

The Clash: Gaia and Homo Sapiens in the
Anthropocene

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Prologue

“Anthropocene,” a candidate term for this epoch of the earth’s geologic history, also signals a decisive and critical transition in human history. These two belong to time scales so different it is difficult to frame them together: The earth is about 4.5 billion years old and has hosted life for about 3.8 billion of those. Civilization is only 8 thousand years old, a vanishingly brief period in geologic time. Yet during that geologic eyeblink human civilization has suddenly become a geologic descriptor,

key to comprehending the transformed character of the earth and of its entire community of life. This is the Anthropocene, a geologic moment of uncertain duration in which the energetic and life-giving flows of the sun-bathed globe bear the unmistakable imprint of our way of life.

In this book we wish to probe the Anthropocene, how we arrived at it, and what paths lead into the future. One challenge in understanding the Anthropocene is the difficulty of seeing beyond the human world. We are so immersed in the world of our devising it swallows up all reference points beyond itself, making it hard to appreciate that the Anthropocene is an epoch in *the earth's* evolution. The earth perspective is important, for the earth has the last word: in the final analysis an Anthropocene that will endure requires a civilization that finds a fitness with the earth.

So in the first chapter we begin with the earth. We aim to see it in its own timescale as a continual evolving process that has passed multiple major thresholds of transformation. The emergence of life is one such, and ever since, life itself has played a major role in the ongoing evolution of the earth. It is easy to get carried away by the uniqueness of the Anthropocene, but it may also be seen as another episode in this much larger story of life's continual evolving probe into what can work. We need to see what it means to be alive, and how all life is constrained and shaped by conditions of the environing earth. This is the framework within which our civilization, our living organization, will likewise be pressured and selected or deselected for adaptive fit.

While we may be subject to the selective conditions of all forms of life, it is also evident that our adaptive capacities differ, allowing us to adapt conditions to ourselves. We have succeeded to such an extent that we have brought about an Anthropocene earth. Chapter 2 turns to this question. What sort of evolutionary probe led to a world-transforming species of this sort? Just how are we different, and what may be the consequences? Why does the advent of civilization critically transform our relation to the earth?

Chapter 3 looks more closely at the transformation of civilization following the Industrial Revolution. This culminates in an exponential post-WWII burst called "the Great Acceleration," civilization as we have experienced it in our own lifetimes. How do science and technology, especially at this point, leverage us into the Anthropocene?

Having seen *how* the Anthropocene emerged, we are in a position to ask in Chapter 4 what this conjunction of earth and civilization *means* as a systemic threshold. By what sort of process does the earth and its

biosphere self-organize and evolve? How is this specifically different from the way human consciousness functions in organizing the human community? What does it mean for the function of earth-organizing processes to now become so enmeshed with conscious human organizing? The incongruence of these modes of organization or management is the systemic source of a now problematic Anthropocene. Climate change and the mounting extinction of species are just the most evident manifestations of the misfit.

Chapter 5 follows this up with an examination of what characteristics would be required of a conscious function that fits with the natural processes by which the world organizes. Our kind of consciousness functions with focus, selectivity, and prioritization. Can these expand beyond the limits of their evolved species-centered frame to encompass a more-than-human world for which we have become responsible? What is the misfit thus far? Why is our apparent success shadowed by the Sixth Mass Extinction?

Chapter 6 reframes these issues from the perspective of motivation and guidance, features that pertain to every living organism. The thrust towards well-being that goes with maintaining life grounds and shapes all motivation and guidance. How is this manifest in the complex motivation and information by which human conduct is guided, and why, unlike other creatures, do we seem not only guided, but often enough misguided?

This question leads into Chapter 7, a consideration of the distinctive way in which human motivation has become highly mediated. All life participates in the challenge of making a living, but we encounter this challenge heavily mediated by our technology and shaped by our monetarized economy. What happens here to the guidance towards well-being inherent in more direct motivation? And in particular, since money is the “bottom line” in so many human situations, what sort of guidance might we expect from an abstract quantitative symbol of exchange? What happens when technological innovation and financial profit become locked in a mutually reinforcing positive feedback loop?

Chapter 8 turns to a consideration of the systemic roots which pair our eusocial tendencies toward more expansive inclusiveness with an inward pull toward tribal identities. Globalization in some form seems an expected trajectory in our social evolution: as our technologies of transportation, communication, and information have shrunk the globe, our systemic social net sweeps up other cultures as well as other creatures. But now cracks emerge with reactionary force both among

and within national communities. This is especially critical now, when the urgency of a coordinated, unified human response to global warming is upon us.

Part I of this book has examined the systemic challenge of the Anthropocene, the overlay of the earth's self-organizing processes with the management of a relatively narrow and self-interested human consciousness. Chapter 9 concludes this section by drawing the many points of tension between the natural world and human society to a focus which points to how the ethos of our civilization must now adapt for an Anthropocene fit.

Part II takes up the question of how that fitness, an ethos for the Anthropocene, could possibly come about in the light of all we have seen. It anticipates that the status quo of our civilization will become fluid under the pressure of encroaching climate change. Under such conditions it will be especially important to have some idea of directions that might alleviate the areas of strain we have identified.

Chapter 10 begins with an analysis of the coevolutionary dynamics of cultural change. We see the feedback loops in which our values and thinking become externalized in socio-economic structure and institutions and how those structures act back to shape our values and thinking. Change in any dimension ripples to affect others. In the contemporary world these interwoven feedback loops are aligned for positive feedback, more leading to more. With this in view, our analysis will first look at potential modifications in the socio-economic sphere, and then take up the other side of the loop, the correlated question of reshaping minds and hearts.

Chapter 11 takes up problematic features of our civilization's socio-economic system. Those problems converge in the Great Acceleration, producing an exponential rate of innovation and transformation that strains the earth and biosphere. Growth and money are two major drivers. We discuss alternatives to an economy structured on growth and look at ways to diffuse the power of money and jobs to control personal life and public policy.

Chapter 12 turns to inner factors shaping the kind of consciousness that has produced contemporary civilization. In Part I these were discussed as issues regarding priorities, short-sightedness, the narrowness of identities and caring, carelessness, and consumerism. This interdependent cluster of features reflects a long evolution in which fitness was mainly a matter of taking care of ourselves; fitness for the

Anthropocene now demands an expanded horizon. Each of these facets of our conscious functioning is taken up in turn in a search for possible developments and related strategies that might enhance their Anthropocene fit.

We follow with a chapter devoted to the big picture, the way we frame the entire meaning of the narrative of our lives. Where do we come from, how are we to live, what are we headed for? Chapter 13 takes up contemporary religion in forms common to the West but with analogues throughout the world. We begin with fundamentalism, a powerful reaction to the experience of unmoored and accelerating change, then consider the capacity of mainline religious traditions to support an Anthropocene ethos. Finally we take up those who now describe themselves as “spiritual but not religious,” a recent but rapidly growing phenomenon of disconnecting with institutional religion but nonetheless reaching for a life meaning more deeply grounded than the daily foreground of secular concerns. One potential here is to return the story of our lives to the embrace of the earth and the broad community of life in which we participate.

The conclusion draws together the challenges and potentials we have seen in Parts I and II. Each of the new directions suggested are possible if not necessarily probable developments. Taken together, they amount to the emergence of a new level of civilization, one that attains the kind of inclusive consideration and functionality required as humans conduct their lives and find well-being in an Anthropocene world.

Chapter 1. Evolution

Social phenomena are by their nature historical, which is to say that the relationship among events in one “moment” can never be abstracted from their past and future setting.

Sidney Mintz

1.1 Introduction

Cultural anthropologist Sidney Mintz was speaking of human society. But his observation is true as well on a larger scale. Life itself is a historical community, a selective process within which species emerge shaped and conditioned to fit with others, the social environment within

which they must make a living. In this book we wish to probe the Anthropocene, how we arrived at it, and what paths lead into the future. As Mintz observes, we cannot understand the configuration and character of our species at this moment of the evolving society of life on earth without the context of past and future.

At all timescales, the future evolves out of a past, conditioned by present circumstances as it probes what Stuart Kauffman has called the “adjacent possible,”¹ a field of not yet determined next steps made possible, but with uneven probabilities, by the way things stand at present. For a species that lives by foresight, the adjacent possible of human society and of the planet itself is now unusually opaque and a source of misgiving. The world of human culture is changing at an exponentially accelerating pace: we now move into the future with a sense of anxious tension akin to that of passengers in a bus driving too fast in foggy conditions. How did we get moving so fast, and what does it portend? Where are we going, and where do we want to go? And who’s driving, and will the driver listen to us anyway? Do we even have brakes? Will they work? Are there pedestrians crossing, and can we see them—or they us—in time?

Indeed, lives are at stake here, both ours and that of more pedestrian species. The world used to be slower, and other species did not have to contend with the fast-moving bus of human culture and society. To say the world has not always been this way amounts to a major understatement. It’s closer to the truth to say the world has never been this way before, and the question is whether and for how long it can sustain being this way. But what do we mean by “this way,” and what makes it so different? Geologic time and evolution provide us with the big framework, the past and future within which we can begin to understand the distinctive shape and adjacent possibilities of our present moment.

¹ Kauffman S. *Investigations*. Oxford University Press, New York, NY, pp. 142-144.

1.2 Emergence of Life: Selves

From the Big Bang onward the universe has been evolving into more complex systemic organization. Gas clouds form stars, fusion burning of stars turns simple elements into more complex, heavier elements, then exploding stars scatter heavy elements into clouds that re-condense into bodies such as planets, where the heavy elements can enter into the complex interactions and molecular combinations we call chemistry. The self-organization of this kind of pre-biotic evolution advances into the adjacent possible of even greater complexity as an unfolding possibility: now that this has happened, what can happen next? What can happen is constrained simply by the laws of physics and chemistry. But when we get to life, while the constraints of physics and chemistry remain, a new kind of constraint enters the picture, the question of working or not working, staying alive or perishing.

The earth formed about 4.5 billion years ago and life emerged some 3.8 billion years ago, that is, almost as soon as the initial conditions of a hot young planet undergoing celestial asteroid bombardment settled down enough to avoid tearing apart complex molecules as they formed. Complex chemistry gave rise to a new form of complexity, biology. Living organisms distinguish themselves by doing more than just subsisting for a time. They do work, taking in and processing a sustaining flow of nutrients from the environment for the energy and matter required to maintain their unlikely, complex structures. Or as we say, they “stay alive” for some period. And the most important accomplishment, aside from maintaining their dynamic living structure, is the fine trick of reproducing it before self-maintenance finally breaks down.

Self-maintenance and reproduction are based in chemistry but belong to biology, a new kind of process. For one thing, they involve the emergence of a whole new kind of unit, the self. A “self” is a special sort of reference point. Unlike any non-living unit, a self is a complex functional unit whose processes circle back to keep maintaining it as such. This may not seem like such a big deal, but consider that it is the emergence of the world’s first trial and error process: while it works, the organism lives; when it fails, the organism dies. Life and death, the origin of working and not working, success and failure. Before this, on the levels of physics and chemistry, everything always worked: the laws and processes always proceed perfectly. Or it might be too much to say they “worked,” since such a concept, like left and right, cannot exist without its counterpart, not-working.

1.3 Working and Not Working: Natural Selection

Metabolisms, the life sustaining processes of any organism, are already novel in having the quality of working or not, or working better or barely getting by. But it is the second distinctive characteristic of life, reproduction, that turns this into a trial and error process that has filled and transformed the earth with its products. Evolution, the original and fundamental trial and error process, has reorganized the face of the globe. The way an organism is put together must work in its environment, for it is only with the appropriate flows from the environment that it can keep its life going. Occasional mutations of one sort or another may better exploit present opportunities or adapt to changing circumstances, but they must be heritable. Reproduction is the gate-keeper that transforms this varied working and not working into a ramifying selective process with huge consequences.

Darwinians call it “natural selection.” Whatever life recipe works well enough to sustain an organism to the point of reproduction gets rolled forward. What works poorly will show up in relatively lower numbers in the reproducing members, the gene pool, of a given species. Whatever gives an edge in making a living in given environmental conditions turns into statistically dominant trends that shape and reshape species for fit with their environment.

Reproduction or not making it to reproduction in this way provide objective markers of success and failure. But it is the environment—all the physical features and life forms that constitute a given eco-system at any point in time—that provides the selective matrix, the conditions that determine what works and what does not. For this environment is what an organism must fit with in order to make a living. Misfits get weeded out, rarely making it into the numbers of the reproducers. So the evolutionary process is often simplified to the phrase, “survival of the fittest.” Though we often think of “fittest” in terms of abilities or characteristics that are somehow inherently superior, what works better is determined by the circumstances in which it must function, so nothing is inherently superior without reference to circumstances.

Life then is a process requiring constant work, both internally and in managing the interface with the external world. This means no organism is simply alive, for a living must always be *made*. In this respect the shaping power of the environment is much like the shaping power of a human socio-economic structure. Or better, we might say that our experience of the way our socio-economic environment shapes our lives

and our prospects is just a subroutine, our human participation in the way environment conditions the availability of ways of making a living for all creatures.

1.4 Making a Living

The selective environment is a moving target for fitness. Not only is the physical environment in flux, life itself drives continual transformation. The churn of innovation in the world of business exemplifies a dynamic that characterizes the project of making a living at all levels of life. Every adaptive evolutionary change by any organism, and every new absence due to failure to adapt, constitute new changes that ripple as small or large modifications to the fitness challenge faced by every other organism. Insofar as lifeforms fit a given set of circumstances, and in the long run virtually all circumstances change, extinction is more the rule than the exception. Estimates are that over 99% of the creatures that have emerged in the course of evolution are no longer with us. But that is perhaps not as dire as it sounds, for a similar ballpark estimate of the average species' lifetime or "background rate" of extinction ranges from 1 to 10 million years.²

This wide variation depends on many factors, but in general being relatively small and simple is an advantage. With increasing complexity comes a steady escalation of needs and a decreasing likelihood that environmental conditions will continue to meet them. So it is no surprise that a species of worm might easily endure for 10 million years while the average mammal shuffles off the stage after only a million. The message in this record for *homo sapiens*, still an adolescent species at about 200 thousand years but by far the most complex, high-living, and needy product of evolution, is less than upbeat. At the same time we also are the most strategically flexible, adaptable, future-manipulating species to yet emerge. We have been so successful that in the last century or so wants rather than needs fill the conscious horizon of those in societies we consider more advanced. Nonetheless, in view of the larger systemic picture, we do well to pay attention.

² For a table of estimated extinction rates by species, see <https://www.britannica.com/science/conservation-ecology/Calculating-background-extinction-rates#ref959268>, retrieved 5/4/18.

1.5 Big Numbers: Going Anywhere?

What are we to make of the vast, unimaginable expanse of evolutionary time? Life has been on earth 3.8 billion years; that means 38 hundred thousand-thousand years, an expanse of time beyond our grasp. Even a millennium, a mere thousand years, seems enough to trivialize the temporal horizons within which we typically live and think and strategize.

Huge numbers are often used as frames that challenge our conventional sense of importance. Hearing that our sun is only one of about 400 billion stars in our galaxy, which is but one of 100 billion galaxies in the universe, who does not feel the challenge to our natural sense that the earth is all-important? Similarly, hearing that homo sapiens emerged only in the last 200 thousand of 38 hundred thousand of thousands of years is bound to dent our sense of cosmic self-importance.

Or the numbers can be used with the opposite effect. Cosmologists argue, for example, that the physical parameters and age of the universe must be what they are for life and consciousness to arise. Change the numbers even a little bit and you end up with a uselessly short and fast universe or a long and boring one in which no interesting complexity takes hold.³ In a similar fashion we can say it took a lot of evolving, a lot of probing of possibilities and elaboration of more and more complex forms of life and ways of making a living before something like human consciousness could emerge.

Both the daunting and self-magnifying potentials of chewing on the huge numbers resident in cosmic and life processes may feed misleading impressions. Being a small part of a mighty process does not necessarily indicate triviality or meaninglessness, nor does being the end of a long process necessarily token a mighty achievement. Important understanding of our species and our times can indeed be gleaned from consideration of cosmic, earth, and life evolution, but when premised either on the notions the whole process is headed somewhere (us), or that it is headed nowhere in particular, these oversimplifications suggest misleading conclusions.

³ Arguments swirl around the so-called Anthropic Principle, which calculates the exceedingly narrow range of cosmic parameters that could produce a universe in which we could be present as observers. See https://en.wikipedia.org/wiki/Anthropic_principle, retrieved 3/5/18.

Scientists generally disavow any notion that evolution is a teleological process, that is, that it has an end point or goal that it is headed towards. We humans act purposively to bring about consequences, but that does not mean every consequential process needs a purposeful mind behind it. When the force of gravity assembles hydrogen particles, the initial and simplest atomic element, into huge stars, it is not for the purpose of starting atomic fusion burning so that hydrogen nuclei may fuse into heavier atomic elements. But this is what happens when the star reaches a certain mass. Framed in terms of physical process, the evolution of the universe in the direction of complex organization did not have to be “on purpose.”

Not having an intended destination does not mean a process cannot get on a vector that goes somewhere. One thing leading to another can just be a random wander, or it can develop a trajectory that arrives at something new. The possibility of the latter emerges with only a slight change of perspective: now that this has happened, what can happen? Physical shape is not a property of atoms. But when heavy atomic elements assemble into complex molecules, the molecules can begin to interact in terms of their shape, and a new dynamic of relation-building emerges. And now that we have shapes that make some sorts of interaction more likely than others, what can happen? And we are off into the realm of catalytic chemical reactions—as such shape-governed reactions are called--that skew the world of chemicals towards otherwise highly improbable forms of further organization. And with this, the emergence and maintenance of life becomes possible. And then, when units organized as self-maintaining and self-reproducing processes arise, what else can happen?⁴

The point is that emergent organization opens a potential to yet further organization even without the enabling step being for the purpose of what it makes possible. Such a process can really go somewhere. Just look around at the complexity in which we are immersed. Evolution in the context of living organisms has the same non-purposeful directionality. But especially because it is a trial-and-error process based upon selection of what works (or more accurately, selecting out what

⁴ For an overview of this process of self-organization at the cosmic, earth, and life system levels, see Mobus and Kalton, *Principles of Systems Science* (NY: Springer. 2015) ch. 10 & 11.

does not work), it is difficult to avoid interpreting it as a purposeful thrust towards working better.

1.6 Crossing Thresholds

When we cross a threshold we move from outside to inside, into another space, and everything is different. Systems thinkers play off this experience when they refer to a development that unleashes a whole new arena of organization as a “threshold.” This book aims to understand one of the most critical and consequential thresholds in the evolution of life on earth, the emergence of human culture as an organizational sphere somehow distinct from the rest of the “natural” or eco-systemic organization of life. As outlined above, such thresholds, new levels of organization, are made possible by antecedent organization, which in turn involves its own thresholds.

Evolutionary thresholds thus constitute a chain of dependent potentials: without the former the latter could not develop as it has. Unlike the worlds of physics and chemistry, in which the unfolding of such emergent organization seems relatively determined, the thresholds involved in life evolution are linked more by possibility than necessity: what happens next didn't have to happen—at least not with the predictable necessity that fusion burning had to happen when stars accumulated sufficient mass. This means that the shape of the world of life is far more contingent than the shape of the universe. Life on earth has been, and could become again, far different than it is at present. To better understand the uniqueness of the present and the potentials latent in its adjacent possible, a brief overview of a selection of the evolutionary thresholds crossed in getting us here will lend valuable perspective.

Early in the 3.8 billion years of life on earth, the hotspot for life was probably literally that, the hot, sulfur-rich waters surrounding volcanic vents in the oceans. The metabolisms of early single-celled organisms (bacteria) were suited to this environment since they used sulfur-based chemical reactions for energy and growth. New recipes for making a living chart the course of evolution. After a little less than a billion years a recipe emerged that crossed the threshold that ushered in the world as we know it. Cyanobacteria or blue-green algae hit upon photosynthesis, the most successful recipe for making a living imaginable. Compared to ways of living constrained by the availability of needed but sometimes

scarce elements and compounds to keep one's metabolic chemistry going, imagine the freedom of needing only water and sunlight to make a living! If you depend only on what is available almost everywhere and always, you can cover the earth (or seas anyway), which is just what the cyanobacteria did. And unlike the 99% of species no longer with us, after 3 billion years they are still going strong.

The new energy process of the booming cyanobacteria economy produced, however, an atmosphere-transforming toxic pollutant, oxygen. Since oxygen so readily combines (oxidizes, "burns") with other elements, at the advent of photosynthesizing bacteria there was virtually no free oxygen in the atmosphere. So at first the oxygen respired by the cyanobacteria quickly entered into compounds, most notably rusting (oxidizing) the abundant iron present in seawater, which then precipitated out into sediment beds we now see as great rust colored bands that appear in some cliffs and that we dig for in iron mines. Then, after about 200 million years, when all readily available combinatorial sinks were filled but the photosynthesizing economy was still roaring along, lacking any other place to be absorbed, the oxygen began to accumulate in the atmosphere.

The Great Oxygenation Event (GOE) as it is called, also has more forbidding titles such as The Oxygen Catastrophe or the Oxygen Holocaust.⁵ The latter terms are descriptive from the point of view of most of the earlier evolved forms of life, which were never prepared to coexist with free oxygen. This was perhaps the first great extinction event, in which a microbial organism transformed the atmosphere in a way that was a huge ecological shock to evolved life. But the oxygenated waters beneath the surface of mats of the photosynthesizing algae provided an environment for the evolution (selection) of oxygen-tolerant and eventually oxygen-utilizing organisms. The corner was turned (if you can see a few hundred million years as a corner) in the history of life to the now oxygen-dependent metabolic structures that fill the earth. Fish have gills and we have lungs owing to the still annoying 3.5 billion-year-old blue green algae whose descendants plague our waterways and beaches with their sometimes-toxic blooms.

So, long before it was our turn to modify the composition of the atmosphere, a tiny single-celled organism with an unstoppable way of

⁵ See https://en.wikipedia.org/wiki/Great_Oxygenation_Event, retrieved 3/5/18.

making a living did it first. Of course the composition of the atmosphere, as we are experiencing, carries other consequences. Before the GOE, earth atmosphere was rich in methane, more than 80 times as potent a greenhouse gas as CO₂. As oxygen broke the methane down into CO₂ and water, the earth had its first major reverse-greenhouse event, plunging about 2.4 billion years ago into its most prolonged and severe ice age, a so-called “snowball earth” condition that lasted for the next 300 million years.

Within about 200 million years after snowball earth, another major threshold was crossed with the emergence of a new kind of cell, the nucleated or eukaryotic cells. The original cellular formation of life was as non-nucleated prokaryotic cells, which are still very much with us as the bacteria that make soils fertile, digestive tracts function, and pharmaceutical companies rich. The eukaryotes are much larger, and far more complex in organization owing to functional specialization facilitated by the development of internal membranes. Everything alive can now be described as either prokaryotes or eukaryotes, but it took more than half the entire span of life evolution, about 2 billion of the 3.8 billion years, to get life to its eukaryotic organization.

Why did it take so long for eukaryotic organization to arise, and why is it such a big deal? Earlier we described the rise of life as a unit that maintains itself through a metabolism, and if successful reproduces itself. We have seen that buried in this description is the emergence of a new kind of unit, the “self” which is the reference for maintenance and reproduction. Units running around taking care of themselves and making more of themselves are interesting and important. This describes prokaryotes, and their collective biomass is still about 10 times that of all the eukaryotes combined.

But once this new kind of unit has emerged, what new potential is opened up for exploration? Organization evolves in terms of new combinations and new ways of combining. Heavy atoms (physics) could combine into molecules, molecules had a whole new kind of combinatorial complexity (chemistry) which eventually led to the dynamic circle of self-maintenance in cellular selves (biology). And now the emergence of eukaryotes is the decisive threshold in what has become a ramifying exploration of the combinatorial potential of selves.

Selves are marked by boundaries, which gives rise to a systemic difference of *inside* and *outside*. Passing through the boundary, the difference between the two sides is marked by a different and much tighter form of organization on the inside, reflecting the special

organizational demands required for self-maintenance. Living organisms, both in their inner organization and in the relational interface with the environment that feeds that organization, must work. Over the course of two billion years the restless evolutionary probe into what works saw the emergence of a wide variety of prokaryotic metabolisms. But although in a few cases the advantages of colonial living were probed, algal strands and similar communities evidenced only low-level differentiation and individual members could in general survive on their own. That is, while the metabolic materials and chemistry of self-maintenance were explored in ways that made prokaryotes the most diverse of any organisms, the selves being maintained remained, if not solitary, at least seemingly ultimate individual units.

Individual organisms, however, may find mutually beneficial ways of living together. Ways of making a living can interlock, as when ants make sure aphids have plenty to eat and the “honeydew” excreted by the well-fed aphids provides nourishing food for the ants. The rugged individualism of being a jack-of-all trades can move in the direction of more expert specialization when there are others around who reliably share their expertise in special aspects of what must be done. I can build a house, doing the carpentry, electricity, and plumbing myself. But perhaps a more elaborate house may be achieved if I become a master carpenter and hire an electrician and plumber. On a sparsely populated frontier the jack-of-all trades strategy works best, but as populations become more dense, the mutualism of synergistic specializations arises as naturally as the dynamics of resource competition, which has more often been focused on as the driving force of evolution.

The rugged individualism of prokaryotes was breached finally by the synergistic dynamics of symbiosis. Eukaryotes were a new kind of entity, a new kind of self-unit comprised of once free-living prokaryotes united in a symbiotic community within a more capacious cell wall. The carpenter, electrician and plumber not only cooperate in the way they make a living, they move into the same house and devote their skills to ever more tightly specialized functions for maintaining and elaborating it. This “endosymbiosis,” wherein the reasonably well-understood phenomenon of symbiotic strategies *among* organisms moves to become a strategy for organization *within* an organism, was greeted with doubt and even ridicule when first proposed by biologist Lynn Margulis in 1966. Her landmark paper proposing that the critical mitochondria, the organelles that produce the energy and control the metabolic processes that maintain the large complex nucleated structure of eukaryotic cells,

were once free-living bacteria was rejected by 15 journals before it was finally published. Proposed in the mid-1960s, the notion of selves cooperating to become a yet larger self, seemed to critics a romantic overextension of symbiosis that would mainly appeal to the love culture of the hippie generation. But within ten years advances in genetics revealed that the mitochondria had their own DNA distinct from the DNA of the cell nucleus, a clear evidence of their once independent lives. The chloroplasts, for example, which enable plant cells to produce nutrient sugars through photosynthesis, are now recognized as a new endosymbiotic live-in form of the stunningly successful blue-green algae.⁶

1.7 Nested Selves

Endosymbiosis may be a technical term little known outside the world of professional biologists and their students, but it marks a threshold in which life revealed an unsuspected potential of immense consequence. Not only can complex living wholes be broken down into parts, living wholes can enter into and become parts of larger living wholes. “Self,” instead of being the term for an irreducible biological unit—something like atoms were once imagined to be—emerges as rather what systems theorists describe as a “nested system,” a phenomenon of many layers with an expansive dimensionality that could be diagrammed as a series of expanding concentric circles. There is a real connection here that leads all the way from the emergence of eukaryotes to the question of the many potential human identities, the choice or construction of larger, socially more inclusive selves by which we characterize and identify our smaller selves.

The human circles of this nested self will engage our attention in later chapters. For the moment, we are at the innermost core of this pregnant phenomenon, the point where, after 2 billion years, unitary prokaryotes become corporate eukaryotes. Complexity ramifies into an enlarged adjacent possible, a greater range of potentials. Prokaryotes tentatively probed the potential advantages of communal organization, but the relative simplicity of their internal organization did not offer much range for intra-species differentiation and specialization. Eukaryotes, with their

⁶ See <https://en.wikipedia.org/wiki/Symbiogenesis>, retrieved 5/4/18.

more complex structures and metabolic processes, had a wider horizon of opportunity. Still, it took another 600 million years for sexual reproduction to emerge. Compared to bacteria simply splitting into cloned copies of themselves, sex brings a whole new dimension of variability to the table, so one might expect the rate of evolution to pick up. Given another 400 million years, bringing us to only about 800 million years before the present, and eukaryotes had worked out how to join together to become parts of a multi-celled organism, a kind of corporation of corporations that comprised a new level of reproducing self-unit.

How multicellularity arose is still a matter of debate. But however it arose, multicellularity takes us decisively up or out another ring of the nested self to the communal enterprise of eukaryotic cells. A nearly invisible little transparent worm has been accounted to be composed of 1,031 cells (Caenorhabditis elegans, a common laboratory animal, was the first multicellular organism to have its [complete genome sequenced](#).) For an average 150 pound human the number is 37.2 trillion.⁷ That is 37.2 million-million little metabolisms that have to be coordinated into one functioning mega-self unit. It took the trial and error probing of evolution almost 3 billion years to get to this point, but it's not time wasted.

Multicellularity carries us across a threshold leading literally into the world as we know it. Within about 200-300 million years of its emergence the modern phyla of animals begin to appear in the fossil record, radiating in a burst of profusion and diversity of life known as the Cambrian Explosion (542 million years ago, lasting 20-25 million years). In passing, it's a useful reminder regarding the scale of evolutionary time that an event lasting 20-25 million years is regarded as an explosive surge.

1.8 The Phanerozoic: The Eon of Macroscopic Life

The Phanerozoic or Eon of Visible Life dates from the Cambrian down to the present.⁸ In some respects one can view the entire Phanerozoic as a

⁷ <https://www.nytimes.com/2015/06/23/science/37-2-trillion-galaxies-or-human-cells.html>, retrieved 5/4/18.

punctuated march to our familiar landscapes. Within a mere 150 million years of its beginning, vertebrate fishes swim in the seas and plants, animals and insects have begun to populate the land. Within another 50 million years the land is covered with vegetation and conifer forests are on the way.

As if to remind us that the complex new multi-cellular arrangements of life go with more complex needs and dependencies and hence increased vulnerability, the Phanerozoic is punctuated by 5 major extinction events. Organisms finally large enough to leave a fossil record yield a rich trove of evidence for the emergence and passing of phanerozoic species. Everybody knows about the asteroid that 65 million years ago wiped out the dinosaurs and gave us mammals our Cenozoic day in the sun. But the Permian Extinction that occurred some 251 million years ago was by far the most drastic of the mass extinction events that have marked the Phanerozoic thus far. It is estimated some 96% of marine species and 70% of those on land perished.

Species loss in each of these extinction events was in the neighborhood of 75% or more. These crashes are precipitous by the standards of geological time, but confound our ordinary sense of an “event” or “crash.” The great Permian Extinction, for example, is thought by many to have unfolded over about 15 million years, though some would argue for a mere 200 thousand.⁹ Recovery of diversity from a mass extinction event may take 10 to 15 million years, or in the case of the Permian perhaps as much as 30 million.¹⁰

Causes are varied across events and much debated for any given event. They may include anything from continental drift, climate change, volcanoes, meteorites, to toxin-emitting microbes. In each case scientists look for the source or sources of a far-reaching upheaval: continents joining, volcanoes spewing, atmosphere and water transforming. But the end point for any species is always the same: modifications in vital life-maintaining conditions beyond their adaptive capacity, expectations for making a living inherent in their recipes that can no longer be met. All living organisms have a specific habitat, an expected systemic context within which they make a living. When that living can no longer be made, they go extinct. Unexpected change is the

⁹ <https://www.britannica.com/science/Permian-extinction>, retrieved 5/18/18.

¹⁰ https://en.wikipedia.org/wiki/Extinction_event, retrieved 5/18/18.

common denominator. Suddenly the plants, or the available prey, or habitat for reproduction, or the atmospheric and water temperatures, or the chemical interactions or other essential conditions are no longer as expected. When the change is too drastic, adaptation fails and extinction results.

Outside of these mass extinction events, life forms seem to get along fairly well. The natural extinction rate varies by species, but the overall non-mass or “background” extinction rate has been estimated at about 1 species out of a million per year. With an estimated 8.7 million species on the earth at present, that means we might expect something like 8 or 9 extinctions per year.

But now a Sixth Mass Extinction event seems underway. It has been ramping up for about 10,000 years, but becomes acute with the Industrial Revolution and has been accelerating especially since 1900. Estimates vary widely, but at present we may be losing species at anywhere from 100 to 1,000 times the expected background rate.¹¹

Except for the asteroid that did in the dinosaurs, the mass extinction events of the Phanerozoic to date would be poor candidates for a newspaper headline. How would anyone know they were headed into an event unfolding over thousands or even millions of years! But the Sixth Extinction is unfolding at the breathless pace that is meaningful even on the miniscule scale of human lifetimes. This Sixth Extinction has been spotted, measured, and garnered headlines in the *Washington Post* and on CNN,¹² as well as having a Pulitzer-prize winning book to its credit.¹³ Scientists can count the known vertebrate species extinctions since 1900 (469) and compare that with what a normal background rate of vertebrate extinction would be in a similar period (4-9 species). We are still on the early edge of this event—in the neighborhood of only 1% total loss so far—but scientists warn that, unless things change, we are

¹¹ <http://www.iflscience.com/plants-and-animals/current-extinction-rate-10-times-worse-previously-thought>, retrieved 9/1/16.

¹² https://www.washingtonpost.com/news/morning-mix/wp/2015/06/22/the-earth-is-on-the-brink-of-a-sixth-mass-extinction-scientists-say-and-its-humans-fault/?utm_term=.88b376f8fda5, and <https://www.cnn.com/2017/07/11/world/sutter-mass-extinction-ceballos-study/index.html>, retrieved 5/18/18.

¹³ *The Sixth Extinction: An Unnatural History*, by Elizabeth Kolbert (NY: Henry Holt and Co., 2014).

headed at breakneck speed for those 75% or more “mass extinction” numbers. Some suggest a 240 to 540 year window for such a drastic unraveling—a veritable lightning strike by geological standards. Harvard’s E.O. Wilson is even less sanguine, suggesting we could lose 50% of higher lifeforms by the end of this century.¹⁴

The Sixth Extinction event is unique among the mass extinction events insofar as the cause of the sudden change is not a meteor, volcano, or micro-organism, but us humans. We can understand how cyanobacteria could photosynthesize a new atmosphere, or how methane-producing bacteria might have bloomed and contributed to the largest crash ever of Phanerozoic life.¹⁵ But no multi-celled organism has ever been suggested as the cause of an event of this magnitude. Initially many of us have found it implausible to even think humans could cause climate change (one factor among others in the Sixth Extinction). Changes that produce mass-extinctions represent something new in whatever state of affairs the life-system has adjusted to when they occur. As we look at the unfolding of civilization in following chapters, we will find an exponentially ramifying history of life-condition altering innovations we have introduced: weapons and hunting strategies, agriculture, cities and civilizations, industry and fossil fuels. This and much more. And the rest of the community of life struggles—and frequently loses the struggle—to keep up with the associated wave of change to their way of making a living even as we experience what we regard as the heights of economic development.

1.9 From Hard-Wiring to Conscious Experience

“Phanerozoic” is just Greek for “life that can be seen.” The threshold represented here is dependent upon size and complexity, but it is a lot

¹⁴ https://www.washingtonpost.com/news/morning-mix/wp/2015/06/22/the-earth-is-on-the-brink-of-a-sixth-mass-extinction-scientists-say-and-its-humans-fault/?utm_term=.07ce06745c52, retrieved 5/18/18.

¹⁵ See “Methane-spewing Microbe Blamed in Earth's Worst Mass Extinction,” *Scientific American*, March 31, 2014. <http://www.scientificamerican.com/article/methane-spewing-microbe-blamed-in-earths-worst-mass-extinction/> Retrieved 1/15/16.

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more than that. *Seeing*. Not only do multi-celled organisms become big enough that reflected light rays carry meaningful information about shape, size, and location, but their size permits the kind of complex elaboration that can, within a few hundred million years, equip animals with eyes and other senses feeding into nervous systems that give rise to conscious experience.

Single-celled organisms move around their environment with hard-wired guidance responsive to chemical gradients and similar electro-chemical signals relevant to their way of making a living. A cell does not need the motivation we experience through sensation and attendant pleasure and pain in order to be attracted or repelled in useful ways: reproductive sifting (natural selection) for responses to chemical signals that work to sustain life can put all that on autopilot. There is literally a world of difference between life shaped and formed by that level of hard-wired guidance and the sense-mediated life directed by pleasure and pain, fear and desire. The tightness of the former still rules the complex biology of our sustaining metabolisms, while the looseness of the latter allows the us to move advantageously through shifting and unpredictable landscapes.

On the multi-cellular side of the threshold then, we are on the way to something quite new, the world of experience. The experienced world is neither real nor unreal, it is just information: visual information, auditory information, touch information, smell information, whatever form of information an organism is equipped to pick up. The world as mediated through the senses is not reality but *about* reality, or we might say not reality but an *experience* of reality. The point of experience is not to be real, but to mediate reality in a way that can guide sensate creatures as they navigate through a world of very real opportunities and pitfalls.

Experiences, like all information, mean something and hence call for interpretation. I am moved not by the sound of words but by what I make them out to mean. A zebra takes flight at the sound in the tall grass as an indicator of a predator—or may fatally ignore it as meaning nothing. And so it goes. In a life community in which members make a living by eating others, information in one form or another about what the environs hold is critical. At the micro-level interpretation of signals is fixed in evolved hard-wired responses, a mechanism that carries over to the insect world but grades out with increase in size, lifespan, and less prolific reproduction. As multicellular organisms grow into more complex lives, hard wiring is increasingly replaced or supplemented with learning from experience.

To appreciate what a departure, what a forking this is of evolutionary trajectories, we must back up a little bit. Guidance by gene pool has been the architect of the life community, laying out a structured living for every organism cross-referenced for sustainability with every other. The reproductive gate monitors change in terms of the shifting composition of the population that makes it to reproduction, which is continually reshaped by the dropouts. The reproductive rolling forward of what has worked for the generation coming to reproductive age works as long as the world in which offspring land bears sufficient similarity to the one parents navigated successfully: change is the challenge that must be met by all evolving life.

A gene pool can effectively monitor change in proportion to its sampling frequency: organisms that reproduce every few hours or every day have a fine-tuned monitor and rapid response mechanism for change, like the pests that evolve around the farmer's chemical warfare. If one bug in a thousand has some inheritable quirk in its makeup that withstands the spray, and it can roll the trait over to 30 offspring which each can soon roll it over again to 30 more, exponential growth soon fills the field with newly resistant bugs. Such a strategy is wonderfully effective for small organisms that live briefly and reproduce often and in numbers.

Multicellularity opens the possibility of larger body plans and longer lives. Reproductive time gets stretched as creatures with larger bodies require longer gestation and special care until they mature enough to make a living on their own. The key that opens up this evolutionary trajectory is to equip organisms with onboard intermediate guidance to keep their responsiveness on track even without frequent selective shaping and reshaping by the reproductive gate. The emergence of memory offers a more flexible substitute for hard-wired response to immediately present signals, and pleasure and pain become an important part of the sensory repertoire. Remembered experience combines with the ability to recognize sameness, that this is *another* case like the one remembered, so similar pleasant or unpleasant outcomes may be expected.

This evolutionary trajectory, then, brings us to organisms equipped with awareness, the ability to learn from experience, and including in their motivation the familiar sensations of attraction and repulsion, pleasure and pain. And implicit in this package of abilities is another novelty, imagination. We often think of imagination as some sort of distinct faculty, but its core is just the ability to project memory and apply it to an expected future. That is, creatures become guided by and responsive to not just immediate circumstances such as chemical signals, but

circumstances remembered and interpreted into imagined futures. This is a development of major consequence.

1.10 Humans: A New Way of Moving Into the Future

Any concrete system is processing in time, which means it is moving into a future. But we have seen that a living organism is a distinctive sort of process; it moves through space and time differently from a rock, a crystal, or any other non-living unit. The rock also is in process, moving through space and time and becoming continually different. But as the rock gradually transforms, nothing is gained or lost, for there is no unit there that has a stake in maintaining any particular condition. Any living organism likewise continually moves into a future, but it does so not with rock-like indifference, but as a stakeholder. To be alive sounds like a condition at a given moment, but it cannot be contained in a moment because it is an ongoing process: being alive means *staying alive*. That means moving into a future of sufficient nutrient flows and in which one does not become another's nutrient. The future is always critical.

Even pre-sentient life enters the future actively rather than with rock-like passivity. That is, it *does something* that sustains it as it moves into the future, acting in a way that makes its future sustainable as it moves into it. This becomes more evident as organisms evolve greater potential to relate actively with their environment. As soon as prokaryotes became equipped with cilia and flagella, hair-like appendages that could be waved to propel them in one direction or another, for example, spatial separation from opportunities and dangers takes on functional significance. Being able in some way to move guided by what is at a distance amounts to a new, enhanced way of entering the future: what is *not yet here* can be attained or avoided. Being responsive to chemical gradients that diffuse progressively through air or water from various sources can move one to find lunch or avoid becoming lunch.

This path has led from hard-wired strategies for acting with regard to the *not yet here* to conscious anticipation informed by memory. Hard-wired responsiveness already reaches into the future, but remembered experience opens a new dimension of active expectation or imagination and the potential to intervene and arrange for conditions to be appropriate before the need is at hand. We shall see (ch. 3) that humans branch off from this trajectory of adaptive learning from experience to become the global masters of arranging the future to suit our desires.

And this is the evolutionary trajectory that has brought us to the Anthropocene, an epoch in which the functions of the earth itself are enmeshed with human anticipatory consciousness. We humans have reorganized the globe to better fit our imagined well-being, and now we, the most anticipatory of creatures, wait anxiously to see if our civilization has a sustainable fit with the rapidly changing conditions civilization has brought about. We who live by anticipation make our future as we move into it, so the question of this book is whether and how we can come up with a fitness that is now severely challenged.

* * * *

In this chapter we have been looking at systemic thresholds in evolution, transitions where the behaviors and potentials of the system become different. The emergence of life, eukaryotes, oxygen, multicellular life and now human life and civilization represent not just changes, but thresholds that fundamentally alter the earth system's potentials and dynamics. The history of human civilization illustrates the new potentials, but the introduction of "Anthropocene" for the present geological epoch points to an even deeper modification in the dynamics of the earth system. In what way would "Anthropos," "human," fittingly characterize not only our obvious cultural creations, but the essential character of the earth and life in these times? This is the question we take up in the next chapter.

Chapter 2. From Constraint to Control: The Emergence of the Anthropocene

We've been talking about the Stone Age but now we're living in what some scientists are calling the anthropocene. Maybe you've never heard of that word. It's a time where everything on the planet is touched by humans in some way, whether it's directly, like clear cutting forests or suppressing fires, or indirectly by the effects of climate change. Is this, as the environmentalist Bill McKibben wrote, oh, 20 years ago, is this the end of nature?

2.1 Ecosystems: Self-organization Through Mutual Constraint

Life does not just evolve, it co-evolves. That is, the other organisms in any species' environment constitute selective forces that shape it, and any species likewise participates in shaping its fellows. "Constraint" is a great descriptor for how lives are shaped and honed in continual coevolution. It comes from a Latin root that means literally "strung together." Lives are strung together with the surrounding physical features and the life activities of innumerable fellow organisms that environ every life. The string that binds is the shared participation in the task of staying alive, which for every organism means continually processing suitable flows of energy and nutrition and navigating challenges from the surrounding world. So life is inherently open and relational, every organism strung together with everything in its sustaining and challenging environs in a dance that mandates and continually hones mutual fit.

The web of co-evolving mutual constraint works in numerous ways. The food web is the most obvious. The basic concept of the food web is based upon who eats whom in an ecosystem. At the base are plants that make their own nutrients from inorganic materials using the energy of the sun. Then the herbivores eat the plants, carnivores eat the herbivores, and various sorts of decomposers break down the complex leftovers back into mineral nutrients. Available nutrients constrain and shape those that live off them, as when the character of grasslands determine how many herbivores of what sizes can make a living in a given area, or the availability of prey constrains what kind of predators can be sustained.

This simple model becomes more complex as soon as you start to consider the various constraint mechanisms more closely. For example, herbivores not only eat vegetation, they depend on it for cover from predators, best achieved if they can blend in or hide. So vegetation not only feeds them, it helps determine their coloring, shape, and general

¹⁶ Science Friday, "Saving Wild Places in the Anthropocene," Sept 27, 2013, <http://www.npr.org/2013/09/27/226837805/saving-wild-places-in-the-anthropocene>, retrieved 2/27/2016.

lifestyle. Herbivores that multiply so successfully that they eat up vegetation faster than it can grow back set themselves up for a crash, so both they and the vegetation depend on a certain rate of predation success. Rabbits are proverbial breeders because their reproduction rate must balance the high rate at which they are consumed. Remove the predation, as when they were introduced to Australia, and they become a disaster for vegetation. And different sorts of vegetation determine different sorts of predators: hawks and eagles do not haunt dense undergrowth, but foxes and badgers might flourish. The web of dependencies and interdependencies expands with every topic one examines. Timing of reproduction, for example, is an interlocked strategic dance of supply and demand as progeny both demand nutrition and provide ready targets for the nutrition of others.

Every strategy for one kind of flourishing gets bounded and shaped by interface with other strategies for which the flourishing represents an opportunity. Constraints imposed by others become internalized in an organism's structures and strategies for making its living. The drive to make as good and long a living as possible and to reproduce as successfully as possible is inherent in the very self-maintaining dynamic which makes something alive in the first place. But that drive is always incarnated in a particular organism with a structure and strategy reflecting the constraints of making that living in a particular environment. That is, the fit of organisms with their environment is produced through the necessity of their interface with the surrounding system.

This means that if they arise and live together for any length of time, organisms will self-organize by natural selection to a mutually constraining/sustaining fit with each other. This is the self-organizing dynamic of eco-systems. Such a system will necessarily have variability but also a resilient overall balance in which members make as good a living as possible together. We have learned through our mistaken efforts at improving such evolved systems that, when possible, it is best to leave them to function as they are. So now the term "introduced species" is synonymous with "problem," and every fire season in California we hear laments of how old policies of stamping out fires indiscriminately have stuffed the hills and valleys with kindling and transformed once natural, system-clearing fire into a destructive monster.

Against this backdrop, the term "natural" has taken on a strongly normative aura. "Natural" means the reliable way things function when

we humans do not mess with them, and it has become the label of choice to market all sorts of products. The reality is that there is nothing magical or absolutely normative about such co-evolved systems, except that we now recognize that whatever is there is there because it somehow works and probably somehow helps other things work in the ecosystem. Our overconfident engineering management is appropriately chastened, though the exercise of a controlling, bettering hand is such a strong human instinct that restraint comes with difficulty.

2.1.1 Are Humans Natural?

Our use of the terms “nature” and “natural” has become complex. We value wilderness as natural. But tourist-infested national parks are favorite ways for us to getaway into “nature.” “Natural” foods don’t get into packages in the store all by themselves, nor is it likely that they planted and maintained themselves without human assistance. “Natural” dietary supplements have not coevolved with our diets and they come in pills and potions that certainly bear the mark of the human hand. And even pristine wilderness is generally such only because we have marked out areas and legislated that they will be left as they are. In general we intend the term “natural” to mark some difference from what is the product of human hands, human interventions, the work of the human mind. But we have to settle for these many degrees of relativity, because it is now hard to find anything on earth that is truly untouched by the managerial reach of the human hand.

And the reverse is also true. With some right, and often a certain indignation, we may query, “So, what is unnatural about us? Don’t we belong on earth as much as anything else?” Competing and contentious agendas take this question in very different directions. One is the voice of secular rationalists arguing that traditional religious notions that attribute to humans a special supernatural spiritual dimension that separates us from the “merely natural” world are now superseded by science. We must make our peace with the evidence that we have naturally evolved part and parcel with the rest of the community of life. But those with this take on human “naturalness” also often urge things like legal constraints on how we turn a profit from the “natural” world. The opposition seizes on this as an inconsistency. If we’re “natural,” we ought to be able to compete in making a living just like everything else competes. You don’t see animals restraining themselves, so why impose all these restrictions on ourselves. This is especially the argument when

some human benefit conflicts with a “natural” interest, such as logging to support my family versus maintaining habitat for spotted owls.

So, on the one hand we seem to be, along with everything else, products of the natural world and its processes, and on the other “nature” or “natural” seems to refer to everything but what is touched by the human hand. Actually, we need both of these usages. If we miss that we participate in the evolutionary probe into the potentials of what can work, we may easily go along with the common view the natural world is just our stage set, a place we have been dropped in to manage. This obscures the really interesting question we pursue in regard to the Anthropocene: how did we ever get peeled off from the rest of the system into this “management” roll in the first place, and what does it mean for the natural system that it has somehow done this to itself by giving rise to us?

On the other hand, if we insist on our naturalness, we may underestimate the obvious and important fact of our difference: somehow the human world (we will call it “culture”) is seriously different from the natural world and it is urgent to attend to the problematic systemic interface of these two worlds. Why is our role as managers so plausible, and why has carrying it out become so problematic that we now worry about the viability (sustainability) of the whole project?

2.2 Language and the Power of Narrative

We have seen that the emergence of agriculture marks a kind of threshold: it enabled a new form and scale of human social organization that in just a few thousand years has brought us the perilous present. But the basic homo sapiens package was not much different in the 94% of our years spent as hunter-gatherers than it is in our 6% civilized period. What is it about us that propelled such a different trajectory when we started farming and settled down to accumulating property and differentiating skills, status, and power?

Many observers would point to the emergence of language as the transforming human capacity. It is language, after all, that allows us to immediately share with the whole community whatever experience proves useful and to accumulate the fruits of learning over generations. The learning of most creatures is tightly linked to experience. Human learning is often tied to experience, but it also enjoys unique latitude. We not only imaginatively combine and recombine experiences—something

some animals likewise are able to do—but we can also add to the mix things never experienced such as souls, zombies, or the idea of infinity. This difference takes a bit of explaining, but it's worth understanding because it is about as close as we're likely to get to the root of the extraordinary trajectory we've been on since we switched to agriculture.

2.2.1 Associative Learning

Animals communicate in many ways, and when they use sounds we often call it language. If only we could understand the languages of birds or coyotes, crows or baboons! Actually, through close observation we can learn a lot about the calls, twitters, and other signals that fly around in the non-human world. The way we learn their signals is by observing the association of the occurrence of a sound with some action, event, or something going on. Chimps make a gleeful sound human observers and also other chimps associate with the discovery of food. They make a quite different sound if what is discovered is a cheetah or similar prowling threat, and yet another if it is a snake and still another for aerial threats such as hawks. In a manner similar to associating smoke with fire, particular sounds may be learned as associated with actions, dangers, opportunities etc. We tap in to this associative ability when we teach our dog to respond appropriately to commands like “sit” or “fetch.” Couple the sound with some reward to indicate a “correct” response, and with a few repetitions (or many) the association is in place.

This kind of associative learning is quite powerful. It works not just for sounds, but for all sorts of experiences, linking times, situations, facial expressions or body postures with various sorts of outcomes, emotional states or whatever else may be important in a creature's mode of life. Such learning shapes the conscious expectations which inform and guide the way creatures move into the future. The predator crouching in cover near the deer trail may know from experience deer often come this way at this time of day, or maybe just that this is the kind of trail deer use, and the deer for their part will be alert and spooky if they have experience that leads them to expect a predator might be around.

2.2.2. Symbolization and Open-ended Possibility

Humans do all of this, but we also move our communication up to the level of symbolic language, which is quite different. The critical question is how sounds (or any other signs or signals) get their meaning. One

way, discussed above, is by association with some element of experience, as when the dog learns the sound “sit” means it is time to put his bottom on the ground. But words are not just sound, they are symbols. They get their meaning not just from the experiential world, to which they may indeed refer, but from their placement with other words. That is, the word gets its meaning from association in a syntactical pattern with other words. Your dog, with training, might associate “run” with galloping off. A human would need other words to determine meaning: run out of money, score a run, run off, a run in a stocking, run to the store, run the corporation, run for office, run up a bill, run out of town. Words may just be grammatical operators or connectors with other words: in the above example of “run,” what is the experiential association of “a,” “off,” “to,” “the,” “for,” “up,” and “out”? Words mean different things in different contexts, and the essential context is that of other words, not the immediate situation. This means it is perfectly possible for language to have nothing to do with the immediate context: one can sit at a baseball game and discuss the desirability of “a run” for office rather than a run for the home team.

Words take their meaning from their place in an interwoven context of other words, and that interwoven context can be expanded. Thus we have not only short utterances, but complex sentences, paragraphs, and narratives or stories of varying length and complexity. And the stories need not be about anything experienced or that could be experienced. This is the incredible freedom of the symbolic language-wielding consciousness compared to the forms of conscious constrained to constructing associations from experience.

Conscious creatures use imagination to probe and arrange the future, but as a projection of remembered experience and its associations, the range and flexibility of such imagination remains relatively closely bound to real life circumstances. Raccoons, for example, as they hunt, are certainly imagining possible food. And by association they can extend what they have found to be successful techniques to new situations, as in the transfer of their searching strategies from wild streams to urban garbage cans. Insofar as such imaginative guidance is tightly tied to experience, it is on a short feedback loop of reinforcement by success or failure, continually shaped and reshaped as it is constrained by the environment to which it responsively adapts behavior. The flexible adaptivity made possible by the evolution of such abilities still lies comfortably within the dynamics of selection for fit by which ecosystems self-organize.

All bets are off, however, when symbolic language allows imagination formed by narrative stories to become a major way of dealing with the future. Narrative stories are a uniquely powerful and new way of imagining and entering the future. Some stories we tell just for entertainment: “tell us a story,” is a demand that arises as soon as our children learn to speak. But the constant verbal chatter in our minds is also constantly weaving narrative scenarios laying out the potentials of the future, be it the next moments, days, weeks, or years. Every decision we make is between alternative stories about the future, and our strategies are interwoven with implicit or explicit stories about how situations may unfold.

In the realm of immediate experience, we often function from the wordless resource of habituated response triggered by associated experience: I don’t have any inner conversation about reaching for my coffee cup as I write this, and the association with past events of spilling it into the keyboard makes my reach a little more careful. But expand that a little further with any sort of question, and I’m into language: “Should I really have a cup full of liquid there on the desk?” Experience guides me into the future, but narratives about what might happen, could happen, might be avoided, what I want or do not want, lay the future open to my manipulation in a new way. The familiar observation that “people get what they deserve,” while a great oversimplification, recognizes the way we expect to arrange the future as we move into it—an incredible ability, but so commonplace we regard it as a basic responsibility.

If fitting into the ecosystem within which we make a living is a kind of sustainability Garden of Eden, what got us kicked out of the garden is ultimately our evolving the capacity for symbolic language.¹⁷ The self-organizing dynamics of an ecosystem depend upon the formative network of mutual constraint, where the self-maximizing dynamic of every species is conditioned by the imperative to fit with others in an interdependent system. However the language-mediated ability to freely imagine alternatives and manipulate the future to maximize our desires potentially undermines the effectiveness of mutualistic constraints.

¹⁷ For an excellent account of the distinctive character and challenges of symbols and the coevolution of human brain with using symbolic communication, see Deacon, Terrence W. *The Symbolic Species: The Co-evolution of Language and the Brain* (NY: W. W. Norton & Company, 1997).

Show us humans a constraint, and we are more likely to regard it as a challenge than a guideline. Evolved to tread solid ground, we have not let rivers, oceans, snowy mountains or even the force of gravity constrain our movement. Once we filled a middle position in the food chain, but what predators now get away with making a living by consuming humans? The habitats we once shared with other predators and prey are refashioned into vineyards to give us wine. Except in a recreational context, we no longer even use the quasi-egalitarian language of hunter and prey: for serious sources of nutrition, be they animal, plant, fish, or fowl, we no longer “hunt,” we “harvest.” We remain supremely adaptive to circumstances, but we have become the creative agents fashioning those circumstances to such an extent that we now distinguish the human world as “culture” or “society,” recognizing that it is systemically quite different from the given world of “nature.”

Such unconstraint has been the hallmark of humans. We look at finding hand axes from 2.8 million years ago as a mark of the arrival of humans because we immediately identify reworking a natural object into a tool as a mark of the typically human. But the qualification above, that our freedom to imagine alternatives and manipulate the future, only “*potentially*” undermines the mutualistic constraints of eco-systemic nature, recognizes that this departure from nature has been a long process of many degrees marked by numerous crossed thresholds.

2.3 Becoming Managers of Nature

Once upon a time, not a time in living memory but in geologic time, humans indeed had a place in and a fit with the world of nature. By this I mean that we were part of the self-organizing system of mutual constraint that is the general condition for evolving life on earth.

2.3.1 The First 99.5% of Human Life

The human line emerged among primates in Africa, diverging from our nearest relatives, the chimps, some 7.5 million years ago. Proto-humans distinguished themselves from the chimps over the course of the next 5 million years mainly by gradual anatomical changes rather than by lifestyle. The first of the genus distinguished as human (*homo*), *homo habilis*, “handyman,” is named for his/her association with the earliest appearance of stone tools about 2.8 million years ago. *Homo habilis* finally took the anatomical change in the direction we feel is especially

ours, a brain slightly larger than the chimps, about 600 cubic centimeters (ccm). Within a million years *homo erectus*, who perfected our lower-back-pain inducing upright stance, jumped that up to 1,000 ccm. Our cousins the Neanderthals maxed out the big-brain trajectory at an average of 1600 ccm., though we *homo sapiens* seem to be able to do just about everything imaginable with 1400 ccm.

The Paleolithic (Old Stone Age) covers the timespan from the earliest stone tool-making humans, about 2.8 million years ago, down to the last 12,000 years. We tend to assume everything really interesting has happened in those last 12,000 years, so it is good to reflect that this represents only about one-half of one percent of human time on earth. What were we doing for the other 99.5% of our (unwritten) history?

The first wave of early humans (*homo erectus*) emigrated from Africa about 2 million years ago and gradually spread throughout Eurasia. They may already have crossed the language threshold, a factor that was, as shall be discussed later, to have immense consequences for the development of the young genus. Some of them may have gained control of fire within another 4 or 5 hundred thousand years, and this crucial human technology was in general use by about 400,000 years ago. So when the *Homo Sapiens* branch of the family finally emerged among the stay-behinds in Africa about 200,000 years ago, we can imagine them organized in small bands and sitting chatting with lifelong companions over a cooking fire. About 75,000 years ago they too ventured out of Africa, joining and eventually replacing the various human species that had earlier emigrated to Eurasia and also spreading to lands that had known no humans, including Australia (c. 55,000 years ago) and finally into the Americas (c. 15,000 years ago).

Humans invented obsidian tipped javelins, the first serious projectile weapons, as much as 280,000 years ago.¹⁸ So such weapons may have been an established technology well before the emergence of *homo sapiens* some 80,000 years later. Spear throwers, which greatly increased the range and force of these projectiles, emerged perhaps

¹⁸ "Oldest Javelins Predate Modern Humans, Raise Questions on Evolution," by Charles Q. Choi, for *National Geographic*, November 27, 2013, <https://news.nationalgeographic.com/news/2013/11/131126-oldest-javelins-stone-weapons-projectiles-human-evolution-science>, retrived 1/23/2016.

30,000 years ago, and the bow and arrow came even later, becoming widespread towards the dawn of the Mesolithic, about 15,000 years ago.

The last 75,000 years of homo sapiens history shows a species on the move, both literally and figuratively. First they spread from Africa onto the Arabian peninsula, and then throughout Eurasia. Stone artifacts became more sophisticated. Cave art appears from at least 35,000 years ago and projectile hunting, and perhaps warfare, took a leap with the invention of bows and arrows. More disturbing, in the wake of the arrival of homo sapiens, other human species became extinct, as did the large animals when homo sapiens became the first humans to arrive in Australia and the Americas.

There is an extensive literature speculating on the cause of these extinctions. Homo sapiens then and now were similar: change the clothes and our paleolithic ancestors could pass through airport security without raising an eyebrow. Thus we are quick to think of aggression, warfare, and overhunting, all operating on the platform of our big brains, as probable reasons. The picture is not clear however, since ice ages and other major climate shifts can also explain extinctions, or at least mitigate human responsibility to the role of just another contributing cause.¹⁹ And we seem to have overlapped with Neanderthals in the same region for thousands of years. Since it turns out that 1-4% of our DNA is from Neanderthals, relations must have been more complex than just hostility and war.

For all that, right up to the edge of the Neolithic, even with our distinctive abilities, we were still just one species among many, and we probably thought of ourselves that way. Yes, we were predators, but for the most part still ensconced in the middle of the food chain, predators to some, lunch to others. Any living organism must fit the environment within which it makes a living, and the flow of nutrition is key. Throughout the Paleolithic, from 2.8 million years ago, humans got their food by hunting and gathering, living off what the land offered in terms of meat and

¹⁹ See for example, Megafauna extinction: DNA evidence pins blame on climate change, By Michael Slezak, New Scientist, July 23, 2015, <https://www.newscientist.com/article/dn27952-megafauna-extinction-dna-evidence-pins-blame-on-climate-change/>, retrieved 1/25/2016. See Wikipedia, Megafauna, <https://en.wikipedia.org/wiki/Megafauna>, for discussion and timeline correlating extinctions and arrival of human populations.

vegetation. Living off the land is to live within the constraints of the land. That is, the land, the environs, determines sustainable population densities, place and timing of habitation, modes of organization.

So even with language, fire, cooked food, social organization and significant weaponry, for most of the paleolithic the human footprint is very light. We used fire as a technology to alter landscapes in order to attract game or encourage desirable vegetation, and we became sophisticated at identifying, processing, and preserving a wide range of food sources.²⁰ But at the end of the period the entire human population of the globe was probably only about 2 million, still constrained, as other species, by the basic carrying capacity of the environment. We know, with the accuracy afforded by hindsight, the earth-altering potential of the abilities for language, social organization and the technology just mentioned, but for 99.5% of human life on earth, while they made a difference in the tiny human population, there was little to indicate what could and did happen in the geological eyeblink of the next 12,000 years.

2.3.2 The Next .5% of Human Life

Over their 2.8 million years of evolution, humans may have become endowed with mounting and distinctive abilities in communication, organization, technology, and strategic planning. But the earth-transforming potential latent in these abilities is highly dependent on organization and scale, and that in turn depends (or interdepends) on how they were making a living. Small nomadic bands, with probably under 100 or so members comprised of a few extended families, form an effective unit for living off the land. Small bands of soft bodied, relatively weak predators running around with pointed sticks and lighting fires did not constitute a huge realignment in the dynamic mutualism of the ecosystems to which they belonged.

Projectile weapons and flexible, coordinated strategy made humans more dangerous predators than the ordinary calculus of sharpness of tooth and claw and musculature for speed and spring would indicate, but humans were still constrained to a relatively balanced eco-systemic

²⁰ On early human use of fire and other technologies, see Scott, James C.. *Against the Grain: A Deep History of the Earliest States* . (New Haven: Yale University Press. 2017) ch. 1.

playing field. Even with the use of fire, the cost their hunting and gathering economy imposed on the environment did not significantly differ in scale or kind from that of other creatures. That is, their way of making a living was still, like other creatures, basically a matter of taking in what the earth produced, a dependence on and constraint by the general conditions of the environment that, in spite of their superior manipulative abilities, still encompassed them within the general organizational parameters of the natural world.

But we are now not natural, at least not in the sense of being participants in an ecosystem organized by mutual constraint. We crossed a threshold into an era where the world that made us has been transformed into a world which we make. The dynamics of the Anthropocene represent an unprecedented shift, a new role for humans and a new behavior of the globe. The Neolithic Revolution which set us on the path to this transformation, occurred at the end of the last glaciation or ice age, about 12,000 years ago.

2.3.2.1 The Neolithic Revolution

Before digging further into the nature of this transformation, let's pause a moment to adjust our perspective. In our ordinary perspective, 12,000 years is a long time: it takes us back as much as 5 or 6 thousand years before the dawn of civilization brought recorded human history. But we have introduced the 3.8 billion year evolution of life as a framework precisely in order to understand and highlight the magnitude, the unprecedented nature and the suddenness of what might be called the Great Transformation that burst upon the scene a mere 12 thousandths-of-a-thousandth of a billion years ago. If we had a ruler a mile long representing just 1 billion years, that 12 thousand years would be just the last $\frac{3}{4}$ of an inch (actually .76). If we made that mile-long ruler represent the approximately 550 million years of multicellular life on earth, our 12,000 years would still come out to less than 1½ inches. It took blue-green algae about 200 million years to transform the atmosphere with oxygen and bring on snowball earth. The great Permian Extinction unfolded over about 50 thousand years, and recovery may have taken some 10 million. As threshold events bringing major shifts in the parameters or dynamics of the community of life on earth go, about the only thing as sudden as our 12,000 year transformation is the meteor event that wiped out the dinosaurs. What happened to make homo sapiens a meteor-like impact?

2.3.2.2 From Hunting and Gathering to Agriculture

About 12,000 years ago, after 94% of homo sapiens 200,000 years on earth (or 99.5% of the human genus on earth), homo sapiens hit on domesticating plants and animals as a way of making a living, and the rest, as they say, is history. We are fascinated by the Neolithic because it is the threshold we cross to human civilization. The conventional impression interprets that as meaning we crossed over from lives of perilous scrabbling for the next uncertain meal to the more certain control and production of our own sustenance, with the great added advantages that come with sedentism, being able to settle down in one place and accumulate all the good things in life.

Actually the story is quite a bit more complex. There has been a drastic revision to the conventional view of agriculture as a liberation from the continual stress and uncertainty of hand-to-mouth hunting and gathering subsistence economies. Anthropologist Marshal Sahlins's landmark 1972 book, *Stone Age Economics*,²¹ introduces what has now become a widely shared perspective. In the first chapter, tellingly entitled, "The Original Affluent Society," he observes:

In the non-subsistence sphere, the people's wants are generally easily satisfied. Such "material plenty" depends partly upon the simplicity of technology and democracy of property. Products are homespun: of stone, bone, wood, skin-materials such as "lay in abundance around them". As a rule, neither extraction of the raw material nor its working up take strenuous effort. Access to natural resources is typically direct- "free for anyone to take"- even as possession of the necessary tools is general and knowledge of the required skills common. The division of labour is likewise simple, predominantly a division of labour by sex. Add in the liberal customs of sharing, for which hunters are properly famous, and all the people can usually participate in the going prosperity, such as it is.²²

²¹ Marshal Sahlins , *Stone Age Economics* (Chicago and NY: Aldine- Atherton, Inc., 1972. Available online, <https://libcom.org/files/Sahlins%20-%20Stone%20Age%20Economics.pdf>, retrieved 7/26/18.

²² Sahlins, *Stone Age Economics*, pp. 10-11.

Compared to the relatively leisurely life of hunter-gatherers, agriculture is hard and demanding work. It has been calculated that about 3 hours a day will suffice to provide sufficient food for hunters and gatherers in a reasonably good environment. If you make a living by hunting and gathering, plants and animals grow for free but you have to search them out. Of necessity this is an economy of diminishing returns in any given location, as initial easy success is balanced by increasing depletion. The solution is to pack up and move, so living light is a virtue and any accumulation beyond the minimum is literally a drag. So acquisitiveness is out, simple living in, and the means to do it abundant and free. This leaves ample time for gossiping, doing elaborate preparations for rituals, or just sleeping during the day like ordinary mammals.

Our Neolithic forebears did not exactly leap at the chance to adapt an urban way of life. The rise of Sumerian civilization about 7,500 years ago follows some 4 thousand years after the introduction of agriculture. The agricultural potential for relatively permanent settlement marks a critical difference from the millions of years in which humans made their livings by hunting and gathering. But the transition to city-state civilization was gradual, mediated by settled but small and easily-disbanded villages subsisting on a mix of light agriculture, seasonal hunting of migrating game, and gathering plants, shellfish and fish from the rich alluvial wetlands of the Tigris-Euphrates delta.

That pause of 4 thousand years before civilization takes hold may be less a mystery than the fact that it took hold at all. Why, one may wonder, would people trade in the comforts of shared work and sustenance in small egalitarian communities for the complex demands of urban societies founded on the implicit violence of extraction of food from those who produce it? And it even turns out that the agricultural diet and lifestyle was less healthy. Under the new agricultural regime stature declined, maladies increased, and teeth got worse.²³ It was not till the 20th century that we regained our paleolithic body height.

2.3.2.4 From Agriculture to Civilization

The story of agriculture and civilization we have long been told seems self-evident in its basic proposition: agriculture allowed humans to settle

²³ James C Scott. *Against the Grain: A Deep History of the Earliest States*, p. 85.

in one place and produce a surplus of food that could support the emergence of non-agricultural specializations, the variety of artisans, laborers, priests and scribes who reside within city walls rather than in the rural farmhouses. While the linkage so-described is not untrue, the picture is misleading.

This simplified picture gives the impression that producing a surplus of food to support a non-farming population is just part of the nature of agricultural production. In ideal conditions such as the Tigris and Euphrates delta in the early Neolithic, subsistence agriculture meant throwing seeds on flood-retreat soil refreshed and prepared by the annual water cycle. Supplemented by gathering shellfish and hunting migrating game, this allowed a not too-arduous lifestyle for a shifting array of more-or-less settled villages. While this set the stage for the emergence of city-states, city-states represent an altogether different proposition, a more difficult way of life probably forced on people by climate change. Initially, more arid conditions forced populations to greater concentration near declining water sources and agriculture came to require more intensive cultivation and irrigation. As James Scott describes it, the scene is ripe for the emergence of a city-state:

The dense concentration of grain and manpower on the only soils capable of sustaining them in such numbers—alluvial or loess soils—maximized the possibilities of appropriation, stratification, and inequality. The state form colonizes this nucleus as its productive base, scales it up, intensifies it, and occasionally adds infrastructure—such as canals for transport and irrigation—in the interest of fattening and protecting the goose that lays the golden eggs. In terms used earlier, one can think of these forms of intensification as elite niche-construction: modifying the landscape and ecology so as to enrich the productivity of its habitat.²⁴

“Civis,” the Latin word for the citizen of a city-state, is the etymological root of “civilization.” One notes, however, that “appropriation, stratification, and inequality,” are not exactly a ringing celebration of the arrival of civilization. The social stratification and inequality derive directly from the appropriation not just of goods, but most basically of labor. The new, civilized, form of human organization necessarily

²⁴ Scott, James C.. *Against the Grain: A Deep History of the Earliest States*, p. 122.

involves taxing/taking-over the “surplus” fruits of the laborers to support a diversified, stratified, and unequal urban life-style. Since urban society requires the excess productivity of a sizeable pool of labor, at its base we find slavery or similarly coerced forms of labor.

We could go on from here to consider the deeper systemic roots of what Marx described as the capitalist alienation of labor, its transformation from producing one’s own well-being into a process that creates and supports a power that controls it. But for the purposes of understanding the Anthropocene, we should attend to a broader and parallel alienation, one in which the earth now supports a human society that has become a kind of alien power over it.

In hunting and gathering, or even in village subsistence agriculture, the plants and animals that sustained humans were primarily produced by the earth, secondarily reaped by human effort. That is, human needs and well-being were met and shaped within the constraints of the self-organized world of nature. But urbanization crossed a threshold, turning the burden of production over to human populations. The settled populace of cities must henceforth be sustained by a major input of calculated and mandatory human labor, reworking the world with an extractive mission to control and enhance flows into the human-designed environment of the city.

Becoming civilized, populations for the first time became organized as members of what we now call states. The walls and stone architecture of the monumental center of a city-state already bespeak a new-found lifestyle of weighty accumulation. But as we scale up from the easy egalitarian structure of small villages to a complex community of differentiated roles, privileges, and possessions, we need supporting social construction to tell us who’s who and what’s what. Ownership, for example, assumes new importance as the acquisition of goods is tied in to social status and political power. But ownership means nothing unless it is publicly recognized, backed up by laws of transfer and inheritance, and enforced by an organized governance structure.

The underlying question, as society becomes thus differentiated and complex, is who gets to tell whom what to do, and why? Or, looking past role differentiation to the sustaining flows of civilized organization, the question might be put, who gets to collect (tax) the “surplus” production of whose labor, and why? The “why” is critical in either case. Government oversees such matters, but it must be legitimated, accepted as right, if it is to amount to anything more stable than a constantly churning power struggle.

The most effective answer to the political question is to take it out of arbitrary human hands. Thus government and religious organization have from the beginning of civilization been joined at the hip: The early Sumerian city states were theocracies, ruled by a priestly elite who even lived in temple precincts. The ploy of ruling at the behest of, or in the name of, or with special guidance from divine sources has been replicated in one form or another across civilizations and down through history until the divine right monarchies of Europe finally gave way to secular governments in the 19th century.

2.3.3 Emergence of the Civilized Controlling Mind

Religion's role in legitimizing government and social norms is an aspect of its larger capacity to mediate a shared understanding of the world and what we are doing here. As the story that discloses the meaning of our existence in the web of all existence, religious narrative offers a window on the deepest assumptions about ourselves and the world that guide the way we live. That story takes many forms at any given time, but broad similarities mark the various strata of human experience, exposing the reshaping of the inner mind-and-hearts that has accompanied the evolution of ways of organizing and maintaining our lives.

Anthropological studies of indigenous peoples offer our best access to the world of hunter-gatherers, the world as perceived before we settled down to civilization. The common thread in the varied fabric of tribal religious life might be animism. Animism has been broadly defined as the view that animals, plants, maybe even rocks and rivers possess a spiritual essence. It is difficult for us to imagine how you might think of a rock as a person; we are literally a world removed from such experience. Perhaps a more useful understanding is that these peoples have not separated themselves out as unique and different from all the other creatures that populate their ecosystem. They regard themselves as equal members of the broad community of life, with life itself a unifying spiritual power manifest in the earth's many forms and creatures. If one of life's necessities included eating their fellow community members, it should be framed with rituals of permission, thanks, and appeasement. These animist communities understood the giving, taking, and consumption of life as a difficult and dangerous sacrament, not a simple act of mastery.

As agricultural and pastoral modes of life finally replaced hunting and gathering, human attention shifted to the mystery of fertility. Fertility is similar to the animistic essence of life insofar as it is a force running through the earth and all living bodies, including our own. But focus shifts to the annual cycle of crops, with perhaps a fertilizing sky god paired with a receptive and fertile earth, or stories of a deity who dies and goes into the earth only to be born anew each spring. Now it is the plowing of the earth and the planting of seeds that should be surrounded with the proper ritual, and human sexuality can ritually participate in and call forth the force that produced from the earth a new cycle of crops. The Hebrew Bible is full of passages that berate Israel's farmers going off to alien fertility cults on the "high places," and remnants of fertility ritual remain in the icons of spring festivals such as maypoles or Easter eggs hidden in fields. Mother Earth still evokes a spontaneous reverence in anyone who ponders the phenomenon of the annual renewal of life and gives thanks for the harvest.

Both animism and fertility religion place humans in continuity with the earth and its manifold manifestations of life. But civilization means organizing into city states, and that brought with it a new way of understanding the world. Fertility long held sway in the agricultural sector, but fertility could not capture the lives and concerns of an urban populace. The new forces deemed to organize the earth bear a clear civilized stamp: now arranged hierarchically like the populace, they lead in war, give commands and laws, and may be concerned with matters such as just administration. Some religious traditions forbid representation of the ultimate power, but almost everywhere where there is representation, the divine now has two legs and the distinctive manipulating hands of humans. The language and concepts of kingship enter religious discourse, with a divine ruler presiding as a commanding presence rewarding obedience, submission, and fidelity.

Sometimes, as in Egypt or Rome, human rulers are divinized, and lacking that, rulers are almost always the focal human interface with the divine, so human legislation channels and reflects the divine will. This is the source of the "God-fearing and law-abiding citizen" of happy memory.

As mentioned above, this function of legitimating humanly created social structure as the normative way of the world is a corollary of religious narrative as the disclosure of the meaningful structure of our existence. But the focus on human society is more than incidental: the rise of civilization is the watershed separation that yields the bipartite world of

nature and human society. Where animism and fertility religion see a continuity, more civilized religion assumes a distinction. The complex human social construction of civilization renders other world processes distinct and subsidiary. They are now merely “natural,” and nature needs no particular divine attention except in those respects that affect humans, such as timely rains and bountiful crops. Religion has always given narrative-creating humans their over-arching story, and now those stories take a decidedly anthropocentric turn.

These emergent forms of religious understanding of self and world may overlay one another even as the dominance of one is supplanted by another. Like climate change, these transitions in our mental weather lack crisp borders but nonetheless shade into prevalent conditions over time. With the emergence of city states and their expansion into empires, human control and power became common reference points in our thinking about what makes and shapes the way things are. But for the better part of the next two thousand years of civilization, the tendency was to project control and power to the divine and then borrow it back again, our exercise of control and power being sanctioned and even constrained by the divine.

With the Industrial Revolution in 18th century England humans finally took control and power directly into their own hands: as Benjamin Franklin famously observed, “God helps those who help themselves.” The industrial reconceptualization of human agency originated in Europe, but with suitable variation it impressed itself around the world as the industry-based military superiority of the West made itself felt throughout a colonized world. Our religious narratives remain, but they have been increasingly subsumed by a shared secular narrative in which we humans become the controlling agency of the world. The first version of the story was a vision of rational, science-based control progressively transforming both the natural and social worlds to maximize human well-being. This vision of progress is now challenged by an alternative in which the effect of our agency is indeed world-transforming, but on a different and highly questionable trajectory.

Chapter 3. The Industrial Revolution

Science and the Industrial Revolution have given humankind superhuman powers and practically limitless energy. The social order has been completely transformed, as have politics, daily life and human psychology. But are we happier?

Yuval Noah Harari

The locus of all that we associate with civilization—government, political power, education, technological innovation, art, literature etc.—is urban, so it is rather a shock to realize that actual urban life remained a very limited phenomenon for thousands of years after the rise of civilization. As late as 1800 only about 3% of the human population lived in cities.²⁵ The origin of civilization put us on the long path of an open-ended extractive production of the flows necessary to support settled urban populations. But as long as production was largely constrained to the energy available through human and animal muscle power, the reach of our transformative control was limited and large-scale urban development was constrained. The Industrial Revolution changed all that, introducing a new kind of positive feedback between the growth of urban population and the extraction of resources to sustain them. Factory jobs swelled the population of cities and mechanization enabled a vast network of transportation to feed their ever-growing appetite for energy, material, and food.

3.1 The Ascent and Chastening of Control

The Industrial Revolution was a revolution in our ways and means of making a living, and it was likewise a revolution in our understanding of ourselves and the world. From the 18th century the revolution was embodied in the vision of Progress, a natural and social world to be made steadily more amenable to human preferences by the advance of science and secular rationality. A western tradition which had seen the world as a divinely sanctioned testing ground now shifted to a materialistic pragmatism: nature is there to be conquered, controlled, and rendered tame to our desires. With the emergence of civilization the world had already been divided into human culture and nature. The two had always been uneasy bedfellows, and a good number of civilizations have fallen due to environmental degradation.²⁶ But with the science and

²⁵ <https://www.theguardian.com/cities/2016/jun/27/rise-fall-great-world-cities-5700-years-urbanisation-mapped>, retrieved 10/29/18.

²⁶ For a history and analysis of management and mismanagement, see Jared Diamond's book, *Collapse: How Societies Choose to Fail or Succeed* (NY: The Penguin Group. 2005).

technology of a now industrial culture at their disposal, the time seemed ripe for the human conquest of the natural world.

We are not done yet with this, but after 250 years of astonishing scientific and technological advance, the idea of progress is being called into question by many. Most obviously, our societies have not become the happy rational secular communities of equality, liberty, and justice anticipated in the narratives that came out of the Enlightenment era. At first glance, the part of the vision that has more or less worked is the technological conquest of natural obstacles to maximizing human well-being. The most fundamental natural constraint, that of space and time, has been largely conquered by our advances in transportation and technology. Health, comfort, convenience, and consumption seem more in our control than ever before. If poverty, hunger, and disease prevail in less fortunate societies, it is nonetheless clear that we have the means to overcome them if we could just get our act together.²⁷

True as that might be, the optimistic vision that supported our crusade to conquer nature has dissipated. Just try doing an internet search on “conquest of nature,” or “war on nature.” In the 1950s those were acceptable terms, ways of introducing the question of how our progress was doing—much as we still check to see how we are doing in our war on cancer, war on drugs, war on teen pregnancy etc. Now when you search the many writings and images related to our war with or conquest of nature, they deal not with the forward human march, but with fundamental human mistakes and the question of whether and how we can rectify them.

The difference, of course, is the half-century of environmental awareness that has penetrated media, politics, and science. The fruits of our conquest have become evident in toxic air and water, depleted soils, dead zones at river mouths, a warming climate, the Sixth Mass Extinction, and other dysfunctions too numerous and disheartening to list. As a bright, adaptive species, we have studied the mess and made great progress in understanding in each case both the cause of the problems and as well the self-organized functionality of natural systems

²⁷ For a compelling defense making the case that the Enlightenment vision has and will work, see Harvard psychologist Steven Pinker’s 2018 book, *Enlightenment Now: The Case for Reason, Science, Humanism, and Progress* (NY: Viking Press).

we so confidently reengineered or disrupted. If only nature had a reset button!

On one level, we have changed our minds and hearts, while on another we look with a certain helplessness at the prospect of reining in the vast, commercialized enterprise we have fabricated in the hopes a subjugated nature would deliver the maximal consumption we now identify with human well-being. This is a moment of great uneasiness in the human trajectory as we struggle like addicts with attractions that do not lose their power just because we see they may be our ruin.

Having been under the influence of a celebratory control mentality for about 250 years, we seem now to have turned a corner. The control mentality has by no means disappeared: engineering has steadily advanced from waterways and dams to the frontiers of life science. Bio-engineering and genetic engineering in particular are hot areas, magnets attracting graduate students and venture capitalists alike. But even as our engineering hand pries open the secrets of life, an advance that would have been hailed with unalloyed self-congratulation in the 1950s is greeted now with public misgiving, as evident in the European restrictions on the import and sale of GMO foods, or the similar battles in the US over labelling them as such. Smart marketers have found it pays extra if they can affix prominent labels to their food products guaranteeing they are “natural,” “organic,” and “free of any GMO content.” We no longer identify it as progress when engineers drain wetlands to erect buildings or grow sugarcane. And we question whether it is for the benefit of humanity or for the corporate bottom line when they engineer Roundup-resistant seeds or salmon that grow twice the size in half the time.

In the good old days the move to name our geological era the Anthropocene, the Human Age, would have been a boast, a sign of our definitive victory in the conquest of nature. But if you read the contemporary literature, you find that it is rather a reluctant and sad recognition of the stature we have assumed. There is little triumphalism but a lot of attention to unhappy systemic consequences such as global warming and the Sixth Mass Extinction.

Even though some kind of reengineering or expectation of a technological breakthrough remains our almost instinctive response to

problems,²⁸ chastened by the results of our attempt to simply take over and control the natural world, we also seek a new approach. “Manage” is not too far removed from “control,” but it has room for a reappraisal of our mistaken readiness to rearrange the natural order of things to suit ourselves.

Good management, be it of a factory or a wildlife refuge, involves sensitivity to the dynamics of the system; the aim is when possible to work with and optimize the functionality that is already there. Instead of reshaping the natural world to our purposes, we now recognize that we must tread softly and respect the dynamics inherent in self-organized ecosystems. If a problem is human-caused, such as the unnatural buildup of underbrush due to over-zealous suppression of small forest fires, then we must intervene to rectify the situation. But if big-horn goats are falling off cliffs because of an outbreak of eye disease, we best not fly in medical relief. The processes of natural selection may be at points painful, but our instinct to minimize pain wherever we see it ill-fits the process that maintains the health and integrity of ecosystems. We now know the intertwined relationships are more complex and subtle than we can grasp, so the best management is to simply keep our hands off.

If we could really just back off and let nature be nature, this would not be the Anthropocene. Now our global reach is such that if areas of wilderness continue to exist, it is because they are the product of human decisions that they will be preserved and protected. Even wise and informed eco-management can exist only in the larger context of civilization, that is, of politics and power and contested control. And if restrictions affect anything of much value on the human market, such as elephant tusks or rhinoceros horn, wise management may be very difficult to enforce.

Our crops and domestic animals already fill most of the earth. The total weight of all our domesticated animals is estimated to be about 7 X the weight of all the larger wild animals left on earth.²⁹ The fish of the seas are ours to harvest; if those of any size remain, it is because we have decided, either by explicit management consideration or by neglect (no

²⁸ See for example, the lively debate surrounding various geo-engineering proposals to deal with climate change: https://en.wikipedia.org/wiki/Climate_engineering. Retrieved 10/29/18.

²⁹ Sapiens, p. 350. The human population, in a similar comparison, would outweigh all wild creatures of size by about 3 times.

market value) that they should remain. Rainforests, which have been called the lungs of the earth, exist only because of strong calls for their protection, and even then they are turning into pasture for cattle grazing and fields for soybeans.

Actually rainforests are a paradigm of our situation. Although they are recognized as critical to the climate and also as comprising the most dense speciation of life on earth, we are still losing them at an estimated rate of about 80,000 acres *per day*.³⁰ We reproach ourselves for this: we cannot manage wisely if we cannot control ourselves! But this oversimplifies. When humans civilized and separated from the natural world of self-organizing eco-systems, we tipped the balance, using our ability to strategically adapt the system to ourselves rather than ourselves to the system. But that only shifted the locus of the constraints to which we adapt: we now are attuned most directly to the constraints we ourselves have structured into our cultural world, for that is the environment which shapes our lives. For any organism, self-maintenance is fundamental, and we have constructed a monetarized global market system as our way of making a living. The lungs of the earth may be of critical systemic importance, but they have as yet no market value. Soybeans on the other hand have high market value, prized fodder for livestock as meat consumption escalates with economic development. From a distance, trading rainforest for soybeans is insanity. But close up, in the local world of making a living, it is the adaptive response to the constraints of the current system.

The problem is not that we cannot control ourselves, but that we have the wrong controls. The divide between human society and the natural world means it is the systemic social constraints, the interwoven construction of our single species, to which we respond, rather than the interwoven environmental construction of the entire community of life. When it comes to the immediate prospect of making a living, the market trumps the environment.

³⁰ "Measuring the Daily Destruction of the World's Rainforests," *Scientific American*, Nov. 19, 2009, <http://www.scientificamerican.com/article/earth-talks-daily-destruction/>, retrieved 2/11/2016.

3.2 The Great Acceleration

The rise of science, its application to industrial technology, and the Enlightenment celebration of rationality and progress have worked in coevolving synergy to tip the globe into the Anthropocene. After thousands of years tracking near flat, the lines indicating human intervention and impact on earth systems start to rise with the Industrial Revolution in the later half of the 18th century. But as the manifold vignette graphs in Figure 3.1 below indicate, after 1950 the climbing slope of change transforms from hillside to mountainside. Analysts have begun referring to this post-1950 period as “the Great Acceleration.”

The Great Acceleration is the exponential culmination of the process unleashed by the Industrial Revolution. After World War II scientific research, technological innovation, productivity, markets and consumption matured into a self-conscious positive feedback configuration, growth feeding growth with exponential acceleration and global consequentiality. As the graphs in Figure 3.1 indicate, lines of

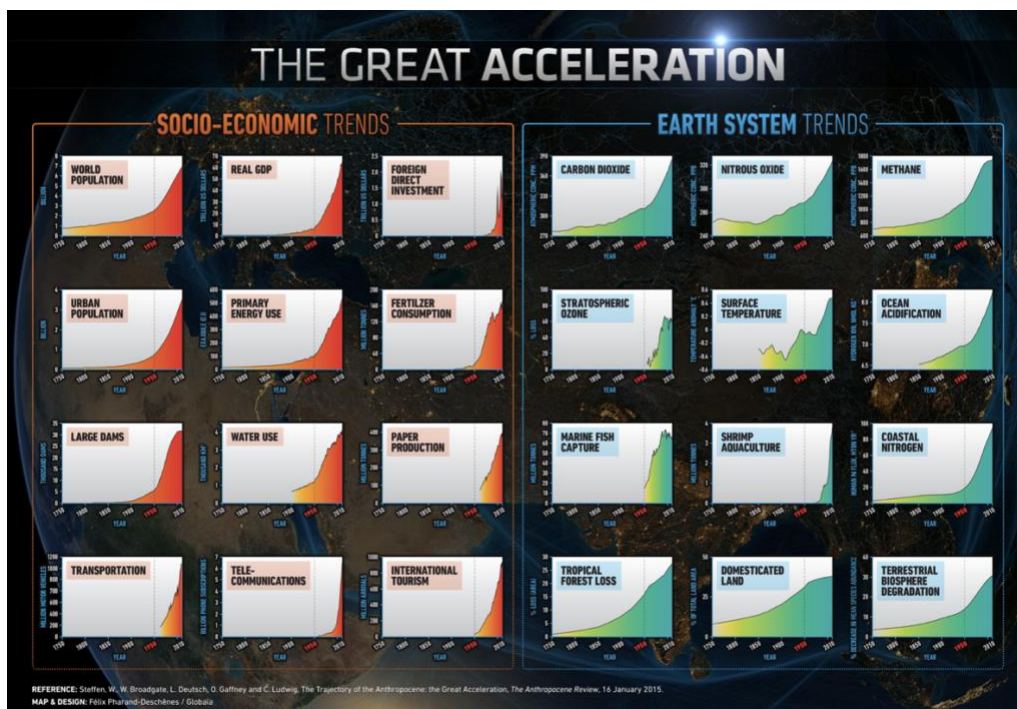


Figure 3.1³¹

³¹ Figure courtesy of the International Geosphere-Biosphere Program.
<http://www.igbp.net/globalchange/greatacceleration.4.1b8ae20512db692f2a680001630.html>.
Retrieved 2/17/17.

change in human society that begin rising with the Industrial Revolution start climbing almost vertically after about 1950. In some regards the Anthropocene is the cumulative consequence of civilization, but more than half of the quantitative flows that now overwhelm the global sinks that accommodate natural cycles and wreak havoc in the biosphere have occurred in just the last 30 years. The weight and the speed we have taken on just in the last 3 decades more than doubles the total human impact upon the globe. And the acceleration continues.

Ever since the Industrial Revolution we have single-mindedly exploited scientific advances for technologies we thought of as enhancing human well-being, a project that has now come to its full flowering in the Great Acceleration. What we missed as those consequences expanded to scales of space and time that evolution never shaped us to consider was sufficient attention to the consequentiality of our interventions for earth and biosphere processes. We are a species uniquely equipped to anticipate the future and respond to anticipated danger and opportunity, and natural selection has insured that danger trumps opportunity. But cognitive psychologists can now map the alarming extent to which we are wired for a heavy time discount.³² Natural selection shaped us well for short scale projects like getting lunch, or on a longer scale for considerations dealing with the change of seasons. Nothing has prepared us to deal with the new scale of space and time, the exponentially expanded terrain of the Great Acceleration in which we now function. The anticipation of future problems still only weakly constrains present pleasure and profit. Growth, we tell ourselves, will take care of the national debt. We will come up with a technological fix for warming.

3.2.1 An Exponentially Accelerating Takeover

Population is a good general indicator of how life is going for a species. At the dawn of the Neolithic, the human populace numbered about 6 million. By the time of Christ it had reached about 300 million, and it took another 1,800 years to reach the billion mark. In the next 200 years that

³²Daniel Kahneman, *Thinking Fast and Slow* (NY: Macmillan. 2011).

shot up to over 7 billion, and by 2050 the UN projects that figure will reach about 9.7 billion. Figure 3.2 below graphs this line of growth.

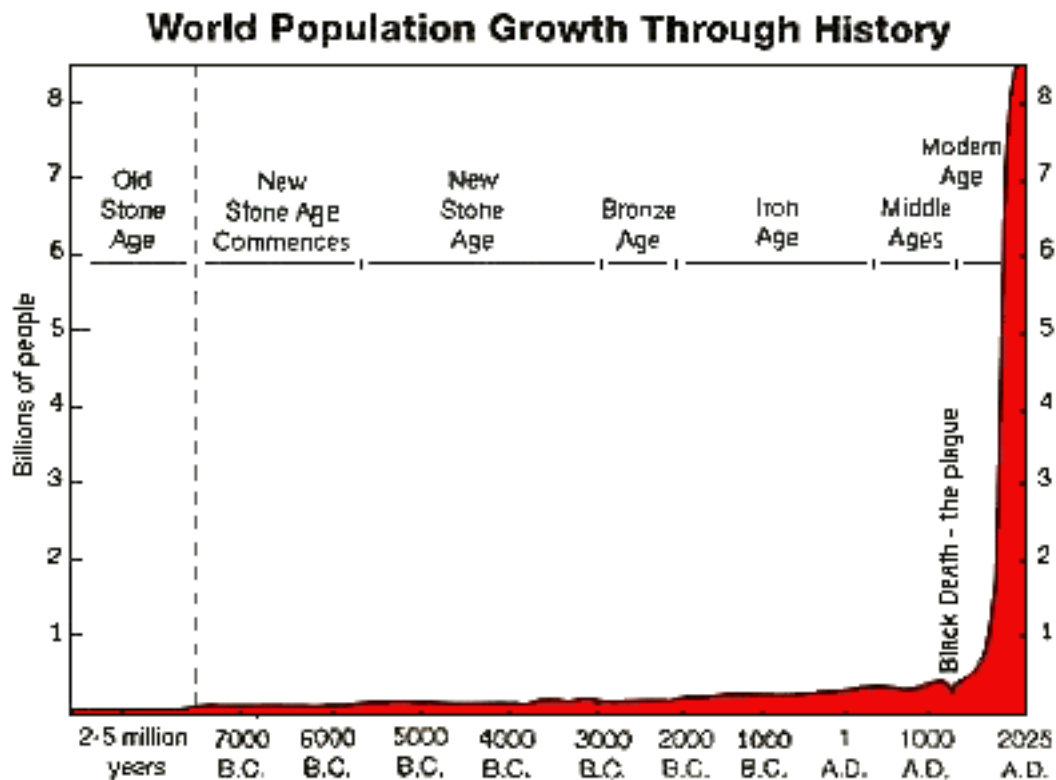


Figure 3.2

As this line clearly indicates, civilization’s effects on humanity’s place in the working and functioning of the globe and its community of life has been not only cumulative but accelerating. The graphs of the many dimensions of social change and its multi-faceted impact on the world in Figure 3.1 share the same timeline and sudden acceleration: all show a long, slowly rising line, followed by a steep increase, followed by an almost vertical rise.

The shape of such lines is familiar to mathematicians: it graphs an exponential process, such as $2 \times 2 \times 2$, that is, each doubling doubles the product of the last doubling. The nature of this kind of process is totally counter-intuitive, leaving us unprepared when it surfaces in the real world. 5 repetitions of this multiplication gives us 64, another 5 gives us 2,048, another 5 gives us 65,536, and then another 5 gives 2,097,152. If you invested \$2 and doubled your money every year, after 3 years you would have \$8, but after 19 years you would be a millionaire.

This is what happens in a long process of gradual accumulation as the accumulation begins interacting with itself in a positive feedback dynamic of more leading to more, culminating in the almost vertical lines of explosive growth. In both the physical and the mental spheres civilization has now reached a stage in which once relaxed feedback dynamics have intensified with the surprising magnitude characteristic of the final stage of an exponential process. A brief examination of what has happened in each of these spheres will help explain why, in the 21st century, we find ourselves standing atop those vertical lines of acceleration, dizzy with the pace of change and wondering what could be next.

3.2.1.1 Physical Exponentiality: The Collapse of Space and Time

Space and time are fundamental factors in shaping lives in the physical world. In general, if one wants to understand the shape, metabolism, and the lifestyle of a given organism, the main explanation is found in local factors; what is the physical environment like, who are the neighbors, what does it eat and how does it get it. The framework of space and time allows for the function of this kind of interdependent but functionally local sort of systemic organization. Since distance translates into time, the practical world of opportunities and threats is spatially configured.

In the lifeworld organized in terms of space and time, daily life is immediate and local, but “local” is relative to how much distance can be covered how quickly. An expanded local may increase options and opportunities, but it also can proportionately expand the range of dependencies and vulnerabilities. Monarch butterflies, for example, migrate thousands of miles, but are threatened due to dependence upon expected conditions all along the way.

Humans, mobile omnivores with the ability to adapt to almost any conditions, are positioned to globalize their local lives. The technologies of speed, the ability to minimize the constraints of distance, has finally allowed us to realize our potential to sustain our daily lives through a systemic network of global reach. But the road to this culmination has been long.

Human life was, like the rest of the natural world, organized locally throughout more than two million years of hunting and gathering. When Sumerians finally invented the wheel and the sail, they took the first civilized bite out of the natural constraints of locale. Goods could be

transported by ship or overland to distant markets, and provisions could accompany far-flung military expeditions. Road-building and ship-building became the preoccupation and precondition of empires as human governance encompassed multiple locales in an extended organization. But as long as ships were powered by wind and wheels were turned by the muscle power of animals, covering distance required significant time and locality remained a major and formative constraint on human culture and living.

This remained the case even after ocean transport and colonization had begun inserting goods from afar into the expectations of daily life. In the 1800's life was still so local that different cities kept different time. The clocks in Chicago would not allow you to figure out what time a resident of Denver might think it was. This was not much of a problem, since nothing one could do in Chicago could consequentially connect with Denver in a single day: no message, communication, or meeting could transpire more quickly than the fastest means of transportation—still horses at the time. So it was sufficient if people were coordinated down to the same calendar day; different locales could work out their own hours of the day.

The localness of the local changed decisively with the mechanization of transportation and electrification of communication. When railroads began to connect cities, it became necessary to coordinate time as never before. You can make a timetable for the arrival of the train at various depots along the route if you know how fast the train travels and the time it departs a given station, but only if all of the stations are following a single correlated system of hourly time. Since sun time is indeed different from east to west, time zones were invented, going into effect in the US in 1883. Then in 1884 an international conference established a Universal Day using the Greenwich meridian as the reference point for calculating time zones around the world.

The speed of transportation determines how fast a cause in one locale can effect a change in another. But humans cause things among themselves as much by communication as by pushing and pulling. In fact, being able to manage the speedy action of distance-spanning railroads depended on being able to know what was happening in those distant places: fast motion correlates with proportionate information-at-a-distance or it becomes the equivalent of driving blind.

Electricity freed communication and information from the remaining time constraints of even mechanized transportation. The telegraph found its first commercial application with the railroads, and railroad beds became

the principal avenues for telegraph lines. The telephone was invented in 1876 and the world thereafter has shrunk on an exponential curve. Now the power of electronic words and images to make things happen in distant places has nullified much of the meaning of spatial separation.

Globalization has become the over-riding fact of the times; the whole world is wrapped in a single system of production, exchange, and consumption. It is the human analogue of a single vast ecosystem, where everyone's way of making a living is constrained to fit with everyone else's way of making a living. Where once upon a time this systemic reality was local or regional, it is now international, so the whole world is a single interdependent job market. Appropriately we now advise our young students to prepare for making a living in the context of global competition.

The collapse of space-time constraints brings with it many conveniences. Commuting to work in some professions yields to telecommuting (though this will never work for plumbers!), going shopping at the mall is overtaken by Amazon Prime. Hardware stores feature displays of switches that allow us to monitor and manage the devices that heat our homes and cook our meals and lock our doors from anywhere via smartphone. Electronic tags help us track the whereabouts of keys, pets or children. Face-to-face contacts may be in space or in cyberspace, and laws must be enacted to keep our eyes and minds on the road as we drive rather than who-knows-where on the all-enveloping web of the internet. In our pockets we carry access to events of interest anywhere in the world, the potential for world-wide passive or active contact and interaction, and access to the cumulative record of human learning through the ages.

In sum, unique among creatures in the community of life, our lives can no longer be described in terms of local factors. Our physical bodies still occupy a local place, but the non-local now virtually overlies and transfigures the local world in such a way that the causes and effects of human actions escape the constraining and organizing power of space-time localization.

Understandably this is a shock to other forms of life, still local but challenged to adapt to human activity now unconstrained and often unguided by local conditions. But it is likewise a challenge to the many social institutions and processes organized assuming now outmoded constraints of spatial and temporal discreteness. For thousands of years civilization has stretched the meaning of locality, but only now, with the shocking suddenness of exponential culmination, do we find ourselves

coping to reconstruct our organization to adapt to a non-local world. Privacy, reliability of information, elections, even who's using my personal identity, indeed security of all sorts, seems newly vulnerable as the locally warranted is overlaid by the potential of unconstrained non-local manipulation. Space-time local constraint provided the kind of predictability required for stable organization. While we enjoy the conveniences afforded by dissolving that constraint, we are with good reason uncertain and uneasy as we try to adapt to and control the unpredictability of the non-local.

3.2.1.2 Mental Exponentiality: From Cumulative Experience to Overwhelming Information

For over two million years, the shared memory, the repository of experience, learning, understanding and stories that united and guided human communities, was a function of organic brains and was transmitted through communal oral tradition. Civilization invented writing, a way of externalizing that memory. Oral tradition sufficed for tribal societies, but urbanization has thrived on words embedded in stone, or clay, or papyrus, or paper, or now on computers and in databanks in the cloud.

We think of brains as the endless source of language. But the written word is more than just an objectified representation of the product of our brains: externalized from brains, it is also freed from the constraints of brains. The most obvious such constraint is temporal. Enshrined in writing and thus insulated from the loss suffered when an older generation passes and a younger generation changes focus or loses interest, the products of human minds begin to transcend generational barriers and accumulate over time to proportions far beyond the compass of any brain.

This effect, in turn, is more than just hitherto impossible accumulation. Knowledge embodied in ideas and concepts does not accumulate in nuggets, but in an interactive whole. Ideas recombine into new ideas which have the power to transform and in turn multiply and interact in brand new and unexpected ways. This gives the accumulation of written thought a multiplier effect with exponential wings— $2 \times 2 \times 2$ instead of $2 + 2 + 2$.

For thousands of years the exponentiality of this interactive power was masked, yielding only the gradual incline we see in the other flat-line segments of the Great Acceleration graphs. In the physical sphere, our

extractive productive prowess went into exponential overdrive only once it was unleashed from the constraints of organic muscle power to explore the power of fire and fossil fuels. In a similar fashion, as long as the interactive potential of the massive accumulation contained in our libraries was still constrained by the processing power of human minds, the growth of knowledge appeared more cumulative than exponential. Now that digitization has rendered language fit for computer processing, we are plunged into the all-engulfing electronic Information Age which now records and enables an unprecedented globalized civilization.

With its interactive potential steadily enhanced in a feedback loop with advances in information technology, the accumulation of knowledge/data has reached a critical threshold. We have seen how doubling a base repeatedly is an exponential process: suddenly the graphed line of increase becomes almost vertical as the base being doubled becomes large. But knowledge also produces technologies that continually feedback to increase the rate of its own cross-fertilizing, so the length of time for a doubling becomes shorter and shorter. We not only double a larger and larger base, we double it more and more quickly. This is what is now termed “hyper-exponentiality.”

In 1982 Buckminster Fuller called attention to this phenomenon, dubbing it “The Knowledge Doubling Curve.” He estimated that up until the 20th century knowledge doubled about every century. But by the end of WW II it was doubling every 25 years. And now, allowing for different rates in different fields, the estimate is that on average knowledge doubles every 13 months. In 2006 IBM produced a paper estimating the internet has the potential to bring that doubling period down to about every 12 hours.³³

The IBM paper³⁴ is actually talking about data rather than the interpreted data we commonly think of as “knowledge.” The distinction is significant: the point of the paper is that as the deluge of data increases our ability to turn it into knowledge for informed business decisions diminishes, so businesses should find ways to prune their data. But others observe the phenomenon with a wider lens. Computers already play a major role in

³³ “Knowledge Doubling Every 12 Months, Soon to be Every 12 Hours,” in *industry tap into news*, <http://www.industrytap.com/knowledge-doubling-every-12-months-soon-to-be-every-12-hours/3950>, retrieved 1/29/2016.

³⁴ “The Toxic Terabyte,” http://www-935.ibm.com/services/no/cio/leverage/levinfo_wp_gts_thetoxic.pdf, retrieved 11/10/18.

the production, storage, and interpretive “mining” of this burgeoning trove of would-be knowledge. As our ability to handle it decreases we are ever more pressed to hand off more and more of our mental role to machines which we make ever faster and more “intelligent” for the purpose. AI, artificial intelligence, is now the holy grail of the tech world.

This is a clear and accelerating trajectory, but where it leads is the subject of much dispute. Unchecked exponentiality is the ordinary recipe for an explosion, the final check on a process that cannot go on. Hyper-exponentiality might just mean a dizzying acceleration to meltdown. But others, inspired by a doubling timeline that shrinks towards zero, think in terms of a threshold. We progress from making our machines more intelligent to machines that can make themselves more intelligent. Then we hit the “technological singularity,”³⁵ where a positive feedback loop of AI improving itself more and more quickly leaves human intelligence in the dust.

Here again the path divides. Some see this as an eclipse for the human species: the new super intelligence has no need for us. Others see us adapting by assimilating the new AI into our own organisms, becoming super intelligent cyber hybrids with a good shot at managing our planet with well-being for all.³⁶

This may seem like the rarified speculation of techno-literati. But the process that engages their attention is felt in the tenor of daily life. We find ourselves awash in information and the riptide of innovation that accompanies it. We enjoy our own expanded power to manipulate but bemoan our expanding vulnerability to manipulation by others. We are alarmed at the shrinking realm of privacy as nothing is allowed to remain opaque to the probing digital expertise of business, government, or hackers. At the same time the buzz of excitement around the new has become addictive, and we find ourselves watching and waiting for The Next Big Thing. This exponentially accelerating phase of cumulative knowledge and its coevolving technological prowess have unexpectedly put the world in our unprepared hands, a responsibility we may grow into –if we have time.

³⁵ See https://en.wikipedia.org/wiki/Technological_singularity, retrieved 11/10/18.

³⁶ For the contrasting perspectives, see for example, Yuval Hariri’s *Homo Deus* and *Novocene*, by James Lovelock.

3.2.2 From Shared Worlds to Plausibility Bubbles

The hyper-exponential rate of change in Information Technology has disparate effects on fields with an organized and shared knowledge base such as science and technology, and the more loosely organized arena of personal social life. While the former struggles to keep up with a mounting wave of innovation and growth, the latter becomes fractured and confused. The difference is owing to what sociologists describe as our “plausibility structure.”

The notion of a plausibility structure was introduced by Thomas Luckmann and Peter Berger, early theorists in the field of the sociology of knowledge which newly emerged in the late 1960s and early 70s.³⁷ They observed that we navigate and sift the world of information with a structured sense of plausibility. Depending on what we already think and believe, new information immediately strikes us as more or less credible or hard to believe. So for good reason it is easier to see truths that align with our assumptions than to accept novelties that demand we reconfigure our mental map.

That much is such common experience it is hardly notable. But what got sociologists’ attention was the observation that the mental topography that thus screens and organizes our ongoing encounter with “reality” is itself a product of our social life. What “everybody knows” has a special contagion, a claim on my personal assumptions that for the most part goes unchallenged. We can identify this phenomenon directly in the initial difficulty experienced in moving to or among unfamiliar communities. The myriad interactions of daily life create a shared space of common assumptions and expectations which branch off into the many variations that mark subgroups and personal networks. All of this becomes our mental furniture, a plausibility structure which prepares us to sort out and make sense of a changing and challenging world. And this in turn feeds back to become the supportive substance of the common social world that we create as it creates us.

³⁷ See especially their ground-breaking book, *The Social Construction of Reality* (NY: Anchor Books. 1966).

As Peter Berger observed, this shared social world is essentially a memory, and memory is a slippery business. When in principle everything could change, be replaced or forgotten, stability and predictability become even more precious and necessary. Like the flying buttresses that support the walls of cathedrals, interaction with like-minded people stabilizes and renders more plausible the constructed architecture of my own mind. Such reinforcement is not only pleasant, than alternatives, it is also a force that is hard to resist. That is, it is difficult to not be shaped into patterns that fit the expectations of one's social community. The outlier, the "non-conformist," is constantly challenged and must make some special moves to reinforce and support discordant configurations. The recipe for maintaining a dissident mindset is to form a self-selecting subgroup of the like-minded. Intensive interaction with such a group makes them the "significant others," a reinforcing and stabilizing presence that allows one to dismiss what others assume is the "real world."

The same dynamics are at work in our new social space, the world of the internet. But the dynamics that preserve and foster a common social world work on the internet as a potential social disruptor. While its function in our cognitive life is much like the plausibility structure Berger and Luckmann described, the dynamics and interactivity of the virtual social web are quite different. The plausibility structure bridges the cognitive dynamics of both personal and social realms, allowing us to form communities of shared expectations. But the Web inserts novel features at both ends of the bridge.

On the personal side of the bridge, the Web easily becomes a kind of plausibility bubble machine. The world of lived experience is beyond our control; it in principle harbors more than we expect, and hence has an ongoing potential for challenging the shape of our familiar comfort zone. But unlike the messy world of human society, the world as presented on the Web is literally at our fingertips. We can search anything, visit anywhere, establish all sorts of relationships literally and figuratively without leaving home. Originally it was thought the wide-open information gateway of the Web would enable a more informed public. But in practice the flood of news, information, and relationality necessitates selectivity: a person can handle only so much, and in the end most of us select according to interests and proclivities which have a way of becoming the comfortable world of our expectations. Without really meaning to, we can end up captured in bubble worlds of conversations, news, facts and events which, mirror-like, largely reflect

our own opinions and expectations right back to us in a self-reinforcing feedback loop. In other words, unlike the uncontrollable messiness of real life, selectivity in virtual reality tends to self-organize a bubble.

At the other end of the bridge is the virtual world of information and interactivity. The real world is shaped into cultures and sub-cultures of generally shared expectations that shape a social world sufficiently predictable that we can function. Society and social institutions have a stake in knowing their constituents: businesses must know their customers and employees, governments must know their citizens. Computers have taken this over a new threshold by ramping up Big Data, a world in which we can be tracked and known to whatever degree there might be a (sufficiently deep-pocketed) interest. And our life on the Web is in principle hyper-tracked, leaving traces in some data base with every search, every site visited, every bit of click-bait that catches our fancy. Big Data is too big for mere mortals: it must be sifted and worked over algorithmically by computers. To an extent we hardly fathom we now live and move through a topography of information shaped by these algorithms.

There are many facets of algorithmically organized life that merit question and investigation.³⁸ But of special interest here is the way this closes the dynamic social-personal feedback loop that constantly constructs and reinforces our plausibility structure. The architecture of our personal cognitive worlds is known and open to interested parties in an unprecedented way. If I search for toilet seats I will be followed by ads for bathroom fixtures for a week. If I buy a book I will see a list of other reading that might interest me. The music and kinds of movies I like are known and served up to me. And the same is true of news stories and even the kind of spin on the news that I prefer. And as we pour our “liking” and “friending” and pass tidbits along on the social

³⁸ See, for example, the New York Times Op-ed piece calling attention to the way algorithms function in hiring for jobs or in college admissions and other critical junctures in our life: “The Ivory Tower Can’t Keep Ignoring Tech,” By Cathy O’Neil, <https://nyti.ms/2hzdpln>, retrieved 11/14/17.

apps, we self-organize into networks of the like-minded in discourses of mutual reinforcement. In sum, the information world in which I am most at home is constantly served up to me, reinforcing the reality of what I believe, think, and value: it thickens the wall of my bubble.

In a way every culture creates a sort of bubble, a world of shared assumptions that are easily mistaken as simply the way the world is—and indeed, the sharing and the extent of sharing makes the cultural world functionally real, capable of exacting a price from those who ignore its norms and expectations. But we do not usually refer to cultures as bubbles, even when their discordant realities clash with one another. “Bubbles” is a term applied to the many sorts of subcultures that construct subworlds of shared expectations of their own that are not shared by the larger culture. Intense interaction within the subworld can even give it a reality that supercedes the normativity of the larger culture. One implication of the term “bubble” is fragility; encounter with a discordant reality can easily prick it. For example, people whose lives routinely take them outside their subculture often feel the subculture becoming less real, less a claim on their behavior and thinking. In any case, the larger culture typically is enshrined in various sorts of authoritative institutions—religious, educational, political, economic—that exercise claims that subordinate and limit the reality-constructing projects of the subcultures.

The Web has been quietly dissolving this structure. The constant, reinforcing selective feed of opinions, values, and expectations has the effect of making bubble walls leather-hard, more able to resist contradiction by institutional authority. In the US, we crossed a threshold in the presidential election of 2016. The authoritative voices of the New York Times and Washington Post can now be dismissed as “fake news,” photographic evidence contradicted by the declaration of “alternative facts.” Scientists, only recently the high priesthood of secular society, are distressed to find their authoritative voice relativized as just a suspect opinion. The heads of national intelligence agencies may be dismissed publicly as “political hacks,” and long-established leaders of the Republican party can be publicly accounted as the enemy by a subgroup of their own party. The rationalist Enlightenment vision of a secular society organized by truths grounded in reasoned reflection on scientific evidence was never as realistic as the sociological analysis of a social reality constructed by a web of agreement and tacit shared assumptions. But evidence-based rationality was nonetheless the generally accepted norm of public discourse, inculcated in our

institutions of higher education and spread broadly through the at least nominal claims of the media. Now the fragility of that vision is exposed in the naked emergence of Web-supported and constructed plausibility for competing realities that once would have been dismissed as marginal, ignorant, or uninformed—the terminology of a cultural normativity now contested as just another bubble—the “elite” protesting their lost hegemony.

Chapter 4. Earth as a Human Managed System

In order to have self-control, one needs a sense of self. Do we have this, on the global level at which intentional action is now required?

David Grinspoon

Self-organization through natural selection is a fundamental dynamic in the community of life that cannot be supplanted. But we have seen how the human imprint now looms so large among selective factors that we have become the constructive shapers of not only our society but of all macroscopic life on the earth. Fit with humans has become a critical selective pressure on every organism. It is we who shape ourselves, but in so doing we determine what is to count as fit or misfit throughout the community of life.

To understand what this change portends it is useful to return to the basics: how does the natural world work on its own? How does the human world work? What does it mean to overlay the former with the latter?

4.1 The Mind of Nature: Unconscious Management

We have seen above (2.1) how eco-systems self-organize through the mutual constraint or conditioning every species imposes as selective pressure on every other. Evolution is an ongoing process continually probing an adjacent possible, constantly filling niches, potential ways of

making a living, as possibilities emerge, transform, or disappear in changing environments. But whence this power to come up with a mind-boggling array of ways of making a living and to organize them in a system of mutual functionality?

Evolution is a continual tuning-tinkering process working selectively on the array of metabolic and behavioral functions by which the community of living organisms make their various livings. Its mechanism is the collection of gene-pools made up of the reproducing members of every species. As Gregory Bateson observed,³⁹ these constitute the guiding “mind” of the living world. The gene pool of each species works in terms of shaping that individual species, but the shaping takes place in terms of fit with environmental circumstances, including other species. So this seemingly species-specific process is inherently cross-referenced: species do not just evolve, they co-evolve.

Like a sculptured figure emerging as marble is chipped away, species are shaped by subtraction. That is, the pool of reproducing individuals is constantly shaped and reshaped by the absence or proportional absence of whatever versions of the repertoire for making a living have not worked well enough to make it to reproduction. What does not work for living long enough to reproduce just does not show up. And this need not be an all-or-nothing process; the ambiguity of “somewhat” and “more-or-less” can also be processed. After enough iterations of reproduction in slowly changing or relatively stable environments, the statistical shape of the pool will closely reflect what has been working better or more poorly. In the stable environment of rainforests, for example, insects and particular plants may become exquisitely adapted to one another.

The positive thrust of evolution comes from the very nature of life, a dynamic of finding and maintaining well-being. Bateson can refer to this process as “mind” because, like the conscious minds of our experience, it functionally guides to ongoing well-being by selecting between what works and what doesn’t work. But there is a critical difference between the way conscious minds and natural selection do their selecting. Consciousness is anticipatory, selecting purposefully *for* what works. Natural selection needs no eye on the future: it simply selects *out* what does not work.

³⁹ Gregory Bateson, *Mind and Nature*, (Dutton Books, 1979).

It is noteworthy that this selective process, in being negative, is inherently as broad and forgiving as it can be. It's like going into a cluttered basement and throwing out all the easy stuff you know you don't want. The negative process is easy, but that still leaves a lot of stuff. Contrast that with going into the basement and selecting positively only what you really want and need. This positive process will leave you with a much emptier basement, but it is fraught with questions of prioritization and accurate anticipation. Almost inevitably a few weeks later something unforeseen develops and we end up saying, "Oh! I never should have thrown that out!"

Above we asked where evolution gets its power to come up with a mind-boggling array of ways of making a living and to organize them in a system of mutual functionality. It is somewhat counterintuitive to realize that the process that shapes and refines the intricate community of life works because it is as permissive as possible. Given time, habitats, like basements, get crammed with about as much diversity as they can support as differences wedge into new ways of making a living in slightly different niches. How else would we get 400,000 species of beetles or 10,000 species of ants? Because it has been winnowed only for what does not work, the basket of life is full of unexplored potential for what lies ahead.

There is an irony here. Reproduction is above all a move that transcends the present to open up a future, and adaptation not to a bygone world but the world as it will be is the key to the whole project's success. We think of the future as the special purview of consciousness: consciousness evolved to enable creatures to move into the future adaptively, and our language-enabled consciousness carries this to such an extreme that we have come to live in a bubble of anticipation. And yet reproduction, the process that gives not individuals but whole species a future, shapes its product through the guidance of gene pools which are blind to the future. No anticipation, no forethought, no consciousness.

Proud as we are of our unique conscious abilities, perhaps we are distracted by our own specialty into missing what makes this "mind of nature" work. What a gene pool offers in its composition is in effect a perfect memory of what has been working and how relatively well it worked in the parent's generation. And what it rolls forward in the reproductive process is not only the recipe that has worked, but any variations and other baggage that has not proved much of a hindrance. Who knows what might turn out to be useful, and how, in the as yet

undetermined future? Not having to make any such anticipatory judgment calls turns out to be a great advantage.

Consciousness likewise calls on the memory of past experiences, turning it into imagination or anticipation of what is about to occur or could occur. Having learned from experience, it can use it as a guide for the future. This conscious process generally works, but its necessary selectivity has inherent weaknesses: sometimes the wrong memory is applied, the wrong lesson learned, or personal history may skew the focus of anticipation.

The gene pool, then, is a more copious and more accurate form of memory. It is a species level form of learning from experience, but unencumbered with the selective attention or the potential misapplication that besets conscious learning and its imaginative application. Instead of anticipation, it penetrates the future as the biological constitution of a new generation, guiding the metabolic function of all organisms and all such behaviors as may be hard-wired.

The major limitation of this kind of mind is that its information regarding what works is registered by the mortality of what does not work. When individuals die before reproduction, their absence in the constitution of what is being rolled forward effectively shapes a new generation. This is fine for species-level adaptation, but death is not a very useful mid-course guidance function for individuals needing to adapt to relatively unpredictable circumstances. From this perspective, then, we can see that the evolved ability of some creatures to learn from experience in order to consciously adapt to an unfolding future fills a gap: it replicates the gene pool's species-level intergenerational functionality on the level of a single organism.

Then humans further evolved the capacity for symbolic language, which inserts into this guidance-by-consciousness the free creativity of narratives unleashed from experience (cf. 2.2.2). This crosses a threshold into a quite new systemic space. Occupying an anticipatory future enlarged by narrative's flexible and creative scenarios, humans, especially in their civilized guise, are doing what gene pools could never do. Gene pools, limited to experience and blind to the future, nonetheless turn out to be superb guides for adaptation. Humans, learning from, but not constrained by experience, anxiously probe the future with imaginative foresight, concern themselves not only with adaptation but with reworking virtually anything into what they consider a *better* mode. The human deliberate and creative search for the "better" has come to occupy a fundamental place in the blind selective process

of what works on the earth, with ramification throughout the entire life community.

4.2 The Mind of Humans: Conscious Management

The emergent role of deliberative consciousness in the life dynamic of the planet merits careful analysis. When we want to improve things, consciousness seems far more potent (faster) than self-organization by natural selection. Perhaps that is why it is easy to find celebratory accounts of our planet finally achieving purposive consciousness. Pierre Teilhard de Chardin set the pace, with his Vernadsky-inspired vision of an evolving earth finally producing not just life but a conscious “noosphere,” (*nous* being the Greek word for “mind”) being widely influential in the 20th century’s New Age movement. Since then experience of our feckless response to global warming has taken the shine off such hopes, but even as informed and careful a thinker as planetologist David Grinspoon ends up with this as our best hope:

One way to look at the Anthropocene, at the coming of human influence, the “Phenomenon of Man,”⁴⁰ is as a new stage in the long life of the biosphere, one in which Gaia, experiencing the first flickering of self-awareness, is starting to wake up and look around.⁴¹

Teilhard, writing at the dawn of the Great Acceleration, expressed a kind of naive evolutionary optimism. Grinspoon is more aware that evolution is indeterminate, and in the light of how things have been going, his emphasis is on the critical need to *wake up* and become the needed kind of global consciousness:

I’ve described us as being like sleepwalkers waking up in the middle of performing some task. There is a sense of discovering we’re in a difficult situation that some version of us has gotten ourselves into, but that we have not been fully conscious of until forced to realize what we’re doing. We now find ourselves in the unenviable role of sort of running a planet—a job we didn’t ask for,

⁴⁰ A reference to the title of one of Teilhard’s best-known books, *The Phenomenon of Man*.

⁴¹ David Grinspoon, *Earth in Human Hands: Shaping Our Planet’s Future*. (NY: Grand Central Publishing. 2016) p.214.

don't deserve, and don't know how to do. Still, we have to find a way forward. We're like an unfortunate soul who has just woken up at the wheel of a big rig, a racing, out-of-control truck. We have absolutely no idea how to drive it, but everything we love is on board. We're heading furiously down a twisty road. We're starting to figure out how some of the controls work, but nobody's ever given us a driving lesson. We'd better learn in a hurry. ⁴²

This is a great metaphor to catch the blindsided feel of this moment. But what if we push further the question of the role of consciousness in a system that self-organizes by a non-conscious process? Say the big rig in question is not out of control but rather one of those self-driving trucks we hear are coming soon. Its human occupant has just waked up, and from old habit seizes the steering wheel, hits the brakes, and starts careening around in ways the other traffic does not expect. There is a question here about the intersection of two kinds of control, and the assumption that Gaia, the big rig and the well-being of all aboard, might somehow benefit from "the flickering of self-awareness" and "starting to wake up and look around" begs the question.

How will the world fare with its Anthropocene awakening of consciousness? It has long done well with the variously constrained forms of consciousness manifest in the portions of the biosphere that learn from experience. With experientially constrained consciousness natural selection has continued to produce ecosystems of mutually constrained fitness on increasingly complex levels. If there is anything distinctive, an incipient waking up and looking around, that goes with the emergence of our distinctive form of consciousness, it must bear the imprint of our capacity for symbolic language and narrative-enabled imagination, the distinctive hallmark of our form of consciousness. We who enter a future shaped by our over-arching shared narratives have reached the capacity of giving the earth itself a trajectory informed by the kind of story we tell.

We must be careful here, lest we create an unwarranted cosmic consciousness. But the non-conscious Mind of Nature that shapes a future by natural selection working through millions of coevolving gene pools now includes us in its selective functioning. *And for a time, at least, the kind of future it selectively shapes will be decisively affected by*

⁴² David Grinspoon, *Earth in Human Hands: Shaping Our Planet's Future*, pp. 452-453.

the way we conduct ourselves. Here is the intersection, where entering the future with anticipation and narrative-enhanced imagination overlays but does not supplant the relentless de-selection of life that no longer works. Natural selection, the process that shapes and organizes the life of the earth, is in the Anthropocene working in concert with anticipative consciousness. And this goes beyond the unplanned extinction or survival of creatures as a consequence of our conduct. We actively select and fill the earth with the plants and animals we prefer, and we intervene directly in gene pools to create organisms suited to our purpose. Our storied future and our behavior in working it out inserts an element of deliberate decision into the selective topography of the Mind of Nature.

If the earth through us is telling a story that shapes its future, what kind of story can it be? So far the story has been essentially human in focus, and so the future we arranged to maximize what we thought was our well-being has taken a shape that deselects many members of the community of life, even as it fills the land with species we have adapted to our purposes. It should be easy to improve on this short-sighted vision. Granted the open freedom of narrative creation, we can at least hope to realign our storied earth future with the life-giving dimensions of the unconscious Mind of Nature.

This, however, is a tricky proposition. Being blind to the future, natural selection totes up the register of what is working and not working with egalitarian and all-encompassing inclusiveness: no favorites, no regrets, no special efforts on behalf of the floundering. If some microbes find a highly successful way of making a living that fills the atmosphere with poisonous oxygen (the Great Oxygen Event), or with methane (the Permian Extinction),⁴³so be it. Or if a multicellular species hits on a highly successful way of making a living by burning fossil fuels and filling the atmosphere with carbon dioxide (the Sixth Extinction), so be it. If polar bears can't adapt to disappearing ice, so be it.

A "woken up" earth with a future-penetrating consciousness would potentially change all this. Penetrating the future means nothing unless there is some purposiveness involved, something that is cared about.

⁴³ A suggested cause of the great Permian extinction event.
<https://www.scientificamerican.com/article/methane-spewing-microbe-blamed-in-earths-worst-mass-extinction/>. Retrieved 11/25/18.

The scope of this care should be as inclusive as the function of the Mind of nature, that is, it should include all living organisms. Including all organisms working out their life and reproduction would still do nothing but replicate the dimensions of natural selection. But one further thing might be possible if the insouciant “so be it” of the non-conscious were supplemented with a caring consciousness: life-community-wide care might be directed to the system itself. The flow of mutual interaction and interdependence in the life system can be disrupted in many ways; a consciousness commensurate with the self-organizing process of the living earth might add a predilection for balance. The “so be it” acceptance of spiking rates of extinction would be replaced with a concern to maintain or restore systemic balance. “So be it” evolves to “does it have to be this way?”

We are not talking about a mythical Mother Earth who can lovingly take care of her critters by altering her physical and chemical processes. Rather we are considering the role of human consciousness in the Anthropocene, an era in which civilized humanity has indeed become a caring consciousness that now continually intervenes in the physical and chemical and biological processes of the earth incessantly asking, “does it have to be this way?” Thus far that care and concern has been largely anthropocentric in focus; we are just beginning to have a grasp of the meaning of balance in a complex, dynamic community of life. The combination of narrow self-interest and ignorance of/disregard for the systemic ramifications of our conduct has been disastrously short of anything like a commensurate fit with the organizing dynamic of the Mind of Nature. Rather, these features of the way we use our minds are at the basis of the Sixth Extinction. Thus concern for life-sustaining balance in the earth’s system begins with addressing the exercise of our own consciousness: Does it have to be this way?

On a scale of millions and hundreds of millions of years, the resilience of probing, self-maintaining, evolving life has enabled it to bounce back from the great unbalanced phases of mass extinction with new moves, richer complexity and more exuberant flourishing. From the perspective of the early anaerobic life community, photo-synthesis unbalanced the system, but an oxygen-rich atmosphere has opened evolutionary potential nowhere evident on the anaerobic horizon. Now, from the perspective of a life community organized in terms of relatively tight mutual constraint, the emergence of an imaginative species with our manipulative technological reach has drastically unbalanced the system. But if, like oxygen, we do not disappear, might the system not rebound

from this negative phase with dimensions not on the horizon prior to the advent of our kind of mind? The Anthropocene thus far has been a story of escalating unsustainability. Does it have to be this way?

The oxygenation of the atmosphere transpired over millions of years and presented a generically constant but mounting selective pressure. Adaptive life has handled it spectacularly, virtually a model case of the function of the Mind of Nature. The Anthropocene presents a different profile: the selective pressure this time is the globe-transforming activity of a future-aware, civilized, interest-directed human consciousness.

As agents of massive, rapid, self-interested change, we have presented a challenge that overwhelms the adaptive capacity of a cascading range of species. But the novel dimension of the situation is that in this case the selective pressure is self-aware, flexible, and interested in the future. That is, at least in principle, the source of the selective pressure that is reshaping the earth system can both modulate and moderate that pressure. Whether our civilized consciousness is in fact capable of the care for balance and the tolerance for self-constraint necessary to recalibrate in a more life-sustaining direction is an open question. If we have floundered thus far, this is the time to probe more deeply the nature of the challenge involved and the sources of the floundering. Then maybe we can do something about it.

Chapter 5. Consciousness in Control

I was taught that the human brain was the crowning glory of evolution so far, but I think it's a very poor scheme for survival.

Kurt Vonnegut

We have come to understand enough of the complex working of the system to realize how much we have yet to learn and to step back from the notion that it is our destiny to master the earth. If one understands the self-organizing processes of the natural world there is little room for the notion that the world has been just waiting for conscious management and the only question is how the insertion of that conscious dimension can be made sustainable. The problem goes beyond daunting complexity and inadequate knowledge. A consciousness that anticipates and arranges a future for individuals, communities, or even nations, is still inherently proportioned to a single

species, and the world we construct for ourselves is far from anything like the trans-species, cross-referenced fabric woven by the Mind of Nature.

Climate change and the Sixth Extinction are paradigmatic expressions of the challenge we grapple with in looking for a sustainable Anthropocene. They express the two faces of what it means for human consciousness to be situated in the Anthropocene. First, something seems amiss in our responsiveness: we see a mega-problem such as climate change, identify how it might be mitigated, and flounder in acting accordingly. Understanding what about consciousness sets us up to mishandle a challenge of such scale and threatening consequence is a precondition for growing into our Anthropocene responsibility. Second, why is the civilization we have created so toxic to other forms of life that it has precipitated a mass extinction event? The specific causes of extinction vary with the species in question, but if we can understand the underlying reason we keep producing such unintended consequences perhaps we might figure out what to do about it. Addressing these two questions will give us a better grasp of the problems and potentials of consciousness in a global system.

5.1 A Stretch for Consciousness

5.1.1 Caring

Above we proposed that a consciousness commensurate with the functioning of the Mind of Nature would have to include all life indiscriminately in its care and concern. Caring tends to follow our identity, and one of the flexibilities introduced by our form of consciousness is that of an arbitrarily expansive identity. This is a bit of a chicken-and-egg sort of situation: what we care about we identify with, and where we identify tends to delimit our care. We are by turns individuals, family members, sports fans, civic boosters, church members, citizens and more. On the most inclusive levels, we can identify as fellow humans and even fellow members in the community of all living beings.

How we manage our flexible identities and the correlated scope of caring is a critical matter for a conscious (as distinct from hard-wired insect)

eusocial species. An imperative to subordinate the pursuit of personal interest to the well-being of the group is a common thread in the moral teachings of civilizations; this is essential for the weave of any social fabric. As civilizations have expanded, one of the hardest lessons we have had to learn is to expand the social self, the circle of those about whom we care, to include those we formerly saw as outsiders, the “them” that arises as the necessary counterpart to any “us” we construct.

The interests that motivate us commonly are subject to a steep discounting with spatial or cultural distance, so when it comes to including the whole human species (“family” in this context) we still do rather poorly, and joining the community of life as “plain citizens and members”⁴⁴ is an even harder stretch. Our expanded, more inclusive identities seem accomplished with some difficulty and are subordinated easily to what consciousness finds more immediate and pressing.⁴⁵ Especially under stress, care seems to contract to tribal dimensions hard-wired by more than 2 million years of natural selection working on hunting and gathering societies. This is now all too-well evidenced in the wave of anti-immigrant sentiment and populist nationalism in response to the mounting numbers emigrating from homelands where well-being is not to be found.

We come by this centripetal tendency honestly. We emerged within the bosom of the natural world, where caring is a form of interest an organism must take with regards to itself and to as many levels of the extended self (offspring, nest-mates, herd members etc.) as may be functionally appropriate. Natural selection takes care of all this, and in the interwoven dynamic of ecosystems there is no demand that participating species care for other species in order to self-organize into mutually life-giving ecosystems. In ecosystems, because natural selection, survival of the fit, cross-references the viability of each species’ way of making a living with that of all the others in the environment, every species takes care of the whole community by taking care of itself. The system-maintaining taking-care function is a system-wide dynamic realized through the self-care of individual organisms and species. But when humans finally broke free from that mutually

⁴⁴ The central mandate in Aldo Leopold’s “Land Ethic,” a 1949 essay that has become the cornerstone of environmental ethics. It is available online: <https://www.uky.edu/~rsand1/china2017/library/Leopold1.pdf>. Retrieved 3/7/20.

⁴⁵ For an extensive discussion of this issue, see below, ch. 8.

constraining community to create our own self-maximizing world of civilized cultures, all that changed. Our relatively unconstrained self-maximizing dynamic has succeeded in filling the earth in way that now engulfs ecosystems and subordinates their function to our interested guidance.

For one species to thus break loose and establish its own interests as the governing and ordering principle for the global home of all species is not just unprecedented, it challenges the balanced mutuality by which life systems organize and survive. How long such a situation can be sustained depends on the extent to which the one species can somehow emulate the system-wide care-taking function of ecosystems. And this is where expanding our identity to encompass the community of life in our caring is now the unlikely requirement for sustainable management. Enlightened self-interest is perhaps a first step, but it is no substitute, for it is always full of the short-cuts and blind-spots that come from a focus on a too small self.

So it will be, literally and figuratively, a stretch for the preponderance of humans to take on membership in the community of life as a primary identity and act accordingly. Fortunately there are workarounds, strategies such as laws, treaties, community standards and the like which serve to constrain and coordinate human behavior from systemic levels that transcend the proclivities of individuals. The Endangered Species Act, for example, represents a rare case of legally subordinating ordinary human interests to the well-being of species on the brink of extinction. Mandatory environmental impact assessments for major construction projects is a similar step inserting the “more-than-just-humans” into the human decision process.

Such measures are just a beginning of what would be required to damp down the selective pressure human society imposes on the rest of the community of life. But even such minimal constraints come under attack and cannot stand without the support of an informed public. As a story-telling, caring, social species, our conscious feelings are shaped by the narratives we live by. If the story is one of free-markets and self-maximizing individuals, even constraints to protect humans, let alone other species, are perceived as intolerable.

Our legal and policy stratagems, then, can succeed only if we become formed/informed by narratives of our participation in the whole earth and its community of life. This development is still young, just beginning to take root in many areas of human civilization. But it cannot be dismissed

as a tree-hugging emotional luxury born of affluence. Instead, it answers to the deepest systemic imperative of our time.

Encompassing the community of life in which we participate in our capacity to care is a necessary step in the direction of rendering the Anthropocene sustainable. It is all too clear that pursuing our hard-wired species self-interest with careless disregard to other species is a path to disaster. We already have sufficient experience to know better, even if it is hard to get beyond such a way of feeling, thinking and acting. But while it is true that “not caring enough” will surely lead off a cliff, we would be mistaken to think there is an “enough” that securely settles our management challenge. “Enough” looks to the scope of our care and concern, but even with an inclusive scope we are confronted with the difficult question of practice. What are the tradeoffs? What comes first? The requirements of time and process confront actual anticipatory action with unavoidable issues of prioritization.

5.1.2 Prioritizing

Like sight, consciousness requires focus—we call it “attention.” We cannot attend to everything at once, so from the perspective of the entire range of what might be attended to in a given situation, the narrow beam of attention is a scarce resource in high demand. In consciously directed life, our conduct as we enter the short and long-term future is shaped by a landscape prioritized by care. Caring equally about everything is a recipe for paralysis. I may care about many things, but in practice they need prioritizing. When I am crossing a busy street, oncoming traffic is the immediate priority. Once I’m across the street I can resume thinking about the talk I have to give or the shopping I need to do. And simultaneously in a larger framework there are my children to be loved and raised, my promotion to be worked on, committees, competitive strategies of all sorts, helping colleagues, getting ahead, being a good citizen etc. etc.

All of these cares overlay each other in our minds, but they must be sorted out and prioritized in the way we allocate our time and attention. Ideally our prioritized caring is thought out so what we care about most gets attended to most care-fully. The shorter the timeframe the more priorities take on an either/or cast, but the overlaying of cares in a larger frame can allow higher priorities to exercise a general guiding role so that they are reflected in the way I handle the lesser.

A fair amount of our spontaneous prioritizing has been hard-wired by natural selection. Consciousness evolved to help find lunch while avoiding becoming lunch, a roll it still fulfills for most creatures. We have expanded the horizons of consciousness mightily, but are shadowed by its rootedness in an immediate world of danger and opportunity. Immediate danger trumps everything: the antelope that reaches for another bite of tasty grass after a cheetah is spotted is less likely to make it to reproduction and pass on its priorities.

It is tempting to see the antelope as a metaphor for businesses or even nations as they graze for a last bite of profit and economic growth while frittering away the brief window available to escape the worst of impending climate change. Indeed, like the antelope, we share a legacy of responses honed by natural selection to deal with more or less immediate threats and opportunities. But unlike the antelope we have evolved a consciousness that includes the need to wrestle with questions of systemic dangers distant in space and time. For that, our legacy response system serves us ill when it bids us to maximize the short term and discount what looms on the horizon.

This now amounts to a selective pressure that will shape the future of our species, or whether we will even have a future. Science and technology expand the temporal and physical consequentiality of human activity far beyond the horizon of the daily care and concern that guided and maintained well-being in the past. Our first response has been to apply this potent knowledge to the short-term realization of increased production, profit, and consumption, culminating in the Great Acceleration. Now climate change has clarified for us that we are tasked with adjusting our behavior for consequences decades into the future and for species other than our own. Inaction is clearly freighted with dire consequences, but it is hard to readjust our evolved prioritization of the more immediate: for many it feels like the threat is far off, and we continue to maximize our lunch. Or at least that is the way our presently conflicted prioritization looks at present. So far it looks like jobs and the economy are the first priority. Immediate well-being does rule: if you can't make a living, that's trumps for any organism. But nations that already live well seem as entranced by short-term GDP as those struggling to become "developed."

We are struggling, in fact, to evolve a consciousness fitted to the dynamics of earth management. Natural selection has never honed consciousness on this level, never deselected a species because it failed to meet an adaptive challenge of this scale. The Anthropocene

introduces for humans the requirement of a new dimension of care for the earth and its life. This jostles together with the many other cares layered and prioritized in the guidance of our lives. We wisely try to avoid bringing our cares into direct either/or priority conflict. We try, for example, to fit together family and work or career, avoiding situations where it comes to an awkward “my family or my job” scenario. As we try to incorporate Anthropocene level care into our many-layered lives, learning to correct for our bias towards the immediate in our prioritization is the only way to avoid a critical either/or in which our way of civilized living hangs in the balance.

We have introduced the question of consciousness, caring, and priorities on a level that reflects individual experience. But as a social species, we have not only personal lives shaped by caring, we organize in various ways to pursue what we care about. In a monetarized economy money becomes a token for many sorts of well-being, so a major part of our organizational activity takes the shape of businesses and corporations organized to pursue profit. Some would even claim the governments we organize to shape the common well-being we seek together exist mainly for the orderly function of free markets to organize the system of competitive private and corporate businesses. But profit and consumption do not by any means fill the entire horizon of human concern and care: we organize movements, NGOs and interest groups of all sorts for the environment, human rights, education, civil rights, animal rights, and many other concerns. As we try to work out tensions and conflicts in the care that informs our behavior, what might be sorted out personally seems too often to become matters of intractable conflict on the level of our social, economic, and political organizations.

5.1.3 Organized Caring and Prioritizing

Our manifold organizations repeat on a larger scale the conundrum of competing priorities and tradeoffs that caring is subject to on the level of personal consciousness. But on the personal level we are guided by a single consciousness within which the many cares jostle and potentially overlay and cross-reference one another. This jostling multiplicity is more muted in organizations, which are created with more discrete goals in mind and are filled selectively with personnel who share the goals and further their realization. In our organizations as well as our personal lives a need for multi-layer prioritizing is clear. No human enterprise can be one dimensional, for our social complexity demands caring attention

at many levels. A business, for example, should care about its employees, its customers, society, the environment, as well as profitability. But as organizations become larger they become further removed from the flexible prioritization available to individuals and more captured by organizational purpose. So in the business world, for example, profit will tend to become the prioritizing window through which attention to the other cares will pass.

Science, the eyes through which we see into a deeper future, likewise is carried forward in multiple forms of organization. Institutionalized in academia, it is further organized into multiple disciplines and professional organizations. For those professionally involved in research on eco-systems, climate change, and other long-term consequences of present and potential human behaviors, their professional lives tend to conveniently mute our evolved tendency to prioritize the short-term. That is, their short-term professional success and daily intellectual engagement heavily prioritizes grasping causality and consequentiality on scales far removed from immediate experience. From this informed and engaged perspective, the priorities of jobs, markets, and national economies seem frustratingly wrong-headed and dangerous.

With luck, this is the period in which we manage to reshape our priorities to reflect the reality of our globe-encompassing behavior. The transition, if it is a transition, is marked by contrasting and conflicting voices too often reflecting their organization-level single-minded prioritized focus. Science, through NGOs, the media, and numerous activist groups, looks at potential doom and pushes for transformation. A deeply invested system of capitalist consumption pushes for another turn on the crank of growth to remedy our problems.

These perspectives converge in a public that knows the future looks bad a few decades down the road but cannot muster a consensus to drastically reshape the priorities that shape our lives in the short term. As the leading edge of a discounted problematic future encroaches more and more on present experience, the discount disappears and a unified response becomes more possible. But it is precisely the remove in time that offers the opportunity to modulate our effect on the earth and its life. Consciously managing the human-earth-life system will be a chronically too-little-too-late affair if we cannot adapt our priorities to a space-time scale beyond the short term frame evolution has prepared us for.

5.2 The Sixth Extinction: Speed Kills

5.2.1 The Speed Limit

At some point in life, usually in childhood, most of us have the experience of running down a steep slope. On a slope gravity adds its acceleration to the momentum initiated by our legs, and soon we go head over heels because our legs cannot keep up with how fast the rest of us is moving. It's not something we do repeatedly because the outcome is predictably unpleasant. Legs, as a system, simply never expected to move that fast, and the structural expectations of the system are a speed limit.

Every life process has built in expectations relating to the speed at which things will happen. We all know living is a timed process: laying out body structure, processing nutrients, learning, synching with seasons and other organisms, aging, reproducing, dying, virtually every aspect of organic life is temporally conditioned. And for species, the most fundamental speed limit they face is the rate at which they can adapt to unexpected environmental change. Given millions of years, fish can develop lungs and legs and crawl out of the water. Given weeks and months, some insects evolve around a farmer's pesticides. But polar bears are stumped to change life routines that depend on now disappearing ice, and coral reefs are vulnerable to a few degrees rise in water temperature. Among larger forms of life, humans have become the most flexible and rapidly adaptive species on earth, and we adapt by both modifying our behavior to fit circumstances and circumstances to fit our needs and desires. The pace and scope of that modification, as we have seen, has now become exponential, and the Sixth Extinction is populated with the thousands of species which, one way or another, cannot keep up with us. How did we get so fast?

5.2.2 The Efficient Species: Time is Money

Civilization has long been an adaptive challenge, a surprise for the land and its life. But the threshold that crossed decisively into the Anthropocene was the Industrial Revolution and the Great Acceleration in which it has culminated. With the Industrial Revolution, speed and its acceleration became a self-conscious and central endeavor of human society.

The mantra of the industrial age has been, "Time is money." Systemically the consciousness of human society began to

conceptualize, plan, and prioritize in terms of efficiency, a focus on producing more in less time. Correlated with greater productivity, “faster” became virtually synonymous with “better,” not only in factories, but throughout society. As this is being written, for example, ads hype the advent of 5G cellular, promising unheard of speeds, volumes, and instant connection of every mobile device with everything in our digital lives.

We have transferred the understanding of profitable efficiency we learned in our factories to the world of agriculture and animal husbandry. Grow more faster is the watchword. Corporate agribusiness supplants family farms with huge mono-cropping operations and economies of scale. Crops are bio-engineered to grow faster and more densely, with genetic recipes tweaked so plants expect specific brand fertilizers and tolerate the company’s pesticides and herbicides. Beef, pork, and poultry are now massively produced industrial products raised with accelerated growth and shortened lives made possible by hormones, antibiotics, and special feeding regimes. This has produced a market-worthy popular reaction as well: if you can afford it, you can now purchase hormone-free beef fed on grass or eggs laid by “free-range,” hormone-free chickens. “Natural” has become a residual high-end niche category in our food industry, but pressures for efficient production are such that one cannot look at the meaning of the term too carefully.⁴⁶

Speeding up productivity tightens the mainspring of civilization, speeding up every aspect of society. Turning out more goods faster calls for faster transportation to move them to markets, faster consumption to spur demand for more production, faster extraction of energy and resources to keep it all going, and faster communication to coordinate it all. As the pace increases, time itself becomes the most precious resource, the one thing we never have enough of. Time is even more than money.

Unfortunately the physical processes that maintain the constitution of earth, air and water now have difficulty keeping up with us. There is a rate at which the earth with its various flows and cycles can take in and recycle, but it is now far exceeded by the speed, volume and character of our engineered productivity. We double the natural budget of fixed nitrogen to fertilize our crops, and are surprised that it also produces

⁴⁶ For a striking analysis of what has happened to food production, see Michael Pollan’s *An Omnivore’s Dilemma* (NY: Penguin Press. 2006).

mega blooms of algae and dead zones where our rivers empty into the ocean. Ocean waters fill with macro plastic garbage and micro-plastic beads even as their acidity is modified due to increased carbon dioxide flows. The atmosphere fills with components we once thought went “away” when we built taller smokestacks, and now the globe has a climate in flux. The difference between a life-nurturing stream and a chaotic flood is nothing but a difference in how much water how fast. Too much too fast of anything overwhelms an organized system, and as we produce more faster we find the earth system in flood mode wherever we look.

5.2.3 Science: A New Kind of Future

Humans have always moved into a future they manipulate to suit their pursuit of well-being. Science can be viewed simply as giving us more potent means for manipulation, that is, a means for picking up the rate at which we introduce change. But that begs the question: what makes scientifically based manipulation so much more potent?

For thousands of years humans have been contriving techniques to alter the world to their benefit, learning from experience what to expect, for example, from firing clay for pottery or smelting ores for metals. But still, until a few hundred years ago, in spite of incremental change, children grew up in worlds pretty much like that of their parents and grandparents, and it was plausible to appeal to the past as a model for the future. Now we know we live in a world never before experienced, and assume that we are moving into a future that will be other than what we now experience.

The scientific method is a new form of experience, measured experience. For thousands of years merchants, traders, and the architects of monumental buildings used measures of weight and size, but it was not until the invention of pendulum clocks in the late 17th century that the temporally conditioned world of physical processes could be investigated with precision. Measurement unlocked the secrets of the universe: as Galileo exulted, “Mathematics is the language with which God wrote the universe.” The first great product of this was Newton’s breakthrough to the understanding of mechanics with his Three Laws of Motion, and we soon were investigating the “mechanisms” of everything from planetary motion to the anatomy of living bodies.

What Galileo celebrates is actually the advent of an entirely new way of moving into the future. We are a species especially equipped to invent

our future as we move into it, but prescientific humans did so at a constrained pace, wary of reaching too far beyond the patterns of familiar experience. It is, after all, the *patterns* revealed in repeated experience that enable our ability to predict and arrange a suitable future, so in traditional societies novelty was unwelcome and introduced cautiously. The first cultural impact of the measured experience of science, by contrast, was the modern notion of progress, an expectation that a continual flow of the new would lead us into an unprecedented and better world.

How could measurement liberate us to expect and to thrive on an exponentially mounting wave of change? The vision Galileo and the mechanistic physics of Newton ushered in is of a universe of predictability. There is a world of difference between expectations based on our common experience of the regular patterns of process and the kind of predictability associated with accurate measurements which reveal the precise consistency of those processes and disclose the “laws” of physics. In this newly lawful universe we can measure how it works, and know that it will work like that in similar conditions anytime and anywhere. Measured experience thus takes us beyond the constraints of actual experience: we can use it to see back to the first nanoseconds of the universe, or to confidently calculate the force that will have to be absorbed by the landing gear of a moon lander and the fuel the lander will require to return to orbit, all before we have ever set foot on the moon.

Experiment is indeed necessary to check the accuracy of our predictions and our techniques of measurement are always a work in progress, but in principle our measurements turn into models which guide us predictively into potential futures. This locates us in a vastly different cognitive space-time from life as guided by experience. The great French mathematician and astronomer Laplace gave perhaps the fullest expression to the implications of the new vision when he proposed that an intellect that could totally grasp the mechanical state of the universe at a given moment with an understanding of its operative laws would thereby grasp both its complete past and entire future.⁴⁷ In its heyday this vision of predictability promised the human grasp and rational management of laws of not only physics and chemistry but biology and

⁴⁷ See *Laplace's Demon*, https://en.wikipedia.org/wiki/Pierre-Simon_Laplace#Laplace.27s_demon, retrieved 2/17/16.

society, virtually guaranteeing Progress. In the 20th century quantum physics, chaos theory, and understanding complex systems have chastened this view of absolute determinism,⁴⁸ but for all practical purposes predictability reigns as the paradigmatic goal in the sciences.

This has left us particularly confused as we confront the unpredictability of the not too distant future in the shadow of climate change. The irony is that it is the science-based predictability and manipulability of the future that has landed us in this situation where we confront for the first time the unpredictability of whether there will even be a human future. For without the control made possible by measured predictability our incredible technological surge could not have happened. As it is, we have come to expect a continual flow of innovative knowledge producing technologies of ever greater power and reach, beyond anything yet experienced.

Our speed of innovation and change indeed produces unexperienced technologies and new lifestyles that shroud the future in a fog. In ways great and small we fashion a world of things and practice beyond experience rather than out of experience. We create weapons we are terrified someone might use. We plant seeds and create organisms the earth has never seen. We invent ways to track personal behavior for commercial purposes and use them in governments. We raise children with attention glued to screens, filled with emotions and motives from an everywhere virtual world which edges out the impinging immediate reality. It's not only climate change. We live beyond our experience amidst a flood of change portending consequences about which we have no reason to feel secure. We look to experience to get our bearings and tell us where we are headed, and come up blank.

5.2.4 Beyond the Speed Limit

With an exponential escalation of all sorts of productivity in the last few hundred years we have enabled an overall better standard of living for a larger human community than any time in the history of our species. We have become very good at measuring all sorts of social parameters, and by virtually any measure—life span, infant mortality, death by violence

⁴⁸ See Mobus and Kalton, *Principles of Systems Science*.

(war, terrorism, crime), poverty, starvation—we live in the best of times.⁴⁹ Not that there are not plenty of problems in all those categories, but the problems are being measurably reduced. Yet in the most advanced and comfortable societies on earth there is a deep uneasiness: citizens do not feel things are going well, and are not impressed by statistics that would have caused an earlier era to break out in accolades to progress.⁵⁰

The widespread insecurity and malaise of contemporary society is disproportionate to our experience of shattering events such as the twin towers going down on 9/11, ill-conceived and protracted wars, or the near melt-down of the economy—disproportionate at least if one thinks of them as the kind of mistakes from which we learn so as to mitigate their recurrence in the future. But not so disproportionate if we suspect that this progressive model of learning from experience has itself been undercut, leaving us rather with a feeling such events are but tokens of an oncoming unraveling. Apocalyptic religion and dystopian science fiction and fantasy are having their day.

At the root of this feeling of foreboding is that we humans, the species supremely equipped to see into and manipulate the future, now have reason to feel we are moving into an increasingly opaque future. Like other processes, the process of entering the future guided by experience has a speed limit. The limit in this case is simple: the future in question must be sufficiently similar to the world experienced that the experience is a valid guide. We know that too rapid change is the way we invalidate the selective experience accumulated in the gene pools of species when their young are born into surprising worlds with which they can no longer cope. Human culture changes and adapts far more quickly than the self-organizing world of ecosystems, but in the final analysis, it too is subject to its own experiential speed-limit.

Experience is the basis for expectations regarding the future. As discussed above, science and technology transcend that constraint, but

⁴⁹ See Harvard psychologist Steven Pinker's 2018 book, *Enlightenment Now: The Case for Reason, Science, Humanism, and Progress* (NY: Viking Press).

⁵⁰ See for example, Leif Wenar, "Is Humanity Getting Better?" *New York Times*, February 15, 2016, http://opinionator.blogs.nytimes.com/2016/02/15/is-humanity-getting-better/?nl=todaysheadlines&emc=edit_th_20160215&_r=0, retrieved 2/16/16.

experience is still our natural resort for dealing with a potentially problematic future. Moving too fast, changing too rapidly, has the double effect of leaving too little time to interpret and absorb the meaning of what we have experienced and suggesting the future may be too different for it to apply anyway. Having outrun any experiential basis, we are left with a feeling we have been engaging in a vast experiment the consequences of which we do not yet know. The security and optimism that comes from the feeling that we know what will work or how to fix what does not work as we move into the future is increasingly rare.

Science and technology have enabled our acceleration into the Anthropocene. After less than 300 years we have reached such a rate of exponential change that it becomes impossible to base ourselves on experience to anticipate the future into which we are moving. The systemic brakes seem worn to the point where we are pushing up against human psychological limits, giving rise to extreme reactions to the increasingly unstable, unpredictable, and insecure conditions of the human world. On one level, we transform the world impelled by our enthusiastic desires, while on another we seem to have arrived at a place we neither intended nor would wish. To understand how this came about, and to grasp the potentials for an unfolding future, we must now turn to examine more deeply the nature and the shaping of the motivation that guides our conduct and informs our behavior.

Chapter 6. Motivation and Guidance: How do we know where we're going?

The unexamined life is not livable.

Socrates

If you don't know where you are going, you'll end up someplace else.

Yogi Berra

6.1 Introduction: Where are We Now?

The human species is on the move. In comparison with any other creatures of size, we are incredibly fast. Motion, however, has a direction, a trajectory. Where, then, are we going? Socrates felt this an essential question because he thought we are most human when we live intentionally, and you can't do that without giving big questions some thoughtful examination. Where are we going, and why? Or, where do we want to go, and why? The second question offers a course correction, guidance, but only if we can also answer the first. Yogi Berra sums up the consequences of the unexamined life for us.

If you are headed somewhere, but don't know where, then you cannot assess even the here-and-now, for "here" is really just a moment on that path. So where do we think we're going? Well, what is the road to this point? A mere 150 years would take us back to a world before automobiles, asphalt roads, and airplanes. It was still the dark ages, with evenings lit only by various sorts of flickering flames; no electricity and electric lights yet. A person familiar with the most sophisticated technology of the times could still not imagine the speed, convenience, and consumer abundance available today to middle class populations of advanced economies. It's been quite a trip!

This last 150 years has seen the exponential growth of virtually everything associated with humans. Some observers look at the explosion of knowledge and technology that has enabled this surge and project a world of even greater, more unimaginable bounty awaiting us 150 years down the road. So for them "here" is a moment on the path to ever more and greater accomplishment and prosperity; we are well on

the way to the “better world” promised by the 18th century Enlightenment.⁵¹

In this vein, Disney’s famed Epcot theme park celebrates the stunning technological innovations produced by human genius. Its centerpiece is a large geodesic dome representing Spaceship Earth. In the technology-confident latter twentieth century, the image of earth as a spaceship was frequently invoked as an admonition that there are only finite resources on board so we must husband them carefully and use them wisely. But Epcot’s celebratory spirit reflects the abundant confidence of techno optimists: human inventiveness is essentially unlimited, so we will always devise a substitution for what is in short supply.

But as we have seen, that optimism is on the wane. Opinion, even at the popular level, has become darker. The technological utopias of mid-twentieth century science fiction have become the dystopias of twenty-first century fantasy and sci-fi. Even while Epcot and the celebration of our innovative genius remain popular, our deeper understanding of environmental complexity and the repeated experience of being blindsided by unforeseen consequences of our actions has chastened us. About two out of three Americans now expect life will be more difficult for the next generation, and this view is shared by the populations of 10 of 13 economically advanced countries.⁵² We are too used to a trickle of headlines such as the two that appeared this week as I worked on the first draft of this chapter: “Seas Are Rising Way Faster Than Any Time in Past 2,800 Years,”⁵³ and four days later, “Decline of Pollinators Poses Threat to World Food Supply.”⁵⁴ And as I return for a second draft: “The Insect Apocalypse is Here: What Does it Mean for the

⁵¹ Pinker (2018).

⁵² Andrew Kohut, Pew Research Center, “What will become of America’s kids?” <http://www.pewresearch.org/fact-tank/2014/05/12/what-will-become-of-americas-kids/> retrieved 2/26/2016.

⁵³ Associated Press, FEB. 22, 2016, <https://apnews.com/7108567e23c44cb68711046f1dfb9ad0>, retrieved 2/26/16.

⁵⁴ John Schwartz, “Decline of Pollinators Poses Threat to World Food Supply, Report Says” *New York Times*, Feb. 26, 2016, <https://www.nytimes.com/2016/02/27/science/decline-of-species-that-pollinate-poses-a-threat-to-global-food-supply-report-warns.html>, retrieved 2/26/16.

Rest of Life on Earth?”⁵⁵ These are the kind of things that seem like consequences of our technology, and for which there is likely no techno-fix.

If we no longer see much of the spaceship earth image, it is probably because even if we keep such news only on the margins of consciousness, it saps a confidence we once took for granted. An implicit assumption of the spaceship earth metaphor is that we are its pilots, but that role for humans has begun to look more questionable. The case now, with the clarity of hindsight, is that spaceship earth came with a fine autopilot of its own, and perhaps we'd all have been better off if we had never grabbed the controls.

But we did and here we are in the Anthropocene. Everything has become so responsively wired to the vision and desires of our minds and hearts that we cannot pretend that we do not have extraordinary influence over the trajectory of the whole system at the moment.

I would suggest another image might be better suited to portray our situation. We are like a man walking home on a path by a frozen river who decides it would be more convenient to take a shortcut across the river. Things go fine until he gets to the middle and suddenly hears cracking sounds. He hadn't thought about the unpredictable things flowing water does under a sheet of ice. He can't just go back. He can't just continue his carefree tread. He is not in control of the situation, but how he handles his weight has a lot to do with outcomes. Suddenly he is all ears, listening for guidance in the cracking noises that accompany the tentative movements of his feet one way or another. If he listens carefully and is lucky, he might make it across, but it certainly won't be in the efficient, carefree, maximally convenient straight line he had been travelling.

About 8,000 years of civilization have landed us in just such a tricky spot. We can't simply withdraw the awkward weight of human intentionality we have worked into the lineaments of the earth, nor can we just behave as if we don't hear warning cracks. There was probably a lot of cracking we didn't pay much attention to, but now that it has our attention we suddenly are desperate to learn how to interpret what we

⁵⁵ <https://www.nytimes.com/2018/11/27/magazine/insect-apocalypse.html>. Retrieved 11/28/18.

hear. For there is guidance in the cracking, a message about what works and doesn't work, if we know how to listen.

The question is how to move on from here. Our weight is such, there will be cracks, but if we move slowly enough and listen well enough, maybe the cracks will not join together and end the journey in a great crash. We know we tend to move too fast, and we know our listening, our caring, is not adequate to predict much ahead. We're getting ratcheted back from facile predictive goal setting to attending to feedback from experience. We will never become the rational, mistake-correcting animals of homo sapiens mythology, but by understanding the inherent limitations of our guidance and of our attunement to it, we might make smaller mistakes that we can survive to learn from, rather than the major ones that join up and terminate this amazing journey.

The question of attending to guidance, or what kind of guidance we attend to, is intimately bound up with priorities. The shortcut across the river looks good when the priority is ease and convenience. But ease and convenience are trivial when basic survival is put in question. In the last chapter we have already discussed the complexity of prioritization we face as we allocate our attention, time, and resources. One of the most frustrating things about climate change, for example, is that, given time we have the capability to avert the worst of it, but we continue to prioritize the short term and fritter away the time we need.

Our evolved tendency to focus on the short-term is only one face of a guidance problem that has deeper systemic roots. Human motivation is many-layered and flexible, but its wellspring is shared by everything alive. Guidance structured into the motivation that moves other creatures seems to work well enough, while for us, even after we sort out and prioritize the complexities, being actually moved to act accordingly is often a hard-won victory. To understand this, we need first to look at the phenomenon of motivation itself, and then consider the ways civilization has intervened and redirected this function to become the kind of motivation that now animates and guides our responsive behavior in society.

6.2 Life, Well-being as Motive Force

Every living organism is motivated. Being alive is itself a motivated condition, for life is a complex performance aimed at a never-to-be-taken-for-granted consequence, staying alive. This is the inherent

intentionality of metabolic function within and of interaction with the environment without. Motivation is there all along, structured into organic constitution and behavior. It became visible when cells evolved wiggling tails that could propel them through their environs. Having motion, the question becomes where do you want to go, that is, what is your motivation. For the single-celled swimmers, the answer is typically towards lunch or away from becoming lunch. Or in the broadest terms, the quest is for success in maintaining one's life in a flourishing condition and to avoid its degradation or termination, that is, failure. *The maintenance and flourishing of life is thus the organic foundation of all motivation*, the mainspring of all derivative forms. This is "well-being," in distinction from the "ill" condition which arises when the dynamism of life fails.

Another term for this kind of motivated dynamism is "interest." Conscious or not, life is a dynamic process inherently interested in its on-going well-being. This brings us close to the commonplace notion that self-interest is the base of all motivation. That is a half-truth. It is true in the sense that if no units called "selves" had arisen as looping processes that maintained themselves as evolving centers for maintenance and motivational reference, there would be no motivation at all, no well or ill, no good or evil to be discerned. But self-interest does not remain a simple phenomenon, for "self" itself has proved a wonderfully dynamic kind of organizational center.

6.3 Complexity of "Self" Interest

If selves had remained packaged in rudimentary prokaryotic single-cell units, the common notion of self-interest would remain a rock-bottom verity. But we progress from there to nucleated cells populated by those prokaryotic single-cell units. And then on to multicellular organisms made up of nucleated cells, and then further still to communities, bands, herds, hives and nests, families, churches, corporations, governments, nations and more. In ascending complexity, each of these larger selves is made up of what comprise whole self-units at a lower order.

So units which in some respects are wholes in themselves, aggregate into larger units which in turn take on self-referential dynamics as wholes at another level. At each level, self-maintenance dynamics entail an appropriate version of well-being which constrains self-maximizing on constituent levels accordingly. Cells in an organism do not get to

maximize their potential lifespan, but must die off and be replaced roughly on schedule. The well-being of an ant colony is different from the individual well-being of any of the ants that make it up. The well-being of a human family, village or community is different from the well-being of its members, and the well-being of nations may depend upon the willingness of individual citizens to die in its defense. These many layers of well-being may overlap and mutually reinforce, but they also may be in tension and competition with one another.

Cells in multicellular organisms and social insects can be hard-wired into an intricate organization of differentiated roles, body types, and behaviors in a way that maximally serves the well-being of the whole to which they belong. But as we have seen, humans are at the cutting edge of an evolutionary trajectory loading individuals with capacity to deal with situations by consciously mediated flexible responsiveness. And at the same time we have also evolved to become the most social of all such species: our inborn dispositions to take care of ourselves are complemented with dispositions to be sensitive to and responsive to the interests that arise as complex social organization advances. The result is that we act with a consciousness able to join in a collectivity of consciousnesses combined with an individuality always primed to take care of its own well-being as well. This means that in our layers of complex nested organization, lower level interests will never be completely subordinated to the next level.

The more loaded up the unit level with flexible self-direction capacity, the more complex it's interface with the higher levels. The question of small government versus large government in relation to the "freedom" of self-maintaining individuals is a source of endless debate and negotiation. At a mid-level, business enterprises have responsibilities to local and national communities above and must take due care of the well-being of workers below. But we are all too familiar with the way a given level's dynamic to pursue its own well-being gets distorted into an interest-maximizing dynamic that distorts systemic balance. Thus we easily find examples of profit-maximizing corporations that fight unions, exact tax breaks from communities, and simply move their business and jobs offshore when the profits look significantly better. The same goes for any level, from governments that steadily expand their authority, to charities that spend more on their organization than their causes, to committees that keep creating new work for themselves, to individuals ready to exploit anyone or anything for their personal enhancement. The stories

of interest-maximizing dynamics skewing into dysfunction are commonplace.

6.4 Managing Interest-Maximizing Dynamics

The question of priorities and tradeoffs among these many levels of well-being and interest or motivation is always complex, shifting not only from situation to situation but from perspective to perspective as well. Gene pools rolling forward the latest adaptive models of whatever has been working manage the multi-level tradeoffs with the blind dynamic of mutual constraint. Although organization is complex, the trade-offs among species, herds, layered forests, groves, flocks etc. and all the individual organisms that comprise them, are constantly negotiated and selectively shaped for how well it works with all the others.

To some extent socio-economic systems are subject to the auto-organizing dynamics of mutual constraint evident in ecosystem formation. Such, in fact, is the theory of the free-market system, or the balance of power theories of government and international organization. Everybody on every level busily pursues their interest and is constrained by all others doing likewise. But the churn in human culture is incomparably more rapid, tumultuous, and complex than in ecosystems.

The critical difference here is that the dynamic of mutual constraint in human systems is partially the product of minds that organize with strategic foresight. The same cognitive abilities that moved our strategizing beyond the systemic mutuality of constraining ecosystems also functions with regard to our own inter-human mutual constraints. Individuals and groups constantly chaff and work to strategically get around constraints perceived as not in the interest of their well-being. Insofar as money has become the token for well-being as the world is now organized, we find waves of money constantly eroding barriers to making more money. This is the reason that any set of regulations we set in place for the financial world, for example, will need regular revision to take account of the ingenious workarounds that clever strategists will devise as they pursue faster more productive routes to more money.

If this sort of short-sighted self-interest was all there is to human motivation we would be too corrosively clever to sustain complex organization in the first place. But our evolution as a social species has selected also for forms of motivation attuned to communal well-being. This motivation, often voiced in moral terms of good and evil, does not

supplant the more direct form of self-interest, but it buffers it and allows a kind of dialectic between our social and individual selves.

Chapter 7. Mediated Motivation: Technology and Finance

The competitive rules of the free market destroyed complex social relations of mutual obligation and undermined deep-seated norms and values such as civic engagement, reciprocity, and redistribution.

Manfred B. Steger,

Every organism makes its living by interaction with its environment. The environment signifies sources of nutrition, safety, reproductive support and correlated dangers that go with the many ways these supports may fail. The pruning blade of natural selection keeps motivation adjusted to a tolerable fit with local environmental conditions, that is, conditions that impinge on the organism in the course of its living and reproducing. For, as we have seen, being guided in ways that enable well-being is what motivation is all about in the first place.

Except for us. The systemic dynamics of fitness shaping motivation remain applicable, but for “the pruning blade of natural selection” we would have to substitute “the pruning blade of cultural selection.” That selective shaping force is now almost entirely a human creation, far-removed from the natural environment. Our own minds produce the shape of the human world, and the world we shape in turn feeds back to shape our minds. In particular, our technology now mediates virtually all human interaction with the world. And technology is in turn mediated by money, which has come to centrally mediate the now commodified world of human interaction. Refracted through these two mediations, human motivation becomes an uncertain guide, in dire need of a triangulating reference to the natural world in order to become again a producer of well-being.

7.1 Technology

Physical, chemical, and biological flows shape and support life on earth. The biological layer, motivated by the organic thrust of a myriad kinds of organisms towards maintaining and refining their well-being, gets physics and chemistry to do things they would never do otherwise. Maintaining a reasonably constant body temperature in warm blooded

creatures is a metabolic example. Blue-green algae photo-synthesizing the world into an oxygen-rich atmosphere (and a mega ice age to boot!) exemplifies an external effect. There is great non-calculated craft in this evolutionary process. But it is widely distributed through the multiple gene pools and relatively slow in its global consequences. The blue-green algae's Great Oxygenation, for example, radically changed the whole earth system, but it was an event that transpired over millions of years, not decades or centuries.

Loading up organisms with consciously mediated sensation to move with flexible strategy into their futures introduced into the system of life the faster kind of calculated craft the Greeks called *techne*. By human standards, the craftiness of most of the creatures on this evolutionary trajectory has been quite modest, generally connected with basic needs such as getting food and constructing shelter. Chimps use shaped twigs or straws to go after termites, and pound hard nuts with rocks to get at the meat. Seagulls open clams by dropping them from a height upon rocks, using gravity instead of muscle power for the hammering effect. Big-brained killer whales have flexible, coordinated and sophisticated hunting techniques, but they do not have hands, and even if they did, their environment does not afford them the use of fire, which is the key to really opening up what a calculating mind can do with physics, chemistry and biology. We are the only big-brained species equipped to manipulate these physical, chemical, and biological components of the earth in a suitably flammable environment.

Living at the exponentially surging peak of technological development, it is hard for us to imagine how laid back our early ancestors were about this ability to come up with better and better (there is no technological "best") methods for realizing our dreams. The earliest technology we know of, flaked stone hand axes, date from about 2.6 million years ago. They occur in many shapes, but the technology of their manufacture and the quality and use of the product underwent little change for the better part of the next 80 thousand years.⁵⁶ Fire may have been tamed by humans as much as 400,000 years ago, and was certainly a common feature of human life by about 125,000 years ago. But for hundreds of thousands of years it's use remained much the same: cooking food,

⁵⁶ Mode 2 stone tools produced with improved techniques came in with the Acheulean, about 1.8 million years ago. See https://en.wikipedia.org/wiki/Acheulean#Acheulean_stone_tools, retrieved 3/10/2016.

providing warmth, perhaps sometimes as a hunting technique to flush game. If you have sharp stones to cut up meat and scrape hides, a fire to cook with and sit around, what else do you need? This is the hunter-gatherer life anthropologist Marshal Sahlins describes as that of “uneconomic man,” a human condition of limited wants and abundant means.⁵⁷

After over 2 million years of uneconomic man, economic man, s(he) of “infinite wants and limited resources,”⁵⁸ as described in classical economics, emerged with agriculture and the settled life of civilization. Once we settled in stable populated locales, accumulation of resources became a way to differentiate a complex hierarchical organization of roles, classes, and power, all of which adds up to a new way of allocating well-being. And in the climate of the new thinking and motivation that went with this emergent civilized structure, technology took off. Fire turned clay into pottery, ore into metals, potters wheels became cart wheels, and within 8,000 short years we were riding and transporting not in carts but automobiles, trucks and airplanes, and we even perched ourselves in the nosecones of tall cylinders of metal to ride pillars of flame to the moon.

This spectacular burst of technological understanding and energy was not the product of any new brain power. Homo sapiens with pretty much the intelligence of our contemporaries had been around for about 190,000 years prior to the Neolithic Revolution. It was not the brain but the structure of human society that changed, and that change brought with it new ways of thinking and a transformation of our motivation. As ever, motivation has remained on the deepest level a quest for well-being, but well-being in a civilized context starts to become more and more a human strategic achievement than a gift of nature, and with that everything changes.

Productivity offers one window on the change when we started to do agriculture. The difference is not in the sudden abundance of food: as mentioned earlier (2.3.2.2), early agriculture was a step backward in the variety, quality, and quantity of human food consumption. The difference

⁵⁷ Marshal Sahlins, “The Original Affluent Society,” (ch. 1 of *Stone Age Economics*). <http://www.primitivism.com/original-affluent.htm>, retrieved 3/10/16.

⁵⁸ The “basic economic problem,” as described in classical economics. See *Economic Problem*, https://en.wikipedia.org/wiki/Economic_problem, retrieved 3/16/16.

was really in who did the producing. Hunter-gatherers make their living literally free-loading (loading up for free) on what nature produces. Sure, they have to do *something* to make a living, but reaping what is freely offered by the environment is a far different matter from making it be there so you can reap it. Agriculture (and domestication of animals) is the epoch-changing step of making the food we eat a product mainly of our own labor, the harbinger of taking the world into our own hands.

Agriculture could be called the definitive control-revolution, the moment we took the essential item in our daily sustenance under our own control. This was the door that opened on a new mentality, the notion that we produce our own well-being by means of our labor. Agriculture enabled humans to settle down in large communities with varied needs calling for new and specialized skills: record keepers, architects, builders, logistical planners, carpenters, all sorts of crafts (the Greeks called them *techne*—whence “technology”) and trades arose in the new city-states. In common with agriculture they shared the connection between making a living and doing some sort of labor, that is, producing one’s own well-being.

Well-being as the product of our own labor and cleverness rather than the free-gift of nature becomes the hallmark of the human endeavor that will eventually become technology. After 190,000 years of living in a manner strongly shaped by the constraints of what is offered us by the natural world, homo sapiens turned attention to producing a world of human-making that will be livable for human beings.

In both its rural and urban forms a civilized version of the world requires continued input of human labor and craft to produce a good human living. The goal underlying civilized technology is the enhanced livability of a human world, with livability now understood as achieved by transforming the natural world rather than by better fitting in with it. In this way technology and its products become a mediating layer that insulates the human world from the constraints of nature.

The full cognitive revolution launched with the introduction of agriculture-based civilization did not happen all at once. We who now view technology as the center of our civilization might be surprised to hear that the term in anything like its present meaning did not even exist until the mid 19th century. Up until the Industrial Revolution, the human world, for all its skills and techniques, still moved mostly within the limits of organic power. We had learned to harness the energy of wind and flowing waters, and our levers, gears and pulleys could raise great stones, our iron plows could cut deep furrows, but in the final analysis

the energy making things happen was largely provided by the living muscle of humans and their domesticated animals. The introduction of the steam engine, and the understanding of how to create electrical energy, opened never before imagined vistas of human control.

For thousands of years after beginning to think in terms of control we thought of the world as in the control of the gods or similar transcendent sources. But by the late 18th century when Ben Franklin observed that “God helps those who help themselves,” the pseudo-religious injunction for humans to take control of their own well-being rang so true many still believe it must be in the Bible somewhere. When Francis Bacon had elaborated in the early 17th century what came to be known as the “scientific method”, he had spoken of it as a way in which mankind could subdue nature. Now, as the new science bore fruit in steamships, locomotives, and the telegraph, we began to think of anything that constrained or inconvenienced us as a challenge of methodology: there must be a better (=faster, easier, more efficient) way to do it. This is what Jacques Ellul has identified as the advent of the “technological mind,”⁵⁹ the mindset that automatically looks for a technological fix to make life better.

By the latter half of the 20th century talk of subduing or conquering nature pretty much disappeared. Perhaps, having conquered, we didn't like what we were seeing. Species disappearing, coral reefs bleaching, fertilizer runoff from industrial farms polluting rivers and creating dead zones at ocean deltas with fertilizer runoff, smog, acid rain, and then to top it all off, global warming! By 1982 Dupont finally dropped its famed "Better Things for Better Living...Through Chemistry," slogan. What was a plausible selling point when it was introduced in 1935 by the 1980s sounded like an ironic comment on naive overreach. In 2009 it was estimated that a new chemical substance was invented every 2.6 seconds, 24/7.⁶⁰ Since the 1970s coal mining in the Appalachians by MTR, Mountain Top Removal, (just put the leftover mountaintop in the nearest valley!) has been a preferred technology (more efficient), though

⁵⁹ Jacques Ellul, *The Technological Society* (NY: Vintage Books. 1964). Ellul was one of the earliest social thinkers to pinpoint and describe the problematic centrality of technology in the contemporary world.

⁶⁰ The estimate of Dr. Hideaki Chihara, Ph.D. chemist and former president of Japan Association for International Chemical Information, *Wired*, 9/09/9, <http://www.wired.com/2009/09/humans-have-made-found-or-used-over-50-million-unique-chemicals/>, retrieved 3/23/2016.

now it may be slowed by the natural gas boom unleashed by our new fracking technology.

And so the story goes. In the Anthropocene, the technological mind reigns supreme in both our fears and our hopes. We know that our technologies, like medicines, come with side-effects, unwelcome baggage accompanying the improved well-being we were aiming at. The simple rule is that in a complex system you can never do just one thing, whether it is popping a pill to feel better or filling a valley with debris to more efficiently get at a seam of coal. When the side effects are too severe, the technological mind looks for a new, improved technique to intervene and remedy the situation.

As the shadows of the unintended consequences of our technological mastery have lengthened, we see more clearly the questionable nature of a strategy of simply outwitting the constraints natural systems impose upon us. But having built a globe-encompassing market-consumer civilization on the basis of efficiency, speed, and convenience, we have also created ourselves as innovating, science informed, technology dependent beings. This genie does not go back in the bottle—and the old bottle is no longer there even if it did want to go back. We are one with the citizens of California who want to restore the wilderness by reintroducing grizzly bears—but only equipped with GPS collars so they can be tracked and dissuaded from venturing too close to human habitat.⁶¹ Our cultured technology cannot but interpose even in our attempts to find again the original community of life.

7.2 Money

Technology works in synergy with money, the second and perhaps most obvious mediating redirection of our inherent motivation towards well-being. We could amend our above description of the “better” sought by the technological mind to read, “the search for a more efficient, more profitable way of doing things.” And when we pursue technologies that on the face of it work against the well-being of both humans and the

⁶¹ See Daniel Duane, “The Unnatural Kingdom,” *New York Times*, 3/11/16, <http://www.nytimes.com/2016/03/13/sunday-review/the-unnatural-kingdom.html>,

greater community of life, or when we pursue paths that pose great risks, the reasons given almost always are economic.

As the most sociable primate species, we instinctively work out our personal well-being as a cooperative project. Even now at the level of family and true face-to-face community we divide labors and take care of one another in a non-monetary mode of exchange. But with agriculture and the emergence of city-states, the network of exchanges became both more complex and less personal. It was not long before Sumer, the first civilization, came up with clay tokens and then silver coins as symbolic media for various sorts of exchanges. In the contemporary human world, most of the necessities for basic well-being, such as health care, food and water, housing, clothing, education and entertainment are delivered as commodities: they come to us for a price by way of a globe-encompassing system of production and consumption.

We are at the apex of a six-thousand-year development, a seemingly inexorable process of networking the globe and permeating social life with a market system maintained by financial flows. But it was only in the 1850's that the word "job" assumed its present usage, as in "Get a job," or, "She has a really good job." To us, money has become the essential means for realizing all sorts of well-being, and having a job is the fundamental way to make money. We are now organized in a way that the association of well-being, money, and a job is taken as the self-evident reality of the way humans make a living. James Clifton, chairman and C.E.O. of the Gallup Poll organization, puts it this way:

The primary *will of the world* is no longer about peace or freedom or even democracy; it is not about having a family, and it is neither about God nor about owning a home or land. The will of the world is first and foremost to have a good job. Everything else comes after that.⁶²

Money is an eminently useful abstract symbolic quantification of exchange value, mediating our consumption of all kinds of goods and services and the labor by which they are produced as well. Work

⁶²From his 2011 book, provocatively titled "[The Coming Jobs War](http://www.nytimes.com/2016/03/24/opinion/dangerous-world-serious-leaders.html?_r=0)," as quoted in the *New York Times*, http://www.nytimes.com/2016/03/24/opinion/dangerous-world-serious-leaders.html?_r=0, retrieved 3/29/16.

“industriously” at a good job and you and your family can have a good life, i.e. abundant well-being. With money as medium, all sorts of productivity can be rewarded and encouraged, and as the variety and quantity of productivity grows, the variety and abundance of available human well-being increases. Where would we be without the stimulus of this incentive? And since money is a pure symbolic quantity, unlike the necessarily limited nature of actual, consumable well-being, it is a form of motivation that keeps on motivating: there is no inherent “enough” to shut down the draw by which clever millionaires keep working hard (and producing jobs!) to become billionaires.

Such is our comfortable view of the role of money in guiding and shaping our lives. But while money plays such a major role in human motivation, it is noteworthy that nothing remotely similar guides the conduct of any other form of life. It is easy to write this off to the fact that no other forms of life seem to have developed the symbolic sophistication to monetarize their needs. But our familiarity and ease with abstract symbolic representation should not blind us to the extraordinary systemic consequences of introducing this quantified, abstract symbol of exchange value as a motivating, guiding medium in the way we go about pursuing a life of well-being. Money as motivation injects a strange, unpredictable, and uncontrollable dimension into human affairs.

7.2.1 Strange

The strangeness of money as a motivation for a living organism is that it is a powerful motivation that offers no guidance. Well-being, at the heart of all motivation, guides activity in an inherently normative way. Though for humans especially it may have a myriad dimensions and complex paths of achievement or maintenance, there is a directionality involved, a norm that differentiates between well and ill in any of those many dimensions. “Health,” be it physical, mental, social, economic, or whatever, is the term we use to reflect our awareness of this qualitative normativity and its content for guidance in living systems. We write books guiding us to healthy lifestyles, healthy diets, healthy relationships. In contrast, money, as an abstract unit of exchange value, motivates as a quantified token of all sorts of well-being, but its guidance is purely quantitative, for in itself it has none of the inherent qualitative content of the potential well-being from which it gets its motivation power.

The search for a money-mediated well-being gives a systemically unique cast to human organization and activity. We observed earlier the complexity and trade-offs among sorts of well-being that may apply at different systemic levels. Humans must negotiate such value tradeoffs constantly as they move into futures they shape with anticipative consciousness. Often money is the quantified medium for the calculus of tradeoffs, as when we work out budgets or make choices at the mall. But the twist is that money does not remain a simple quantifiable medium of exchange: it migrates in our value awareness to become a value in itself, one of the players among the value tradeoffs being made.

When money itself enters the field of consideration as a value being weighed against other values, the playing field is by no means equal. Any of the concrete items that constitute well-being are particular, as are the related abstract categories of well-being to which they belong such as health, food, security etc. But as a quantified abstraction of exchange value, money includes the whole range, and yet, as we consider trade-offs, it may be treated as another concrete value competing like any of the others.

This puts the conduct of human affairs in a category of its own. We are accustomed to attributing our uniqueness to the complexity of the decisions by which we navigate a path in life uniquely rich in options. We enjoy and create novelty as no other creatures, for the inner voice of symbolic linguistic narrative allows us to entertain a relatively unconstrained range of possibilities as we enter the future. But equally or even more distinctive, money, the uniquely human motive offering nothing but quantitative guidance, regularly plays a major role in what we decide. For example, year after year, in the neighborhood of 30% of the graduating class of Harvard University heads off to Wall Street for careers in finance and consulting.⁶³ Why would the best (or most advantaged) and brightest, with the prospect before them of all the world needs and all it has to offer, choose to spend their lives this way? Maybe the prospect of six-figure starting salaries has something to do with it.

Being strongly motivated by a force that offers no inherent qualitative guidance weakens the learning feedback loop that characterizes complex adaptive systems. Not that we do not learn with an agility

⁶³ See article in the *Harvard Crimson*, <https://www.thecrimson.com/article/2016/2/17/-Wall-Street-Problem-Morris/>. Retrieved 2/16/17.

unmatched by any other creature, but our learning is no longer constrained to track closely with our well-being. If my back exercises do not help my lower back pain, I seek new ones. If my diet puts me at risk for diabetes, I am motivated to correct it. But feedback on cash flow has no corrective guidance relating activity and well-being. We may give up careers helping others because it does not pay enough. We may get coal by dumping mountain tops into valleys because it is most profitable.

If one probes the motivation forces that organize the natural world, well-being is the rosetta stone for making sense of every sort of organization and activity. When we hear of lemmings rushing into the sea, or of some species of female spiders that dine on their mates immediately after fertilization, we assume there must be some contribution to maintaining life and/or procreation and try to understand what it may be. But when we observe humans and human organizations behaving in ways that appear to beget ill, we can make no such assumption: often enough one need look no further than the money it produces. If human society seems strange in how often and how far it can deviate from the logic of well-being, the guidance-free motivating power of money makes sense of a large part of the strangeness.

7.2.2 Unpredictable

As a quantified unit of exchange, money crystalizes two characteristic features of human civilization. First, the quality-free quantification of money serves the tendency of settled societies to prize accumulation, even as it removes the constraints on quantity inherent in the possession and consumption of concrete goods. Second, as both a unit of and an incitement to exchange, it enables the most social of big-brained creatures in enveloping the world in a freewheeling exchange of matter, energy, ideas, and labor in an interwoven and accelerating modification of the globe in line with human vision and interests.

But to say that we are engaged in a “modification of the globe in line with human vision and interests,” is perhaps an over-simplified generalization. For the notion of vision and interests suggests that humans, like all other living creatures, are in the final analysis motivated to seek their well-being. Even if this were the case, given the reach of our technological prowess, it would amount to a problematic shaping of the world by the limited consciousness of a single species, a human maximization that would challenge the adaptive capacities of the community of life. But in fact, the case is not that straightforward, for the

tendency towards the shorthand equation of well-being with money clouds the function of vision. As we observed above, qualitative well-being involves a normative, guiding content, whereas money does not. The vision and practice of what is truly in our interest is constantly put in question when there is a strong profit motive in the picture.

We have become used to living with misgivings about the profit motives of institutions and individuals, and we have routinized our awareness of this loose link in our motivation. The ancient Romans already made the expression “caveat emptor (let the buyer beware)” a commonplace, and we often observe—without taking it too seriously—that “money is the root of all evil.” Indeed, it would be hard to say money is the unique source of our problems; human judgement in the complex pursuit of well-being is full of pitfalls. But money does introduce a systemic ambiguity and unpredictability throughout human conduct. The jobs which are our livelihood involve both the work described and the payment, and an eye on the money can easily subvert the integrity of the work performed. When money is tight, as in the Third World, buildings and bridges may crumble unexpectedly because someone was shorting the specs on cement or reinforcing rods. Where money is plentiful and organization more sophisticated, games just get more complex. Analogous to shorting cement and reinforcing rods, the richest financial institutions in the world marketed bundled subprime mortgages as triple-A securities, a critical shorting of the information on these products that in 2008 almost brought down the world’s financial structure.

The large corporate segment of our social organization dedicated to making money is not intentionally inimical to well-being: in general, providing goods and services for what we think of as our well-being is also the best way to make money. But even well-intentioned endeavors need continual course correction, and once we organize profit and jobs around something, it becomes especially resistant to corrections that cut into profit (politically protected as a matter of “jobs”). Such phenomena as mono-cropping industrial agriculture, the destruction of rainforests, the distortions of the pharmaceutical and medical industry, or the environmental recklessness of mining and fossil fuel industries, all richly illustrate the systemic organizational tension between providing for human and non-human well-being and the value-free motive to make (more) money.

Life systems originated and have subsisted as systems of mutual adaptive constraint. Our technologically enhanced strategic flexibility has rendered us eccentric to the immediate constraints of the natural life

system, but in the final analysis, the mandate for adaptive fit is inescapable. Our ability to seemingly go our own way really means the rest of the life community is increasingly constrained to adapt to us. As always, the price of maladaptation in the life system is individual death and eventually species level extinction. Now few creatures of any size can adaptively match the moves we make as we pursue wealth and well-being. If other creatures cannot adaptively keep up with us, the systemic burden of adaptive behavior shifts proportionately to us.

Adaptation should be the predictable consequence of learning. We humans adapt by conscious adjustment as we move into an anticipated future. For creatures that learn from experience, missteps are occasions for improvement. As our predictive anticipation has become more accurate, we should be able to guide ourselves to a better adaptive fitness with our global environment and life community. We now understand our problematic impact on life and earth systems as never before. But we find that our predictive anticipation of disaster routinely outstrips our ability for adaptive modification. Climate change is, of course, the poster-predicament for our deer-in-the-headlights inability to match vision and action for well-being. When the question of correcting what we are doing is complicated by bifurcation into future well-being versus how much money we make by doing what we are doing, it seems as if our very capacity to realize ongoing well-being by adaptive foresight is undercut.

7.2.3 Uncontrollable

In the natural world motivation is a mechanism of controlling guidance, a way in which creatures find and maintain well-being. As conscious processes take over more and more from hard wiring in more complex organisms, the basic attraction/repulsion features guiding behavior become more and more packaged in the experience of pleasure and pain. Natural selection is sufficient to keep such proclivities on track: if your guidance system (and ability to learn to tailor it to circumstances) is messed up or no longer fits the environmental conditions, your recipe no longer makes it into the next generation.

The control that results from this relatively simple level of motivation is systemic. On one level it shapes behavior of organisms predictably towards well-being, and on a broader level it allows the behavior of other creatures to adaptively coevolve to fit with the expected behavior. This gives rise to interwoven strategies for well-being, such as the ongoing

strategic arms race that interlocks the behaviors and abilities of predators and prey, or symbiotic strategies that bring mutual benefits to interacting species.

Controlled predictability also invites manipulation, and the world is full of evolved strategies whereby what motivates one becomes for another a means of entrapment. We humans, specialists in anticipatory living, are the masters at discovering and manipulating motives of both other creatures and of one another. Our ability to fill the world with domesticated animals (now more than twenty-five times the body mass of all wild mammals)⁶⁴ exemplifies our manipulative prowess in the community of life. The \$180 billion advertising industry evidences our attention to manipulating our own motivation. And both illustrate how money exacerbates the human meta-motivation problem, that is, the motives which guide how we manipulate the functioning of motivation.

Animal husbandry, under the impact of the profit-maximizing industrial model, exploits economies of scale that radically distort expected life patterns of our major food animals. For cattle, pigs, and chickens the ordinary pleasure and pain guidance for a life of well-being is replaced with a human calculus of how to manipulate metabolic processes to maximize profitable productivity.

In the case of advertising, the task is to ever enlarge and direct our imagination of pleasures to be had and pain to be avoided, but with scant attention to the well-being to which pleasure and pain once guided us. Rather, the manipulated feelings of attraction and repulsion which now guide our lives as consumers have become shaped for market profit, and in the process the allure of the promised well-being has become quite unreliable. Our evolved appetite for fat, sweets, and salt profits the fast food industry while contributing to an epidemic of obesity, diabetes, and heart disease. Our appreciation for ease, convenience, and speed has ratcheted into a world of hyper-productivity, hyper-

⁶⁴ See Vaclav Smil, "Harvesting the Biosphere: The Human Impact," in *Population and Development Review* 37(4) : 613–636. http://vaclavsmil.com/wp-content/uploads/PDR37-4.Smil_pgs613-636.pdf. If all larger animals, not just mammals, are taken into account, the figure is still 7X the wild body mass.

connectivity, and hyper-tension, fueled in a positive feedback supply-demand loop with ever more potent mobile electronic devices, meds, fitness salons, and marketed distractions. Reproduction in any species is typically surrounded by imperious motive powers; for humans, sex becomes a tool for selling clothes, cars, and cell phones. Our needs, whims and fancies are immediately sucked into data banks and cycled back to us with tailored personal amplification.

The point here is not that all of this is necessarily ill. It is neither necessarily ill nor good: the for-profit meta-motivation of the system which delivers human well-being is so uncertainly linked with human well-being or the well-being of the world of life with which humans interdepend that the situation eludes a general valuation in terms of good or ill. In making money, the only inherent guidance is a preference dial set to "more." But motivations operating on an open-ended "more" are sustainable only in situations that involve relevant constraints. We do our best, for example, to rein in powerful appetites for food and sex. And though our success is imperfect, our effort is supported by strong feedback in terms of the well-being or ill that goes with our conduct. But there is no such feedback on money-making, except the ill that comes from lack of money; that is, the only feedback amounts to the message that more is better. And the absence of any inherent guiding control in money is aggravated as the flow of money increases to become an organizing power that can shape and manipulate conditions to further maximize its own flow.

Money, then, is a powerful motivation that operates not within but alongside the umbrella of well-being that encompasses and controls other forms of motivation. The profit motive may operate in synergistic concert with our many-layered thrust for well-being, or it may become an alien force, uncontrolled and disorienting insofar as it is not subject to the normativity of the well-being it supposedly mediates. The "more" of profits has reshaped the lives and bodies of our domestic animals. And the same "more" plays upon our appetites for all sorts of consumption, with an eye to pumping up the appetite and minimizing restraints. The same "more" will conserve arrangements that are highly profitable and seek workarounds on regulatory restraints that reduce profitability. The same "more" finds its way into the notion of an economy comprised of people with infinite wants and limited means, a biological impossibility systemically shored up by the advertising industry. The "more" also finds its way into the vision of necessary and open-ended economic growth, a

formulation that puts perceived human well-being on a collision course with the ecological and environmental system of the earth.

I should also hasten to add that the same “more” also pushes entrepreneurs, researchers, and all sorts of businesses to search out and more effectively supply what the human community needs (and wants) for its well-being. If well-being were not still a major guide in human conduct, we would not have survived as long and as well as we have. But since well-being is so much the essence of what living is about, our monetary mediation of the flows necessary to our well-being is too easily construed as a benign facilitation that occasionally happens to get out of control. The point here is that there is nothing mysterious or incidental in our common experience that money can motivate in a way disconnected from or even negatively related to fairly evident questions of well-being. Money simply is not inherently under the control of our motivation towards well-being, even though we can often call on that motivation to try to corral the anomy of the profit motive.

The commonplace failure to curtail financially motivated dysfunction brings us back to our earlier discussion of how particular forms of well-being do not compete on a level playing field with making money. Money, and jobs to make money, are such strong placeholders for holistic well-being that it frequently overbalances the weight of other considerations as we confront tradeoffs with the well-being of both human society and the natural world. When profits become the primary consideration, from the point of view of motivated guidance towards the realization of well-being, the situation is no longer in control.

7.3 Money and Technology: Positive Feedback for More

The “better” achievement of whatever, which is the animating thrust of technology, promises an open-ended more: more productivity, more speed, more convenience, more ease. This technological “more,” abstracted from any particular project, became the Enlightenment’s vision of progress: science and technology would surely move us continually towards a better, more abundant life. As our technological prowess has ramified, we have experienced the negative feedback from a world strained and reshaped to allocate our abundance, and as we have seen, the optimistic expectations have been chastened.

Yet even as we expect less of it, indeed even add it to our list of things to worry about, the “more” of technological innovation seems to

accelerate. Socially, psychologically, in child-rearing, education, and employment, we strain to keep up with our surging flood of new devices enabling “better” ways of doing everything. This is made possible by a positive feedback built into cumulative knowledge: the more you know the more creative cross-connectivity increases to open up brand new avenues to learn and explore. But the motivating enthusiasm with which we push this project forward comes from something stronger than an innate love of knowledge. Technological innovation has become systematically linked in a positive feedback loop with money. If it is no longer at the heart of a vision of growing progress, no matter, it has become the heart of a vision of growing profit.

Medieval theologians forbade lending money at interest: usury, they observed, is unnatural and therefore a sin, because money does not have the living nature to grow. Their reasoning was flawless, but too narrow. They missed the capitalist insight. Perhaps money may not grow by itself, but productivity, and especially technologically improved productivity, can grow, and more products turn into more money which can turn into more technologically improved productivity. If lending means we go into debt as individuals and nations, it is nonetheless virtuous debt because the money enables a yet more productive future, meaning there will be more money to spare to pay the interest and enable further investment.

More money is a powerfully attractive motivation as a symbolic placeholder for all sorts of well-being. But if that “more” is nothing more than a desire for a larger slice of the pie, it amounts to plain greed, a socially constrained motivation. But when profits fuel technological innovation leading to productivity growth and more profit, we have the magical pie that gets bigger the more we eat. Hence the provocative “Greed is good!” assertion that prods us to recognize the special nature of the capitalist pie. Ongoing technological innovation is the systemic key here that unlocks and transforms the only guidance inherent in money, that more is better, making it the system-driving “virtuous” profit motive. Seeing the productivity of this system, it is all too easy to dismiss the equally systemic unpredictability and uncontrollability of this motivational package as just an occasional aberration.

Profit fuels innovation which fuels profit in a positive feedback loop that sustains the global market economy. In the 1990s it was possible to imagine an “end of history,” in which the dynamics inherent in civilization played out into a last act of triumphant liberal democracy and global

free-market capitalism.⁶⁵ As we now know too well, this was a far too simple reading of the dynamics structured into civilization. The looping relationship between technological innovation and the profit motive is proving far more destabilizing than was anticipated, contributing to a backlash that threatens the future of liberal democracies.

This most potent of our system dynamics is implicated in the burst of pent up frustration and anger that in 2016 led to a vote by Britain to leave the European Union and to a US presidential campaign dominated by an unexpected wave of populist defiance, culminating in the election of Donald Trump. Upheavals in complex social systems are inevitably multi-causal, but a shared linkage in this summer of our discontent is what has been happening to jobs, the “first and foremost will of the world.”⁶⁶

Good jobs, identified with well-being, have been disappearing, melted down in the churning pot of technological innovation. First technology simply changed and improved the productivity of human labor. Then, with automation, it began replacing human labor, freeing hands for other levels of productivity—provided the education was there. Then communications and transportation technology freed jobs from local labor markets to float to the global lowest bidders. And now robotics and artificial intelligence threaten further inroads of such proportions that the very notion we all need to have a job to earn money to support ourselves seems in jeopardy, though there seems little thought of systemic alternatives.

Smart money looks for the next big innovation, and right now that is robotics and artificial intelligence. Viewed in the framework of behavior guided and motivated by well-being, this is a perplexing moment in a profit-driven process of technological innovation that has long been eroding the jobs we systemically expect be the human way of making a living. For a time, profit making drove the system to a sweet spot-- , perhaps somewhat enhanced now in angry and nostalgic populist

⁶⁵ See Francis Fukayama, *The End of History and The Last Man* (NY and London: Free Press. 1992).

⁶⁶ James Clifton, *The Coming Jobs War*, as quoted in the *New York Times*, http://www.nytimes.com/2016/03/24/opinion/dangerous-world-serious-leaders.html?_r=0, retrieved 3/29/16.

memory-- but in any case, now the system seems to be on a trajectory to consume itself. And even now that the erosion has become explosively clear, the process at its core continues to be a magnet for investors. The loop of technological innovation and profit is not inherently guided or controlled by the well-being it promises, and this simmering populist anger manifests its consequential unpredictability, both for human society and for human management of the natural world.

Chapter 8. The Fractious Tendency: Ingroup Outgroup Dynamics

Creating a Shared Future in a Fractured World

2019 theme, World Economic Forum, Davos Switzerland

We began our discussion of a globe shaped and influenced by human mind and behaviors with the observation that a consciousness commensurate with the processes by which life is organized would have to embrace the entire community of life in its concern. That led into discussion first of questions of focus and prioritization and then into what motivates and guides our behavior. Now we need to examine the function itself by which we expand our care and concern to identify with a larger community.

The communal “we” is for humans an amazingly flexible term, perhaps because for us it is a linguistic as well as an experiential reality. Our categorical abstractions open a wide range of potential we-communities based on whatever shared traits are the basis of the category: we Americans, we mid-westerners, we Cubs fans, we left-handers, we humans, we living beings, we survivors of cancer, we jazz lovers. The possible communal identities are virtually limitless, but in practice a changing handful shape and guide our lives as social creatures, while a number of others may be relatively latent but available to be triggered in the right circumstances.

In principle human identity can and on occasion does transcend species borders: we do have the potential to think and behave like Aldo Leopold’s “plain citizens and members” of the community of life. We fall far short, however, of managing consistently in practice to assume an identity stretched to include all humans, let alone all fellow living beings. It is so easy to say, “we humans,” and to speak as if we are some sort of

unified collectivity. But humans, the most social of any non-insect species, are also famously fractious

When a problem is constant and predictable, it almost always has deep systemic roots beyond the immediate circumstances we too easily identify as the cause. We do not just have people who happen to get diabetes, we have a system that channels cheap sugar and incentivizes consumption patterns in certain populations. We do not just happen to have CEOs who make 300 times as much as their average employees, we have a systemic tilt in the economic system. And as predictably as the rich getting richer and the poor getting poorer, human communities will be challenged to find and maintain the cohesion they crave. What then, leads the most social of species into such seemingly inevitable fractious behavior?

8.1 Organic Inside/Outside

We might do well to return to our earlier Chapter 1 discussion of self as a new kind of unit emerging at the dawn of life (1.2). The advent of life closes a loop that refers to a bounded organized unit, a self. The referential loop of self-maintenance, a distinctive feature of life, is at the base of self as a distinct unit of existence making its way through time. The essential reference is not conscious but dynamic and functional: the living unit does something to maintain *itself*.

Living organisms have boundaries which separate the inner world of their organized metabolic process from an outer world from which they get the flows of energy and matter that keep them alive and which is also the source of threat to the well-being of the inner world. Hence the organism's steady evolution of acute functions to get what it needs from the world and to defend itself; borders become equipped with all sorts of sensing mechanisms and with defenses ranging from prickles and thorns to poisons and irritants, tough hides and sharp teeth and claws.

Sentient consciousness, then, emerged to mediate the maintenance of self or inner well-being in the context of an exterior world of resources and threats. It functions as the personal world, within which the larger world and everything in it are present as the outside, the "other." Self and other thus appear to be a basic structure of ordinary consciousness, a co-dependent duality that arises, like right and left, in terms of one another.

That fundamental self-other structure is basic to the way consciousness evolved to guide sense-mediated interaction with a world that is truly outside skin-bounded organic selves. It is through this interaction that we sentient creatures maintain our organic existence, make our living, as it were. But the world is also a source of both passive and active threat: there are cliffs to fall off of, and predators that make their living at the expense of prey. The shape of this situation is reflected in the hard-wiring of the feelings that trigger our most immediate responses. Fulfilling needs can often be postponed a bit, but the threat of becoming lunch calls for decisive response. In other words, desires for food, sex, warmth, shelter and the other elements of well-being are routinely trumped when fight-or-flight is stimulated, and fear and danger get routine priority in getting attention and making memories.

8.2 Social Inside/Outside

That description of inside and outside on the level of individual organisms needs to be complimented, however, by a consideration of inborn social instinct as well. In many species a threat to offspring trumps threats to self. For social insects it is an advantage that defense of the nest/community can be hard-wired as a priority over individual self-maintenance. In the human case, we seem to pass through an unusually long period of infantile dependency in which the needs of self fill the entire horizon, followed by a growth and maturation process in which others are increasingly encompassed in our care and concern.

This expansion of our care and concern can also be considered as an expansion of self-identity. This is because it is typically mediated by our ability to empathize with others, the ability to identify with what they are feeling. We use this ability continually to read the reactions of those with whom we interact, though its strongest manifestation is often in response to pain—much as pain trumps pleasure in guiding our own maintenance of well-being. As social creatures, it is a serious pathology when we remain enclosed within the confines of our most immediate self-identity.

To expand one's identity to include family members and those with whom one is in constant contact in the routine of making a common life is a fundamental part of our inborn dispositions. We bond with one another as members of a shared community. Communities are one of evolution's most potent inventions, a new level of unit strengthened by

joint cooperative action and rendered more resilient by the way numbers can dilute the impact of setbacks and multiply potentials for survival. It is a wonderful thing to belong to a community, to share and have a place, to be “at home.” Having mastered symbolic language, human communities compound the sharing of relationships of birth and locale with an added narrative dimension which knits the group tightly in a shared history and often a religious sense of their place and meaning in the world. Indeed, the very sharing of a language is itself a powerful potential bond.

The downside is structural, the self-other framework we discussed above: there is no inside without and outside, no members without non-members, no inclusion that does not evoke some exclusion. Of course the outsiders, the non-members, the excluded belong in turn to their own communities, in-groups from which vantage point other communities are the outsiders. The “we” of the community easily becomes the righteous “us” of the tribe. This dynamic has been muted by the more cosmopolitan experience of living and working in the growing urban centers of a globalizing economy.

8.3 Cosmopolitanism

The 17th century enlightenment thought that science and rationality would lead to a unified and peaceful human community. Then two world wars encouraged us to form the United Nations, a new level of transnational organization where we could meet in all our diversity and work things out. Next it seemed that triumphant free-market capitalism would find its necessary culmination in a globalism that would subsume our diversity in a humanity united in the shared identity of consumers. And the world has indeed become laced together in a network of hubs of transportation and commerce where any traveler may soon feel at home in communities that not only tolerate but expect diversity.

Cosmopolitanism is the mindset that emerges from immersion in a tolerant multicultural milieu. If tribalism represents the sociability built on similarity—my tribe shares all the vital elements of my identity in terms of physical appearance, thinking and behavior—cosmopolitanism represents its polar opposite. That is, whatever my appearance, thinking and customs may be, I become accustomed to being surrounded by people who do not necessarily look, think, or behave like me, and I nonetheless assume/feel we belong to a common community. In a tribal

milieu it is easy to assume the rightness of the “normal” social world around me, while alternatives seem to be deviant, evil, or inferior. In a cosmopolitan milieu, my own looks, thinking, and behavior is, through the constant presence of alternatives, reflected back to me as the contingent shape of my personal history. In such a situation it is hard to absolutize, easy to relativize. “Right and wrong” slide towards “my opinion,” “my preference,” or perhaps more thoughtfully, “as far as I can see.” The assertiveness of the self is tempered by the presence of the other, and the collective “we” enfolds what otherwise would be many tribes in a shared identity.

The world of living in big cities and making a living employed in transnational business seems to virtually demand such cosmopolitanism. And insofar as populations worldwide are becoming increasingly urbanized and caught up in the global economy, one might with some reason expect an increment of cosmopolitan restraint in our multi-cultured world. Such indeed was the optimistic vision of many as we turned the page on the troubles of the violent 20th century to enter the 21st. But it has taken less than two decades to provide ample experience to the contrary.

What we too easily miss in our cosmopolitan expectations is the fact that the many tribes are present and constitutive parts of our culturally diverse urban milieus. Their mutual presence and participation in the shared activity of making a living can well be a springboard to cosmopolitan identities in which we think of ourselves first and foremost as fellow human beings with multiple differences. But the spring of that board is loaded by education and economic activity in a social topography historically shaped to favor wealth and power. The true self-aware relativizing of tribal identities happens most effectively through higher education and at the levels of employment opened up thereby. For those of more limited education and more constrained means of making a living, life works proportionately more in terms of tribal relations and tribal placement in the competitive jostling of the community. The lunchrooms of high-schools tend to be full of tables at which diverse student bodies separate into tribal units. Who gets to drive the taxis, who runs the green groceries or the 7-Elevens? Who changes the beds, cleans the halls, guards the doors? In most cities, those questions have predictable tribal answers. And for those who lose out in the competitive scramble, the loss is often understood in terms of identifying the “others,” who are presumed to be the cause of the loss, in terms of tribal identities.

8.4 Tribalism

Tribalism was an effective survival strategy for several million years during which humans made a living as hunter-gatherers. But in the six thousand or so years of civilization (city-states and beyond) we have been challenged to enlarge our identities in step with the expansion of our social organization. As we moved beyond family and life-long small communities to states, nation-states, international confederations and to making a living in a global economy, inborn resources of social feeling and empathy have had to be steadily supplemented with deliberate education and cultivation. Now when the term “tribalism” appears, it is usually in a negative context. The demands of interconnected cosmopolitan societies call for such many-layered, flexible and expansive identities that those who seek the refuge of the familiar and the like-minded where they feel “at home” are viewed by a cosmopolitan elite as a drag and hindrance to realizing the potential of our complex and diverse societies.

“Tribalism” as a pejorative term brings out the rough edges of what in other respects is a quite normal human tendency towards relatively homogeneous social clumping. In proportion as we find ourselves at home with an ingroup, outsiders, the other, are easily appraised through a distorted lens. Ingroup dynamics meet our deep-seated need to maintain and defend ourselves in a potentially dangerous world, and the outsider, the unfamiliar represents a possible threat.

We have evolved socially far beyond the insecure defensiveness that inclined tribes to identify other tribes as “bad people” and made fight-or-flight the default response to an encounter with strangers.⁶⁷ But scratch the surface, and the double-edged dynamic of maintaining a secure home in a threatening world reemerges. As this is being written, the fluid, open cosmopolitan world of the European Union is fracturing into the boundaried, defensive posture of familiar ethnic nationalism in the face of the refugee crisis. And in the U.S. we have elected a president whose promise is to defend and restore a (tacitly white) America from the threat and incursions emanating from Mexico, China, and the Muslim

⁶⁷ See Jared Diamond’s excellent account of tribal dynamics, *The World Until Yesterday: What Can We Learn from Traditional Societies?* (NY: Penguin Publishing Group. 2012).

world. The dynamics here are all too familiar. Not only are ingroups likely to see the other in terms of threat, but the prospect of threat may be manipulated to activate ingroup dynamics for political purposes. Even where we thought we had achieved such cosmopolitan experience and tolerance for diversity that the “other” as threat was a waning phenomenon, under stress the tribe easily reemerges.

Tribal identities are routinely present, but in a working society they are also routinely ensconced in the larger shared identity. We have, however, far too much experience of the way they can be the flashpoint for outbreaks that call into question or even destroy the larger identity. Religion, race, and class are notoriously poised on this tribal edge and so are open to political manipulation. As “we”s unite, whether around shared injustices, inequities, and oppression, or in enthusiastic support of righteousness and defense against erosion of the status quo, let the “other”s beware—and perhaps shore up their own tribal ranks.

Understanding that as our shared identities become more encompassing they include proportionately more potentially fractious tribes prepares us better for the contemporary experience of an alarming social world that seems to be falling apart. Buoyed by the Great Acceleration after the second World War, human interaction and accumulation on all fronts seemed on an ever more agglomerative trajectory, even against the stubborn tribalism of nation states. Now, after two or three generations for whom global unity of some sort seemed to be the arc of history, seeing fear, animosity, and denigration of “others” reemerge in the midst of our communal achievements is a particular shock. But these are less dark evils buried in the human heart than unhappy expressions of structures that, in their place and time, help keep us alive. It is sad, but no surprise, to see that, in the face of real or manufactured threat, self-defensive dynamics manifest as a reassertion of tribal identities.

The power of our tribal instinct can also be viewed positively as a primary manifestation of our amazing sociability. We are ready to clump together. Community enables a better living, and that has supported the evolution of a consciousness that is just ready to *belong*. Human belonging is incredibly malleable, the character we mold into the shapes of communities large and small. Small is easier, larger more fragile but not necessarily less powerful. On the large end of the spectrum, for example, it is common for people now think their constructed national identities are simple facts of life, and patriots may sacrifice their lives in their name.

Seeing the inherent fragility of more expansive identities may make the notion that we might expand beyond our stubborn national skins to become not just citizens of nations or of the human world but “plain members and citizens” of the community of all life may seem like a hopeless ideal. But there are enough examples of people who do think this way and try to live accordingly that we know it is possible. The question is whether and how this phenomenon can be scaled to become a common component guiding our societies. It seems evident that the life support systems of the earth would be distorted beyond proper function if they were managed to maximize the well-being or convenience of a single species. In effect that is what we have been doing, even if unaware of it. Now that our impact and its problematic consequences have become evident, we know what is needed. As a New York Times essay on the well-being of a “good-enough” way of life (vs self-maximizing “greatness”) insightfully concludes:

Achieving this will also require us to develop a good enough relation to our natural world, one in which we recognize both the abundance and the limitations of the planet we share with infinite other life forms, each seeking its own path toward good-enoughness. If we do manage any of these things, it will not be because we have achieved greatness, but because we have recognized that none of them are achievable until greatness itself is forgotten.⁶⁸

Good-enough, be it within national polities or a global community, can be shared. The maximizing dynamic of going for greatness, a notion we often think of as inspirational, bears the seeds of divisions that fracture the functional unity of interdependent systems of life at any level.

Chapter 9. Summary and Conclusion to Part I

We have looked at the evolution of human consciousness, considering how its functioning led eventually to the creation of civilization, a human world of culture systemically distinct from, yet within and ultimately

⁶⁸ https://www.nytimes.com/2019/02/20/opinion/the-good-enough-life-philosophy.html?fallback=0&recId=1Hg6wpoW6H87WyclZy7FP7SJfZz&locked=0&geoContinent=NA&geoRegion=WA&recAlloc=home-desks&geoCountry=US&blockId=home-living-vi&imp_id=386136507, retrieved 2/25/19.

dependent upon, the self-organized world of nature. In particular, we have seen how our form of consciousness equips us to adapt by imaginative anticipation, modifying our conduct and the circumstances of the world in order to maintain and enhance our ongoing well-being.

Imaginative anticipation is an adaptive tool of unique power and potential peril. “Imaginative” in the human case goes beyond the widely shared ability of sentient creatures to remember, project, and thereby learn from experience. Narrative scope empowered by symbolic language allows a free play of imagination in dimensions beyond experience: we become creative manipulators of the world, entering a future shaped to an unprecedented extent by the workings of our minds and hearts. Indeed, that shaping has finally become the Anthropocene, an era in which the globe and its life are caught up in the innovative workings of our minds and hearts.

“Imaginative” bespeaks the openness of our advance into the future. But anticipation, the very act of consciously entertaining a still absent future, has its own unique requirements. We have considered the need for attention and focus, care and concern, and prioritization, with motivation being the animating force within all of them. Each of these is a necessary but open facet of anticipation, filled variously with the spontaneity of instinct, habit, or with the product of more careful reflection and calculation. In broad strokes, however, the civilized cultures we construct include default modes for all this, so even with all the variability, we end up with a relatively predictable social ethos, a common way of living as we enter the future together.

Attention, care, prioritization and motivation are the features that give anticipation direction, but misdirection is also possible. Several million years of natural selection for patterns that keep us alive have honed our flexibly directed awareness to prioritize immediate dangers and provide for relatively immediate needs. Civilization, a recent phenomenon, introduces both dangers and needs on a quite new scale, one which we penetrate intellectually but prioritize with difficulty.

Civilization produced the Anthropocene, but did not prepare us for it. Civilization was launched by the domestication of plants and animals. “*Domus*,” “household,” is the Latin root of “domestication.” Plants and animals were domesticated, meaning they were brought into the easy reach of the household. This was the first step in a steadily escalating process of easing access to whatever we need, want, or desire. The culmination of this process has been the transportation-communication

network that collapses space-time and puts everything within our reach, that is, the domestication of the globe.

In this respect, the consciousness of civilization has scaled up mainly to encompass our ever-expanding anthropocentric reach for convenience, a faster, easier, more efficient fulfillment of what we deem our well-being. This is the quest that has shaped our societies. And now that virtually everything on earth is within our reach, we suddenly find that this means the globe itself is in our hands—at least for as long as the Anthropocene lasts.

This was unexpected. As we proceeded with expanding our domestication, we assumed there was always a “natural” world beyond our *domus* that just took care of itself. Our concern was simply to manage our *domus* to maximize production and consumption. The success has been measured by growth, with intertwined positive feedback driving a now breath-taking exponentiality. The *beyond* has disappeared along with the “away” where the smoke went from the ever-taller smokestacks of our industrial establishment.

We know how to manage our own household for growth of productivity, consumption, and profit. That kind of management reflects the self-maintenance functionality for which our expanded conscious abilities were selected in the first place. Managing a planet destabilized in its life-sustaining processes by the weight, speed and reach of our transforming hand requires something new and as yet unfamiliar.

“Manage” here is a somewhat misleading word, suggesting that we must expand conscious control to a yet larger project, like a high-school student suddenly confronted with running a transnational corporation. But the Anthropocene does not invite us to literally complete our domestication of the globe, managing nature as we manage our *domus*. The management challenge is really an issue of how we control and organize *ourselves*, a new round of the civilization project: we need to let the life-giving world rebalance by finding a lifestyle, an ethos, that fits with the community of life and the global processes to which that community is adapted.

Part II. An Ethos for the Anthropocene

Introduction

We have seen the challenges posed by the Anthropocene, an era in which humans have assumed a role in global and life system function for which we are ill-prepared. We evolved with powers selected for successful self-maintenance, but they turned out to have a globe-transforming reach. We created our civilization with our well-being in mind and are now tasked with adjusting it to better accommodate the well-being of the whole community of life upon which it impinges. In sum, we need to reshape our ethos, our way of life, lest we overshoot and crumble our civilization.

“Ethos” comes from the Greek word “*ethnos*”, “tribe,” the same word from which we derive “ethics” and “ethnic.” While ethics is normative, the way we members of the tribe *ought* to behave, ethos is descriptive, referring to the way members of the tribe routinely *do* behave. Routine behavior is a fundamental social requirement: to live well together we need to have mutual expectations about how we go about doing things. Expectations do not just stay in our heads; they get externalized in institutions, laws, physical and social arrangements of all sorts. So shaping or reshaping an ethos involves two intertwined poles, what goes on in our minds and hearts and the structures of our socio-economic system, or in popular parlance, “the System.”

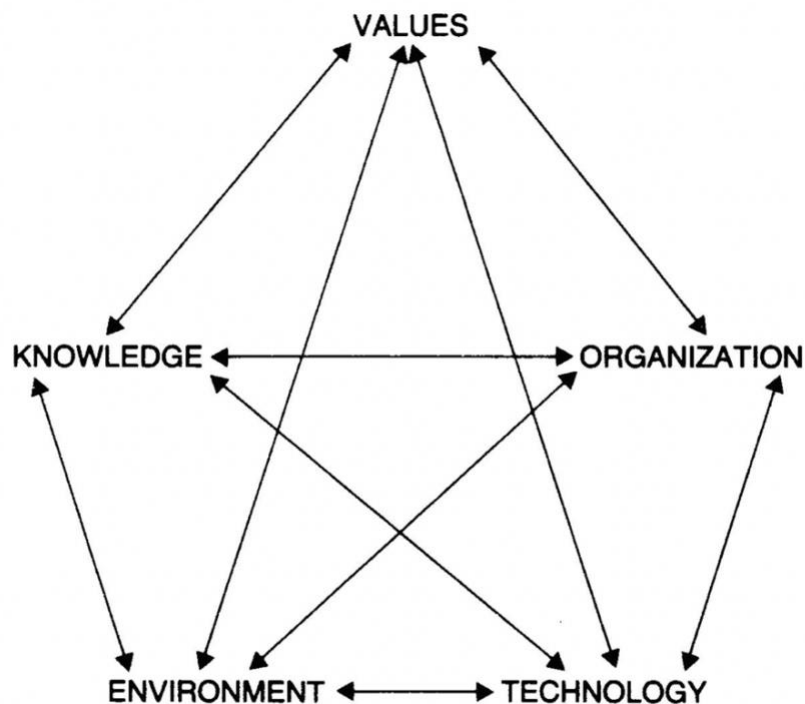
Our evolved techno ethos is to identify a problem and then fix it. Our approach to climate change has followed that approach, complete with targeted reduction of CO₂ parts per million by a given date (uniformly missed, so far, and so escalating) to avoid a given catastrophic degree of warming. The typical thinking is that we need to find and switch to sufficiently cheap green replacements for fossil fuels, or maybe carbon sequestering technologies, or probably both, and everything will be OK. Yes. If you are crossing a street with a bus bearing down on you, it is not the time to work on plans for a more walkable city. First things first: we are evolved for that kind of prioritizing, although climate change works on a scale where it’s too late when alarms finally ring in our short term arena. But even avoiding the climate cliff, if we can do it, would not yet give a sustainable ethos for the Anthropocene. The Sixth Extinction has been under way with plenty of drivers even before a changing climate weighs in. Hydrogen-powered earth movers, carbon-free chain-saws and factory trawlers will not really be a great way to rebalance the community of life. We need to revisit the broader picture of our co-evolving way of living, seeing not just individual problems but the interwoven connections that give them shape and tenacity.

Chapter 10. The dynamics of cultural change

Everything is interlocked, yet everything is changing in accordance with the interlockedness.

Richard Norgaard

Culture has many vectors of change. We live amidst a torrent of new technology, changing organization, shifting values, advances in science and medicine. The critical thing is that all such factors are what they are because the others are as they are. They affect one another in a tangle of feedback loops so that change in any one dimension impacts the others, and change in the others in turn impacts that dimension. Environmental economist Richard Norgaard has diagrammed these coevolving vectors of cultural change as shown in Figure 9.1.⁶⁹



⁶⁹ Richard B. Norgaard, *Development Betrayed: The End of Progress and a Co-evolutionary Revisioning of the Future*. (Routledge, 1994). Ch. 3.

Figure 9.1

This diagram illustrates the dynamic relational structure of causality in cultural change. The double-headed arrows represent feedback loops entangling everything with everything. Norgaard produced this diagram of cultural co-evolution years before the Anthropocene emerged as a topic of discussion, but his insightful inclusion of the environment in the web of mutual feedbacks represents the culture-natural world interface at the core of Anthropocene dynamics. There is no starting point in this web of change, but what is happening at any node and at any level of consideration may be elucidated by considering the connections. Starting with climate change (environment) for example, looking at the incoming arrows leads immediately to considering how it is the consequence of industrial organization, market values, fossil fuel technologies, and a research and knowledge base appropriate to all of these. Consider the outgoing arrows, and one sees how it invites and is already driving waves of change in all these areas, with each of them also driving changes in the others as it absorbs the impact of a changing climate.

When viewed through the lens of this coevolutionary dynamic, virtually any question--climate change, fossil fuels, human rights, international trade, jobs, the food we eat and the ideas that flow through our minds—can be opened up and understood in the context of its place in a rich web of causal interdependence. For the purpose of considering how we might move towards a better fit between our world-domesticating civilization and the earth systems with which it must finally find a sustainable fit, the coevolutionary framework offers a useful guide. The kinds of problems and challenges that we saw in the first part of this book clearly have no straightforward solution. But if civilization is to have a future, it will be by a coevolved transformation, not the product of a silver bullet sort of solution. What we are looking for is not a grand solution, but to identify the kinds of developments and changes in any given sector that move us in a more sustainable direction, and how that might ramify as it impacts other sectors.

“Everything is interlocked.” Norgaard’s diagram illustrates why we so often experience gridlock. In the shorter term those connecting arrows create an anchoring mesh. Our response to climate change is a case in point. We do not lack the knowledge to see the problem, but the difference between seeing a problem and doing something about it has never been so excruciatingly apparent. Activists see clearly what has to change, but then they encounter pushback from all sorts of intertwined

sectors. Somehow when it comes to doing what needs to be done, our collective motivation seems constrained to fit with the structure of expectations that go with our market-based capitalist civilization. The frustration and bleakness that accompany our attempts to mitigate climate change are the product of these short-term dynamics. While only a few decades separate our trajectory from climate tipping points, the interlocked and resistant mind and matter of the status quo still carves months and years out of a disappearing window of time to avoid the worst.

“Yet everything is changing in accordance with the interlockedness.” We know that in the long term nothing is nailed down and change is always rippling through the system. Every now and again gridlock will allow such pressure to build up in a particular sector that its release sends not a ripple but a tidal wave of change and instability through the whole socio-economic system. One thinks of revolutions. Or of climate change. The gridlock we experience at present will very likely be enough to tip us into a problematically changing climate regime; we are already experiencing the leading edge of the unprecedented, and it will get worse. So when we consider those outgoing arrows, how change in any area ripples through all the others, we will expect major waves of change to be flowing from the “environment” corner of the diagram.

It is possible the full impact will be enough to send our civilization over the cliff. That would be another “so be it” selective episode for evolution. But it seems unlikely the technology, organization, values and thinking of our civilized society will unravel rapidly all at once. More likely, the coming decades will see heightened turmoil and instability, a situation in which the established System is more open to question and more vulnerable to change than the gridlocked gradual incrementalism of ordinary times. New directions become possible, trajectories upon which we launch in hopes of finding something better. Our earth-transforming civilization, supercharged by science, technology, and commerce for speed, convenience and consumption, will certainly become far different as the weather, the seas, and the land change around us. Our collective ability to discern life-giving trajectories from attractive dead-ends may be the selective gate determining how much future there is for complex civilization.

We need to identify alternative directions that could possibly get legs, rendered at least plausible in the counter currents of feedback as the effects of a less stable status quo ripple through the coevolving system. New directions. The plural is appropriate. There is no silver bullet, no

single “solution” for a now problematic way of life that coevolves on multiple fronts. In Part I we saw interlocked factors in our mental life and evolving socio-economic system that have brought us to the Anthropocene. Revisiting these in Part II, we will look for ways and openings where they may turn in the direction of global balance and well-being. Those outward-headed arrows of connection are a source of cautious hope: there are so many areas that can be wedged in a positive direction, and every wedging has a multiplier effect through its connection with the others.

It is not that difficult to describe the overall direction needed, the door that opens on a sustainable future in which human society has a more life-giving fit with the natural world. An adaptive ethos would have to relax the heavy selective pressure we exert, make it easier for the rest of the community of life to share the globe with the human community. This entails slowing our transformative reach to better maintain the expected conditions of the physical environment, gentling our necessary extractions and adjusting outflows to the capacities of a cycling earth system. To do this, short-sighted priorities that maximize consumption, convenience, and gratification need to be subordinated to long term consideration of consequences for both future generations of humans and for the future of non-humans.

All that is easy to say; it sounds as if we just need to rearrange our values and thinking and everything will be better. But our values, expectations, and priorities reflect the shape of the technology we use and the entire social organization constructed around how we pursue the good life. That means any substantial change will be an incremental process that will refract variously in the feedback among the complex facets of our inner life and their externalization in our culture and world organization.

The interdependent coevolution of the facets of our way of life, our ethos is a critical way of thinking at odds with our ordinary technocratic mentality. We like to identify “the problem” and home in on its “solution.” The critique of the Green New Deal proposal brought forward by Rep. Alexandria Ocasio-Cortez and Sen. Ed Markey is typical:

Whether such measures will satisfy the activists who have gathered around Ms. Ocasio-Cortez is another matter. After all, her talking points, as well as the resolution itself, speak also of providing higher education for all Americans; universal health care; affordable housing; remedies for “systemic injustices” among the poor, the elderly and people of color; and a federal job guarantee

insuring “a family-sustaining wage, adequate family and medical leave, paid vacations and retirement security.”

Which raises this question: Is the Green New Deal aimed at addressing the climate crisis? Or is addressing the climate crisis merely a cover for a wish-list of progressive policies and a not-so-subtle effort to move the Democratic Party to the left?⁷⁰

Questions of political strategy aside, what does education, health care, housing, a guaranteed family wage and the like have to do with arriving at a zero-carbon economy? Everything, if seen in the coevolutionary perspective. Everything that has left a significant portion of the US populace open to populist promises to roll back all sorts of environmental regulations and restore the glory days of coal. One cannot change everything at once, so perhaps in that respect the Green New Deal was too ambitious. But lasting change either moves through these sectors of our living “in accord with their interlockedness,” or the old status quo finds new ways to reassert itself.

Change is often said to be the art of the possible. In Chapter 1 we introduced Stuart Kauffman’s very useful notion of the “adjacent possible:” every system has an adjacent future (choose your time unit) with a range of possibilities and probabilities regarding the next state of the system. Not everything is equally possible, and some things that may not be possible in the next step may become possible with a few intervening steps. If you want to get through a distant door, the solution is not a single step but steps put together informed by the direction to the door from the position at any moment. The key is to be able to pick out, from the array of possible directions, the ones that will work to get where you want.

10.1 The Challenge

We seek to find a way of living, an ethos, that is fit for the Anthropocene, a systemic era in which our way of life is a determinative factor in the ongoing shaping of the biosphere, atmosphere, hydrosphere and

⁷⁰ “The Green New Deal Is Better Than Our Climate Nightmare.”

<https://www.nytimes.com/2019/02/23/opinion/green-new-deal-climate-democrats.html>.

lithosphere, that is, of the earth and its inhabitants. In Part I we argued that speed can be taken as an inclusive characterization of our selective weight on the globe and its community of life. Speed takes many forms. It is immediately evident to us in our constantly accelerating pace of life: do more, work more, play more, be more, all in the compacted, leisure-free 24 hours of daily life. But it is also manifest in the pumped up volume of supporting physical, chemical, and organic flows that transform the earth in as they are extracted and overwhelm its receptive sinks as output waste. With every sort of information interactively at our fingertips we innovate better and faster technology to enhance productivity and render consumption more convenient. In sum, the knowledge, technology, organization and values of our contemporary culture are not just coevolving but coevolving with interlocked positive feedback that gives us the exponentiality of the Great Acceleration.⁷¹

In sum, the vectors of our way of life converge to give our complex civilization a rate of consumption and output that destabilizes the current physical and biological parameters of the earth system. On the whole, sustainability is in the direction of slowing down, though this will take different forms as we consider opportunities to mitigate the thrust for “more” coming from the various sectors of contemporary life.

10.2 Speed Bumps

Human cultures are not necessarily agents of rapid massive transformation. As we have seen, hunting and gathering tribal organization endured for over 2 million years with a rate of change we would today find ossified. But a mere 6 thousand years of agriculturally based urban civilization has transformed the entire bio-physical system of the earth into the Anthropocene. Our communication and transportation systems now collapse the temporal meaning of spatial separation vital to the life organization of all other creatures. Writing, printing, telegraph, telephone, and now optical cables that carry our messages and commands with the speed of light negate the meaning of distance for us. But only for us. The now humanly-managed biosphere still marches to the beat of adaptive gene pools and the firing of synapses and contraction of muscles.

⁷¹ Cf. above, 3.2 The Great Acceleration, Figure 3.1.

We have perfected our global reach to a point of our own systemic discomfort. On the one hand our newfound ability to communicate and act in a nearly “real time” manner to anywhere from anywhere is the wonder that organizes a now truly global system. We expect it in our daily lives, taking it for granted for example that our supermarkets will be replete with produce no matter what the season because it’s always in season somewhere in the world. At the same time we realize our unprecedented vulnerability to actors who once would have been safely remote. Could the North Koreans bring down our power grid? Did the Russians play with the information we use as informed citizens to elect our leaders? Has my identity been hijacked by someone in Eastern Europe? Our physical living and immediate well-being is still always local, always someplace at some time, but now every place and time is laced with global dimensions we struggle to comprehend.

We are now challenged to keep up with ourselves. The jobs that constitute a good living now change so quickly that no specific skill preparation can capture the world students will graduate into. Now schools claim their objective is to teach us to “learn to learn” so we can surf as “life-long learners” through an anticipated five major career reconfigurations. Our information outruns us. As of 2017 90% of stock trades were done by high speed automated computer algorithms working in a microsecond transactional world that leaves human traders and their slow cognitive processes as an endangered species.⁷² Data for corporate management has become so vast it can be “mined” only by computers, and a cyborg future of chip-implanted humans beckons as we struggle to keep up.

As we are propelled to faster lives and ever more abbreviated attention spans, the discomfort is noticed. There is a boom market for meditation teachers. Slow living now has its own movement,⁷³ and even a radio station.⁷⁴ SLOW becomes an acronym: S=sustainable, L=local, O=organic, W=whole. The acronym reflects the movement’s origins in the widespread critique of what has happened to our food. We are quite

⁷² Evelyn Cheng, “Just 10% of trading is regular stock picking, JPMorgan estimates.”

<https://www.cnbc.com/2017/06/13/death-of-the-human-investor-just-10-percent-of-trading-is-regular-stock-picking-jpmorgan-estimates.html>. Retrieved 3/11/19.

⁷³ Cf. <https://www.sloww.co/slow-living-201/>. Retrieved 3/11/19.

⁷⁴ <http://www.slowlivingradio.com>. Retrieved 3/11/19.

aware of the disaster of transferring industrial notions of efficiency and productivity to the life processes of plants, food, and earth. Industrial agriculture with its monocropping, massive livestock warehousing and feedlots, chemicals and antibiotics, and genetic tinkering still is the order of the day, but its problems and pain have evoked a countermovement. Hence the popularity of locally grown, organic, whole (vs processed) foods. Such food production is more sustainable, but slower, more labor intensive, and so more costly. It's hard to escape the systemically grounded "time is money" imperative. But those who can afford it now tend to favor such foods, aware of the many ways industrial speed and economies of scale have undercut the well-being of animals, plants, environment, and finally of human consumers.

The insight of the Slow movement is that it takes an array of interlinked problems and sees them as manifestations of a system that prioritizes speed. Once speed is questioned innumerable other benefits of a slower lifestyle come into view. Slow Living radio takes as its motto, "back to real life." In endless parental preachments to adolescent children "real life" may be featured as a painful, harsh, demanding place, but in the Slow Living context it is more an invitation to stop and smell the flowers and taste the wine. The website defines it for us in simple dictionary terms. "Real: fundamental, essential, occurring or existing in actuality." "Life: the sequence of physical and mental experiences that make up the existence of an individual."⁷⁵ Think of all the ways the sequence of our hyper-fast physical and mental experiences might fail to be fundamental, essential, occurring or existing in actuality. The website promises to bring us back to reality by "presenting topics ranging from food, wine, travel and health to greener living, the environment and entertainment." Evidently reality here is best found in the laid-back, affluent lifestyle of southern California's Napa Valley wine country, which is the home of Slow Life radio.

Billions of people in China and India are willing to tear up the earth and fog the air with carbon, sulfur, and heavy particulates in the dream of achieving the luxury to slow down that way. We know too well that after keeping up with the hyper pace of making a good living in an urban world we easily lose the wisdom of how to slow down and enjoy it once we have "made it." The California critique of speed picks up on the

⁷⁵ Ibid.

discomforts that indicate something amiss in physical and mental well-being, but it has little purchase on the systemic reality, the technologically enabled way we go about making a living and its penchant for acceleration. Slow Living is a beginning: the discomfort of speed is one chink, an opening that might be wedged for deeper questioning of our accelerating system.

On the broadest systemic level, the rate of change that we introduce and tolerate is perhaps the most problematic aspect of the Anthropocene. When we overwhelm the current recycling processes of earth, air, and water new behaviors take their place and we have a changing climate, eroded and saline soils, acidified oceans. When we transform the face of the land, we challenge the adaptive limits of every form of life that had absorbed the previous pattern into its recipe for making a living. As we exponentially increase the quantity of information and the speed at which it can be processed, accessed, and recombined we surpass the capacities of flesh and blood processors and yield informed guidance to artificial intelligences that can keep up with it. Now we, the most agile of adaptive organisms, contemplate the adaptive leap of transforming ourselves into AI enhanced organisms. The fact is, we can no longer keep up with ourselves.

The intuitive response to such considerations is simple: slow down! How that might come about in our complex, accelerating coevolving society is difficult to imagine. Certainly there is no single (and fast!) remedy, no magic switch, short of chaotic collapse, that will undo the multiple components of our contemporary speed machine. Our schools prepare us for change, stressing the value of innovative and creative thinking. Our economy is organized around growth in productivity and consumption, and our technology feeds an expectation of immediate access and gratification. “More, faster, better” is deeply engrained in the mutually reinforcing network of our values and motivation, education and expectations, and the technologically organized system into which we plug to make a successful living.

Our ability to slow our headlong rush into a future we really do not want depends on adjustments we are able to introduce in all of these dimensions. Change in this kind of interwoven, coevolving system will come only by a process similar to the process that has brought us to this point. Just as elements in multiple areas of our life have gradually aligned into a mutually reinforcing network pushing us ever faster, so a mutually reinforcing shift working through these areas could move us in a new direction.

Our situation is now like a vehicle moving too fast in a dense fog: we survive by foresight, but we are overdriving our capacity to anticipate and control where we are going. In the following chapters we will first take up the factors that impel us to keep accelerating, and then take up those that conspire to fog our vision. Through all parts of this enquiry, the question of what might slow us down to a sustainable rate will point the way.

11. Taking our Foot off the Gas

In fact, more than half of the carbon exhaled into the atmosphere by the burning of fossil fuels has been emitted in just the past three decades.

David Wallace-Wells

We live in exponential times. Every child in grade school learns multiplication. The math of exponentiality is nothing but the repeated multiplication of a base that is the product of the preceding multiplication: $2 \times 2 = 4$, $4 \times 2 = 8$, $8 \times 2 = 16$ etc. But somehow the ease with which we grasp multiplication leaves us totally unprepared to understand exponentiality, the way numbers suddenly balloon when multiplication is repeated in this manner. For example, 2 after 10 doublings is 2,048. After 15 doublings it leaps up to 65,536. And another 15 doublings takes us to 2,147,483,648.

The math of doubling in areas of real growth lead rapidly to the limits of what the globe can sustain. For example, let's say that at the dawn of civilization 8 thousand years ago people started with an annual income of 2 cents, and that grew by an annual rate of 2 percent, the contemporary lower limit for decent growth of the global GDP. Remember the doubling formula for growth? 72 divided by the percent of annual growth. So at 2% it would take 36 years for people to leap up to 4 cents a year, 72 years to make it to 8 cents. One long lifetime to get to 8 cents a year, but we hope our children will keep up the good work and lead richer lives. At 36 years per doubling, in 1000 years we could have 27.8 doublings. With 27 doublings of 2 cents (and no inflation!), the process that raised us to 8 cents in our first lifetime, would take us to \$1,342,177.28, enough to make it comfortably into the top 1% among current US incomes. And that would leave another 7,000 years and 194 doublings to go!

This simple example makes clear that nothing like this exponential process has been going on for 8000 years. In fact, it appears to have arrived only with the Industrial Revolution in about 1650, with significant statistical surging beginning about 1800 as indicated in Figure 11.1 below. Two things drive the lines almost straight upward for the last fifty or one hundred years. First, you get to a point where the base being doubled is of the size that it leaps with every doubling. Think of graphing the doubling of the above \$1,342,177.28 in the next iteration, compared with doubling 4 cents in the second iteration of our thousand year example. Second, the rate at which doublings occur can increase, driving the rise ever faster. In the case of the GDP, a growth rate of 3.5, as the IMF projects for 2017,⁷⁶ rather than the anemic 2% we used as base rate, reduces the doubling from 36 years to just a little over 20. The explosive economic growth of South Korea and now China was based on annual growth of 8% or better, a doubling in just 9 years.

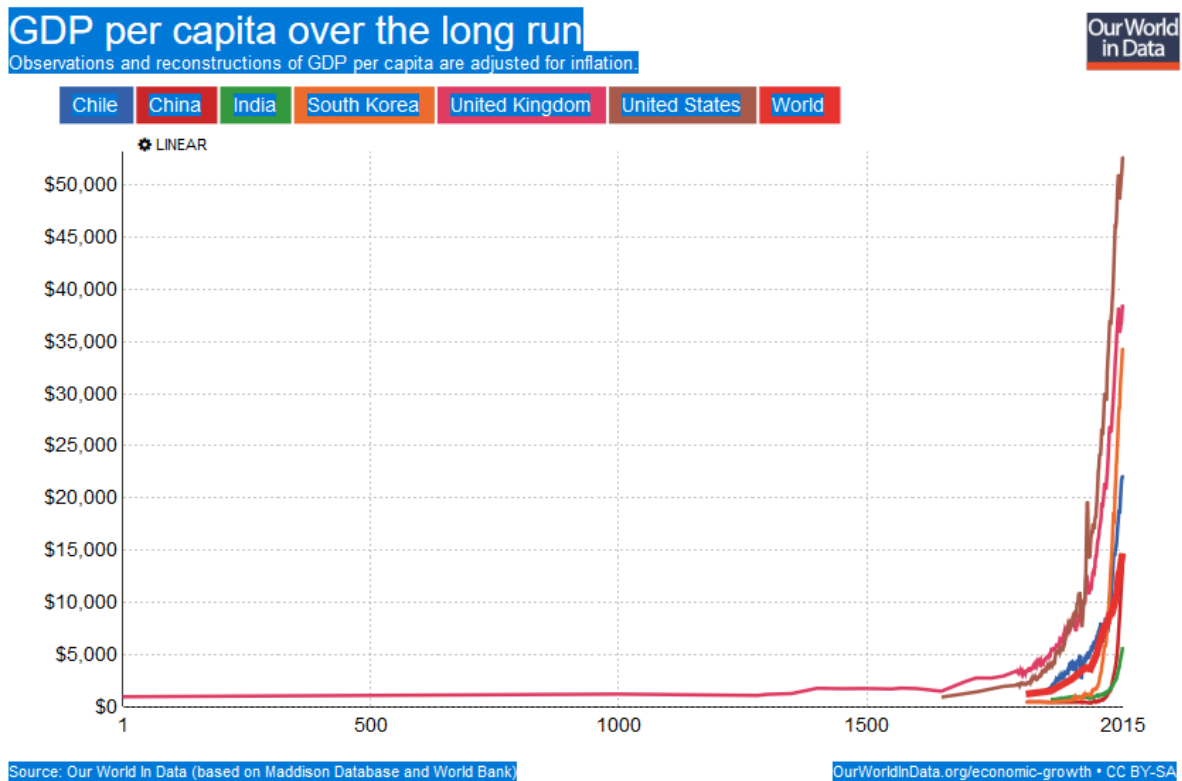


Figure 11.1

⁷⁶ https://www.nytimes.com/2017/04/18/business/dealbook/imf-raises-forecast-for-global-economic-growth.html?_r=0, retrieved 6/9/17.

For good reason we think of technological innovation as the engine of this exponential growth; it stands to reason that it was the Industrial Revolution that kicked off the exponential era. But what about that long flat line of thousands of non-growth years? They were certainly marked by a steady advance of important technologies: writing, plows, water wheels, irrigation, paper, printing, the list of life-transforming technologies goes on and on. But the GDP line stays pretty flat.

Economic historian Gregory Clark calls the thousands of years of flatline the “Malthusian trap.”⁷⁷ Early on Malthus had contradicted enthusiastic Enlightenment anticipation of progress with the sobering observation that as times got better population would just increase and eat down the gains to the former level of per capita subsistence. In the Malthusian trap things indeed work this way: for thousands of years the improved life afforded by inventions was swallowed up by population bumps which returned societies to the flat line. Gradual technological improvements could not make the pie grow faster than the mouths that consume it. Not until the Industrial Revolution in late 17th century England did the system shift into the modern miracle, a pie that gets bigger the more it is consumed.

Clark is clear regarding the essential factor in this shift of the human trajectory:

The model reveals that there is one simple and decisive factor driving modern growth. Growth is generated overwhelmingly by investments in expanding the stock of production knowledge in societies. To understand the Industrial Revolution is to understand why such activity was not present or was unsuccessful before 1800, and why it became omnipresent after 1800.⁷⁸

“Expanding the stock of production knowledge” is another way of saying “knowledge for technological innovation.” Just milking an introduced technology is not enough to get out of the Malthusian trap. That happens only when innovation feeds back into yet further innovation, a positive feedback loop that increases productivity far faster than the population

⁷⁷ Gregory Clark, *A Farewell to Alms: A Brief Economic History of the World*. (Princeton and Oxford: Princeton University Press. 2007).

⁷⁸ Gregory Clark, *A Farewell to Alms*, p. 197.

growth unleashed by better times. That is the modern definition of life getting better and better.

Clark's book is a long and careful inquiry why this once-in-human-history shift took place when and where it did: in England and not until about 1760. There is a copious literature and lively debate concerning this issue, for it is nothing less than the human world finally entering its modern phase, the decisive advent of the Anthropocene. An especially popular approach looks to the impact of changes in political and civil institutions. Although strictly speaking external to the economy, factors such as property rights and the transfer of property can have dramatic consequences in motivating innovation and new modes of productivity. Think, for example, of the critical role of intellectual property rights and patents in the contemporary system. Another approach suggests that it was a matter of crossing a density threshold in the networked interaction of the population, which had slowly increased over the course of thousands of years of intermittent technological change and increased economic productivity. Put simply, more people interacting with more ideas produce yet more ideas, finally mushrooming into the burst of innovative productivity we call the Industrial Revolution. Or perhaps it was not just the quantity but the quality of the people that made the difference. As families started to have fewer children, they poured more resources into their care and education. A larger literate population is key to the kind of interaction that really spurs innovation. Or maybe some other factor could flip the switch from millennia of a subsistence equilibrium to the modern growth equilibrium. Aristocracies and similar governing elites can live well by appropriating the productive resources and wealth that might otherwise cycle into innovative ferment and productive growth in the larger society. Thus we associate democracies with capitalist dynamism and witness exploitative autocracies holding back impoverished population that long for the growth they see in the more egalitarian and open societies of the "developed world."

Clark reviews all these explanations for the Industrial Revolution and finds them wanting in one respect or another.⁷⁹ His own preference is for a deeper cumulative cultural evolution leading to the particular family structures and attitudes towards work and time that sparked a systemic transition in late 18th century England. But whatever sparked that

⁷⁹ See Clark, ch. 11, "The Puzzle of the Industrial Revolution."

transition at that particular place and time, all the factors cited above have played evident and critical roles in the subsequent rapid spread of what has become a system of global economic growth.

If we seem to be living amidst a crescendo of innovation and change, we can point to what amounts to a perfect storm in which all those factors converge and amplify one another in a nest of positive feedback loops. We calculate GDP growth as if it were the index of human well-being, view innovation and entrepreneurship as key to a secure future, inculcate schoolchildren with the ideal of creativity and originality, and reward with wealth and celebrity those who introduce the next wave of technology-driven transformation. In short, the modern world has evolved to self-consciously invest its greatest resources, hopes and rewards in the feedback between technological innovation and productivity that ushered in the Industrial Revolution and the inauguration of the full-blown Anthropocene.

Major drivers of the rate of change include our systemic need for growth and the motivating power of profit intertwined in a powerful loop of positive feedback. We shall consider each of these in turn: change or redirection in this nexus is key to reducing our unsustainable acceleration.

11.1 Growth

Growth takes many forms. Populations, knowledge, economies, incomes, expectations all grow. These are not just separate areas: they interdepend and drive one another. Before Adam Smith introduced a capitalist understanding of the potentials of the new industrial economy, expectations were that money is a static unit of exchange. Unlike organic life, it does not naturally grow, so the only way to grow your pile is to reduce that of someone else. This is an ethically fraught endeavor. Through the Middle Ages, the Church prohibited not only outright thievery, but also lending money at interest, for the interest represented a sum taken from a neighbors pile for which there was no natural justification.⁸⁰ The solution to this ethical conundrum is the capitalist view of the profit link between production and consumption: if production is

⁸⁰ The Islamic tradition still generally prohibits lending at interest, which necessitates complex work-arounds for Muslim banking in the capitalist world.

not simply consumed but also yields a surplus profit (versus the old idea of equitable exchange), the extra can be reinvested for yet more production and more consumption yielding yet more profit for more reinvestment—a virtuous cycle in which getting wealth increases wealth.

So now we expect money and incomes to grow and we leverage our futures on this prospect. Lending at interest is fundamental to the new system insofar as it provides the initial capital which can then grow in proportions that enable not only the repayment of the interest but also contribute to the overall dynamic of a growing economy. Not only personal debt, but government debt thus amounts to a leveraged system committed to growth, for it is only growth that furnishes the increased wealth that a 30-year loan at 3% assumes is going to be available. In the absence of growth, repayment cuts into the capital base, which can introduce the downward spiral into bankruptcy.

But we are committed to growth by other factors than just our indebtedness. Between 1900 and 2000 our population increased more than three times more than the entire previous history of humanity— an increase from 1.5 to 6.1 billion in just 100 years.⁸¹ Global population growth rates have been falling since 1962, but the base has become so large that we will probably reach somewhere around eleven billion before it levels off at the end of this century. So just to maintain the status quo we would have to just about double the world economic flow by 2100.

Fortunately and unfortunately that prospect is not particularly daunting in terms of conventional economic expectations. In 2016, a not very good year, the World Bank estimates the global economy grew at 2.3 %, and projects 2.7% for 2017.⁸² The mathematical formula for doubling is 72 divided by the percent rate of growth. Thus even a sluggish 2% growth rate would double the world economy in 36 years and then more than double that again by 2100. As we have seen, this rate of growth is fed by our incredible growth in knowledge and its externalization as innovation in technology and productivity. Those who focus on such matters can foresee an adjacent possible of unimaginable abundance. Kevin Kelly, the guru of high-tech, in his best-selling projection of trends for the next 30 years, *The Inevitable*, concludes his insightful first-

⁸¹ <https://ourworldindata.org/world-population-growth/>, retrieved 4/5/2017.

⁸² <http://www.worldbank.org/en/publication/global-economic-prospects>, retrieved 4/5/2017.

chapter analysis of where the digital revolution is taking us with an enthusiastic peon:

So, the truth: Right now, today, in 2016 is the best time to start up. There has never been a better day in the whole history of the world to invent something. There has never been a better time with more opportunities, more openings, lower barriers, higher benefit/ risk ratios, better returns, greater upside than now. Right now, this minute. This is the moment that folks in the future will look back at and say, “Oh, to have been alive and well back then!”⁸³

Mainstream economics takes the economy as a system enclosed within human society, somehow magically abstracted from the natural world. The “unfortunately” in the paragraph above comes from observations more typical of those who insist on including in the picture the conditions and constraints of the natural world. Ecological Economics, a growing whole-systems oriented school of economics, takes as its first principle that, “The human economy is embedded in nature, and economic processes are actually biological, physical, and chemical processes and transformations.”⁸⁴ If one accepts the proposition that human beings maintain their lives and therefore their societies through biological, physical, and chemical processes, it seems evident that “the economy,” our current term for the socially organized way we maintain our lives, is in the final analysis a human participation in those fundamental earth processes.

This is where “unfortunate” comes in. The anticipated quadrupling of the global economy in a mere 72 years, which is now less than an average lifetime for our children, as a quadrupling growth in the related biological, physical, and chemical processes of the earth strains all commonsense plausibility. And a sixteen-fold increase within the lifespan of our grandchildren (2X2X2x2) simply has no plausibility at all. Clearly then, in the narrow span of two generations the present global system of leveraged growth will change drastically, either at our civilized behest, or by the simple route, the collapse of civilization.

⁸³ Kevin Kelly, *The Inevitable: Understanding the 12 Technological Forces That Will Shape Our Future* (NY: Penguin Publishing Group. 2016) p. 27.

⁸⁴ https://en.wikipedia.org/wiki/Steady-state_economy, retrieved 4/5/2017.

Navigating climate change, the really critical narrow passage in this process, may allow our children to enjoy their later years in a still complex civilization. From a present population of about 7.5 billion we are on a trajectory to hit a population of 9.6 billion by 2050, and 11 billion by 2090, 73 years from now. A mere doubling of our economy would suffice, if we can pull it off, but even a 1% growth rate is premised on conditions not too different from what we enjoy (no irony!) at present. The challenges are manifold, but we can simplify by reducing them to two categories: stuff and food.

11.1.1 Stuff

That human beings are a stuff-accumulating species is a story as old as civilization. Literally. Once we settled down in stable communities we not only had the luxury of accumulating stuff, we also quickly took to shaping socially complex societies in which accumulation played a major role as a motivation and as a social marker. How we produce, accumulate, and consume stuff is perhaps the most potent shaper of our societies.

In the stuff category, we include all our material production and consumption and the associated energy and resource flows. Optimists tend to focus on challenges to production. They look to human ingenuity to find substitutes for scarce resources, to provide copious flows of clean energy, and in general to devise new technological fixes for any problems. Sceptics roll their eyes at notions of unlimited production growth and look for a transformation in both production and consumption. Perhaps the greatest problem in the stuff category is the way our material flows overwhelm the systemic recycling capacities of air, water, and land that maintain the system within familiar parameters. Climate is changing. Oceans are changing. Land is changing. And as we use new stuff to produce yet more new stuff, we drive this transformation at an accelerating rate. Living beings, humans included, struggle to keep up.

To get through the next generation with our stuff relatively intact, we are going to need both the optimists and the sceptics. We seem to be dropping the ball on climate change, and we're even letting our antibiotics become outdated by evolving microbes, but that does not mean we aren't clever when we put our minds to it. We need the exponentially growing information/knowledge and creative technology to clean our emissions, substitute recyclables for plastics, desalinate sea water to supplement scarce fresh water etc. etc. But we also need the

wisdom of the sceptics who have turned their attention to the alternative shaping of the whole economic system.

It's not as if there are no bridges between the present system and a future with a future. To mention but a few of the most prominent, Hunter and Amory Lovins founded the Rocky Mountain Institute in 1982. Now with a \$30 million dollar budget and staff of over 150, they have for decades worked to provide the market system with energy, material and process solutions that move in the direction of falling in line with the resource and recycling capacities of the earth. Paul Hawken has a rich trove of ideas on how to re-rig the system to reward people for doing the right thing rather than incentivizing problematic behavior. Hawken and the Lovins collaborated on a 1999 book which has attracted wide attention, *Natural Capitalism: Creating the Next Industrial Revolution*.⁸⁵ In his latest edited book, *Drawdown*,⁸⁶ Hawken engages a large research team in assessing the potential of 100 already available and emerging techniques for dealing with the Climate Change threat. In his treatise, *Regenerative Capitalism*,⁸⁷ John Fullerton, a former Managing Director of JP Morgan, describes a financial system that follows the self-organizing and self-maintaining patterns of the natural world. His *Capital Institute* website offers research papers, a blog, and dozens of case studies of this sort of self-organizing regenerating capitalism in practice.

But many would argue that at the end of the bridge to the future there must be an end to growth. The simple proposition is that in a finite system such as the earth, no subsystem can expand indefinitely. The groundwork for this proposition has been established most definitively by Nicholas Georgescu-Roegen, a Romanian-American mathematician, statistician, and economist. His 1971 masterwork, *The Entropy Law and the Economic Process*, drew a fundamental link between economics and the Second Law of Thermodynamics, the most incontrovertible law of all energy processes. His application of the entropic dissipation of useable energy to the degradation of the utility of materials in the process of production was stretching the technical meaning of entropy a bit, since the law applies strictly to energy processes and micro particles such as

⁸⁵ Cf. https://en.wikipedia.org/wiki/Natural_Capitalism.

⁸⁶ The best-selling environmental book of 2017. See webpage, <https://www.drawdown.org>.

⁸⁷ Pdf available online: <http://capitalinstitute.org/wp-content/uploads/2015/04/2015-Regenerative-Capitalism-4-20-15-final.pdf>.

gas molecules. But the symmetry between the entropic degradation of energy in every thermodynamic exchange and the degradation of the potential utility of materials in every production process was sufficient. Landfills leaking methane as they enter the detritus of civilization into the fossil record, oceans filled with plastic microbeads, streams filled with our pharmaceuticals, all such phenomena bring home the fact that our economy grows by taking in useable materials at one end and spewing them out as useless junk at the other.

Once the view of the human economy is repositioned as necessarily participant in the physical energy and biological flows of the earth (natural capital), everything changes. Herman Daley, a student of Georgescu-Roegen, responded with a theory of steady-state economics, a scenario in which a relatively stable human population and stock of capital wealth would be maintained by a steady and replenished flow of natural capital. Daley's work became one of the foundations of the new field of Ecological Economics, so named because it attempts to take full account of the human economy as necessarily contained and maintained within the systemic biophysical flows studied by ecology.

Humans manage economies by keeping accounts, and what one counts turns out to be fundamental. Once natural capital is taken into account, depletion and replenishment, recycling, and maintenance efficiencies of more durable goods and more durable populations all come into sharp focus, replacing the conventional dream of unending increase and the churn of the new replacing the old with an ever increasing value. Daly's view was that once we have a clear accounting, it would be the role of government to impose regulations that would control our use of natural resources and maintain the human economy in a steady, balanced state.

The practical problem is that people perceive regulation as a loss: something we had is taken away from us. Psychological studies show clearly that the pain of loss far outweighs the pleasure of gain. Woe to the politician who tries to improve conditions by taking something away from people: some group, often with "freedom" as their banner, will surely organize against them.

An alternative to top-down, expert-guided regulation, is bottoms-up grass-roots activism. When there is an experienced loss the psychological problem may become a plus. We can count on strong reactions when the fish stocks have already collapsed, the polar bears are gone, the rain forest is cut down etc. The trick is to be responsive enough to move before dire thresholds are crossed. We live by anticipation, and small groups educated to see and feel the loss

threatened by unrestrained growth can become potent movers. Europe, more than the US, has responded to the whole-systems view of the economy with grassroots activism, as exemplified in the DeGrowth movement. “Degrowth” is an English neologism translating the original French “décroissance,” a term that became popularized in French intellectual circles advocating a political movement toward a reduction of both production and consumption. Degrowth, inspired explicitly as a response to the rising awareness the human community might be in overshoot of the carrying capacity of the earth,⁸⁸ also meshes easily with anti-capitalist sentiments and humanist critiques of consumerism’s qualitative diminishment of life. The movement has generated six international conferences since 2008⁸⁹ and it networks worldwide with some 32 loosely similar movements.⁹⁰

We know that the growing economy of the human population is not sustainable. There is no “in the long run” for the way humans make their living at present; it is a short-term phenomenon. Great progress has been made in measuring the systemic capacities of the globe, and graphic devices such as the “Ecological Footprint” have been devised to bring the bottom line home to the general populace. Students learn to go online and calculate the resource footprint of their family and to see national and global metrics.⁹¹ We know that it would require about 1.6 earths to keep up with our pace, and if we keep on growing as we are that will be about 2 earths by 2030. There is even a calculation that gives us an annual Earth Overshoot Day, a way to get some media attention. Earth Overshoot Day is the day of the year when we have used up 100% of the earth’s replenishment capacity for the year; the rest is all deficit living. That day was in early October in 2000, but as of 2016 it moved back by more than 2 months to August 8.⁹² If it moves another 2 months to early June in the next 14 years, it will duplicate the calculation that has us living as if we had two earths by 2030.

⁸⁸ The Club of Rome and the 1972 book they sponsored, *The Limits of Growth*, by MIT professors Dennis and Donella Meadows et. Al., were instrumental in the popular spread of this awareness.

⁸⁹ <https://en.wikipedia.org/wiki/Degrowth>, retrieved 4/8/2017

⁹⁰ *Degrowth in movements*, <https://www.degrowth.de/en/dim/degrowth-in-movements/>, retrieved 4/8/17.

⁹¹ See <http://www.footprintnetwork.org/our-work/ecological-footprint/>.

⁹² <http://www.footprintnetwork.org/our-work/ecological-footprint/>, retrieved 4/10/17.

Living in budget overshoot, be it at the family, national, or global level, is a tricky problem: it usually feels fine in the present, and we seem hard-wired to give greater weight to present benefits and disproportionately discount future costs. We saw that fiscal debt (borrowing at interest) makes sense if the borrowed capital can grow. But the earth cannot grow, so our overshoot is a borrowing that will be repaid by a proportionate shortfall in the future. But that will be something for the next generation to deal with.

So how can we get off the growth treadmill? We have the knowledge both of how to stretch our budget (rejigger capitalism) and of how to finally balance it with a steady-state alternative. There are likewise nascent grassroots movements, a potential that awaits its time. The consensus is that we still lack political will for the kind of extensive top-down regulating Daley saw as necessary, but it is not too hard to imagine the kind of change that could happen if an inspired government met with an aroused populace. Something of the sort—though moving in the opposite direction—happened with the 2016 Trump election in the US. And now, as we approach a new election in 2020, a strong counter-reaction has set in with younger voices raised for socialism (unheard of in the US!) and a Green New Deal.

Politicians have made a career of worrying about the national debt, which in fact is still pretty tractable in a healthy growing economy. Would it not be equally possible to make a career of worrying about our mounting earth debt? The part of the debt that is likely to come home to roost first is climate change, the penalty for overspending our atmospheric CO₂ account. Like the onset of spring, climate change has fuzzy borders: some say it's here already, other say not yet. But the change is real and in the foreseeable future we will be unambiguously in its midst. Rising waters, droughts, storms, new weather might or might not bring down civilization. We, the most adaptive of species, may well adapt to the new normal. But as we do, there will be recriminations, and leading the way may well be anger that we did this to ourselves in the name of economic growth.

For years the proclaimed need for continuous economic expansion has saturated our public life. Our market system expects growth, and when growth fails it spreads many kinds of pain. But it is not too hard to imagine that as we struggle painfully to adapt to the new normal, late night comedians will skewer politicians who mouth the old lines about prioritizing growth, and the young will roll their eyes at any such notions. In coming decades we may indeed be looking at a change in political

climate that will move degrowth movements into the mainstream and support regenerative capitalism or transforming to a more steady-state way of making a living.

Such a shift is likely also to bring to the fore long simmering national and international wealth-distribution issues. Degrowth is a movement for the so-called developed world, and it has a natural synergy with the social justice critics who see an inherent inequality in how and where the wealth of the world accumulates. The form of wealth in short supply in the underdeveloped world has to do not so much with the stuff that clogs our landfills as with the basic necessities of food and clean water and conditions that keep bodies alive.

11.1.2 Food

Movements like Simple Living or Degrowth tend to focus on the stuff that crams our lives and attention. But what we do with our fertilizer-and-pesticide-enabled industrial agriculture and our feedlot and antibiotic enabled livestock-raising practice is perhaps an even more troubled interface with the natural world.

Like all other living organisms, human bodies are organized around and maintained by a continual flow of nutrients from the environment; without sufficient food, we perish. This simple biological fact establishes a necessary link between food and population growth. The remainder of this century, the 80-some years that may determine the survival of our complex civilization, also coincide with the most spectacular population increase in history. In 1800 we finally reached our first billion. By 2012 we passed the 7 billion mark. By 2050 it is projected to be 9.6 billion, and may finally level off over 11 billion at the end of the century.⁹³ We were able to make it through a doubling from 3 billion in 1960 to 6 billion in 1999 largely due to the Green Revolution. We have now added another 1.5 billion to that, but our custom-crafted crops have kept up and more: it is estimated that people in the developing world consume on average about 25% more calories than before the population doubling.

The downsides of this techno-revolution in agriculture are now well-known as we find that agriculture has become one of the major stressors on the natural world. Under a steady rain of fertilizers, pesticides, and

⁹³ https://en.wikipedia.org/wiki/Population_growth, retrieved 4/18/17.

herbicides soil loses the fertility produced naturally by its organic community of micro-organisms and insects. Our nitrogen-based fertilizers runoff the fields and produce algae-choked rivers and lakes and expanding dead-zones where rivers meet the sea.⁹⁴ Microbes in the soil consume the nitrogen and pump it out again as nitrous oxide, the third major greenhouse gas in the atmosphere and far more potent molecule for molecule than CO₂.⁹⁵ Irrigated soils become saline as the water leaches salts to the surface. Monocropping rewards any pest that evolves a work-around to get at the rich target, creating an ongoing pesticide arms race. And agriculture dependent on expensive capital inputs transforms the diverse regionally sensitive crops produced and marketed locally by smallholder farmers into agribusiness operations producing a narrow and vulnerable selection of cereals for humans and livestock, and biofuel for global markets.

It is clear that we are not going to accommodate our 9.6 billion population in 2050 just by ramping up the Green Revolution agribusiness technology. In fact, in many ways the Green Revolution parallels the profile of our industrial overshoot, where the problem is how to back off from a growth dynamic inherent in the system. But here there is the added complexity that the backing off must nonetheless be accompanied by an increase in food production to match the inexorable (barring collapse) population growth.

The UN Food and Agriculture Organization (FAO) summed up the situation in the Executive Summary of its 2017 report as follows:

High-input, resource-intensive farming systems, which have caused massive deforestation, water scarcities, soil depletion and high levels of greenhouse gas emissions, cannot deliver sustainable food and agricultural production. Needed are innovative systems that protect and enhance the natural resource base, while increasing productivity. Needed is a transformative process towards 'holistic' approaches, such as agroecology, agroforestry, climate-smart agriculture and conservation agriculture,

⁹⁴ <https://www.scientificamerican.com/article/fertilizer-runoff-overwhelms-streams/>. Retrieved 4/19/17.

⁹⁵ <http://news.berkeley.edu/2012/04/02/fertilizer-use-responsible-for-increase-in-nitrous-oxide-in-atmosphere/>. Retrieved 4/19/17.

which also build upon indigenous and traditional knowledge. Technological improvements, along with drastic cuts in economy-wide and agricultural fossil fuel use, would help address climate change and the intensification of natural hazards, which affect all ecosystems and every aspect of human life.⁹⁶

Part of the way forward, “a transformative process towards ‘holistic’ approaches, such as agroecology, agro-forestry, climate-smart agriculture and conservation agriculture,” attempts to correct for the destructive edge in an agriculture that assumed that technological prowess freed us from the need to listen to the land. But recovering the neglected wisdom in the proto-technologies of indigenous peoples and their traditional methods, and amplifying it with the best of our environmental understanding, is still not going to yield the kind of growth in production required. The long shadow cast by climate change needs also to be taken into account: farmers depend on nothing as much as the weather to deliver anticipated quantities of sun, heat, and moisture for their crops--and that is exactly what is changing across the face of the globe.

The coming decades, the lives of our children, will require the human community to navigate a narrow passage. The bulk of population growth is expected in the very impoverished areas that can scarcely support present populations and—a very bad roll of the climate dice—these are among the regions more likely to see unprecedented droughts or flooding. Societies in the more developed world are already reeling under the wave of political and economic refugees, and that will only increase. Few factors stir the pot of instability like hunger and food insecurity.

In the Executive Summary of the FAO report quoted above, one of the most striking features is the relatively low profile given “technological improvements.” This is perhaps an over-reaction to how badly we got

⁹⁶ “The future of food agriculture: Trends and challenges,” Food and Agriculture Organization of the United Nations, Rome, 2017.

<http://www.fao.org/3/a-i6583e.pdf>. Retrieved 4/18/17.

burned by the techno-enthusiasm of the Green Revolution. But if we are to feed an additional 1.5 billion people by 2050 we will need a strong technological contribution to supplement the best practices of a more sustainable agriculture. We need high-yield, drought-resistant, salt-tolerant, low-fertilizer crops that can be made available to the challenged farmers and burgeoning populations of the Third World.

This sounds like a tall order, but with our mushrooming plant breeding and genetic engineering capabilities it may not be too much to hope that we can bio-engineer a work-around for climate-challenged agriculture. The proviso, of course, is that we can sustain the organized, complex societies that are the necessary basis for this high-tech enterprise.

The challenge of the next three or four decades will be to somehow step off the growth treadmill of producing and consuming ever more stuff and at the same time maintain the complex educational and technological infrastructure needed to produce and distribute food for a mushrooming Third World population. These are tricky cross-currents, for it is the same educational and technological establishment that feeds our appetite for stuff and our appetite for food. Both stuff and food are commodities in the global market system. We hear endless exhortations that we must educate ourselves to compete in the global market, and our technology whirs to fulfill the demands, expectations, and imaginations of the market. Whatever transpires to dampen the profit-driven growth imperative of our stuff-market is likely to have a similar effect on the food-market.

As we increasingly feel the effects of our failure to deal with and mitigate climate change, a political climate may arise conducive to trashing the system that left us defending short-term economic growth and giving away the future. In some respects at least, this might present an opening to solve some of the problems the present system presents for efforts to feed burgeoning but impoverished populations. The market mechanism serves those who can pay, but it is awkward in meeting the needs of those short on cash, such as the places most of our next several billion

additions to the human population will be occupying.⁹⁷ Free food from the surpluses of developed economies distorts and dampens markets for local producers in recipient nations. And as illustrated in the spiking market of 2008, such aid from afar cannot provide food security to the poor when market forces demand otherwise.

What makes sense is for the aid, in the form of knowledge and technology, to be localized so food can be produced where it is needed. But now it is private companies that lead the way in investigating and enabling the crops of the future, and they jealously protect their intellectual property rights and the patented seeds and life forms produced by their costly research. They are unlikely, even unable by law, to give these critical resources to countries in need. If governments in the developed world converted their food aid to cash, that might help subsidize the transfer, but present American food aid, for example, is a system of disbursing agricultural surpluses through a self-serving network of American handlers. Such aid is valued at some 2 billion dollars a year. If that resource could be transformed and directed to empowering and enhancing local and regional agriculture, much could be accomplished.

The FAO estimates that we will need to increase our agricultural production by 70% to accommodate the additional 1.5 billion humans on the globe by 2050. Why a 70% increase to deal with a 20% population increase? Largely because, as the experience of China and now India indicates, as impoverished economies improve, people increase the amount of meat in their diets. But animals consume far more calories than they produce for human consumption: For every 100 calories of grain we feed animals, we get only about 40 new calories of milk, or 22 calories of eggs, or 12 of chicken, 10 of pork, or 3 of beef.⁹⁸ So eating our livestock carries an increased calory-production price tag—hence the 50% margin in the increase to account for more meat consumption.

⁹⁷ See for example, “8 Ways to Fix the Global Food Crisis,” an article that appeared in *US News*, in the midst of the 2008 global food crisis, <https://www.usnews.com/news/articles/2008/05/09/8-ways-to-fix-the-global-food-crisis>.

⁹⁸ “The Future of Food,” *National Geographic Magazine*, <http://www.nationalgeographic.com/foodfeatures/feeding-9-billion/>, retrieved 5/5/17.

In scenarios that calculate how we might meet the need for increased food production, a reduction of meat consumption figures as a significant contribution.⁹⁹

The challenges of growing our food production are severe, but we have the knowledge and capacity to meet them. Emphases vary depending on the orientation of given authors, but in the end the mix of measures is well-grounded and predictable. Paul Erlich, who has spent years immersed in the controversies concerning population and food, sums them up as follows:

What are the prospects that *H. sapiens* can produce and distribute sufficient food? To do so, it probably will be necessary to accomplish many or all of the following tasks: severely limit climate disruption; restrict expansion of land area for agriculture (to preserve ecosystem services); raise yields where possible; put much more effort into soil conservation [3]; increase efficiency in the use of fertilizers, water and energy; become more vegetarian; grow more food for people (not fuel for vehicles); reduce food wastage; stop degradation of the oceans and better regulate aquaculture; significantly increase investment in sustainable agricultural and aquacultural research; and move increasing equity and feeding everyone to the very top of the policy agenda.¹⁰⁰

These are not new insights; what has changed is mainly the growth and depth of the research that supports them. But, as Erlich goes on to note, “Most of these long-recommended tasks require changes in human

⁹⁹ See, for example, “8 Ways to Fix the Global Food Crisis,” *US News*, <https://www.usnews.com/news/articles/2008/05/09/8-ways-to-fix-the-global-food-crisis>, retrieved 4/28/17.

¹⁰⁰ “Can a collapse of global civilization be avoided?” *Proceedings of the Royal Society B*, http://rspb.royalsocietypublishing.org/content/280/1754/20122845?ijkey=6a2c81951e358e550741d2e1b839c2d16143a82a&keytype=tf_ipsecsha#sec-2, retrieved 5/01/17.

behavior thus far elusive.”¹⁰¹ Many factors come together to hold our misfit behavior in place. We will deal with a number of them more at length when we turn our attention below to what it is that clouds the anticipatory vision that guides us into the future. In any case that future will be far different than anything experience would lead us to expect. Since 1800, our population has increased six-fold, and our global economy has expanded 50-fold.¹⁰² We clearly have been on quite a trip. And the next 200 years will certainly be a very different kind of trip. If we do not simply crash and burn, population will level off and economic growth will stabilize. The social and economic structures that formed and facilitated the modern experience of the last two centuries will have to be completely transformed.

11.1.3 Two Opportunities for Change

We are on the cusp of two developments that involve major destabilization of the status quo. If they do not simply bring us down, either or both have the potential to dislodge our addiction to growth.

The first has to do with the social and political reaction to the experience of a world degraded by climate change. We mentioned this above, but it merits closer examination. The first thing Erlich mentions in his must-do list to sustain civilization is “severely limit climate disruption.” At present we have settled on the premise that we must shoot to hold change to 2 degrees centigrade, though some experts now say even that is far too dangerous.¹⁰³ In any case, even that uncomfortable overshoot is a very optimistic and unlikely target, a best case scenario outlined in the unenforceable Paris Climate Treaty, now battered by the prospect of US withdrawal. We are surely headed into difficult terrain, though the degree of ruin will remain uncertain as it unfolds over decades and centuries. We may not end up in the dystopian future of movies like *Water World*, *Mad Max*, or the wounded civilization of *Blade Runner*. But

¹⁰¹ Ibid.

¹⁰² <https://skepticalscience.com/Can-animals-and-plants-adapt-to-global-warming.htm>, retrieved 5/6/17.

¹⁰³ “Safe Limit for Global Warming Is Lowered Dramatically by Experts,” *Scientific American*, <https://www.scientificamerican.com/article/safe-limit-for-global-warming/>, retrieved 5/6/17.

a rising generation, our young children or perhaps their children, will experience the end of the stable climate regime within which civilization arose and flourished.

As we contemplate this situation, those paying attention raise a clamorous warning about impending disaster, the end of the world as we know it. This is appropriate: the point of a warning is to evoke action before it is too late, or at least to mitigate how bad it will be as we coast into “too late.” The warnings have made us uneasy, but have not been sufficient to budge us from our growth mania (or stupor). Having multiplied our global economy 50 fold in 200 years, the common sense of the community of nations assumes that ongoing development, and especially development of the undeveloped, is an imperative that must constrain our response to our incrementally encroaching crisis.

The question of sustaining civilization in a deteriorating environment then becomes, what will it take to dislodge us from this now ingrained prioritization? At this point, our minds easily leap to questions of how major, how widespread a disaster will it take, and will it not by then be beyond the point of no return in any case? But equally, or even more to the point, we need to consider what the mental and political landscape will look like for a generation that finally crosses the awareness threshold and realizes they have been handed a lesser and lessening world?

Human mental weather is in some ways more predictable than what goes on in the atmosphere. Cognitive psychologists are clear that we are hard-wired to steeply discount the future in comparison to immediate attractions—otherwise how would tobacco smoking not simply disappear? And they know also that we react more strongly to loss or the prospect of loss than to gain, as politicians discover when they try to cut back entitlement programs.¹⁰⁴ These factors have worked to keep us locked into jobs and economic growth in the face of projected climate change. But when change happens and the loss is experienced, the hard-wiring remains the same but the response of public opinion and outrage flow in the opposite direction.

The middle class in the US and much of Europe has been economically stagnant and shrinking in numbers and opportunity for decades. Then in 2016 accumulating discontent boiled over and we had Brexit, the

¹⁰⁴ See Khaneman, *Fast and Slow*.

election of Trump, a teetering EU, and the seeming inevitability of the march of democracy and free-market globalization join the list of misapprehensions about the future. Populist anger in the US swept both the right and the left as we have veered from iconic global citizenship to border walls, economic protectionism, and, in a left reaction, even a flirt with a socialistic leveling of the tilted playing field. People seem to want anything but the established, the expected, the frustrating dissatisfaction of the status quo.

What then might be the cumulative reaction to decades of steadily incremental negative conditions in our oceans, atmosphere, wild and cultivated lands? The eventual heirs of the earth will simply take what they are born into as the way things are. But a swing generation or two will feel loss, a birthright wrongfully deprived. How did this happen?! Who let it happen to us?! Who can fix it? Around the world the answers will vary in the particulars, but the culpability of governments fixated on markets and economic growth will be blindingly clear in the record of decades of arguments for doing nothing or not moving “too aggressively.” The doors of fundamental structural change will be wide open. Anything but more of this!

This might finally present an opening for a turn to some version of the steady state economics outlined by Herman Daley. Daley would use government restrictions to achieve three essential elements to a steady, non-growth economy:

1. Limiting population to a constant size;
2. Distribute wealth more equitably, including establishing minimum and maximum limits on income;
3. Restrict capital flows to balance economic input and output.¹⁰⁵

All three of these measures amount to heresies in the present political and cultural milieu: their common point, after all, is to do away with growth, which at present is regarded as the magic solution to all our problems. If a climate-change depleted world comes to regard our growth mania as the chief cause for their diminished heritage, the political climate might well shift to favor a steady-state alternative.

A second crisis is brewing that promises to radically disrupt that scenario. If civilization holds on to its technological prowess, it is bent on doing away with a vast number of jobs in the coming decades. We have already discussed how in our drive

¹⁰⁵ https://en.wikipedia.org/wiki/Steady-state_economy#Herman_Daly.27s_concept_of_a_steady-state_economy, retrieved 5/9/17.

to become rich by coming up with a compelling innovation, the cutting edge of our high-tech world is now a race to come up with a new generation of AI. The goal is to put robots in positions we once thought of as the exclusive preserve of human intelligence.

The limitations of the traditional claim that automation simply frees humans to do more rewarding kinds of jobs should be evident to all. That may have been true in the phase when machines replaced human muscle in the factories and on the farm, but the digital world of intelligent and increasingly autonomous machines is an entirely different matter. Factory jobs were just the earlier casualties. According to the Wall Street Journal, manufacturing output has been a fairly steady percent of our growing GDP since 1960, but it employed 24% of our workforce in 1960 and only 8% in 2016.¹⁰⁶ We are used to the fact that only 2% of the population now grows all our food, and we are not surprised that automobile assembly lines (the “better” kinds of jobs all those displaced farmhands could get) are now mainly a lineup of robotic arms. And now AI is on the cusp of replacing not only the legions of truck drivers (the most common job in the US), but the better educated who became pharmacists, accountants, financial planners, translators, medical diagnosticians, law clerks, and the list goes on and on.

The deep rationale for the new wave of AI is that, analogous to the way our machines have long done what our muscles cannot, our AI will be able to do what our minds cannot. Not just that AI can do what we cannot, but that the scaffolding is rapidly taking shape where we need and depend on it to do so. Now, as the ordinary data processed in our minds as we make decisions becomes immeasurably complex Big Data stored in a cloud suspended in cyber space, we need to ramp up the processing and decision making proportionately to inform and guide the New Activity, whatever that may be.¹⁰⁷

The computers that first defeated human chess masters a few years ago had to be programmed with a deep array of historic chess games, a reference library no human brain could hold. But the new generation of computers can be programmed with learning algorithms that allow them to master new games by deciphering rules and mastering strategies on their own, developing in a few days the skill to defeat most human players. Automated scanners now outperform highly trained humans in reading mammograms for signs of cancer. Who would you want to diagnose your illness, an experienced physician or a computer accessing a Big Data trove of hundreds of thousands of case histories with all their symptoms, diagnoses, and outcomes?

¹⁰⁶ <https://www.wsj.com/articles/u-s-manufacturers-fewer-workers-more-productivity-1476034763>, retrieved 5/9/17.

¹⁰⁷ For an insightful, though perhaps overly enthusiastic, analysis of the digitized world we are moving into, see Kevin Kelly, *The Inevitable: Understanding the 12 Technological Forces That Will Shape Our Future*.

Calling attention to the inexorable advance of fabricated intelligence usually leads to a kind of frenzied reflection trying to think of jobs that will still call for humans. There will still be such jobs, though in many cases they might call for humans with special cybernetic implants that will allow them to better keep up with the robots. Speculation diverges when we get to this point: will we rise to new heights or descend to new depths? Do we go on to become masters of the universe, or end up on the discard heap?¹⁰⁸ These are not idle questions, but there is another more mundane and calculable crisis in this development: many, many jobs are going away.

The economy of the modern world ushered in by the Industrial Revolution has been structured on a single simple formula: humans maintain themselves by a monetary flow and the money comes from having a job. This is so fundamental that in the US it enters into the normative sense of modern morality: a successful, decent human being works hard, holds a job, and supports him/herself and the family. There are a variety of ways of implementing this formula, but one can see the common denominator in the crisis of identity and self-worth that often goes with unemployment, or the suspicious eye and tacit disapproval aimed at those who do not prepare themselves and seek a job. How then will we cope with 50% or 75% unemployment in the developed world?

At present the solution we envision for the escalating inequity of wealth is to grow the economy so that there are more jobs and everyone is busy and happy earning a decent living—too busy and happy to use much psychic energy bemoaning the insane wealth accumulating among the 1% at the top. Replacing the functional center of modern social structure with AI will be a challenging endeavor. But it also includes a unique opportunity, a chance to drive a wedge in the job-money-well-being linkage and its association with the production-consumption growth treadmill which creates the requisite jobs. If this rethinking of jobs were to occur in the context of a climate-damaged planet rife with anger at profit-driven growth mania, there could well be a synergy for revolutionary transformation of much that we now just take for granted as basic facts of life.

This will become more clear if we turn to the second facet of the co-evolving factors that drive our relentless acceleration, money.

¹⁰⁸ See, for example, Yuval Harari's discussion in his book on our cyber future, *Homo Deus: A Brief History of Tomorrow* (NY: HarperCollins. 2017).

11.2 Money

The Industrial Revolution ushered civilization over the threshold into an era of a new kind of continual acceleration. Mechanized factories churned out products faster and faster for consumers who became more and more acclimated to change and novelty. Agriculture followed suit with economies of scale and efficiency, mechanized monocropping, faster growing livestock. Rapid transportation to distribute our more massive production and speedy communication to coordinate distant movements shrunk the temporal meaning of distance to the point that we now inhabit a world organized for constant contact and instant gratification. $D/T=S$: Distance divided by time is the formula for speed. Underlying this relentless speeding up of virtually every aspect of human life is another formula, the calculus of efficiency: $T=\$$, “time is money.”

When Benjamin Franklin in 1748 made the sage observation that “time is money,” he was talking about working at a job:

Remember that time is money. He that can earn ten shillings a day by his labour, and goes abroad, or sits idle one half of that day, though he spends but sixpence during his diversion or idleness, it ought not to be reckoned the only expense; he hath really spent or thrown away five shillings besides.¹⁰⁹

One must be “industrious” and not waste time, which is now a value calculable in dollars and cents as well as hours and minutes. Of course the same calculus was not lost on employers, and we entered on the age of time-motion studies, accelerating assembly lines, and the emergence of efficiency as a major consideration in organizing the many processes that constitute our daily life.

The industrial monetarization of time becomes critical when the profit motive inserts itself to push processes that have their own innate times. Biology and ecosystems, the realm of living metabolisms and the complex networked processes by which they are maintained and reproduced, are a uniquely timed world, but the timing can be pushed. One can see the dollar signs, for example, in producing genetically modified salmon that grow to full size in half the time. Natural selection shaped salmon to turn off their growth and appetite for food as a

¹⁰⁹ From his essay, *Advice to a Young Tradesman*. <http://quoteinvestigator.com/2010/05/14/time-is-money/>, retrieved 5/18/17.

strategy to deal with an annual cycle of lean food supplies, but the modified salmon are equipped with nonstop growth hormones and appetites that never turn off. As a factory-farm product this is a great efficiency. But as wild escapees they become either dead-end misfits or potentially wreak havoc on the temporal expectations of an entire food-web. Analogous dynamics go with monocropping and scale efficiencies of sowing and reaping, which alter the cycles of nutrient flows in soil and air and transform communities of microbes, insects, herbivores and predators. What is faster and more profitable for the humans distorts and diminishes the innate clock of the natural life community.

As long as the connection between speed and money governs our social organization, there is little hope of taking our foot off the accelerator. The lure of faster processing in the age of information technology is leading us right into Artificial Intelligence and a system that expects for its routine functioning a massive collection and crunching of data on a scale that requires quantifiers such as terabytes and nanoseconds. This has the potential to displace and rearrange the expectations of our time-starved social systems as effectively as the frankenfish salmon might rearrange their eco-system.

One effect will probably be the expected: it will speed up a lot of things we would like to be faster. Traffic made up of AI controlled vehicles, for example, will be able to flow through intersections rapidly and maximize the use of alternative routes to reduce periods of congestion. Amazon may routinely deliver its packages in a single day, or perhaps in hours. Perhaps as the little slack remaining in our psychological speed limit is tightened we will technologically rewire ourselves to keep up.¹¹⁰ But maybe, just maybe, the AI revolution also has the potential to slow us down.

The Industrial Revolution placed us on an accelerating treadmill by linking speed with making money, the stand-in for well-being in a monetarized economy. When increased productive activity means more jobs means more money means more well-being, the system is locked into growth and acceleration. But what if the human link between productivity and money is broken? Jobs are the human middle term here. The modern world has been built systemically around the linkage between money and having a job that produces the commodities that

¹¹⁰ See Yuval Harari, *Homo Deus*.

make the money. The system has remained in place even as automated machines began from the mid 20th century to gnaw into the jobs humans could do to make money. In a system that still expects “decent” (that is, fitting systemic expectations) people to have a job and so support themselves, the personal and social consequences of high unemployment are highly problematic. But what if, as discussed above, the oncoming advance in AI means that 50-70% unemployment rates became the norm in developed economies? The means by which people get the money to live—presuming an ongoing monetarized economic system--would have to change, and the system would have to adjust to a new normal. But adjust is perhaps too weak a word; transform is more like it.

If people can no longer get their monetarized well-being by having a job, maybe they will be paid a “basic income” just for being alive. Maintaining life is, after all, the meaning of well-being, and so is the deep rationale for money in any event. Although it sounds almost unthinkable in our present job-focused system, the idea of a basic income has already received considerable attention and even limited experimentation.¹¹¹

It is hard to imagine a smooth transition to a basic income system, for jobs and differential wealth accumulation reach deep into the responsive nerves of our market system and our social structures. The point here is simply some such system that enables a living to be made in the absence of jobs is a requirement for a civilization that no longer needs much of our muscle power and has leapfrogged ahead of many of our cognitive abilities. And in the transition, the place of money will be up for grabs.

The “what if” speculation regarding basic income runs in all sorts of directions, as do notions of implementation. We have so long associated moral values with hard work some suspect such a system would lead to moral degeneracy. Many turn their eyes to what productive alternatives we would find to fill our time: will we become ever more creative, artistic, or inventive entrepreneurs? Will neglected labor-intensive ways of small-scale organic farming flourish, or will we take better care of the families, friends, and neighbors we now have too little time for?

¹¹¹ See https://en.wikipedia.org/wiki/Basic_income, retrieved 5/16/17.

A commonly imagined scenario is that everyone gets enough money to maintain life and limb, as it were, and then the more ambitious work out other ways, such as advanced education, entrepreneurial activities, paid service, or some other way to insert themselves into the greatly reduced remaining job sector. For the rest, there will ways to enjoy life on a more modest scale. Such a scenario is certainly a possibility, perhaps even a likelihood. What makes it likely is that it is in continuity with the present motivation structured into our system. That is, money remains the stand-in symbol and quantifier for all forms of well-being, and as such will continue to motivate the best and the brightest to spend their lives in its pursuit.

But one could as well question such a simple projection of current values. Instead of reimagining a world facing a profoundly new situation, such a projection simply moves the furniture around a bit. But motivation is highly context sensitive, a shared social phenomenon that can swing with the popular mood. Anyone old enough can remember the “tune in, turn on and drop out” 1960s counterculture disparagement of the job and money making ethic of the larger culture. The force of that movement was palpable but not lasting because it had no deep institutional foundation. That is, most hippies within a decade awoke to the implacable systemic connection of jobs, money, and well-being.

But a basic income system could be the institutional foundation that enables a more effective cascade of discontent with what our current culture exacts from us in the pursuit of money. A guaranteed basic income might in fact topple money from its powerful association with well-being and dull its competitive edge among the values that move us. Freed from the motive power inherent in the notion we need more money to ensure well-being, we could rediscover the fact that money is just a unit of exchange. This profoundly alters the calculus of well-being. If an acceptable basic well-being is made available by “free money,” even in a still monetarized system more money would no longer be automatically associated with more well-being, and we would be freed up to engage in a broader calculus of well-being.

The present system leads young people (and their parents) down a more-is-better path: I need to make money to have a life of well-being, and the more money I make the more well-being I will have. But if basic well-being is taken care of in the mental calculus, making more money and having more stuff is repositioned as simply one option among many in the calculus of well-being. That is, the money-well-being connection would be basically taken care of, so attention might turn in a more open

way to other ways of enhancing well-being. Even at present people can choose to subordinate making more money to having more time for child care or to the pursuit of lower-paying but more rewarding or less demanding and stressful careers, but such decisions go against the systemic grain. What if we were routinely in the position to weigh our options?

The possibility here is that a basic income system would break the time-is-money syndrome that has been the heavy foot on our accelerator ever since the industrial revolution. Basic income might transform the equation to something like “time *or* money.” With basic income taken care of, people would constantly be confronted with a priority question: “Would I rather have more money, or more time to do X?”

Chapter 12. Changing our Minds and Hearts

Only a crisis—actual or perceived—produces real change. When that crisis occurs, the actions that are taken depend on the ideas that are lying around.

Milton Friedman

We have constructed technologically enabled societies premised on an intertwined system of money and growth which introduce exponential or even hyper-exponential change. This institutional social construction is produced through the inner workings of our minds and hearts, and in a feedback loop continually shapes the workings of our minds and hearts. In this section we will consider five closely interwoven facets of the inner life: our priorities, short-sightedness, identities, consumerism, and carelessness. These overlay and intertwine with each other. A summary statement of their functioning at present might be something like: short-sighted priorities based on anthropocentric consumer identities foster a carelessness about non-human life that allows the Sixth Extinction to continue and accelerate.

It might seem this should be the easy part of the change we must make. After all, we change our minds about things all the time. The deeper structure of our minds and hearts is not so easily changed, however. The shared social nature of our thinking and expectations makes the world the way it is and the way the world is reinforces the assumptions that are the architecture of our inner life. And further, the facets of that

complex inner architecture form a net of interdependence in which everything seems to hold everything else in place.

The upside of all this interwoven structure is that change in one area creates tension and currents of transformation in the others. And as we have seen, the social system we have created is on a path of rapid and deep transformation in the coming decades, so the external structures we have produced will no longer support assumptions that have been shaped by the modern industrial era and the Great Acceleration. To an extent perhaps beyond our experience, it is likely things will seem “up for grabs.” Faced with uncomfortable fluidity we may double down on trying to shore up problematic but familiar structures already in place, a vain attempt to reach back to a time when, at least in imaginative memory, things worked. But there is also room for movement, and in such unsettled circumstances it will be a great help to have some idea of what might lead in a fruitful direction. So in this chapter we will be reviewing the facets of our inner architecture with an eye out for leverage points where change might make us a more sustainable, life-sharing species in the community of life.

12.1 Priorities

We can't do everything at once, or as systems thinkers put it, you can only maximize one value at a time. Our solution to this problem is serial maximization: first this, then that. In other words, we organize by prioritizing. We are comfortable when the question of first, second, or third in priorities is a matter of just arranging steps in a temporal process. But all too often the situation is a matter of allocating scarce resources such as time, energy, attention, or money where “priority” means what really gets addressed, as opposed to what may or may not be attended to. We don't mind the both-and sorts of serial priorities but often agonize over the either-or sorts, which we prefer to see as both-and compromise situations if possible. Maybe it's not really a choice between a high-paying job or doing what I love, maybe I can find something I like that pays pretty well. Maybe it's not fossil fuels or the climate, maybe we just need a cleaner way of burning fossil fuels. Sometimes the middle of the road works, sometimes it is self-delusion.

When we discussed motivation in Chapter 6, we argued that the root of all motivation is well-being: the maintenance and flourishing of life is thus the organic foundation of all motivation, the mainspring of all derivative

forms. Strategic priorities shift with changing circumstances, but well-being in some form may be considered a common bottom line. We can easily identify a list of high priorities that routinely get subordinated to profit, comfort, or some sort of expediency. Life, health, food, a livable environment, seem pretty obvious as top priorities, but we are surrounded by evidence that they are neglected, especially in the pursuit of money. Talking about it, “consciousness raising,” helps around the edges, but jobs for workers, more wealth for the wealthy still seems to shape the central discourse that gives us our shared priorities.

But we live in times when the sovereignty of money and the GDP is in many quarters under severe questioning. The stronger social contract of European societies self-consciously prioritizes well-being over the kind of aggressive production and profit maximizing individualist capitalism exemplified in the US. The once common assumption that a chart comparing national GDPs is an indicator of which nations are better places to live has yielded to a much more complex calculus of “quality of life,” a concept that engages with well-being on a far deeper level than simply assessing the state of the economy.

There are now multiple indices comparing and tracking well-being nationally and internationally. Trying to come up with some common statistical measure of well-being is more complex and less straightforward than tracking financial and production flows, but variables such as health, social relations, governance, and environment are typically included. The introductory paragraph of the webpage on well-being by the UK’s Office of National Statistics is fairly representative:

Societal and personal well-being in the UK looking beyond what we produce, to areas such as health, relationships, education and skills, what we do, where we live, our finances and the environment. This data comes from a variety of sources and much of the analysis is new.¹¹²

The tiny Buddhist nation of Bhutan introduced the idea of replacing the economics of GDP growth with tracking measures of GNH, Gross National Happiness, as a development strategy back in 1971. For decades it attracted attention mainly as some kind of idealistic oddity. But the encroaching reality of climate change and the global financial

¹¹² <https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing>, retrieved 1/4/18.

crisis of 2008 have made the Bhutan model an object of serious attention.¹¹³ The UK began its indices tracking well-being in 2012, the EU in 2013.

These are as yet small changes; the emergence of systemic attention to factors of well-being is still massively overshadowed by the compulsive tracking of measures of economic growth. But the shift of attention to well-being has been ushered in by crisis—the 2008 financial debacle and experiencing the encroaching effects of climate change. Given the likely prospect of mounting crises for the human community in the coming decades, there is a good chance well-being may emerge as an increasingly well-articulated and critical theme in our public discourse.

The self-conscious emergence of well-being as a common framework for personal and communal priorities would be a critical shift from the unpredictable consequences that attend human societies prioritizing economic growth. In the organizing dynamics of interdependent systems, be they logjams, arches, ecosystems or the working of our hearts and minds, some elements have a central or “keystone” relationship that enters into the behavior of all the rest. Reintroducing a missing keystone species can integrate and revitalize an entire ecosystem. For humans, rediscovering the keystone centrality of well-being in framing the priorities that motivate our behavior has a similar potential. It touches both immediate personal practice and the deepest dynamics of human civilization in the Anthropocene.

Well-being for humans is particularly complex, comprising not only physical but psychological health, social relations, governance, immediate and distant environmental conditions, shorter and longer time spans. Prioritizing is a complex dance continually shifting among all these factors as we go about making a living, that is, maintaining ourselves in the many-layered system that maintains us. Necessarily the priorities that guide us in daily life and throughout the years are a matter of trade-offs. A high awareness and concern for well-being does not magically solve the conflicts and tensions inherent in the necessity of

¹¹³ See the 2012 article in *The Guardian*, <https://www.theguardian.com/world/2012/dec/01/bhutan-wealth-happiness-counts>, retrieved 1/4/18.

introducing focus and order, but it provides real guidance in considering the alternatives.

I say well-being provides “real guidance” because, as we have seen, it is the deep wellspring of motivation for any living creature. Insofar as money, an empty place-holder for well-being, has come to play a central role in the self-organizing dynamics of the human community, civilization has become not only distinct from but also deeply alien to the rest of the world of life. In that respect, the reemergence of well-being as a more prominent way of prioritizing and ordering our lives is like finding anew the common discourse that runs through the entire community of life.

Bringing the frame of our priorities into alignment with the inner thrust of all motivation in systemic life is a precondition for the Anthropocene experiment to endure for long. It is significant that “the environment” appears in any list of conditions important for our well-being. But it typically appears rather far down that list. The excellent briefing paper prepared by the European Parliamentary Research Service, “Measuring Well-being and Progress: Looking beyond GDP,” reflects the typical sort of prioritization inherent in our present way of thinking and valuing even as we try to reframe it in terms of well-being:

Indicators of social aspects that play a large role in determining citizens' well-being are increasingly being used to supplement economic measures. Health, education and social relationships play a large role in determining citizens' well-being. Subjective evaluations of well-being can also be used as a measure of progress. Moreover, changes in the environment caused by economic activities (in particular depletion of non-renewable resources and increased greenhouse gas emissions) need to be evaluated so as to ensure that today's development is sustainable for future generations.¹¹⁴

It does not auger well when the managers of the globe think mainly about their own needed resources when they do get around to considering the environment. We exist most immediately in our humanly constructed society, so social concerns take precedence, much as

¹¹⁴ <http://www.europarl.europa.eu/EPRS/140738REV1-Measuring-well-being-and-progress-FINAL.pdf>. Retrieved 1/8/18.

oncoming traffic is the focus when crossing a busy street, even though larger questions are more critical in a larger framework. But as we face up to the Sixth Extinction, we become aware that our own well-being is intimately tied in to the well-being of the larger community of life. In releasing the UN's 2019 report warning that one million species are now on the verge of extinction, the comments of the chair of the committee preparing the report highlight that connection:

“The most important thing isn't necessarily that we're losing . . . 1 million species — although that's important, don't misunderstand me,” Watson said during a teleconference Sunday. “The bigger issue is the way it will affect human well-being, as we've said many times — food, water, energy, human health. We care about nature, but we care about human well-being,” Watson said. “We need to link it to human well-being; that's the crucial thing. Otherwise we're going to look like a bunch of tree-huggers.”¹¹⁵

Professor Watson's comments reflect a clear awareness of the public he is addressing. He is looking for leverage to mitigate the disaster to all life, and concern for our own well-being is more effective than looking “like a bunch of tree-huggers” who emotionally prioritize the non-human. But once well-being is the frame of consideration, the game of inserting the economy and jobs versus the environment is derailed:

“It's no longer enough to focus just on environmental policy,” said Sandra M. Díaz, a lead author of the study and an ecologist at the National University of Córdoba in Argentina. “We need to build biodiversity considerations into trade and infrastructure decisions, the way that health or human rights are built into every aspect of social and economic decision-making.”¹¹⁶

When focus is adjusted to the scale appropriate to the Anthropocene, the well-being of the biosphere clearly must be structured into the way we go about our living. This brings us to the question of how we can readjust our focus to compensate for the evolved tendency for a short-sighted ordering of our priorities.

¹¹⁵ https://www.washingtonpost.com/climate-environment/2019/05/06/one-million-species-face-extinction-un-panel-says-humans-will-suffer-result/?hpid=hp_hp-top-table-main_massextinction-7am-banditleader%3Ahomepage%2Fstory-ans. Retrieved 5/9/19.

¹¹⁶ “Humans Are Speeding Extinction and Altering the Natural World at an ‘Unprecedented’ Pace.” <https://www.nytimes.com/2019/05/06/climate/biodiversity-extinction-united-nations.html>. Retrieved 5/9/19.

12.2 Short-sightedness

Short-sightedness is a distance-based metaphor: We need to see something of concern to us, but fail to recognize it because it is too distant. The distance that hinders our appropriate recognition and response is of two types. The first is distance in time. We are hard-wired to steeply discount future gains and losses in favor of more immediate gain or loss.¹¹⁷ The second is relational distance. We are equally hard-wired to be concerned for our personal well-being, family, and other close relationships. The dismissal of things that “have nothing to do with me” reflects this kind of distance discount. Our short-term responsiveness evolved by natural selection: mortal dangers tend to be relatively immediate and personal threats.

Climate change, is the Anthropocene’s poster child for temporal short-sightedness. The stakes could not be higher, the cost of delay mounting steeply, but real disaster is just beginning to be felt, with the bulk of the payment not due perhaps until late in our children’s or grandchildren’s lives. The Sixth Extinction reflects the problem of relational distance. Especially as we have rapidly urbanized since the Industrial Revolution we have been intensely caught up in the more immediate world of human society and relatively oblivious of the toll our expanding and invasive domestication of the globe exacts on the non-human community of life.

As our technological reach extended, we have become shapers of the evolving world on a scope and scale beyond anything for which the daily life experience of our species has prepared us. It’s a little odd to be addressing the problem of short-sightedness at the very point when our scientific abilities give us further practical and anticipatory reach into the future than ever before. Now we have the means and the urgent challenge to shape our actions guided by deeper understanding and anticipation of future consequences. We are a near-sighted species that has learned to construct scientific models that offer deeper vision and understanding of potential futures. Having fashioned these corrective lenses, now we need the maturity to look through them even when it seems more comfortable and convenient in the short term to avoid doing so.

¹¹⁷ Kahneman, *Thinking, Fast and Slow*.

Short term prioritization is most acute at the individual level: it guides us through our daily lives. But our daily lives and activities extend far beyond our individual grasp. Unlike my ancestors, I cook my food and wash my dishes with appliances I could not make or repair. I communicate and take in information by devices I do not comprehend, and my food, transportation, clothing, and medications are an act of faith in processes about which I really know little. In sum, we now live in a world produced by organized collective intelligence and abilities.

In some ways this is like the phenomenon of other eusocial species that make their living by coordinated interdependent activity. Ants and termites, for example, routinely create complex nest-worlds the architecture of which exists in no individual. Except we do our collectivity with a consciousness that guides by anticipation and foresight. As we scaled up our social organization with city-states, empires, and now nation states, we have managed the increasing complexity and extended scales of space and time by inventing government, bureaucracy, and an array of social, business and political organizations, with the internet and cyberspace adding the latest and in some ways most potent frontier of collective organization.

Our organizations and institutions work on a scale beyond individual consciousness to represent a diverse array of interests and concerns to be pursued. They function with varied scopes of vision across a range of both personal and common interests. Corporations look to shareholders and profits, NGOs to a wide range of differentiated public interests. The governmental level of organization has been and still is our main strategy for dealing with the complex intersection of interests and the scales of space and time that lap far beyond the horizons of the typical individual consciousness that guides our daily life. Indeed, history is largely a record of the successes and failures of this governance level in arranging for a livable future.

Our collective consciousness, especially at the government level, must now scale up to meet the global challenge of the Anthropocene. For the first time policy must deal with global management based on anticipated consequences that may be one or multiple generations in the future. Our technological reach has already assumed such proportions without our realizing it. We were surprised to discover that the CFCs with which we cooled our refrigerators and propelled deodorants from our spray cans we were also destroying the ozone layer that makes dry land habitable. And now we find that with fossil fuels we have recalibrated the earth's carbon cycle, changed the chemistry of the oceans, and modified the

weather. As planetologist David Grinspoon has observed, we have thrashed around on the global scale inadvertently: the Anthropocene caught us by surprise. Now the challenge is to begin to act on that global and geologic scale with intelligence, that is, with the foresight and action appropriate to maintaining well-being at that scale.¹¹⁸

When the threat was sufficiently immanent, such as the annually growing ozone hole and the accompanying escalation of skin cancers, governments pulled together, overcame resistance and disinformation campaigns from commercial interests, and enacted enforceable global legislation banning CFCs. Meeting the Ozone Crisis has been the outstanding example of collective consciousness at the level of governments, guided by science, successfully managing in the Anthropocene. Other examples come mainly from our responses to various health threats such as avian flu, the ebola crisis, and rolling back ravaging diseases such as scarlet fever and polio. The good news in all this is that these examples show that, for all the political static and pressures from vested interests and misinformed publics, the human community can pull together to act globally for well-being.

One might temper optimism, however, with the observation that in all those cases response was based on the experience of immanent threat. Even government agencies wait to ramp up their preparation for “hundred-year storms” until the hundred-year storms start happening every five or ten years. If uncertainty stretches to decades, as in the case of volcanic eruptions or earthquakes, our risk management falters and preparation tends to drop off drastically.

As recently as four or five decades ago, we did not have the knowledge at our disposal to exercise long-term foresight. Both the Ozone crisis and climate change caught us largely by surprise. But now satellites enable us to track global processes with great accuracy and science has advanced to allow a much clearer interpretation and modeling of the complex causality underlying trajectories of global change. We can almost say our collective consciousness is on the cusp of overcoming the human penchant for granting decisive weight to the short-term.

¹¹⁸ See David Grinspoon, *Earth in Human Hands: Shaping our Planet's Future* (NY: Grand Central Publishing, 2016). Grinspoon's book is a rarity in Anthropocene literature, a deep, thoughtful analysis of its problematic nature and cataclysmic potential combined with a grounded and cautious optimism that we might meet the challenge.

The potential is there, but whether we will bring it off is still in question. Governments are presently structured to look after interests on a national, not global scale, and commonly they are heavily shaped by national economic priorities and the interests of the affluent. Short term interests are powerfully organized in an international “free-market” economy. The role of government in this economy is hotly debated. One ideological position sees free competition as the essential control mechanism that will maximize market functionality for the well-being of all. In this view, government regulation distorts the market and lessens the well-being (read “wealth”) it could deliver. Naomi Klein has argued insightfully that the implications of climate change are so at odds with this conservative ideology that those for whom it is a virtual world view end up denying climate change altogether or at least deny that humans have anything to do with it. Humanly caused climate change, the hallmark of the Anthropocene, calls so clearly for government intervention and regulation that in right-wing circles it can plausibly be depicted as some deliberate hoax, a conspiracy of those who would like to see a world government that would take away our freedom.¹¹⁹

But the way technologically empowered human beings make a living is now deeply and consequentially structured into global processes, so we indeed need government to regulate and shape how we work out the short-term and particular interests of human society in a way commensurate with long-term consequences for the livability of the earth. This is where the incipient shift to deeper consideration of what constitutes well-being becomes critical. Governments, whatever their actual practice, typically legitimate themselves as overseeing the well-being of the community.

A focus on annual and quarterly economic performance is perhaps the paradigmatic case of short-term thinking. But even this short-term sensitivity is shifting as conditions become such that we begin to see we are all in the same boat and do not like where that boat is headed. As the edge of the discounted future nears and the initial effects of a changing climate begin to register, even the economic impact starts to lever a shift of focus. In the US, 2017, with 3 of the 5 most expensive hurricanes ever, was by far the most costly year ever for weather related

¹¹⁹ Naomi Klein, *This Changes Everything*, (NY: Simon & Schuster. 2014). See especially ch. 1.

disasters.¹²⁰ Insurance companies, for obvious reasons, lead the financial sector in concerns about what lies ahead. Municipalities have been put on notice that they had better start devoting more attention to disaster preparations or suffer in risk ratings. And as we become more aware of risk, we may begin to pay more attention to the impact of how we make a living. The CEO of BlackRock, the largest institutional investor in the world, in January 2018, shook the financial world by announcing the end of the simple “maximize profit for shareholders” mantra of corporate responsibility: “To prosper over time, every company must not only deliver financial performance, but also show how it makes a positive contribution to society.”¹²¹

This is just the beginning of the kind of expanded scale of consideration we desperately need. As the effects of climate change begin to lap into our short-term awareness, government, business, and other organizations are drawn to look more critically at how our present way of life impacts what the future may hold. We can only expect this re-focusing to increase as things get worse. As we swing from our present populist know-nothing reactionary moment, there will be ample factors supporting attention to a more long-term vision of the challenges we face and what we must do to meet them. This could be a positive legacy of the awkwardness and inadequacy of our initial attempts to deal with climate change. We are headed into difficult climate times, but the very difficulties may serve to allow a focus we could never hold in the context of business as usual.

Climate change may be the Anthropocene problem that grabs our attention and holds our focus on the global consequentiality of human action, but it is by no means the only challenge. The Sixth Extinction event, akin in its suddenness to the asteroid that wiped out the dinosaurs, is well underway even before the more dire consequences of our fossil fuel orgy have registered. Climate change has caught our attention because it immediately affects us. Disappearing species less visibly affect us, but we are included in the thickly interwoven web of life that weakens with each absence. We naturally care about ourselves,

¹²⁰ 2017 cost \$306 billion, blowing past the previous high of \$215 billion in 205. <http://time.com/5093043/natural-disasters-cost-us/>, retrieved 1/17/18.

¹²¹ <https://www.nytimes.com/2018/01/15/business/dealbook/blackrock-laurence-fink-letter.html?action=click&module=PopularOnFacebook®ion=Lists&pgtype=collection>, retrieved 1/17/18.

and that would be enough in a pre-Anthropocene world; as far as we understand, that is about all that has been required of any organisms. But in the Anthropocene world what we do in making a human living has become a gate of selection through which the rest of the life community must pass, so we can no longer be care-less of other life.

As conditions shift to give well-being a greater priority and to view well-being with a broader perspective, the question of “whose well-being?” will emerge with greater urgency. This is an issue relating to the second sort of short-sightedness mentioned at the beginning of this section, the discounting that goes with proportional distance from what we take as our personal well-being. Such discounting is directly related to our sense of identity, the next facet of the function of our minds and hearts to be considered.

12.3 Identity

When we explored what it means for earth to become a human-managed system, we ran into the intertwined questions of the scope of our caring and of our identity:

In ecosystems, because natural selection, survival of the fit, cross-references the viability of each species' way of making a living with that of all the others in the environment, every species takes care of the whole community by taking care of itself. The system-maintaining taking-care function is a system-wide dynamic realized through the self-care of individual organisms and species. But when humans finally broke free from that mutually constraining community to create our own self-maximizing world of civilized cultures, all that changed. Our maximizing dynamic has succeeded in filling the earth in an unconstrained way that engulfs ecosystems and subordinates their function to our guidance. For one species to thus break loose and establish its own interests as the governing and ordering principle for the ecosystem of all species is not just unprecedented, it fundamentally challenges the deep guiding mechanism by which life systems organize and survive. How long such a situation can be sustained depends on the extent to which the one species can somehow emulate the system-wide care-taking function of ecosystems. And this is where our expanding our

identity to encompass the community of life in our caring is now the unlikely requirement for sustainable management.¹²²

Organisms evolve constantly selected for successful self-maintenance. This can reach beyond the physical individual to include others essential to individuals of the species surviving to reach successful reproduction. If young cannot survive without a period of intensive parental care, care for offspring will be wired into individuals so that at the appropriate time caring for self becomes caring for an expanded self. Cowbirds lay their eggs in other bird's nests and exploit their parenting instincts. We value breeds of dogs that take the family's children into their protective expanded self-maintenance. We tend to despise the cowbirds as selfishly irresponsible and praise the selfless responsibility of guardian canines.

This response is typical because we, as a symbol wielding eusocial species, possess self-identities of unique elasticity. As civilization has expanded our social organization far beyond the tribal level that was the default for millions of years, we have devoted our resources of religion and education to instilling a suitably expanded sense of self. Praise for the heroism of serving the common good rather than narrow self-interest has been one of civilization's most predictable themes. The contrarian "Greed is good" claim of recent aggressive capitalism gets attention mainly because it is so unexpected. And even that falls into the common pattern when one sees that "good" really refers to serving the common interest, which this free-market ideology maintains is best served by individuals competing in maximizing their own profit.

The "greed is good" movement has been too successful in infecting Wall Street and sectors of the business community focused almost exclusively on their duty to maximize value for shareholders. It plays into the way money distorts human motivation and priorities and encourages a short-sightedness that belies well-being for both humans and the larger life community. But it also serves a useful purpose: much as a compass needle that can help us head south by pointing north, if we reflect on what turns most people off when they hear such words we find a source of hope and also an indication of the direction in which we move.

¹²² See above, 5.1.1.

The hope is that by and large humans still recoil from overt self-absorption, even after we have been saturated in advertising and media in which SELF is continually promoted as deserving and needing continual care and feeding. As strong currents atomize our eusocial species into nuclear families and then into childless couples, counter currents arise in which new housing developments advertise themselves as walkable communities with front porches. Sociability is deep within our wiring and strong social relationships are now recognized as key by research into well-being and quality of life.

One can easily map the expanding circles of potential identity as a kind of bullseye pattern: personal, family, local organizations (school, church, work etc.), regional, national, transnational organizations. Identity of this relational sort translates into feelings of belonging, and this becomes in turn a matter of what can be asked of us. Fundraisers play on this part of our psyches to the point of exasperation if not exhaustion, but they do it because it works. Donated time, charitable giving, the need for friends and belonging all point to the more inclusive caring that might develop further in our human character to make the Anthropocene sustainable.

At our more expanded levels of identity there is continual and predictable static stemming from conflict or competition with more immediate concerns. We often buttress functionality on those levels with laws or other sorts of rewards and punishments. Silicon Valley is infamous for the culture of tech companies that subsume and swallow up personal levels of life. Governments back up taxation with laws and fines, churches and more intimate social groups may find it enough to say, "We missed you last week." Clearly as we look at the dynamics of our multi-level identities it is a world of trade-offs. Not surprisingly, when it comes to the furthest, that is, the most inclusive levels, our record of appropriate prioritization and concern becomes spotty. We empathize with the suffering of refugees we see every night on the news, but tend to harden borders against immigration. While we flounder in functioning adequately as members of a shared humanity, what hope is there that we can live the sensitivities of our membership in the community of life?

Put that way, prospects look pretty grim. But the case is not so hopeless. Another perspective emerges if we attend to the feedback between identity, feelings, and organization. We have stretched beyond tribal identities by the steady expansion of organization throughout our civilized period. Tribesmen become citizens of city states, empires, and nation states. People give their allegiance, submit to the laws, and

sacrifice lives fighting for flags representing organization on the scales of millions, hundreds of millions, and even billions.

The critical identity challenge of the Anthropocene is the species barrier. Can we care about non-human life to such an extent that we will curtail short term human benefit for non-human preservation? Here too we organize to function on a level of more systemic function. Life is a tonic to us. We flock to places rich in vegetation and animals, forests, savannas, ocean reefs, to refresh our bodies and spirits. Just as we organize an array of NGOs to care for humans beyond the confines of a particular national identity, so we organize environmental NGOs at national and international levels to care for species and lands beyond the proprietary interest of humans. Our governments establish agencies and pass laws. In many cases this is a matter of seeing the overlap of environmental health and human well-being, but there are notable cases, such as the Endangered Species Act, where we legislate care that does not translate immediately into human interest.

So we civilized humans can indeed organize to identify with and care about life beyond our species. The question is whether we can foster these beginnings into a civilization-transforming and civilization-constraining force.

12.4 Carelessness

For 8 thousand years the civilized human community has self-organized for a human well-being relatively careless of the natural world except insofar as we needed it as resource for food and material. With deliberate attention to productivity and cumulative learning we have mastered globe-transforming abilities in order to make the world a better place for ourselves. Now we find that the way we routinely make a living destroys the conditions in which many of our fellows in the community of life make their livings. We never meant to do this: it's just that a practical focus on our economy has turned out to be fatally careless of the myriad of other economies. In 2019 a UN science panel reported that roughly one million species are now on the verge of extinction due to our activities. We can see what is being lost and guess at even more. As we identify with and feel the loss coming through the Sixth Extinction, the question is whether we can care enough to transform the carelessly damaging shape of our civilization. Will our dawning knowledge and

burgeoning care bring effective change, or just suffice for bitter regret as we enter a diminished natural world and a questionable human future.

This question is fraught with the dynamics of distance discount we saw above in considering expanded identity. This is no surprise, for carelessness or its opposite, carefulness, amount to the practical edge of identity. That is, we care about what we take into our identity, our sense of self, and this caring translates into carefulness, a guide for maintaining the well-being of the extended self. The flip side of the coin is carelessness about “the other,” that with which we do not identify as having anything to do with us.

Carefulness works most easily at the local level, where we naturally invest our care and generally have the requisite experience to take care of things. Local problems with local consequences can be cared for locally. It is not difficult to mount community action against local polluters of local drinking water. But when local causes produce unintended distant problems, the distance discount takes the form of denial and demand for scientific proof which, when forthcoming, is not readily accepted.

Acid rain provides an early paradigm of the kind of structural problem that has so far dogged caring human responsiveness in the Anthropocene. Coal burning power-plants provided jobs, energy, and well-being in Chicago. Nothing local gave a clue that they were also killing trees on the Canadian border. US scientists picked up on the problem in 1972. In 1980 congress established a commission to study the problem and the National Academy of Sciences as well took up the problem in 1981. By 1990 congress enacted a cap and trade program for some emissions, phase one beginning in 1995 and phase II in 2000. In 2005 the EPA established a framework to handle the much-vexed issue of interstate transmissions, when actions in one state produce problems in another. The timeline was elongated to over 30 years because every step was fraught with controversy and opposition from vested interests: science was disputed, economic costs of control exaggerated, jobs defended, disinformation campaigns launched.

In effect, when it is your problem but my cost, carefulness comes, when it comes, mainly through scientific guidance finally concretized in government regulation. And this puts government in the unhappy position of constraining the free activity of both large and small enterprises, often for reasons not very apparent on the more local level. Even as our scientific ability to trace consequentiality over gaps of space and time increases, resistance also seems to mount to government-

defined and regulated care of the earth and its life. Just as management may seem distant and out of touch to workers on the shop floor, so government seems distant and out of touch when it regulates to guide individuals and businesses in their daily life. Ranchers angry at newly constrained grazing on public lands make common cause with Wall Street bankers chafing at government reining in risky financial speculation: we know better, get the government off our backs and we will all be better off.¹²³ The academic world is similarly far removed and science has been spun by vested interests as just another interest group looking for big research grants.

All of this feeds into a rich pot of anti-government, anti-intellectual, anti-establishment feeling. As I write this in early 2018, voters in England have opted to leave the EU, chafing under constraints imposed by unelected officials in far off Brussels. In the US, workers in industries gutted by globalization and automation, ranchers and rural communities chafing under EPA constraint, a fossil fuel industry feeling the weight of constraints on CO₂ emissions, and financiers looking for less regulation and free markets have elected a government promising to constrain immigration, unfetter business, undo environmental constraints, renegotiate international relationships in terms of naked self-interest, and let loose pent up forces for unprecedented economic growth. Far from moving to more and more inclusive caring, we seem to be reverting in the direction of increasing tribalism. Rather than utilizing our science for policy guidance to anticipate how to accommodate the needs of a living earth community, we revert to the blind anthropocentrism of all-out national competition for economic growth. As we haltingly try to refashion civilization into a shape with a future, we seem to be overtaken by forces of resistance structured into the complex but unsustainable system we have created.

We do have the means to make this work. We now have global satellite eyes in the skies and the science to interpret what they see. This give us more foresight, more ability to track the consequences of our actions and guide them appropriately. Global climate change is our coming-of-age challenge, testing the capacity of world governments to use such knowledge to guide human behavior in a manner appropriate to the

¹²³ <https://www.nytimes.com/.../fear-of-the-federal-government-in-the-ranchlands-of-orego...>

Anthropocene. During our adolescence of exponential growth, it was easy to imagine technology was leading us into an ever less constrained future. An open, cosmopolitan democracy, with broader compasses of identity and care, looked like the wave of the global future back in 1990, but now, less than 30 years later, the wave seems to be rolling back.¹²⁴

The decades that lie before us, with a changing climate, unprecedented migration of populations, and tenuous nutrition flows for a mushrooming population, are times of particular uncertainty. And while we cope with the human edge of change and turmoil, to navigate this narrow passage to a civilization that will last requires that we also adjust to maintain the well-being of animals and plants threatened by the tidal wave of change unleashed by our Great Acceleration. There may be other ways for civilization to find its way in the Anthropocene, but the most obvious is strong government authority enlightened by the best guidance available from science and data-rich technologies.

Can democracies pull this off, or will we need to look elsewhere?

Democracy, with its orientation to the dignity, freedom, and fulfillment of every person, ideally fit the expansive expectations of the Great Acceleration. Science and technological innovation fed an ever-burgeoning productivity promising an ever faster and fuller fulfillment of what humans perceived as their well-being. The shadow side of this, however, is the resentment and intolerance for constraints, especially those imposed from above for reasons that seem distant. As discussed above, this has left both Europe and the US, the exemplary leaders of the Great Acceleration, battered by reactionary populist movements. Polarization has paralyzed the US government, and while the economy booms confidence in our government and institutions has plummeted to the 33% in 2018. The UK, in the midst of Brexit, is slightly better at 36%.¹²⁵

No major governments yet show the responsiveness needed for Anthropocene scale problems. The economic bottom line continues

¹²⁴ See for example, "Open Societies Under Siege," by Roger Cohen, NYT, <https://www.nytimes.com/2018/01/26/opinion/open-societies-under-siege.html?action=click&pgtype=Homepage&clickSource=story-heading&module=opinion-c-col-left-region®ion=opinion-c-col-left-region&WT.nav=opinion-c-col-left-region>, retrieved 1/28/18.

¹²⁵ The Edelman Trust Barometer, as cited in *Forbes*, <https://www.forbes.com/sites/niallmccarthy/2018/01/22/the-countries-that-trust-their-government-most-and-least-infographic/#4012bb7f777a>, retrieved 1/30/2018.

uniformly to outweigh climate and the extinction of species in priority and policy. But that does not mean dysfunction is equally distributed. According to the same report on trust in government, China leads the world at 84%. Based on the assumption that all humans are moved by a deep desire for autonomy and freedom from constraint, it was thought that economic advance would be accompanied by demand for a more open, democratic form of government. But under the leaderships of Xi Jinping China has become steadily more authoritarian even as confidence in governance has increased. It also has the largest population in the world, nearing 1.5 billion, more than 4 times the size of the US.

The situation has not escaped attention. A recent spate of books such as David Runciman's *How Democracy Ends* form an ironic 21st century bookend with Nakamura's 1990 accolade to the global inevitability of liberal democracy, *The End of History*. Runciman's argument is complex, but the *Washington Post* takes from it a message that is gaining increasing traction:

In other words, the future, by definition, has no present political constituency in systems legitimated by consent of the governed. In this sense, democratic politics can disable the requisite will to act until climate calamity is already upon us. That will likely be too late.¹²⁶

It then continues with what is becoming a typical Anthropocene revisioning of perspective regarding China:

In this respect, China's one-party, long-term-oriented system presents yet another challenge to the West. Indeed, California Governor Jerry Brown warned this week that by sabotaging America's electric car industry, Trump was handing the future of auto manufacturing to the modernizing Middle Kingdom, which is vigorously pursuing new battery technologies. China's leaders believe in science. They have the will and capacity to take decisive and meaningful climate action on a large scale, without a break in the continuity of governance. Whether democracies can similarly rise to this challenge without resorting to authoritarian means will

¹²⁶ Nathan Gardels, "Democracy may fatally slow climate action."
<https://www.washingtonpost.com/news/theworldpost/wp/2018/09/13/saving-the-planet/>.
Retrieved 3/23/19.

determine if, one dire day, the choice comes down to liberty or survival.¹²⁷

The message here is typically mixed. No realistic discussion of contemporary dynamics can neglect economic motivation: China is in a superior position to recognize and act on the inevitable market demand for green technology. At the same time China's leaders not only "believe in science" (that can happen even in the US), but "they have the will and capacity to take decisive and meaningful climate action on a large scale." Not yet, but the rhetoric is already out there and the world is increasingly looking for leadership, for someone who can and will *do something*. China still expects to sail into global hegemony on the wings of the Great Acceleration, which has manifested so prominently in Japan, Korea, and now in China itself.

A few decades deeper into the Anthropocene may change all that. In a best-outcomes scenario, that "belief in science" could prioritize decisive and meaningful climate action on a large scale and communicate a sense of urgent action to the rest of the world. If the world is to become managed with appropriate carefulness by humans, the more authoritarian Chinese government, with its larger and more accepting population may be the place to look. China is presently emerging to take a lead on climate change and the Paris Treaty even as the US is stepping back. Top figures in government are mostly engineers who can understand science when push comes to shove, and a high respect for education is one of China's deepest traditions. If any country can really lead the international community of nations in a pivot to responsible caretaking of the earth, China appears the most likely candidate.

The very potential for shaping the behavior and practice of a vast population required by the Anthropocene can translate into spectacular mistakes, which in fact are much in evidence in the Chinese case. When China plugged into the capitalist system, its structure enabled a super-charged version of the capitalist model with all its weaknesses writ large. With a clear-eyed perspective of economic growth first, worry about the environment and everything else later, China became a technocratic bulldozer ignoring everything that got in the way. The life-sustaining qualities of air, water, and land have been ravaged in the rush to grow

¹²⁷ <https://www.washingtonpost.com/news/theworldpost/wp/2018/09/13/saving-the-planet/>. Retrieved 3/23/19.

economically. Regional officials threw up ill-considered projects leveraged by heavy debt, income disparity mushroomed, and within a few decades China produced more billionaires than the US (647 vs 550 in 2017).¹²⁸ The silver lining here is that things have gotten so bad that priorities are starting to shift. It may still be too late before environment can trump the economy, but the momentum is already there and may contribute to an earlier awakening as the global climate becomes more problematic.

The Chinese example shows the potential to meet this challenge, but it also illustrates a deep and closely related problem. Top down control demands acceptance. I have said Chinese people trust their government. But in large measure that trust is the product of several decades of spectacular economic growth and the experienced transformation of their standard of living. In successfully tying into the global market system, the Chinese populace have joined fully the global population of “consumers.” The ever-growing production of goods and services must be matched by growing consumption, and a market-framed vision of human well-being translates into lives the meaning of which is measured largely in terms of ever-increasing accumulation and consumption as the driver of production, jobs, and well-being. A trusting population of consumers can become dangerously restive if the spigots of growth are turned down for anything but a more or less immediate peril. This is a major constraint, as the Chinese government is well-aware, on the ability to implement measures that will slow growth, especially if it is in the name of a seeming distant and discounted future. So far, the mantra has to be transforming to a climate-friendly economy as rapidly as may be done without substantial cost to the economy. The expectations that go with the consumer mentality endemic to the global market system induce short-sighted policy even when we can see into a more distant future and could act accordingly.

12.5 Consumerism

To be alive is to be a consumer. Organisms are not atomic units. They are open systems that maintain their otherwise unlikely organization by a

¹²⁸ https://en.wikipedia.org/wiki/List_of_countries_by_the_number_of_billionaires. Retrieved 2.12.18.

steady flow of energy/nutrition from their environs. This, along with reproduction, is the essential task that drives the organization of living—making a living, the economic system patterned into every living creature. Desires, pleasure, abilities of responsive sense and mobility, all evolve for fitness within this patterned need to consume and reproduce, and they likewise coevolve to fit with the economies of surrounding life forms. An economy of economies, ecosystems anticipate the self-organizing dynamics humans attribute to an “inexorably” expanding and integrating global market system.¹²⁹

But the economies of the natural world are need-based. They expand to fill opportunity space and integrate with a necessity dynamically propelled by natural selection: only when needs are sufficiently satisfied by strategies for making a living that fit contemporary circumstances (the “environment”) do organisms survive to pass their recipe for life to a new generation. The human economy has evolved from need-based to increasingly want-based. Needs are limited and describable; wants are open-ended and invite endless manipulation by marketers.

The widely shared assumption is that the transition from needs to wants is progress in well-being. We see meeting the conditions for participation and integrating into the market system as the way impoverished nations can better meet the needs of their people, moving them to the enviable state of consumers who can live guided by wants rather than the imperatives of need. This notion of consumer societies is a human cultural creation naturalized as a simple, objective reality by populations, governments, and agencies such as the WTO, IMF, and World Bank. It may indeed describe the shape of civilization at this juncture, but it has no inexorable necessity beyond the socially engineered consumerist vision that confuses well-being with want fulfillment. In spite of all contrary evidence, with this vision in place, it is hard to imagine that a better life does not necessarily lie just a bit further down the road of the Great Acceleration. We will grow into a better world, meaning more jobs, more opportunity, more stuff, and yet more growth.

The Great Acceleration has propelled us into a condition we now recognize as the Anthropocene. We have filled the world with plants and animals shaped to our needs, pleasure, and choice, in the process

¹²⁹ See Manfred B. Steger. *The Rise of the Global Imaginary: Political Ideologies from the French Revolution to the Global War on Terror* (Oxford: Oxford University Press. 2008) ch. 5.3.

reshaping soil, air, and water as they accommodate the byproducts of our consumptive process. In shaking off the immediate constraints that configure the natural world of interdependent eco-systemic life, we did not actually transcend the playing field of mutual adaptation, we just tilted it in our favor. To the degree we grow and prosper unconstrained by fit with the community, the community is burdened to fit with us. Or to go extinct for lack of fit with the circumstances that go with the flourishing of the human community. Thus our Great Acceleration has been mirrored by a Great Dying, the Sixth Extinction.

It is a hopeful thing that the common equation of the maintenance of civilization with the inexorable global spread of markets and consumerism is a cultural artifact. Even if we have structured our vision into the way the world works, at least in principle, something else is possible. Indeed, something else is inevitable, since as we have discussed at length, this scenario has almost played itself out. The question is, how do we get shifted out of this?

When you push against the current world view, you can't help sounding like your grasp of reality is in question, because it is precisely an agreed upon, shared sense of the shape of the real that is being pushed against. But history is the continual unfolding and overlaying of our constructed visions of reality. The earth is no longer the center of the universe. Families are no longer born to rule or to be ruled in divinely ordained aristocratic hierarchies. China no longer is the Middle Kingdom, the unquestioned seat and paradigm of civilization. History is a progression of "no-longers," and in this exponential era the progression is speeding up. Maybe we are at a point where American-led free markets and conspicuous consumption will no longer seem an aspirational model for societies of the world.

World views cannot be wished away nor changed at will. But as they become frayed and vulnerable—at least in the case of those that are not wiped out like the dinosaurs by some catastrophic event—the change is generally accompanied by mounting voices of criticism and dissent. After all, our public discourse is itself a way of constructing and reconstructing the world we inhabit. Such voices now raise a chorus of dissent even in the midst of the seemingly inexorable dynamic of a would-be integrated global market system.

Or perhaps "cacophony" would be a better word, considering the manifold groups and perspectives involved. Manfred Steger, in his penetrating analysis of how the globe as a unit is coming to overlay and replace the nation state as our bottom line reality, pairs market

globalism, the dominant ideology of our time, with a contrasting and critical “justice globalism.” He describes the 50,000 protestors who took to the streets of Seattle in 2000 in an anti-WTO demonstration as a kind of coming out party for a global justice movement. Over 700 globally networked organizations participated, representing a variety of interests and critical perspectives. As Steger describes it:

...this eclectic alliance of justice globalists included, among others, consumer activists, labor activists, students demonstrating against sweatshops, environmentalists, opponents of genetically modified foods, animal rights activists, religious advocates of debt relief for developing countries, pacifists and nonviolent direct action proponents, feminists, and human rights activists.¹³⁰

They marched with chants such as "our world is not for sale," and "no globalization without participation," reflecting the thread of unity running throughout these disparate organizations. Worldwide, people whose identities transcend the more conventional bounds of our smaller selves came together to give voice for the voiceless with a shared sense the system of market globalism neglects and does violence to a broad spectrum of well-being.

That description puts the best spin on it. But as protest demonstrations take on size and power, the moral idealism of putting oneself on the line for a cause easily melds with populist dynamics. Populism tends to feed on and stoke the anger of people who feel their interests are neglected or endangered. The small-self ready to fight for its well-being is all too ready to identify some “other” as the source of its problem, be it immigrants, another race, or corporations, or an Establishment representing a moneyed, educated “elite”. Revolutions may be launched by idealists, but they are carried out by angry partisans.

The environment, including the community of non-human life, stands in an ambivalent position in all this. The global enterprise that grows by producing more and more commodities for human consumption systemically subordinates the environment and economies of the non-human to a burgeoning human community. Some 70 years ago Aldo Leopold described the revolution that would transform the Anthropocene from a global insult to something with a future:

¹³⁰ Manfred B. Steger. *The Rise of the Global Imaginary: Political Ideologies from the French Revolution to the Global War on Terror*, ch. 5.4 (Kindle Locations 2730-2732). Kindle Edition.

In short, a land ethic changes the role of Homo sapiens from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such.¹³¹

Leopold could well have described our problematic role not as “conquerors” but as “consumers” of the land-community, for our mode of consumption demands relentless and distorting subjugation of the land-community to our desires and wants. Idealistic students have read his words for years and wondered how to make the transformation a reality. Unlike laborers or repressed minority populations, the land-community cannot be stirred up to assert its self-interest against a human other. Idealist activists and scientists in their labs do not take on the system-transforming populist dynamic of revolution.

But indeed, a revolution is in the systemic cards, though its nature and outcome are much in question. The trigger for the new revolution will be when the loss due to climate change affects people’s life experience. At that point, both idealists and politicians of various stripes will get their complement of angry partisans and unsettled populist dynamics. By mid-century or sooner our lives will very likely be enveloped by a transformed climate upsetting the settled productive processes of global market civilization. The revolution will not be so much in the weather as in how we respond to the new Global Weather Change (GWC).

GWC, a global problem with a myriad different local manifestations, is double-edged. It could be a force of disintegration or of unprecedented integration. A hopeful trajectory would amplify the voice of the now inchoate global justice movement as an alternative to global consumerism. With a vivid concern for the effects of our way of life we could come home to the earth community, a new kind of globalism. We could even take on the “plain member and citizen” identity described by Leopold. But other possibilities lead in very different directions. It is all too easy to see how a defensive attempt to save civilization as we know it now, that is, free market consumer civilization, could bring us to the very edge we hope to avoid.

Disintegration is easy to imagine because it involves very familiar sorts of human response. The scenario is already foreshadowed in the 2017 feckless response of both the EU and the US as they attempted to

¹³¹ “A Land Ethic,” In *A Sand County Almanac*, p. 240.

respond to waves of refugees from regions of economic, political, and social devastation. By mid-century droughts, floods, major storms may upset the livelihoods of population-dense agriculture-dependent areas of the globe, creating much larger waves of refugees. If the better-insulated industrial nations are no better at handling mass immigration in 2040 or 2050 than they are in 2017, Trump's wall could become a paradigmatic structure. Tribal emotions are easily aroused in populations under pressure, and in a tide of populist defensive sentiment would-be immigrants are easily branded as threats to "our way of life," and governments turn inward with a protectionist stance. Under virtual siege by the displaced landless "others," national borders could become barricades as national identities harden. The global integration of markets then becomes disintegration under pressure of widespread protectionist sentiment. Democracies become polarized and fractured as politicians seize on the opportunity to attract target voters by blaming and demonizing the "other" for mounting problems and tensions. Such dynamics unwind along many possible paths of disintegration and decline in a globe where economically developed civilization becomes a fortified bastion for a minority while the less fortunate may unite in anger.

Manfred Steger's perceptive analysis of the rhetorical strategies of populist demagoguery clarifies the danger. "We," the good, hard-working ordinary people, are distinguished from a manipulative "elite" which has sold us out. Not only wealth, but education comes under suspicion: these are the globalist people who would open our borders, export our jobs, enrich themselves at our expense. We the pure cannot compromise with the corrupt elite, those who run the Establishment. We are in a crisis of moral and cultural decay and need strong and uncompromising leaders to tell it like it is and put a stop to selling out our country and its proud heritage.¹³² This is already a skillfully practiced rhetoric. One does not like the prospect of its mobilization in a context in which the "elite" have messed up "our" world and the "other" are displaced masses clamoring at "our" gates.

This is not the normal mindset of ordinary people who experience well-being. But when the times seem out of joint and things don't seem to be

¹³² See Manfred Steger's perceptive analysis of the rhetorical strategies of populist demagoguery, *The Rise of the Global Imaginary: Political Ideologies from the French Revolution to the Global War on Terror*, ch. 6.1.

working any more, conditions are ripe for scapegoating. When finger-pointing comes in, fingers too naturally point away from “us” to locate the source of the problem. Immigration, the challenge of an influx of otherness, becomes a lightning rod when populist sentiment is on the rise. The GWC will rearrange familiar flows of air and water around the globe, but it may well be the flows of our fellow humans it sets in motion that prove the greatest adaptive challenge for civilization.

By pointing north, a compass can help us go south. The dynamics of populist tribalism are so contrary to what is demanded for a sustainable complex human society in the Anthropocene that it provides at least some useful initial guidance. Anything that takes us in the direction of more inclusive identities and accommodating the needs of others even when they put a crimp in the immediate gratification instinct of consumer societies would be on the right track. The openness to the foreign and the flexible tolerance for difference that characterize cosmopolitan urban milieus at their best needs strong vocal support from governments resisting the temptation to take a nationalist road. The critical issue of a globally networked human society will be providing for distributed human well-being in the context of transforming populations, so the globalist justice movement will need to supplant the profit maximizing market globalist ideology.

At the same time our anthropocentric species populism is equally problematic. For navigating the Anthropocene we need to be concerned for the well-being of a more inclusive community. The irony is that the same crisis that requires us to complete the aspirations of our long partially enacted humanism should also demand we move beyond humanism. Loving ourselves better will require the ability to also diminish our own unquestioned priority in the calculus of trading-off short and long-term interests.

These directions towards integration both as humans, and as fellow citizens in the community of life, may sound like ivory tower idealism. But this idealism is founded on the pragmatic world of how things actually work—the “real” world commonly contrasted with the ideal. This is the eye of the needle we must thread in order to move into a future of well-being rather than of deep dysfunction.

So now it looks like we are being challenged to complete the Enlightenment’s rationalist dream, becoming creatures that can subordinate troublesome feelings and instincts in order to live like reasonable future-anticipating beings. The Enlightenment imagined that the advance of secular reason would inevitably advance both

technological and social progress. For reasons discussed earlier, technological progress has indeed been spectacular, while social progress has been halting. Reason has triumphed socially to the degree that the various forms of exclusive and intolerant feelings of contracted identities are viewed with suspicion in contemporary secular societies. Nationalism, racism, religious exclusivism, and anthropocentrism all come in for significant criticism, especially in higher education, even though they maintain stubborn roots in the larger society. But another set of tricky feelings, our instinct for ease, pleasure, and accumulation receive secular sanction as essential to the market system and consumer economy. Now technology has interacted with consumer marketing to give us the Great Acceleration and carried us beyond mere industrialization into the Anthropocene.

Studies of brain activity now support what observation should have revealed all along: we are guided in our responses by an inseparable mix of feelings and reasoning processes. Consumerism is heavily driven by feelings, wants deliberately amplified by marketing strategies produced by instrumental rationality in the service of maximizing profit. It takes a lot of emotional support to change from an unhealthy diet even after one knows that too much weight may have dire consequences. Rationality may indicate the consumerist trajectory is unsustainably skewed when it comes to the future well-being of the earth or of the human community, but there is not much reason to hope that will be enough to alter the course we are on. We need to figure out how to enlist a more full range of human motivation to move out of a system that has a powerful grasp on the way we live.

And that brings us to the final topic in our search for a sustainable ethos for the Anthropocene. Perhaps the most important intersection of human thought and feeling may be found in our array of religious traditions. We seek meaning in our lives, and can endure almost anything if we believe it has a deep meaning. Meaning as given us by religion encompasses a sense of the world and its always unfolding story of success and failure, pleasure and pain, life and death. Religious narrative lays open to our meaning-seeking minds and hearts the deep meaning of our own life story as enmeshed in this larger story. In this respect it is different, richer than the kind of meaning delivered by logic or cause-and-effect analysis. For it reaches a deeper level, encompassing and addressing the felt questionability of our lives; answers on this level come with many degrees of clarity and conviction—one can even come up with a meta-answer that explains why it's OK to settle for not having an answer.

However we navigate the terrain of this quest for a Meaning to frame our small diurnal meanings, the quest is intimately bound up with our feelings of well-being and security. Thus when problems and gaps appear in this our deepest narrative, we almost inevitably resort to the language of feeling: “I just somehow don’t feel life is meaningful anymore.” An intellectually framed Anthropocene tells us new facts about the consequentiality of our conduct for global processes and the well-being of the myriad forms of life interwoven with them. We have considered and tried to give reasons for things that do not work or that might work as we look to sustain our civilization. But reasoned guidance means little when it has no resonance with the deeper well-springs of human conduct, the level from which we draw the meaning and motivation for the way we live. So our discussion of a sustainable ethos for the Anthropocene cannot duck the fraught question how the Anthropocene can fit into the deepest narratives by which we live.

Chapter 13. Religion

Different human beings have to follow different paths to find that oneness which we really have—with other human beings, with animals, with plants, with the whole cosmos. To arrive there is bliss, the path of heart.

Brother David Steindl-Rast

13.1 Religion and Cultural Stability

We nail down the otherwise precariously fluid world we create by a number of stabilizers. Simple habituation to ways of operating in the context of shared taken-for-granted expectations goes a long way to giving us the predictability we need in order to live and thrive together. What’s more, we externalize our mental understanding and strategizing in the organization and technological structure within which we work out a common living. These externalizations in turn act back and hold the configuration of our shifty mental world in place. We make arrangements in our societies for getting food, clothing, hardware, health care, and entertainment, and because the world is so arranged, the arrangements themselves keep reminding us that this is the way to do it. In a nice feedback loop, the relative stability of the world “out there” helps stabilize

and render less changeable the ideas and values that inform the activities which produce and maintain what's out there.

This is the cultural world we ordinarily objectify as a simple fact; it's just the way the world is. But multi-cultural experience forces the recognition that there are many alternative arrangements possible, that what is a fact in our world may not be a fact in others, and indeed may not remain a fact in our own. Awareness of the relative arbitrariness and potential changeability of the cultural world invites opportunistic change, non-conformity and instability. Best keep such awkward notions out of sight and buttress our way of life with a normative dimension that locates our facts beyond the whim of individual preference.

Our normative dimension comes from a world of more than human making, or at least more than individual human making. Our laws and regulation are human-made and changeable, but we produce them at a collective level beyond our individual reach. And what is really of immutable importance we call "morality" and ground in a source beyond the human, be it the sacred and fertile Earth, or the laws inscribed by divine beings in our hearts and minds, or the patterning Dao running through everything, or the dancing of the Divine Dancer.

Religion in this way functions as an anchor, stabilizing the social world by putting its most essential structures apparently beyond our reach. But its reach into our lives goes beyond this social functionality. Aware that we are part of something beyond ourselves, we fittingly transcend the human to find guidance and discover the deeper meaning of our storied lives. Our religious narratives locate us, give us direction in terms of that to which we belong. The stories of that belonging have varied with the contexts to which we belonged: hunter-gatherers, farmers, urban dwellers, modern cosmopolitans may all share a participation in this larger reality, but the windows through which it is experienced are as different as their lives.

Back when movement was slow and spatial separation translated into temporal barriers limiting contact and interaction, shared religious narratives cemented cultural worlds with a common sense of belonging and location in the scheme of things. It was easy to think of religion as simply mediating the true nature of reality—not just "my view," but the view appropriate for all right thinking, right living people.

Now the onrush of change and the overlaying of once separate worlds in the cosmopolitan digitized life we experience has changed all that. The social change accompanying the Great Acceleration challenges the very

notion of unchangeable norms, and the self-awareness that comes with exposure to cultural multiplicity suggests historical cultural diversity as the source of much we once objectified as just the facts about the real world, the one right way.

Institutional religion around the world has responded variously to this situation, marked by the different doctrinal and structural resources of the various traditions and differing local conditions. But thematic similarities arise in the necessity of responding to the plausibility challenge mounted by a relativizing, historicizing secular milieu. Here we will take up the example close at hand, the Christian churches in the US.

The response of the so-called mainline churches has been compromise. With varying degrees of enthusiasm, they have become doctrinally less rigid, more open, even celebrating religious diversity as something to learn from. For some, this is an acceptance of shifting and relativizing cultural currents they strongly oppose, so they drop out to become members of fundamentalist or conservative evangelical churches. For others, this is too little and too late: institutionalized religion seems too fettered by its history, too implausible in its claims of privileged access to the truth. They become the dropouts, self-described as “spiritual but not religious,” in contrast to the purely secular. The Pew Research Center finds in a 2017 poll that some 27% of adult Americans now identify as “spiritual but not religious.” Moreover, they note that this is a rapidly growing category, increasing by 8% in only 5 years. It now has even become a common self-description on online dating sites.¹³³

So while both fundamentalism and unchurched religiosity grow, not surprisingly the “mainline” religious establishment pays the price. Once it seemed obvious that more open, liberal churches were the ones capable of successful accommodation to the rapidly changing mores of secular culture, but that kind of accommodation now looks like a vulnerable half-way house. Insufficiently rigid, doctrinaire, and unchanging, they lose those looking for a reliable, unyielding base in a tumultuous culture to their more evangelical brethren. At the same time, for those who swim with change, the mainline churches seem too fixed and anchored in the certainties of an outworn world, so those join the ranks of the less defined “spiritual but not religious.”

¹³³ <http://www.pewresearch.org/fact-tank/2017/09/06/more-americans-now-say-theyre-spiritual-but-not-religious/>. Retrieved 2/26/28.

This analysis directly addresses America and Christianity, but similar dynamics are evident globally. Since these three realms of the contemporary religious world are so different in their fundamental way of relating to the changing world, we shall consider each in turn as we look at the interface of the Anthropocene and the way we find meaning and direction in our lives.

13.2 Fundamentalism

At first blush, it would seem the relation of the Anthropocene to Fundamentalism would be one of unrelenting negativity. After all, these are the folks who populate the ranks of climate-change deniers, who question evolution and are ready to challenge inconvenient science. At the same time there are homologies, themes important to our systemic analysis that manifest with particular clarity in the rise of fundamentalism.

When the fundamentals shift too drastically for a species, that recipe for living goes extinct. The fundamentalist reaction in human society voices a protest, a systemically grounded fear of shifting fundamentals. As the Great Acceleration has reached its exponential phase, religious fundamentalism has coalesced as a systemic resistance to the onslaught of confident but unmoored secular change. As we probe to behave with respect for the global consequentiality of human action, fundamentalism calls attention to the care we need to take in dealing with our more immediate foundations. The human-induced rate of change in air, water, and land is the major challenge to the contemporary community of life, but the human-induced rate of social/cultural change is an additional major challenge for the human community.

All organization is leveraged on the enduring conditions which make its continuation possible. It used to be that people took their societies more or less for granted; culture was invisible, taken as just the way the world is. Our religious narratives describe our changeable lives as anchored in deep, unchanging, even eternal verities, a really Real, the conduit by which Meaning enters the story of transient lives. Against an encroaching tide of change, fundamentalism arose as a hammer to nail down those essential verities

Fundamentalism became a named movement as a response to Christian Biblical scholarship in the late 19th and early 20th centuries.

Scholars were using new philological and historical techniques to reveal how historically evolving cultures gave rise to divergent themes and understandings in the Bible. As opposed to what had seemed straightforward common sense, it was being proposed that ideas like God, heaven, hell, afterlife, soul, and sin each had long histories and meant different things or were even absent in earlier layers of scripture. This scandalous revelation of history and change in the written deposit of revealed Truth was welcomed by some, abhorred by others. The latter response found expression in a series of pamphlets entitled “The Fundamentals.” The authors identified five “fundamentals” of Christian doctrine, including the divine inspiration and infallibility of scripture, the virgin birth, the resurrection of Jesus and his death as atonement for sin, and the historicity of miracles. For each of these fundamentals, it is easy—and accurate—to imagine some revisionist scholarly tract suggesting that the item in question was the way some ancient culture thought of or presented a truth that might be presented in a quite different way in these more enlightened, modern times. The fundamentalist foot came down: if you are a true Christian, these are essential beliefs. And a demand for “literal” plain-sense interpretation was but a corollary: words in scripture mean what they say.

Controversy regarding matters of doctrine and practice are commonplace in the histories of all of the major religious traditions. But fundamentalism is distinctive in that the hub or trigger of controversy is typically resistance to accommodating to currents of change and to intellectual considerations that render the Real and Unchanging a relativized moment in the tide of cultural histories. The nub of the matter is less a dispute about right or wrong than the feeling that forces are trying to change the unchangeable and sweep away the reference points for a decent and meaningful life. At stake is not just the item in question, but the security and Meaning of a life anchored in Unchanging Reality. Exclusivism is a companion of this perspective, since if it's Real and True for me it must be so for everyone, meaning the alternative to being with me/us is to be wrong. So a fundamentalist stance involves deep feelings that bond the like-minded into in-groups with strong mutual support.

This sort of fundamentalism often is associated with religion, but it has migrated widely to encompass deeply held convictions in areas we do not think of as religious. The fundamentalist dynamics surface surrounding all sorts of perceived but contested verities that serve various communities as symbolic anchors, and unfortunately such

dynamics are open to easy manipulation by involved interests. What we call “culture wars,” and litmus test ideological absolutist no-compromise political polarization are manifestations of the quasi-religious fervor that can emerge around foundational verities. Any deeply rooted expectation can be moralized, absolutized, and made a flash point for organized resistance. In our increasingly secular societies we see this happen around issues such as abortion, gay marriage, or even failure to perform expected rituals of respect for the flag.

If civilization is to adapt to the conditions of the Anthropocene, it will require a quite radical transformation of our economic and political life based on a deeper understanding of our responsibility and relationship with the earth. Such a transformation will provoke and demand a new overarching story about ourselves and the world; this is where the Anthropocene intersects with religion. Mainline religion has already begun to adapt and the spiritual but not religious are alert to something new in the air. True to their role, we can expect fundamentalists to man the barriers in defense of the fundamentals of the status quo. Two themes in particular may become sources of contention. The first relates to joining the community of life as, in Aldo Leopold’s words, “plain members and citizens.” The second has to do with the recognition that we, like any of the other members of that community, have only a limited time here, and we may well be hastening our demise. These are not new questions, but in the Anthropocene, these questions move from speculative philosophy to the realms of policy and practice.

13.2.1 Who are We?

Aldo Leopold issued his full-throated appeal that humans accept their place as responsible fellow-citizens in the community of life in 1949. Since then it has been repeated in numerous forms in meetings and in classes relating to the environment for over 60 years. Yet this is a message so contrary to our general shared patterns of thought that it has not left enough of a mark to even arouse much protest.

Most religious traditions understand human lives in terms of some version of a two-tier vision: the ephemeral reality of daily successes and frustrations is complemented by a dimension of Unchanging True Reality which is able to deliver Meaning in the worst of circumstances. The two tiers can take many forms. This world may be illusory, or just transitory, for example; we may wade through suffering and trials as the price of awakening to perfect True Reality, or the lumps and bumps of life may

constitute a testing ground of moral endurance and fidelity, or perhaps the point is to connect with some Bridging Reality. As different as these religious traditions may be, they share an assumption that the deep Meaning of our lives is how it leads to a union with the transcendent True Reality.

If such is to be the deep Meaning of human life, humans must be creatures inherently connected to that Transcendent dimension. Religious traditions generally describe this connection as unique to human beings, a matter of something we alone possess such as a spiritual and immortal soul, free will, moral constraints etc. Beyond establishing our superior place on earth, the reasons for this exclusivity are unclear. It could be an inchoate intuition that only symbol-wielding, narrative-constructing consciousnesses like ourselves call for such a Meaning for our storied lives.

In effect, our exclusive, living participation in this Real dimension involves the assumption that all other forms of life are simply part of the transient world of only contingent, not Real meaning. In Aldo Leopold's call for us to assume an identity as "plain member and citizen" of the land community, the word "plain" is freighted with meaning. It challenges us to join a community we have hitherto consigned to a lesser reality. If we can see ourselves in continuity with the natural world, there is at least a basis to begin to constrain and shape our way of life to allow for our fellow species to make a living.

We will discuss below some of the ways in which this might be done without plunging us into Meaninglessness. But this is exactly the point at which we can anticipate a strong fundamentalist reaction as well. At stake, in a fundamentalist perspective, are basic truths such as spirit, immortal souls, and eternal salvation—for them, the fundamental components of the Meaning of life. Darwinian evolution evoked a strong reaction because it was perceived as a threat to our distinctive status. That may be a mild foretaste of what opposition might be aroused to an Anthropocene-inspired movement proposing to use science-informed government constraints in order to adjust society to a more equitable fit with the community of life.

13.2.2 Contingency

Greek culture in its heyday placed great value on youth, beauty, and strength—a heritage we still see in the Olympic Games. But it was thereby likewise haunted by transience: the peak of life value seemed

passed before you hit your thirties. Beauty and grace of physical form are contingent, inherently conditional and therefore subject to change. Greek philosophers responded by seeking to ground the changing in the Unchanging, the contingent in the Absolute, the limited, changing truth, beauty and goodness of our mundane experience in a realm of Eternal Truth, Beauty and Goodness.

The contrasting paired conceptualizations that arose from this, contingent and Absolute, change and the unchanging, finite and the Infinite, time and Eternity, were easily assimilated into Jewish, Christian, and Islamic thought and expression. But this merely gave systematic voice to modes of discovering religious Meaning long common to religion.

In solving the problem of contingency, changeableness, by a grounding in an Unchanging Infinite Source, we find a deep meaning and direction for our lives. But in so doing, religious thought in general plants a related assumption in our minds: humans, by our special relation to this transcendent dimension, must be somehow written into the fabric of existence. This is underscored by apocalyptic end-of-time scenarios popular in fundamentalist circles: the ramping up to a final crisis for the human species is also the end of the world. After all, what sense would there be in a world without humans?

That indeed is a question or attitude shared widely beyond just fundamentalist forms of religion. But science reveals that over 99% of species ever evolved have already gone extinct, and the assumption is the same will be true of our species. Anthropocene-aware voices extend this observation to make it the pressing question for the humans of our era: how can we conduct ourselves so as not to prematurely terminate or foreshorten the tenure of our species on earth?

Blunting the guidance and motivation that stem from recognizing our own contingency is a critical consequence of religiously distinguishing humans from other species. Not only for fundamentalists, but also for a broader swath of those of us schooled in our uniqueness, the notion that humans might number among the wave of extinctions is implausible—a matter of severe cognitive dissonance at the least.

When young people behave with reckless abandon, we often observe that they think they will live forever. Adults know better and behave with more constraint. The Anthropocene is our challenge to adulthood. With our civilization spread in a globe-encompassing net, it is difficult to entertain the possibility that the situation might not always be that way,

even when the term and question of “sustainability” has become a commonplace in contemporary discourse. We have plenty of evidence that societies, even pre-global civilizations, collapse. But on the table in the Anthropocene is our now global civilization, and beyond that even the continuation of our species. The once easy belief that the earth is here for our sake is no longer so easy, but traditional anthropocentrically transcendental ways of finding Meaning in our lives remain a barrier to grasping the deep meaning and challenge of this era.

13.3 Mainstream Religion

This section addresses the portion of institutionalized religion that took a more adaptive stance towards interpreting the cultural and historical dimensions of their traditions. This includes both Catholics and the “mainline” Protestant denominations in Christianity. The intention here is to broadly consider the potentials of an adaptive stance among major traditions, one that stands in contrast to the fundamentalist fastening on a selection of basic Unchanging Truths.

Mainstream religion had a major readjustment to make when the traditional linkage between religion and government was broken. Accepting religious pluralism carries the side effect of introducing history and cultural context into thinking about religion. This may occur initially when viewing the traditions and institutions of others, but it easily comes to include one’s own tradition as well. In this context, the straightforward emphasis on Unchanging Truth shifts to finding the best, the most Meaningful for our times interpretation of the profound truths revealed in one’s tradition. Instead of locating the Meaning of our lives as a matter of their alignment with an exclusive orthodox doctrine, this more adaptive approach leans towards viewing our multiple religious traditions as united in the profound objective of making us Good Human Beings, and becoming and living as such is the Meaning of life. In the US this is illustrated by what is known as the Social Gospel movement: Jesus’ life became viewed as an exemplary teaching of compassion and of advocating for the poor and powerless, and Christian ministers and priests were numbered among the leaders of the social movements that roiled the 20th century. This mainstream religious voice is strong among the advocates of Global Justice. The focus on being a Good Human brings attention to how we affect both human and non-human life around us, so mainstream religion of this sort has been acutely aware and

critical of the difference between actual well-being and the conventional focus on GDP growth.

The capacity of mainstream religion to respond to the Anthropocene is evidenced with outstanding clarity by *Laudato si*, Pope Francis' 2015 encyclical on global warming. A papal encyclical is a weighty teaching voice giving guidance on topics deemed of pressing importance for the times. The 20th century saw encyclicals dealing with such matters as justice for workers, birth control, Communism, and the Vietnam War. Pope Francis' 85 page document is the first to take up global warming, a topic which raises fundamental questions about the human interface with the world of nature.

The title, *Laudato si (Praise be to You)*, is taken from the first line of a poem by Francis of Assisi with which the encyclical begins: "Praise be to you, my Lord, through our Sister, Mother Earth, who sustains and governs us, and who produces various fruit with coloured flowers and herbs." The encyclical takes the theme in another direction:

This sister now cries out to us because of the harm we have inflicted on her by our irresponsible use and abuse of the goods with which God has endowed her. We have come to see ourselves as her lords and masters, entitled to plunder her at will. The violence present in our hearts, wounded by sin, is also reflected in the symptoms of sickness evident in the soil, in the water, in the air and in all forms of life. (par. 2)

"Sister Earth" is a figure of speech, but one with a foundation in the systemic web of life in which we participate:

The created things of this world are not free of ownership: "For they are yours, O Lord, who love the living" (*Wis* 11:26). This is the basis of our conviction that, as part of the universe, called into being by one Father, all of us are linked by unseen bonds and together form a kind of universal family, a sublime communion which fills us with a sacred, affectionate and humble respect. (par. 89)

Lest this familial unity be taken too far, however, he immediately balances the picture by reasserting the traditional place of humans. It is clear here and throughout this document, that as deeply concerned he may be for the earth and its creatures, Francis is even more distressed by the havoc wreaked on the poor and powerless in the human community:

This is not to put all living beings on the same level nor to deprive human beings of their unique worth and the tremendous responsibility it entails. Nor does it imply a divinization of the earth which would prevent us from working on it and protecting it in its fragility. Such notions would end up creating new imbalances which would deflect us from the reality which challenges us. At times we see an obsession with denying any pre-eminence to the human person; more zeal is shown in protecting other species than in defending the dignity which all human beings share in equal measure. Certainly, we should be concerned lest other living beings be treated irresponsibly. But we should be particularly indignant at the enormous inequalities in our midst, whereby we continue to tolerate some considering themselves more worthy than others. We fail to see that some are mired in desperate and degrading poverty, with no way out, while others have not the faintest idea of what to do with their possessions, vainly showing off their supposed superiority and leaving behind them so much waste which, if it were the case everywhere, would destroy the planet. In practice, we continue to tolerate that some consider themselves more human than others, as if they had been born with greater rights. (par. 90)

Here *Laudato si* is typical in grafting environmental concern onto the Social Gospel of mainstream religion. Frank recognition of the mistaken notion of human dominion is coupled with an emphasis on our unique role as “stewards”:

An inadequate presentation of Christian anthropology gave rise to a wrong understanding of the relationship between human beings and the world. Often, what was handed on was a Promethean vision of mastery over the world, which gave the impression that the protection of nature was something that only the fainthearted cared about. Instead, our "dominion" over the universe should be understood more properly in the sense of responsible stewardship. (par. 116)

Indeed, we must recognize our distinctive abilities and role in order to meet our god-given responsibility:

There can be no ecology without an adequate anthropology. When the human person is considered as simply one being among others, the product of chance or physical determinism, then "our overall sense of responsibility wanes".[96] A misguided anthropocentrism need not necessarily yield to "biocentrism" for

that would entail adding yet another imbalance, failing to solve present problems and adding new ones. Human beings cannot be expected to feel responsibility for the world unless, at the same time, their unique capacities of knowledge, will, freedom and responsibility are recognized and valued. (par. 118)

This view of human distinction does not prevent a consideration of interdependent relatedness that would fit any holistic systems science:

When we speak of the "environment" what we really mean is a relationship existing between nature and the society which lives in it. Nature cannot be regarded as something separate from ourselves or as a mere setting in which we live. We are part of nature, included in it and thus in constant interaction with it. Recognizing the reasons why a given area is polluted requires a study of the workings of society, its economy, its behaviour patterns, and the ways it grasps reality. Given the scale of change, it is no longer possible to find a specific, discrete answer for each part of the problem. It is essential to seek comprehensive solutions which consider the interactions within natural systems themselves and with social systems. We are faced not with two separate crises, one environmental and the other social, but rather with one complex crisis which is both social and environmental. Strategies for a solution demand an integrated approach to combating poverty, restoring dignity to the excluded, and at the same time protecting nature. (par. 139)

This complex system requires—and surpasses—the best efforts of scientific research, while the deep value of the organic system under investigation is that, like us, it is a creature of God:

Due to the number and variety of factors to be taken into account when determining the environmental impact of a concrete undertaking, it is essential to give researchers their due role, to facilitate their interaction, and to ensure broad academic freedom. Ongoing research should also give us a better understanding of how different creatures relate to one another in making up the larger units which today we term "ecosystems". We take these systems into account not only to determine how best to use them, but also because they have an intrinsic value independent of their usefulness. Each organism, as a creature of God, is good and admirable in itself; the same is true of the harmonious ensemble of organisms existing in a defined space and functioning as a system. Although we are often not aware of it, we depend on these larger

systems for our own existence. We need only recall how ecosystems interact in dispersing carbon dioxide, purifying water, controlling illnesses and epidemics, forming soil, breaking down waste, and in many other ways which we overlook or simply do not know about. Once they become conscious of this, many people realize that we live and act on the basis of a reality which has previously been given to us, which precedes our existence and our abilities. So, when we speak of "sustainable use" consideration must always be given to each ecosystem's regenerative ability in its different areas and aspects. (par.140)

Mid-twentieth century environmentalists strongly protested a tradition of biblical interpretation that read passages in Genesis as giving humans dominion over the earth and its creatures, thereby seeming to justify the techno-industrial vision of the earth as a trove of resources there for our exploitation. *Laudato si* could not agree more with this critique:

Men and women have constantly intervened in nature, but for a long time this meant being in tune with and respecting the possibilities offered by the things themselves. It was a matter of receiving what nature itself allowed, as if from its own hand. Now, by contrast, we are the ones to lay our hands on things, attempting to extract everything possible from them while frequently ignoring or forgetting the reality in front of us. Human beings and material objects no longer extend a friendly hand to one another; the relationship has become confrontational. This has made it easy to accept the idea of infinite or unlimited growth, which proves so attractive to economists, financiers and experts in technology. It is based on the lie that there is an infinite supply of the earth's goods, and this leads to the planet being squeezed dry beyond every limit. (par. 106).

This is but a sample of the voice in which this document issues a critique of our failing stewardship of the earth and a call to renewed effort, a "ecological conversion" of our hearts (par. 216-221). It is open to and unthreatened by science and technology, and at the same time eloquent in its ability to critique their potential to join with market forces to disorient us into a dead, objectifying, instrumental manipulation of the living world (par. 106-114). In contrast to the "otherworldliness" of save-your-soul-and-get-to-heaven sorts of religion, it concludes by locating our care for the earth in an inclusive vision of the journey of all creation to God:

At the end, we will find ourselves face to face with the infinite beauty of God (cf. *1 Cor* 13:12), and be able to read with admiration and happiness the mystery of the universe, which with us will share in unending plenitude. Even now we are journeying towards the sabbath of eternity, the new Jerusalem, towards our common home in heaven. Jesus says: "I make all things new" (21:5). Eternal life will be a shared experience of awe, in which each creature, resplendently transfigured, will take its rightful place and have something to give those poor men and women who will have been liberated once and for all.

In the meantime, we come together to take charge of this home which has been entrusted to us, knowing that all the good which exists here will be taken up into the heavenly feast. In union with all creatures, we journey through this land seeking God, for "if the world has a beginning and if it has been created, we must enquire who gave it this beginning, and who was its Creator".[172] Let us sing as we go. May our struggles and our concern for this planet never take away the joy of our hope. (par. 243-244)

The troubled and troubling journey of earth and its creatures is presently instanced most clearly in the deepening shadow of climate change. Francis' discourse on climate change is thoroughly and respectfully couched in contemporary science, with an especially keen eye for the impact on the poor and powerless in their struggle to make a living. The social gospel is well-informed by social science and the critique of consumer capitalist markets. Much of this discourse could come equally from ecologically informed secular humanists, but throughout runs a critically important and distinctive thread: in our ignorance and greed, we do violence to the gift of a loving Creator. And in these concluding paragraphs the picture is given its final transcendent frame: the deep Meaning of all existence is the return of all creatures to a perfect existence in union with a loving God.

There is great power in the transcendent bi-level frameworks common to religious narrative. They offer a dimension of hope and Meaning-making that is impervious to the outrages and blocked paths too common in our earthly lives. We can draw on this transcendent dimension of existence not only for solace in pain but also for a motivation for life-giving activity rendered unflagging because its Source is beyond ordinary worldly calculus. For both good and ill, whatever the cause being pursued, it is common experience that religiously inspired activists are the hardest to block.

Marx famously criticized religion as “the opium of the people.” In this he underestimated the potential of the Transcendent to inspire social and political revolutions, but he was not inaccurate in skewering a certain cushioning or muting effect inherent in this kind of bi-level transcendence of the world and its challenges. The Pope’s encyclical is a ringing call to awaken believers of all faiths to the looming crisis of climate change. But it also implicitly limits the nature of the challenge, de-radicalising it at critical points where the Anthropocene might evoke a reconsideration of familiar assumptions about ourselves and the world.

While it is eloquent regarding the disruption of the natural and social worlds that climate change portends, nowhere does *Laudato si* mention that climate change could trigger the early demise of our species, a theme quite common in secular literature. Instead this ultimate threat to the human species is muted by the unpronounced assumption that we are somehow inherent in the very fabric of the universe. Less sophisticated religious texts often portray the world as created for our sake; here, in urging us to a better care for the world, the emphasis is rather the love of the Creator for every creature, which as such has its own value. But in the final analysis, there can be little doubt that it is we who are the most loved, the most valuable. We are in no way inspired to imagine a world of life going along without our presence.

Likewise nothing in *Laudato si* prepares one to see the systemic challenge of the human species having become a major factor in global function and evolution. Rather the newness and uncertain future of this situation is entirely masked by a religious warrenty for our distinctive role: “In the meantime, we come together *to take charge of this home which has been entrusted to us*, knowing that all the good which exists here will be taken up into the heavenly feast” (par. 244, italics added). The document is clear and forceful in asserting that stewardship must replace dominance, listening to the God-given natural thrust of living things rather than bending them to our market-driven technological drive for efficiency, convenience, and profit. Mainstream religion is especially effective in critiquing distorted values and calling for a more life-giving conversion of our minds-and-hearts. At the same time it assumes such a change is all that is needed, that the capacity to “take charge” is there, just in need of a course correction.

Which brings us to a third and closely related cushioning. Our comfort with taking charge of the planet is based upon a set of capacities we assume set us apart from and above any other forms of life. We are the species with rational minds and symbolic communication, we participate

in a spiritual dimension not available to other creatures. This assurance allows us to see our relations with other species not as a participation in a systemic community of life but rather in instrumental terms: taking charge of the planet easily devolves into turning it into a means whereby the human community prospers and lives the good life. *Laudato si* counters this with its assertion that we are here to care for a world of intrinsic value and loved by its Creator. But deeply engrained assumptions about our unique capacities will not change without hard and direct challenge. The distinctive status of humans assumed in our major religious narratives runs counter to the perception that we need to become “plain citizens and members” of the community of life.

Unlike fundamentalism, mainstream religion meets social and cultural change with a strategy of critical discernment and adaptation. But exponential change and the cosmopolitan disestablishment of any particular institutionalized religion have weakened this once dominant form of religiosity. Mainstream congregations now leak members at both ends. For some, as we have seen, their adaptation to new social currents renders them too wishy-washy, and they move to a more evangelical or fundamentalist home. At the other end of the spectrum, for increasing numbers no particular doctrine or denomination remains exclusively persuasive in a milieu of constant change and too many alternatives. They trade in their institutional affiliations for a deliberately less-defined “spiritual but not religious” identity.

13.4 Spiritual but Not Religious

“Spiritual but not religious” has become the identifier for the varied array of people who now decline to be identified by any of the traditional religious labels but feel or seek some deeper but not readily identifiable Meaning in life. There are many differences of awareness and degrees of engagement here; many of whom I speak would not themselves use the self-description “spiritual but not religious,” but the term has entered common usage and catches important commonalities in this disparate group.

As a description, “spiritual but not religious” is, in the eyes of any scholar of religion, an unfortunate mismatch. “Religious” is an adjective denoting a human feeling about the overarching Meaning of life—that is, those that feel there is some meaning worth capitalizing and try to live accordingly. Institutionalized religions, the named traditions, are one

form in which this feeling finds expression, but far from the only form. Reverence and awe, the hallmarks of religious experience, can hardly be confined to institutions, and in general people who would describe themselves as “spiritual” mean to indicate they are open to such experience.

“Not religious,” then, does not mean not religious. Rather it reflects a common notion of religion as coming in multiple institutionally sponsored bundles of doctrine and practice. This notion of religion came to the fore only in the late 19th century when the plurality of major religious traditions became a more relevant factor in a shrinking globe. Subsequently the term religions in the plural entered common parlance, and belonging to a religious community transformed into the idea of “having” or “not having” a religion.¹³⁴ With this set of ideas, many who part from or never have been affiliated with institutionally organized religion are regarded by themselves and others as not having a religion, and this gets extended into the descriptive adjective: they are “not religious.”

How then does “spiritual” come to mean what “religious” once meant? This takes us back to the days before the Enlightenment and the rise of science when the western world view was neatly divided into spirit and matter. Matter accounted for the physicality of the changing and transient world. Spirit accounted for the Eternal Source from which that matter took its beginning, and humans participated uniquely in spirit by their endowment of immortal souls as manifested in the distinctive spiritual conscious of our inner lives. Religious sermons often addressed how we struggle through the trials and tribulations of this transitory material world to reach our true eternal home with God. In this world view, God, eternity, salvation, free will, moral norms and values, all the components of Meaning, fall heavily on the side of spirit.

The rise of science deeply undercut the spirit/matter world view. Science in principle limits itself to the realm of the discernable and measurable, the physical world traditionally described as “matter.” As science grew to eventually assume the status of what we “really” know, the realm of

¹³⁴ The history of this development has been examined in depth by the scholar Wilfred Cantwell Smith in his book, *The Meaning and End of Religion* (NY: New American Library. 1967), available online, https://openlibrary.org/books/OL23315151M/The_meaning_and_end_of_religion. The title itself is deliberately ambiguous: once you understand what religion is all about (its meaning and end) it will be the *end* of using the term as a plural something you either have or don't have.

spirit, being scientifically opaque, lost status as it receded into the haziness of unverifiable opinion or belief. Not only that, values were reversed. Science promised for the first time to transform the realm of the material into a good life for humans, something that, from a science perspective, spiritual means such as prayer and fasting had no hopes of accomplishing.

The scene was set for a tense if not antagonistic relation between materialistic science and the religious world of spirit. A crude but science-friendly materialism began to dismiss religion as “superstition,” regarding it as something we should and would get over. As we have seen, we have not gotten over it: while fundamentalism doubles down, the mainstream has adapted. But both are wounded, suffering leaking plausibility as our confidence in our grasp of a realm inaccessible to science weakens. The religious alternative, being “spiritual,” now means not an assertion of a non-material realm—though it may be open to that—so much as a determination to hang on to the purpose and Meaning of life once accounted for as belonging to the realm of spirit.

13.4.1 Half a World View

The emergence of “spiritual-but-not-religious” religiosity might be viewed as an inchoate protest against being left with what amounts to half a world view. The spirit-matter world view gave a reasonably full account of human experience, with the spirit side accounting for meaning, purpose, and identity. There is no surprise that enlarging greatly upon the half of a world view that was shaped with the assumption the other half would take care of Meaning and purpose has filled the secular horizon only with short-term ersatz meanings such as consumption, convenience, and productivity. As science deflated the spirit side of our bi-partite heritage, an unreconstructed concept of matter is severely strained to offer a full account of our experience. The spiritual but not religious resist this reduction of meaning to the confines of a narrow materialist understanding: they may resist formulations of doctrine and dogma, but they look for something More.

Non-western traditions not shaped by the dichotomous matter/spirit understanding of the world are less affected by this tension, so currents of thought from the Hindu, Buddhist, or Taoist traditions enjoy new currency. And the traditions of indigenous peoples likewise extend a heritage not enmeshed in the spirit/matter dichotomy. These primal traditions richly figure our systemic participation in the biosystem of life

on earth, prefiguring what for some has now become a cogent contemporary science-based insight. Thus the once disregarded narratives of indigenous peoples are in the 21st century reconsidered as windows that help us envision our place in the community of life.

As the Anthropocene unfolds, narratives that connect us deeply with the earth and the community of life take on critical importance. The ritual traditions that allow humans to relate to mountains, rivers, and wind, or to the mysterious power of life itself have a new-found power. My brother the bear, my sister the singing waters, my mother the earth, these are modalities that allow us to express the awe, reverence, joy, and love for the process of life in which we have our own being and from which, along with all other forms, we have emerged. But for many in contemporary society the terms in which the primal traditions find expression are too inextricably bound with a way of life that has little to do with the daily reality of an urban setting. For the broader urban community, matters such as ecosystems, the interdependence of life, and the consequentiality of our human economy are most meaningfully discussed in the conceptual vocabulary of science, which, even when it is only half understood, remains the main public vehicle of serious knowledge.

The problem here is that materialist science has long openly proclaimed that items such as meaning and purpose have no place in the knowledge they seek. In the traditional spirit-matter world view the notion of matter was shrunken in a way that left all the juice to the spirit side: the material half was never conceived as adequate to explain the world of our experience. But the material is what science inherited as its purview; if one limits explanatory resources to the material half of the spirit/matter world view without thoroughly rethinking what one means by matter, inevitably what was accounted for by the spirit half gets not explained but explained away.

Conventional scientific reduction has opened vistas on *how* things work, a kind of understanding of the mechanics of the physical world that has enabled our far-reaching manipulation and rearrangement of the world. Prescientific natural philosophy, with limited understanding of the *how*, made liberal use of the *why* category of explanation, final causality. The whys easily led to what would now be regarded as empty explanations of process, behavior and activity. Birds eat seeds, cows eat grass, and lions eat meat because “that is their nature.” Compare this with understanding how differently constituted metabolisms extract energy from differently constituted molecules and how they evolved these

different metabolisms in the selective context of environmental constraints. The discovery that experiment and measurement could disclose the *how* of organization and process has allowed us to transform the earth, and the old attraction of *why* explanations has seemed in comparison an idle distraction, neither useful nor germane to the new methodology. Except we happen to be a species that lives in terms of consciously processed meaning and purpose, with “why” as the direction-finder for our activity. This is the dimension of our experience the spiritual-but-not-religious will not yield to materialist reduction.

13.4.2 Refreshing a World View

With the emergence of science, our understanding of *how* has progressed with breathtaking speed: after only a few centuries we have moved from the initial understanding of things like air pressure to understanding the age and formation of the universe, galaxies, and the earth, black holes and the origin of life. On one level this is awe-inspiring and thrilling. But as biologist and author Ursula Goodenough observes, “For many of us, the great scientific discoveries of the modern age—the Big Bang, evolution, quantum physics, relativity—point to an existence that is bleak, devoid of meaning, pointless.”¹³⁵ The enthusiastic rationalists of the Enlightenment would be totally surprised at such a statement, but after a few hundred years of hearing the wonders of the universe and of life reduced to various forms of ever-ratcheting mechanical complexity, whether we agree with the sentiment or not, we have no trouble understanding it.

Indeed, the very inclusiveness of the materialist reduction invites a revisioning of our very notion of matter. If one maintains the physicality of everything going on in the world of human experience, that should entail reworking the shrunken notion of matter. If one insists, for example, that music and art and philosophical arguments are in fact all a matter of electricity firing across synapses, then you need a concept of electricity adequate not only to the possibility of light bulbs, but of music, art and arguments. A narrowly materialist reductionist science can become its own kind of fundamentalism, and fundamentalist materialists are as caught in the heritage of a bipartite spirit/matter world view as the

¹³⁵ Book jacket of *The Sacred Depths of Nature*, by Ursula Goodenough (NY: Oxford University Press. 1998).

spirit-centered religions against which they argue. It's just that they are caught in the other half.

Another telling of the story could use contemporary systems science which frames the evolution of the universe as a process of continual emergence. Staying within the scientific bounds of the physical universe, systems analysis complements reductionistic methodology with the observation that in terms of systems, *new* things happen: particles, then atoms, stars, and galaxies; planets with physics, then chemistry, biology, ecology, even sociology.¹³⁶ To ignore the systemic emergence of qualitatively distinct levels of behavior and reduce it all to complex physics is to miss the story of what the physical becomes. In a systems account, earth, life, and human lives participate in the emergent becoming of everything, indicators of the unfolding potential of the stuff of which we are made. This is an open story: we do not know the potentials of the whole to which we belong, but we do know that it is up to a performance such as ourselves and our lives. We have no warrant to regard ourselves as the best or final performance of this unfolding, but since we belong to it, the universe cannot be less than us.

We can dig deeper into this story, inquiring what it means for life to emerge from the not-yet-living. As we saw in our discussion of the emergence of life, being alive is an inherently normative state, bringing into the world the distinction between success and failure, working and not working, well-being versus dying (1.3). And anything alive must be *doing* something, a very particular something normatively guided by metabolic structure and environmental fit, in order to maintain the process of being alive moment to moment. With this, activity becomes purposeful effort, normatively aimed at maintaining life and well-being, guided by information that now conveys not just differences, but differences that *make a difference*.¹³⁷

These dimensions of normatively guided purposeful activity emerge with the very origin of coming alive. In its 3.8 billion year evolution, life has

¹³⁶ See *Principals of System Science*, by George Mobus and Michael Kalton (Springer, 2015), ch. 10.

¹³⁷ Gregory Bateson's definition of information, *Steps to an Ecology of Mind* (NY: Ballantine Books. 1972) pdf available online, <http://ejc.orfaleacenter.ucsb.edu/wp-content/uploads/2017/06/1972.-Gregory-Bateson-Steps-to-an-Ecology-of-Mind.pdf>.

reiterated this package in innumerable forms and on manifold levels of complexity, but it is there in the first single-celled organism, for it is what it means to be alive, packed into the very origin of coming alive. When we ask Meaning-seeking questions like, “What does it all mean?” “What difference does it make?” we are in fact manifesting on the level of a consciously self-aware, language-equipped, narrative-spinning species a dynamic informing all life. We seek Meaning and Purpose, and these have arisen as hallmarks of being alive. We desire lives that make a Difference, and well-being versus ill is the fundamental difference of any difference that makes a difference for being alive.

Non-western traditions escape the truncated materialism that is the heritage of our dualistic spirit/matter dichotomy, as do primal traditions that see clearly the continuity of all life. And in addition, an Anthropocene spirituality might move towards grounding itself in a cosmic framework elaborated in the respected vocabulary of science. Harbingers are already with us. Berry and Swimme's *Universe Story*¹³⁸ consciously strives to weave a spiritually cogent cosmogony in scientific terms. Less deliberately but with similar effect, scientific work on self-organizing systems such as Stuart Kauffman's *At Home in the Universe*¹³⁹ depict a cosmic process bound to eventuate in life. Goodenough's *The Sacred Depths of Nature* explores a religious sense of mystery and awe emerging from scientific theory and insight. Clearly the recovery of a deeper Meaning of nature is emerging as a trajectory beyond the traditional divide between the worlds of religion and secularity.

¹³⁸ Brian Swimme and Thomas Berry, *The Universe Story: From the Primordial Flaring Forth to the Ecozoic Era--A Celebration of the Unfolding of the Cosmos* (San Francisco: HarperSanFrancisco, 1992).

¹³⁹ Stuart Kauffman, *At Home In The Universe : The Search for Laws of Self-Organization and Complexity* (NY: Oxford University Press. 1995).

The kernel of an ethos, a guidance for a way of life for the human community in the Anthropocene, is already present in this understanding of our place in a world come alive.

14. Conclusion: Towards An Anthropocene Ethos

Can we at least envision a behavioral mode, a way of working with the rest of the world, a version of ourselves, that we could celebrate?

David Grinspoon

In Part II we have been looking for potential trajectories that might serve as a corrective for characteristics that render the future of an Anthropocene civilization doubtful. As the ethos of the Great Acceleration becomes unmoored as new generations experience a deteriorating world, we need to have some grasp of alternatives that move in the direction of a way of life fit for the Anthropocene.

In the preceding chapters of Part II we have considered what to look for:

1. Instead of speed: slowing of innovation, production, consumption.
2. Instead of growth: steady state.
3. Instead of guidance by monetary profit: real well-being, of humans, of biosphere, a planet hospitable to flourishing life.
4. Instead of short-sighted priorities: science-informed government policy constraining short-term-interest maximizing behaviors.
5. Instead of constricted identities: more inclusive identities, embracing humans and non-human species in concern for well-being.
6. Instead of carelessness of non-human life and earth systems: concern for the consequences of our techno-enhanced behavior for other forms of life.
7. Instead of consumerism: identity as “plain citizens” of earth’s life community, discernment of real needs, prioritizing well-being (of self, others, other species) over maximizing consumptive desires.
8. Instead of Meaning grounded in transcending earthly dimensions: embrace of a life-giving participation in community of life.

Just as the facets of the ethos they replace, these are intertwined and potentially coevolving features of a renewed form of civilization. They are offered less as a model to be realized than as suggestions for identifying directions that will ease the intense pressure our way of life exerts upon the entire biosphere. Anything that helps move in these

directions merits consideration, and any positive developments in one area will facilitate coevolution in the others.

Taken as a whole, these features describe what amounts to a credible noosphere, a collective exercise of consciousness proportioned to the entire earth, its processes and its community of life. In the influential works of Teilhard de Chardin, the noosphere was presented as a final stage of evolution, the earth becoming self-aware through the emergence of human consciousness. I referenced this notion back in Chapter 4, *Earth as a Human Managed System*, only to dismiss it with the observation that the earth already has a perfectly adequate non-conscious guidance system for the organization and flourishing of life. The point being made there was that entering the future by conscious anticipation is far more problematic insofar as it presents the need for selective focus and prioritizing. We have seen how this problematic narrowness has spun out into a human civilization in danger of extinction for inability to find a fit with the encompassing systemic processes of a flourishing earth.

Correcting the ways our anticipatory consciousness systemically misfits an Anthropocene earth would indeed yield a noosphere, a living consciousness that fits the earth. But in place of the notion that somehow consciousness would naturally be a crowning glory for an evolving earth, we have presented a more complex consideration. Consciousness self-awareness is indeed a crowning glory for humans, a pivotal feature in the way we maintain ourselves into the future. But the need for consciousness to evolve to noosphere proportions belongs to us: civilization, not the earth, demands a noosphere in order to continue much beyond the point it has reached.

The very accomplishments that have propelled our expansive civilization into a globe-encompassing Anthropocene demand that we now somehow emulate a noosphere. It is evident that the wild ride of our exponential Great Acceleration must yield to a less frenetic alternative (items #1, 2, 3, and 7 above). And as we have seen, Anthropocene fitness also calls for transcending the anthropocentric tendencies natural to our minds-and-hearts (items 4, 5, 6, 7, and 8). Wise legislation and public policy can shape a shared ethos less negligent of long-term consequences and non-human well-being (#4), but top-down constraints will in the end require a significant measure of bottom-up buy in.

In sum, the features of an ethos suited to the Anthropocene, a patterned guidance of how we move into a future with a habitable

globe and viable biosphere, while different from where we are now, are not an unrealistic dream. A noosphere, perhaps makeshift but functional, is within our reach. In fact, it seems our only alternative. But as we see the Amazon burned to clear land for beef cattle and soybeans, or as we witness resurgent tribalism manifest in right-wing populism and nationalist movements, the future looks dark. Is there any real hope we could pull this off?

This is the unanswerable question on everyone's mind. Does it have to be this way? But what is the "this" of which we speak? We tend to think of it in the same line with all of our other scrabbling to maintain the well-being of our persons and of those about whom we care. We daily witness the ill consequences which beset the short-sightedness and narrowness of this enterprise—often referred to as our "economy," the civilized way of making a living. But the "this" in question, while it indeed involves transforming our economy, belongs to a much larger framework and emerges with a weight and persuasive power of a different order.

The "this" in question is civilization itself at this most critical moment in its 8 millennia of evolution. Evolution is the framework: either we make an evolutionary jump in the way we guide and maintain our complex societies, or this form of human organization will lack the fitness to endure into a deeper future. Species and their ways of making a living emerge fit to their world, but in the depths of time for more than 99% a changing world has outstripped adaptive capacity: those initially selected for fitness end up deselected for lack of fit. Why should we civilized humans be any different?

But this case is significantly different. Insofar as the basic dynamics of natural selection go, there is no difference. But the situation surrounding the mounting selective pressure on our civilization is systemically unlike any encountered by the 99%, and the adaptive capacity being pressured, our enhanced ability to anticipate and respond strategically to futures not yet fully shaped, is likewise unique. Whether these differences will in the end make a difference is a large part of the question at hand.

There are many ways in which the world can change that invalidate organisms' inherent patterns of making a living. Sustenance is conditioned by qualities of nutrition, climate, soil, and water. As these change, what used to work no longer works, and the organism faces an adaptive crisis, the challenge to find a renewed fitness or join the 99%. The world changes, so it goes. Except our situation is more

complex because it is we ourselves who are changing the world in ways that undercut the conditions for the viability of our civilized making a living. This would seem to be hopeful. We think of ourselves as the beings that can always come up with alternatives. The technological mind says that if it is something we are doing, we can find some other better way of doing it. The adaptive challenge here is to accurately identify “better” in our rapidly transforming circumstances, but this does not seem beyond our scientifically informed and technologically amplified reach.

Which brings us to the second and most frustrating part of our unique crisis. We are the first creatures to encounter such a major selection event with our eyes open and alternatives at hand. We make our living in a bubble of storied anticipation. The science that has made us a globe-girdling force expands our anticipatory power and grounds our stories of how things work. Unlike creatures totally blindsided when chainsaws enter their forest habitat, we foresee probable futures unfolding along complex skeins of interlinked causality. Anticipation is full of information about the future into which we are moving, and this offers guidance that allows us to adapt not only ourselves but world around us for our well-being. The information about climate change and the rising tide of extinction accompanying our way of life has been available for decades now, and expert analysis sees probable gloom and doom on multiple fronts unless we make urgent adaptations. Wide open flexible adaptation to overcome anticipated threats and problems is our distinctive and proud human ability. Why do we use it so poorly in meeting this global crisis?

We are awash in information belonging to different scales of space and time and offering guidance that registers with varied urgency on the many levels of our complex human organization. We necessarily select and prioritize our guidance, and we have seen the ways in which short-sightedness, money, and self-interest play into this process. On multiple fronts interests vested in maintaining a profitable status quo have distorted otherwise obvious responses to this crisis. But the holistic character of the situation makes it something more than just an unusually large problem awaiting solution. Our entire civilization confronts an urgent need to mend what has become a systemic misfit with earth and its biosystem.

Our very success now demands we change. Pursuing our species-centered interests, over the course of 8 thousand years we have achieved an organized presence empowered to bend the flows of the

earth and biosphere to our service. The bending, however, has been ignorant and careless of the deep integrity of those processes, transforming them in ways that render civilization itself unsustainable. The selective criterion for viability now becomes meeting the challenge to systemically incorporate the globe and its life into the hitherto species-centered interests which guide and inform the way we shape the future into which we move. A guidance system fit for the Anthropocene will be an evolutionary jump, a noosphere instead of the anthropocentrically constrained mindset that has made human culture/civilization a self-enclosed and self-absorbed world apart from “nature.”

So we move from the frame of problem-solving to the related but different frame of how adaptive evolution takes place. Species have their routine bag of problem-solving tricks: that is, quite literally, how they get lunch. This is akin to the way economic growth keeps popping up as the solution to our problems. The adaptive response to a new evolutionary pressure, however, does not come from the routine bag of tricks. Evolution, as they say, does not occur within lifetimes but across generations. That is, evolutionary change is a phenomenon inherently related to transitions. Populations carry variations, outliers and bearers of baggage largely irrelevant to the normal routine of making a living, but perhaps offering a new critical functionality when the old normal no longer works. At such points the new features may be selected by offering a superior rate of successful reproduction, and that success will reshape the population to a new normal.

The transmission and evolution of culture is subject to similar dynamics, but the transmission of shared expectations, values, and ways of doing things from generation to generation is potentially far more fluid than biology. We concretize our communal consciousness in institutions and try to nail down our arrangements by attributing them to some higher authority, but new generations find their own version of fitness and may adapt in their own selected way to fit changed circumstances. Especially in the rapidly changing world of the Great Acceleration, each new generation as it comes of age tends to feel it has a fit superior to their elders. The situation has now taken on a positive feedback dimension: accelerating change increasingly undercuts the authoritative voice of the elders, and the weakness of that voice increases generational flux. As the consequences of climate change are ever more part of their experience, the next

generation will have even less reason to respect the voice of their elders. This may be critical, for as we try to shift the vast system of our civilization from the inertial sway of the status quo, a very large generation gap may be our best hope.

This is not abstract speculation but reflection on a situation immediately at hand. We have only a few decades—the space of one or at the most two generations—to mitigate climate change, the most immediate threat to both human social organization and the organization of life on earth. Millennials already question capitalism, markets, social norms, and institutional religion with a vehemence that signals an open search for a different human fit. Even as we turn our education system into a job-training program and preach the gospel of global competition, the ethos that brought us to the Anthropocene is in the midst of a very challenged transmission.

Like neglected genetic potential finding new functionality, previously marginal voices have new currency. We need the ecological egalitarianism of Aldo Leopold and John Muir, the non-humanism of the poet Robinson Jeffers, the trans-species comprehension of the novelist Richard Powers, the holistic understanding of environmental economists and of agroecology. If the globe itself could select the fitness of what goes forward and is amplified in our cultural DNA, these are the sorts of cultural genes that would give us the evolutionary jump to a noosphere. But our civilization is first of our own making. The selection will be done by the minds and hearts of millennials and their immediate successors across the world as they sift out what suits from their Establishments, from the periphery, and perhaps from modalities still inchoate in these extraordinary times.

We do have a shot at this—perhaps a better shot than our sorry experience might lead us to expect, since for a new generation that spectacle undercuts the weight and plausibility of a no longer viable status quo. Anticipation gives us the ability to identify looming problems and arrange a future of well-being, but hope gives us the energy to do it. We have plenty of well-founded anticipation regarding the problem, but our feckless response thus far has taken a heavy toll on hope. The young generation needs to feel superior, convinced it can deconstruct the established order and build a better world. These feelings, typical of the naivete of youth, have never been so appropriate; they are now the only realism. A “better” Anthropocene world will mean a human civilization consonant with and engaged in maintaining a habitable earth and an integral biosphere. We have

never had to do this before, but it is the new imperative. We have the knowledge, we have the means, and we may just have the time.
NOW.

Epilogue: Earth Justice

When evaluating global happiness, it is wrong to count the happiness only of the upper classes, of Europeans or of men. Perhaps it is also wrong to consider only the happiness of humans.

Yuval Noah Harari

I am life, and life loves life

Diane Ackerman

So where does this leave us? What next? Now that human organization has in effect encompassed the life and the processes of the globe, the critical question becomes how our species will navigate the requisite expansion of communal concern. We are still working by the hardest to encompass an inclusive human community in our respect and concern, too often failing to expand from the tribal moralities that guide us to collaborate in the well-being of people unlike ourselves. But we know that our global civilization makes that both possible and necessary. And likewise, when it comes to the earth community, numerous examples show that humans are capable of love, respect, and care for the earth and its manifold life. But, like love, respect and care for fellow humans, we do best at the more immediate levels, with a thinning, spottier record as the scope expands to more distant forms of life.

This is where we depend upon organization to meet exigencies on scales where individual responsiveness weakens. Environmental NGOs can fight the good fight and governments can legislate restraints and protections. But so-far the discourse surrounding restraints and policy reflects the mind of a public habituated to an almost exclusive concern for ourselves. The concern for the life of the proverbial canary in the coal mine is less concern for canaries than for human lives. This mindset of the population must expand to include more than human life if it is to enable a robust responsiveness of institutions of governance to a science-informed understanding of the consequences of human behavior.

Our institutions and governance exist in a feedback loop with the mind of the public; they shape our mind and behavior and are shaped by our mind and behavior. As individuals we often feel powerless before the weight and inertia of institutional organization, but now more than ever we are aware of how the populace gets leverage to reshape the dynamics of the “System”: we organize. In our own lifetime popular movements have self-organized around numerous disequilibria in the

communal flows of well-being: women's vote, civil rights, feminism, gay pride, same-sex marriage, black lives matter, me-too, mothers against drunk driving.

It used to be that movements arose when a threshold was crossed in a long accumulation of insult and injury, something like a bucket finally overflowing. Now they can ignite from a video going viral, more like a flash flood than a bucket. The accumulation of insult and injury remain the same, but now with the internet, such accumulations react more like dried, over-dense undergrowth awaiting a spark to rage into a fire.

The more-than-human community of life within which our human lives transpire has accumulated insult and injury since the dawn of agricultural based civilization, but the scale has increased exponentially with the Industrial Revolution and especially in the Great Acceleration. We know this scientifically: the Sixth Extinction already has an extensive academic literature. Videos and nature specials show us bleaching coral reefs, starving polar bears, endangered primates.

Individual movements ignite to save the whatever it is that catches our attention as endangered. But nothing yet has ignited a movement that addresses the scale and deeper nature of the problem. The scale is more than any particular species, and "saving" does not get to the reason so many creatures need saving in the first place. Exhortations to save something arise mainly when it is something that we connect with our immediate well-being or something that hits our buttons for empathy or aesthetics. "Save the rainforests, the lungs of the earth," works because we don't want to lose something we really need; "save the koala bears" hits the other kind of buttons. But "save the millions of unknown and unclassified insects in the rainforests" is never going to get legs in the public forum—unless we can do something like connect them to the pollination of our crops. And when we try to ramp up saving to a more inclusive level, we end up with proclamations like "save the earth," which sound a bit hysterical and cannot withstand careful scrutiny. Going about "saving" the endangered is both too limited and too anthropocentric. And we are as well subject to salvation fatigue: a few dedicated individuals carry on, but the more general response remains something like, "Life is short: we don't have time or energy or money to go around saving everything."

We need to go deeper to get to the core of the Anthropocene problem. We have so much to save mainly because of the way we have instrumentalized our relations with non-human life. In the human community, when we forget respect and simply act instrumentally,

systemic distortions arise, webs of exploitation are spun, and people suffer. The same goes for our relations with other forms of life. A common thread runs through dysfunctional relations at both levels of community: when we humans behave without the kind of thoughtful constraint of respect, we lose the only kind of constraint that can render us fit, life-conducting participants in a relational community.

In fact, we all too often turn our own communities into power structures in which respect is overshadowed by exploitation of the weak and powerless. Revolutions often just put the oppressive shoe on the other foot. A more effective corrective is the various justice movements in which exploited communities demand relations of respect, often under the name of equal rights. True respect is a habit of the heart, but a foundation for such habituation can be set up institutionally through law. The legal institutionalization of human rights has become the instrument of choice for trying to establish relations of respect in our communities.

We are long overdue for an Earth Justice movement. The emergence of the Anthropocene means that the Earth now groans under the weight of our hand. "Groans" is more than a figure of speech: it can be unpacked in terms of distorted and impaired well-being at the level of ecosystems, species, and individual organisms. In our communal relations with our life fellows, surely there is injustice in the unnecessary wave of dysfunction and death we have thoughtlessly inflicted. Arguments that non-human creatures are not objects of justice miss the point: we are the species that needs to exercise justice and respect in order to participate sustainably in the communal flow of life. Earth Justice is simply the demand we constrain ourselves in the only way that can work for the kind of species we have become.

We humans live by anticipation, guiding ourselves to arrange futures of well-being for ourselves and our communities. Justice movements are protests against deprivation of this sought-after well-being. Humans protest by organizing to draw attention, change minds, transform the status quo. The natural world protests by the spectacle of disorganization, dysfunction and death. This has indeed drawn our attention, but not with intensity or focus. We are the species with voices. We are the anticipatory species who can see what is going on, we are the ones to give voice in order to arrange a future with a better well-being of the Earth community to which we belong.

In justice movements it is common to observe that the oppressors also oppress and endanger themselves. We need an Earth Justice Movement to spread throughout the human community an

understanding of and respect for the integral well-being of the community of life in which we participate. Life flows through and is sustained in community. The Anthropocene means the earth's entire life community is caught up in the dynamics of the human community. It is now high time for an Earth Justice Movement to render those dynamics conducive to the well-being of life.

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