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Reflections on the Relational and Emergent Nature of Cultural and Natural Ecologies

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Abstract

The primary focus of this essay is on the relational and emergent nature of life sustaining processes in both cultural and natural ecologies. There is a brief reference to how the technologies of print and computer-mediated thinking represent things, ideas, events, and so forth as distinct entities separate from the cultural and natural ecological contexts from which they have been extrapolated. The main focus is on how the relational nature of existence within cultural and natural ecologies represent information pathways, and on how the continued dominance of the old paradigm limits awareness of what is being communicated through these information pathways. The suggestion is made that the emerging field of biosemiotics should be named eco-semiotics in order to avoid limiting understanding of the relational/information pathways that are heavily influenced by the metaphorical language inherited from the past. This inheritance includes the failure to recognize that words have a history and carry forward the silences and misconceptions of a world that was not understood as relational and emergent.

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Charlene Spretnak goes to the heart of the problem when she writes that “Our hypermodern societies currently possess only a kindergarten level understanding of the deeply relational nature of reality.” For all our technological and intellectual achievements, we have missed, as she puts it “the way the world works.” (2011, 1) As our everyday lives are dependent upon awareness of what is being communicated through the relationships of which we are aware (the car speeding in the wrong lane, the non-verbal communication of the Other, use of a word that encodes a prejudice, and so forth), Spretnak’s statement points to a complex cultural double bind: that is, how print and now what can be digitized lead to ways of thinking that misrepresents the emergent and co-dependent world we live in as fixed and made up of autonomous things. The challenge here is to provide a conceptual framework for understanding how computer-mediated learning, which still relies on print as the principal means of communication, perpetuates the students’ conceptual misunderstandings and thus limits their understanding that all aspects of life are emergent, relational and co-dependent. As will be explained more fully, there are no autonomous entities, except in the world constituted by print and English nouns. Unfortunately, this linguistically constructed world of reifications, such as free markets, freedom, data, rational thought, and so forth, has been imposed on the dynamic life forming and sustaining processes.

How Print Misrepresents Life Processes

Print has had special standing since the invention of the printing press. Books, maps, treaties, and newspapers have been acclaimed as contributing to democracy and a literate public. But there is a down side to print that brings into question whether this old technology is, on balance, capable of representing the ecological challenges we face in the 21st century. The following summary of the characteristics of print needs to be considered especially now that more of the students’ learning is mediated by computers that rely upon the technology of print. The often ignored characteristics of print include the following: (1) Print provides only a surface knowledge of an event, process, and context; (2) What is encoded in print quickly become dated and thus misrepresents the relational and emergent processes in the different cultural and environmental ecologies; (3) Print reinforces the misconception of providing an objective account; (4) Print lends itself to being reified and treated as having universal validity; (5) The impression of objectivity associated with printed accounts is further reinforced when the conduit view (sender/receiver) view of communication is adopted; (6) Although print can be used to provide an historical account and even a description of contexts, too often print is used in ways that hide that words have a history; (7) The combination of print and the conduit(that is, the sender/receiver) view of language undermines awareness that most words are metaphors, and thus have a history. Print also privileges sight as the primary basis of knowing, while excluding reliance upon the other senses as sources of information about what is being communicated through the relational world we call ecologies. In effect, the transition to computer-mediated learning, which allows for the use of other media, continues the dominant tradition in the West of marginalizing an awareness that there are no objects, ideas, facts, data, individuals, or events that have not been influenced by their relationships within larger and more complex ecologies that have a history, and that interact with other ecological systems—both natural; and cultural.

The Paradigm Shift that is Underway

In order to understand this criticism it is first necessary to provide an overview of how the paradigm that emphasized a mechanistic view of organic processes, of individual autonomy in a human-centered world, and of science and technology leading to endless progress and material abundance, is now being challenged. The primary importance of these challenges, beyond providing a more accurate understanding of life-forming processes, is that it provides the conceptual framework necessary for addressing how to live more ecologically sustainable lives.

What does Spretnak mean by referring to the world as relational, and why do the print-based misconceptions become especially important as the world's population expands toward the nine billion mark, along with a consumer lifestyle that is further undermining the life-sustaining capacity of natural systems? The answer to both questions can be traced to a single word: Ecology. This word, which in the middle of the 19th century represented what has become the modern translation of the early Greek word, *oikos*, which supposedly referred to the management of the Greek household. I say "supposedly" as the translation by the German biologist, Ernst Haeckel (1834-1919), was accepted within the scientific community of that day as a fact. This example of metaphorical thinking, where the management of the environment was understood as like the management of the household, led to a very narrow understanding of ecology as the study of the behavior of natural systems. Lost in translation was what Haeckel, as an early proponent of Darwin's theory of evolution, was less able to understand. Namely, that for the early Greeks, *oikos* encompassed the norms governing a wide range of cultural practices.

This science-dominated understanding of ecology is now beginning to change. A small group of scientists is developing the new field of biosemiotics that expands understanding how the word ecology moves us closer to understanding the emergent nature of life processes. There are now increasing references to the ecology of identity, the ecology of language, the ecology of bad ideas, the ecology of colonization, the ecology of marriage, and so forth. That the explanatory power of the word ecology can be applied to any aspect of the natural and cultural world, as well as to how they interact, is based on the recognition that ecology is another word for codependent relationships, and the multiple patterns of communication that are integral to all relationships.

This is where the thinking of Alfred North Whitehead, Gregory Bateson, the biosemiotic-oriented scientists, Charlene Spretnak, and other linguistic and anthropological thinkers such as Clifford Geertz, Walter Ong, and Richard E. Nisbett becomes helpful. Nisbett's *The Geography of Thought: How Asians and Westerners Think Differently...and Why* (2004) is especially useful as it clarifies how the languages in East Asia rooted in Confucianism, Taoism, and Buddhism focus awareness on the world of relationships, and the moral codes that should guide these relationships.

For example, the relational orientation of Confucianism can be seen in its five fold guiding principles: Jen which "involves simultaneously a feeling of humanity toward others and respect for oneself, an indivisible sense of the dignity of life wherever it appears." Chun tzu which highlights relationship that are the opposite of the competitive, petty, and ego-centeredness. Li is the quality that leads to doing things correctly—in the use of language, in avoiding extremes, in the correct ordering of relationships within the family and society. Te is the power of moral example that attracts the willing support of the people, and it refers to the "arts of peace", specifically the power of the arts to transform human nature in ennobling ways.

(Smith, 1991, 175-181) Taoism and Buddhism also focus on the moral nature of relationships with others and natural systems.

By way of contrast to these ancient epistemic/moral frameworks, it has only been in recent decades that Western thinkers have begun to lay the conceptual foundations for understanding the misconceptions that represent the world as material entities—both animal and human—that have their own distinct properties and that can be understood objectively and engineered to serve economic and political interests.

In Whitehead's most important and most difficult book, *Process and Reality* (1929) he challenges the idea of discrete entities or things— which range from ideas, organisms, events, material objects, facts, etc.—by claiming that actual entities are vital, transient “drops of experience, complex, and interdependent.” (28) That is, actual entities, contrary to the Western linguistically-driven habit of thinking of things and objects, are units of emergent processes. As he put it, “there is no going behind actual entities to find something more real.” (27-28). In short, there are no self-contained “things”, as everything in the human world has a history shaped by both environmental and cultural influences. Reality is best understood as ongoing relationships (units of process) that serve as creative influences on succeeding relationships.

It is the thinking of Gregory Bateson that brings into focus what is most distinctive about relationships, and to understanding a key characteristic of all ecologies. Bateson's *Steps to an Ecology of Mind* (1972) is also a difficult read, partly due to it being a collection of essays where his most important insights about relationships (ecologies) are only briefly explored and then submerged in a discussion of other non-linguistic issues. If one reads him in terms of what he has say about the interconnections between the archaic language processes we still take for granted and living systems (ecologies) the pedagogical and curricular implications begin to emerge for understanding Sprenak's observation about why the high-status systems of knowledge promoted in public schools and universities, which are largely based on print-based knowledge, misrepresent how the relational world in which we live.

Key Ideas of Gregory Bateson on Language

Summaries are always dangerous, but it is possible to present Bateson's core ideas about how language encodes earlier misconceptions and silences that continue to marginalize awareness that relationships, and how the information communicated through these relationships, are the dominant feature of all forms of existence. One of Bateson's criticisms of what he referred to as a recursive pattern of thinking in the West is the past failure to understand the individual, plant, event, data, and so forth in terms of its relationships within the ecological system of which it is a participant. The misconception that there are autonomous entities, and thus the ontological world created by this misconception, leads to studying their distinctive characteristics separate from the emergent life-altering relationships within the micro and macro ecologies the encompass all forms of life.

The following are three of Bateson's insights about language that are particularly relevant to understanding how the current educational reforms that rely more heavily upon computers reinforce the long-held cultural pattern of ignoring relationships and thus the ecology of influences that carry forward a long history of previous influences. For readers who want a deeper understanding, they should go to the chapters in *Steps to an Ecology of Mind* where Bateson speaks for himself. The section titled “Epistemology and Ontology” is the most direct

discussion, although other insights are scattered throughout the book. Unlike other books on the ideas of Bateson, my book, *Perspectives on the Ideas of Gregory Bateson, Ecological Intelligence, and Educational Reforms* (2011) focuses on the connections between his insights on how the misconceptions encoded in the metaphorical nature of language perpetuate such myths as individual autonomy, the progressive nature of change, and that science and technology will enable us to survive the destruction of the environment.

Perhaps most important is how Bateson's three core ideas on language, which are largely unknown by most public school teachers, academics, and the general public, highlight how the misconceptions about a world of facts, objective knowledge and data, help us to recognize the many ways classroom teachers and professors undermine the relational way of thinking essential to exercising ecological intelligence. These core ideas include:

The Map is Not the Territory

As Bateson thinks ecologically, he recognizes that everything, including words, have a history shaped by earlier cultural and environmental influences. This insight immediately brings into question how the current over-reliance upon print (whose limitations were identified earlier) undermines awareness of the ecology of language. The current meaning of words, such as woman, individualism, data, and so forth, is the outcome of an earlier process of metaphorical thinking where the analogs settled upon by thinkers in different cultural eras are carried forward and too often become the taken for granted basis of thinking about today's problems and possibilities. For example, the old analogs that framed the meaning of women have now, in some regions of the world, been replaced by new analogs that represent women as artists, astronauts, historians, CEOs of giant corporations, and so forth. The effort here is to reframe how to understand individuals in terms of their relationships within the larger ecologies they are dependent upon. Other cultures have already achieved a relational/ ecological way of thinking about the individual, while others continue to derive their analogs from the West's consumer-oriented culture that requires the myth of individual autonomy.

The critically important issue here is how old patterns of thinking continue to misrepresent today's realities. Many of our taken for granted patterns of thinking continue to be based on the root metaphors (interpretative frameworks) of patriarchy (now being challenged), individualism, progress, mechanism, a human-centered world, economism, and now evolution, that go back hundreds of years—and in the case of patriarchy and anthropocentrism (human-centeredness) thousands of years. One of the characteristics of root metaphors is that they create supporting vocabularies that make it difficult to challenge what the root metaphor or combination of root metaphors exclude from awareness. For example the vocabulary that supports the root metaphor of individualism, such as “freedom” and “autonomy”, limits the possibility of recognizing that words have a history, and that many of the individual's taken for granted patterns of thinking are based on metaphors that encode the assumptions from earlier eras. In effect, the relational nature of what is mistakenly thought of as the autonomous individual needs to take account of how her/his patterns of thinking, personal identity, and even physical characteristics have been influenced by the ecologies of language, cultural identity, and genetic inheritance. The root metaphor of mechanism, which can be traced back to the thinking of 17th century scientists such as Johannes Kepler, led to a vocabulary that is now used to explain organic processes, including the nature of thought itself. Other root metaphors such as evolution and progress have also led to complex vocabularies that are self reinforcing of its deepest

conceptual foundations. The excluded vocabularies limit awareness of other relationships that, as the ecological crisis deepens, are more critical to achieving a sustainable future.

If students are to learn to think relationally beyond what is required to attain immediate personal goals, which is needed for developing an ecological understanding of the world they live in, it is important for them to be introduced to Bateson's explanation of an aspect of language that has generally been ignored. That is, his explanation of what I prefer to call the linguistic colonization of the present by the past. The metaphor of "map", as he uses it, refers to the conceptual interpretative frameworks based on the vocabularies (metaphors) acquired in becoming a member of a language community. The "territory" for Bateson, refers to the current everyday world of relationships—that is, the cultural and environmental ecologies within which we live. In short, the maps (the metaphorically constructed interpretive frameworks) are generally inadequate guides for understanding and responding to current social and environmental changes. This is because the selection of analogs in the distant past, such as thinking of the environment as a source of danger and in need of being brought under human control, and then later as a natural "resource" waiting to be economically exploited, were not based on an awareness of the interdependencies between the natural and cultural ecologies. The root metaphors of mechanism and progress, which provided conceptual direction and moral legitimacy to the early stages of the scientific/industrial revolution, also limited awareness of the exhaustible nature of natural resources.

We shall later consider how students can be mentored in becoming aware of how the metaphorical nature of language illuminates or hides an awareness of what is communicated through their relationships with each other, of the traditions from the past still carried forward in their behavior and values, and of the natural systems undergoing changes that exceed the capacity of technology and science to reverse. This will be taken up when considering how current educational reforms misrepresent the ecology of language.

Double Bind Thinking and Behaviors

Double binds were first understood by Bateson and his followers within the context of therapy situations where the efforts to help took the form of reinforcing the very behaviors that needed to be changed—thus making the idea of progress an illusion. But the concept has more important implications in terms of understanding the double binds inherent in current widely held cultural agendas such as the globalization of the West's economic system, of digital technologies, and in the use of the English language that privileges nouns over verbs—to cite just three examples of double bind thinking.

The linear view of progress taken for granted by the promoters of world economic growth fails to take account of environmental limits. This example of double bind thinking leads to equating the economic exploitation of the whole biosphere we depend upon with progress. The double bind in promoting digital technologies on a global basis is that this view of progress undermines the oral traditions essential to the intergenerational renewal of the cultural commons that enable people to live more community-centered and thus interdependent lives that rely less on consumerism. In short, double bind thinking results from relying upon the old assumptions (conceptual maps) instead of giving attention to what is being communicated in relationships that have a smaller ecological footprint.

The double bind in the process of linguistic colonization where English displaces other languages is that English nouns such as individualism, progress, intelligence, facts, environment, and so forth, reinforce a world of fixed entities that seemingly are independent of actual cultural contexts and the ecologies of emergent relationships. That is, they reproduce a static view of reality, rather than the relational/process/emergent world communicated through the use of verbs. Linguistic colonization of other cultures can be seen in how the adoption of the English vocabulary that now accompanies Western technology and consumerism within East Asian cultures, along with the printed texts of Internet technologies, are undermining their more relationally-sensitive languages. As in the earlier examples, double bind thinking fails to recognize that what is assumed to be a progressive development is in reality an ecologically destructive set of ideas and practices. Unfortunately, the language that accompanies double bind thinking, and appears essential to a modern way of thinking, hides its own history of failure in solving fundamental social and environmental problems.

A Difference Which Makes a Difference

This phrase is part of Bateson's statement on what occurs in relationships. As it is a key to understanding both what he means by double bind thinking and how the historically constituted conceptual maps are seldom adequate guides to understanding and responding to today's "territory", it is important to quote him in full. "A 'bit' of information", he writes, "is definable as a difference which makes a difference. Such a difference, as it travels and undergoes successive transformations in a circuit, is an elementary idea" (1972, 315) Bateson follows this brief statement with the example of the series of differences which make a difference such as how the axe introduces a difference in the cut-face of the tree that leads in turn to a change in the angle of the axe as it makes the next cut. The response of the Other to the difference which makes a difference can be observed in every relationship—in speaking with others, playing a game, in walking through a forest, in exploiting someone else, and so forth.

His brief statement and equally brief example are not really adequate for overcoming how we have been conditioned to think of acting on things, and to ignoring how we continually adjust our response to the difference which makes a difference in making bread, in playing a game of chess, in a conversation with others, in passing another car, in supporting the clear-cutting of an old growth forest, in driving a car that puts on a yearly basis 8,320 pounds of carbon dioxide into the atmosphere, and in being passive as computers replace workers and further erode our privacy, and so forth. These examples of relationships encompass both cultural and natural ecologies, as well as the micro and macro scale of these interacting ecologies. And there is no escaping from them. The question is whether we can become aware of the historical linguistic influences that limit our awareness. Also, can we become aware of the ecological destructiveness of the old conceptual/cultural maps that represent individuals as rational and autonomous, and who act on the external animate and inanimate worlds? These questions should be taken seriously by everyone, but especially by teachers and people who develop curricula.

The reality is that we all adjust our thoughts and behaviors to the differences that our language and taken for granted interpretative frameworks enable us to recognize as we interact in the complex ecologies that are an inescapable aspect of daily life. To reiterate a key point: the emergent nature of relationships are pathways for the exchange of complex information and signs. This becomes clearer if we give attention to the multiple forms of information being communicated in changes in relationships such as in game, in a conversation, in bullying

someone else, and so forth. Responding to the information Bateson refers to as “differences” is greatly influenced by the historically derived conceptual maps (metaphorical language) that influence what is recognized and what is ignored.

The over-reliance upon print and digital technologies (that is, metaphors framed by the analogs settled upon by earlier thinkers) continually reduces the emergent world to things, events, facts, and static relationships—in effect, to the world as understood in earlier eras. The metaphorical nature of language, with its historically derived analogs that frame how to interpret the world in terms of past ways of thinking, hides not only the interactive processes that are part of our living world, but also what earlier thinkers were unaware of. The culturally influenced sense of being an autonomous individual, with an inflated sense of personal agency and privilege, also leads to a reduced awareness of what is being communicated through the multiple information pathways that are part of even the most seemingly banal relationships.

Let me cite two examples of seemingly simple relationships that turn out to be complex in the different kinds of information being communicated—but mostly ignored because of cultural influences such as a biases, lack of sensitivity and empathy, and the personal egos that the participants may bring to the relationship.

First, it is necessary to clarify a potential source of confusion. I have been using two metaphors, “information” and “communication” which are hang-overs from the old paradigm that represented the world as distinct entities and the individual as a rational being who supposedly can provide an objective account of her/his observations of the external world. Bateson’s reference to “differences which make a difference” needs to be understood as involving different messaging systems (or “information”) that may range from the electrical-chemical, the genetic, differences in temperature, and so forth that influence what cells communicate to each other—and which may inhibit or promote growth. The complex physical/chemical changes in one’s own bodily experience may become part of the differences (information) which make a difference in how one responds when encountering someone where tensions still exist. The connections between systems and what is communicated between them was highlighted when the 2013 Nobel Prize in Medicine was given to three researchers who discovered how hormones inside a cell, that are ferried in membrane-bound sacs known as vesicles, know how and where to deliver their genetic information so that there are no disruptions that can lead to a wide range of physical ailments. The complexity of information exchanged, for example, can be seen in how the molecular code carried in the vesicle senses calcium ions and triggers the release of brain chemicals at the right time.

The relational world of humans and animals involves even more complex semiotic/symbolic systems. In terms of cultural patterns of communication, the range of “information” generally includes both non-verbal cues that send powerful messages about how the relationship is interpreted, as well as the use of words (metaphors) and silences that convey historically loaded prejudices and so forth. For example, when I tried to talk to colleagues in other academic departments about the importance of the cultural commons, the differences which made a difference for me was communicated in how quickly they averted eye contact, changed the subject, and signaled with bodily movement that they needed to go elsewhere. These differences in behavior, like all relationships, need to be understood as ecologies that were influenced by the professor’s conceptual background—including influences that contributed to her/his being curious about a new way of thinking, or defensive in protecting a self-image of being a leading thinker. And these ecologies also include the ecology of language that limits or

involves an expanded vocabulary necessary for understanding newly encountered ideas. The ecology of thinking within the professor's discipline, as well as the ecology of values and reward system within the department and within the discipline at the national and even international level, all influence the professor's response to what was being communicated in the short-lived relationship.

Biosemiotics: Further Support for a Paradigm Shift

The small group of scientists who were influenced by the ideas of Bateson as well as others such as Thomas Sebeok who focused on the ecology of communication among animals, and by the growing body of research on how cells interact, are now promoting biosemiotics as a way of understanding the relational life-forming and sustaining (and destroying) processes. If the study of culture is not to be overshadowed by the continuing emphasis on the natural sciences this new field of inquiry should be called "eco-semiotics." Referring to this new field of inquiry as ecosemiotics leads to the more inclusive understanding that all relationships, in both the natural and cultural worlds, involve some form of semiotic (information) exchange that sets in motion further exchanges.

Jesper Hoffmeyer, the Danish molecular biologist who is one of the leading thinkers in this emergent field of inquiry, reframed Bateson's statement about differences which make a difference being an elementary idea, by suggesting that the multiple forms of information communicated through differences should be understood as signs. He further shifts the focus from the traditional mechanistic way of understanding the primary characteristics of things, plants, animals, cells, and so forth, to what is occurring in their relationships. This can be seen in Hoffmeyer's observation that "the individuality of a human life cannot be justified by its uniqueness as a particular genetic combination, but must be justified by its uniqueness as a particular semiotic creature." (2008, 328) Thus, the individual, for example, is not to be understood only as having the capacity of being intelligent and a critical thinker, of being ego-centered, hard working, and so forth. Instead of the personal attributes that might be identified by liberals and theologians, or by teachers, he suggests that the focus needs to shift to the biological and cultural attributes that enable participation in different semiotic systems of communication. For example, humans lack the genetic and cultural attributes that enable them to respond to the signs that enable dogs to recognize dangerous substances. Nor are the semiotic systems that Orca whales rely upon available to humans, given their differences in genetic and cultural make up. In short, Hoffmeyer is shifting the focus from the narrow range of communication that educators and others too often associate with speaking and writing to include the whole range of life forming processes—from the most primitive to the most complex and evolved organisms.

By introducing the idea that a more complex interspecies understanding of communication requires shifting to the more inclusive category of semiotic systems that all organisms (including humans) have the genetic and culturally mediated capacity to respond to in terms of their unique form of agency, he and the others in this new field have provided a way of understanding what Bateson meant by writing that differences (which is the most basic form of communication within ongoing ecological life altering processes) represent the most basic idea or unit of information. In effect, biosemiotics (or eco-semiotics as I would prefer) is in the Whitehead and Bateson tradition of representing reality as emergent and ongoing processes. What it adds is an evolutionary framework, and a way of understanding that the biological and

cultural worlds represent different levels and forms of cognition (that is, the ability to respond to signs) at even the most elementary level.

Educational Reforms that Support the Exercise of Ecological Intelligence

The increased reliance upon the consciousness-changing characteristics of print as students spend more time reading the screens of computers, cell phones, and other digital technologies, creates a special challenge for teachers. As pointed out earlier, everyone participates in multiple ecologies—of language, cultural identities, family life, media commercialism, peer pressure, and so forth—that influence how relationships are understood—including which relationships will be ignored. In short, in taking into account the information being communicated through these relationships everyone is exercising ecological intelligence. Awareness is most often influenced by self-interest, and what is needed to achieve immediate objectives. Some people are more aware of unjust social relationships and thus exercise what can be called a social justice oriented intelligence. And it is possible to identify a third form of ecological intelligence; one that is aware of how relationships affect the quality of life in both the cultural and natural ecologies. To reiterate another key point essential to understanding the unique challenge that today's teachers face, given the rate of climate changes and the spread of poverty and unemployment that is being magnified by the digital revolution, print as a primary medium of communication, is unable to represent the world as ecological systems that are emergent, relational, co-dependent, and becoming rapidly degraded. The Internet can provide vast amounts of information, but it cannot assist students in learning to interpret the short and long term implications of what is being communicated through the multiple relationships that make up their ecological worlds. That is, the Internet relies on a sender/receiver view of language that is unable to clarify immediately that a factual statement is dependent upon metaphors that have a history. Nor can it clarify that meanings are influenced by an ecological mix of critical thinking and taken for granted thinking.

The starting point for helping to align how students think with the emergent and relational world within which they live is for teachers to challenge the archaic idea that they exist as autonomous beings in a world of material and unintelligent things. This can be done by introducing students to Bateson's insight that relationships are ecologies of differences that lead to reciprocal responses—in effect, a dance of information exchanges that influence subsequent behaviors. Students could be asked to observe the non-verbal patterns, as well as the changes in the use of language, that are part of every conversation and relationship. The interactive world that Bateson's phrase highlights can be seen in the differences in the behavior of a pollinating insect flying around a non-native plant. Students should be asked to give special attention to the difference which makes a difference in the behavior of the insect. That is, what are the sources of information to which the insect responds? Do the past influences include the genetic make up of the insect as well as the plant? Why do so many people want to rid their yards of native plants? Does the absence of native plants have any relationship with the decline in the number of pollinators? How do the chemicals in the soil become critical differences which make a difference in the growth of the native flowers to which the insect responds? This may appear as leading to an inconsequential insight, but when the same question about the relationships between the toxic chemicals ingested during pregnancy and the large number of autistic infants, the importance of understanding the patterns (relationships) that connect will be recognized.

Nothing exists in a totally isolated state, and the emergent patterns of interaction can be understood by giving attention to the differences which make a difference. This means giving close attention to the multiple messages being communicated in every experience, rather than being aware of only what prior print-based learning and communication establishes as being real.

Similar everyday examples, such as a sporting event, a conversation—including between people of different genders, social classes, and ethnic groups, learning from others how to plant a garden or engage in a craft, and so forth, can be used to encourage students to give close attention to the differences (information) communicated as the dance of relationships evolves.

An example that will engage the students' attention, as well as make explicit the ecology of differences that comes into play in even the most banal relationships, was suggested by Clifford Geertz. In his explanation of “thick description”, which is really what is being suggested here as learning to give explicit attention to the differences which make a difference (including historical and otherwise taken or granted patterns of influence), he suggested that his readers consider what separates an involuntary wink of the eye from the wink that is intended to send a message to another person. What then are the differences which might influence how the intended wink is understood and responded to, or behaviors that follow from a series of misunderstandings? What are the behavioral and other changes occurring in the local context? How does memory influence how the relationships prompted by the wink will evolve—and even be misunderstood? How do gender and social status differences become part of the message exchange?

Another common everyday relationship that involves multiple messages that can lead to misunderstandings, depending on the taken for granted largely influenced cultural assumptions the participants bring to the relationship, is the way people engage in different forms of physical contact. The growing tendency toward engaging in physical embraces is an example of ecologically complex messages—that is, differences that should have made a difference where what is ignored could become a new set of differences that become part of a new succession of differences that undergo “transformations in a circuit” (to get back to Bateson's wording). Having students observe how and when people embrace each other, as well as the non-verbal patterns of communication that follow, provide yet another example of the complex range of transformation in the differences which make a difference. It will also provide a good example of what Sprenak and others are saying about living in a world of relationships—and awareness that may lead to reducing the mindless behaviors that set off a string of consequences that go unnoticed when the complexities of relationships are ignored.

Part of understanding how so much of the conceptual world in the West misrepresents the emergent and relational world of everyday existence can be addressed if teachers encourage students to understand the fundamental differences between face to face communication and oral cultural storage, and how a static view of the world emerges from print-based storage and communication. In helping students to understand the differences it is important to emphasize the dangers of either/or thinking which might lead them to conclude that print based knowledge or face to face communication should be abandoned. The importance of each depends upon contexts, and ultimately to which contributes to community self-reliance and an ecologically sustainable future. It would also be useful for students to understand why print-based cultural storage and thinking is inherently ethnocentric. This might enable older students to recognize why so much of Western philosophy and social theory has had a colonizing influence on other cultures—and why the digital revolution is having the same impact.

The point made earlier about how language carries forward the misconceptions and silences from the past also has implications for teachers who realize that computer-based education, both at the instructional and testing level, indoctrinates students to accept the mindset promoted by the digital revolution—which has an anti-democratic and pro-corporate agenda that is ignored because of the many genuine contributions of digital technologies. If the historically encoded vocabulary the students acquire limits their awareness of what is being communicated through their relationships within the larger cultural ecology in which they live then it should be obvious what the teachers' responsibility should be. They should help students recognize the metaphorical nature of the language/thought connection, including how the current meaning of words were often framed by the analogs settled upon in an earlier cultural era. This should include helping students understand how to reframe the meaning of words such as traditions, intelligence, data, markets, wealth, individualism, and so forth, by selecting new analogs that are ecologically and culturally informed.

That is, it is important for students to be able to recognize the world more as it is rather than to have it filtered through the interpretative frameworks influenced by a language that encodes the prejudices and silences of earlier generations. For example, the word tradition is a metaphor that still carries forward the misconceptions of Enlightenment thinkers who were unaware of the importance of the cultural commons of their day (which will become even more important today as computers replace the need for workers). They were also unable to anticipate how encoding the word with their optimism about rational thought and technological change would lead to today's loss of privacy and historical memory of how to live less money dependent lives.

The exercise of ecological intelligence requires being aware of what is being communicated through the relational information pathways (or though the differences which make a difference, to quote Bateson again) and recognizing when the information is a sign of a destructive relationship. As universities continue to ignore engaging students in a deep understanding of the cultural amplification and reduction characteristics of technologies, which include computers, print and visual media, it is unlikely that we will be able to escape the inherited taken for granted conceptual patterns that each generation passed forward and disguised as the latest expression of progressive thinking. Unfortunately, these patterns of thinking led to the first industrial revolution which is likely to be overlooked now that the digital revolution is contributing to the cultural amnesia that is eliminating memory of relationships and patterns of mutual support that were less destructive of cultural and natural ecologies.

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