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The Three Tomorrows of Postnormal Times☆

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ABSTRACT

The Three Tomorrows of Postnormal Times is a new method for foresight and futures researchers and practitioners. Designed and developed to explore the complexity, chaos, and contradictions of postnormal times and what might come next, the three tomorrows method uses a multi-layered approach to situate and analyze trends, emerging issues, and imaginings of the future(s), including complex, horizonspecific forecasts. In this paper, we provide a theoretical overview of the key concepts underlying our approach, including the three forms of ignorance and uncertainty as well as the Menagerie of postnormal potentialities, which we developed as a mechanism for challenging deeply held convictions, illuminating entrenched contradictions, and enlivening novel considerations.

1. Introduction

'Everything changes and nothing stands still'. So said Heraclitus, as reported by Plato in *Cratylus*(402a), over two millennia ago (Sedley, 2003). But nowadays everything is changing at an accelerating pace on a variety of scales: social, political, cultural, technological, including geologic, as the emergence of the notion of the Anthropocene (Crutzen & Stoermer, 2000) or the more radical concept of the Technopocene (Berthon & Donnellan, 2011; Sweeney, 2014) suggests. On a smaller, yet interrelated, scale, the very idea of what is the human body and what it means to be human is changing in ways seemingly beyond our control and capacity to comprehend the implications for what might lie ahead. As Enriquez and Gullans argue in *Evolving Ourselves*, we are intentionally and unintentionally changing the very conditions of possibility for evolution. While we have always adapted our being-in-the-world through artefacts, tools, and prosthetics, the compounded effects of our all-too-modern lives have ushered in an era of '*unnatural selection*' and 'non-random mutation' (Enriquez & Gullans, 2015). Globally, rates of obesity in humans nearly doubled from 1980 to 2014 (World Health Organization, 2015). In the U.S. alone, the rate of autism rose by 119 percent from 2001 to 2010 (Centers for Disease Control and Prevention, 2015).

Moreover, the changes we are facing today are not incremental and isolated but occur simultaneously and are connected and interconnected. Often when these changes come together they create a sense of crisis, as noted by the UN Secretary General, Ban Ki-moon. 'The world', he declared at the UN General Assembly in 2014, was 'living in an era of unprecedented level of crises' (Borger, 2014). The world faced a daunting list of crises – which ought to be read chaotic behavior – in 2014: Ebola, ISIS, Central African Republic, Gaza, Iraq, Myanmar, South Sudan, Syria, Ukraine, financial instability within the EU, and the deteriorating relationship between Russia and the West, in addition to the long-standing, and decidedly unaddressed, problems of climate change. What does it all mean?

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All of the above adds up to a snap shot of our lives in postnormal times (Sardar, 2010, 2015). In light of such far-reaching, rapid, and simultaneous changes – a major characteristic of postnormal times (*hereafter* PNT) – an important new question arises for futurists and foresight researchers and practitioners: are existing methods able to cope with futures that are intrinsically complex, chaotic, contradictory, uncertain, and rapidly collapsing in and upon themselves? Traditionally, Futures Studies deals with plurality of alternative futures by differentiating between plausible, probable, possible, and preferable futures (Henchey, 1978, p. 26). But what is probable in a world where uncertainty and chaos is the norm? What is plausible in futures dominated by contradictions? Are our conventional methods, such as forecasting, scenarios, and modeling fit for purpose in PNT? Do scenarios about future(s) take note of changing change? Do existing scenario modeling methods adequately allow for the requisite pluralism and polylogues, including amongst humans, non- and, un-humans, needed to confront PNT? How do we produce viable policies to navigate PNT? Or, to put it another way, do our stories about the future(s) tell us something meaningful that can generate policies and strategies to cope with complexity, uncertainty and chaotic behavior?

This paper provides a theoretical overview of the concepts comprising a novel method (The Three Tomorrows of Postnormal Times) we have developed to address the above queries. In this work, we outline what we believe is a pressing need for our methodological framework and how our approach fits into the field of Futures Studies. As this research builds off established and related concepts, we believe both casual and expert readers will benefit from reviewing the core readings of PNT theory (Sardar, 2010, 2015). Ultimately, this paper represents the first in a series of research articles that will feature case studies showing the applicability of our method.

2. From dialogues to polylogues

'When all is uncertain, nothing is predictable', writes Gardner in *Future Babble* (Gardner, 2012, p. 139). Many, if not most, predictions invariably turn out to be wrong, as *Scientific American*recently found out when it performed a review of its past pronouncements about the future (von Reibnitz, 1988). In fact, Gardner argues, expert predictions and forecasts, despite the cautious probabilities, the kind we use in Delphi, add to our problems because they do 'away with complexity, incomprehension and uncertainty' (Gardner, 2012). As a means to remedy this problem, scenario planning is often used. But, as Glenn and Gordon argue, 'scenario is probably the most abused term in futures research. What usually passes for a scenario today is a discussion about a range of future possibilities with data and analysis [. . .]. It is like confusing the text of a play's newspaper review with the text of the play written by the playwright' (Glenn, Gordon, & Millennium Project, 2009, p. 2). Scenarios can never take into account, however carefully they are generated, many, if not most, of the changes that may occur between now and one's designated time horizon—we believe this very much applies to scenarios emphasizing plausibility as well.

Plausibility has always been a contentious term within Futures Studies, if only because one of the primary aims of foresight is to call into question the normative and logical lenses with which we perceive what might lie ahead. It is interesting to note that the root of the term plausible is the Latin *plausibilis*: 'worthy of applause'. In short, plausibility is as much about acceptability as it is about logical coherence, which is to say that it has much more to do with the present than it does with the future—a point well and directly addressed by Dator's Second Law of the Future: 'any useful idea about the future should appear to be ridiculous' (Dator, Sweeney, & Yee, 2015).

This is not to say that current futures methods are in any way irrelevant but simply to point out their inherent limitations—particularly in relation to PNT. If Futures Studies is first and foremost about analyzing imaginings of futures, then perceptual plausibility is certainly something to be considered when modeling scenarios, but it need not be the only and most important metric. After all, the goal of any scenario planning exercise is to generate actions for the future by disturbing the present, but we do not believe that futures methods are keeping up with the forces and drivers that are actually disturbing the present and moving us toward Unthought Futures. An analysis of the increasingly popular Three Horizons method helps to contextualize our point.

Originally devised to help business clients 'engage simultaneously with short-term, medium-term, and long-term futures', the first iteration of Three Horizons aims to 'wind tunnel' strategy and policy initiatives using successive S-curves to model change over time (Curry & Hodgson, 2008, p. 4). Moving beyond standard management-oriented approaches, Three Horizons received a major overhaul through the work of Sharpe and Hodgson (2006, p.6), who reframed the tool to 'see our current situation in a variety of ways and help illuminate the choices available'. First, one creates an *x*-axis using the metric of time (present to future) and a *y*-axis using the metric of 'strategic fit' with a low (bottom) to high (top) spectrum as depicted in Fig. 1.

Next, one plots the three horizons. The first horizon articulates the predominant paradigms and ideologies of today, which, as the method presumes, will decline as one moves forward in time. Then, one charts the third horizon, which is composed of emerging issues or weak signals – including those most aligned with one's preferred or feared future – that are extrapolated using a growth S-curve model. Finally, one maps the second horizon to model the challenges and uncertainties relative to the first horizon, and, as it were, challenges facing both horizons. There is no question that this is the most interesting dimension of the Three Horizons method, especially as this is the only space where truly postnormal conditions might emerge, at least in theory. Our qualification, and contention, centers on the fact that the only true site of conflict in this method occurs in the mid-future, so to speak, which is to say that this approach takes little account of the complex and accelerating dynamics that continuously usurp our best practices in the here and now. In other words, the Three Horizons helps us prepare for a future that might have already passed or, perhaps even worse, might inadvertently cause us to presume

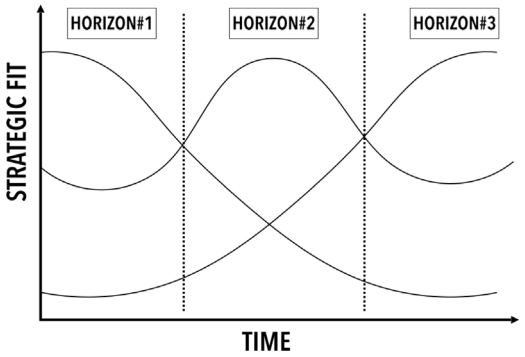

Fig. 1. The Three Horizons.

that change unfolds in a predictable, if not cyclical, fashion. To be fair, no tool or method is perfect, but we believe that something more is needed to help us navigate PNT.

As we, and others, have argued elsewhere, PNT demands that we get away from linearity and focus our attention on the interconnections amongst complexity, chaos, and contradictions. Moreover, all stories we tell about the future(s) ought to emphasize their dynamic and mind bogglingly diverse nature, chaotic potential, contradictory possibilities, and invoke imagination and creativity (Montuori, 2011). This is why we, as well as others, prefer to speak of 'global weirding' (Armour & Roe, 2011) rather than 'global warming,' and Futures Studies must do better at not just engaging but embracing the truly weird, if only to remain relevant in the wake of the changes to come (Sweeney, 2014). In light of this phenomenon, Schultz argues that Dator's Second Law must be expanded as 'ridiculous' only 'challenges assumptions,' and any truly useful idea about the future(s) should appear to be 'transgressive (challenge paradigms) and repellent (challenge values)' (Schultz, 2014).

The scope and scale of global weirding, which we still do not fully comprehend, has led some to pen manifestos in response to the postnormal challenges of the present and possibilities for what might lie ahead. The founders of *Accelerationism*, Williams and Srnicek, argue:

> What the left must reconnect to is its roots in the Enlightenment [. . .] to lay claim to a positive vision of the future, capable of supplanting our current economic and political systems with ones which enable, rather than suppress, a generalised human flourishing . . . For it is only once the left takes command of the future, and modernisation once again becomes synonymous with radical left politics, rather than neoliberalisation, that we can collectively come to grasp our world such that we might change it (Williams & Srnicek, 2013).

Although *The Accelerationist Manifesto* cites the concept of future shock, they seem woefully unaware of Futures Studies—both as an academic discipline and field of praxis. While it is perhaps foolish to expect research-driven analysis from a manifesto, Pickard's *Gonzo Futurist Manifesto* locates itself squarely within the dynamics of PNT and gestures toward the need for new modes of thought and action (Pickard, 2012). What is interesting about both manifestos is their difference with regards to scale; while one (accelerationist) focuses on the macro, the other (Gonzo) relishes in 'a tribe-of-affinity; your personal community-of-interest' (Pickard, 2012). If anything is evident in PNT, it is that one must not simply choose between grand political enterprises and echo-chamber cliques. What is needed? Polylogues of various scope and scale (Kristeva, 1977).

Coined in 1977 by Kristeva, who has a book with the same name, polylogues denote 'multiple logics, speeches, and existences' (Chen, 2010). As we see it, polylogues require the creation of new physical and mental spaces where diversity, pluralism, and contending perspectives are present on their own terms but also deeply invested in engaging others in creating and sharing information and knowledge.[1] For some, this was the hope of Wikipedia, but the English version has been deemed a 'colossal failure' as 'only a tiny proportion of users now edit articles and the overwhelmingly majority of those editors are male' (Kleeman, 2015, p. 35). In addition to finding better and more egalitarian ways to share what and how we know, we must continuously seek out collaborative and dynamic means to craft and share our stories. As Latour points out, 'story-telling is not just a property of human language, but one of the many consequences of being thrown in a world that is, by itself, fully articulated and active. It is easy to see why it will be utterly impossible to tell our common geostory without, all of us – novelists, generals, engineers, scientists, politicians, activists, and citizens – getting closer and closer within such a common trading zone' (Latour, 2014, p. 14). Latour's 'common trading zone' is precisely what we seek in our invocation of Kristeva's polylogue, and we believe this notion is sorely lacking in much, if not most, of ongoing discourses on the present and futures. Establishing such zones through the formation of event or issue-specific polylogues[2] will not be an easy task, especially as this endeavor demands that we rethink deeply held traditions, practices, and customs of knowledge sharing and

[1] We very much recognize the vast contributions of many over the past decades who have sought to expand discursive feedback loops for foresight-driven policy and decision-making processes, and we particularly want to call attention to the work of Amara (1972),Linstone (1999), and Functowicz and Ravetz (1994) in this area, especially the critical notion of forming of an 'extended peer community.

[2] In May 2014, we held our first polylogue at East-West University. We are currently planning another workshop-based polylogue for Fall 2015, and we plan to experiment further with this concept and develop another research paper featuring case studies.

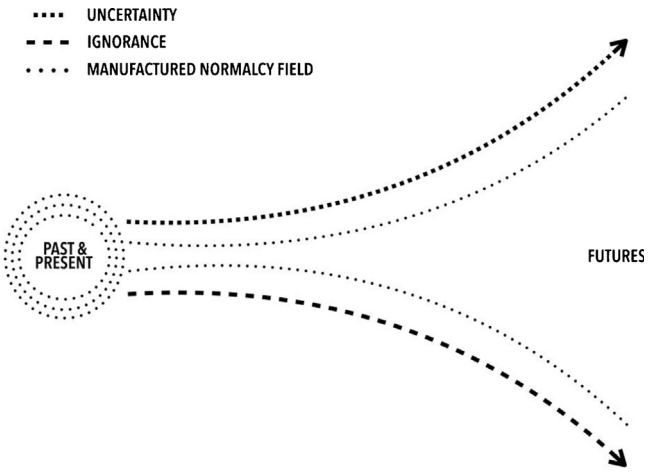

Fig. 2. Our modified futures cone.

production. As such, any analysis of the present and futures also needs to acknowledge that many things we take for granted, including a variety of complex systems, are going to (continue to) get weird. It might be true that there is no such thing as an historical possibility, but, in our estimation, this is very much a future(s) fact.

3. Normalcy, postnormalcy, postnormal creep and burst

The first weird fact that we must acknowledge is that normalcy and postnormalcy both overlap and exit side by side. Not all systems are affected in the same way and to the same extent by complexity, chaos and contradictions (hereafter 3Cs)—'the forces that shape and propel postnormal times' (Sardar, 2010, p. 436). Equally, not all systems are inherently postnormal and will become postnormal in the same way. For example, isolated communities, structures and organizations that are self-sufficient and not connected to the global economy and international system can and might be more resilient in the wake of climate change. However, many 'normal' systems will not continue to operate 'normally' in PNT—sooner or later, the 3Cs will have a direct or indirect impact on them. Moreover, there are some systems that are already postnormal, such as science, intelligence, privacy, and other networked systems looming with postnormal potentiality—such as our cars (Higginbothan, 2015) and refrigerators (Greenberg, 2015). When one stops to reflect on the changes all around us, things can certainly feel postnormal. For generations born into this milieu, however, postnormal will be normal—the world as they know it and inhabit it.

With that said, the notion of normalcy itself is somewhat weird, especially in PNT. This normalcy does not conform to accepted definitions: standard, common, conventional, usual, regular, and natural. Rather, as Rao points out, it is a decidedly 'manufactured normalcy' (Rao, 2012). It is 'manufactured' in the sense, as outlined by Herman and Chomsky in *Manufacturing Consent*, that such norms have been developed by powerful international institutions and organizations, including the media and technology companies, that function by relying on market forces, internal, unquestioned assumptions, and subtle manipulation to generate ideological and consumer desires and dreams. But more importantly, it is manufactured by our reactions to and perceptions of change—both past and present. As Rao notes, when people are faced with new technological experiences they put all their effort in maintaining a 'familiar sense of a static, continuous present' (Rao, 2012). Indeed, we change our mental models and behaviors in an attempt to overlook or ignore the changes that are taking place in front of our eyes. We look back to create stories and metaphors that relate new changes we are experiencing to something we already know and understand. The smart phone used the phone metaphor to make mobile computing comprehensible, word processing uses page and document metaphors that have been in use for a millennia, and 'we understand Facebook in terms of school year-books' (Rao, 2012). Then we make deliberate choices to de-emphasize the strangeness of the new. Rao explains this using the example of air travel:

> Airline passengers don't fly. They travel in a manufactured normalcy field. When you are sitting on a typical modern jetliner, you are traveling at 500 mph in an aluminium tube that is actually capable of some pretty scary acrobatics. Including generating brief periods of zero-g. Yet a typical air traveller never experiences anything that one of our ancestors could not experience on a fast chariot or a boat (Rao, 2012).

As Rao elucidates, the manufactured normalcy field (hereafter MNF) is a means of re-orienting our perceptions of what is and is not normal, and as a field that expands and contracts relative to our individual or communal focus, the MNF is shaped by the forces of ignorance and uncertainty. Fig. 2 provides a rendering of this relationship.

'Normal' phenomena move toward postnormalcy through the process of postnormal creep (hereafter PNC): when systems become interconnected and complex, when social media, 24-hour television and other forms of technologies are used to generate positive feedback, chaos emerges, sometimes rapidly, and things get weird. This concept is captured

brilliantly in the BBC's award-winning series, *Black Mirror*, which deftly imagines the many and varied changes surrounding new and emerging technologies, and explains the decidedly human interactions and reactions underlying various 'mutative media' (Dator et al., 2015). A number of scholars have noted the diffuse ways with which 'net-based information and communication tools may serve as powerful accelerating factors of social protest' (Stepanova, 2011, p. 6), of which the uprisings in the Middle East and North Africa, commonly known as the 'Arab Spring', and recent protests in Baltimore, Ferguson and other cities in the U.S. leading to the emergence of the #blacklivesmatter movement, are clear examples of how communication technologies can hasten PNC.

Although the forces driving PNC can be powerful, not all embrace the flows of such strong currents. There are some who cannot see, or rather ignore or refute, the emergence of PNC and cling to manufactured normalcy in face of the weird. They suffer from Postnormal Lag (hereafter PNL): a perceptual condition of denial. An obvious example is climate change deniers. In psychology, the concept of abnegation explains how one continues to deny something – in this case one of the greatest threats facing the world – even in the face of overwhelming evidence. With abnegation as with PNL, one chooses, perhaps consciously, not to know. Thus, PNL is a disavowal—one that can only be overcome through postnormal burst (hereafter PNB): when the system goes totally postnormal and there is no place to hide.

Consider the case of how our digital lives constantly keep us at the edge of chaos. Take Twitter, which demands instant reactions and multiplies your reaction manifold; a thoughtless tweet can instantly take you toward unthought horizons as Justine Sacco, the PR head of an American publisher, discovered on 20 December 2013. On her way to Cape Town, she tweeted to her rather miniscule 170 followers just before boarding the plane at Heathrow: 'Going to Africa. Hope I don't get AIDS. Just kidding. I'm white' (Ronson, 2015, p. 64). Although Sacco saw her tweet as a comment on white privilege, the Twittersphere overwhelmingly saw it otherwise. By the time she landed in Cape Town, eleven hours later, she was topping the world-wide 'trending' list. Within 11 days, Sacco was Googled 1.22 million times, and a few days later she was fired. Sacco has yet to find gainful employment or find a date (Moses, 2015). As the Sacco example illustrates, PNB can have a range of effects on a number of scales, including the intensely personal. Another example of PNB is the European refugee crisis, which has been creeping toward chaos for some time, and the complexity underlying and contradictions surrounding it are now undeniable.

4. The Three Tomorrows of Postnormal Times framework

Given our age's weird characteristics, exploring futures within the PNT framework presents us with specific challenges. We need to focus on simultaneity and complexity as well as the dynamic nature of PNT. We need an appreciation of uncertainty as well as of different levels of ignorance—in postnormal times the unknowns cannot be reduced to measurable risks. We need to take account of empirically observable trends, theoretically understand the mechanisms that produce PNC and PNB, and incorporate as much imagination and creativity in the whole exercise as possible. The framework we have developed to understand and navigate PNT, as well as explore futures, is The Three Tomorrows of Postnormal Times (hereafter 3T).[3]

In the 3T framework, we need to consider that the present is dynamic, networked, consists of manufactured normalcy and systems that are pregnant with the potential to go postnormal: in other words, the present is complex, pluralistic and partly postnormal – all of which has to be introduced right at the beginning of our exploration of the future. But the present is not simply the now. The present is 'extended' because many empirically observed trends are deeply embedded in the now and will manifest themselves in the coming years. This Extended Present is the first tomorrow; as a common term in Futures Studies, it is what most people mean when they talk about 'the future'. As we see it, the Extended Present is dominated by and populated with trends (global, regional, and local) and emerging issues or weak signals that cannot be averted; they simply expand and extend the present to cover the next five to ten years, although the temporal particularities are elastic in relation to the thematic context. In other words, the future represented by the Extended Present has already been largely colonized (Dator, 1975; Sardar, 1993). Here the best we can do is use the lens of PNT to identify systems that may be creeping toward postnormality, or on the verge of PNB. To suggest that the Extended Present is already colonized smacks of determinism— something that is anathema to Futures Studies, which is also rather averse to predictions. However, the fact remains that a variety of trends and phenomenon are embedded in the Extended Present and are foreseeable, although perfect knowledge of what might be ahead remains impossible.

Consider the rather trivial example of Apple's iWatch. In the November 2014 issue of *T3: The Gadget Magazine*, the final letter from the publication's (now former) Editor, bragged, 'We predicted the 'iWatch' in my first issue, almost four years ago . . . On a long enough timeline, we all get something right, and now the iWatch is here' (Hill, 2014). Hill's prediction is not exceptional or right. The trends toward 'wearable computers' was well established by 2008 (Rhodes, 1997), and as the corporation that had established the 'i' line of products that made Apple a '$1 Trillion Company' (Yarow, 2014), it was hardly surprising that Apple would produce an iWatch, especially as the market for wearables is considered by many to be the next big thing. There was a small problem with Hill's assertion: a European-based firm registered the name iWatch back in 2008, which means that Apple's smartwatch, which appeared on the market in April 2015, was not able to join its line of 'i' products. It is simply called the Apple Watch. What is interesting about Hill's claim, and its relevance for contextualizing the

[3] Our choice of name for this method is not meant to allude to Frank Brennan's Three Tomorrows, which is fiction-driven, English-language learning programme.

Extended Present, is that he identified an embedded trend that would take its natural course, but missed, or rather misidentified, the details. In the Extended Present, it might be possible to accurately predict or forecast what might lie ahead, especially in areas of technological development, but one must look beyond mere extrapolations to understand the postnormal dynamics of this horizon.

After the Extended Present comes the familiar future(s), which can and might extend from ten to twenty years but, regardless of time horizon, seems familiar because it is mediated by images and imaginings of the future(s)—from data-driven projections to science fiction. Trends embedded in the Extended Present along with images from advertising, corporate visions, popular 'futurology' and science fiction novels, films and television shows are extrapolated and projected to create a picture of the future that is all too familiar. Consider, for example, how many technological developments have originated, or are about to start, based on the images of science fiction films: cyborgs from Terminator (1984) and robots from *Star*Wars (1977) have morphed into Google military robots such as the Atlas, 'the agile anthropomorphic robot' and Pet Man, 'the soldier robot', both in development and to be unleashed in a decade or so (Peckham, 2012). Or, how built environments and urbanization have come to reflect the cityscapes of *Blade Runner* (1982) and *Dark City* (1998); and Disneyland itself has inspired so many cities such as Putra Jaya, Malaysia, and Mecca, Saudi Arabia. Or, how the behavior of the characters in *Mad Max* (1979, 2015) is replicated by the fanatical Jihads of the 'Islamic Caliphate' (Harnden, 2015). Or, the possibility of merging technology, biology and human physicality depicted in *Ex Machina* (2015) that heralds the fashion industry's push to develop a 'digital skin': nanotechnology will allow manufacturers to embed functions into the simplest articles of clothing, while a network of sensors in and on the body, injected or worn, will envelope the body with a second skin (Holmes, 2011). Reflect on how many technologies portrayed in various *Star Trek* films and television shows are already in everyday use and how many others could follow suite. Indeed, we are embarking on futures that are, at once, highly familiar and, yet, conceal intensely weird dynamics.

Inayatullah's notion of the 'used future' resonates with the intended scope of the Familiar Future(s), which is meant to explore and challenge extant imaginings for what might lie beyond the Extended Present (Inayatullah, 2008). By inherently pluralizing the future(s) through a double reading, the familiar future(s) is simultaneously meant to be both singular and plural. It is singular in the sense (*Future*) that it aims to find what is familiar amongst a range of complex possibilities and plural (*Futures*) in the sense that it engages with alternative, and at times divergent, imaginings.

Beyond the familiar future(s) lies the unthought future(s), a horizon of pure possibility that extends beyond the next 20 years. The unthought future(s) is not unthinkable but rather a horizon where something always remains *unthought*, which is to say that it is populated with seemingly infinite alternative futures—each necessitating their own polylogue to begin to explore the divergent perspectives surrounding them. Although there are seemingly innumerable data sets about these worlds—from demographic to economic projections—there are few, if any, models that can provide adequate insight into what might transpire in this tomorrow. Thus, collaborative creativity and 'ethical imagination[s]' are not simply the best tools for constructing scenarios in this tomorrow, 'they are the *only* tools' (Sardar, 2010, p. 444). Furthermore, the unthought future(s) is not simply something that is not expected or anticipated; rather, it is something outside the framework of conventional thought—something that does not allow us to focus on or think about it. On the other hand, the unthought can also be an opportunity so uncommon that it appears utterly unreachable. As such, the unthought is not just limited to the unthought future(s); it can and might exist in the Extended Present and Familiar Futures. But, it is only in the unthought future(s) where full implications are brought to bear and we are forced to confront it head on.

In order to locate our method within the broader field of Futures Studies and strategic foresight, we have adapted, or rather mutated, the well-known futures cone (Candy, 2010; Hancock & Bezold, 1994; Taylor, 1993; Voros, 2003; von Reibnitz, 1988), to show the relational dynamics between each horizon. Fig. 3 shows the perceived relationship between each of the

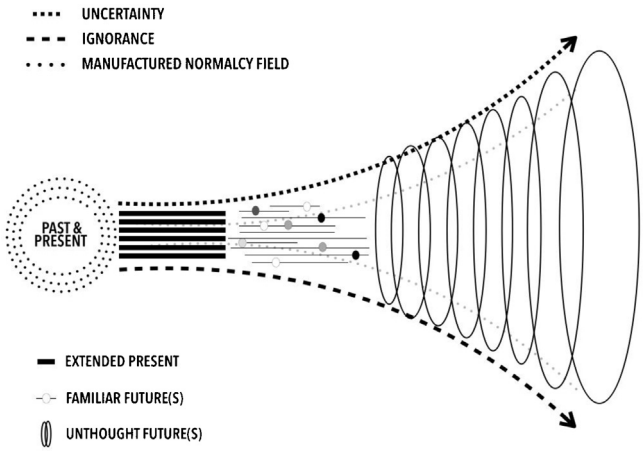

Fig. 3. Temporal-only 3T rendering.

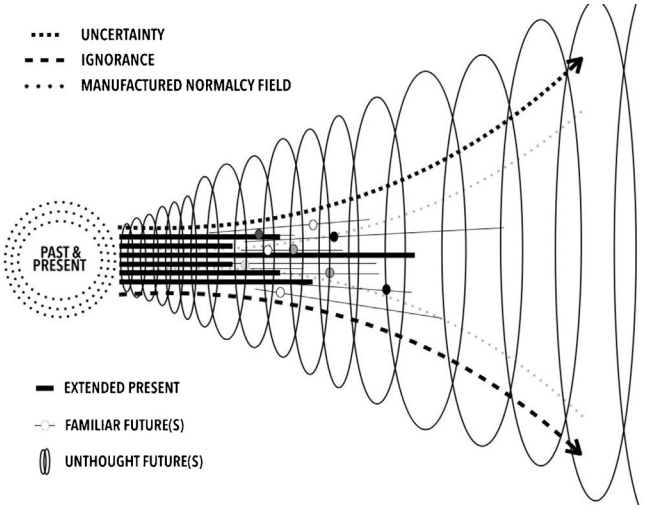

Fig. 4. Spatio-temporal 3T rendering.

three horizons. In this image, the thickness and trajectory of the lines within each horizon symbolizes perceptual acuity, the degree to which one has the capacity to see trends emerge, persist, and/or be disrupted; and potentiality, the capacity for something to move from mere possibility toward actuality.

Although this two-dimensional image suggests separation, the 3Ts are not isolated entities but deeply interconnected spatial and temporal zones of actual and perceptual phenomena that have a dramatic effect on the here and now. The familiar future(s) is an integral part of the Extended Present; and both contain a great deal of unthought future(s). It is also important to emphasize that any event or phenomenon from the furthest horizon has a real potential of having an impact on the here and now. In PNT, what seems unthought becomes part of tomorrow's everyday life. As such, the exploration of the future(s) in this framework has to involve and engage with all 3T's simultaneously. Moreover, there are systems and phenomenon with the potential to go postnormal in all three, which means that we should be able to examine the contextual components in each tomorrow that may be exhibiting PNC or be on the verge of a PNB. Thus, 3T actually operates more as represented in Fig. 4.

5. Ignorance, uncertainty, and the Menagerie of Postnormal Potentialities

Each tomorrow has a particular type of uncertainty and ignorance attached to it.[4] When complexity, chaos and contradictions come together, it should not surprise us that uncertainty is the result. The most basic variety of uncertainty emerges when the direction of change is known but the magnitude and probability of events and consequences cannot be estimated. This is the situation we find within the Extended Present, where the future is largely colonized and certain trends are deeply embedded. We have a limited set of possible alternative futures, at least one of which could come to fruition. We call this surface uncertainty, which can be managed to some degree with adequate knowledge and foresight tools. In the familiar future(s), we are presented with a broad range of alternatives and a plethora of possible futures. As such, we can say little about the general direction of change; and even less about the emergence of postnormal phenomenon when complexity, chaos and contradictions come together. But we do know that many of these futures are simply a projection of common images and imaginaries of the future. Managing the resultant uncertainty presents us with a complex, not to say, wicked problem, but we can still grasp it to some extent. We call this shallow uncertainty. Finally, the unthought future(s), where anything can happen and nothing is known, presents us with Deep Uncertainty. Here, we are not only unaware of the direction, dimension and impact of change, but we are also incapable of knowing what is happening to the system because our worldview or epistemology is totally inadequate. The three varieties of uncertainties are entrenched in an environment where change is accelerating and new innovations, processes, social and political relations are constantly transforming the emerging landscape. Fig. 4 captures how we striate the three uncertainties.

Each type of uncertainty is associated with a particular category of ignorance. The simple or plain ignorance (signified as i[5]) can be defined as the absence of knowledge; it relates to those items or phenomena that we do not comprehend. This is the ignorance we may encounter in a complex or contradictory situation, which may be overcome by understanding the

[4] We plan to do further research on and analysis of existing typologies of uncertainty and ignorance in a subsequent paper on this topic. At present, we believe the models presented for both uncertainty and ignorance best suit our methodological approach.

[5] Our thinking has been greatly aided and strengthened by the many critical comments and insights of Jordi Serra del Pino, Scott Jordan, Wendy Schultz, Jim Dator, Merryl Wyn Davies and Ted Fuller. We are grateful to the International Institute of Islamic Thought (IIIT) for supporting this research.

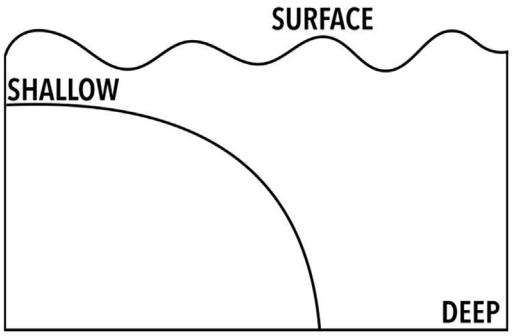

Fig. 5. Levels of uncertainties.

complex networks involved, or appreciating the simultaneous 'truths' of actors with contradictory demands (for example, a government that needs development and a community that wants to preserve its environment, land and heritage). This is the dominant variety of ignorance in the Extended Present: it can be overcome, and Surface Uncertainty reduced, through learning, research, appreciating the viewpoints of others, and asking the right questions. The Familiar Futures present us with a deeper level of ignorance, associated with shallow uncertainty, when we do not even know what questions to ask. But it also has another dimension: the answers to any pertinent questions, if we could ask them, can only be found over the horizon. For example, we do not know for sure how genetically modified food will affect the food chain, or how genetic engineering will affect the human body, or what impact 'infectious connectivity' (Sweeney, 2015) will have on the human mind—the answers can only be found sometime in the future after a generation at least has experienced the impacts and effects of these developments. We call it Vincible[6] Ignorance (signified as i[7]): it cannot be overcome in the present by learning as there is nothing to learn, but it creates an awareness of what we do not know and must seek to know in the future. Associated with Familiar Futures, it generates shallow uncertainty, which could also be transformed into surface uncertainty in the future. Then, of course, there are Rumsfeld's 'unknown unknowns': 'the ones we don't know we don't know' (Morris, 2014). It is related to the Deep Uncertainty of the unthougtht future(s) and is categorized as Invincible Ignorance (signified as i^1).

The unthought lies beyond our imagination; we are unable to think about things that lie outside our imagination which is determined by and limited to our worldview and frameworks of our assumptions and axioms, and often because we do not have a language to deal with such thought. Invincible Ignorance is thus 'the ignorance of our ignorance, the in-built ignorance of the potential risks of recent developments' that 'requires radically new ways of thinking' (Sardar, 2010, p. 440). In other words, Invincible Ignorance cannot be overcome by our conventional tools as it is connected to the unthought parts of our own worldview; it is the ignorance that compels us to action with a false sense of confidence in existing paradigms and modes of knowing, being and doing. We can only grapple with Invincible Ignorance by questioning our axioms, by critiquing our basic and long cherished assumptions, and by totally rethinking our worldview. Fig. 5 captures how we situate a unique uncertainty and ignorance within each horizon.[8]

The three levels of uncertainty and ignorance enable us to begin to understand and chart the degree of actual and perceptual postnormalcy surrounding a particular issue, system, or horizon. In the Extended Present, we attempt to reduce Surface Uncertainty by processing the available information to produce hypotheses that could throw some light on what we are seeing. If available information is not enough, we will have to determine if gathering more data will help or not. If uncertainty continues to increase, it would be an indication that we are moving toward Vincible Ignorance of Familiar Futures: we would now have to determine what lines of inquiry could possibly produce appropriate knowledge and the time horizons involved in acquiring that knowledge. Finally, if the situation has reached a chaotic stage, we know we are dealing with Deep Uncertainty of Unthought Futures. We now have to consider if it is our paradigm itself that is failing us, which would indicate the presence of Invincible Ignorance. The most appropriate action now is to work toward an alternative, better paradigm.

However, all three horizons – Extended Present, Familiar Futures and Unthought Futures—include systems and subsystems that are either on the verge of PNB or, at the very least, showing signs of PNC. Much of our uncertainty, and hence ignorance, is associated with the emergence of postnormalcy. So, apart from grasping the uncertainty and ignorance associated with each horizon, our exploration of futures, and any forecasts, scenarios and visions based on it, must also grapple with the postnormal potentialities inherent to all three horizons.

[6] We are intentionally re-appropriating the language of Catholic Ethics, specifically Thomas Aquinas in *Summa Theologica*, although our definitions for both Vincible and Invincible Ignorance differ substantively from their original deployment.

[7] As Sweeney notes, global weirding is 'a fitting moniker for the emerging meshwork of (1) increasing technological advancement, dependence, and ubiquity, (2) impending ecological catastrophe(s), and (3) the transnational drive and reach of postnormal actants [. . .]' (Sweeney, 2014, p. 3).

[8] This visual is intentionally modeled after Functowicz and Ravetz's Postnormal Science image, and we are indebted to Jordi Serra del Pino for making this important connection and developing the initial visual for Fig. 6.

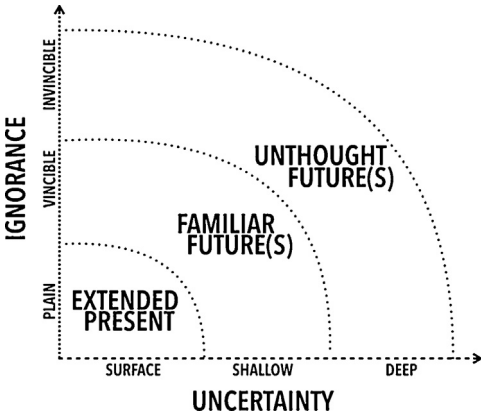

Fig. 6. Ignorance and uncertainty matrix.

Postnormal phenomena are most evident and most easily seen in the Extended Present. It is like a Black Elephant in the room, which either no one can see or chooses to ignore. Or, if its presence is recognized, no one is actually able to tackle it. A Black Elephant, notes Vinay Gupta, 'is an event which is extremely likely and widely predicted by experts, but people attempt to pass it off as a Black Swan when it finally happens. Usually the experts who had predicted the event – from the economic crisis to pandemic flu—go from being marginalized to being lionized when the problem finally rears its head' (Gupta, 2009). In line with Gupta's concept, Markley argues for using Type II Wild Cards that are 'high probability and high impact as seen by experts if present trends continue, but low credibility for non-expert stakeholders . . . ' (Markley, 2011, p. 1079). An obvious example is atmospheric carbon concentrations, which were recently recorded at 400 parts-per-million—a level which predates humanity by millennia and foreshadows immense climatic changes (Biello, 2013). While there are many, including a large majority of Americans, who deny anthropogenic climate change, the scientific consensus is just that, and one of the earliest proclamations of the CO_2 climate problem comes from a report given to President Johnson in 1965 (Keith, 2000; Royal Society, 2009). As such, Black Elephants are a sort of known unknown, as Rumsfeld puts it, especially as the chasm between expert and public opinion adds complexity and uncertainty to the issue (Morris, 2014). Normally, events with high postnormal potential require collective, global action – as was the case in remediating 2014's Ebola pandemic. Black Elephants capture the postnormal dynamic of the Extended Present, and they are decidedly contextual and ought to be situated and/or articulated from more than one perspective, if only to capture the contradictions inherent to their emergence. Finally, Black Elephants indicate that PNL is present, and perhaps dominant, within a particular system.

Nasim Nicholas Taleb's popular notion of the 'Black Swan' captures the essence of the familiar future(s). In contrast to the Black Elephants of the Extended Present, Black Swans in the Familiar Futures are not perceptible or articulated, even by experts; they appear as 'outliers' and come 'out of the blue,' as Taleb notes, they are 'very fragile to miscalculation, with a general severe underestimation mixed with an occasional severe overestimation' (Taleb, 2007, p. 420). Black Swans are fundamentally unknown unknowns; and, in contrast to Black Elephants, Black Swans can and might be positive, which is to say that their impact might illuminate previously unimagined opportunities, which is what suits them for the complex dynamics of the familiar future(s). Indeed, it has been argued that Black Swans are responsible for some of the greatest societal changes of history. However, they can equally be negative and serve as a signal for emerging PNC or PNB. As such, dealing with Black Swans requires a higher level of analysis.

Postnormal phenomena are not easy to foresee in the unthought future(s) but, of course, they are there. We represent the postnormal potentiality of the unthought future(s) with Black Jellyfish; like Black Elephants and Black Swans, Black Jellyfish are 'high impact', but they are 'normal' phenomena driven toward postnormalcy by positive feedback—or increasing growth leading toward systemic instability. Why jellyfish? Climate change is having a dramatic effect on the world's water systems. Increasing oceanic temperatures and acidity levels are creating perfect conditions for jellyfish blooms, which have forced shut downs at coastal power plants around the world, including nuclear reactors (Gershwin, 2013). Epitomizing the weirding inherent to Unthought Futures, jellyfish are also known for 'undermining the world's largest military and fostering political unrest' (Sweeney, 2013, p. 6). Demonstrating how small things can have a big impact driven by positive feedback, jellyfish blooms provide us with the ideal representation of postnormalcy in the unthought future(s).

In Rumsfeld's accounting, Black Jellyfish are unknown knowns—things we think we know and understand but which turn out to be more complex and uncertain than we expect. In centering our concept on the escalation of jellyfish blooms, we aim to draw attention to scale: in Unthought Futures we need to examine small things and imagine their impact on larger scales and upon multiple overlapping systems over time. Black Jellyfish are all about how normal situations and events become

[9] Recently, Frederick Grinnell penned a short editorial for *Nature* suggesting that Postnormal Science 'offer[s] a more coherent approach and permits a more nuanced analysis than the current regulatory framework' for research with human participants (Grinnell, 2015, p. 257).

postnormal; how they mutate through PNC by becoming interconnected, networked, complex and contradictory. In this sense, Black Jellyfish resonate deeply with Molitor's seminal work on emerging issues analysis, and we envision Black Jellyfish as decidedly 'catalytic events' that herald unthought possibilities, although we do not believe that they all must and follow the famed S-curve model of change (Molitor, 1977), which is useful for charting the impacts of a single event or impact but does not enhance our 'radar/sonar [. . .] for identifying new elements in the territory that have either arisen since the map was drawn, or which are in motion' (Schultz, 2006, p. 7). As with de Jouvenel's concept of *futuribles*, 'there is not time at which we can enumerate' Black Jellyfish 'exhaustively' (de Jouvenel, 1967, p. 19).

Collectively, we call Black Elephants, Black Swans, and Black Jellyfish the Menagerie of postnormal potentialities (hereafter Menagerie), which aims to focus our attention on the postnormal potentiality of the 3Ts—simultaneously. The Menagerie, however, should not be seen as an assortment or range of purported wild cards. Writing on the critical importance of introducing disruptive examples within foresight consultations, Barber contends, 'designing a Wildcard that expands the client's perspectives will provide an essential framework that will enable many other foresight methods and tools to be leveraged beneficially' (Barber, 2006, p. 79). While we believe that modeling postnormal potentialities are crucial to robust, and ultimately useful, foresight, we shy away from using 'wild card' as this designation situates one squarely within the confines of risk management.[9] If anything is true in PNT, it is that our command-and-control impulses will only serve to heighten our ignorance and entrench uncertainty, and we cannot manage risk but rather our perceptions of risks—from 'inevitable surprises' (Schwartz, 2001) to things that remain unthought. In PNT, the rules of the game have changed such that all cards have the potentiality to be wild. As such, we must, as Miller contends, become Futures Literate and enhance 'the sophistication of our anticipatory systems' by using 'the future to question, unpack, invent what is going on and what is doable now' (Miller, 2007, pp. 27–28). As an ensemble aimed at challenging deeply held convictions, illuminating entrenched contradictions, and enlivening novel considerations, we believe our Menagerie does just that.

6. Working with 3T

The 3T framework has three specific functions: to aid our exploration of alternative futures, with an emphasis on plurality and postnormal potentialities; to critique existing projections and extrapolation; and to structure and shape policies that are specifically geared to navigating postnormal times. It helps if we frame a set of specific questions for each horizon:

6.1. Extended Present

- What trends are embedded in the Extended Present?
- What do we not know? (plain ignorance)
- What are the surfaceuncertainties of the Extended Present?
- What are the obvious dangers we are ignoring?
- Are there elements of Extended Present displaying PNL?
- What issues/things are people afraid, embarrassed, and/or uncomfortable to talk about? In other words, what Black Elephants are staring us in the face?
- What polylogues do we need to explore the impacts of potential Black Elephants?

6.2. Familiar Futures

- What imaginings of the future and trends are 'pulling' us toward this horizon?
- What do these Familiar Futures reveal to us about what we might need to know– vincible ignorance?
- What do we understand to be the shallow uncertainties of these Familiar Futures?
- Are there elements of these futures with postnormal potentialities?
- What do people think would never happen? In other words, what are the Black Swans?
- What polylogues do we need to explore the impacts of potential Black Swans?

6.3. Unthought Futures

- What axioms and assumptions are made into projections and forecasts on this horizon?
- Can we consider these axioms and assumptions to be valid in the face of Deep Uncertainty and Invincible Ignorance?
- What elements of the Unthought Futures contain postnormal potentialities?
- What might quickly escalate into something with an extreme impact? In other words, are there any Black Jellyfish showing signs of PNC?
- Are conditions ripe for PNB? What would need to happen to foster PNB?
- What polylogues do we need to explore the impacts of potential Black Jellyfish?

Shaping policy to cope with PNT requires an appreciation of 3T's spatio-temporal simultaneity. It also needs some understanding of the ignorance and uncertainty associated with each horizon as well as an appreciation of the contextual elements, which could be whole systems or subsystems, with the potential of going postnormal—what we have identified as Black Elephants, Black Swans and Black Jellyfish. Any policy that aims to deal with future possibilities must take all this into account. Collectively, the three varieties of ignorance and uncertainties and the Menagerie points toward PNC: the process through which normal things and events become chaotic and go postnormal.

To examine PNC, decision and policy makers have to study the complexity of a system, examine whether the system is interconnected, whether it displays obvious contradictions, and identify potential avenues of positive feedback: if these four factors are present, it is likely that the system will become postnormal. Within many systems, there are institutions and structures that are already so complex and networked that they can go postnormal anytime, such as financial markets and infectious diseases. In general, PNC develops in three phases. In phase one, the system is complex and interconnected but functions normally. That however does not mean that it will continue to function as usual. Any small change or perturbation in the system, that can emerge by ignoring certain level of ignorance or overlooking uncertainty, can rapidly produce consequences that cannot be controlled and usher postnormalcy. A Black Elephant or a Black Swan could also be present in the system. In phase two, positive feedback emerges, and possibly a postnormal potentiality has been activated, and the system begins to show signs of chaos. Phase three is reached when chaos takes over and the system becomes postnormal. We need different policies to deal with each phase.

What can we do when a system is exhibiting PNC? In phase one, the best option is to simplify the system: complexity condemns us to limited and uncertain knowledge and the need for simplification. In our globalized world, there are no closed systems; all systems are open and open to interconnection. But even open systems have (unnecessary) interconnections that can be reduced, which would lead to decrease in its complexity. Here we need to be aware of sensitive dependency: any intervention such as a badly thought policy, protest, conflict, act of gross injustice, degrading effect on the environment, can accelerate the system toward postnormalcy. Moreover, we also need to identify specific elements of the system with postnormal potentiality – what are the Black Elephants in the room that have to be urgently addressed. In our globalized world, all national governments are complex, interconnected systems, with Black Elephants sitting on the tipping point toward postnormalcy. The recent attention toward migrant crises in Europe and Asia speak directly to this point. In phase two, when positive feedback has kicked in, we need to pay attention to attractors enhancing the positive feedback. In any dynamic system, there will be a number of factors – policies, contradictions, campaigns, protests, conflicts, digital media, new technologies, social change, power shifts – which create and enhance positive feedback and toward which the system tends to evolve regardless of the initial conditions or rights and wrongs of a particular issue.

To prevent the system from going postnormal, we need to identify, and if possible block, the avenues of positive feedback, unpack systemic interconnections, and identify the contradictions. There is a legitimate sense of urgency; but this should not mean an unthought reaction. The emphasis should be on deeper analysis, an integration of plurality and diversity, and on quality. This requires both simplification as well as complexification at the same time. We need to 'complexify' because complex systems can only be handled by other complex systems (Keune, 2012). Moreover, all of this has to be undertaken in the context of vincible ignorance and shallow uncertainty. This requires, notes Stirling, 'a more rigorous approach to assessing incomplete knowledge, avoiding the temptation to treat every problem as a risk nail, to be reduced by a probabilistic hammer. Instead, experts should pay more attention to neglected areas of uncertainty as well as deeper challenge of ambiguity and ignorance' (Stirling, 2010). There is nothing we can really do when the system reaches phase three except perhaps to continue to resolve the contradictions in the system and try to reduce positive feedback as much as possible.

Shaping postnormal policy (hereafter PNP), that is, policy that enhances our ability to navigate PNT, is not about management and control; these notions are redundant and even dangerous in PNT. Rather, PNP's aim is to be aware of our ignorance in its three varieties, to understand the complexity and uncertainties involved, to anticipate postnormal potentialities, and thus chart a viable, even if unpalatable, way forward. The function of a conventional policy is to guide decisions to produce pre-defined rational outcomes, and the whole process assumes a linear cause and effect relation between policy and outcome. PNP, on the other hand, does not offer the luxury of such an assumption, and its main function is to deal with, and if possible prevent, PNC, to draw attention to the practical complexities that confront us not just with essential questions but also fundamental challenges, and thus assist us in charting and navigating postnormal futures. While we believe that there are a few examples of innovative policy initiatives, such as the extension of legal rights to the Whanganui River (Isaksson, 2014, p. 52) or the proliferation of guardians of future generations, we have yet to see PNP emerge.[10]

7. 3T's place in the futures field

While Futures Studies emphasizes alternatives, many methods of futures and foresight seldom incorporate pluralism and diversity intrinsically in their frameworks, and few, if any, emphasize the dynamic and merging nature of futures

[10] As with many of the other concepts developed in this paper, PNP is worthy of its own article-length inquiry. We certainly plan to do further research in this area and will produce another paper focusing on this concept with case studies.

possibilities, or highlight the ignorance and uncertainties we constantly confront. In response to this need, many practitioners and researcher have concocted 'mash-ups' by 'combining and layering different techniques to enrich outcomes' (Curry & Schultz, 2009, p. 58). The 3T framework offers just such a multi-layered approach that can serve as a useful tool of critique and exploring critical futures, or for 'critical complexification' of alternative futures (Keune, 2012, p. 4). 3T can also serve as an analytical tool for situating and contextualizing trends, emerging issues, and imaginings of the future(s), including complex, horizon-specific forecasts, and we believe it can be complimentary to many, if not most, other futures methods and research, including the Three Horizons approach.

From scenario modeling to visioning and backcasting to cross-matrix analysis, 3T can amplify how ignorance and uncertainty are analyzed, framed, and/or mapped. We have already seen our Menagerie adopted by a U.K. government foresight unit, who integrated it into their stakeholder engagement process. We have designed the 3T framework to be both digestible and pluralistic; as such, it locates the future within the context of simultaneous alternatives that are both distant and ever present. It emphasizes complexity and draws our attention to ignorance and uncertainty at each step. 3T aims to consistently focus on the unthought, forcing us to ask associated questions, as well as challenging our assumptions, values, and basic axioms. And finally, it attempts to provide a space for us to articulate postnormal potentialities – Black Elephants, Black Swans and Black Jellyfish – to focus on resistance, both in the sense of the contradictory resistance of a particular context, not to see the challenges ahead, and the notion of building a resistance to such short-sightedness. Although adapting to and taking advantage from coming changes is at the heart of foresight, we also believe that a critical aspect of 3T centers on that which we must sustain—and a host of indigenous and native peoples continue to embody this ethos.

In PNT, pushing the boundaries of plausibility requires a new kind of thinking coupled with creativity and imagination, and we must be able to deal with complexity and incomplete knowledge, link what is compartmentalized, and tackle interconnections and interdependence. As such, our approach must be both radical and modest to be realistic and efficacious. And creativity and imagination, as Montuori has argued, must move from the individualistic/atomistic view of modernity toward a more contextual, collaborative, complex approach – breaking with the mythology of genius and inspiration that informs philosophy, ethics, and action (Montuori, 2011). This is the direction the 3T framework ultimately takes us – toward the unthought.

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