The Natural and the Artefactual

An Interview with Keekok Lee

Casey Walker: One of the brilliant theses of your book, The Natural and the Artefactual, *is that current and rising technologies should be evaluated for their potential to "humanize" nature and not simply for their potential to damage or fix nature. Will you begin by describing what you mean, and why the distinction between natural and artefactual is key?*

Keekok Lee: The major question in environmental philosophy up until now has mistakenly emphasized the polluting effects of our actions and technologies. This emphasis is mistaken for several reasons. First, it concentrates too much on existing technologies. Admittedly, it is true, existing technologies are somewhat polluting and in some cases very polluting indeed, but once we look beyond existing technologies to the current and rising technologies of biotechnology and molecular nanotechnology, we see a concentrated hope that these radical new technologies will offer "green techno-fixes" for pollution. Many proponents hope that these technologies will lower pollution or repair losses to such a degree that socially, culturally, and politically, these technologies will become an acceptable means to creating a better world. As I argue in my book, we must realize that the price we pay for "repairing" nature is the kind of nature we would be making in the process. I argue that at the level of ontology–the nature of being–we should be aware that our technologies transform nature through an ultimate process of 'humanization': thus transformed, nature would not exist independent of human intent and would, in a very critical sense, no longer be 'natural' but 'artefactual.'

Secondly, when we critique the polluting or remedying effects of technologies, we mistakenly place too much emphasis on empirical matters of fact–what kinds of technologies we invoke–rather than on grasping that a certain philosophical dimension, namely, the ontological, is missing from consideration. On the whole, up to now, we tend to evaluate technologies as more or less polluting, as more or less ecologically degrading, holding pollution or ecological degradation as a disvalue *simpliciter*. If, on the other hand, we evaluate technologies ontologically-through a system of types of being-then we begin to evaluate technology for its effects on primary characteristics of independence and autonomy, which only naturally-occurring entities and processes possess. I argue that it is essential to emphasize technology's effects on types of being if we want to throw light on this crucial problem. We should understand that there is an ontological distinction between what we humans can do as opposed to what the rest of nature can do, or may do.

Now, it is often argued that everything is natural, or that because humans are natural it follows that everything humans make or do is natural. However, from an ontological point of view there are important and distinguishable differences. In one sense of the term natural, we are all natural beings–the opposite of which is supernatural. This sense may be called cosmological "nature." There are other senses of natural, such as nonhuman nature, natural kinds, and so forth. *(Editor's note: See inset "Seven Different Senses of Nature.")* The most important distinction, however, is between what comes into being-into existence-solely by virtue of our human intention and what comes into existence entirely independent of human intention. These are two distinct ontological categories: The first is the artefactual and the second is the natural.

To see more clearly what is meant by saying that the

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artefactual and the natural belong to two distinct ontological categories, let us imagine a world without humans. In such a world, human artefacts simply would not exist, and the notion itself would not be intelligible. However, the natural nonhuman world and the world of natural kinds would still exist. It is in this sense that I see the crises of our time. The important crisis is ontological–the prospect of an artefactual world–and not merely a crisis of polluting effects, cleanup, or replacement of habitat and biodiversity losses. We cannot write off this view simply an anti-technological, or Luddite. My point is not that I'm against technology per se, but that before we pay the price for changing the terms for being in the world, let us at least be clear as to what that price is.

Along these lines, will you address why it's important to see that an ontological "end of nature" through the artefactual is entirely different from "ends" caused by disturbances of the ozone layer or global warming or species extinctions?

First of all, take the example of species extinctions. Philosophically, we should bear in mind two very different contexts of species extinctions. There have been five major periods of extinction on Earth before humankind appeared, but these have no philosophical significance whatsoever compared to the extinctions we humans have brought and will continue to bring about. Up to now, the main causes of human-caused extinction have been habitat destruction and habitat fragmentation. But in clearing forests and draining swamps, we did (and do) not directly intend to render species extinct. Similarly, in releasing CFC gases or carbon dioxide into the atmosphere, we did (and do) not directly intend to destroy the ozone layer in the stratosphere or cause global warming.

But in the twenty-first century, such powerful technologies as biotechnology and computer technology are already capable of combining synergistically to produce results that, taken together, are even more powerful than their separate effects. Take the new Human Proteome Project, just announced, to which IBM is committing nearly 100 million dollars. This project will build the world's fastest computer and presumably enable biologists to find their next "holy grail": discovering how cells in the human body build up each amino acid (of which proteins are made) atom by atom, using the genetic information provided by DNA and RNA; it will also tackle the problem of protein folding itself. If this "holy grail" were indeed found, it might open the way not simply to new forms of medical treatment but to the ability to construct life from scratch.

Molecular nanotechnology, in conjunction with computer technology, has similar ambitions for the abiotic world: to construct totally novel materials, atom by atom, from the elements themselves. If such projects were successful, we humans would be able to substitute even more thoroughly artefactual kinds for natural kinds in both the biotic and abiotic domains. The goal of this second "end of nature" is precisely the fabrication of artefactual kinds, an end which one cannot deny is directly intended.

The "end of nature" which Bill McKibben wrote about is not (and has not been) directly intended and deliberately brought about. Even now, when the evidence is more or less in, there are many nations in the world that feel they have no choice but to continue to burn coal. They may be adding to the greenhouse effect but most certainly do not set out deliberately to change Earth's climate-quite unlike those who set out deliberately to try to terraform Mars to make it as habitable as Earth.

The most serious threat posed to nature by such rising

Seven Different Sense of Nature

1) Nonhuman nature, nature(nh), is opposed to culture. Culture involves human agency and its products. The products may be intended or unintended-for instance, a piece of legislation is intended whereas the origin of language is said to be an unintended product of human agency.

2) Cosmological nature, nature(c), is far too wide and obliterates the fundamental dichotomy between nonhuman nature and culture. According to it, the American Revolution, Hadrian's Wall, the Great Barrier Reed, the Grand Canyon are all natural events or objects, which they undoubtedly are, as they can be identified in terms of certain spatio-temporal co-ordinates. The opposite of nature(c) is the Supernatural.

3) Pristine nature, nature(p) is nature unaffected in any way by the impact of human action, whether intended or not.

4) Humanly Impacted nature, nature (hi); nature impacted by humans.

5) Foil to the Artefactual nature, nature(fa), is itself defined in terms of what is brought into material existence deliberately because of human intention. The "natural" is defined as "what is *not* the material embodiment of deliberate human intention" and is, therefore, independent of humans.

6) Foil to the Artefactual includes nature of natural kinds, nature(nk), which refers to what Aristotle called second matter, and can be biotic or abiotic.

7) Foil to the Artefactual also includes nature(f), what Aristotle calls first matter or what we call today the naturally-occurring elements in the Periodic Table, of which natural kinds are made.

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technologies is, therefore, for me, an ontological one. Every natural being has a "trajectory," by which I mean the whole fact and history of a natural being, including its coming into existence, its continuing to exist, and its going out of existence. Now, in principle, this whole history, as it were, is independent of human manipulation and human control, and therefore of human intention. But our technology, which manipulates biotic and abiotic forms at increasingly deeper levels, allows us to transform the natural being and divert its natural trajectory in order to force it to do our bidding-to become the artefactual.

Do you evaluate the impact of artefactual creations on natural systems in terms of acceptable or unacceptable thresholds-thresholds of transgression?

Science and technology are not static. They are dynamic. So we have to bear in mind that with each basic theoretical discovery, we generate a new kind of technology. Technology has a very long history, which, for the purpose of this discussion, may be divided into two periods. From the earliest beginnings, when humans started to use tools, to roughly the mid-nineteenth century is the period of technological history that may be called "craft-based." In other words, the primary method was trial and error. This remark should not be read as belittling such technologies. On the contrary, the advances made were quite spectacular, and some have not been equaled even today. What we understand as "modern science" did not begin in earnest till the seventeenth century in Western Europe. For roughly two and a half centuries, modern science did not have much to offer tecJhnology. Actually, it was technology that sometimes spearheaded fundamental scientific discoveries-witness how attempts to improve the efficiency of the steam engine led to founding the basic science of thermodynamics. But after about 1840, the causal arrow began to point the other way: Major technological breakthroughs became dependent on fundamental theoretical advances in the various sciences. Today technology is largely no longer autonomous but induced by scientific theories.

....The direction we are going now with technologies such as molecular nanotechnology, genetic engineering, or terraformation technology is toward a very radical change in terms of creating the artefactual. The question is no longer simply one of spewing out chemicals having disastrous impacts on the rest of the environment. The proponents of nanotechnology like to point out that it is by and large minimally polluting, but it would enable us entirely to bypass "natural kinds," both biotic and abiotic, as we construct their artefactual substitutes. In the end, for example, we would no longer rely on wood, which, though renewable, presents problems. By leaving resources like wood behind and by constructing, atom by atom, new artefactual materials, we would avoid the problem of scarcity of materials and perhaps the pollution that comes from using them.

However, I think it would be very difficult to set a threshold of transgression, given the complexities of the world in which we live. If you were to press me on this point I'm afraid I would be a coward–I would say it is impossible to set a limit *a priori*. All I want to do is make people aware of what is at stake, so we don't just willy-nilly start transforming whatever is left of the natural world. Now, some further transformations may undoubtedly be required, given a world that is very unequal economically and politically, and given a world in which everyone aspires to have a decent standard of living. I think humankind must somehow confront this problem collectively.

In other words, at the practical level I have got no panacea, and it would be silly of me to think that I have. But at the theoretical level, at the philosophical level, I think we must realize there are important values at stake. Before we rush to use these radical new technologies, we should at least pause and ask ourselves: Is this absolutely necessary? Is there a way by which we could at least leave some of the natural aside?

It is often argued that today's genetic engineering-particularly with agricultural applications-is not fundamentally different from Mendelian genetics and hybridization techniques as we've practiced them for years. Yet mixing genes or organs between two different species clearly creates a whole new order of artifice. Where on the continuum of tinkering with crops, forests, and livestock do we determine a threshold of artifice that violates ecological autonomy and independence?

I wholeheartedly agree that the biotechnology we have today, via DNA genetics, is a very different kettle of fish from the kind of Mendelian breeding done before. However, to determine if there is a cutoff point at which we say it is not acceptable, we would have to break the question down into various scenarios, so to speak, and examine each scenario in detail. Take for instance the genetic engineering of bacteria: The genetic engineering of microorganisms would present different problems altogether from the genetic engineering of mammals or plants.

We'd have to ask what kind of biological being it is we are trying to engineer. Then, given the kind of being, we would also need to understand the context in which we were attempting to make that transformation. For instance, there may be some ways of engineering some kinds of biological beings in which the risk of ecological escape would not be great. It may be possible to isolate contexts in which we may be able to engineer biological beings without unacceptable ecological impact. Now, with other kinds of biological beings, this may not be possible. For instance, plants with pollen–because pollen floats about in the wind-would be next to impossible to contain. Also, it may be possible to genetically engineer a kind of biotic artefact that will be sterile and pose no risk. Again, I don't want to say *a priori* that there are no such beings or contexts or that there is a predictable threshold.

We should always bear in mind that there is a great disvalue in transforming nature to our own intent; but having said that, I can't see that we are all going to turn our backs on doing so. I think we must realize, therefore, that there is a disvalue involved that requires us to try to restrict this technology as much as possible in the real world. It's easy for me to say that because I'm not a policy maker! But that would

be the way forward.

Do you see an inherent fallacy in the assumption that we can self-realize at higher levels if the world is, at the same time, ontologically simplified? If there's less to perceive and interact with, won't we, too, become diminished?

Yes. That's right. That's a very good point to bring out. Modernity takes two kinds of approaches to thinking about human life: One is the more materialistic approach, which says we human beings are here to improve our material standard of living and that improvement constitutes progress. The more spiritual and seemingly more noble approach says that we're here not simply to improve our standard of living, but to progress toward increasing freedom, self-realization, and individuality. Now, in the end, the latter turns out to be much more dangerous because, while it may be possible to demonstrate that a material standard of living has reached a saturation point, the quest for individuality and self-realization is idealistic or neo-marxist and is really an endless project. It's a Faustian thing. We think the human spirit has to aspire to higher and higher levels, and indeed, there are more and more projects to fulfill depending on the technology available. In the past we would never have had the aspiration to go to Mars or send machines to Mars. It is difficult to argue that there is a saturation point to self-realization.

HANK MEALS

Transhumanists, or those who believe in a posthuman world, are searching for the technological realization of that existentialist idea-that our freedom and our autonomy is unlimited–that we create our own essence. We are now rapidly reaching the point at which we can transform ourselves beyond biological limitation–we don't have to die after three score and ten. It all sounds sci-fi now; but with the exponential growth of technology, who knows if we will sooner or later be able to download part of a computer to become part of our human brain. This realizes the human project: creating our own essence using human technology!

Which completely ignores self-realization as being a part of the living world of "other." How might we come back to your original argument that in our ignorance of the ontological we perpetuate a narcissism and solipsism that are in themselves stultifying and static?

Yes. In that sense, we are poised at a cusp in human history–-in the project of self-realization–that is taking us into a totally narcissistic world. I agree that this project of self-realization would ultimately mean that we would live in a techno-sphere, which means that ultimately not only are we no longer natural beings in the sense of being subject to biological constraints, but that we will be living in a world where biological beings have all been created at our bidding and at our will. The biological world will have lost its own *telos*. I think that is where the arrow is pointing, unless we miraculously draw the line now.

There are several points that make narcissism and its moral failures obvious and significant. First, it is obvious that we feel awe in the presence of some of our artefacts–Chartres Cathedral, the Taj Mahal, and the space shuttle, to name just a few. Some of us might even be moved to tears by such exquisite products. We are also capable of feeling awe while watching a sunset or a volcanic eruption. We might also be moved to tears by such sights. But such reactions and emotions, though similar at one level, are profoundly dissimilar at another. In the first context, they have been elicited by our own handiwork, and in appreciating and admiring them, we are in reality admiring our own creativity, our own imagination, our own intelligence. But in the second context, our reactions have been elicited by some being (and its processes) other than ourselves–in appreciating nature, we are admiring nature's own creativity, nature's own ingenuity, nature's own handiwork. There is a world of ontological difference between the two contexts.

Secondly, according to standard ethical thinking, moral failure consists primarily of a failure to grasp the underlying similarities shared by two different classes of agents or states of affairs. For instance, all humans are capable of feeling pain in spite of the fact that there are differences between them-some are female, others male, some have darker pigmentation than others, and so forth. Likewise, nonhuman mammals are capable of feeling pain in spite of their differences, such as the fact that humans are bipeds and some nonhumans are quadrupeds. So just as it would be morally wrong to discriminate between dark-skinned people and light-skinned people in health care distribution, so would it be morally wrong to discriminate between humans and the higher mammals in the context of scientific experimentation–if it is wrong to vivisect humans, it would be equally wrong to vivisect nonhumans who feel pain to a similar extent.

While morality has advanced greatly along such lines, it might not have advanced far enough. This is to say that morality ought also to respect the differences between different sorts of beings, not only the similarities that they may share. It may be true that we and the chimpanzee share 98.4 percent of DNA or that we and the nematode worm share 70 percent of DNA. But it is the respective remaining differences which make humans human, make chimpanzees chimpanzee, and make nematode worms nematode worm. Each is its own kind of being with its own distinctive characteristics and ways of living, each deserves respect for the kind of being that it is, and deserves to be treated in a manner appropriate to its kind. Philosophically, it is a mistake for us to try to get chimpanzees to acquire human characteristics (such as teaching them human language) or for us to be more chimpanzee-like (such as trying to walk on all fours or swing from trees in their presence).

Thirdly, modernity has dispensed with God–a transcendent entity said to explain the world–since Lyell, who forged the modern science of geology, and Darwin, theorist of natural evolution in modern biology. Yet modernity has not been content merely to banish God from its worldview, but has proceeded systematically since the mid-nineteenth century by means of its science and its technology to transform the nonhuman natural world, which has evolved over the eons, to conform its image and requirements. Humans and their artefacts pose a constant threat to the natural, both in its empirical manifestation, and as an ontological category. This amounts to ontological impoverishment, leaving human will and intention supreme.

Lastly, the dominant form of ethical thinking in Western moral philosophy–namely, anthropocentrism–claims that humans alone are morally considerable because they possess a set of unique characteristics, including rationality and language. (Obviously, I do not buy anthropocentrism, although I do admit that humans, as a species, do possess a unique characteristic: namely, they are moral agents.)

Beings which are morally considerable are beings to whom we owe direct duties, not merely indirect ones. A tale about St. Francis illustrates this distinction well, though ironically so. Convalescing from an illness, one of his brethren expressed a desire to eat pig trotters. Jonathan, a disciple of St. Francis, rushed out to find a pig and chopped off its trotters to use for the meal. However, when St. Francis heard of it, he reprimanded them–not for damaging the interests of the pig, but for damaging the interests of the pig's owner. In other words, the pig's owner possessed moral considerability and, therefore, was a being to whom one owed direct moral duties. In contrast, the pig, which was not a morally considerable being, was owed at best indirect moral duties–we must be nice to the pig and not hurt it simply because by damaging it, we are damaging its owner's interests.

A standard challenge to this kind of anthropocentric thought is to deny that there is such a set of unique human characteristics. This strategy seeks to find underlying similarities in beings/things in spite of the obvious differences between them. If rationality–suitably defined in a certain way–is not unique to humans but is also characteristic of some of the higher mammals, for instance, then the domain of moral considerability will have to be extended to include, minimally, the great apes and, maximally, all the mammals. But this strategy has its limitations, as we have seen.

The strategy I advocate rests instead on recognizing the differences between beings/things. This leads me to emphasize the ontological value of independence and to lean on it as the basis for moral considerability. All naturally occurring items, nature(fa), whether biotic or abiotic, embody this value. However, each biotic or abiotic kind (and its processes) has its own trajectory. We humans, who are unique in being moral agents, have a direct duty to respect the different trajectories of nonhuman others.

In saying this, I do not wish, however, to be misunderstood to mean that one should never ever use nonhuman others to serve human ends. That would be a ridiculous thing to say. Drawing an analogy with Kant's categorical imperative (which holds for interpersonal conduct) is pertinent here. His imperative should not be distorted to mean that one should never ever treat other people as means to one's ends, but that one should not always and only treat people as means, never as ends in themselves. In the same spirit, I do not wish to say that one should never ever treat nonhuman others as means to human ends; I merely wish to say that one should not treat nonhuman others always and only as means to human ends, but never as ends in themselves.

It becomes quite compelling then that we understand and begin to articulate the process of not being pathologically solipsistic or narcissistic–that if we're going to mature morally and ethically, we have to understand not only the ontological criteria for all of life, including our own, but the intrinsic value of the nonhuman.

I think your saying it that way puts very clearly the difference between my position and the position one sometimes finds in so-called "green theory." There are a lot of other green theorists who say we need the natural world because without it we would not be whole. They differ from my view because I see their position as still anthropocentric. All they're saying is that to be a whole human is to have human needs satisfied in nature. The human is still at center. I am saying we are not going to be whole until we see that the natural has got a value that is independent of us. Its value is not relative to our need of it.

Along these lines, will you explain what is meant by teleology and why it is important to distinguish between the "old teleology" and the "new teleology"?

Teleology is a many-headed term. In general it means "with an end,"[1] or sometimes "with a purpose or a goal." By and large, I am not using the term in the sense of conscious purpose. When I say a natural, biological being has got its own *telos*, I'm not saying the plant or the animal is conscious of its own goals. I am saying that plants as well as animals can only be understood in terms of so-called "end states." Each has its own *telos*.

With that said, in "old teleology" one perceives the biological being–the plant or animal–as having its own *telos* in

the sense that it has a trajectory of its own, independent of humans, which unfolds from its beginning to its final demise. It is controlled, as Aristotle says, by its own *telos*–how it behaves and at what rate of development it progresses and matures and so on. This I call "immanent/intrinsic teleology,"" which is distinguished from "imposed/extrinsic"" teleology.

By extrinsic teleology I mean what happens to a plant or animal when we humans come along and manipulate the biological being, altering its *telos* so that in the end the plant or animal does what we want it to do. When we genetically engineer a human protein into a cow, for instance, the cow ultimately produces a human protein in its milk, and we are displacing its own immanent *telos*. External teleology is simply the view that biological beings are going to be of use–the grass has instrumental value to the cow, and the cow has instrumental value to us.

Yet one has got to distinguish between these kinds of teleologies and see that external teleology comes after intrinsic/immanent teleology. By this I mean that before the grass can be of use to the cow, the grass itself must carry out its own *telos*. Because the grass has and manifests its own *telos*, it can be of use. Logically speaking, intrinsic teleology precedes external teleology, and that is what Aristotle said.

Now, with "new teleology," the whole situation changes. We humans have put extrinsic/imposed teleology at the top of the list in that we are determined to manipulate and control nature, including biological nature, in order to remove or sidestep nature's own *telos* and get it to carry out and embody our own intentions. In other words, we have no respect for intrinsic/immanent teleology.

Will you describe the implications of imposed teleology for evolution, the trajectory of species and natural systems?

Yes. I'm afraid that if we go down this road, which we are in great danger of doing, and simply use radical technologies to transform the natural to become the artefactual, it is the end of natural evolution. That must be the conclusion to which modernity is leading us. Natural evolution involves, for me, not only biological evolution but also natural evolution of nonbiological things. So, for example, in terraformation of planets: At the moment we think there is no water or atmosphere on Mars that would make it habitable for humans, so we will have to use terraformation technologies. Using these technologies to make Mars habitable would interfere with the natural trajectory of Mars as a planet. For all we know, maybe in the course of many millions of years Mars would have water–we just don't know; and we may therefore be stopping its evolution by imposing our will by intention. The same is true, even more so, of biological evolution. The great fear we must have of biotechnology is, of course, that bio-engineered life forms will dominate the natural system and stop natural evolution.

How do you respond to people who argue that human creations are in themselves natural, that "evolution" includes our imposition of technology upon natural systems?

One has to remember that the modern theory of natural evolution does not presuppose an end. The idea that we humans are executing natural evolution with our radical and powerful technologies takes us back to the very senses of the word natural, which I am keen to distinguish. Without differentiating the meanings of natural, one can constantly get into confusions and muddles of this kind. In one sense of natural, of course we are natural beings and of course we are part of this so-called natural evolution; but in another very important sense of the term of natural, we are not natural. We are cultural beings. That is why what we would do constitutes cultural evolution. If we allow cultural evolution to run free, it is obviously going to overrun natural evolution and put an end to it.

How do you critique EO Wilson's concept of the confluent rise of technology and biophilia?

As far as I understand E.O. Wilson, it strikes me that he is trying to cling to two things–to have his cake and eat it too. On the one hand, when he is uncritical of modernity, he applauds us getting better and better at our technologies. On the other hand, he also celebrates so-called biophilia. Obviously, to me, biophilia is a very great value to have, although empirically I think he's wrong to say that all of us actually have it. Not many people have this value in my experience. But, as I said in my book, we've got to make a distinction between life as a naturally occurring phenomenon and life which is fabricated. Now, Wilson's fascination with modern technology means that in the end he may approve of any kind of life–he doesn't distinguish between life as natural and life as fabricated artefacts.

This is a great danger. If people fail to appreciate the ontological distinction between the natural and the artefactual, it becomes okay to destroy life because we can fabricate new life. In that sense, it's still life–and we love life, right? That's not the point. Biophilia as a concept should be refined to mean love for naturally occurring life forms, not love for humanly fabricated life forms. So, too, should our concept of biodiversity come to mean not just more and different animals brought to life in a world that is a living, man-made zoo.

Which returns me to the emphasis on the ontological dimension throughout this discussion. Biophilia is a value but it is a mistake to regard it as a value *simpliciter*; one should constantly bear in mind two very different types of contexts in which it may occur. As we have seen, naturally occurring life forms belong to an ontological type different from humanmade life forms, although both are undoubtedly life forms. So if biophilia is considered merely as a value *simpliciter*, there is no loss of value--indeed, there may even be a gain in value in certain contexts if naturally occurring life forms are replaced by humanmade ones. But on the ontological level, the loss of the former would constitute an irreplaceable loss. In such a world, only human beings and their artefacts would exist and prevail.

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