

Economism and the Econocene: a coevolutionary interpretation

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We live in the era of Economism. Human consciousness is deeply etched by economic beliefs in individualism, materialism, property, markets, economic growth, and freedom as consumer choice. These beliefs are necessary to sustain the system that supports us. But the economy we have is unlikely to support our grandchildren. Natural scientists argue that we are in a new geologic era, the Anthropocene, where people have become the major force in changing the geosphere: the atmosphere, oceans, and land. But it is the economic beliefs that describe the cosmos of most people, bind people together, support their particular behavior, and sustain the economic system. Economism is altering the physical processes of the geosphere and collapsing the diversity of the biosphere. Econocene is a more appropriate term for the new geologic era. Fossil fuels and their technologies have transformed agricultural and industrial processes, the mobility of goods and people, and the geographies of cities and rural areas. People's values, ways of understanding, and social organization have coevolved with fossil fuels and their technologies, but it is economism¹ that binds people together and girds the economic system we have. We need a new "ism", a new human consciousness, to support a new relationship with Earth and its other inhabitants.

Economic beliefs are not detrimental because they are mere beliefs. People need a belief system to live together. Yuval Harari develops this argument around the following statement.

"Any large-scale human cooperation – whether a modern state, a medieval church, an ancient city, or an archaic tribe – is rooted in common myths that exist only in people's collective imagination" (Yuval Harari, 2014, p. 30)

Many critiques of the recent neoliberal economy make the same point that neoliberalism survives on a set of necessary public beliefs, but most critics imply that those who profit from the system orchestrate the beliefs. While not denying that those who most benefit from particular beliefs have helped push them on the masses, the process by which beliefs come to be held and sustained is more complex than this. People need beliefs to explain the system in which they live, and they need beliefs to rationalize their decisions and those of others. Furthermore, people are able to choose between alternative beliefs and rationalizations being pushed by religious organizations, interest groups, and social commentators. The dominant choice of Europeans and North Americans switched during the 20th century from Judeo-Christian explanations to neoliberal economism. And the rest of the world also made this shift on their own time scales starting from their own religious bases.

The early Chicago economist, Frank Knight, argued in the 1930s that economics must be included among the beliefs in people's collective imagination. Except Knight used the term

¹ Bottomore (1991) describes the diverse ways Lenin, Gramsci, and other Marxists have used the term. Kwak (2017) uses the term to emphasize the unrealistic nature of the ideology of neoliberal economists. Cobb (1999) used the term to designate an era during which economic beliefs organize humanity. My use incorporates Cobb while building on Knight (1932) with respect to how economic beliefs are necessary, indeed need to be religious in nature, to satisfy the needs of people as well as to keep the economy running.

“principles”, a term that plays an important role in science, but then immediately argues that the “principles” must be essentially religious.

“The point is that the ‘principles’ by which a society or a group lives in tolerable harmony are essentially religious. The essential nature of a religious principle is that not merely is it immoral to oppose it, but to ask what it is, is morally identical with denial and attack.

There must be ultimates, and they must be religious, in economics as anywhere else, if one has anything to say touching conduct or social policy in a practical way. Man is a believing animal and to few, if any, is it given to criticize the foundations of belief ‘intelligently’.

To inquire into the ultimates behind accepted group values is obscene and sacrilegious: objective inquiry is an attempt to uncover the nakedness of man, his soul as well as his body, his deeds, his culture, and his very gods” (Knight, 1932, p. 448–9).

“Certainly the large general [economics] courses should be prevented from raising any question about objectivity, but should assume the objectivity of the slogans they inculcate, as a sacred feature of the system” (Knight, 1932, p. 455).

Note that Frank Knight argued that economists, mostly unbeknownst even to themselves, should be the surreptitious purveyors of economic beliefs as religion. Or, to paraphrase and mix Marx with Knight, economists need to be pushers of the opiate to the masses where now religion is economic beliefs. And yet economists are portrayed to be and think of themselves as objective scientists dedicated to reason and reason alone.²

Let me be more specific. Economism consists of the shared beliefs that support the market order and capitalist growth upon which most of humanity is currently absolutely dependent. Laborers, white collar “technocrats”, entrepreneurs, capitalists, financiers, and specialized scientists including economists work together in amazing synchrony through shared economic beliefs that:

- a) Explain and rationalize one’s place in the economic system,
- b) Rationalize the dominant way in which people interact with each other as a process of free choice,
- c) Rationalize how “greed is good” in opposition to earlier religious/secularly-based moral teachings with respect to care for others,
- d) Divide nature into property that can be owned and traded,
- e) Rationalize growth of GDP as progress,
- f) Explain the nature, including the emergence, of the economic system,
- g) Rationalize transcendence through consumption, the meaning of life is to consume more and more, the mandate of nations is to grow.

Note that as listed here, the belief system is “complete” in that it includes everything that a religion would include: an explanation of the cosmos, of one’s place in it, and how to behave. While most people hold other beliefs as well as economic beliefs, increasingly since mid

² While acknowledging Milton Friedman’s theoretical and empirical accomplishments, the most important role he played was as a public spokesman for market religion through popular books, a television show, and numerous public appearances. Friedman pushed economic beliefs as religion in accordance with the argument above of Frank Knight, one of his mentors.

20th century, economism has displaced earlier religious beliefs or become syncretic with religious beliefs as in Christian prosperity gospel (Bowler, 2013).

The belief systems that have organized people have changed over time. The beliefs that supported hunter-gathers were different from those that supported agricultural societies that were different from those that have supported industrial societies. This gives us hope for another change that will support people and planet. Yet, paraphrasing Albert Einstein, we cannot get out of the crisis we have created through economic thinking by using economic thinking. A coevolutionary framework for thinking about history and possible futures is an alternative that provides insights.

A coevolutionary framework

Over nearly four decades, I have argued for a coevolutionary framing of people's historical and current relations to nature (Norgaard, 1981; 1994). Others have also found this perspective insightful.³ Coevolution in biology is a process where two species select on each other (Ehrlich and Raven 1964). Evolution is typically explained in terms of a single species being selected upon by physical conditions of the environment. Tortoises, for example, evolved to be better and better adapted to dry environments through competition for resources and the natural selection of those tortoises more fit for dryness. The Western idea of progress (Bury, 1920; Nisbet, 1980; Lacsh, 1991) easily aligns with the idea of the tortoise becoming more and more fit. Social Darwinists starting in the late 19th century falsely adapted the idea of the survival of the fittest to justify, under a banner of progress, how superior people were outcompeting inferior in the newly emerging corporate industrial capitalist economy (Hofstadter, 1944).

While physical environments are important in the selection process, so are how each species interacts with other species leading to species selecting on the characteristics of each other. More broadly, [coevolution](#) is the sum of evolutionary changes of interrelated entities selecting on the characteristics of each other. Each entity in a coevolutionary relationship exerts selective pressures on the others, whereby each affects each other's evolution. Note that with coevolution, there is no equivalent to the concept of progress. The characteristics of species simply change in response to each other's changes.

The concept of coevolution has been extended to the interactions of systems and how they select on the characteristics of each other.⁴ A process of social and natural system coevolution is portrayed in Figure 1. The blue arrows portray the direct cause and effect feedbacks between the two systems illustrating how people typically think of how nature affects us and we affect nature. The red arrows in Figure 1, however, also suggests how the two systems can be understood as *coevolving* together with features of the social system favoring the more effective reproduction and survival of particular features in the natural system and *vice versa*.

In *Development Betrayed* (Norgaard, 1994), I break the social system into four subsystems: values, knowledge, organization, and technology shown in Figure 2. I envisioned a process

³ The "economic" literature on coevolution is surveyed in Kallis and Norgaard, 2010.

⁴ Lumsden and Wilson, 1981, respond to the cultural critique of Wilson's sociobiology by including cultural systems in the coevolutionary process. Peter Corning, 1983 also provides an independent systems response that is constructive.

wherein each subsystem interacts with the others in direct (mechanical) ways while they also coevolve together through selecting on the characteristics of each other while also interacting and coevolving with the natural system. The distribution of characteristics in each subsystem also changes by innovations and introductions from other areas.⁵

Figure 1 The coevolution between nature and society

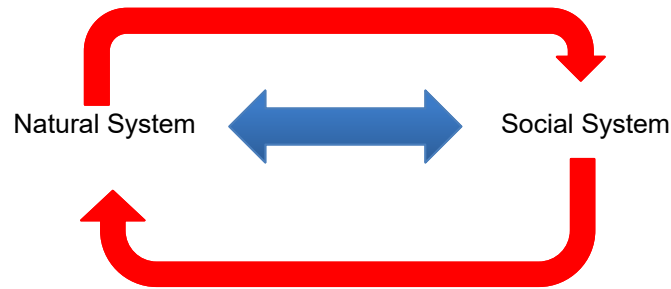
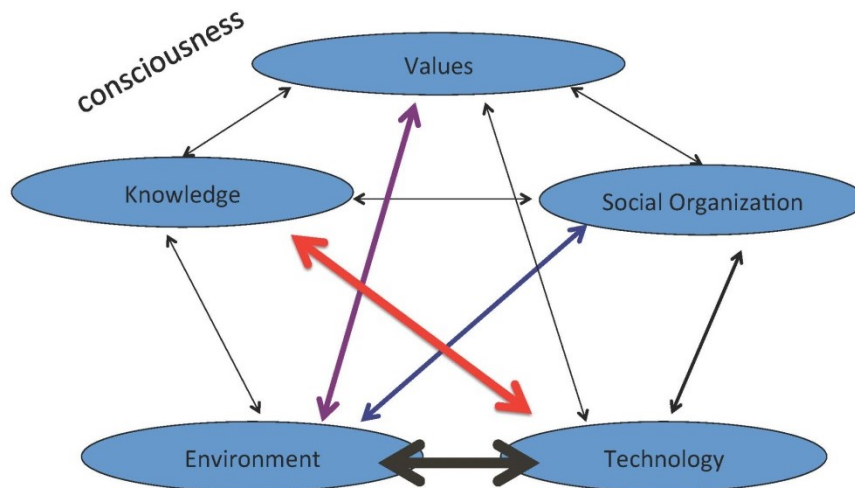


Figure 2 The coevolution of social subsystems with the environmental system



Note that I have put the word “consciousness” between and above the knowledge and value subsystems to indicate that when I use this word, I am thinking of it as a combination of the two. The coevolutionary framing of human interactions, mechanical and evolutionary, with the environment has some special features that are critical to the overall argument of this paper.

First, as in the coevolution between species, things just change in response to each other. There is no presumption of progress. Indeed any criteria for progress are within the value

⁵ This framing is different from the dominant framing within ecological economics of the economy being within, and a subsystem of, the environment (Daly, 1973; Daly and Farley, 2011). Readers may find my portrayal of the environmental system as no larger than any subsystem of the social system rather off-putting. This is a different framework emphasizing a parallel framing of processes rather than of magnitudes of stocks and flows. Note that the social system selects on characteristics of nature, not on the characteristics of natural laws like gravity or thermodynamics.

subsystem that is itself coevolving in response to the changes in the other subsystems. And this provides a direct insight into how the nature of progress changed from moral progress during the 17th century to include material progress beginning in the latter 18th century, to become economic progress during the 20th century, and then since 1980 or so to become simply “growing the economy” or GDP growth. Values coevolved with increasingly dominant economic understandings within the knowledge subsystem as well as with the increasingly dominant market organization of the social system. As values became more economic, the criteria of what constitutes progress changed accordingly.

Second, as the previous paragraph clearly suggests, the coevolutionary framework explains path dependence or “lock in” very easily. This characteristic of the framework does not offer much hope for humanity getting out of the current crisis. And yet, coevolution also explains how wholly new features can arise, giving us hope. The environment is changing because of climate change, forcing new direct interactions as well as selecting on the characteristics of the social subsystems. While the lock in was sustained for a decade and a half, especially strongly in the United States, there is now clear evidence that climate change is influencing the consciousness of people around the world.

Third, the mechanical processes also illustrated in this coevolutionary framework suggest how human consciousness, the sum of understandings in the knowledge subsystem and beliefs in the value subsystem, sustains the social organization and technological subsystems that exist. Many authors have noted that particular values and understandings among the people are necessary to sustain a particular economic system.⁶ The coevolutionary framing, when the arrows are viewed as cause and effect relationships, illustrates this.

Fourth, the coevolutionary framework illustrates how environmental, organizational, and technological realities coevolve with people’s consciousness, how people understand and value things within the reality they are simultaneously changing. This framework is constructionist, and explicitly so. In this framing, understanding, for example, is recursive, incorporating how prior understanding effected actions taken and the selection processes that changed society and nature. For example, historically we understood soils mostly as physical and then later as chemical systems. While we now understand soils more as biological systems, or biogeochemical systems, our understanding of the agricultural soils that exist today is more complete, and thus better, when we incorporate how we had historically transformed these biogeochemistry systems through plowing and the application of fertilizers based on our earlier, dominantly physical and chemical, understanding of soils.

Understanding how past thinking has created the world “out there” is important for understanding agricultural soils, but it is even more important for understanding our economy. The economy and the problems we have today reflect our past understandings that have been dominated by neoliberal beliefs about markets as self-regulating, about the superiority of markets to government, and about how economic growth supposedly advances well-being and even brings about environmental protection too. People, with the help of the economics profession, have come to worship markets and condemn the supposed inefficiency of governmental “command and control”. Yet we ignore the phenomenal rise of the large corporations that employ us and provide us with our daily goods and services. Corporations large, many larger than nation-states, as well as small are organized and supposedly run efficiently by command and control. Somehow, the economics profession fails to teach this,

⁶ For a recent example with respect to neoliberalism that also reviews the prior literature, see Streeck, 2017.

nor do people choose to notice the anomaly either. It is easier to ignore realities that question values, at least for a while. Indeed, as I will try to show, a [false consciousness](#) is partly necessary.

Within this framing, let me explain how we reached the crisis we are in.

A coevolutionary history

There have already been 3 substantial transformations in human consciences that have accompanied major organizational changes in societies: 1) from hunter-gatherer societies to agricultural societies, 2) from agricultural societies to nation-building societies, and 3) from building nations to economism (Harari, 2015; Cobb, 1999). A fourth change in consciousness driving and coevolving with other changes, perhaps an Earthism or ecologism, is needed to assure environmental sustainability, social justice, and meaningful lives.

From hunter-gather to agricultural societies. Being smart, especially since the emergence of Homo sapiens a quarter of a million years ago or so, people learned that they could hunt more successfully by hunting together. It also made sense to share what they caught, for some hunting parties were more successful one day, others the next. And young children and elders, best left in camp, needed food too. Sharing was good for the success of all. Working together and sharing made productive and reproductive sense. Cooperation works best when there are expectations that people can be trusted to meet such expectations, and trust tended to formalize into moral rules. Hence, from the earliest of times, the processes of production and distribution and the human qualities of being trustful and moral, or what we now think of as the separate realms of economics and religion, have been tightly fused.

Religions provide more than simply moral guidance. Hunting, as well as the gathering of nuts, fruits, and vegetables, entailed working with the intricacies of nature. People had practical questions about the timing of events in nature, many of which were important to their material success. For these, people slowly contrived through experience and passed between generations through survival of the fittest increasingly good enough arguments that they composed into stories to document how to work with nature. Some of these stories improved hunting and gathering techniques, partly by cause and effect, partly by selecting on each other. These earthly queries intermixed with larger questions about the heavens and earth, the cosmos, for which existential myths evolved. The ethics of accessing nature and sharing became intertwined in these earthly and existential stories as well.

For the vast majority of human history, people lived in tribes of 50-200 people. The small size of tribes facilitated, though did not guarantee, an organizational structure with information sharing and something close to collective decision-making. People's environmental impacts were largely local and temporary, though people did drive some species to extinction. Most importantly, when a tribe's environment deteriorated, whether by their own doing or an act of nature, there were possibilities of moving to new territory, for population levels overall were low.

From agricultural societies to nation building societies. After many millennia, grazing and farming started gradually within hunting and gathering communities. Dominantly agricultural societies arose as the effectiveness of agriculture increased and perhaps also as population levels demanded. Agriculture vastly increased people's ability to capture the sun's energy and

transform it into food. There were modest increases in well-being, especially for those at the top of the hierarchical societies made possible by an agricultural surplus. But most of the productivity gains were absorbed by population growth. Farming facilitated an estimated 225-fold increase in human population during the 12 centuries prior to the rise of industry in 1800, as shown in Table 1.

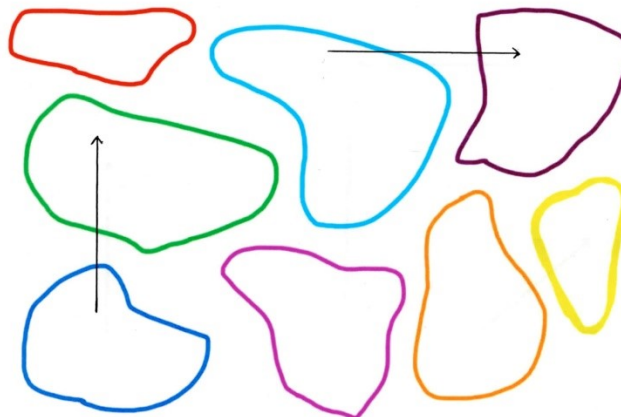
Cultures largely based on hunting and gathering coexisted with agricultural societies, but they were pushed into mountainous, desert, and other less desirable landscapes. Agricultural societies began having new and larger direct impacts on the environment and put new selective pressures on other species. People in different regions transferred a few seeds, plants, and animals, exchanged ideas about the origins of the universe and the meaning of life, and even traded a few practical items, such as salt and spices, over considerable distances. Yet overall, interconnections between societies were relatively few compared to later times, and thus cultural diversity between the patches was considerable. Such a world might be sketched as in Figure 3, with the coevolutionary processes shown in Figure 2 taking place in each patch. With low interconnectivity, the failure of one culture did not reverberate through and take down societies around the globe.

Table 1 Population and global gross product through history

Date	Population billions	Global Market Activity in trillions 1990 world dollars
2000	6.3	41
1975	4.1	15
1950	2.5	04
1900	1.6	01.1
1850	1.2	00.036
1800	0.90	00.018
1600	0.55	00.0077
0	0.17	0.0018
-10000	0.004	0.000037

[Estimates by J. Bradford DeLong 2008](#)

Figure 3 A cultural patchwork quilt with an occasional transfer of a plant or technology



Agriculture, however, was not simply a magnificent human advance through new technology and social organization as conventionally portrayed. There were dramatic transformations, and clearly not all were favorable, in people's consciousness of nature, of their values and knowledge systems, in the process of becoming agricultural societies (Harari, 2014). The tedium of working the soil and harvesting but a few crops rather than dynamically interacting over a wide landscape with a diversity of plants and animals selected against the larger consciousness of nature possessed by hunters and gatherers. Consciousness coevolved toward new, simpler ideas fit for farm laborers. People's social consciousness also needed to be civilized. New rationalizations evolved to support living in larger groups and working as field laborers rather than at a higher level, and vice versa, in the newly formed social hierarchies. Formal religions arose as specialists took on the task of developing, maintaining, and conveying moral principles and origin narratives. Knowledge, values and social organization changed through coevolutionary processes in ways that complemented the changes in farming technology. All of this constitutes the very nature of *agriculture*, the outcome of the agricultural coevolutionary process.

For 10 to 15 thousand years, most peoples lived in multiple, fairly distinct, predominantly agricultural, societies. A millennium ago, the people who were to eventually think of themselves as Europeans were organized around the Catholic Church. Christian beliefs rationalized and supported the feudal social order for centuries. It was an age of Christianity even as Protestantism challenged Catholicism (Cobb, 1999). It was traditional religions that also organized people in agricultural societies pretty much around the world. In the last centuries of agricultural societies, however, knowledge, values, technology, and social organization began to coevolve in new ways.

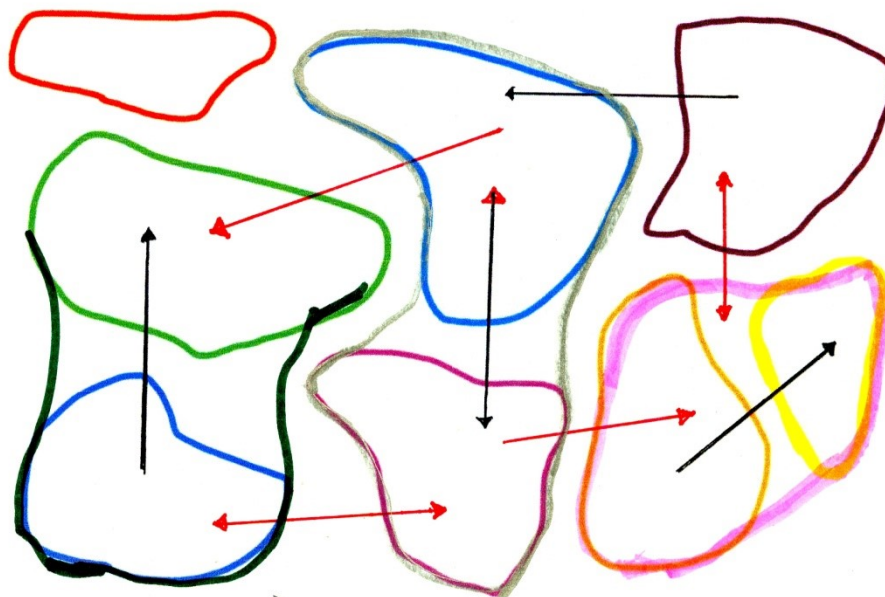
European intellectuals' sense of the world and their place in it began to change with the Renaissance beginning in 1300. The emergence of modern science proved critical to how people interpreted nature. In the Abrahamic tradition, a single designer created the heavens, sun, planets, and Earth and creatures, plants and people as a whole with Earth at the center of the universe. People, formed in the creator's image and being most favored, had dominion over, yet responsibility for the care of, nature. Modern science succeeded by studying the components of nature separately, it reordered the sun, planets, and Earth, and it ever so slowly set people free from Christian and other religious dogma about nature, though that process is still ongoing. People's sense of dominion began to coevolve with science and technology into the hubris of control of a spiritless world.⁷ The new ideas of modern science in Europe coevolved with social organization, specifically the authority of the Catholic Church, over centuries and spread slowly through the population.

Again, taking a European perspective, there were also more and new interactions with other parts of the world, with people of other cultures. Beginning about 500 years ago, Europeans carried plants, animals, and diseases to and from the New World. Soon after the movement of people and goods over the great oceans began to more tightly connect what were separately coevolving patches of social and environmental systems. This created a smaller number of larger patches, beginning the process of reducing the diversity between cultures as well as natures (Crosby, 1973; 1986; Mann, 2011).

⁷ Lynn White (1967) set off an extensive debate about the role of Judeo-Christian teaching and responsibility for the environmental crisis in a famous article in *Science*. I provided an overview of the responses to White in (Norgaard, 2002), but of course that literature has continued since.

Changes in European perceptions of themselves, both with respect to nature and social organization, also coevolved around very important new ideas about individualism that coevolved with the rise in atomism in natural philosophy. Martin Luther's call for reform of the Catholic Church stressed that individuals were responsible for their own salvation through their own reading of the Bible, the only true source for coming to know Christ and God. Luther's call awakened individualism, expanded education to the masses so people could read, unintentionally further separated church and state, and ignited multiple intellectual Enlightenments: English, Scottish, French and eventually in the Catholic Church and feeding back on Protestantism too (Ryrie, 2017). The natural theology that evolved into natural history and then into natural science was increasingly built on atomism and the assumption that the parts of nature could be understood apart from each other. As a result, modern science split into disciplines with each discipline learning about particular parts of nature. No one needed to understand the whole because it was thought that the parts would naturally unify into the whole. Millgram (2015) characterizes the coevolution of knowledge with technology and social organization since the Enlightenment as the Great Endarkenment. People today, scientists included, are far less conscious of the environmental system in which they live than were hunter-gatherers. The Enlightenments' strong move toward individualism in social thinking and atomism in natural thinking became traits of modern beliefs that are at the core of today's crisis.

Figure 4 A coevolving patchwork quilt of cultures with more connections



From agricultural societies to nationalism. A period of nation building arose after the Treaty of Westphalia in 1648 that ended the Thirty Years War between the shifting allegiances of royalty to Protestantism and Catholicism. Social philosophers sustained by a new wealth apart from the Catholic Church introduced disruptive ideas about the legitimacy of the power of those in authority to rule over other people, arguing instead that the people should only be ruled by their own consent. The authority bestowed by the Catholic Church on the authority of rulers was already breaking down, and these new ideas further selected against religious authority. Later, there were arguments not only for democratic election of rulers but also for democratic involvement in decision making generally. As Europeans coevolved into nation-states, nationalism became the dominant belief system. It was

nationalism that organized the new nations of the new world in the 18th and 19th centuries as well as the breakdown of European colonialism and the rise of nationhood in Africa and Asia during the mid 20th century. Wars in the age of Nationalism were common because nationalist beliefs stressed imaginary ethnic identities, boundaries, and loyalty foremost though modes of governance were also important. Religious influences were still important too, but no longer ruling.

The liberal social thinkers of the Enlightenment who favored independent, free individuals realized that one cannot be free without property. Without one's own land or capital, one can only be someone else's laborer. And if employer's freedom includes letting laborers go, a freedom soon to be derived from market thinking, than freedom certainly requires all individuals to possess property. Around the same time, increased trade changed relative prices of farm products selected for an acceleration of the enclosure movement that started in England and spread to France as well. The transition from feudal societies to market societies separated large numbers of people from the land, causing great misery and great losses of freedom for the masses. The development and spread of liberal philosophy coevolved with the rise in the institution of private property for the few, selecting against the institution of common property with shared responsibilities. The individualism of liberal philosophy selected for individualism over cooperation and care in social organization and rationalized the demise of common property and responsibility under feudalism (Polanyi, 1957).

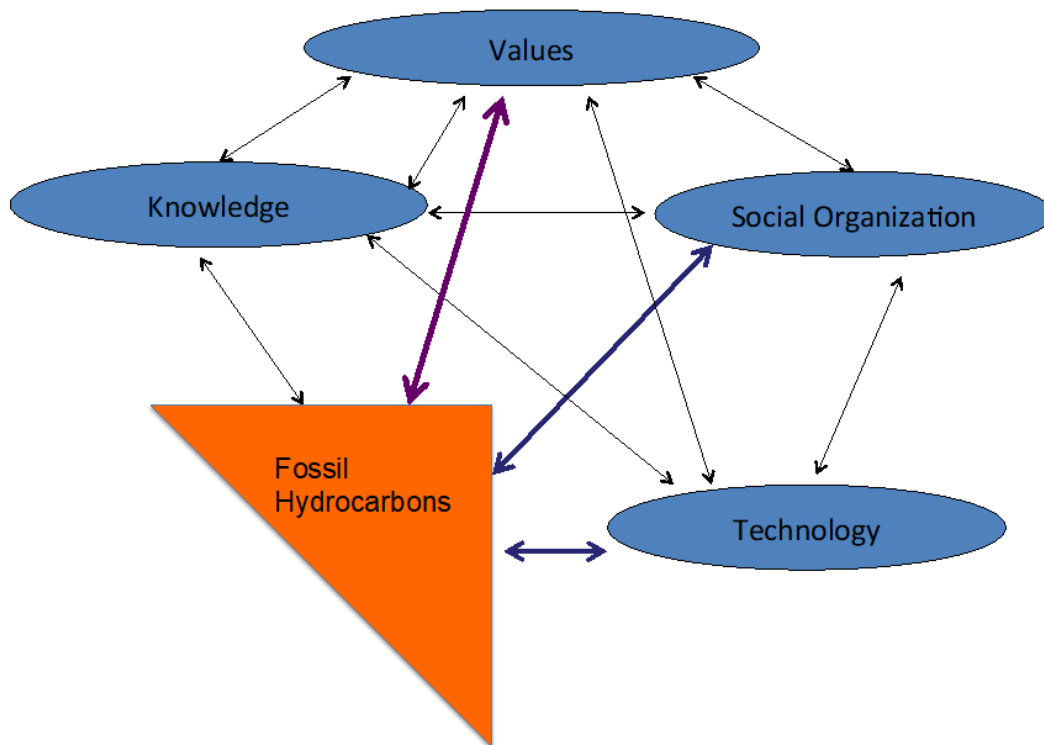
The demise of land stewardship and the rise of the idea of private property coevolved with notions of atomism in science, the idea that nature could be separated into parts. A new understanding of nature as complex interconnectedness, the science of ecology, would not evolve for another century. In the meantime, the myth that nature could be divided up into parts, without connections remaining, and owned by separate people became not only a part of human consciousness but a key condition of liberal society. The economic concept of environmental externalities has the story backwards. Environmental connections are denied in the concept of private land ownership and were made external in economic thinking from the start.

From nationalism to economism. The changes in how people perceived nature and organized themselves became clearly noticeable in practice around 1800. Europeans, at least those with sufficient property, began to equate freedom with individual choice, sensed a control over nature through technology, the idea of progress began losing its moral base and switched toward the possibility of material abundance for all. These changes coevolved with a dramatic increase in access to energy through the mining and combustion of coal followed by petroleum in the next century. Rather than coevolving with the environment, our social organization, technologies, and even the balance of the ways people understood began to coevolve around fossil fuels.

The economy began to coevolve around fossil hydrocarbons and their associated industrial and transportation technologies beginning with coal in the late 18th century and then petroleum beginning in the latter 19th century. In 1901, Svante Arrhenius documented that carbon in the atmosphere from the combustion of fossil fuels would increase the natural greenhouse effect that keeps the planet reasonably comfortable and warm it further. His calculations of when the warming would become dangerous was grossly in error because he had no way to foresee how rapidly fossil fuel technologies would dominate others and find new niches as well. While this error proved critical, it is important to realize that Arrhenius was making a serious effort to understand the impact of people on the geosphere. The vast

majority of theoretical scientists were busily digging deeper, narrower strands of knowledge that occasionally other more applied but still specialized scientists and engineers were turning into technologies that were profitably introduced into human and natural environments with little if any concern for their larger consequences. How could they be concerned given their fragmented training and lives in specialized organizations of specialists who also were oblivious of larger systems? The fragmentation of knowledge and how that coevolved with social organization is a central part of this coevolutionary history of humanity's predicament.

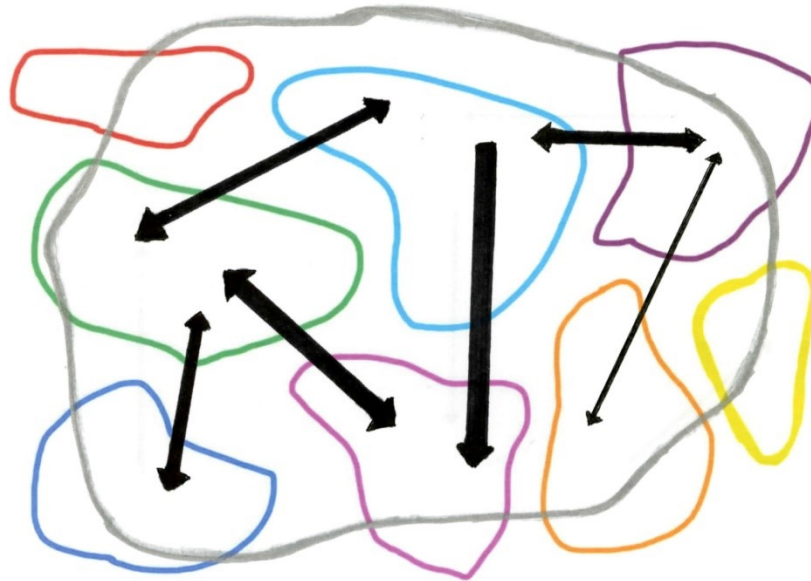
Figure 5 Social system coevolving with fossil fuels



The uniformity across geographies of fossil hydrocarbons and their technologies and the economies of scale of fossil hydrocarbon technologies selected for the corporate industrial order we know today. These direct changes, along with the coevolutionary processes of selection, freed people from coevolving with the complexities of the natural environment. This in turn gave rise to modern economism that pays no heed to nature. With our cosmos being the modern industrial order, economism emerged as the dominant secular religion, an eclectic package of beliefs that explain our place in the economic system, our relation to other people and nature, and how we should live what has been deemed a meaningful life.

Belief in markets spread, indeed was carried around the world, even forcefully so, to counter the rise of the Soviet Union in the Cold War, through efforts to “free” trade globally, and through the implementation of the idea of development. By the second half of the 20th century, much of the world was beginning to look like the market world assumed in economic models. In the late 20th century, the globalization of capital began and the interconnections between the patches of Figure 3 began to look more like Figure 6.

Figure 6 A globalized former patchwork of cultures

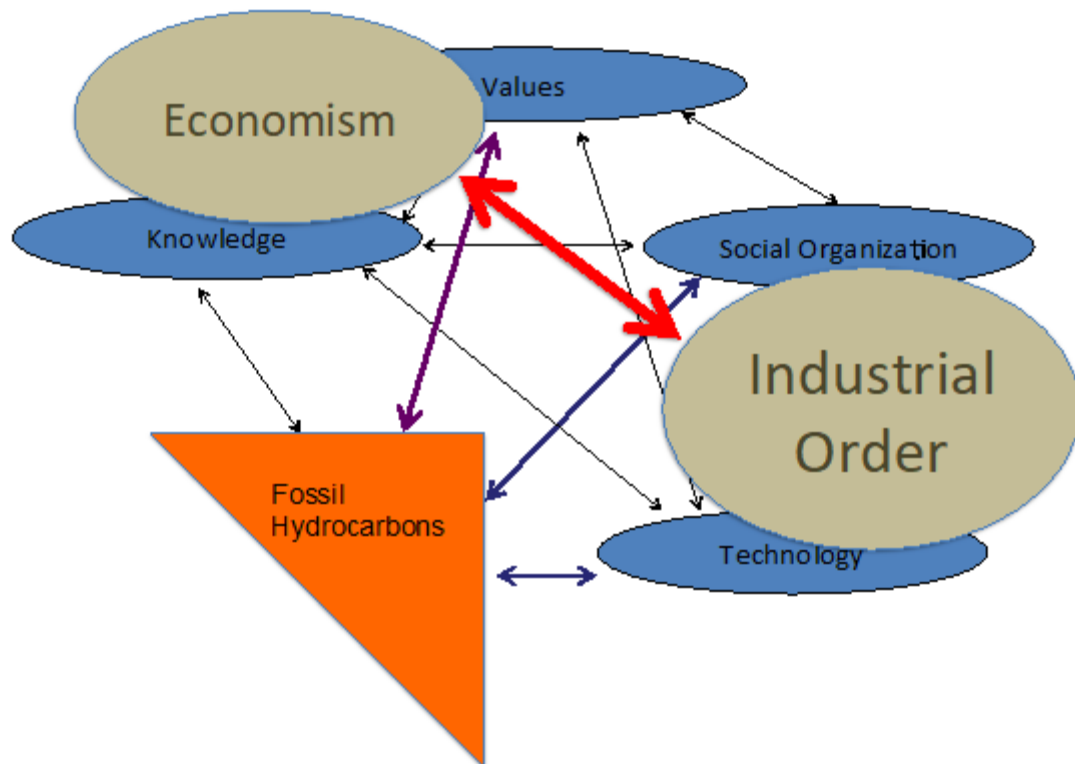


People performing specialized tasks are now so interdependent through markets that if people do not believe in markets and their larger purpose, all markets would collapse, as financial markets nearly have periodically, most recently in 2008. If markets collapse most of our population of 7.7 billion people would very quickly starve. Economism is necessary to sustain the economic cosmos in which people live.

Economism, however, has also become the dominant form of reasoning and the source of metaphors and utopias used in public communication. With the shrinkage of other ways of thinking about systems, economic terminology has even become critical to how conservation biologists explain nature to the public. Nature, like other forms of wealth, can be thought of as capital that pays dividends in the form of ecosystem services. Saving nature has become a process of designing economic incentives for individual actors to invest in nature in order to reap her ecosystem services. In turn, conservation biologists now frame their research around market terminology to back up the ecosystem market programs they have helped facilitate. Biology is becoming economism.

The industrial order sustained by economism is not sustainable itself. We are in the Econocene maintained and coevolving with economism. Any new social organizational system that is sustainable, socially just, and provides meaningful lives will also need its "ism" to keep it going. This raises a key question. How can we have new system of beliefs/values, ways of thinking, and social organization emerge, a new ism, without crashing the current economic system, with economism maintaining it, on which we depend during the transition?

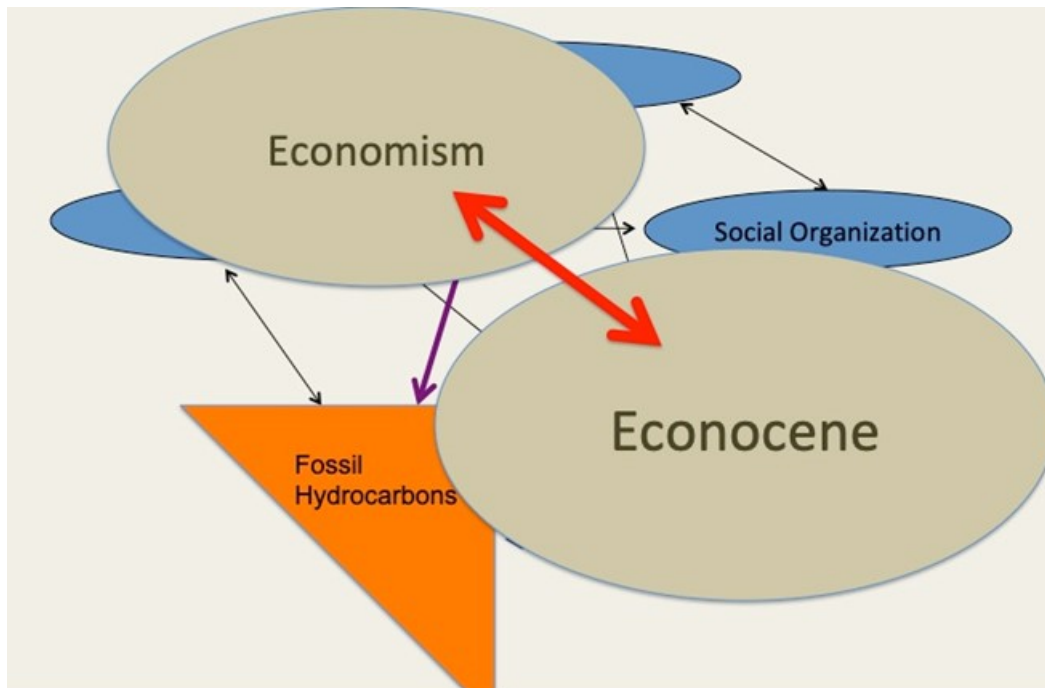
Figure 7 The coevolution to economism and the industrial order



During the 20th century economic beliefs have supported diverse and coevolving capitalisms as we know them and resulted in spectacular changes. Human population roughly quadrupled from about 1.6 billion people to 6.3 billion people. Global market economic activity during this period increased by nearly a factor of 40, or about 10-fold per capita. This rise of market activity entailed a parallel rise in specialization in work and associated knowledge. We went from a 19th century world in which the vast majority of people on the globe were pretty closely tied to the land and performing a similar mix of comparable agricultural and domestic activities to a 21st century world in which most people are performing specialized tasks using task specific knowledge. People are tied to bureaucratic structures, both public and private, while being globally interconnected by markets.⁸ This new system has proved extremely effective at producing material goods while also presenting unprecedented social and environmental challenges. It is this transformation into what I will call the Econocene that must be understood in order to find our way out.

⁸ I have skipped over the deliberate role of economists in supporting the most important and global economism of all, neoliberalism. The role of the Mount Pelerin Society and the Chicago School is very well documented. I am also skipping over the role of international institutions established after WWII and their role, in the midst of the Cold War, in establishing a neoliberal economic order that led to economism coevolving with the Econocene.

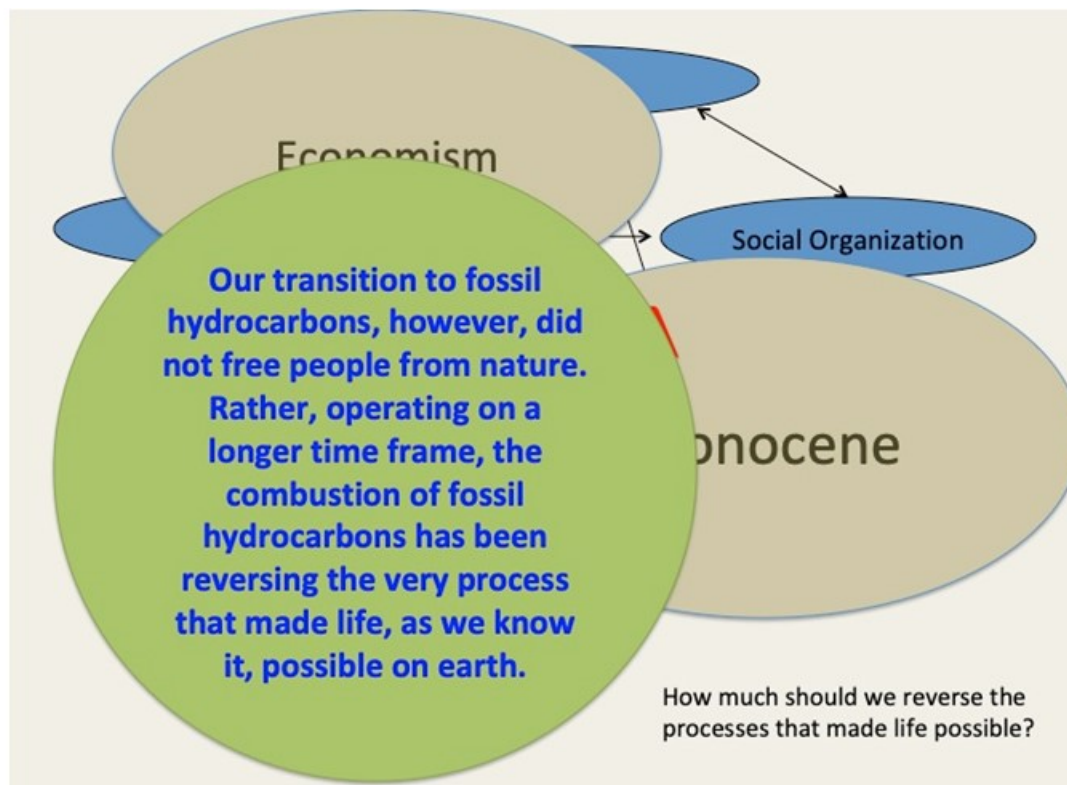
Figure 8 Economism coevolving with the Econocene



While social organization, knowledge, and values were coevolving around fossil hydrocarbons and their technologies, however, the geosphere and biosphere systems were operating on a different time scale, accumulating the CO₂ and other greenhouse gases that are now resulting in climate change, sea level rise, and a further quickening of the extinction of species.

The Econocene is a period of rapid transition of the geosphere and collapse of the biosphere. The transition to sustainability, social justice, and meaningful lives will not occur simply through the use of market mechanism to reduce carbon in the atmosphere. The economy has become our cosmos. We awake to stock market reports from financial capitals several time zones to our East, work in command and control hierarchical corporate structures while praising free markets, and are absolutely dependent on others in distant places working for the global economic machine. City lights and polluted air curtain us from the starry heavens, few are even aware of the phase of the moon. Reality is on the screens at our desks and on our cell phones in our hands, we share hearts through social media rather than in person. To face the reality we are in, our consciousness needs to become much more closely aligned with how nature and people function in a rapidly changing interaction. The economism that drives and coevolves with the Econocene must be replaced with a new “ism” that is environmentally sustainable, socially just, and supports meaningful lives.

Figure 9 Economism and the Econocene challenged by the reality of climate change



Humanity, fortunately, has been through multiple major transitions before. But now all of humanity is absolutely dependent on a tightly coevolved system of beliefs and social order. If people did not believe in markets, if economism were not equivalent to a religion that frames each person's very existence and *modus operandi*, all markets would collapse, as financial markets have, and 7.7 billion people would starve. How can we change to a new consciousness, to new systems of values, of knowledge, of social organization, and of technology that will coevolve without crashing during the transition and be sustainable thereafter?

Fortunately, capitalist economic order has proven pretty malleable, indeed significantly reconfiguring every quarter century or so. Evolutionary and coevolutionary processes also can occur rapidly. Counter to our mechanical intuition, coevolution explains change, including the evolution/emergence of wholly new properties, even while it explains "interlockedness". This is the good news. The bad news is that the story of progress through conquering nature through better science and technology has been strong for several centuries. While capitalism has indeed changed, it has continually increased specialization and material and energy consumption while also increasing the separation of people, and their knowledge, from each other and nature.

Conscious consciousness changes for survival

The coevolutionary history provided in this article suggests at least the following four ways in which humanity's consciousness needs to shift.

From material progress to holistic survival and morality. The coevolution of economism with the Econocene has led humanity to the brink of disaster. Faith in progress has long been a part of the problem. Actions to stave off climate change have been trimmed and delayed on the presumption that countering environmental destruction has the opportunity cost of foregone human wellbeing through further investments in technology that further increase the production or provide novel forms of material goods. And yet studies show that wellbeing increases little, if at all, with further material assets after basic needs are met. Shifting from faith in progress toward a consciousness of holistic survival would be more appropriate given the challenges of climate change. I include the word holistic to remind us that we need to be more fully conscious of all peoples and other species too.

Most of the questions we face today are moral questions. We have neither fully faced our moral responsibilities to future generations raised by past environmental destruction nor faced climate change over the past three decades. Economists have avoided addressing moral issues in order to meet legislators' and the public's expectations and need for so-called "objective" answers. Hence economists talk of economic efficiency when moral issues are at stake. This shriveling of economists' ability to think and discuss moral issues is the essence of economism.⁹ Economics, in theory, cannot say what is moral, but if political processes determine what is moral, economics can talk about alternative efficient economies that meet moral obligations and paths to them. It is past time for economics to work with moral reasoning and political decision-making rather than falsely standing in for them.

From knowledge hubris to knowledge humility. We need to become much more humble with respect to how smart we are. If we were so smart, we would not be in this dire predicament. Science and the scientific community can become part of the solution, but we also need to acknowledge how science has been a part of the problem. Western hubris allowed technologies based on new findings in particular fields of science to be implemented in and spread through whole natural and social systems. Because we had scant knowledge of the whole, specialized innovations transformed the geosphere and biosphere as well as the sociosphere in unexpected ways. Those in denial of climate change are partly caught in the hubris of Western knowledge past. The environmental sciences still evoke a nature that is "out there" and slowly changing at most rather than a nature undergoing rapid change driven by our economy sustained by our beliefs. Science education, research, and participation in management and policy need to shift from the hubris of scientists as agents of material progress through specialization to scientists as humble seekers of understanding of whole and rapidly changing systems.

Given the limited nature of current knowledge, more experimentation in how we interact with nature, with quick corrective steps taken when experiments go wrong, would provide opportunities to learn through experience. Introductions of innovations need to be limited in general until our understanding is sufficient to develop criteria. There will be advantages to de-globalizing. Differentiation in our future economies will allow lessons to be drawn with respect to what might work better. The idea that we can design one best way to transition and sustain a better world is an extension of Western hubris.

⁹ Richard Howarth and I used an overlapping generations model to show that if we care about future generations by assuring them environmental rights, for example climate rights, then the efficient solution for future resource allocations changes, the rate of interest goes down, and environmental values go up (Howarth and Norgaard, 1992). In response, Resources for the Future organized a workshop, without inviting us to participate, where participants questioned the need for switching to a model that actually provides the option of addressing intergenerational equity and published the resulting papers in a book (Portney and Weyant, 2000).

From individualism to cooperation and care. Adam Smith wrote two books. We have neglected his first, *The Theory of Moral Sentiments*. Economists found the logic of markets in *The Wealth of Nations* compelling while wealthy converts with political traction spread selected messages. We need a significant shift towards the messages of Smith's first book. It still provides important insights into how empathy can build trust, responsibility, and care that are key to rethinking meaningful lives and social organization. And while Smith did not emphasize care across generations, we now need to care ahead.

From private property to global commons. The belief that land could be owned by a private individual and used however its land-owner saw fit gained traction in the west only centuries ago, an extremely short time in human history. Throughout history, what an individual could do with land has been restrained, but in America in particular, the idea of land ownership as sacred and any restraint considered a deep imposition on liberty and freedom. The interconnectivity of natural systems assured that private land ownership, especially when connected to markets ever more distant, would result in environmental disaster, and it has. The common threads between land need to be managed as a commons, and with today's technologies and markets, those threads have become global. Shifting consciousness in this direction will be difficult but necessary.

Just as a coevolutionary framework helps explain how humanity has come to the brink of social and planetary disaster, it can help us see how we might back off and set out anew. The framing is systemic and evolutionary, it incorporates ecological interactions and the selective processes of evolution, showing how things tightly fit together while also changing. It incorporates the best of postmodernist understanding. Social organization, technology, values, and even science, are "socially constructed", indeed even nature is increasingly being socially constructed, but none are *only* "socially" constructed. The "economy" is important, but to understand how to escape the coevolution of economism and the Econocene, it will be important to concentrate on how other aspects of life besides the material contribute to individual and collective wellbeing and can guide us into the future. We need to both concentrate on survival and consciously expand our consciousness.

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