



Postnormal Prometheus: How to anticipate and navigate postnormal times

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ABSTRACT

Despite being labelled as a theory of change, so far, postnormal times theory has only offered a broad explanation of why and how change happens in postnormal times. It has merely stated that it is the joint action of complexity, chaos, and contradictions (the postnormal factors) what prompts postnormal change, but has not produced a more thorough explanation of its development. This has made postnormal times to be perceived as unavoidable or fated. This article uses the simile of Prometheus, the classic titan, to determine up to which point postnormal times are truly ineluctable. Accepting that the three postnormal factors need to act jointly to cause postnormal change but rises in complexity appear to act as a catalyser. So, to have an operative way to estimate these grows in complexity levels, the article proposes to break down complexity into concurrency and connectivity. Both parameters can be measured much more easily and provide a workable way to measure these rises in complexity. Ultimately, the goal is to develop an approach to better understand postnormal change and to anticipate it. Thus, by improving our capacity to comprehend and foresee postnormal change we will also enhance our capacity to navigate postnormal times.

For I possess a detailed knowledge of what lies in store before it happens- none of my tortures will come as a surprise. I must endure, as best I can, the fate I have been given, for I know well that no one can prevail against the strength of harsh Necessity. And yet it is not possible for me to speak or not to speak about my fate

Prometheus Bound - Aeschylus

In Aeschylus' *Prometheus Bound*, we find our hero, Prometheus, chained to the rock, condemned to perpetual punishment, lamenting the torture that lays before him. Necessity, for Prometheus, is the inevitability of what is to come; his future is sealed by the fate he has been given; *no one can prevail against the strength of harsh Necessity*. Life, for Prometheus – who sacrificed himself for the advancement of humanity - is to turn one over to one's fate; to live is to give oneself over to the whims of destiny. Indeed, it is this predilection for the inexorability of fate that became the basis for Greek tragedies. In this regard, Prometheus is an example of a shared conviction among ancient Greeks, that everyone was subject to destiny by the rule of *Moirai*, the three goddesses of fate. They were, *Clotho*, the spinner, who spun the thread of life; *Lachesis*, the allotter, who would assign everybody's lifetime; and *Atropos*, the 'unturning', who cut the thread of life at its end. Even the gods would be subject to the destinies of the *Moirai* as well. But of all the tragic heroes, it was Prometheus who was the most poignant in his contemplation of the preordained. Originally a Titan, Prometheus was

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able to foresee that in the forthcoming war between Gods and Titans, the Gods would have the upper hand. Prometheus, rather than resign himself to be a victim of fate, decided to join Zeus, convincing his brother, Epimetheus, to do the same. Prometheus had an unquenching thirst for knowledge and convinced the Gods to teach him all sorts of sciences and arts. By all accounts he took a key interest in the change that was happening around him - we might even call him the futurist *avant la lettre* - and envisioned a future where humanity would inherit the Earth. So, Prometheus began to teach humankind and even bestowed on them the gift of fire. Zeus, who despised humans deeply, was enraged by Prometheus' love for humanity and plotted revenge against him; he created Pandora, the most beautiful and fickle woman, to marry Epimetheus. But, Epimetheus, already suspicious of Zeus' true intentions, respectfully declined. That angered Zeus even more; he ordered Prometheus chained to mount Caucasus and sentenced him to endless torture: every day a vulture would go to eat his liver, only for it rejuvenate every night and the torture to start anew.

So here we find Prometheus, shackled to a rock on mount Caucasus, bemoaning his own foolishness. He believed that his deeds, no matter how heroic, were inconsequential; his fate and that of humanity were already destined by the *Moirai* and there was nothing he could do about it. Even Zeus' part in the story was also preordained and the ascent of humankind was beyond his almighty reach. That he was chained to the rock was irrefutable proof that fate is inexorable and inescapable and that, once *the wheel of spinner* is set in motion, the only choice left is to accept one's destiny with nobility.

Since its earlier characterization as a theory of change by Sardar (2015), postnormal times theory has emphasized its focus on human agency. Postnormal times may be challenging but they are not fated; and yet they are often perceived as ineluctable. In this regard, Prometheus offers a useful analogy in addressing this question of inevitability; namely, whether postnormal times are inevitable. Judging from his actions, we can say that Prometheus was sage in his capacity to anticipate change and, most importantly, understand how change would unfold and act correspondingly. First, he figured out that the conflict between Titans and Gods was coming and concluded that the Titans' time was up and thus joined the God's cause. Not only that, but he was also able to trace long-term shifts and see that humans would eventually inherit the Earth. More to the point, once he understood the logic of change, he began to plan how to best navigate that transition: he improved his knowledge and passed that knowledge to humanity; he collected all manner of potential threats for men and bottled them in a jar (the famous Pandora's jar¹); he took great risks to give humans fire, ultimately causing his own demise. Therefore, and considering all this, we are left to wonder if Prometheus really believed in fate or if he was emblematic of emergent Greek philosophy of the time - creating one's own destiny.

I prefer to think that Prometheus comprehended that a big transformation was coming, and, because of this awareness, made plans for the course that most enhanced the chances of his preferred future. Nonetheless, I can argue that he managed to grasp the signs that indicated the end of a system; and in those moments of transition, many unexpected things can happen. Like in postnormal times when you can be sure that there will be change, but you will be highly uncertain of where that change will take you, something that Sardar noted when he first introduced the notion of the postnormal condition: "the particular mode of being and existence we find ourselves in (...) which leads us towards uncertainty and ignorance." (2015: 29). Prometheus probably understood this too as he applied a common futurist approach, to try to account all known alternatives:

Then I invented arithmetic for them, the most ingenious acquired skill, and joining letters to write down words, so they could store all things in memory, the working mother of the Muses arts (Aeschylus).

His actions show that he accepted change and tried to navigate that wave of transformation in the direction he deemed as best. His decision was ultimately costly, a notion that resonates with us because, as Funtowicz and Ravetz have established, in postnormal times the "stakes are high" (1993: 744)

In the face of the tide of change in which we are already immersed, we must reflect if we are to possess the wherewithal to avoid, alter, or manage that which is to come. Modernity was rooted in the belief that humanity can control the world around us; create certainty where there is uncertainty. Consequently, Inevitability seems to have an ominous connotation, it feels esoteric or anti-science, traditional or whimsical. Western society, in what Beck calls a *risk society*, tends to reject inevitability if nothing else by its capacity to estimate in advance the probability and impact of different risks. Taking risks are "a systematic way of dealing with hazards and insecurities" (Beck, 1992: 21). We can speculate if the fact of being left without a choice seems unfitting and suggests an abandonment of hope. But the analogy is there, we are also chained to this big rock called Earth. From a postnormal perspective we can argue that what seems inevitable may just be our inability to comprehend what is happening. And this is precisely one of the founding features of postnormal times "an in-between period where old orthodoxies are dying, new ones have yet to be born, and very few things seem to make sense." (Sardar, 2010: 435). Therefore, the need to determine if postnormal times are avoidable in the first place.

But to be able to discern if postnormal times are avoidable, first we must de-code the ways in which postnormal change is brought about. Is it provoked by a particular triggering mechanism? Or is it more a case of the conjunction of several elements acting jointly? Or simply the natural consequence of some evolutionary process? Depending on the answers we will be in a better position to determine if postnormal times can really be avoided or prevented. Let us begin with the first query, how do postnormal times start?

Well, definitionally it has been argued that for postnormal times to transpire we need the intervention of the postnormal factors; a set of elements that actively and jointly contribute to the advent of postnormalcy. These factors are complexity, chaos, and contradictions, for short, the postnormal Cs. Sardar first stated the centrality of the three Cs in *Welcome to Postnormal Times* (2010) and expanded it later in *Postnormal Times Revisited* (2015). Serra also confirmed it in two applied contexts, governance (Serra, 2014) and intelligence (Serra and Sardar, 2017) and recently Covid-19 proved to be a good case study to further develop the centrality of the three

¹ What Pandora originally opened was a jar, not a box. See Robert Graves' "Greek Myths"

Cs (Jones et al., 2021). The consensus is that the essence of postnormal times is the progressive and inexorable convergence and overlapping of these factors. It is important to stress that no factor, on its own, can trigger postnormalcy which comes about from cumulative factors.

If we accept that the Cs are factors of postnormal change and that all of them must be involved to prompt postnormal change, the next issue to address is how this occurs; how do the factors trigger postnormal change? Following this thread, we need to acknowledge that complexity is not new. Indeed, evolution's advancement entails rises in complexity. In 1832 Charles Lyell wrote 'Principles of geology'.² Where he stated that "if we examine the whole series of known animals, from one extremity to the other, when they are arranged in the order of their natural relations, we find that we may pass progressively, or at least with very few interruptions, from simple beings to those of a more compound structure; and in proportion as the complexity of their organization increases, the number and dignity of their faculties increase also." (Lyell, 1832: 11). Given that this volume was part of the Beagle library is not difficult to guess why Darwin also supported this notion that evolution implies growths in complexity. And there seems to be extensive evidence of this: we can see in nature the transition from basic particles to sophisticated molecules; from single-cell organisms to multicellular colonies; and a similar sequence can be found in human phenomena, from nomadic clans to structured empires; from oral tradition to the Internet. As Huston puts it "Like all evolving systems, our sociopolitical system increased in size and internal complexity through Darwinian adaptation to the increasing complexity of its co-evolving external environment." (2005: 38). However, McShea pointed out that, in many cases, the correlation between evolution and complexity seemed to be more self-evident than demonstrated (McShea, Daniel W. (1991)). One of the problems here is how to assess that complexity increases as a given system evolves. Arthur came up with a way to tackle this by proposing three mechanisms in which evolution may prompt complexity. The first one is "coevolutionary diversity where complexity surge take place in the form of greater diversity and a more intricate web of interactions that tends to bootstrap itself upward over time." (Arthur, 1993: 3). The second mechanism is *structural deepening*, and it is the one used by single entities that manage to improve their performance in extreme or exceptional circumstances by adding to their structure depth or design sophistication; technological evolution frequently follows this path. Finally, the third mechanism is *capturing software*, that happens when in a context of emergence complexity, a system can take over the findings of external systems; like grammar, that captures what a language users' community is already using as elements with shared meaning. All and all, the three mechanisms add consistency to the notion that evolution implies higher levels of complexity and provide a more operative way to measure these increases. But, if evidence suggests that complexity has been growing all along, it cannot be the singular triggering element that would provoke postnormal times.

And similar conclusions can also be drawn about chaos, even if we accept Wiesner and Ladyman's proposal that non-linear behaviour seems to be a by-product of growing complexity. Chaotic systems, like climate, have been around for eons. Hence, chaos alone cannot be what enables postnormal change (Wiesner and Ladyman, 2020). However, it is also undeniable that the shift from normal to postnormal involves an increase in both complexity and chaos. Indeed, the more complex a system becomes the greater the probability of that system behaving in a non-linear way. Therefore, growth in complexity and chaos appears to be something that needs to happen to achieve postnormal times. But this only begets another question, how can we detect or, more to the point, measure a rise in complexity or chaos?

Let us start with complexity. Etymologically, complex comes from Latin *complexus* the past participle of *complecti*, meaning to embrace or to encircle, but *complexus* is usually translated as encompassing or surrounding. This points us to two of the most important features in complexity: a multiplicity of elements that somehow are together or related. Yet, this multiplicity requires another feature, these elements must be discernible somehow. So even if we are considering a group of the same kind of elements, a flock of birds, it is necessary that we can distinguish each bird individually, if nothing else, by the minor variations in their flight. In other words, the presence of many elements becomes only a constituting feature if we can recognise each of them separately. That would indicate that repeated uniformity would not result in complexity, or not in the same degree, as diverse multiplicity does. The second feature is the connection between the elements. In the case of the flock, the fact that the individual birds are of the same species and cooperate to enhance their individual and collective safety by flying in a coordinate manner within the flock.

But multiplicity alone does not capture complexity, that seems to be a difficult concept to define. The journal *Science* devoted its issue 5411 to complex systems and the diverse contributing authors provided different definitions. Some emphasized the necessity of having multiple elements interacting in diverse ways, like Rind (1999) and Arthur (1999) (a feature that would reinforce the critically of multiplicity); others however, focused more on how these elements and interactions would end up developing some sort of structure or patterns, in this group we have Goldenfeld and Kadanoff (1999) or Parrish and Edelman-Keshet (1999); Werner (1999), on the contrary, highlighted the non-linear quality of complex phenomena; and finally Wengupinder, Bhalla, and Lyengar (1999) noted how complicated and unintelligible complexity is (something that it is not really helpful for our purposes). Prior to the *Science* issue, Sardar and Ravetz (1994) encountered a similar problem when editing a *Futures* special issue devoted to complexity and also provided diverse definitions. Yet, Funtowicz and Ravetz (the coiners of the postnormal category) added something relevant in their article *Emergent Complex Systems*: basically, that complexity foregoes the notion of control and certainty in science making dialectic thinking and the use of contradictions a key issue. As Sardar expressed it "Contradiction expresses a general heuristic, a way of looking at the world, which encompasses complexity, change and conflict as natural and essential." (Funtowicz & Ravetz, 1994: 6).

More recent attempts to describe complexity label it as a phenomenon. Wiesner and Ladyman (2020) proposed that "Complexity is a multi-faceted phenomenon, and complex systems have a variety of features not all of which are found in all of them." (2020: 1). And then they proposed a distinction between conditions for complexity that include: numerosity of elements, numerosity of interactions,

² The whole title was *Principles of geology, being an attempt to explain the former changes of the Earth's surface, by reference to causes now in operation*

disorder, non-equilibrium (openness), and feedback; and products of complexity that are the emergent properties that arise from the interaction of the previous conditions. Products of complexity include: nonlinearity, self-organisation, robustness of order, nestedness, robustness of function, adaptive behaviour, modularity, and memory. It is a rather long list, but we must keep in mind that Ladyman and Wiesner began by stating that not all complex systems show all these features (Ladyman et al., 2013). Yet there is something relevant for us, the more complex a system becomes the more likely that it will behave in a nonlinear way. This means that the effects or outputs of the system will increase faster or slower than the causes or inputs. But it also confirms that if we want to decipher the triggering mechanism of postnormal times we have to focus on complexity. For the purposes of the original quest, how do the post-normal factors trigger postnormal change? The fact that non-linearity may be a natural by-product of higher levels of complexity makes finding a way to measure growth in complexity even more relevant.

Yet, and given that complexity has an inbuilt tendency to grow, we need to ponder if there is a particular reason that causes growth in system complexity and, consequently, chaos to take that system to a postnormal level.

I propose to use the notions of connectivity and concurrency to offer a workable way to measure this increase. Both have been involved with postnormal times since the beginning. Sardar made it very clear in *Welcome to Postnormal Times* (2010) that present day complexity cannot be understood without the current level of interconnectedness and globalization. He refused to give these features the same rank as complexity and I respect his choice to keep the alliterated C's to a maximum of three. However, connectivity and concurrence may provide a way to identify and process concrete changes and surges in any aspect of complexity, not just the number of elements and/or connection, also the internal differences. I have noted that inner variance is important to bring about emergence; and the more dissimilar these elements are the more complex the system gets. Think of a herd in an African savannah; if it is just one species, wildebeests, the inner difference and the complexity is not incredibly high. However, if zebras are added, there is a more complex herd that can exploit the territory resources better and can put up a more robust defence against predators³; effectively becoming an example of Arthur's *coevolutionary diversity*. What I propose here is that concurrency should be used not just to enumerate or identify upturns in the number of elements, but also in their internal disparities. Which also means that, for postnormal purposes, inner difference is more relevant than mere multiplicity.

For instance, if one analyses the initial stages of Covid, the fact it started in China, during the Chinese New Year, is a key element. China is possibly the country with the largest diaspora. All those Chinese going home for the holiday, some from remote places, generated concentrations in homeplaces that gave the pandemic momentum. The fact that many had to return to their current residence allowed for the virus to spread even faster. It appears that the coincidence of the new year's celebration resulted in a significant rise in concurrency in some places, like Wuhan. Yet, the fact that many visitors returned to different countries with diverse regulations and strategies was one of the factors that explains why the effects varied so much in different countries. So, it is not a question of just registering the growth in seasonal population in some places, but also to account for the other elements (return destination, transport or even duration of the visit). These differences, no matter how small, kept adding levels of extra complexity that made, and make, the pandemic such an intricate issue to address.

Likewise with connectivity. As a subset of complexity, whether it is structural (interconnections) or cultural (globalization), it provides an operational element that can be developed to better pinpoint and process increments in complexity. The more diverse connections that can be identified in a complex phenomenon, the more complex it will become. Not only that, if the dissimilitude among its components grows it will also require a surge in types of connection. Returning to the Covid example, it is quite clear that an infected family travelling back together in one vehicle gave the virus less opportunities to propagate than the same family in a coach or a train, and clearly less than in an airplane, where the closed air systems ensured that the virus would reach all the people in the cabin. If that family returned to places that applied quarantines or not, it generated another variable, if the family had access to a good health system at their destination, so on so forth. And finally, one cannot ignore that nowadays everything is mediated by overexposure to social media. The constant barrage of inputs, including misinformation and infoxication, has added layers of connections and complexity as the pandemic has proved.

I do not wish to imply that the presence of more internal components and/or connections will automatically result in that system becoming more complex. Complexity is a far more multidimensional endeavour. I am just trying to find a practicable way to identify how a postnormal event starts; and, unlike emergence or self-adaptivity, concurrency and connectivity offer a workable way to assess the rises in complexity that result in postnormal phenomena. If a system has more elements (and they are more varied), or more communication channels, or better communication flows are all questions that can be measured or corroborated empirically. Given that they are conditions for complexity, they can be interpreted as the first indication of growing complexity and the generation of a potential threshold for postnormalcy.

But if one is dealing with complex phenomena, (meaning that one already knows that they were complex), one cannot forget that the potential to become postnormal was already there. In these cases, any increase in its concurrency or connectivity may prompt a sudden jump to postnormal. That of course begs the question of how do we recognise complexity? Judging from the previous definitions that may look like a difficult enterprise. However, there is a feature that indicates with high probability if we are in front of a complex phenomenon or not, emergence. According to Heylighen, "Emergent properties are properties of a whole that cannot be reduced to properties of the parts." (2018: 30). One of the best examples is any living being. Being alive is an emergent property of its body. One can divide the body into its constituent parts, from organs to molecules, and none of them can survive individually. Only when these different parts are arranged in a particular manner a body can live, this implies that self-organization is connected to

³ While zebras eat the taller grass, wildebeest focus on the short one; zebras have a better eyesight and wildebeest a better hearing. Not only that, as both species like to be on open savannahs, forming larger joint herds increases the safety in numbers.

emergence. Thus, if the system we are considering shows emergence we know for sure that it is complex and any rise in its constituting elements or internal connections will generate an opportunity for postnormalcy to set in. And these surges can be provoked by a wide variety of causes: in the case of connectivity, it may be the invention of a new communication technology (i.e., the print or the World Wide Web), the creation of better communications infrastructures (the Transcontinental railroad or the Channel Tunnel); in the case of concurrency, it can be brought about by a demographic expansion due to rise in fertility rates or to a big migration. Whatever its origin, the expansion in connectivity and/or concurrency can be the first indications of a rise in complexity. Thus, Complexity's growth will trigger an increase in another postnormal factor, chaos. As Wiesner and Ladyman have already stated, nonlinearity is the first product of a complex system. And this is precisely why dealing with already complex systems or phenomena is tricky, even minor rises in concurrency and/or connectivity can trigger sudden and deep leaps to postnormalcy precisely for the intervention of the chaos factor.

At this point, if there is evidence of growths in complexity and nonlinearity, we only need to identify another factor to confirm that the phenomenon is going postnormal: contradictions. Contradictions are a critical factor, as they highlight one of the core traits of postnormal change - its qualitative nature. If we go back to Sardar's seminal definition of postnormal times, the "in-between period where old orthodoxies are dying, new ones have yet to be born, and very few things seem to make sense" (2010: 435), we can see that his inference was that postnormal times is fundamentally a paradigm shift. Namely, mere incremental change does not bring about postnormalcy. And contradictions prove this. Quantitative developments alone produce a kind of change that does not challenge the hegemonic paradigm; as a matter of fact, paradigms are designed to explain this kind of change and, logically, incremental development is consistent with the standing paradigm. The kind of contradictions I am talking about suppose a discrepancy that the paradigm will not be able to resolve; because it defies the model the paradigm is based on. Or as Sardar puts it "Contradictions may be paradoxical but they perform a very useful function. They provide us with a perspective which prevents oversimplified analysis of problems or situations. We are forced to consider clashing trends, viewpoints, facts, hypothesis, and theories and realise that the world is not amenable to naive one-dimensional solutions." (2010: 440). Thus, it is exactly the fact that the prevailing paradigm is incapable of settling these emerging inconsistencies that make us realise the postnormal nature of the change we are analysing.

Contradictions are a clear indication that postnormalcy generates the sort of discord that cannot be reconciled within the existing paradigms. I believe that all this is the consequence of the upswing in connectivity, concurrency, complexity, and chaos that, jointly, generate a new kind of situation that the current epistemology cannot fully comprehend, let alone manage. However, one would be mistaken to conclude that contradictions are just the result of the enlargement of other Cs. On the contrary, once they begin to pop up, contradictions become major agents in the generation of further postnormalcy. And all these Cs together end up boosting the chaos level which, in turn, allows for sudden, simultaneous, and unpredictable shifts. At this point, there can be no further doubt that the postnormal development has already gone beyond the point of no return. Conversely, we could say that without contradictions it would be much more difficult to know that we have surpassed those thresholds in complexity and chaos development. If we accept that postnormal times are qualitative change, we need something to differentiate quantitative growth from qualitative change. Contradictions do indicate this kind of shift.

And this is why it is important to consider the relevance of the epistemological aspects in all this process. Particularly, because postnormal times is about deep transformative change. Either from a systemic point of view, where postnormal times could be seen as the equivalent to a system reaching a transformational break (Huston, 2005) or, from a Chaos theory perspective, where it could qualify as a bifurcation (Heylighen, 2018), I can conclude that postnormal times will bring about a big transition. However, it may be that initially the increase in the triggering Cs, connectivity, and concurrency, are not especially challenging for the current hegemonic paradigm. Yet, like the proverbial frog in the pot that does not realise that the water is getting warmer, growing levels of complexity will test the solidity of the paradigm. But only the eruption of contradictions will mean that contending perspectives, worldviews, if not paradigms, begin to appear. At that moment, the inability of the hegemonic paradigm to transcend these contradictions will be the first undeniable sign that a postnormal change is underway. The increase of unexpected simultaneous events, in frequency and/or impact, will confirm the build-up in chaotic behaviour and the failure of the hegemonic paradigm to make sense of postnormal change. The risk here is to believe that long held ways of knowing and understanding will still provide the answers to the puzzles generated by the new challenges when the situation is actually asking for a new paradigm.

This takes us back to the need to consider both the ontological and epistemological aspects of any given phenomenon when applying postnormal times theory. This is the postnormal condition (Sardar, and Mayo, 2015, 2020). If we accept that the essence of a postnormal change is a journey towards a paradigm shift, we must concede that, while navigating that change, we may experience all sorts of epistemological hurdles. We will be required to look toward alternative ways of knowing and understanding to be able to deal with the emergent challenges that postnormal change pose. In this sense, the postnormal condition drives us to deconstruct and rebuild traditional epistemological frameworks. Thus, we must engage in deciphering the novel, surface, reality while developing fresh intellectual tools better attuned with the emerging reality. However, this may be particularly challenging due to the intervention of the Manufactured Normalcy Field (MNF) (Rao, 2012). The MNF continuously works to subsume whatever we may perceive into the framework of the old paradigm; in other words, the MNF will try to reaffirm the perception that the emerging reality is not so new and/or it can be decoded using the old paradigm tools. It is an exercise that can be symbolised by the analogy of the firefighters fighting a house fire with their standard equipment hose and fire truck, only to discover that the house's fire is a chemical one, meaning the water only acts as an accelerant. The energized fire moves then to a neighbouring house, adjacent park land and, essentially, gets out of control rendering the firefighters and their equipment incapable of putting out the fire. Therefore, the postnormal condition is dogged by uncertainty and ignorance; we keep sending the firefighter to fight the fires. With postnormal times theory we are reminded that, to navigate a postnormal change, we will have to go through existing knowledge to build new knowledge. The same way we went through analogic before getting to digital; or just like we mastered Newtonian physics before tackling quantum mechanics. In both cases, the old cannot explain the new, but are vehicles to get us to the new.

All this also means that, in postnormal times, we may not be able to see the full extent of the change occurring in front of us. And this is precisely why in postnormal times theory, we use a twofold approach to fully understand change. We need to address the ontological plane to try to capture, as best as we can, what is happening and, at the same time, we must include the epistemological plane to analyse how we are making sense of what we are capturing. Still, as the transformation progresses, both planes will experience different effects and will require from us the capacity to tackle this transformation in different manners, sometimes sequentially, sometimes simultaneously. This interwoven double development of change is the postnormal creep (Jones et al., 2021). And we also know that the MNF will try to diminish or conceal the full extent of a creep by fooling our mind that whatever is taking place can be dealt with the old paradigm. Given our brain's main directive is to save energy, the MNF often succeeds and causes a postnormal lag: "the perceptual condition of denial;" denial despite overwhelming evidence to the contrary (Sardar & Sweeney, 2016: 5). As the lag disavows change, despite change; the postnormal creep indicates the multiple nature of postnormal. Yet, once the creep has started our inability to catch up on the epistemological plane will not deter the process on the ontological one. The creep will carry on progressing to a point in which the postnormal character of the change will be revealed in, most of times, a shocking way (Mayo, 2019).

What comes next is a bombardment of rapidly shifting agendas, legislations, messages, and norms; chaos – ontological and epistemological. To move through the postnormal condition is to embark in the dual analysis, of using the ontological variances to challenge existing epistemological structures, and then, return to actual change using new theoretical tools and restart the process again; what Jones describes as "a myriad of ontological and epistemological streams that feed a global ocean of shared/conflicting meaning." (Jones, 2022: 45). This speaks further to the process of going 'through' existing knowledge to build new knowledge; what remnants of the past can we rescue to help us make sense of the change now and what new knowledge do we need to create to fill in the gaps. Nonetheless, as mentioned, the MNF often leads us toward the lag; often but not always. The recent Covid-19 pandemics offers a good example of this, while many stated that SARS-CoV-2 was only provoking a new kind of cold, a few realised that it was much more than that, like the late Doctor Li Wenliang who was able to foresee the emerging threat in December 2019 (Green, 2020). But only a fraction of the later understood the shock wave that Covid was about to be. That is to say that the lag can only set in if the MNF operating paradigm is not challenged. Once individuals or communities began to question the conclusions offered by the hegemonic paradigm it is possible to start looking for contending emerging paradigms. We call this state of awareness the postnormal tilt (Jones et al., 2021).

This, however, does not provide an explanation regarding how the creep starts. I have already proposed that the mere presence of the C's, by itself, cannot trigger postnormalcy. Postnormal times imply higher levels of them; hence, I must conclude that there must be some sort of thresholds that, once surpassed, activates the movement of a system toward a postnormalcy. This is also what ecology has taught us: quantitative changes can lead to qualitative ones.⁴ And, given that I have already stated the relevance of the epistemological dimension in postnormal changes, I can conclude that the ineptitude to recognise those thresholds may be an additional pull for postnormalcy. Further, and maybe more relevant, our ineptitude to recognise our own ignorance in the face of emergent postnormal change, increases, and speeds the impact of postnormal change.

This takes me back to the question of the inevitability of postnormal times. Before that though, it must be stressed that identifying the advent of postnormal times is one thing, and to assume that they will lead to a particular outcome is quite another. Postnormal times is the notion Sardar coined to describe the big transitional change we are experiencing. However, he was very careful not to imply any particular outcome from them; or more accurately, he has not inferred that the application of postnormal times theory will lead to a concrete result. I concur. As Sardar himself noted, he was not alone in recognizing the uniqueness of our epoch (Sardar, 2017). As a matter of fact, there is a long list of authors that have elaborated similar ideas; all agreeing with the notion that we may be going through a big transition. To name a few: Bauman's (2007) 'Liquid Time', Friedman's (2010) 'Global Weirding',⁵ Colville's (2016) 'The Great Acceleration', Curtis' (2016) 'Hypernormalization', Crutzen and Stoermer's (2000) Anthropocene, Han's (2015) 'The Burnout Society', Bridle's (2018) 'The New Dark Age', Hallam's (2019) 'Extinction Rebellion', Zuboff's (2019) 'The Age of Surveillance Capitalism' or, quite fittingly, Fraser's (2019) 'The Old is Dying and the New Cannot be Born'. Even the latest updates to the Doomsday Clock denotes that we are reaching a turning point.⁶ The one thing they all point to is that we are going through a deep model transformation. They differ in how they have noticed it, or on the features and the causes, but they all agree that things will be deeply different after this process. Sardar was led to similar conclusion after fifteen years as Editor of *Futures*, during which he had the opportunity to review numerous contributions to the journal. *Welcome to Postnormal Times* was not only his distillation of all that work but also his realisation that futures studies was increasingly out of sync with what was going on. The article also presents Sardar's case of why futures studies, as a discipline, needs a profound overhaul or else risks becoming a zombie discipline like Mayo and Miah (2021) have theorised.

But wondering if postnormal times are inevitable when you have already crossed the threshold is futile. It is like wondering how to avoid a landslide when you are already rolling down the slope; at that point you need to focus on how to make it through. But, so far, we have not been very good at navigating postnormal creeps. There are some cases where some of actors involved in a postnormal creep have tried to reduce one of the factors to halt the creep, only to find out that the other factors have carried-on progressing. For instance, Turkey was able to dodge the Arab Spring contagion by shutting down the main social media; yet it finds itself more and more

⁴ A continued extraction of water from a lake is a quantitative or incremental change, but if it ends up drying up the lake it results in a qualitative change as the lake ceases to be and becomes dry land.

⁵ It must be noted that, although Friedman was the one who popularised the label "Global Weirding" it was coined by the Rocky Mountain Institute co-founder Hunter Lovins.

⁶ The Doomsday clock updates can be followed here: <https://thebulletin.org/doomsday-clock/current-time/>

entangled with the effects of Arab Spring in Syria, Libya and Kurd controlled territories (because complexity finds alternative ways to expand). Even the case of Syria, that some consider as an example that the creep can be stopped since Bashar al-Assad has managed to remain in power; still, we can wonder if by his action he may have forfeited the country's future in a deeper creep. In any case, what I do know is that, once a postnormal creep starts, it is unstoppable. Even so, how we deal with postnormal change, inflicted by the postnormal condition, will determine where this transformation takes us.

I was trying to determine how postnormal times start. I can conclude at this point that it is because a significant rise in complexity, something that, in turn, results in more nonlinear behaviour. However, the mere growth in complexity and chaos are not enough to bring about PNT. This growth must take the system or phenomenon to a situation in which it is no longer capable of accepting, understanding, or integrating the new context. That point or threshold will indicate that the system has been pushed beyond its complexity tolerance limit and contradictions will begin to arise. The irruption of contradictions will signal the irrevocable entrance in a postnormal state and will also boost the creep.

It is important to add here that a creep can be very fast and condensed, generating the perception that all happens at the same time. Yet we can try to anticipate these kinds of changes by monitoring increases in the levels of concurrency and connectivity that will indicate the complexity upsurge. In this stage it will be particularly relevant to analyse not only the increase in the number of elements and/or connections but also in their inner differences (as signs of coevolutionary diversity). The growth in nonlinear behaviour will add further indication of the passage towards postnormalcy. However, it will only be the presence of contradictions, that cannot be resolved with the hegemonic paradigms, structures, or knowledge, what will confirm the postnormal character of the changes we are analysing.

And all this means that the starting question about if postnormal times are inevitable is irrelevant. If I am right, and postnormal times are big systemic changes, yes, of course they are. Nothing in the universe seems to be free from the cycle of birth, development, and death (even the universe himself); postnormal times could just be the transition through major transformations, like the one we are experiencing. But ineluctability is not the key feature here, the lesson we can learn from Prometheus is that it is one thing that something is inevitable and a totally different one to be powerless about it. The purpose of this article has always been to strengthen human agency in the face of postnormal change. And, right now, our best chance is to improve and deepen our knowledge about creeps. If we want to have a better chance at navigating them, we need to discover under which circumstances the creep speeds up? Or, more to the point, how can we facilitate tilts? Or reversely, how can we avoid lags? The more we understand the role of concurrency and connectivity in triggering higher levels of complexity, chaos, and contradictions, the better equipped we will be to navigate postnormalcy. Because here is where Prometheus was wrong. He foresaw the big shift. He could even notice how the emergence of humans was increasing the concurrency and connectivity of the ancient world. But Prometheus did not understand the postnormal nature of the change he was facing, qualitative more than quantitative. And that is why he did not realise that the knowledge of gods, the old orthodoxy in Sardar's words, was not only unfit to navigate the incoming transformations, but also the main cause of his demise. The emerging world was that of humanity and required new human knowledge where fate was not the main driving force. By resorting to old knowledge, he mistook ineluctability for predetermination. He assumed that he only could do what he did and, even worse, that his actions were inconsequential to alter the preordained destiny. And thus, he renounced any possibility of modifying the outcome or, more importantly, his own situation. Still, even in his fall, Prometheus gave us a last lesson, failing systems - old orthodoxies - do not go down easily and will lash out. Moments of big transitions allow for new orthodoxies to emerge but also for big destructions to happen.

In the end we may have to accept that we are chained to this rock called Earth. And that we have certainly been instrumental in generating our current predicament. But postnormal times is not an inescapable fate, a punishment, we still have options and interests. If nothing else because the stakes are higher than ever. To navigate postnormal times we need to improve our comprehension of the turbulence ahead if we are to set course to a safe port. Any other alternative is a lot worse.

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