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Two Themes Inherent in Big History

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Abstract

The following work ties together the Big History components of collective learning and complexity-building within the long term perspective of the evolution of the Universe and the shorter term perspective of human culture. Since human culture is at the leading edge of complexity-building, it is appropriate to wonder about where that process is taking us and whether there are ways through which it might be influenced. I suggest that the pace of cultural evolution is significant in terms of the heavy investment in war technology over the past 10,000 years, while the more leisurely pace from 25 to 45 thousand years ago may be a product of the peaceful coexistence inherent in sustainability.

Big Historian David Christian makes a gigantic leap forward in his book, *Maps of Time,* by connecting the 'collective learning' that humans do with the complexity-building that has been in progress for at least the past 13.7 billion years (Christian 2004). We humans are at the forefront of the process that has now been clearly demonstrated by Christian, and our culture is the vehicle through which this process is maximizing the energy-flow density metric that astronomer Eric Chaisson has so brilliantly identified for us (Chaisson 2010: 2). Is there some grand purpose to this complexity-building, as well as some significance to this moment in time, when our collective learning is amassing information at what feels like an overwhelming pace? Should or can we be taking clearer control of the process? If so, to what ends?

Collective learning is unique to humans, but it may not be exclusive to humans. Other species may pass information from generation to generation culturally and genetically, but no other species on Earth does so in the organized way that we do. Should we be paying more attention to the mechanisms that we build to filter and apply the data, which is the foundation of our learning? What we seem to be lacking are mechanisms that filter and apply the data in ways that benefit our species as a whole. To be sure, we have the market place and other components like the family, which sort and apply data as it emerges, but those mechanisms seem to be at best only a very poor actualization of the potential inherent in this process.

Two themes march together as we look at history through this new and more comprehensive lens. The first asks: are we the only beings in the Universe contributing to complexity-building as we are doing it? So far, we have no way of answering this question with any certainty. Physicist Enrico Fermi's question from the 1950s has never been taken seriously, other than by Carl Sagan and a handful of others, but it holds humans in a place so special in the Universe that I, for one, cannot imagine that we alone maintain this place. 'If we are not alone', Fermi asks, 'where then are the others?' (Davidson 1999: 346).

This is a perfectly reasonable question, since Big History and all the fragmented histories that have preceded it make clear that our galaxy and solar system is 'new', compared to other galaxies in the Universe. And now we are finding other solar systems that have existed for billions of years before ours was even born. This is ample time for other intelligent beings to evolve and contribute to complexity-building… and ample time to evolve to whatever level intelligent beings can evolve, which would include, one would think, the technical capacity to make their presence known to other species with whom they might communicate. But we do not find this. What we find, so far, is an eerie silence.

Some have taken the position that our species, and those like us, should they exist, are so inept that they destroy themselves before they connect with other such species in the Universe (Davidson 1999: 353). This was a theory bandied about during the last half of the 20th century, when the great powers stood with nuclear weapons as a mechanism for resolving conflicts, which seemed irresolvable at the time. A major point in our favour, regarding our competence to survive as a species, is that we did not take our species and our world down that road of nuclear holocaust. To be sure, we still have the option to do so, but mutually assured destruction is not very appealing to even the most determined 'war hawks', and nuclear weapons, should they be used again as weapons, will probably be used either by accident or on a small enough scale for much of the planet to absorb the impact.

An interesting variation on this theme of self-destruction has been suggested by Big Historian Akop Nazaretyan, who has proposed the 'Law of Techno-Humanitarian Balance'. This proposition states that the higher the power of war production and technology, the more refined the behavior-regulation needs to be for self-preservation of society (Nazaretyan 2004: 160). Nazaretyan builds on the work of physicist/biologist Erwin Shrödinger, which shows:

> …anti-entropy work can be done only by means of 'order consumption' from outside – that is, at the cost of the increasing entropy of other systems. In instances of abundant environments, open non-equilibrium systems increase the volume of their anti-entropy work, and expand as much as they can. Sooner or later, this exhausts the available resources, and as a result, a specific crisis in system-environment relations fol-

> lows… Crises of this type are called *endo-exogenous* in ecology. The system – an individual, a population, or a human society – runs against the unfavorable environmental transformations provoked by its own activity. Endo-exogenous crises, including all anthropogenic (technogenic) ones, play a special role in evolution. As previous anti-entropy mechanisms turn counterproductive – being fraught with catastrophic entropy growth – a bifurcation phase develops. If migration is impossible, there are only two further possibilities. Either the system turns back to equilibrium – that is degrades (which is named *simple attractor* in synergetics) – or diverges from that owing to the development of advanced anti-entropy mechanisms. The last possibility is usually caused by inner diversity and structural complexity, and a more dynamic world model with higher resolving power and sensible feedback (Nazaretyan 2005: 75–76).

From this perspective, all social systems face the potential of devastating crises in their 'system-environment relations', from which no previous culture may have survived intact. It is precisely those societies that are most highly invested in the production of war technologies that are most vulnerable to demise. Nazaretyan does, however, offer the possibility that more refined behavior regulation might allow for even their self-preservation. It would seem that such refined behavior for self-preservation would require an understanding of the stakes involved by the participants, as well as a capacity for the system to reorient itself more sustainably.

There may be some evidence that this is actually happening within human culture, and it may indeed be the role of Big History to encourage this self-awareness to take place. In this sense, our culture would then perhaps be at the leading edge of many such cultures that have evolved over the eons. We might then engage in the effort to enable complexity-building to proceed beyond the barriers that entropy places before it. This is a startling perspective, but not nearly as arrogant as the position that humans are the be-all and end-all of the Universe, or as pessimistic as the view that all human-like cultures inevitably destroy themselves.

More importantly, the second theme relates to human culture itself. Eric Chaisson and others point out that cosmic evolution is a collection of evolutionary phases – from rudimentary alteration of physical systems to Darwinian modification of life forms to Lamarckian reshaping of society – all consistently and fundamentally characterized, at least in part, by mass normalized energy flow (Chaisson 2010: 3). Chaisson has applied his metric of energy-flow density to cultural evolution from 300,000 years ago through the agro-industrial revolution 10,000 years ago, tracking progression in terms of energy rate density. In addition to the vast increase in mass normalized energy flow, we find an increasingly accelerated pace.

I would like to suggest that this increase in pace, as well as the slower tempo prior to 20,000 years ago, has much to tell us about who we are and the role our culture is playing, if only we are able to pause and appreciate that significance. Prior to 300,000 years ago, the use of stone and bone tools – along with the domestication of fire – are events most might agree on as to when they occur. Once advances of such proportion are made, they tend to spread rapidly, with the use becoming common wherever we look in the archeological record.

The tendency is to lump all our ancient ancestors into the category hunter-gather. This implies to the lay person, as well as many scholars, that these were small bands forever on the move, with little or no behaviors that we might de-scribe as 'advanced culture'. There is not a lot we can do to validate that obser-vation prior to 300,000 years ago, since what we know is very speculative. It is just as easy to draw erroneous conclusions as valid ones. And, in fact, it is probably only for half that time that we can, with some confidence, begin to see the symbols that we take for granted as a measure of sophisticated culture: art, music and language.

My point is that we have made lots of assumptions about how we have got-ten to where we are today, and that by reviewing those assumptions we might get a better appreciation of a pace that allowed Modern Humans and Neander-thals to live together peaceably for tens of thousands of years. For example, it was not possible for people to be on the move in winter in Europe 45,000 to 25,000 years ago. They had to have a sustainable village setting from which to prepare for and endure winter. So, year-around hunter-gathering was not an option if it is viewed as a small group being on the move as plants ma-tured. Clearly they stored firewood and food to survive winter and therefore were more sedentary than traditional views of hunter-gathering implies. How did they control population density for those thousands of years, or did the en-vironment do it for them? This is one of the many questions that arise as we look more closely at the evolution of culture and the pace at which culture has been evolving.

If Nazaretyan's law of techno-humanitarian balance is correct, then the need for behavior regulation to enable self-preservation was less at that time than what later became necessary to protect oneself from one's neighbor, even though a sedentary life, that most of us attribute to the era of agriculture, must have existed. Clearly, conflict between neighbors is a result of the surplus in-herent in the subsistence mechanism, not in the sedentary nature of village life. If firewood and food were sufficient to accommodate everyone prior to 20,000 years ago, as it must have been, since they survived, there was no need to be in competition and no need for war technologies. Previous advances in stone technology were not for killing each other, but rather for hunting or scav-enging and for enhanced security against predators. People like Nicholas Wade,

New York Times science reporter, would have us believe that our ancestors have been at war as far back as one can look (Wade 2006). If this is not the case, and if the only commodity that might have been scarce from time to time was fire, which lends itself to sharing rather than hoarding, since there is no advantage to having lots of fire, we may have a long period of peaceful co-existence in our history, prior to the period of violence we have had for the last 15,000 years.

What are the implications of that kind of history for dealing with the current pace of cultural evolution and the heavy investment in war technology? Is the pace of modern cultural evolution a product of our use of war technology to survive? Is the rather leisurely pace prior to 20,000 years ago a product of sustainability? Perhaps, the answer lies in a couple of major events that we can date with accuracy during the past 60,000 years – the expansion of our ancestors out of Africa and the development of sophisticated European cave art (Guthrie 2005).

In regard to the migrations out of Africa, there is a rather significant timeframe when our ancestors stayed in one place for tens of thousands of years in what is now France and Spain. Were they in conflict with each other? Probably not; at least there is little or no evidence in the archeological record to support that view. The European cave art is clearly dated at 32,000 to 12,000 years ago, an unparalleled recorded history, although we act as if recorded history only began with the printed word (Curtis 2006). In all that time, with the exception of the remarkable faces in the cave at La Marche in France, there are only four humans depicted in these caves; the rest of the artwork is of other animals, not humans. What does this mean? Were they trying to tell us something about a transition through which they were going?

I have written that confidence is the variable that allowed our ancestors to expand, as we have in the past 20,000 years, and that we were probably instrumental in the extinction of large mammals in the path of that expansion (Tierney 2002). Nazaretyan has written: 'Archeological, anthropological and neuropsychological data confrontation bring us to the conclusion that their survival was due to specific neurotic faculties' (Nazaretyan 2005: 76). Anthropologist Bernard Chapais believes that weapons allowed for greater equality between males and that general monogamy followed general polygamy, while psychologist Michael Tomasello suggests that cooperation gave humans our advanced culture (Chapis 2008; Tomasello 2009).

We are probably all correct and probably all wrong. The fact is, we do not know much about ancient social behaviors, especially what these people were thinking. The assumptions that we make are based more on the eyes we are looking through now rather than the eyes through which our ancestors viewed the world. Even our good friend David Christian only gives 30 pages to this period of our history, when the culture we now understand as critical in

the complexity-building process was being established and beginning to show a leap in the pace that now feels a bit frightening (Christian 2004: 171–203).

It is only very recently that we have come to understand that our cultural evolution is driving complexity-building… and we have no idea whether that is being done just by chance. The pace of this cultural evolution seems to be increasing rapidly, if we use 300,000 years as our base for a fairly sophisticated culture. The pace of change today is a challenge to keep up with. My grandfather, for example, was expected to take his son, if he was disrespectful to his mother, 'to the wood shed' (a New England expression for physical punishment that was traditionally carried out in the shack used to store firewood). Nowadays, my son would go to prison for doing the same thing. This is a big change in individual and social behavior over the course of a mere century, but one that is all but taken for granted.

Do we have the option to modify the pace? Are the prospective outcomes inevitable? We do not know. What we do know is that we have the option to acknowledge that human culture is driving an extraordinary process. We have the option to wonder together about what kind of outcomes might be best for humans, and consider what kind of things might most likely lead to those outcomes.

Big History is the vehicle through which we are becoming aware of the connection between complexity-building as the function of the Universe and the gathering of data that fuels our collective learning. So, it is appropriate that Big History facilitate our wondering together about all the questions inherent in our collective learning. Chief among those, in my opinion, is how we sort and apply data to best insure a sustainable future. Maybe students can help sort through information that emerges as fact, but may not be accurate, which is all too often the case once one is committed to or opposed to an idea.

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