

## Ecology and Technology: *Dialogue de sourds*?

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*This article was initially constructed as an imaginary dialogue between two very different scholars who meet accidentally at the library while looking for the same book. As they discuss their reasons for wanting the book, they discover that their disciplines share various key terms and concepts. Exploring the different meanings of these terms and concepts becomes a way of laying the groundwork on which future collaborations could take place. As the dialogue progresses, it becomes clear that important terminological and conceptual differences do exist, but that it is far from being a “dialogue de sourds” as both participants search for points of intersection in their ways of thinking about and representing their areas of research.*

**Computer Scientist:** Oh. Hello there. You're also looking for the book *Environmental Mechanics*? I haven't seen you around the Department of Computer Science before.

**Eco Literary Theorist:** Actually, I'm on the other side of campus in the Old Arts Building. The title of this book caught my eye because I'm very interested in the different uses of the word *environment*. The ecological movement has long been associated with a greater awareness of the environment and environmental problems where the word *environment* is understood as the natural world, something other than the human but with which we interact. This idea of the environment as a fixed set of physical conditions has given rise to two forms of ecologism, the one biocentric and the other anthropocentric, both holding that there exists a centre around which one can build a new comprehensive system of ethical values. Yet not all ecological discourses fall into the anthropocentric/biocentric division. This portrait reflects more North American ecologism than French ecological theory. For example, French philosopher Michel Serres rejects the word *environment* because it presupposes, according to him,

that humanity is at the centre of a system of things, that it is the bellybutton of the universe, the master and possessor of nature.<sup>1</sup> Serres adds that historical and social processes must be considered when trying to understand different conceptions of humanity and nature.<sup>2</sup> So this book, *Environmental Mechanics*, is part of research I'm doing on the presence/absence of the concept of environment in the development of ecological thought in different cultural spaces.

As for the word *mechanics*, the North American ecological movements have embraced the organic model of the environment as a more accurate reflection of nature than the mechanical model. Yet as Robert Kirkman clearly shows in his book, scientific ecology uses both models to represent the interactions within ecosystems. The combination of the words environmental and mechanics in the title intrigued me as it seemed to suggest, on the one hand, the North American view of ecologism, and on the other hand an opposition to the organic model of nature. To solve the mystery, I decided to look for the book at the library and read it myself. And what about yourself? Why are you interested in this book?

**CS:** I come from a computing perspective and I study computer environments and interfaces. Though the meanings of environment in computing can be divergent and difficult to determine, it hadn't occurred to me that this book, *Environmental Mechanics* might be about nature or ecology. In computing, the word *environment* serves at every conceivable level, from the space outside the actual computer to the microscopic architecture of electronic chips. For instance, we talk of the computer environment as the physical space that surrounds a computer or collection of computers, like in a computer lab or an office. Similarly, the computer environment can refer to the physical characteristics of a computing space in specific reference to humans, the ergonomic factors. The term *computer environment* sometimes also functions as a kind of synonym for the word *computer*, though perhaps making more explicit the aggregation of both hardware and software: a given machine offers a specified computing environment. In the

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<sup>1</sup> The original text reads as follows: "Oubliez donc le mot environnement, usité en ces matières. Il suppose que nous autres hommes siégeons au centre d'un système de choses qui gravitent autour de nous, nombrils de l'univers, maîtres et possesseurs de la nature" (*Le Contrat naturel* 60).

<sup>2</sup> For a similar perspective, see Bruno Latour's *Nous n'avons jamais été modernes* and *Politiques de la nature*.

context of software, environment is used to describe software that contains or drives other software, like the Windows environment or GNOME, the GNU Network Object Model Environment. In software design—or perhaps software marketing—a computing environment can also suggest a suite of tools that are meant to work together to construct other tools or objects. For instance, programmers often make use of an IDE or an Integrated Development Environment that provides various tools including a text editor, compiler, and debugger. My research is on a somewhat similar kind of environment: I'm interested in both the inner architectural design of text-analysis tools and the usability of the external interface. I was hoping to gain some insights into the mechanics of building effective text-analysis environments.

**ELT:** How ironic that we should converge on this same book when ecology as a world-view or philosophy has largely constructed itself in opposition to technology. For example, eco-theorists such as Verena Andermatt Conley use Heidegger to support the idea of technology as a machine dominating nature. In *The Question Concerning Technology*, Heidegger makes the claim that technology is a cultural form through which everything in the modern world becomes available for control. The French philosopher Henri Bergson is another example of an early Twentieth Century precursor of ecogism. By defining nature and human in terms of *l'élan vital*, or vital impulse, Bergson attempts to think against the mechanical, machinic models of the modern era. Indeed it would seem that technological progress and environmentalism are fundamentally at cross-purposes.

**CS:** It sounds as though technology is almost always present in ecological discourse. The reverse is certainly not the case. Heidegger did claim that technology enframed all of modern life, suggesting that technology had become an essential component of our environment, though he was more interested in drawing our attention to technology than in criticising it. In any case, ecology is still mostly ignored, suppressed, or compartmentalised in the pursuit of technological advancement, especially with computers (notwithstanding tokenistic

gestures like the “Recycle Bin” in Microsoft Windows). In some ways, the natural (in an ecological sense) represents the unpredictable and the unalgorithmic that is so antithetical to computing. The computer demands order and logic.

**ELT:** That may be, but the danger is that an expectation of order and logic is projected back onto nature, reducing its complexities into a series of binary states. This, of course, assumes that technology is entirely formalisable and that nature is not at all formalisable, but I don’t think that’s the case. Despite some terminological and epistemological differences, I suspect that our two discourses have several points of intersection. We’ve already talked about environment, what about the concept of network?

**CS:** The concept of network has two primary uses in computing. The first refers to a system of interconnected machines, with particular emphasis on the pathways of communication between them. In this sense, a network can consist of just two computers in a room or, say, all of the computers in the world connected to the Internet at a given time. Depending on the type of network, there can be concepts of multilinear and hierarchically organised exchange; notions of domain and access rights become crucial. The other primary use of networks in computing is in relation to connectionism and neural networks. Modelled on the human brain, neural networks share some characteristics with interconnected systems of computers, but also exploit the idea that information can be distributed across multiple nodes.

**ELT:** So in computing discourse, the computer, the data and the pathways of communication are normally dissociated? This distinction is not so clearly made in ecology where the model of a decentralised network is used to represent the whole of relationships and elements. In her book on the history of ecology in the Twentieth Century, Anna Bramwell explains what the founder of ecology as a science meant back in 1866: “When Haeckel coined *oekologie* he was referring to the web that links organisms and their surrounding environment” (40). Since then, scientific ecology has developed more complex models of networks to include other levels of organisation such as the interactions between organisms, and the interactions between organisms, their environments and ecosystems.

Ecologism has in large part adopted this model in order to legitimise its worldview of humanity as necessarily and integrally connected to nature. In *Le Contrat naturel*, Michel Serres uses a slightly different approach as he speaks of network in terms of links, lines, cords and trellis's that make up the natural contract, that is, an implicit and mutual contract between the world and humanity. This concept obviously lends itself to a pairing with the concept of interaction.

**CS:** Interaction is definitely an important component of computing, both theoretically and practically. The modes of interaction with computers have changed dramatically during the history of digital computers. Compare, for instance, the sending of batch jobs to a mainframe computer in the 60s or 70s to the relative immediacy of graphical interfaces on personal computers in more recent decades. Building on the continuous interaction facilitated by graphical environments (even prior to graphical web browsers), early hypertext theorists such as Bolter and Landow explored the interactivity of computer reading as compared to print reading and claimed, debatably, an empowerment of the user, elevated to the status of co-author. Game critics also examine interaction, quickly multiplying the permutations of participants: human with humans, humans with humans mediated by the computer, humans with computer, computer with computer, etc. A key underlying concept of interaction for both hypertext and game criticism is agency, determining who intends to do what and who and what can *intend* at all. For instance, should we ascribe intentionality to the computer avatars of a game? Or the game's programmers? Finally, HCI or Human-Computer Interaction has grown tremendously as an area of study in recent years, partly as a result of intense interest and investment on the part of software companies. For the most part HCI is concerned with the effectiveness of interfaces, that is, ensuring that users can interact effectively with the computer to accomplish tasks (see Dix *et al.* for a good overview to the topic).

**ELT:** In ecological discourse, interaction is first and foremost a way of establishing the reciprocal relationship between humans and nature; not only do we act on our surroundings, but they in turn act on us. Drawing on cybernetics and information

theory, Gregory Bateson attempts to apply this concept to ideas and to the mind, in other words, beyond the physical (*Steps to an Ecology of the Mind*). His epistemological ecology gives rise to a model of nature where mind and world, material and immaterial interact. This principle of interdependence is at the core of deep ecologists' search for a spiritual, reconciled relationship with the natural world.

The application of the idea of interaction that I find the most useful is the one that breaks down dichotomies and dualistic thinking and shows how conceptions of nature and human necessarily intertwine. In his book *Divided Natures*, Kerry Whiteside explains how theorists such as Michel Serres and Bruno Latour search for the historical processes that link social practices and different understandings of nature. Rather than trying to define nature outside of the human, these theorists as well as others such as Neil Evernden and David Rothenberg try to understand nature as a changing, multiple, social creation.

**CS:** Well up to now it seems we've succeeded in highlighting some major differences in our respective discourses. Maybe we should move from a less oppositional approach to a more interactive way of thinking about the relationship between ecology and technology. We could start with some examples of theorists who have already started up the dialogue between the two.

**ELT:** What about Félix Guattari? In *Les Trois Écologies*, he theorizes ecology in terms of the social, the mental and the natural but he includes in his *ecosophy* or eco philosophy the idea of a machinic ecology. While arguing against mass-mediated consumerism, Guattari adds that human intervention in the natural environment will necessarily take place by way of machines. In this way, he reminds us that science's solutions to environmental disasters are implementations of technology—weather-mapping and global warming predictions are all based on computer modelling systems. But in light of our discussion of terms like *environment*, *network*, *interaction*, what seems surprisingly absent from Guattari's machinic ecology is any serious engagement with the details of what type of action constitutes this human-machine relationship.

**CS:** Surely an important milestone in the conceptualisation of the human-machine relationship came with the development of sophisticated machinery at the dawn of the enlightenment, machines that created the conditions for humans to be thought of as extremely complex machines. In an eighteenth century treatise entitled *L'Homme machine* Julien Offray de La Mettrie describes James de Vaucanson's famous mechanical duck that could flap its wings, and, thanks to an internal digestive tract, ingest grain, decompose and eliminate it. La Mettrie wishes to get beyond the question of whether or not man is a machine and on to the description of the machinery of man. As he says, "man is so complicated a machine that it is impossible to get a clear idea of the machine before-hand, and hence impossible to define it" (89). Of course, more recent discussions focus on the interaction and integration of the biological and the artificial, and the political, cultural, ethical and philosophical repercussions. In a book subtitled *The Reinvention of Nature*, Donna Haraway formulates, albeit ironically (by her own admission), the notion of a cybernetic organism, a hybrid of machine and biological organism. Haraway subverts anxiety about technological domination to celebrate the post-gender cyborg, capable of transcending traditional, patriarchal, colonial, and capitalist dualisms. Haraway's remarks that "high-tech culture challenges these dualisms in intriguing ways. It is not clear who makes and who is made in the relation between human and machine. It is not clear what is mind and what body in machines that resolve into coding practices" (177).

**ELT:** As non-centred and purposely heterogeneous as Haraway's cyborg is, though, there may be more lost and devalued than the dominant discourses that she attacks. I'd be concerned that the environment would be thrown out with the bath water.

Going back to the three terms we discussed earlier, would it be possible to construct our own dialogue that goes beyond terminological similarities? Sharing a set of common words, could this be the basis for a new exchange between our respective discourses? For example, your use of the word *environment* highlights the purely functional, as it unproblematically names the object and the space. In ecological discourse, the word *environment* includes some

important epistemological and ethical underpinnings; it's seen as circumscribing, delimiting, in some ways creating, the object and the space. We could pursue our dialogue by using the questions that ecology asks about environment to explore the creation of technological spaces: what they include or exclude, how they encompass certain human activities and not others.

**CS:** It seems to me that the ecological concept of network encodes directly and necessarily notions of responsibility and causal consequences. These notions are often absent or added as an after-thought in computer networks, as can be seen by the challenges of security and rights management. Ecological networks also seem very holistic, drawing in all elements in an environment in a non-hierarchical way. I think neural networks could benefit from this approach by explicitly including not only the brain but the functioning of the entire body, as well as factors in the environment. In contrast, the hierarchical structure of computing networks can be a reminder that adopting the model of the network does not necessarily mean getting rid of the dynamics of power in systems. If we are dominated by the technological, as Foucault and Marcuse argue in several of their texts, it is because of our particular social organisation. But the good news is that the organisation and the domination can be challenged and changed.<sup>3</sup>

**ELT:** Some of the notions of interaction that you mentioned in reference to hypertext and game criticism seem to be potentially fertile ground for rethinking interaction in ecology, especially when the agency of non-human organisms is beyond ascertainment. Just as interaction in computing is mediated in various ways by the human and the machine, interaction of humans in an environment is mediated through social, cultural and personal filters. On the other hand, ecological discourse which considers all everyday activities as forms of engagement with the world could serve as a model for questioning what is involved in agency and activity in computer-computer or computer-human interactions: is it possible to speak of a responsibility or political engagement in

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<sup>3</sup> See chapters 1 and 3 of Feenberg for a good discussion of how philosophy and politics relate to technology and environmentalism.

this case? What types of activity are included or excluded in this form of interaction?

**CS:** Thinking technology through ecology and ecology through technology requires that we first recognise and understand our different perspectives and then move toward new ways of framing these perspectives. Ecologist turned tech theorist David Rothenberg reminds us that we must pay attention not only to the tools that we construct but also to the context that gives rise to, and is in turn influenced by these tools. As for Neil Postman, ecology serves as a useful metaphor for representing the impact of technology on social institutions and structures; as he says: “Technological change is neither additive or subtractive. It is ecological” (18).

**ELT:** This two-way exchange opens up passages between the human and the hard sciences, between literature and science, passages that are at the heart of Michel Serres’ philosophy. His concept of the *tiers-instruit* or the educated third, that transcends C.P. Snow’s two cultures distinction by being both scientific and humanistic, contrasts with the idea of ecology and technology as a *dialogue de sourds*. Rather than an unhearing, incomprehensible pair of monologues, our discussion has established, in part thanks to our willingness to listen, some possible lines of communication and even the potential for mutual enrichment.

**CS & ELT:** So who gets the book first?

*This dialogue has been a preliminary attempt to have two discourses—the ecological and the technological—meet and find possible points of convergence. It seemed crucial to begin by questioning the shared terminology and the divergent concepts in order to move beyond the common perception of opposition between these discourses. An interdisciplinary approach to ecology and technology can lead to opportunities for mutually beneficial developments, as suggested in the dialogue. Discussions following the performance of the dialogue at the Culture & State conference evoked other areas, such as pedagogical applications, where a*

*mixed perspective would be valuable. We hope that this artificially construed dialogue will provide some impetus for a real dialogue of the practical ways in which ecology and technology interact.*

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