

Postmodernism Meets Ecology¹

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In the autumn issue of *Anglistik*, 2003, an article of mine appeared, entitled “Why the Humanities Need a New Paradigm which Ecology Can Provide”.² As it is the professional journal of *deutsche Anglisten*, many of you may have read it. I’m sure, also most probably, that is why I’m standing here addressing you today. I am going to review and expand on some points made in that article during the coming hour.

In this sequel I will briefly state the benefits of postmodernism but shall dwell more on its drawbacks because they begin to outweigh the benefits. The benefits of postmodernism lie in the various emancipations it has brought about. Postmodernism asserts that humans live in cultures which they create historically. Self and world are indissolubly united as the emergents of an ongoing interpretive dialogue that humans have with their surroundings. We inherit a pre-interpreted world, accept, repudiate, or question it, and leave a changed world for the next generation. Because historically limited interpretations are all we ever get, postmodernism insists that our discourses stay open-ended. Our dialogue with the world should resemble a play-back loop in which the ground we stand on undergoes change via the new interpretations that it originally makes possible. As various past cultural absolutes and essences underwent postmodern deconstruction, the social creation of reality became a widely accepted doctrine. Of course, if reality is more a social than a natural creation it can be changed. In the U.S. change happened big time during the last forty years, and mostly for the better: e.g. American blacks refused to be defined by racial stereotypes in the

U.S. South; the feminists rebelled against the ubiquitous patriarchy found both in the U.S. and Europe; gays and Lesbians sought legal recognition for their relationships; and natural scientists began investigating open ended feed back loops as biology supplanted physics as the most influential science in our culture. For us in the arts and humanities, metaphor and imagination, the agencies bringing forth a different future, received the validation and respect due to them. All these developments certainly will remain a lasting legacy of postmodernism. But are there any drawbacks? Where has the postmodern legacy left us?

The postmodern tilt to the subjective pole has emphasized the open-ended nature of reality, that social codes used to explain and utilize our external environment are limited historical creations. Because these codes are models built on metaphor, their use needs self-awareness about the limits of their fit to nature. This insight or truth of our moment has been fore grounded by present day artists, scientists, and culture critics alike. For example, Magritte's realistic depiction of a pipe with the title, *This is not a Pipe*. Anselm Kiefer's drawing an artist's palette board over some of his paintings to remind the viewer that his blackened landscapes are interpretations whose meanings hover undecidedly between war's destruction and earth's fertile dark renewal. The paintings, in their self-reflexivity, refer both to their mediating process as well as to an ambiguous potentiality, more than to a reality³. Virtually, all of Peter Greenaway's films are self-reflexive and he repeatedly affirms: "My cinema is deliberately artificial, and it's always self-reflexive. Every time you watch a Greenaway movie, you know you are definitely and absolutely *only watching a movie*. It's not a slice of life, not a window on the world. It's by no means an exemplum of

anything ‘natural’ or ‘real’. I do not think that naturalism or realism is even valid in the cinema”.⁴ The deliberate self-reflexive literary works of Borges, John Barth, and Calvino also testify that, to be authentic, novels must reveal the limits of their own conventions. All of these artists have understood the central issue of our time and their art clarifies and resonates with their audience. But once self-reflexivity as the focus of an art work has been used and the sought after self-awareness publicly displayed, the artist must move on. In the last twenty years (and this is world wide), art has become decentered and rather directionless. In his article “Contemporary Art and Contemporaneity”, Terry Smith describes it thus: “The artists are wittily proposing that contemporary art is concerned with posing questions usually about itself, perhaps without much hope of effect, and destined to end in ambiguity... Surety of form and uncertainty of content is the hallmark of the 21st century so far.”⁵ Even though rapid globalization and decolonization fuels contemporaneous art, they leave it without a center.

In their awareness that we are historical creatures, products of temporal codes, the self reflexive masterpieces referred to in my *Anglistik* article, Margaret Atwood’s novel, *The Blind Assassin* and Dennis Potter’s TV series, *The Singing Detective* celebrate the dialogical movement of their heroes in overcoming the internalized moral constrictions that have imprisoned them for most of their lives.⁶ Their emancipation is shared by readers and viewers in realizing that they face the same task in taking over their own lives from unconscious dependencies and control. But these literary works have not progressed much farther in their anthropocentrism than the existentialist literature of fifty years ago. The attitude toward nature by such existential writers as Jean Paul Sartre and

Samuel Beckett viewed it as alienating and indifferent. Human values were difficult to come by in Beckett's bleak plays. In *Krapp's Last Tape*, the hero listens to his own voice recording the experiences of his life as they were happening. Now old, he selects highlights from his past and, after listening, concludes that his life excreted on brown vinyl tape has no more significance than his last crap.⁷ In Beckett's plays, nature surrounds man's search for values as a vast absurd darkness. Sartre's opposition to nature is just as total as Beckett's. But he hurls defiance towards the universe. Through their acts, humans create value and meaning in the teeth of a non-supportive universe. At the end of *The Flies*, Orestes understands human action as a "dreadful freedom" and with Promethean defiance accepts the human condition of having to create value in the midst of an uncaring nature.⁸ Today, historical dialogical movement has replaced the metaphysical vertical movement of fifty years ago, but a changed relation to nature is not evident in either of Potter or Atwood's works. Both remain anthropocentric with the central issues of their heroes focused on the inner psychodrama or conflict between inherited social identities and having to break free into a more adequate selfhood - based on awareness that their past lives had been socially scripted.

Perhaps, a better way to illustrate the drawbacks brought on by self-reflexivity about models and framing would be to watch a literary critic handle the problem of reference. We will select two postmodern critics, one who would like to include nature within the human purview and one who repudiates its possibility. Kathy Rigby in her article, "Earth, World, Text: On the (Im)possibility of Ecopoiesis", investigates whether there is a creative practice and a critical methodology that does not fall short of giving 'voice' to the natural world.⁹ She uses a Heideggerian model of ecopoiesis developed by

Jonathan Bate in the last chapter of *Song of the Earth*¹⁰. Ecopoetry, according to Bate, is that work of art or poiesis which in speaking can “save” the earth. “Save” here is meant in the sense not to enframe or reduce nature to a “thing” or commodity as technology does. Poiesis is a bringing forth which doesn’t enframe, says Heidegger, but which lets things be in their otherness while revealing them in art. To “save” is not to rescue but to free something into its own presencing. The poet’s task (and all humans are to dwell poetically) is twofold: negatively to disclose the shrunken, utilitarian world as unhealable, and positively, to reverse the departure from the Open as Rilke expounds it, which endangers our relationship to Being. Rigby agrees with this art-as-intuition into the sacred or Other. But she doesn’t believe that art (verbal or non-verbal) escapes enframing. Art is no different from technology in this respect. So how does art save the earth by disclosing it as unsayable? She says that “only to the extent that the work of art is self-cancelling, acknowledging in some way its inevitable failure to adequately mediate the voice of nature, can it point us to that which lies beyond its own enframing”¹¹

Thus, to achieve connection to and with nature and yet uphold the postmodern mantra that one can’t jump the culture/nature gap, the artist must produce a self-reflexive text that reveals itself to be an artifact, not a self-disclosure of nature. Only then, can art become a mystical intuition of what remains ineffable and unsayable. “It becomes a discourse of the secluded, what lies outside all enframing, social systems, language.”¹² In other words, the “more” of nature can only be mutely and obliquely resonated, never articulated. Undoubtedly, this mystical, intuitive role of art’s relation to nature owes much to “deep ecology” and its borrowing from Heidegger as Lawrence Buell points out in *The Future of Environmental Criticism*.¹³

Our other critic, Dana Phillips, in his book, *The Truth of Ecology*, dislikes such intuitionism and attacks most traditional nature writing¹⁴. He is against any unmediated relationship with nature that nature writers seem to desire. While Phillips says he does not accept the social construction of reality, he uses it throughout as a polemic against any and all forms of “right representation” or “direct experience” of nature in literature. He accepts Richard Rorty’s hybrid centaur culture/nature or nature/culture as all we’ve got or ever will get. Why then try to look behind or beyond it? If one can’t say anything about the beyond or ineffable, forget about it. If nature always comes culturally mediated, and will always remain the historical hybrid culture/nature, adjust criticism and writing to the historical moment¹⁵. The current predicament of social constructionism, however, is the increasing proliferation of viewpoints, e.g. feminist, gay, race, class, ethnic, colonial, economic, etc.; the increasing subjectivity of such critical readings; and the desire of nature writers and ecocritics to escape the unending rhetorical analysis of power relations performed by textual critics. None of this is adequately addressed by Phillips. To the question - Can nature ever be given its own voice? Phillips responds - seemingly not. It will always be entwined with human interest; so much so that nature whenever it appears in a discourse needs to be deconstructed to reveal some kind of human manipulation behind it. Phillips seems able to put up with this situation, whereas ecocritics like Buell, Love, Elder and Preston wish to escape standpoint epistemologies which leave no room for nature to speak.¹⁶

While both postmodern artists and critics reveal the truth of our moment, i.e. that we are the products of history and must remain imaginatively and dialogically open ended, the cultural dialogism evident in these works seems as truncated and isolated from

nature as the literary examples of fifty years ago. It is this truncation of culture from nature and even, in its most radical expressions, changing nature altogether into simulacra and virtual reality that has helped bring on the political and cultural disaster in the U.S. and elsewhere. In its flight from nature, science, and technology, postmodernism gave up third person objectivity for social constructivism, standpoint epistemologies, and situated knowledge. It embraced the horizontal movement of history fueled by Freudian desire, Nietzschean power, or Marxist materialism – all of which, granted, had more to do with how the hierarchical societies of today were established than scientific enlightenment. These hierarchies needed deconstructing from a social justice point of view.

Having embraced social constructivism and the metaphoric basis of all knowledge, postmodernism has no truth criteria to legitimate change. It can't establish the facts of the matter, only the unfairness of a lived situation. Bereft of any method to establish an independent referent while accepting that all reality is a product of human manipulation, postmodernism has been completely ineffective against the reactionary Right in the U.S. and elsewhere, both politically and religiously.

If physical nature is always culturally mediated, does it not matter how this is done? Or which individual consciousnesses within the various cultures do it? We have already experienced an inverse ratio between proliferation of viewpoints and the importance of the ensuing analyses within Cultural Studies. As dissertations focused on the social hegemony of power relations within texts multiply, they become evermore hermetically sealed off from the natural world. The hostility and obduracy of postmodernism against the natural sciences having any contribution to make in our epistemological relation to nature stands revealed in the science wars of the last twenty

years. As I described the science war of the mid-nineties in my *Anglistik* article, I won't repeat it here. But the earlier sociobiology conflict and recent blank slate debate have been a continuation of the same issues.¹⁷

Postmodern critics in their effort to maintain historical open-endedness identified science with reductionism and deterministic law. In their efforts to "save" human freedom and cultural open-endedness they derived science from historical epistemes and de-emphasized its key trait of empirical verification. "Facts", they claimed, existed only in a cultural discourse which could only offer "contextual" verification. At the time when E.O. Wilson's *Sociobiology: The New Synthesis* and Richard Dawkin's *The Selfish Gene* appeared¹⁸, Roland Barthes' demystification of the "natural" into culturally motivated discourse, supported by Foucault's uncovering of historical epistemes, and Derrida's deconstruction of any and all foundations, removed the "objective" and value free aura of science.¹⁹ Thus, the vigorous assault on sociobiology led by two of Wilson's own Harvard colleagues, Richard Lewontin, his department chair, and Stephen J. Gould (who later would oppose Richard Dawkins, a more formidable theoretical opponent), took the form of deriving scientific investigations of social behavior not from nature but from cultural sources. The strongest and most sustained attack against sociobiology and Neo-Darwinian reductionism came in *Not in Our Genes*.²⁰ Its title repudiates nature as the origin of human behavior (if not wholly, then for the most part), so just where does it originate? The goal of the book is to provide a genealogy of present day human thought and behavior, including science, via a Marxist point of view in which the political New Right are shown to utilize an individualistic view (libertarian) of the

biological world which emerged historically during the bourgeois revolutions of the 18th century. It is this capitalistic bourgeois ideology that lurks behind sociobiology.

Ideologies are the ruling ideas of a particular society at a particular time. They are ideas that express the ‘naturalness’ of any existing social order and help maintain it: The ideas of the ruling class are in every epoch the ruling ideas, i.e. the class which is the ruling material force of society is at the same time its ruling intellectual force. The class which has the means of material production at its disposal has control at the same time over the means of mental production, so that thereby, generally speaking, the ideas of those who lack the means of mental production are subject to it. The ruling ideas are nothing more than the ideal expression of the dominant material relationships.²¹

With Lewontin and Gould insisting on viewing science as subordinated to a cultural episteme, in short, a Marxist social construct, Wilson, who describes himself as a political *naïf*, had to undertake a crash course in the humanities and social sciences to understand where this criticism was coming from. He concluded that Lewontin had embraced a “Marxian view of holism, a mental universe within which social systems ebb and flow in response to the forces of economics and class struggle.”²² Doused with water at a symposium given under the auspices of the American Association for the Advancement of Science in 1978 at Washington, DC, while demonstrators chanted “Wilson you’re all wet”, he concluded that sociobiology would remain in trouble until it incorporated culture in its analysis.²³ He with the help of Charles Lumsden came up with the following strategy:

“everyone knows that human social behavior is transmitted by culture, but culture is a product of the brain. The brain in turn is a highly structured organ and a product of genetic evolution.. It possesses a host of biases programmed through sensory reception and the propensity to learn certain things and not others. These biases guide culture to a still unknown degree. In the reverse direction, the genetic evolution of the most distinctive properties of the brain occurred in an environment dominated by culture. Changes in culture therefore must have affected these properties. So the problem can be more clearly cast in these terms: how

have genetic evolution and cultural evolution interacted to create the development of the human mind? ²⁴

He and Lumsden concluded that a particular form of “gene-culture co-evolution” emerged operating in a playback circle of reciprocal influence with heredity and culture each contributing to an ongoing open-ended evolution. This attempt to bring nature back into discussion of human behavior and with it scientific method met with little success from the social constructionists. They reviewed the book, *Genes, Mind, and Culture* (1981) unfavorably, ranging from contemptuous to nasty scorn.²⁵

Lewontin and his fellow social constructivists were motivated by open-ended freedom in human affairs, keeping nature and biology out of the picture. But Lewontin’s subordination of natural science to Marxist ideology - which is just one postmodern epistemology among many: e.g. feminist, racist, heterosexist - just incites a reactionary backlash. By its very nature, ideological conflict isn’t resolvable. If all discourse is ideological, where does one find consensus? The “truths” on which they are built remain incontrovertible and the debaters retain their irreconcilable differences. Nor was the nature/culture gap overcome in the subsequent “mind as a blank slate” debate between Steven Pinker and Richard Rorty.²⁶

Pinker, a cognitive psychologist at Harvard, also wanted to bring nature back into the study of human behavior. He felt that “...hypotheses that pit nature against nurture as a dichotomy or that correlate genes or environment with behavior without looking at the intervening brain will turn out to be simplistic or wrong.”²⁷ Richard Rorty in his rebuttal, quite rightly pointed out that science can’t provide a normative human nature to serve as a guide to the good life. “Our convictions about what really matters are constantly modified by new experiences.”²⁸ We are historical creatures and must remain open-

ended and free to make ourselves up as we go along without asking what we were somehow 'meant' to become²⁹. It is enough to rely on imagination, utopian speculation, and dreams to bring about profound changes in Western social life such as feminists and social reformers have already done.³⁰

Well, I like Rorty a lot, particularly as he cites history, literature, and the arts more than philosophy or religion as superior sources for human edification and ideals. But I don't think imagination all by itself can accomplish the task. After all, the pre-eminence of Western civilization rests on the rationality of the Enlightenment. Scientific rational procedure supplanted religious and metaphysical explanations in the West. Of all present day discourses, science is most privileged because it tests the validity and truth of its claims. To try to subordinate scientific method to ideology like the social constructivists attempt to do undercuts scientific claims to objectivity and truth. And if the political Left can subordinate science so can the political Right. Making all truth a precipitate from a point of view has been disastrous for the United States in the last twenty years. If one is left with no criteria to legitimate change except ideology then those in control of the media either through money or ownership will control the political future. That is the sorry condition today within the United States.³¹

Without doubt, the present Bush administration has been the worst and perhaps most dangerous the U.S. has ever had. Through his ignorance, arrogance, and incompetence, he has ruined the image of the U.S. worldwide. Domestically, his administration has transformed the U.S. from a democracy into an oligarchy, serving the interest of the corporate elite while ignoring the welfare of the common people who nominally should control and be served by a democracy. Substituting ideology for

scientific consensus and expertise and using this faith based approach to both the economy and social concerns has brought increasing disaster to life in America for the majority.

Market fundamentalism in its

“celebration of the market has become an insidious form of contempt for political democracy. Excluded by definition are the possibility of deliberation leading to social learning, institutional refinement, and an evolving conception of the common good. Indeed, the essence of the theory is to deny that such a thing as the common good exists, except as the sum of selfish individual goods. Those who posit a collective good, or an ethic of public-mindedness, are mere ‘sentimentalists’ pursuing an unscientific mirage. This body of thought seemingly provides expert witness for the claim that we should minimize political intervention in the economy.”³²

Thus, government should just butt out from all regulation of markets and an increased well-being will be shared by all. To finally be able to achieve this end led to the genuine euphoria of Newt Gingrich’s “deregulation bill” when Republicans took over Congress in 1994 , and motivated the subsequent Shelby Amendment and the Data Quality Act.³³ Let business run business unfettered; let business control energy policy, the utilization of public lands, the distribution of pharmaceuticals and all will be well. With profit - the bottom line - as the only value to be considered, anything that interfered or diminished that value needed to be overcome. That the ensuing wealth was horribly skewed to benefit the few while impoverishing the many and that the commons (clear air, clean water, fertile soil, healthy ecosystems) were being exploited and destroyed for private profit at public expense, of course, needed to be hidden from public scrutiny.³⁴

Almost all the deregulation moves by the corporate interests were anti-science. The “sound science” buzzword which became the mantra of the new Republican Congress had nothing to do with good science but everything to do with deregulation. As

Chris Mooney in *The Republican War on Science* put it: “ ‘Sound science’ is shorthand for the notion that anti-pollution laws have gone to extremes, spending huge amounts of money to protect people from miniscule risks.”³⁵ Furthermore, the Republican ...”free market conservatives... align themselves with industry “science” even in cases where it represents a clear outlier viewpoint that warrants considerable skepticism, and to dismiss or ignore concerns about conflicts of interest.”³⁶ To shield their actions and its consequences from impartial objective scrutiny, the corporate Right brought into being their own think tanks: The Heritage Foundation, the American Enterprise Institute, the George C. Marshall Institute, and the Annapolis Center for Science-Based Public Policy and, actually, hundreds more. The purpose of these think tanks was not to take science seriously but to undermine scientific work that might threaten the economic interests of private industry.

Mooney and R.F. Kennedy both provide a list of politicized abuses of science such as: undermining science itself (creationism); suppression (which Reagan did with the acid rain report); deliberate editing and misrepresenting scientific ecological reports (which Secretary of the Interior Gail Norton did regularly, with no qualms); magnifying uncertainty (perhaps the favorite, most widely used ploy and made famous by the tobacco industry and used relentlessly by energy corporations against dangers from climate change).³⁷ The Doonesbury comic strip reveals the procedure quite well. (See Figure 1.) One can fruitfully compare Gerald Graf’s notion of “teaching the conflict” during the “canon wars” of the 90’s. Having embraced historical standpoint epistemologies, Graf could only proffer students the emancipation of becoming aware of the limits and shortcomings of plural viewpoints and approaches. Graf believed a fuller resolution and

understanding of historical frameworks would lead to greater student maturity.³⁸ The Bush Administration, however, having embraced market fundamentalism, brooks no interference from scientific environmental reports that threaten the bottom line. All discussion of environmental problems are abrogated or deflected by undermining the “objectivity” of science with bogus “sound science” provided by corporate think tanks. If all discourse is governed by a point of view and is equally subjective, it all boils down to a conflict between points of view, which is precisely how the media have been treating it.

The same procedure of attacking the “objectivity” of science emanates from religious fundamentalism. As Mooney points out: “...similar tactics have also been brought to bear by the Right in the service of a religiously conservative cultural and moral agenda.”³⁹ Instead of the bottom line, the religious Right defend their faith-based authority, either Church or Scripture, by disregarding, distorting, and abusing science on evolution, embryonic stem cell research, health risks for women seeking abortions, and sex education. Like other fundamentalist movements in Iran, India, and Afghanistan, the Christian Right also seeks a theocracy, to overcome America’s long tradition of the separation of church and state. To achieve their agenda they, too, have their own think tanks and political action committees. (See Figure 2). The Bush administration operates obsequiously to these two self-serving groups who despise the truth and eliminate it when it interferes with their fervent beliefs and desires.

The Union of Concerned Scientists finally did break through in 2004 with a report on “Restoring Scientific Integrity in Policymaking” signed by sixty leading scientists, among them twenty Noble laureates. But political interference with science continued with hardly a protest from mainline media.⁴⁰ This shouldn’t be surprising as the media

so far has been part of the problem, not the solution. As late as July 10, 2006, in an email to members, Kevin Knobloch, President of UCS wrote:

“Across a broad range of issues – from childhood lead poisoning and mercury emissions to climate change and nuclear weapons – scientific findings are being censored and distorted, scientists’ recommendations are being ignored, and many top scientists are leaving government service, fed up with years of interference and intimidation. This abuse of science has serious consequences for our health, national security, and our environment.”

As I stated in my *Anglistik* article: Without some notion of truth on one’s side and having science as a witness to the environmental position, I don’t see any hope in overcoming this reigning ideology. Scientists need to become better defenders of science and get through to the public with their message. Al Gore’s film *An Inconvenient Truth*, did for science what hundreds of reports, articles, and books hadn’t done. It broke through a wall of disinformation and made persuasively clear to millions that global warming was real, that it was a threat, and that humans were the chief cause of it. It has been savagely attacked by both industry and the religious Right but with limited success. It was a persuasive performance and because of its importance to the world, deserving of both its Oscar and Noble Peace awards.

Besides the epistemological need for more objectivity in our dealing with nature, is there any other connection between culture and nature that escapes the present attitude that anything goes because cultural subjectivity is unavoidable?. Katherine Hayles in ‘Chaos as Orderly Disorder: Shifting Grounds in Contemporary Literature and Science’ offers such a continuity principle⁴¹. She points out that the “shifting ground” in contemporary literature and science comes out of “chaos” or “complexity theory” as it is now being called. The shift has to do with realizing “that the

basic stuff that everything is made of is information” Matter and energy can be approached as a flow of information with “the world (becoming) a text, a physical embodiment of information markers.”⁴² In the fifteen years since Hayle’s essay, complexity science has foregrounded emergence as its central issue. Emergence and self-organizing systems have come to be recognized as basic to life and evolution.⁴³ The increasing number of books on the topic of complexity and its application signals that we are on the threshold of an intellectual revolution. The old linear world of Newton whose laws were controlled and determined by the calculus he invented is being replaced by the non-linear world of complexity. Complexity science wants to understand emergent behavior in all fields and believes it can do so by focusing on information exchange in dynamic systems, i.e. systems that change over time. With the help of computers which can perform repetitive mathematical programs with dazzling speed, one can begin to approach transitions or emergences that have been around for centuries. How do chemical reactions evolve out of the laws governing physics? How do cellular and molecular biology evolve out of chemistry? How does consciousness emerge out of physiological processes? Even social and cultural systems can be handled as emergents from nonlinear interactions of independent elements whose interactions bring into being a higher order not reducible to their individual parts. e.g. tribe, cities, nations, markets, business corporations, etc⁴⁴.

Nature as a complex adaptive system can be viewed as a forerunner of our own cultural dialogism in which antecedents constrain but do not control emergent consequences. Complexity science in its traditional science demeanor wishes to continue the use of reductive models to predict the workings of complex systems like business

corporations and the stock market. As Steven E. Phelan describes it in his article “What is complexity science, really”, complexity science posits *simple* causes for *complex* effects. At the core of complexity science is the assumption that complexity in the world arises from simple rules. However, these rules (which Phelan terms ‘generative rules’) are unlike the rules (or laws) of traditional science. They use “feedback and learning algorithms to enable the agent to adapt to its environment over time. ... Finding a set of generative rules that can mimic real world behavior may help scientists predict, control, or explain hitherto unfathomable systems.”⁴⁵ These generative rules need computers to do the non-linear mathematics so the modeling and interactions are done in the virtual worlds of computers. Virtual worlds like the earliest, John Conway’s cellular automata, *Game of Life* (1970), James Lovelock’s *Daisyworld* (1981), Chris Langton’s *Artificial Life* (1989), and Tom Ray’s *Tierra* (1990), all endeavor to parallel real life activity.⁴⁶ The underlying assumption of this computer modeling of nature is that life is an information system. This self organizing feedback mechanism, an ecological dialogism if you like, orchestrates emergence.

Traditional reductive scientists, like John Holland (who provided the genetic algorithms for the human genome and who authored *Emergence: From Chaos to Order*) modeled “computer programs that evolve, just as organisms do in nature, and find optimal solution to various problems”. He came to the conclusion that “the rules of the game were the same in physics, in economics, in biology.” He believes his model building just extends the Newtonian Enlightenment tradition of establishing laws. Complexity science demands that “you have to look at the interactions as well as the parts”. But if the ensuing emergent system is truly novel and not determined by its parts,

then one can't predict the outcome completely. To which Holland reluctantly agrees as of now⁴⁷. Holland's reductive approach is opposed by the more holistic approaches of Stuart Kauffman, Brian Goodwin, Stuart Pimm, and others. Fueling complex adaptive systems is an "order for free" operating at the edge of chaos in computer models without any human direction⁴⁸. The fact that nature's evolving processes seem to participate in the "order for free" excites many Sante Fe Institute researchers. It is this recent scientific definition of nature as an evolving adapting system that has begun to realign many human activities and discourses. It is producing a new cultural orientation in science, politics, economics, ethics, and aesthetics. We are on the cusp of a big intellectual revolution.

In my *Anglistik* article, I gave various examples of cultural dialogism indicating that open-ended evolving playback models were wide-spread in various human sciences. Here are a few more examples, now under the auspices of ecological dialogism.

Lawrence Buell in his *The Future of Environmental Criticism* acknowledges that the field is in flux and going in many directions.⁴⁹ The biggest happening between what he calls the first and second wave of environmental criticism was the inclusion of urban and social milieus into the notion of environment.⁵⁰ He admits – what environmentalists have long insisted on – that the early "wilderness ethic" was short sighted and that excluding humans to get back to some uncontaminated natural paradise won't work. First of all, humans were always a presence in nature from prehistorical beginnings. Early human hunters killed off the woolly mammoth more than did climate change. Secondly, if social inequities such as wide spread poverty, hunger, and disease aren't solved worldwide, we won't be able to implement our new found ecological insights.

Ecological blight follows inevitably from social blight.⁵¹ Thus, Buell doesn't use ecocriticism in his title but "environmental criticism" to include the humanly created environments with the natural. But his literary criticism reflects and encourages the new developments in environmental thinking. If nature is a living evolving open-ended process, then literature and criticism must give voice to this new insight. Furthermore, we are subordinate to this interaction even though we perceive and record experience from our individual standpoints. If self and world emerge from our interaction with the environment – both natural and social – then "place" becomes crucial to this engagement, especially as place is the site where our new ecological truths can be revealed. He cites Edward Casey, J. E. Malpas, and Christopher Preston as moving in the right direction in their attempts to escape standpoint epistemologies in order to let nature speak⁵². I, particularly, like Preston's use of *place* to draw together the natural, the social, and the intellectual in such a way that they give us a location from which to understand the full complexity of our relationships to what lies around us. No place is entirely free from culture so taking place seriously is one important way to affirm the significance of people for "what they are where they are".⁵³

Of course, if you believe that nature is an open-ended emerging process, as does Buell, then place must also include a temporal dimension. Art, too, must reflect this reality in both its content and method. Jorie Graham's poetry seeks to delineate nature's processes while, simultaneously, her poems also reflect on their own creativity. In both domains, the focus is on an interaction that brings a process more than a thing into a reader's consciousness.⁵⁴ I believe that even some titles of her poetry collections reveal this orientation, e.g. *Erosion* (1983); *Never*, (2002). While Buell makes utopian or

science fiction the *ne plus ultra* of environment-poetics in narrative form, a trip to the fourth floor of the new National Museum of the American Indian in D.C. might provide better examples of what is needed. On the fourth floor, *Our Universes* exhibit various “lifeways” of native tribes. What they all have in common is an ongoing creative practice which interweaves the everyday, the cosmic, and the ethical. How they make their living and how they treat their surroundings – “as if living systems mattered” – is precisely what we need to relearn. (See economic realm below) Ecologically, native behaviour and attitudes toward their natural surroundings show an understanding and respect we need to reacquire. Our cosmic orientation needs new stories, less utopias and more in place environmentalism, whether planetary or regional.

Another fruitful application of ecological dialogism occurs in Bryan Norton’s *Sustainability: A Philosophy of Adaptive Ecosystem Management*. It is an example of political policy being developed on the basis of nature’s dynamic systems. Norton weds environmental sustainability concerns with social welfare concerns in an adaptive system that remains open-ended and self correcting. The only difference between nature’s playback self-creative systems and Norton’s adaptive management playback system would be human self-awareness of the model’s limits. As human knowledge is historically circumscribed, especially in the time and space scale of the model, policy informed by natural and social sustainability principles must continually adapt its political management to what the ever expanding historical horizons lets us experience.⁵⁵

In the economic realm, two books do a good job of guiding us from the old economic order into the new: *Natural Capitalism: Creating the Next Industrial Revolution* by Paul Hawken, Amory Lovins and L.Hunter Lovins and *Cradle to Cradle*

by William McDonough and Michael Braungart⁵⁶. The first offers four strategies to achieve economic efficiency, ecological conservation, and social equity. But the new industrialization demands a different mind set of values than conventional capitalism. It's capitalism "as if living systems mattered."⁵⁷ Resource depletion should certainly be our concern and much can be done to make resource use more efficient, but the services rendered by natural systems are even more valuable. To make this vivid, they point to the Biosphere 2 experiment in Arizona in which eight people were to be maintained with life-supporting oxygen for several years within an ecologically organized dome. The experiment failed. Yet Biosphere 1: Planet Earth does this free for six billion people nonstop so far. This supporting service can't be replaced even though it has no market value. Climate debate is not about specific resources but about a life-supporting system. One of nature's life supporting cycles is the exchange of carbon dioxide and oxygen between plants and animals. This "recycling service" is provided by nature free of charge. Our combustion of fossil fuels builds up carbon dioxide beyond nature's capacity to recycle it. There is no alternative to nature's carbon cycle service. If it goes, so do we. Recognition that we operate within such living systems lies at the heart of the new industrial revolution. We must change our habits to survive.⁵⁸

The *Cradle to Cradle* title announces the central issue of the second book: eliminate waste through design. Instead of the usual journey of manufactured objects to landfills (cradle to grave), one should design objects so they can be reused and recycled. Use Nature's design method in which there is no waste, no stasis. Everything is recycled and kept in motion. Manufactured products should become food for interdependent systems viewed as either industrial or biological cycles during or after their useful life has

completed itself. At all stages of their manufacture, use, and disposal, the materials and making process should benefit the environment. Industrial technology needs to be reassessed from this interdependent ecological point of view. It is nature's web of life that makes our cultured existence possible. They need not be antagonistic and harmful as they are now.⁵⁹

The reception of ecology into the religious field has been very conflicted. The fundamentalist leadership of world religions have ignored the truths of ecology. But fissures are appearing, due more to the suffering of millions of people brought on by ecological deterioration than to the leadership of these religions. Faced with ecological crises, world religions undergo an excruciating crisis within their own theology, especially the Judeo, Christian, and Islamic transcendent monotheisms with their dualistic material/spirit, body/soul, earth/heaven dichotomies whose values accruing to this split denigrate the former while glorifying the latter. These world religions have a difficult time reforming their message. Because their message rests on ahistorical divine revelations which reveal to the faithful God's Will and Commands, these religions demand special privilege. The Absolute resides in them, each sect understands itself as God's chosen instrumentality to save humanity. How to reformulate God's guiding message from its supernatural, other-world orientation to one that shows care for earthly concerns and seeks justice for biodiverse plant and animal life, even though they lack the soul, spirit, and heavenly destination of humans? It's difficult to retrofit two thousand years of dogma. Even the scholars and editors of the Religions of the World and Ecology Series put out by the Harvard Center for the Study of World Religions admitted as much. In the *Christianity and Ecology* volume, the editors stated

...at this late date, despite the engagement of environmentally active members, most of the churches remain quite slow to meet the environmental challenge. The exciting prospect of Christianity's ecosocial transformation contrasts sharply with the reality of sluggish ecclesial life and rigid theologizing. A majority of Christian communions and theologians on every continent still think and act with old pictures of the world and of humanity's place therein, rather than refocusing on the worldview, liturgy, and praxis of eco-justice.⁶⁰

What the editors admit about Christianity applies equally to fundamentalist Islam and Judaism. But our planetary crisis needs ecological friends in main stream religions. Time is short and as pollution, climate change, and an ever increasing human population indicate, we face a system overload and breakdown. Religious fundamentalists influence multi-millions and have the power to help avoid this planetary disintegration.

Not all religions, however, form a closed system based on divine revelation. Some understand that religion can't escape history and that it must join all other cultural discourses in staying open-ended and changeable. Two such are Don Cupitt's recent acceptance and promulgation of the social creation of religion and the older Process Theology going back to A.N. Whitehead.⁶¹ Cupitt accepts that language creates religion and that as religious codes wear out due to knowledge acquisition, we should create more adequate religions. Up to now, Process Theology would seem to have provided the most adequate religious narrative based on scientific knowledge of the universe. But joining it is the recent infusion of complexity science into theology. Perhaps the best example of ecological dialogism at work in theology can be found in *The Re-emergence of Emergence*.⁶² The attraction of complexity science to religion lies in its computer experimentation with complex adaptive systems whose self-organizational dynamic supplements traditional bottom up causation. When Stuart Kauffman critiqued the Neo-

Darwinian explanation of emergence (evolution), he affirmed that genetic mutation honed by natural selection could not possibly account for all the evolutionary evidence, particularly that from chemical to living processes. Mathematically, the odds against evolution happening by mutation and natural selection in the pre-genome era were too great. He suggested that emergence needed another operative principle which Kauffman labeled “order for free”. Various computer programs when they enter the “edge of chaos” region display a self-organizational action, an autonomous self-sustaining play-back loop that is spontaneous and can’t be explained via bottom-up causation. Kauffman turns this into a cosmic principle:

...we have only begun to tell the story of emergent order. For spontaneous order... has been as potent as natural selection in the creation of the living world. We are the children of twin sources of order, not a singular source. So far we have showed how autocatalytic sets might spring up naturally in a variegated chemical soup. We have seen that the origin of collective autocatalysis, the origin of life itself, comes because of what I call “order for free” – self-organization that arises naturally. But I believe that this order for free, which has undergirded the origin of life itself, has also undergirded the order in organisms as they have evolved and has even undergirded the very capacity to evolve itself.⁶³

The reduction of biology to schemas of information or communication has met with skepticism from some biologists⁶⁴. They want wet empirical proof and not just dry artificial computer models. Stuart Kauffman, a theoretical biologist, in his *At Home in the Universe: The Search for Laws of Self Organization and Complexity* has come close to providing the transition from chemistry to living organisms in his notion of “autocatalytic set” in which a group of chemicals react with one another to produce other chemicals which in a feedback loop catalyzes or promotes the original reactions. Such a set of chemicals through replication would eventually dominate their surroundings.

Eventually, this evolving catalytic set, over millions of years, could approach the earliest reactions that make up life, primitive RNA. Thus, adaptation and self-organization so prominent in computer models find potential empirical explanation in Kauffman's theory of autocatalysis.⁶⁵

For those who are taken with the more ambitious applications of complexity, a visit to Amazon.com reveals a proliferation of books on the topic of complexity science or network culture. The topic has entered the popular realm. A more serious journey and impressive vista over this terrain are the works of Fritjof Capra, especially *Web of Life* (1996) and its sequel, *Hidden Connections* (2002).⁶⁶ They construct and provide a continuity principle between nature and culture that duplicates the strengths of religion and postmodernism without their drawbacks.

Evolution and emergence undermine the authority of the closed static structures of world religions based on revelation or mysticism. Their dualistic, supernatural frame or narrative is no longer believable. Yet the religious imperative doesn't disappear. It has to be answered, i.e. how do our self-aware individual existences relate to the natural world around us, from planet to cosmos? Salient to our growing awareness and knowledge of the natural world is the fact of emergence itself. We find ourselves in the midst of a process whose transient flow we are coming to understand more fully through the recent paradigm shift named complexity science. The hierarchies of matter, life, consciousness, culture which once were treated as separate domains, each with its own methodology, suddenly have become study sites focused on how they hook up with each other as emergents. What makes such study possible is the non-linear mathematics

initiated by Poincare's topology and taken up by the Sante Fe Institute researchers as applicable to the relations of complex adaptive systems.

The brilliance of Capra lies in taking this new found or revised "system thinking" and applying it to both nature and culture. The open-endedness of cultural production so prized by the social constructionists in his view becomes just the latest "emergent" of an ongoing process which has been in existence for three billion years. Cultural dialogism rides piggy back on ecological dialogism. Future emergents of dynamical systems can't be predicted so they are not a pre-determined causal or teleological product. They are a product of a mutual bottom-up and top-down playback organization. We are entering a new era of non-linear network culture which is non-deterministic and which will replace the closed, deterministic Newtonian model. Cultural dialogism finds a continuity principle in ecological dialogism, retains its imaginative freedom, and loses its rootless historicism. Cultural Studies will drop its anthropocentrism and operate within the expanded confines of Aldo Leopold's ecological "land ethic".⁶⁷ Religion will have to shed its transcendental, supernatural past, embrace Divine Immanence or panentheism, and adopt a narrative that, like science and literature, can change itself with history. As we undergo our *Bewusstseinswandel*, we may finally encounter that variety of religious experience described by William James and Stuart Kauffman as "at home in the universe".

Appendix

While *Not in Our Genes* subordinated the science in sociobiology to a socio-cultural ideology and criticized Wilson's book for its reactionary political and ethical

consequences, the controversy continued with Stephen Gould and Richard Dawkins becoming the main protagonists. Gould's attack on Wilson and Dawkins followed a familiar path. Wilson's attempt in *Consilience: The Unity of Knowledge* to integrate the sciences and humanities with a fusion of methods linking culture to biology met from Gould the oft repeated freedom versus determinism opposition.⁶⁸ This dichotomy goes back to Kant's contrast of nature governed by laws of necessity, on one side, with the free moral realm of human choice in which man was his own lawgiver, on the other. The later NeoKantians, Dilthey and Rickert, insisted that Geistes- or Kultur-wissenschaft dealt with life forms that needed a subjective approach which yielded understanding (*verstehen*) via actual experience of the values involved therein. Natural science had as its study, abstract, value free phenomena which it explained causally and externally (*erklären*).

Gould used "emergence" and "complexity" to further separate these two "magisteria" which he claimed were not in conflict because they operated at different levels:

The humanities cannot be conquered, engulfed, subsumed, or reduced by any logic of argument, or by any conceivable growth of scientific power. The humanities, as the most glorious emergent properties of human consciousness stand distinct and unassailable. Any complete human life ... must join the factuality of scientific understanding to the moral and aesthetic inquiry of our most particularly human capacities".⁶⁹

"Emergence" for Gould produces hierarchical separation in which morality and aesthetics rest on new criteria that didn't "exist on this planet before the emergence of human consciousness".⁷⁰ Without a self conscious moral and aesthetic agent to do the choosing, morality and aesthetics have neither meaning nor existence. While these capacities arise

from a material substrate (our brain) they can't be "reduced" to biological or neuroscientific causal mechanisms. As often proclaimed, the whole can be and often is more than the sum of its parts. Because Wilson retains a bottom up causal orientation which leaves biology in control, Gould's use of emergence to keep the humanities separated seems warranted. But it's a different ballgame with Richard Dawkins.

He is not a reductionist even though Gould labels him an "ultra Darwinian fundamentalist."⁷¹ There is nothing "atomistic" or linear "cause and effect" reductionist about Dawkins. While he champions Darwinian natural selection, he has changed the way scientists (and the world) think about evolution. In his book, *The Selfish Gene*, he promotes the "genes eye view" of evolution. Normally, the individual organism or the species has been the focus of evolutionary study as they change under the directive force of natural selection. This is wrong, says Dawkins. Focus on the gene, the replicator, not the vehicle, or individual organism. Genes are what replicate. During this process of replication, genes change due to mutation, meiosis, cross over, and inversion. The effects of these changes are visible in the vehicular forms that carry and distribute the genes. When beneficial to the replicator (increased number of replicas) changes in the vehicle are retained; otherwise, the vehicle becomes extinct. Roughly, ninety- nine percent of all living forms (vehicles) have become extinct. But the germ cells that humans carry around in their testicles and ovaries go back uninterruptedly 3.5 billion years to when life originated.. As vehicles, we briefly participate in this relative immortality – the only immortality for which we have evidence. Our replicators (genes) have given us our present shape through natural selection which is also true of all planetary life forms surrounding us. We are all made of the same genetic material and we all go back to the

first replicators. The selfish gene is only a descriptive metaphor which does the same job as Bergson's *élan vital* or life force. Genes, however, are empirical, not some value added dualistic spirituality. They can be sequenced and counted. Their configuration and reconfiguration provides the new fossil record which illuminates our evolutionary journey from murky prehistoric eons. Life in its various forms may be competitive but they have all taken the same journey and play in the same game.

So why doesn't natural selection function as the imperial (universal) causal principle controlling this evolutionary game as Gould charges? Actually, Dawkins welcomes the thought that natural selection could operate as a universal Darwinism⁷², but what he offers in *The Selfish Gene* is an interactive game in which particular outcomes emerge that are not controlled by particular genes. Events happen guided more by information loops, mutual co-operation between organisms, historical contingencies, and unexpected emergents.⁷³ Instead of seeking a causal relationship between gene and some characteristic trait, Dawkin's natural selection begins to resemble what we, here, have been describing as open ended dialogue. One might prefer to analogize the outcomes of J. Maynard Smith's "evolutionary stable strategy" (ESS) to ecological sustainability than try to analogize memes to genes⁷⁴. Memes do not come into existence to replicate themselves like genes. If communication is "not designed to result in the copying of information" but "designed to manipulate the minds and hence the behaviour of other animals" says Robert Aunger, then "memetics appears to be in search of subject matter because its central claim, the meme hypothesis, lacks substance."⁷⁵ And if life resembles an open ended communication system, then the more adequate continuity principle

between nature and culture is not genes to memes but ecological dialogism prefiguring cultural dialogism.

NOTES

This is a revised version of an address given to the annual conference of the German Association of New English Literature, May 20, 2007, at Friedrich Schiller University, Jena, Germany.

² “Why the Humanities Need a New Paradigm which Ecology Can Provide,” *Anglistik* (Fall, 2003), pp. 45 – 61.

³ His most recent exhibition sponsored by four U.S. museums continues this focus on how humans mediate nature and culture, earth and heaven, matter and spirit, etc. In an interview appearing in the volume accompanying the exhibition, Kiefer admits that palette, wings, chariot (merkawa), angels, books, alchemy’s lead, fern trees, all share in being ambiguous mediators or symbols in the human search for meaning down through history. See Anselm Kiefer, *Heaven and Earth*, ed. Michael Auping, (Fort Worth: Modern Art Museum of Fort Worth and Prestel, 2005), pp 155 - 176

⁴ Interview with Gavin Smith in Vernon and Marguerite Gras (eds.) *Peter Greenaway: Interviews* (Jackson: University Press of Mississippi, 2000), p.98

⁵ *Critical Inquiry* (Summer, 2004), p. 682

⁶ Dennis Potter, *The Singing Detective* (London: Faber and Faber, 1986); Six Part TV Series BBC Video, 1986; Margaret Atwood, *The Blind Assassin* (2000, New York: Anchor Books, 2001)

⁷ Samuel Beckett, *Krapp’s Last Tape and Other Dramatic Pieces* (New York: Grove Press, 1994 (1957))

⁸ Jean Paul Sartre, *No Exit and Three Other Plays* (New York: Vintage, 1989)

⁹ *New Literary History* (Summer, 2004), pp. 427 - 442

¹⁰ Jonathan Bate, *Song of the Earth*, (Cambridge, MA: Harvard University Press), 2000

¹¹ Rigby, p.437

¹² Ibid.

¹³ Lawrence Buell, *The Future of Environmental Criticism* (Oxford: Blackwell Publishing Ltd., 2005), p. 101 ff.

¹⁴ Dana Phillips, *The Truth of Ecology* (New York: Oxford University Press, 2003). See especially ch. 1: “Expostulation and Replies”

¹⁵ Ibid., pp. 37 - 41

¹⁶ See Buell, *op. cit.*, ch. 1: “The Emergence of Environmental Criticism”

¹⁷ See Ullica Segerstrale, *Defenders of the Truth: The Sociobiology Debate* (Oxford: Oxford University Press, 2000) and the special issue “On Human Nature” of *Daedalus* (Fall, 2004)

¹⁸ Edward O. Wilson, *Sociobiology: The New Synthesis* (Cambridge, Mass.: Harvard University Press, 1975); Richard Dawkins, *The Selfish Gene* (Oxford: Oxford University Press, 2006 (1976))

¹⁹ Roland Barthes, “Myth Today” in *Mythologies* (London: Jonathan Cape, 1972); Michel Foucault, *The Archaeology of Knowledge*, trans. Sheridan Smith (New York: Random House, 1972). On Derrida, see my entry, “Deconstruction” in *The Princeton Encyclopedia of Poetry and Poetics* (Revised: Princeton University Press, 1993)

²⁰ R.C. Lewontin, Steven Rose, and Leon J. Kamin, *Not In Our Genes: Biology, Ideology, and Human Nature* (New York: Pantheon Books, 1984)

²¹ *Ibid.*, p.3-4

²² Edward O. Wilson, *Naturalist* (Washington, D.C.: Island Press, 2006 (1994)), p. 345

²³ *Ibid.*, 348

²⁴ *Ibid.*, 350

²⁵ *Ibid.*, 352; Lewontin in his review of the book in *The Sciences* (July/August, 1981) was nasty: “ Since very few readers, including evolutionists, understand vector algebra, it seems as if they are saying something more complex than the ‘ordinary’ equation, but they’re not. The two equations are, in fact, identical, but one has been written in a purposely ‘elegant’ form to make it seem more complex. This sort of mathematical puffery pervades the book, giving it an air of originality and profundity that it does not really possess.”, pp. 23 – 26, 26

²⁶ Steven Pinker, “Why nature and nurture won’t go away”, pp. 5 – 17; Richard Rorty, “Philosophy Envy”, pp. 18 – 24 in *Daedalus* (Fall, 2004)

²⁷ *Ibid.*, p.17

²⁸ *Ibid.*, p. 21

²⁹ *Ibid.*, p.19

³⁰ *Ibid.*, p.24

³¹ Robert W. McChesney, *Rich Media, Poor Democracy: Communication Politics in Dubious Times* (Urbana: University of Illinois Press, 1999), p. 2: “Behind the lustrous glow of new technologies and electronic jargon, the media system has become increasingly concentrated and conglomerated into a relative handful of corporate hands. This concentration accentuates the core tendencies of a profit-driven, advertising-supported media system: hypercommercialism and denigration of journalism and public service. It is a poison pill for democracy.

³² Robert Kuttner, *Everything For Sale: The Virtues and Limits of Markets* (Chicago: University of Chicago Press, 1999 (1996)), p.337

³³ Chris Mooney, *The Republican War on Science* (New York: Basic Books, 2005), p. 110: “ With the Data Quality Act, industry had finally found a means of disputing agency science in the earliest stages of the regulatory process. At the merest public mention that a government agency might be looking at a particular study and wondering whether it could compel regulatory action, industry interests could file a complaint challenging the agency’s ‘dissemination’ of the information. ... both the Shelby amendment and the Data Quality Act represent successful under-the-radar attempts to pass bite-sized pieces of legislation highly reminiscent of the failed Gingrich-era “regulatory reform” bill.”

³⁴ Robert F. Kennedy, Jr., *Crimes Against Nature* (New York: Harper, 2005), p. 198: “George W. Bush and his court are treating our country as a grab bag for the robber barons, doling out the commons to giant polluters. Together they are cashing in our air, water, aquifers, wildlife, and public lands and divvying up the loot. They are turning our politicians into indentured servants who repay campaign contributions with taxpayer-funded subsidies and lucrative contracts and reign in law enforcement against a booming corporate crime wave. If they knew the truth, most Americans would share my fury that this president is allowing his corporate cronies to steal America from our children.”

³⁵ C. Mooney, *op.cit.*, p.69

³⁶ *Ibid.*, p. 10

³⁷ *Ibid.*, pp. 17 – 24; R. F. Kennedy, *op.cit.* pp. 38 – 43, 42: “I’ve had many brushes with Norton’s crew of hardheaded ideologues. They are convinced that our government and its laws are illegitimate and that the illegitimacy makes it permissible for them to violate all the rules. I have seen them subvert the law, corrupt our democracy, and distort science. I have witnessed their willingness to break promises and deceive those they are appointed to serve.”

³⁸ Gerald Graff, *Beyond the Culture Wars: How Teaching the Conflicts Can Revitalize American Education* (New York: W.W. Norton Co., 1992), p. 12

³⁹ Mooney, *op.cit.*, p.171

⁴⁰ McChesney, *op.cit.* , p.29: “ (Media) firms are run by wealthy managers and billionaires with clear stakes in the outcome of the most fundamental political issues, and their interests are often distinct from those of the vast majority of humanity. By any known theory of democracy, such a concentration of economic, cultural, and political power into so few hands – and mostly unaccountable hands at that – is absurd and unacceptable.”

⁴¹ *New Literary History* (Winter, 1989), pp. 305 - 322

⁴² *Ibid.*, p.305

⁴³ As the Sante Fe Institute has been the center for complexity studies, a visit to its web site gives some indication of where emergence studies are going. They list five research topics: 1. Physics of Complex Systems 2. Emergence and Innovation in Evolution 3. Information Processing and Computation 4. Dynamics and Quantitative Studies of Human Behavior and Institutions 5. Emergence, Organization and Dynamics of Living Systems

⁴⁴ Harold J. Morowitz, *The Emergence of Everything: How the World Became Complex* (New York: Oxford University Press, 2002) Preface, v: “We are clearly at the beginning of viewing science from the new perspective of emergence”; Roger Lewin and Birute Regine, *The Soul at Work: Embracing Complexity Science for Business Success* (New York: Simon and Shuster, 2000)

⁴⁵ *Emergence* (Vol. 3: 1, 2001) , pp.130 – 31. One can download this article from the web. Google Steven E. Phelan, then click on Homepage.which lists his articles.

⁴⁶ A description of all these computer models can be found in Roger Lewin, *Complexity: Life at the Edge of Chaos*, 2nd edition (Chicago: University of Chicago Press, 1999). See index

⁴⁷ See the interview by Lewin and Regine of John Holland in R. Lewin, *Complexity*, pp. 213 – 222; John H. Holland, *Emergence: From Chaos to Order* (Reading, Mass.: Addison-Wesley, 1998)

⁴⁸ Stuart Kauffman, *At Home in the Universe: The Search for the Laws of Self-organization and Complexity* (New York: Oxford University Press, 1995); _____, *Investigations* (New York: Oxford

University Press, 2000); Brian Goodwin, *How the Leopard Changed Its Spots: The Evolution of Complexity* (Princeton: Princeton University Press, 1994) ; Stuart Pimm, *The Balance of Nature* (Chicago: University of Chicago Press, 1991)

⁴⁹ Buell, *op.cit.*, Preface, vii

⁵⁰ *Ibid.*, p. 22

⁵¹ *Ibid.*, pp. 66-67; 126 - 27

⁵² *Ibid.*, p. 65; Edward Casey, *The Fate of Place: A Philosophical History* (Berkeley: University of California Press, 1997); J.E. Malpas, *Place and Experience: A Philosophical Topography* (Cambridge: Cambridge University Press, 1999); Christopher J. Preston, *Grounding Knowledge: Environmental Philosophy, Epistemology, and Place* (Athens: University of Georgia Press, 2003)

⁵³ Preston, *op.cit.* p. 107; See also his “Restoring Misplaced Epistemology” in *Ethics, Place and Environment* (October 2005), pp.373 - 384

⁵⁴ Buell, *op.cit.*, p. 53 - 55

⁵⁵ Bryan G. Norton, *Sustainability: A Philosophy of Adaptive Ecosystem Management* (Chicago: University of Chicago Press, 2005), p.xii : “Adaptive management is science-based management that assumes we usually do not know enough to choose what is absolutely best to do. Adaptive managers adopt an attitude that actions to correct environmental problems must also be actions that reduce uncertainty in the future, allowing correction of our uncertain course in later decisions. This is humble management (not by experts) via political participation and social learning.”

⁵⁶ Paul Hawken, Amory Lovins and L. Hunter Lovins, *Natural Capitalism: Creating the Next Industrial Revolution* (New York: Little, Brown and Co., 1999); William McDonough and Michael Braungart, *Cradle to Cradle* (New York: North Point Press, 2002)

⁵⁷ Hawken, et. al. *op.cit.*, p.9 ff

⁵⁸ *Ibid.*, p. 5

⁵⁹ McDonough and Braungart, *op.cit.* , Ch. 4: Waste Equals Food, pp. 90 ff

⁶⁰ Dieter T. Hessel and Rosemary Radford Ruether (eds.), *Christianity and Ecology* (Cambridge: Harvard University Press, 2000) Introduction. See web site: www.environment.harvard.edu/religion

⁶¹ Don Cupitt, *After God: The Future of Religion*. (London: Weidenfeld and Nicolson, 1997) ; David Ray Griffin, *Whitehead's Radically Different Postmodern Philosophy: An Argument for Its Contemporary Relevance* (Albany: SUNY, 2007); John B. Cobb, Jr., and David Ray Griffin, *Process Theology: An Introductory Exposition* (Louisville: Westminster Press, 1976)

⁶² Philip Clayton and Paul Davies (eds.), *The Re-Emergence of Emergence: The Emergentist Hypothesis from Science to Religion* (New York: Oxford University Press, 2006)

⁶³ Kauffman, *At Home in the Universe.*, p. 71

⁶⁴ Franklin M. Harold, *The Way of the Cell: Molecules, Organisms and the Order of Life* (New York: Oxford University Press, 2001), p. 221 “Form, structure and function are not straightforward expression of the gene’s dictates; there is more to heredity than what is encoded, and you can only go from genotype to phenotype by way of epigenetics. ... An organism is, in fact, a self-organizing entity and more than the sum of its molecular parts. The informational metaphor all but ignores the multiple webs of relationships

that make up physiology, development, evolution and ecology.” But like “*das ewig Weibliche*,” the hidden communication codes of living nature excite and attract our questing. See www.wired.com/print/science/discoveries/news/2007/10/veggie/intelligence: Nicole Martinelli, “Smarty Plants: Inside the World’s Only Plant Intelligence Lab” in which she visits the International Laboratory of Plant Neurobiology, seven miles outside Florence, Italy, and discovers that “...there is a growing body of research showing that plants have a lot to contribute in fields as disparate as robotics and telecommunications”. See also Stuart Kauffman and Philip Clayton, “On emergence, agency, and organization” in *Biology and Philosophy* 21:4 (Sept., 2006), 501 – 521, during which the authors “... offer a model of molecular autonomous agents which meets the five minimal physical conditions that are necessary (and, we believe, conjointly sufficient) for applying agential language in biology...”

⁶⁵ Kauffman, *At Home in the Universe*, p. 47 ff

⁶⁶ Fritjof Capra, *The Web of Life: A New Scientific Understanding of Living Systems*. (New York: Anchor Books, 1996); _____, *Hidden Connections: Integrating the Biological, Cognitive, and Social Dimensions of Life into a Science of Sustainability*. (New York: Doubleday, 2002)

⁶⁷ Aldo Leopold, *A Sand County Almanac and Sketches Here and There* (New York: Oxford University Press, 1989 (1949)), p.201 ff

⁶⁸ Edward O. Wilson, *Consilience: The Unity of Knowledge* (New York: Vintage Books, 1999 (1998))

⁶⁹ Stephen Jay Gould, “In Gratuitous Battle,” in *Civilization Magazine* (Oct. 1, 1998), p. 88. Reprinted online at The Stephen Jay Gould Archive: www.stephenjaygould.org/reviews/consilience.html

⁷⁰ Ibid.

⁷¹ Stephen Jay Gould, “Evolution: The Pleasures of Pluralism,” *The New York Review of Books* (June 26, 1997), pp. 47-52, 47. Reprinted at www.stephenjaygould.org/reviews/gould_pluralism.html

⁷² Richard Dawkins, “Universal Darwinism” in D.S. Bendall (ed.) *Evolution from Molecules to Men* (Cambridge: Cambridge University Press, 1983) , pp. 403-25

⁷³ Dawkins, *The Selfish Gene*, pp. 24 – 45. Also p. 84: “Genes are selected, not as good in isolation, but as good at working against the background of other genes in the gene pool. A good gene must be compatible with, and complementary to, the other genes with whom it has to share a long succession of bodies”

⁷⁴ Ibid., pp. 69-86; 183- 86

⁷⁵ Robert Aunger, “What’s the Matter with Memes?” in Alan Grafen and Mark Ridley (eds.) *Richard Dawkins: How a Scientist Changed the Way We Think* (Oxford: Oxford University Press, 2006), pp. 184, 186; Dawkins, *The Selfish Gene*, Ch. 11 “Memes: The New Replicators” pp. 189 ff

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