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Research

"A Strange Catalogue of Things"

Abstract. The universe has evolved humans who in their turn act as natural-cultural agents to intensify the acceleration of evolutionary processes. The human sciences, whose growth severely trailed that of the physical sciences, failed to theorize the objects that we invent and make. Professions such as architecture that exist in both the realm of naturally occurring substances and human activities have suffered without the intellectual resources for adequate reflection on the world we have made, and about whose consequences we remain all too unaware. Naturally occurring substances and humans must be framed together within a single idea. Further, "the strange catalogue" of contemporary production and billions of individual consumer products must be understood as having relationships within human society. As an integrating discipline that composes with physical materials and cultural life, architecture benefits from a theoretical unification too long neglected by the human sciences.

> For 'tis not barely the ploughman's pains, the reaper's and thresher's toil, and the baker's sweat is to be counted into the bread we eat; the labour of those who broke the oxen, who digged and wrought the iron and stones, who felled and framed the timber employed about the plough, mill, oven, or any other utensils, which are a vast number, requisite to this corn, from its being seed to be sown to its being made bread, must all be charged on the account of labour, and received as an effect of that; nature and the earth furnished only the almost worthless materials, as in themselves. 'Twould be a strange catalogue of things that industry provided and made use of about every loaf of bread before it came to our use, if we could trace them: iron, wood, leather, bark, timber, stone, bricks, coals, lime, cloth, dying-drugs, pitch, tar, masts, ropes, and all the materials made use of in the ship that brought any of the commodities made use of by any of the workmen to any part of the work, all which 'twould be almost impossible, at least too long, to reckon up.
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> John Locke, *The Second Treatise of Government*, [1681: 242 (Ch. 5, §43)]

Introduction

A little more than three hundred years ago, in Locke's account, diligent human labor applied systematically to the "almost worthless materials" of nature furnished a world of things: we see men sweating in the fields and the women over a wood fired stove in a division of difficult labor. Today, that graphic image gives way to automated harvesting machines and robotic factories and the processes from extraction through manufacturing and consumption, all managed by computational hardware and software; and the software handles all sorts of mathematical calculations necessary for production.

Critique

There was trouble in Locke's world that we have inherited, trouble which lurks behind contemporary retail and architectural surfaces. We carry with us the dismissive, self-deluding notion of an "almost worthless nature." That is to say, much of human endeavor in the past three centuries has centered on a belief system where the "natural environment" possesses no inherent value, except as "raw materials" to be transformed by human intervention.

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In Locke's formulation we witness one of those bifurcation points in the history of human thought whose effects play out over centuries. Locke released a possible knowledge of nature and rallied human society around the concept of human labor that creates wealth and value.

Fig. 1. BMW headquarters, designed by CoopHimmelblau.
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Yes, naturally occurring elements can now be priced precisely by resource economists, but from the standpoint of the other human sciences, even today, such as anthropology, history, political theory, and sociology, nature has little standing. Branches of the physical sciences designate, theorize, simulate, and experiment on their particular slices of nature, but neither the physical sciences nor their collective objects of nature have been theorized as wholly human-natural phenomena by the cultural sciences.

More importantly, physical scientists have not adequately accounted for how the biological human brain in communication with others can identify and simulate nature. That is, we do not really explain theoretically how a biological creature can know itself and act so effectively on the natural world. The incorporation of nature into *culture*, the vast realm that apprehends and processes the ingredients of the "strange catalogue," is no more adequately theorized today than it was 329 years ago. In the present era consumer goods with little roughness and a great deal of lay ignorance enter cultural life as fully socialized quasi-beings. The domestic Chihuahua is no longer a wolf and the lithium in a battery no longer resembles unconsolidated lithium carbonate found 3,000 meters below the earth's surface in a hot stew of brine and other trace metals. Most humans don't know the physical bases and could care less, whether it lights our paths or lightens our moods.

As a result of this incomprehensible theoretical omission not only has the planet suffered for centuries from a false invisibility but so have the design professions for a simple reason: alternative ideas, beliefs, and values have not been made available because they are inadequate or absent. Or, when they have been voiced, they have been discredited, marginalized, and dismissed as being contrary to progress.

Locke's words give a particular historical picture of nature and the human efforts that release seeds and soil from their natural state for human use. This has bestowed value on the world's largesse, offering a rationale for ownership that has displaced native peoples, worldwide. Humans who tilled the soil invested things with value and provided the basis for ownership of the goods they produced. It is an easy route to trace this labor theory of value from Locke through Smith and Marx into twentieth-century economics and social thought – the organization of society through the division of labor, the structure and function of the social order, the value added to things in their manufacture and distribution, and the resulting unequal distribution of power and access to it.

Fig. 2. Detail of BMW headquarters, designed by CoopHimmelblau.
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Surfaces

Today, a glossy seam of highly finished surfaces very nearly runs across the entire interface of material goods, where nature has become fabricated for use in cultural settings. The protective and branded surfaces of handheld devices or the plastic wrapped consumer items, from bread to memory storage devices, indicate an exterior below which no one need peer into any natural substance or process. The world of nature – mapped, measured, weighed, and then mined, pumped or harvested – moves from numerically denominated substances through research and development at the hands of scientists,

engineers, and technicians into the tight fit of retail packaging that often presents on their shells instruction sets for the consumer. The didactic texts of ingredients, warnings, how-to's and subsequent product reviews, further socialize the now highly finished stuff of nature. Humans welcome into consumer society products that are remote from their natural origins, imbuing their concealed ingredients with human characteristics and animating them with what in some respects resemble human activities, like speaking and singing. The ubiquitous seam of glossed surfaces, although but a dream for Locke's world, includes the built structures housing work, play, and domestic dwelling. The face of nature that urban dwellers presently see has been brought to them by designers of buildings, commercial signage, autos, and packaging. Built structures of great complexity, designed by architects, affect global society and present readily visible facades along an infinitely extended and unconsciously accepted juncture, easily straddling nature and culture.

Terrifying asymmetry

A worthless nature and a laboring society offer an extreme asymmetry and place nearly the entire source of abundance on human work. *Locke gives no power to natural things, only to humans*. While labor can be catalogued, the sheer volume of natural resources and commodities engaged in delivering a loaf of bread are too long to account for. Nature, ever embedded in iron, timber, cloth, masts and ropes used to transport the ingredients for bread, not only eludes accounting but has no single commonality, such as labor, which serves for society. The singularity in society is the fruit of human effort, but for Locke nature has no comparable unity. He finds it nearly valueless as it lies about, untouched by human hands; once touched by the hand of man, it is then too complex to reckon up.

This tragic bifurcation of nature and culture remains an essential assumption in thought more than three centuries later with only the feeblest efforts to theorize them back together again. Even in Locke's account nature and its ingredients appear as silent, almost docile necessities. Without dozens, perhaps hundreds of physical resources, the journey from seed to bread could not be made. If nature in this picture is economically worthless, then the objects made from nature (like the plow or the bread, which obviously retain their physicality despite the application of labor), remain in the background, untheorized, mute, taken-for-granted, and in an odd way, partaking more of nature's invisibility than of human sociality. It is as if plow, mill and oven, much less all the machinery on the grain ship, inhabited an unnamed, unconsidered third space between a fallow earth and a fully realized human social order. Even technology assumed the invisible cloak of nature.

Wealth

What is so deeply disturbing about Locke's insistence, is that the substances in the strange catalogue are the whole starting place of capitalist development of planetary resources, the location of such exuberant wealth production, the very resource base that humans have enlarged for themselves in service of an expanding population in order to stave off human poverty. The rapidly growing global market pulls endless natural resources into manufactories that produce creature comforts found in all parts of the world, none more so than in the affluent portions of Asia, Europe, and the Americas. By contrast to the seventeenth century, the explosive arrays and volumes of goods today appear beyond enumeration. This expansion of stuff has burst forth such that in advanced consumer society it threatens to engulf us.

Theory

How do we theorize nature so that it is no longer "almost worthless materials," and with that, also re-theorize this vast zone – the extensive assembly line from the mine to the shelves at Wal-Mart – in order to grasp them for thought and more effective action? How do we address this challenge from within the standpoint of the human sciences rather than from within physics or biology, as some physical scientists have proposed? The first order of business is to alter the agenda of the human sciences. The great challenge is to incorporate both nature and humanity within a single framework with as much clarity as either one side or the other musters to explain its own domains. For example, the physical energy of a planet receiving solar radiation and promoting human life could be unified under studies of energy flows, but would need massive rethinking in order to unify meaningfully the sciences of humans and nature [Smil 2008: 380].

It is necessary to reframe humans as having evolved entirely out of nature, partaking of the same energy and matter as all else. Humans and human culture are naturally occurring in response to Darwinian challenges that any animal species faces. Humans with their cultural abilities and the entire empire of nature evolve simultaneously. Beginning long before Locke, humans have evolved various branches of the sciences of nature, but physics and biology are not disciplines to which the explanation for humanity ought to be reduced. Rather these divisions of learning are, in all their splendor, simulations, experiments and commercialization, the sum product of humans engaging with the whole range of stuff available in the world. This position provides the initial formulation for a unified theory.

Powers

The natural sciences, historically at work in their disciplinary silos, have defined and cut out pieces of nature and experimented with them on site and in the laboratory in order to achieve an understanding of naturally occurring substances. The findings are turned into property through patenting; communicated to other scientists by means of scholarly articles in journals; and down the value-added process, elements are fabricated into retail products for the consumer. Human scientists have no more theorized what has happened to the pieces of nature – coal, oil or gas, for example – than petroleum scientists have theorized the effects of large carbon molecules on human adaptation in cold climates, or global air, land and sea transportation and its effects on human linguistic interaction. The phenomenal successes of the natural sciences and their productive laboratories may have simply swamped the world with knowledge gained in specific disciplines and the potential for products. Even if human scientists have noticed the exponential increase of such riches over the last three centuries, they have turned away from explaining how the advances in science impacted social phenomena.

Animism

Our ancestors intuited our relationship with natural objects and local places. For roughly 45,000 years or 2,250 human generations before the rise of the major religions, our hunting and gathering ancestors tended to believe that everything had an animating spirit and was in some sense alive, even stones. This animism is today dismissed as incapable of providing any meaningful approach to the world, and even those who are said to practice it tend to be migrating to cities where engines and pharmaceutical substances replace spirits and the other powers of the unseen world. But there is a clue here, developed elaborately in the myths of our ancestors, that the theorist cannot afford

to ignore: that things not only contain something lively within – essence, substance, activity, hidden abilities – but things also affect humans (who are themselves animated things) and all can interact with one another. Everything has powers. Everything effects.

Unification

Powers of A affect the powers of B as they are brought into proximity by natural events or at the hands and machines of humans. The animist understands with some humility that these relations contain some danger and that it is not a given that events will go smoothly or painlessly. All of this is to say that the world landscape is an array of powers distributed over a large sphere; it is a busy collection of tangible substances, all of which – including the human – have real powers of effect. These powers are increasingly patented, owned and transacted, precipitating an array of incidents, accumulating in catastrophic eruptions and collapses. And each feature of this landscape, visible or not, accounted for or not, is made up of myriad elements with their powers to affect. It is not turtles all the way down, it is powers upon powers all the way down. Brilliant effects and effects upon effects. Nothing is docile. Our theory of the planetary landscape, then, is a theory of the powers of things engaging one another; of humans engaging this engagement with their own powers; of the experimental uncertainty that results from humans encountering the other powers; and, of human powers using the powers derived from nature and amplified by human fabrication. All these things are potentially melded and made useful by means of the global market. The entire landscape is a distribution of remarkable powers. Herein we express our answer to Locke's omission.

First Formulation. All ingredients of the physical universe are active and have evolving combinations of powers that are exerted on other things within the processes of evolution – whether the nuclei of atoms or human beings. The unifying science of humans takes this as the first formulation, which is a kind of democratization of all the substantive elements and their potential relationships in the universe.

Second formulation. As natural objects of great effectiveness, humans amplify and accelerate the processes of cultural and natural evolution; for example, inventing genetically modified seeds and animals and exponentially speeding up computational potential. Phrased another way, the universe has evolved humans that in turn, acting as natural-cultural agents, intensify the acceleration of evolutionary processes.

Acceleration

If the evolving universe has evolved humans who then loop back to accelerate natural evolution, so too it becomes more understandable that humans through experimental science use fabricated nature for tools in order to dig deeper into nature and to engineer even more energized products, in a spiral heaping upward of things used to construct more and other things. This references the Law of Accelerating Returns.

Two axes

Think of two axes, X and Y (fig. 3). The X axis moves from X to X^1 and the Y axis from Y to Y^1.

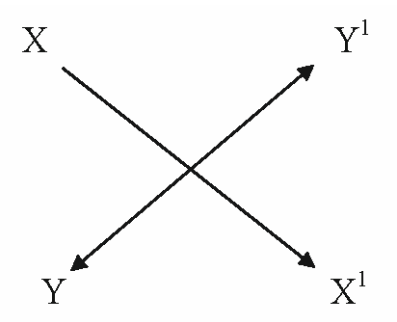

Fig. 3. Two axes

The *X* axis indicates the ingredients of the Strange Catalogue, where physical and biological materials, i.e., the "nearly worthless things of nature," *X*, are transformed through human industry by means of science, math, and engineering and inducted into human society, at X^1.

The *Y* axis represents two effects of the processes moving along the *X* axis; one is entropic and the other is accelerating. By amplifying evolutionary processes, recent human activities produce both disorder and an increasing, higher order. *Y* can be represented as "entropy production," and Y^1 as "order production," innovations that recursively amplify human innovation – for example, the internal combustion engine, nuclear energy, genomics, or supercomputing.

The Y axis

In the middle of the nineteenth century, as the steam powered engine underwent rapid development, Rudolph Clausius formulated the second law of thermodynamics to explain why, during a process, quantities of energy became unavailable for work. He named this quantity "entropy," designating it with an *S*. The point here is that although the earth is not a closed system, as were nineteenth-century energy efficiency experiments, the entire transformation of the materials of nature under capitalism have created high quantities of entropy on the earth.

Y, then, captures the notion of the costs that nearly seven billion humans incur as they do business, and injure major ecosystems. Nearly one-half of the surfaces of the earth has been dramatically changed through human habitation, and not for the better. Biologists point to one-quarter of the bird species having been driven to extinction, more than half of all fresh water being put to use and degraded, more nitrogen fixation by humans than all natural terrestrial processes combined, and a thirty percent increase in carbon dioxide production in less than two hundred years – massive changes that result from the great expansion of the catalogue resulting from human ingenuity and commerce and the necessity to feed and service an expanding populace [Vitousek, et al 1997: 494-499].

If *Y* indicates the Second Law, then Y^1 points toward the very nearly opposite, an increase in order. Carbon emissions from U.S. power plants contribute to entropy, but the electricity generated has contributed to air conditioning for residential, commercial, and manufacturing sites inviting a large in-migration to the American southern tier from Florida to California. Such expansions of human habitation, by no means restricted to

America, underscore the general opening out of the human species into eco-zones of the planet formerly inhospitable to working and dwelling.

While dialectically convenient, the contrastive pair of disorder and order are nonetheless misleading, and failing to take into account the increasing speed and range of human innovation. The issue is not merely that humans create higher order and environmental chaos at the same time, as the *Y* axis suggests, it is that at Y^1 the actual velocity and the things themselves are growing exponentially in power and effectiveness.

From the birth of the universe to the present some scientists consider that the pace of physical evolution, then biological evolution, then human technological evolution, experience exponential augmentation periods that alter the dynamics of the entire system. Termed *The Law of Accelerating Returns*, a phrase coined by Ray Kurzweil, the fundamental idea is that acceleration is inherent in the history of evolution up to the present and that biological evolution continues within the exponential growth rate of human inventions, particularly in computation, genomics, and nanotechnology. To put it somewhat differently, by increasing computational power and applying it to genomics and nanotechnology, whole sectors of innovation explode exponentially, including the potential to radically transform the human brain and body. For example, it is believed by computer scientists that within a few years computer intelligence will not only outstrip the human biological brain in effectiveness, but fuse with it [Kurzweil 2005: 7-14]. In the picture provided by computer scientists, human labor and computational resources tend to blend into an almost seamless human-machine work environment. Locke could not have envisioned such entries into the Strange Catalogue.

Architecture and design

The design disciplines, none more so than architecture, can be located on the nature to culture/entropy + accelerating returns axes. I would place the architect at the crossroads where *X* and *Y* lines intersect. The weight of the world bears down here and future thinking must accept the responsibilities of the pressure and step up to the opportunities.

Fig. 4. Detail of BMW headquarters, designed by CoopHimmelblau.
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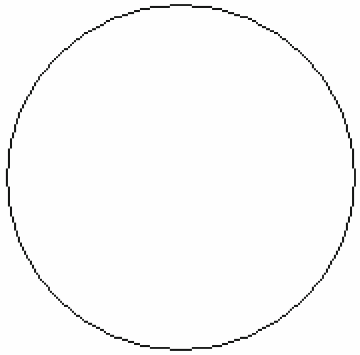
Curious thoughts

Curious thoughts flow from the formulations:

1. Since humans are naturally evolving creatures that amplify the processes of nature, this suggests that the universe sends us to itself as accelerators of evolutionary potential.
2. If this is so, then what ought we to consider about where we and the earth and the universe can possibly be going?
3. How should we imagine the ever-transformative human role in the unfolding universe of the future?
4. How ought we to imagine accelerating the evolution of our own bodies and minds, as well as our practices and living and working?
5. Where ought our ethical considerations be focused and by whom? A century ago, Nietzsche asserted that humans had entered the halfway point, noon in the temporal moment of a solar day. The early morning was over, the afternoon not yet begun. The childhood of dawn had not yet given way to the afternoon of sophistication and maturity. It was a turning point. Call it a search, in the fullest light of day, for the right path forward. He writes:

> My task, to prepare a moment of supreme coming-to-oneself on the part of mankind, *a great noontide* when it looks back and looks forward, when it steps out from the dominion of chance and the priesthood and poses the question why? To what end? For the first time as a *whole*—this task follows of necessity from the insight that mankind is *not* of itself on the right path, that it is absolutely *not* divinely directed, that under precisely its holiest value-concepts rather the instinct of denial, of decay, the *décadence* instinct has seductively ruled. The question of the origin of moral values is therefore for me a question of the *first rank* because it conditions the future of mankind. The demand that one ought to *believe* that fundamentally everything is in the best hands, that a book, the Bible, will set one's mind finally at rest as to divine governance and wisdom in the destiny of mankind, is translated back into reality, the will to suppress the truth as the pitiable opposite of this, namely that hitherto mankind has been in the *worst* hands, that it has been directed by the under-privileged, the cunningly revengeful, the so-called 'saints', those world-calumniators and desecraters of man [Nietzsche 1908: 66].

In this paper we have advanced 217 years from Locke to Nietzsche. However, where Nietzsche's paragraph ends, we must pick up by using the scientific advances of today fused in a moment of supreme coming-to-ourselves. Lunch is over. It is time to bend the trajectory of line Y so that Y and Y^1 are joined, forming a circle. Our accelerating returns from successful innovations, on the Y^1 side, must begin to intervene far more conscientiously on the entropic disorder from the Y side that we have unleashed on the planet, and ourselves (fig. 5).



$$Y \rightarrow|\leftarrow Y^1$$

Fig. 5

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About the author

Dan Rose is Professor Emeritus in the Department of Landscape Architecture, School of Design, University of Pennsylvania. An anthropologist, designer and artist, Dan Rose began making and showing art work in 1995, including seventy-five one-of-a-kind artist books and a year-long project of writing while building twenty-five machines for a three-dimensional novel, *The DNA-Photon Project: 1925-1995*. In addition to showing art he has collaborated on installations and performances, most notably with actors and with couture composer and sonic designer, Melissa Grey. Rose has redesigned and built a facsimile of America's most famous race car, the Shelby American Racing Team, Daytona Cobra Coupe. He has an office and a studio, Pure Theory (Formerly Bob's Used Furniture and Appliances) in Adams, Massachusetts. He has lectured and taught at universities in the United States and Europe and is the author of a number of scholarly articles and books.