse of modernism, a pronouncement that reflects an absent being. For example, etymologically, the word "political" derives from the word *polle* (head),

referring to the part of an individual identifiable in a crowd; heads were counted, to become a unit, a muster or a census, hence a category representing a number of the population, forming the unitary *pol*-itical body. The political body is created discursively, metonymically, from the physically present "heads" counted in the crowd. Categorically, each individual is likened to the other in that category, representative of the category. The concept of individuality is a discursive construction of modernity, from which, ironically, personal *being* has been stripped.

As the "head" (*polle*) is figured into "political," analogously the activities of a scientist, researching aspects of the physical world and producing a body of knowledge ascertained from that study, are far removed from the general disciplinary category of knowledge called "science." More accurately, perhaps, this is *scientism*, which is the use of the scientific method of acquiring knowledge; the belief that science alone can explain phenomena or the application of scientific methods to fields unsuitable for it (Encarta). A conceptualizing episteme, that is, one that reasons conceptually, enables—even encourages— such deceptions in representation as the equivalency of this and that. Mimesis, inherent in "methods," as I have suggested, misleads one to equate one situation with another, to equate the word with an objectified reality, to equate being with a conceptual object. For example, the methods of science, emphasizing observable, empirical, measurable evidence, subject to principles of reasoning are a form of discourse. Methods represent a "visible and describable organization of signs, called 'thinking'"—that belong to a particular episteme. Written, method intends to make possible replication of the path the scientist takes toward conclusions—to replicate thinking—for verifiability and for rigor in practice. It is a format for the consistent representation of an idealized form in a conceptualizing episteme. However, the "methods" we attribute to science are not necessarily a representation of what a scientist actually does—or his or her thought process (Holton, 1973).

Methods are technologies that ensure consistency in discursive practices—that as a culture we think alike. As Foucault pointed out, method disciplines thought and we are disciplined through social institutions such as schools, prisons, and hospitals to adopt certain discursive practices even when it is obvious that the reasoning is faulty. For example, J.T. Fraser (1982) points out, "The metaphysical

underpinning of physical science, necessary in its epoch but now outdated, is being carried along by linguistic inertia," (p. 180). He calls the reasoning of the physical sciences "schizophrenic" (p. 180), caught between the *timelessness* of the laws of nature and the eternal forms of Plato, and the concept of initial conditions which "stands for all things of which Plato would say generation is the cause: for becoming, for whatever we learn through our senses, through experiment and experience," i.e. the *temporal* (p. 180). The linguistic inertia Fraser refers to is the habit of thought that acknowledges the paradox of timelessness and temporality embedded in the discursive practices of physics. Ilya Prigogine's exploration of this problematic conception of time leads eventually to his confirmation of the arrow of time and development of the idea of dissipative structures at the edge of chaos leading to transformation (Coveney & Highfield, 1990). He was criticized, however, for his suspect methods (Hayles, 1990 p. 91–93). The dominance of the discourse associated with science, the power associated with the knowledge derived through these methods, has endured for centuries and serves as a good example I think of how these objectified practices serve to obscure day-to-day relations between people. Philosophical argumentation, dialogues (after Plato), and critique (after Kant) are examples of other methodized discursive practices.

As an intellectual practice, critique, derives from the Platonist/Kantian praise and blame tradition and sits within an either/or frame. In critique, mimesis is at work: "this" is/is not "that," pronouncing on some objective reality. As Cary Wolfe (1995) notes, competing views, theories or critiques can only hope to reduce the "verticality of difference," (p. 46) based on some assured access to truth without which critique has no basis and is thus powerless. As a discursive practice, critique seeks to more accurately describe a "reality." "Reality" is, of course, a conceptual word, not a "thing"; *reality* is part of a modernist vocabulary, related to objectivity, a word that is no longer useful because there is no longer agreement on "reality." Critique is a practice that tends to hold intellectual thought embedded in right/wrong argumentation. As Wolfe, Richard Rorty and other pragmatists point out, once we acknowledge that no one has a privileged view, there are multiple perspectives. A conceptualizing episteme, that is, one that reasons conceptually, encourages such deceit in representation. This

deceit is sustained in modernist discursive practices by adherence to accepted methods. The "method" of Science is not necessarily a representation of what a scientist actually does—or his or her thought process. It is a format for the consistent presentation of an idealized form in a conceptualizing episteme. Mimesis inherent in "methods" misleads one to equate one situation with another, to equate the word with an objectified reality, to equate being with a conceptual object.

Charles S Peirce had all but memorized Kant's *Critique of Pure Reason*, before he realized that that it is not enough to simply identify, to analyze, to see what is wrong and what is right. Such an "either/or" approach does find the limits of a situation; however, having identified the "both," one must work toward—not a middle ground, not a place on the continuum—the creative "and." It is the "and" that moves discursive practices beyond modernity and beyond simple order. In his own *critique*, Peirce found it necessary to introduce, after "long and critical consideration," something either "quite new, as far as I was aware, or else gave new reasons for believing what others had denied" (1998, p. 469). For example, in *critiquing* Kant, Peirce develops a post-Enlightenment form of reason, one that builds upon Kant's work, but which also addresses the logical problems of rationalism as it failed to address the issues of evolution (the cosmos is not static, existing as if created by the hand of God) and ideas about freedom, equality, and democracy (contrary to order achieved by imposition and normalization). Peirce develops a new logic, a new habit of thought, one in which possibility continually comes into being, a process-oriented, logical space of emergence.

Beyond Simple Order: Pragmatism and Complex Political Engagement

If modernist discursive practices limit us to seeing/enacting order in a particular way, what would it mean to move beyond that simple concept of order? What might be the political implications of moving beyond modernity? And, what is science—particularly complexity science— representing? These questions guide my inquiry into the relationship between science and discursive practices, where I find sufficiently satisfying answers to my questions by tracing one root of complexity science to the writings of C. S. Peirce.

First some historical context: In the post Civil War period, a time of major social upheaval, members of the Metaphysical Club, the first American pragmatists, grappled with the pressing social and philosophical issues of their day. They posed the questions of what it means to be American among people as diverse and fluctuating as was possible especially in those times of sweeping social change due to industrialization, urbanization, and the influx of vast numbers of immigrants. What is an *American* culture to a new immigrant? This question condenses down to, what is a category characterized by flux and change? They questioned the concept of "order" in relation to the Constitutional ideals of freedom and equality. Amidst wild demographic change, without resorting to the top-down methods of the past, how would one conceive and achieve political order? Discussions amongst the members of the club influenced them all in profound ways, and collectively they greatly influenced intellectual thought in America (Menand, 2000).

Charles Sanders Peirce, a logician, a member and major contributor to the development of pragmatism, developed the first theory of semiotics, which he thought of as the science of signs and their interpretation. For Peirce, pragmatism is about "ascertaining the meanings of hard words and of abstract concepts" (Peirce, 1998, p. 400). He relates meaning to practices and practicalities of everyday living. According to Kenneth Ketner (1998), much of Peirce's work on logic derives from the period of time he worked as a scientist in a laboratory. In a sense, he de-sanctifies such words as "science" which for him is sound reasoning, grounded in practice. Meaning is influenced by one's experiences.

Of the three traditional categories of logical reasoning, Peirce weights *abduction* as heavily as induction and deduction and develops the logical difference it makes to include (personal) experience in reasoned thought. The effect of abduction is to bridge the objectivity of induction and deduction with the subjectivity of the biological/experiential. The significance of this difference is related to the question of creativity. Influenced by Charles Darwin's controversial theory, one of the topical questions of the day concerned whether the cosmos was evolving toward greater order (from its chaotic origins), or less. This question relates to order as it was conceived Biblically, out of chaos; or as that sense of order

was challenged by the concept of evolution. Peirce reasoned that the cosmos is evolving both ways, and that creativity is a characteristic of the universe and of humans. But, where does the new come from? If it is "creativity" that leads to something previously unthought or unseen, how did that genesis occur, except through interactions?

The pragmatist habit of thought begins with the unique contribution of individual beings based on their varied human experiences. This discursive practice, valuing creativity, shifts away from *mimesis* in the discourse of modernism toward understanding that is interpretative, acknowledging what is now often called "observer effect" and interaction with the interpretant, the object of one's gaze. Meaning is never fixed as with "facts." Peirce's semiotic logic, based on an evolutionary process of relations among (i) a person, (ii) culture (episteme), and (iii) physical environment corresponds analogically, I suggest, to Poincare's three-body problem of physics, the relational logic of which opens the idea of self-organization. Peirce's logic of relations opens spaces for *chance* and *time* in reasoning. It is an open system of relations among individuals, culture and environment, between cultures and the cosmos; a system of ongoing interpretation, negotiation, and working at solutions for problems encountered in being in a culture. What makes Peirce's system work as a self-organizing system is feedback to the system through social interactions and relations. From a pragmatist perspective, discursive practices are social and political *practices*; that is, they are the day-to-day practices of relations between and among people, in their physical, intellectual, social, spiritual, "bloomin,' buzzin'" (William James's phrase) and disorderly world.

In Peirce's analysis, Aristotelian categorical reasoning embedded in rational discourse was, faulty. "The utility of the word 'reasoning'" he says, "lies in its helping us to discriminate between the self-critical and uncritical formations of representation" (in Ketner, 2000, p. 46). In his view, humans are not shaped by the discourse as passive subjects; they do not speak in a disembodied voice; rather, they interpret, they interact, they object to, and they shape and use discourse. In further explaining the "utility" of reasoning, Peirce makes the analogy that as Euclidean geometry leads to the development of basic mathematical reasoning, topology, while still mathematics, leads one to a very different appreciation of space. To reason in the topographical sense is to see

"relationships between elements linked together in a system" (Encarta)—*over time*. An example based on the above analogy is that the concept of "order," can mean "an organized state, with elements arranged properly, neatly or harmoniously" (Encarta). Or, in the topographical sense, *order* would not be a *state*, but rather a system of relations, over time. Peirce's semiotic logic calls attention to the obfuscated role of "discourse" in influencing "reason," (which is, for him, "thought," or sound thinking). The deceit of rationalist reason lies in the practice of assuming steady states of concepts (deriving from the eternal forms) allowing us (wrongly) to (i) accept that probabilities are actualities; and (ii) focus on entities or things rather than relations. Relations between and among things as part of evolutionary processes are part of what Peirce calls "living science." Following from his recognition that nothing is ever static and fixed is the implication of an evolutionary-type process in semeiotics, where interpretation is always ongoing, due to interactions and feedback.

In the Peircean pragmatist sense of ascertaining the meaning of hard words and abstract concepts, Ilya Prigogine–whose work in thermodynamics has been key in developing many of the concepts of complexity–began his study by questioning the concept of entropy, literally, assuming that what one refers to is not a steady *state*, but relations between and within systems (Hayles, 1990). Prigogine challenged the metaphysical foundations upon which science had based its claims and from which reasoned arguments (discursive practices) follow. He noted that the concept of entropy usually carried a denotation of "waste, decline, and death." He also noted however, that in certain entropic situations—those far from equilibrium—there also exists "the spontaneous appearance of organized structure," emphasizing "the important positive role that entropy production can play" (Hayles, p. 94). The significance of the difference Prigogine (and Isabelle Stengers, initially) theorized and described has "to do with changes in world view rather than shifts in scientific theorizing" (p. 93). In a *non*-mechanical worldview, inputs and outputs are not necessarily equal. And in this way, as I stated earlier, complexity science *itself* unsettles the easy relationship between science, reason and representation (see, e.g., Cilliers, 1998). At this point, however, I will shift from Prigogine's dissipative structures leading to transformation, to Maturana and

Varela's autopoietic organization of living systems such as cognitive systems (in Wolfe, 1995, pp. 52–55) to make two points. First, from the perspective of complexity theory and self-organizing dynamical systems, the organizing principle of modernism—*mimesis*—no longer holds. Cary Wolfe (1995, p. 53) writes:

> The difference between cognitive systems—and, Maturana and Varela would argue, autopoietic systems in general— and input/output devices is, in the words of Marvin Minsky, "that brains use processes that change themselves—and this means that we cannot separate such processes from the products they produce." (Marvin Minsky quoted in Maturana and Varela, *Embodied Mind*, 139)

The brain itself is transformed by its activities and because this is so, input does not equal output. The implications for schooling and mandated testing are far reaching. Schooling *can* be reduced to input and output but the value of such schooling needs to be questioned in light of its oppressive politics and dubious humanist ethics.

Disengaging concepts/words from customary reasoning practices opens a space for understanding living systems differently and has implications for what it means to be critical. Complexity theory opens a new worldview—one of patterns, self-similarity, fractals, dynamical self-organizing—thus bringing to the discursive practices of science a reflexive criticality perhaps previously unknown. This worldview offers more than simply seeing things in a positive manner which is objective observation; it has to do with understanding *relations* that are interactional, open, and reflexive. A dynamical flow of *relations* is crucial to a complexivist view. In this view order is dynamical and self-organizing; disorder is stability which leads to the death of the system.

What kind of politics arises from this worldview? As the early pragmatists envisioned, rejecting the idea of imposed order and keeping the ideal of liberty in mind, what it means to be American emerges through social interactions in the complicated, if not complex, process called democracy. This *being* American involves reading and interpreting the constitution and finding creative solutions to problems encountered

in living as an American—the experience of being an American. This ideal demands interactions and relations, and most importantly, feedback. This political engagement is the enactment of democracy as a participatory process. The idea of political engagement here involves the emergence of being "American" through recursive, reiterative, reflective interactions and relations with others; i.e., speaking with, being with, each other. This political engagement, while it may be disorderly is—borrowing from complexity theory—"self-organizing," dynamically stable and emergent. There is no common understanding amongst those who come from different cultural backgrounds and experience; there is only the ongoing conversation.

Ideas about order and how it is to be achieved are epistemic, that is, they are tied in to discursive practices. As Doll (1986) noted in his "Prigogine: A New Sense of Order, A New Curriculum" paper, Piaget was "misinterpreted by American psychologists and educators" (p. 10) because he was read from a particular worldview. His views were pulled into a frame he sought to disrupt. I suggest that John Dewey and C. S. Peirce have been read in much the same way. In the following section, I return to the issue of critique and the point concerning complexity theories not being critical enough of cultural power structures.

Questioning Feminist Poststructuralism

Much of the critique of the discourse of modernism by early feminists, post-colonialists, and poststructuralists over the last many decades, while valuable in bringing to general awareness the effects of stratification, inequality, marginalization, and other issues of great social importance, seems often to get trapped in the very either/or logic or praise/blame evaluation that characterizes dominant (modernist) discourse. I suggest, in questioning feminist poststructuralism, that analyses of discursive constructions fails to provide insights that shift the discourse beyond a modernist frame. Bronwyn Davies (2005, pp. 318-323) explains that feminist poststructuralism seeks to trouble the very categories male and female, to make visible the way they are constructed, and to question their inevitability. She continues:

> Feminist poststructural research is focused on the possibility of moving beyond what is already known and understood. Its task is not to document difference between men and women, but to multiply possibilities, to demassify ways of thinking about 'male' and 'female'—to play with the possibility of subjectivities that are both and neither—to understand power as discursively constructed. (p. 319)

At heart I am in sympathy with this endeavor which I see as founded on semiotics and an interpretivist view. The contested ground for feminist poststructuralists lies in discursive constructions of (i) the subject and (ii) power. While I agree that these are concepts that need questioning or interrogation, I am bothered by the narrow focus of discursive construction. I am reminded of John O'Donohue's comment (on a CBC radio interview, 2004) that too often the biographical (text) is confused with identity. The feminist poststructural "subject" is caught between the dichotomy of individualism and identification, difference and sameness. Seeking her place, the subject sounds remarkably like the autonomous self-contained individual of liberal humanism (see also Wolfe, 1995), and, as Hayles (1990, 1999) has pointed out, in the Information Age the concept of gender loses much of its relevance. To me it seems that in exploring the discursive construction of subjects and subjectivity, through the parsing of language the subject is forced into an object, a (passive) recipient of action. The object is equated with a categorical term: this is that (*mimesis*). The subject/object dichotomy embedded in this narration belies the web of lived, day-to-day relations and practices (actions) in which all life forms are immersed. As Martin Jay (2005) notes in his concluding remarks to *Songs of Experience*, if it means anything at all—"experience involves an openness to the world" (p. 408).

In her chapter Davies states that "power is understood in terms of lines of force" (p. 320), which relates, I believe, to a magnetic field of attraction and repulsion; it is a closed system. In this statement relations are conceived as dialectical, linear, and limited. The power of discourse, as I see it, is to trap thinking in the (traditional) either/or dichotomous categories we have come to accept in modernist thought. The

proliferation of differences to "demassify [sic] ways of thinking about 'male' and 'female' is still trapped in predetermined categories. The concept of power (*cause*) needs to be recognized not simply for the *effect* it has to subjectivize, oppress, and shape identity, but also as Hayles (1990) suggests, from a different worldview. Foucault comes remarkably close to articulating this different (complexivist) worldview in "Nietzsche, Genealogy, History" (1977, 149–151) with his description of power as emergence, although the image he presents there is of adversarial forces. (On Foucault and complexity, see Osberg, 2008, this volume)

Power is too often used as a reified concept/word that signifies not a "thing" but rather differential relations. In reference to social relations the word "power" carries a negative connotation which perhaps obscures the effective *doings* of differential relations, much as for Prigogine "entropy" obscured, first, the "exchanges between the system and the outside world" and, second, "how much entropy is produced inside the system itself." Closed systems will eventually collapse; however, "systems far from equilibrium can experience a local entropy decrease…[which] manifests itself as a dramatic increase in internal organization" (Hayles, p. 94). In this view, it seems that differential relations, under certain conditions, may contribute to transformational change in the future. The "relations" are interactions.

The implication for discursive practices of representation is that dynamical patterns of self-organizing systems can serve as a metaphor for the analysis of situations (replacing the telescope of modernism) to provide possible insights into relations that are not identical, but self-similar. This worldview, that of dynamical self-organizing systems, gives me hope. It helps me to understand that that which I cannot see or even anticipate is at least as important as that which I can. Humility follows from this insight, and from there a shift from authority and certainty to questioning and inquiry. I locate the political and social order in relational experiences.

Curriculum Politically Corrected

In a set, orderly, determined world, knowledge is a mirror of reality; it will do to school children mimetically when schooling is seen in terms

of cultural reproduction, preparing children to take their pre-determined place. Modern schooling was a function of an industrial, hierarchical society and reflected the simplistic values of a mechanical, Newtonian worldview (Doll 1986, 1993; Biesta 2006, 2007). Mimetic discursive practices of schooling reinforce this oppressive worldview.

Alternatively, Doll's "Transformative Curriculum," (Doll, 1993) based on Piaget's biological theories of development and Prigogine's (thermo-) dynamical systems, presents new ways to think about curriculum, ideas that were radical a quarter of a century ago. Shifting from the mimetic discursive practices of schooling, utilizing principles derived first from chaos theory and then dynamical self-organizing systems, Doll later developed his reconceived Transformative Curriculum using the alliterative, heuristic 3 S's (science, story, spirit), 4 R's (rich, relational, recursive, rigorous) and 5 C's (*currere*, chaos/complexity, conversation, community, culture) [Doll, 2005; see 3-4-5 heuristic in "Modes of Thought," posted on his website http://www.lsu.edu/faculty/wdoll/Papers/RTF/modes_of_thought.rtf]. While playful, his three-four-five combination signifies that the whole is greater than the sum of its parts. Indeed, Doll's approach to curriculum is post-modern and politically revolutionary (see Doll, 1993). Relations, interactions, fallibility (the role of doubt and questioning), reflection— and perhaps, most importantly, inquiry as the basis of education—all figure prominently in a postmodern episteme, where, as William Doll often claims, "no one owns the truth and everyone has the right to be understood" (Milan Kundera, 1988, p. 164; in Doll, 2002, p. 52).

As C. S. Peirce realized, shifting discursive practices, moving beyond a modernist frame, necessarily changes one's view of political order. The political implications of new discursive practices for curriculum are found in the educational and political writings of pragmatist John Dewey, who, I suggest, needs to be re-read in light of a *postmodernist complex* (rather than a modernist) episteme or habit of thought (see e.g. Biesta, 2006, 2007). In regard to political order, chaos and complexity theories offer a useful heuristic to move beyond simple, deterministic, hierarchical conceptions of "natural" order, to re-conceive order as that which is dynamically self-organizing, non-linear, recursive, relational and patterned.

Acknowledgements

References

Best, S. & Kellner, D (1999). Kevin Kelly's Complexity Theory, *Organisation and Environment, 12* (2) 141-162. (URL: http://www.uta.edu/huma/illuminations/best7.htm).

Best, S. & Kellner, D. (1997). *The postmodern turn*. New York: Guilford Press.

Biesta, G. (2006). *Beyond learning: democratic education for a human future*. Colorado: Paradigm.

Biesta, G. (2007). The problem "learning." *Adults Learning*, April, 8–11.

Coveney P. & Highfield, R. (1990). *The arrow of time*. London: Harper Collins.

Cilliers, P. (1998). *Complexity and postmodernism: understanding complex systems*. London: Routledge.

Davies, B. & Gannon, S (2005). Feminism/Poststructuralism. In *Research Methods in the Social Sciences*, B. Somekh, C. Lewin (Eds.), pp 318–325. Thousand Oaks: Sage.

Dewey, J. (1958). Experience and nature. New York: Dover.

Doll, W.E. Jr. (1986). Prigogine: A new sense of order, a new curriculum. *Theory into Practice, 25*(1), pp. 10-16.

Doll, W. E., Jr., (1993). *A post-modern perspective on curriculum.* New York: Teachers College.

Doll, W. E., Jr., & Gough, N. (Eds.) (2002). *Curriculum visions.* New York: Lang.

Doll, W. E., Fleener, M. J., Trueit, D. & St. Julien, J. (Eds.). (2005). *Chaos, complexity, curriculum and culture: A conversation*. New York: Lang.

Foucault, M. (1977). Nietzsche, genealogy, history. In *Language, counter-memory, practice*: *Selected essays and interviews*, D. F. Bouchard (ed.). Ithaca: Cornell University Press.

Foucault, M. (1982). The subject and power. In *Michel Foucault: Beyond Structuralism and Hermeneutics*, 2nd edition. Hubert Dreyfus and Paul Rabinow (Eds.). Chicago: University of Chicago Press (pp. 208–26).

Foucault, M. (1995). *Discipline and punish. The birth of the prison*. Alan Sheridan (Trans.). New York: Vintage.

Fraser, J. T. (1982). *The genesis and evolution of time: A Critique of interpretation in physics*. Amherst: University of Massachusetts.

Hayles, N. K. (1990) *Chaos Bound. Orderly disorder in contemporary literature and science.*

Hayles, N. K. (1994). Boundary disputes: homeostasis, reflexivity and the foundations of cybernetics. Configurations. *Journal of literature, science, and technology*, 2(3): 441–67.

Hayles, N. K. (1999). How we became posthuman. Virtual bodies in cybernetics, literature, and informatics. Chicago, IL: Chicago University Press.

Heidegger, M. (1972). Heidegger on the art of teaching. Edited and translated by V. Allen and A. Axiotis. In Peters, Michael (Ed.). (2002). *Heidegger, education, and modernity*. Lanham, MD: Rowman and Littlefield.

Holton, G. (1973). *Thematic origins of scientific thought*. Cambridge, MA: Harvard University Press.

Ketner, K. (1998). *His glassy essence. An autobiography of Charles Sanders Peirce*. Nashville, TN: Vanderbuilt University Press.

Ketner, K. (2000). *Peirce and computing*. Institute for Studies in Pragmaticism. Lubbock, Texas: 79409-0002.

Kundera, M. (1988). *The art of the novel*. L. Asher (Trans.). New York: Grove.

Menand, Louis (2001). *The metaphysical club. A story of ideas in America*. New York, NY: Farrar, Straus and Giroux.

Oakeshott, M. (1962). *Rationalism in politics and other essays*. New York,

NY: Methuen.

Osberg, D. (2008) The Logic of Emergence: An alternative conceptual space for theorizing critical education. *JCACS, 6*(1).

Peirce, C. S. (1985). Reason's conscience: A practical treatise on the theory of discovery, wherein logic is conceived as semeiotic. In *Historical perspectives on Peirce's logic of science. A history of science*. 2 volumes, (pp. 801–51). Carolyn Eisele (Ed.). Berlin: Mouton.

Peirce, C. S. (1992). Reasoning and the logic of things. *The Cambridge Conferences Lectures of 1898*. Kenneth Laine Ketner (Ed.). Cambridge, MA: Harvard University Press.

Peirce, C. S. (1998). *The essential Peirce: Selected philosophical writings*. Vol. 2 (1893–1913). Edited by the Peirce Edition Project. Bloomington: Indiana University Press.

Peters, M (Ed.). (2002). *Heidegger, education, and modernity*. Lanham, MD: Rowman and Littlefield.

Rasch, W & Wolfe, C (2000). *Observing complexity: Systems theory and postmodernity*. Minneapolis: University of Minnesota.

Reiss, T. (1982). *The discourse of modernism*. Ithaca, NY: Cornell University Press.

Rahman, A (2006) Review of *Chaos, Complexity, Curriculum and Culture: A Conversation*, in Education Review, Nov. 2006.

Rorty, R. (1979). *Philosophy and the mirror of nature*. New Jersey: Princeton University Press.

Rorty Richard. (1999). *Philosophy and social hope*. New York: Penguin.

Somekh, B. & Lewin, C (Eds.). (2005). *Research Methods in the Social Sciences*. Thousand Oaks: Sage.

About the Author

Donna Trueit is a sessional instructor at the University of Victoria, British Columbia, where she teaches Interpretive Inquiry as a research methodology. Her research interests are in conversation, complexity theory and curriculum.