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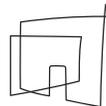# POSTNORMAL
TIMES
READER

THE POSTNORMAL TIMES READER

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The Centre for
Postnormal Policy
& Futures Studies

CONTENTS

WHAT JUST HAPPENED?

Introduction by Ziauddin Sardar

Are you paying attention at the back? Lee Gates has something important to tell you. In case you don't know, he is the television personality of the film 'Money Monster' (2016), who provides frenetic financial advice to overexcited audiences. This is what he has to say: 'You don't have a clue where your money is. See once upon a time you could walk into your bank, and open your vault and point to a gold brick. Not anymore. Your money, that thing you bust your ass for, it's nothing more than a few photons of energy traveling through a massive network of fibre optic cables. Why do we do it? We did it to make it go faster because your money better be fast. Faster than the other guys. But if you want faster markets with faster trade, faster profits, faster everything, sometimes you are going to blow a tyre'.

A sane and timely observation; except, it is not an odd tyre, here and there, that's had a puncture—the car and the road itself are in complete disrepair. Blowouts are everywhere and seem to be occurring simultaneously with frightening regularity. In 2016, we witnessed a string of unprecedented events. Ongoing conflicts in Syria, Libya, and Iraq leading to a refugee crisis of unparalleled proportions. Mass shootings in France, Germany, and the US – by terrorists and lone wolves. An attempted coup in Turkey. Both Turkey and France in a state of emergency for months. Left-wing populism that produced Jeremy Corbyn as the leader of the Labour Party in Britain, and Bernie Sanders as the leader of 'political revulsion' in the US. Right-wing populism in France, Austria, Holland, Poland, Hungary that could bring the far right to power in Europe. Zika virus. The rejection of a landmark peace deal in Colombia. Escalating tensions between China and Japan in the South China Sea. President Rodrigo Duterte, who said killing the poor who get quick money from selling drugs is necessary in destroying the 'apparatus' in his ambitious drug war in the Philippines. The spectre and implementation of negative interest. Brexit. Cracks in the European Union. And, of course, Donald Trump – the 45th President of the United States who was elected with support from the Alt-Right (or, is it: Alt-Reich, as some suggest).

It is not just money that is moving faster. Everything is speeding up. As Robert Colvile notes in *The Great Acceleration* [1] new trends, ideas and crises emerge in the blink of an eye, accelerating developments in media, industry,

politics and society. Established and cherished ideals can be overturned overnight. Unconventional and uncommon notions and events can proliferate and become dominant. The Oxford English Dictionary's international word of the year for 2016 is 'post-truth', which 'relates to circumstances in which facts are less influential in shaping public opinion than appeals to emotions and personal beliefs' [2]. Seeking not to be outdone by its rivals, Merriam-Webster chose 'surreal' as its word of the year since "it was looked up significantly more frequently by users in 2016 than it was in previous years, and because there were multiple occasions on which this word was the one clearly driving people to their dictionary" [3].

IN WHAT LOOKS LIKE AN INSTANT, WE NOW LIVE IN A POST-TRUTH SOCIETY, CULTURE AND WORLD WHERE FABRICATIONS ARE MORE IMPORTANT THAN OBJECTIVE FACTS, RATIONAL ARGUMENTS, OR SOLID EVIDENCE.

Conventionally, we regarded science largely as a domain of objective knowledge – but now scientific evidence can be dismissed as irrelevant. The entire history where we saw truth as a prime value has been overturned. As truth is associated with freedom – 'You shall know the truth and the truth shall set you free', said Jesus (John 8:32) – we have now located freedom in falsehood and must confront the breakdown of governance that comes along with this axiom. As Hannah Arendt warned, "the ideal subject of totalitarian rule is not the convinced Nazi or the dedicated communist, but people for whom the distinction between fact and fiction, true and false, no longer exists" [4]. Allegedly, Europe had consigned fascism to the dustbin of history. Civilised people don't do fascism, yet far right movements are thriving across Europe. Something is not quite right with the world. Just what is going on?

A number of academics, thinkers, writers and commentators have been trying to figure this out for well over a decade. For example, the British left-wing sociologist, the late Zygmunt Bauman, has been charting the strange developments of our times in a series of books – usually with 'liquid' in the title. We are living in an era of *Liquid Times* [5], a product of *Liquid Modernity* [6], which has produced a permanent *State of Crisis* [7], he suggests. In *Babel* [8], which is a conversation between Bauman and the Italian journalist Ezio Mauro, the two thinkers suggest that the crisis is all pervasive and 'cuts into 'everything'. 'Like an invading army in a sleeping kingdom', Mauro says, 'the crisis, with astonishing ease, marches over the entire material, institutional and intellectual system of democratic structures' of the West. Everything

that was set up after the Second World War – 'governments, parliaments, intermediary bodies, social subjects, antagonisms, the welfare state, parties, and national, international and continental movements' [9] – is in a state of acute crisis. Moreover, this network of crisis behaves as an independent force. 'It is a force', Mauro says, 'that asserts its autonomy without any perceivable theory of itself and its action, without a project, but with a force of action whose consequences are painfully visible' [10].

Amory Lovins, American physicist, environmental campaigner and co-founder of the Rocky Mountain Institute, coined the term 'global weirding' to describe the changes that are taking place on a planetary scale [11]. In his recent book, *Thank You for Being Late* [12], the neo-liberal American commentator, Thomas Friedman points out that everything is changing so fast that we just do not have enough time to think or adjust to change. A host of 'accelerations' are interacting with each other to produce new clusters that are making the world crisis unsustainable. British documentary filmmaker, Adam Curtis, suggests that we live in a period of 'HyperNormalisation', where we become lost in a fake world and cannot see the reality outside [13]. Geologists are debating whether we have propelled ourselves into a new geological epoch, the Anthropocene, where human activities have significant and global impact on ecology and geology of the earth [14]. Climate change, acidification of the oceans, increases in the extinction rates of species are just three examples of how we are changing the planet. The great British physicist, Stephen Hawking, and his Cambridge astronomer colleague, Martin Rees, points out that digital technologies allow very small groups of individuals to make enormous profits very quickly. Artificial intelligence has the potentiality to decimate a range of jobs—including both blue and white collar vocations. So inequality is set to increase further. 'We are', Hawkins declares, 'at the most dangerous moment in the development of humanity' [15]. Rees believes that the twenty-first century may well be *Our Final Century* [16].

Now, all these voices, from the left and the right of the political spectrum, from the scientific and humanities communities, are spot on. But the spirit of the age cannot be described by any one of these distinctive, individual assessments. Different approaches from different perspectives end up describing different bits of the anatomy of the proverbial elephant. To get a bigger picture – to look at the elephant as a whole – we need to step back.

Essentially, what they are all saying is that

WE HAVE EITHER LOST, OR ARE LOSING, OUR FAITH AND TRUST IN WHAT WE HAVE THUS FAR CONSIDERED TO BE NORMAL, CONVENTIONAL OR ORTHODOX.

Conventional politics does not deliver the greatest good for the greatest number of people. There is a growing distance 'between those who vote and those who are put in power through their votes', says Bauman [17]. Politics has become the preserve of rich elite and seems to serve only their purpose. Democracy has become government by the highest bidder, and often turns into tyranny of the majority. Orthodox capitalist economics only makes the rich richer at an increasing accelerating pace. The highly vaunted trickle-down effect has never materialised. Even the most cherished notion of human rights – described by British international relations academic, Stephen Hopgood, as a form of secular Christianity which the West turned first into global rules through imperial power, and then international law and organisations [18] – appear to be reaching the end of the road. They are being increasingly contested by emerging powers who question the authority claims of the hitherto dominant Western states.

So normal, no matter how it is defined, is evaporating. We are moving towards what I have called 'postnormal times'. This *Reader* charts the development of the theory of postnormal times, with its origins in postnormal science, and brings some of the key papers and articles together. My aim here is both to provide an overview of postnormal times theory and show how recent events can be understood through this lens.

But first a few words on the outline of the *Reader*. It is organized into four sections: Origins and Theory, Methods and Questions, Space and Time, and Lives and Works. Origins and Theory provides a selection of foundational readings on postnormal science and postnormal times. Slivio Funtowicz and Jerry Ravetz's 1993 paper, "Science for the Post-Normal Age," first outlined the elemental structure of postnormal science and offered a cogent argument for the democratization of science. Science became postnormal, they argued, when "facts are uncertain, values in dispute, stakes high and decisions urgent". The concept of the "extended peer community" was first introduced in this paper; it is an antecedent to the notion of polylogue which is central component of the postnormal times theory. Ziauddin Sardar's "Welcome to Postnormal Times," published in 2010, lays out the basics of postnormal times as a theoretical framework for understanding the present and enhancing our capacity to imagine possible futures. It is the paper that first defined the core structure of postnormal times—complexity, chaos, and contradictions. Sardar returns to the original arguments in "Postnormal Times Revisited," while also responding to the critical stir that his original paper provoked. He supplements his contention for postnormal times with additional examples and provides a forward-looking analysis as to how the dynamics of our contemporary age might impact future generations.

The Methods and Questions section gives a host of perspectives on approaches for expanding the reach and scope of postnormal times as a theoretical framework for using the future. In "The Three Tomorrows of Postnormal Times," Sardar and John Sweeney outline the approach, which emphasizes ignorances and uncertainties, to exploring and modelling alternative futures developed by the Centre for Postnormal Policy and Futures Studies (CPPFS). The paper also introduces and explains the Menagerie of Postnormal Potentialities. The applications of the Three Tomorrows method are provided by Sweeny in an exploration of scenarios for the future of the Internet in his essay on '"Infectious Connectivity". He treats the phenomena of electromagnetic hypersensitivity as an emerging issue that could lead us toward truly unthought futures. In his 1997 essay, "The Science of What-If," Ravetz argues that scientific inquiry must include an anticipatory and prospective mode of analysis, which he encapsulates in the question: what if? It is in this article that Ravetz highlights the importance of ignorance and uncertainty, which have become pillars of analysis of postnormal times. In "Here be Dragons: Exploring the 'Unknown Unknowns," Shrin Elahi engages with postnormal science, wicked problems, and black swans to produce a cogent analysis of the ways in which uncertainty has been undervalued within a variety of cognitive, scientific, and organizational paradigms. The following two sections, Space and Time and Lives and Work, look at a range of issues and institutions form the perspective of postnormal times – from climate change to governance, Japan, European Union and the Middle East, as well as Science, Religion, Islam, and films. The final paper, on "Creativity and Leadership in Postnormal Times" by Alfonso Mantouri and Gabrielle Donnelly, argues that in the age of accelerating change, complexity and chaos, we urgently need new ideas and radical way of thinking that go to the roots of our assumptions and issues.

Accelerating, Globalised & Networked
So, how do we understand the nature of change in these postnormal times?

We have to acknowledge that not everything has changed. But quite a lot has changed, and other things are changing. Postnormal times are best defined as 'an in-between period where old orthodoxies are dying, new ones have yet to be born, and very few things seem to make sense' [19]. Or, as the Ezio Mauro puts it: 'We are hanging between the "no longer" and the "not yet" and thus we are necessary unstable – nothing around us is fixed, not even our direction of travel' [20]. To understand the nature of contemporary change, and where it could lead us, we need to grasp the character and dynamics of postnormal times.

Let's begin with the obvious observations: our world is globalised and networked, and this has certain consequences. In a globalised world, things tend to have a global scale and scope. A localised event, such as emergence of a virus like Zika, or a banking crisis in a particular country, quickly acquires a global dimension and penetrates even the remotest parts of the planet. As the world is networked, things move at rapid speed. So a local contagion can become a global pandemic very quickly. Anonymous individuals are now propelled into the international spotlight in ways that previous generations would find stupefying. Malala Yusufza became a global icon within only a few months: she went from being attacked by the Taliban in October 2012 to winning the Noble Peace Prize in October 2014: in between she addressed the UN, published an autobiography, and travelled all over the world campaigning for girls' education. Terry Jones, the pastor of a small extremist church in the Southern US, announced that he would burn the Koran and drew the attention of the Secretary of State, who asked him not to risk putting the lives of service men and women at risk. Within days after the story was reported, Jones received the attention he so desperately coveted and riots spread across many countries.

Beyond speed, scale and scope, there is simultaneity. As things move at great speed and acquire global scale and scope, they also tend to occur simultaneously, a point first noted by the outgoing UN General Secretary, Ban Ki-moon. In a July 2009 speech given in Dublin, he suggested that 'we are living through an era like no other. There are multiple crises: a food crisis, fuel crisis, flu crisis and financial crisis. Each is a crisis we have not seen for many years, even generations. But this time they are hitting the world all at once. We have never seen any era when we have been hit by all these multiple crises at the one time' [21].

THIS SIMULTANEITY IS ESSENTIALLY A FEATURE OF INTERCONNECTED, NETWORKED SYSTEMS. AND THIS IS HOW WE NOW HAVE TO SEE OUR WORLD: AS AN INTERCONNECTED, NETWORKED SYSTEM, WHERE THINGS ACCELERATE QUICKLY, OFTEN SIMULTANEOUSLY, AND BECOME GLOBAL IN SCALE.

This is what happened, for example, with the Brexit vote in Britain, that led to the election of President Trump, that led to 'No' vote in the Referendum in Italy – all of which is now leading into the surge in far right votes in Europe. Internal

and external forces are changing the nature of the nation states. This move portends a tangible shift in governance and speaks to the changing dynamics of life in postnormal times especially as, according to Denmark's Foreign Minister, "these companies have become a type of new nations and we need to confront that" [22].

To give another example of simultaneous occurrences: consider, how many wars are simultaneously being fought today. The 'Cold War' between Russia and the West has returned with a vengeance. The 'Proxy Wars' between Russia and the West, and between Saudi Arabia and Iran, fought on the battlefields of Syria and Iraq. 'Hybrid Wars' with states using cyber-attacks and propaganda, where elections in other countries could be hacked and political processes subverted. And open 'Cyberwars' where states, spies, criminals, terrorists, scammers, thieves, and hackers attempt to steal information, and/ or cause damage to states, corporations, banks, hospitals and individuals. Not forgetting: 'Twitter Wars' fought between all and sundry with 140 characters. Not just that we have new varieties of wars to contend with but the old and the new occur simultaneously.

Beyond scale, speed and simultaneity, postnormal times has other important features that we express as the 3Cs: complexity, contradictions and chaos.

Interconnected, interdependent, networked systems tend to interact in multiple ways following local and different rules. In other words, they tend to be complex. Indeed, almost everything we have to deal with nowadays is complex – that is, connected to and embedded in a plethora of other interdependent things. To solve one problem, we have to solve a string of other problems, which interact with each other in multiple ways. But not everyone shares this view.

On 27 January 2017, President Trump penned an executive order that banned all refugees for 120 days (a direct violation of the Geneva Convention), halted entry for anyone from Syria, and barred anyone from six other countries: Iran, Iraq, Sudan, Libya, Somalia and Yemen. What is clear about Trump's (unconstitutional) order is that it was meant to be an exercise in sensation—a tactic meant to stun—and a "simple" solution to a complex situation. Although Trump campaigned on a platform that involved a complete ban on Muslims entering the US, this modified proposal, albeit equally as horrific, seems to have been generated solely to appease the President's extremist base and speaks to the ways with which complexity is misunderstood or, perhaps even more egregious, appropriated for political ends. In a lengthy, and widely shared, post on Facebook, Heather Richardson, a Professor of History at Boston College, called the Muslim Ban a "shock event"

and noted that such phenomena "depends on speed and chaos because it requires knee-jerk reactions so that people divide along established lines" [23]. It would be foolhardy to underestimate this type of cunning.

There are no simple problems or simple answers. The world is neither one dimensional nor predictable. When citizens demand quick fixes, simple answers to their intractable, interdependent problems, we face a contradiction. No politician of integrity can produce clear, simple plans or give easy, understandable answers. Neither are they willing to say: 'it's a complex problem, we do not know what to do'. So: they lie; and the voters tend to prefer politicians with simple, manufactured, post-truth answers. As American political scientist and futurist, Jim Dator, once quipped, "the future doesn't count because the future doesn't vote." Increasingly, we face complex challenges with multi-generational impacts.

Consider the case of the world's largest movable structure: a steel dome that was recently placed over the damaged nuclear reactor in Chernobyl. After decades of concerted effort, a further crisis was abated, but the solution was not simple or short term. The same is likely to be the case at Fukushima, which might actually end up being worse. After five years, radiation levels remain so high that the robots sent in to gather data are dying at a record pace [24]. The complexity of the situation in Fukushima cannot be underestimated and, as with Chernobyl, is certain to have multi-generational implications. Future generations will have no choice but to deal with this quagmire, and we have colonized their already complex future and bequeathed them a host of contradictions.

And this complexity is enhanced by the contradictions that are all around us – expressed as social inequality, competing demands and outright conflicts between countless competing interests and diverse communities with their own outlooks, ideologies, designs and desires, pulling society in multiple directions. In a complex, networked world, contradictions are a natural product of numerous antagonistic social and cultural networks jostling for dominance. Contradictions are also an outcome of the fact that every policy has costs and affects something or someone negatively.

Something interesting is happening…
The inherent contradictions of postnormal times are well captured by a quote, attributed to marketing professional Tom Goodwin, that circulated on Facebook during May 2016:

UBER, THE WORLD'S LARGEST TAXI COMPANY, OWNS NO VEHICLES. FACEBOOK, THE WORLD'S MOST POPULAR MEDIA OWNER, CREATES NO CONTENT. ALIBABA, THE MOST VALUABLE RETAILER, HAS NO INVENTORY. AND AIRBNB, THE WORLD'S LARGEST ACCOMMODATION PROVIDER, OWNS NO REAL ESTATE. SOMETHING INTERESTING IS HAPPENING.

When such glaring contradictions and complexity come together, the common outcome is chaos. A networked, complex world of contradictions and accelerating change is open to positive feedback where things can multiply rapidly and dangerously in geometric progression and become chaotic. Even small, insignificant things can trigger upheaval and lead to enormous changes with great speed on global scale. A single tweet, a computer hack, a strike, a single resignation, can set off a chain reaction with unforeseen consequences.

So to understand what just happened, and what could happen next, we need to see things within the framework of postnormal times. The four S's and the three C's behave as independent, autonomous forces, which can be triggered and activated by any small perturbation. The danger of things multiplying rapidly in geometric progression is ever present. When crisis emerge they often emerge simultaneously in clusters. Complex networks generate positive feedbacks that can produce chaotic events such as Brexit and, what the *New Statesman* dubbed, 'the Trump apocalypse' [25].

From a postnormal perspective, there is nothing surprising about populism. It is a product of a number of contradictory and complex trends and phenomenon maturing over the years that, thanks to new technologies, have interconnected and emerged simultaneously. The anger and resentment caused by growing inequality. The reinforcement of destructive ethos both by the market and the media – in, for example, the vast array of reality shows on television that promote ruthlessness, greed, and naked consumerism. The inability of political systems to provide mechanisms for addressing the grievances of minorities – whether African-Americans in the US, or Aborigines in Australia, or the Shia in Iraq—is widely apparent. All of these trends have fostered a sense of alienation and loneliness. Now, of course, demographic changes have created a new minority: the disfranchised and marginalised working and middle class whites in the US and Europe, people who conventionally had an upper hand and are not used to seeing themselves at the bottom of the food chain. Then, there is the social media, which like

much else in postnormal times, has an inherent contradiction: it connects and disconnects simultaneously. You cocoon yourself with those who share your views and cut yourself off with those who disagree with you. Thus divisions are strengthened. Both the left-wing populism of Bernie Saunders and Jeremy Corbyn variety, and the right-wing populism of Trump and Le Pen type, are a product of extreme marginalisation and frustration, which in turn, are a product of uncaring, winner takes all political system, the relentless ruthlessness of a 'reality' shows and celebrity based culture, and a social media technology that enables people to create complex networks that can generate chaotic events rapidly. Brexit served as a trigger to galvanise these forces and usher them towards chaos.

Much the same can be said about the forces that have nudged us towards a post-truth society. After all, this was the goal of postmodernism, which told us triumphantly, that 'grand narratives are meaningless', that all truths, whatever their source, are totally relative and, as such, as bad as each other [26]. For the last thirty or so years, this ideology has fuelled academia, architecture, cinema, television, and even shopping malls. A whole generation has grown up imbibing this creed. Politicians, unable to cope with complexity and uncertainty, have been systematically economical with the truth. Corporations and lobby groups have been funding and manufacturing ignorance – climate deniers and pro-smoking lobbies were the initial visible tip of this iceberg. Right-wing extremists and Islamophobes have been spreading lies and misinformation for years. The new communication technologies have enabled all these trends to coalesce into a global force and transform themselves into a complex network. Trump served as a catalyst that enabled these networks to burst out into the open.

Postnormal times have undermined the conventions about how society supposed to function. The assumptions that served as the bedrock of the global order have also evaporated. We find ourselves face to face with new and emerging realities that we have yet to grasp. To have any hope of navigating our way out of postnormal turbulence, we must begin by acknowledging just where we stand at this particular juncture of history.

IN THE EMERGING POSTNORMAL WORLD, POWER HAS EVOLVED, TRANSFORMED, DISSIPATED AND RELOCATED ITSELF FROM THE WEST TO THE EAST AND EVERYWHERE IN BETWEEN.

We have moved from a unipolar to a multipolar world with competing superpowers at loggerheads with each other. The digital revolution is creating novel opportunities for developing countries to consolidate their own domains of power [27]. New non-states actors have emerged that function as networks with immense clout. And individuals, with potential to start viral reactions, willingly or unwittingly, have tremendous chaotic power. Cyber threats from states, non-state actors and networks of hackers and criminals undermine all sources of power. Russia has allegedly interfered in elections not just in the US but also in Georgia and Ukraine. In June 2016, a highly sophisticated Colombian hacker rigged elections in eight Latin American countries – in favour of right wing candidates [28]. Other states will follow. The shifts in power as well as emerging sources of power have not only increased the complexity and contradictory nature of geopolitics but have also generated a host of uncertainties. There is seldom a direct cause and effect relationship between a decision or action and its consequences. If you light a political touch paper in the postnormal world, you are as likely to burn yourself as much as your intended target.

As a consequence of global power shifts, the assumed moral superiority of western culture has evaporated [29]. When Ghandi suggested that 'western civilization is a good idea' he was pointing out that the civilization aspect of the western civilization is only skin deep. The much-vaunted assumption that Europe could never return to its fascist past is no longer valid: the rise of the far right in Europe is now an established trend. We have already seen the part played by the alt-right in the election of Donald Trump. The far right parties in other European countries – Austria, Holland, Hungry, Poland, Norway, Germany – are deeply entrenched and gaining ground. President Le Pen of the fascist National Front is a possibility in France. In postnormal times, Europe can return to its recent fascist past with astonishing speed, regional scale and simultaneously. Much of the post-war international infrastructure, form the World Bank to the Human Rights convention, based as it is on western culture and morality, will thus be increasingly questioned and contested. In postnormal times, all human cultures have lost their bearings; and every social, cultural, political, philosophical and religious outlook known to humanity needs to relearn how to engage with its own moral and ethical precepts.

The assumption that capitalism, as it exists today, can be reformed or altered to promote equality is, as the German sociologist Wolfgang Streeck points out, an 'utopian ideal'. It is now obvious that capitalism, like communism, contains the seeds of its own destruction. The point is not that markets are bad, or private ownership is bad, or creating wealth is bad. The point is that in

its current unrestrained form capitalism is intrinsically designed to increase inequality at an increasing pace. At the beginning of the decade, Oxfam estimated that 388 richest people in the world owned the same wealth as the poorest 50 per cent. In 2014, this number dropped to the richest 80 people. A year later, it came down further to 62 people. In 2016, only eight people on the planet own as much wealth as the bottom half of the population (3.5 billion people). Now, one can argue with the figures but the trend itself is very well established. Moreover, the world has changed too drastically for conventional capitalism to perform adequately. Mervyn King, the former Governor of the Bank of England, points out in his book *The End of Alchemy* [30] that we no longer live in a world where risks could be precisely defined. Instead, we are in a state of 'radical uncertainty': there are just too many known and unknown unknowns for risk-weighted capital to deal with. Capitalism has thus reached its 'sell by' date. It will eventually die. But, as Streeck's book asks, *How will Capitalism End?* [31]. The answer: not with a bang. Before capitalism disappears, it will hang around for a foreseeable future, in limbo, comatose. And even after it is dead, its decaying body will stench the air for generations.

The nation state is caught in a contradictory trap: it has become too complex to be governed adequately yet it cannot cope with the complexity of an interdependent world. It has lost the capacity to protect liberty and equality of all its citizens. Its institutional structures are unable to deal with the contradictory demands of increasingly diverse citizens. A small perturbation – a demonstration against economic inequality, a rally against unpopular government policies – can lead to big unintended chaotic consequences that could unravel the state. As we can see on YouTube, just such sparks produced serious perturbations in Venezuela, as well as Egypt and Ukraine. Witness how rapidly Greece was brought to its knees and turned into a 'Third World' state within Europe. Certain states just cannot function as states at all – Iraq and Syria are obvious example. Everywhere, the state is edging closer and closer towards the edge of chaos. Populism underlines the frustration with the modern state and its inability to cope with postnormal times.

In postnormal times, what is technically possible will be realised and become a reality whether or not it is actually necessary, legitimate or ethical. Emerging technologies are always sold for their benefits. But in postnormal times, all technologies have a darker side that cannot be ignored. Take, for example, two emerging trends: the weaponisation of code and DNA. The interaction of several technologies such as social networks, cloud computing, big data and AI will generate new possibilities for profiling and focussing on specific groups and communities of people. Advancements in what is called Lethal Autonomous Weapon System (LAWS for short), that is a system able

to identify and select a target based on racial profile, behaviour, and other human traits, raise the possibility of development of killer robots specifically designed to target certain groups. Not all such developments would be intentional; some would be second order consequences of innocent technical advances. Consider, for example, the fate of Tay, the AI chat-bot designed to speak like a teenage girl and improve Microsoft's customer service. Within hours of release on Tweeter, Tay was transformed into a fascist entity happily tweeting 'Heil Hitler' [32]. Human interaction can give a totally new spin to an emerging technology. Something similar may happen to DNA editing, bankrolled by high profile investors, such as Bill & Melinda Gates Foundation, Google Ventures, and DuPont, and promoted as a panacea for reducing the suffering of humanity. For the moment, its main applications are limited to genetic engineering, disease modelling, and biomedicine. But its eventual consequences for human societies could be immense as it could easily lead to genetically designed babies (something that is already happening in India), enhancing the physical or intellectual capacity of certain people, and other forms of eugenics. An obsession with racial purity can easily be channelled into an obsession with genetics as history teaches us. It could also be used to engage in genetic warfare against some groups, such as Muslims, Arabs, homosexuals, or it can be applied to ruin specific ecosystems in 'enemy' states. Moreover, specific bacteria, parasites, viruses and fungi could be engineered to focus on selected communities. All this could become a reality because it is technically feasible. Regulatory bodies and 'ethical committees' notwithstanding, there are no real checks to thwart such developments.

POSTNORMAL TIMES ARE NOT LIMITED TO 'FAKE NEWS', 'ALTERNATIVE FACTS' AND 'POST-TRUTH' PRONOUNCEMENTS. RATHER, IGNORANCE HAS EMERGED AS A NEW HIGHLY VALUABLE, ALL-EMBRACING, COMMODITY THAT CAN BE EASILY CONSTRUCTED, MANUFACTURED, AND DISSEMINATED ON GIGANTIC, INDUSTRIAL SCALE.

Ignorance comes in different varieties designed as an instrument of power and manipulation, as agent of contradiction and chaos, as a strategy for distraction, and for the production of uncertainty. It is a valuable tool for states, groups, networks as well as individuals. And it could be used, in all hands, for generating major chaotic events. A good example is provided by a

recent fake story that produced a tense tweeter exchange between two nuclear powers. A tweet headlined 'Israeli Defence Minister: If Pakistan send ground troops to Syria on any pretext, we will destroy this country with nuclear attack' was circulated in December 2016. Pakistani defence minister replied with his own tweet, 'Pakistan is a nuclear state too'. Matters were prevented from escalating further when the Israeli government acted quickly to point out that the story was 'totally fictitious' and the quote had been invented. In postnormal times, the study of ignorance is as important as the promotion of knowledge.

There is no such thing as a generalised, static public opinion. People move like a pendulum from one extreme to another – from yearning for more freedom to yearning for more security, from demanding that the state intervenes to help the needy to accusing the state of controlling their lives. In almost every democracy, society is deeply fragmented: there are unbridgeable chasms between the Left and the Right, the secularists and the religious, the liberals and the fundamentalists, the modernists and the traditionalists, and numerous other verities of outlooks and worldviews in between. Each group exists within its own insulated digital echo chamber where its opinions and prejudices are reverberated endlessly. Digital technology also enables individuals and groups to act anonymously from distance. There is no visible link between the agent and the action. Hence, no or little sense of responsibility. As a result, people who would never normally consciously hold or act on bigoted views are influenced at a deep subliminal and emotional level to project their own 'shadow'. Thus issues of prejudice, bigotry, hate, and divisive attitudes are constantly inflamed. Not surprisingly, there is rapid growth of online social media abuse and trolling amplified by lack of accountability.

It should be obvious, given its complex, contradictory and chaotic characteristics, that postnormal times cannot be managed and controlled. Indeed, the postnormal condition cannot even be understood within absolute outlooks, frameworks of certainty, disciplinary or sectoral boundaries, engineering and technical perspectives, or geopolitical polarities. When nothing is definite, truly guaranteed or totally safe, and acceleration is the only constant, the best we can hope for is to navigate our way through these turbulent periods while also never losing sight of our preferred future. Although it can be easy to feel overwhelmed at the swirling postnormalcy all around us, we must never lose hope and do our utmost to nurture positive, sustainable and life enhancing change. Projects such as the Seeds of Good Anthropocenes [33], which showcases ecological initiatives that are not well known, provide a strong counter-narrative to the widespread appetite for dystopia. Appropedia [34] —a wiki for open source sustainability solutions

that boasts over 7,000 tools and resources for those in need—offers another testament to the potentiality that beyond postnormal times another future is possible, but we must, as Jim Dator observes, learn how to surf tsunamis—an apt metaphor for life in postnormal times.

Navigating postnormal times requires certain prerequisites. We need an awareness of different futures: what alternatives may be lurking over the horizon. An alertness to futures consequences can increase agency in times of radical uncertainty and support an ethos of futures literacy. As Mervyn King says, it is better to be roughly right than precisely wrong. That means instead of trying to predict we need to anticipate. In an interconnected, interdependent world, events can rapidly become chaotic. We need to appreciate that there are no single or simple solutions to any problem. Most of our problems are complex, interconnected, and 'wicked'. Tackling them needs aptitudes and techniques based on inclusive and multiple ways of knowing, being and doing. We need to move from conventional problem solving based on illusory precise mathematics, such as GDP formula [35], derivatives, and opaque algorithms [36], towards systemic stewardship, and work 'to create the conditions in which interacting agents in the system will adapt towards socially desirable outcomes' [37]. We need to connect knowledge with values, and question ethical implications of perpetual technological advancement. Most of all, navigating postnormal times requires a commitment to some rather old-fashioned virtues that globalised society has side-lined such as modesty, accountability, humility and community. And there is one value that we need to urgently learn: how to deal with mindboggling diversity, listen to multiple voices, appreciate a plethora of perspectives, accommodate different ways of being, doing and knowing, *and* synthesise an inclusive way forward.

This is where polylogues enters the equation. Polylogues are spaces where, as cultural theorist Julia Kristeva [38] suggests, multiple logics, perspectives, voices, and existences come together to generate new synthesis.

POLYLOGUES ARE ACKNOWLEDGEMENT OF THE REALITY THAT DIALOGUE IS NO LONGER ENOUGH IN A WORLD OF ASTONISHING DIVERSITY AND PLURALISM.

The concept also emerges from the realisation that contradictions cannot be resolved but only transcended; and new syntheses and knowledge is produced in communities through vigorous and structured exchange of ideas. Polylogues are central to our work on postnormal times.

The Postnormal Times Reader embodies and speaks to the values of polylogues, the essential tool for navigating our way out of the pile-up that is building on the highway to the future. The discourse of postnormal times remains a work in progress. Hence, the *Reader* will itself change and evolve over time with new editions. But it will always be a text with diversity and plurality at its core; and a space that welcomes your contributions.

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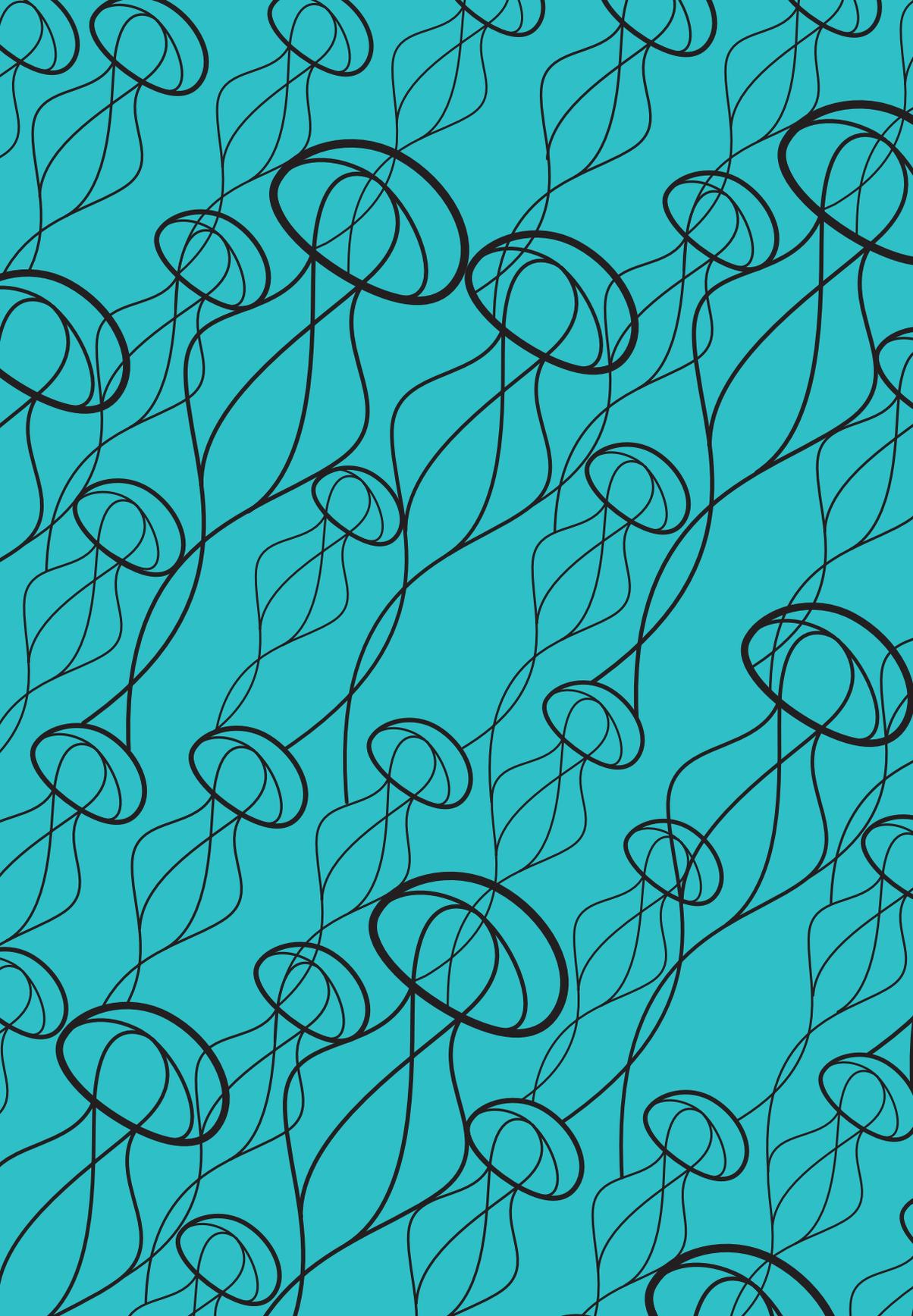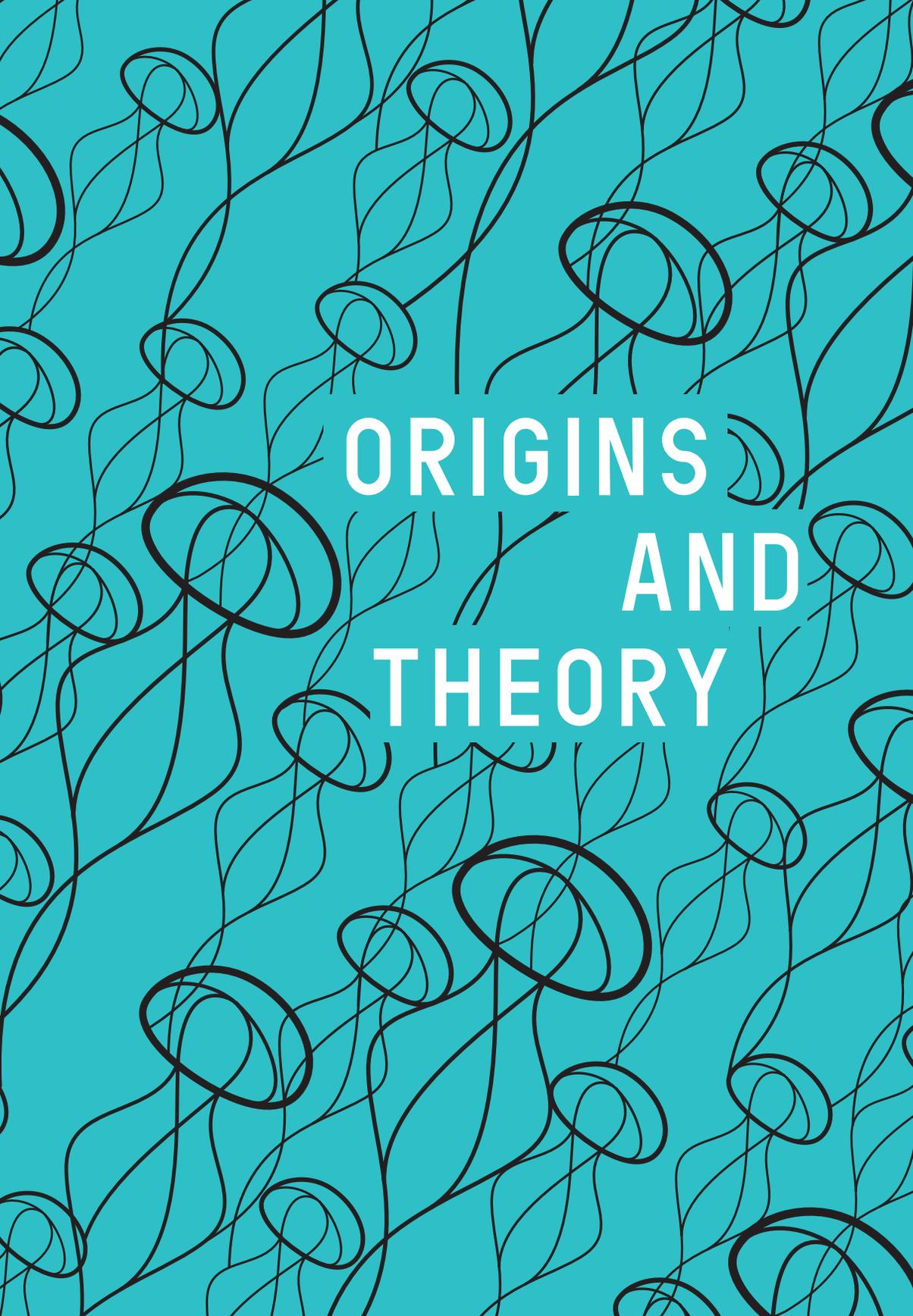
ORIGINS AND THEORY

SCIENCE FOR THE POST-NORMAL AGE

Silvio O. Funtowicz and Jerome R. Ravetz

Science always evolves, responding to its leading challenges as they change through history. After centuries of triumph and optimism, science is now called on to remedy the pathologies of the global industrial system of which it forms the basis. Whereas science was previously understood as steadily advancing in the certainty of our knowledge and control of the natural world, now science is seen as coping with many uncertainties in policy issues of risk and the environment. In response, new styles of scientific activity are being developed. The reductionist, analytical worldview which divides systems into ever smaller elements, studied by ever more esoteric specialism, is being replaced by a systemic, synthetic and humanistic approach. The old dichotomies of facts and values, and of knowledge and ignorance, are being transcended. Natural systems are recognized as dynamic and complex; those involving interactions with humanity are 'emergent', including properties of reflection and contradiction. The science appropriate to this new condition will be based on the assumptions of unpredictability, incomplete control, and a plurality of legitimate perspectives.

AT PRESENT, THERE IS NO AGREED DESCRIPTION OF WHAT THE FUTURE WILL BRING, BUT THERE IS A GENERAL SENSE THAT MUCH OF OUR INTELLECTUAL INHERITANCE NOW LIES FIRMLY IN THE PAST.

'Post-modern' is widely used as a term for describing contemporary cultural phenomena [1]; it refers to an approach of unrestrained criticism of the assumptions underlying our dominant culture, and it flirts with nihilism and despair. In contrast to this, here we introduce the term 'post-normal'. This has an echo of the seminal work on modern science by Kuhn [2]. For him, 'normal

science' referred to the unexciting, indeed anti-intellectual routine puzzle solving by which science advances steadily between its conceptual revolutions. In this 'normal' state of science, uncertainties are managed automatically, values are unspoken, and foundational problems unheard of. The post-modern phenomenon can be seen in one sense as a response to the collapse of such 'normality' as the norm for science and culture. As an alternative to post-modernity, we show that a new, enriched awareness of the functions and methods of science is being developed. In this sense, the appropriate science for this epoch is 'post-normal'.

This emerging science fosters a new methodology that helps to guide its development. In this, uncertainty is not banished but is managed, and values are not presupposed but are made explicit. The model for scientific argument is not a formalized deduction but an interactive dialogue. The paradigmatic science is no longer one in which location (in place and time) and process are irrelevant to explanations. The historical dimension, including reflection on humanity's past and future, is becoming an integral part of a scientific characterization of Nature.

Our contribution to this new methodology focuses on two aspects. One is the quality of scientific information, analysed in terms of both the different types of uncertainty in knowledge and the intended functions of the information. It has hitherto been a well kept secret that scientific 'facts' can be of variable quality; and an informed awareness of this human face of science is a key to its enrichment for its future tasks. Our other contribution relates to problem-solving strategies, analysed in terms of uncertainties in knowledge and complexities in ethics. When science is applied to policy issues, it cannot provide certainty for policy recommendations; and the conflicting values in any decision process cannot be ignored even in the problem-solving work itself. For quality of information, we have developed a transparent system of notations (NUSAP) whereby the different types of uncertainty that affect scientific information can be expressed. It can thereby be communicated in a concise, clear and nuanced way, among traditional and extended peer communities alike. The NUSAP approach embodies the principle that uncertainty cannot be banished from science; but that good quality of information depends on good management of its uncertainties [3].

We use the interaction of systems uncertainties and decision stakes to provide guidance for the choice of appropriate problem-solving strategies. The heuristic tool is a set of graphical displays of three related strategies, from the most narrowly defined to the most comprehensive. Two of them are familiar from past experience of scientific or professional practice; the last, where systems uncertainties or decision stakes are high, corresponds

to the practice of the sciences of the postnormal epoch [4]. One way of distinguishing among the different sorts of research is by their goals: applied science is 'mission-oriented'; professional consultancy is 'client-serving'; and post-normal science is 'issue-driven'. These three can be contrasted with core science the traditional 'pure' or 'basic' research-which is 'curiosity-motivated'. In the area of post-normal science the problems of quality assurance of scientific information are particularly acute, and their resolution requires new conceptions of scientific methodology.

In this new sort of science, the evaluation of scientific inputs to decision making requires an 'extended peer community' [5]. This extension of legitimacy to new participants in policy dialogues has important implications both for society and for science. With mutual respect among various perspectives and forms of knowing, there is a possibility for the development of a genuine and effective democratic element in the life of science. The new challenges for science can then become the successors of the earlier great 'conquests', as of disease and then of space, in providing symbolic meaning and a renewed sense of adventure for a new generation of recruits to science in the future.

Reinvasion of the laboratory by nature

The place of science in the industrialized world was well depicted by Bruno Latour [6], when he imagined Pasteur as extending his laboratory to all the French countryside, and thereby conquering it for science and for himself. In this vision, Nature itself no longer needs to be approached as wild and threatening, but through the methodology of science it can be tamed and rendered useful to mankind. The miracle of modern natural science is that the laboratory experience, the study of an isolated piece of Nature that is kept unnaturally pure, stable and reproducible, can be successfully extended to the understanding and control of Nature in the raw. Our technology and medicine together have made Nature predictable and in part controllable, and they have thereby enabled many people to enjoy a safer, more comfortable and pleasant life than was ever before imagined in our history. The obverse side of this achievement is that it may well be unsustainable, not merely in terms of equity, but even in terms of sheer survival.

The triumph of the scientific method, deploying the technically esoteric knowledge of its experts, has led to its domination over all other ways of knowing; this applies to our knowledge of Nature, and of much else besides. Commonsense experience and inherited skills of making and living have lost their claim to authority; they have been displaced by the theoretically constructed objects of scientific discourse, which are necessary for dealing

with invisible things such as microbes, atoms, genes and quasars. Although formally democratic (since there are now no formal barriers to the training for that expertise), science is in fact a preserve of those who can engage on a prolonged and protected course of education, and thereby of the social groups to which they belong. In a tradition stemming from the Enlightenment of the 18th century, the rationality of public decision making must appear to be scientific. Hence intellectuals with a scientific style (including economists par excellence) have come to be seen as leading authorities, indeed the possessors and purveyors of practical wisdom. There has been a universal assumption (however superficial and laced with cynicism) that scientific expertise is the crucial component of decision making, whether concerning Nature or society.

Now the very powers that science has created have led to a new relationship of science with the world. The extension of the laboratory has gone beyond the small-scale intervention typified by Pasteur's conquest of anthrax. We do not merely observe the familiar gross disturbances of the natural environment resulting from modern industrial and agricultural practices. The methodology for coping successfully with these novel problems cannot be the same as the one that helped to create them. Much of the success of traditional science lay in its power to abstract from uncertainty in knowledge and values; this is shown in the dominant teaching tradition in science, which created a universe of unquestionable facts, presented dogmatically for assimilation by uncritical students. Now scientific expertise has led us into policy dilemmas which it is incapable of resolving by itself. We have not merely lost control and even predictability; now we face radical uncertainty and even ignorance, as well as ethical uncertainties lying at the heart of scientific policy issues.

For understanding the new tasks and methods of science, we can fruitfully invert Latour's metaphor, and think of Nature as reinvading the lab. We see this in many ways; for example, our science-based technology, which for a while appeared to be a new man-made Nature dominant over the old, is now appreciated as critically dependent on the larger ecosystem in which it is embedded: and that it risks destruction of itself if that matrix becomes seriously perturbed or degraded. Similarly, the extension of modern technology to all humanity, essential if equity between peoples is to be realized under the present system, would accelerate the self-destructive tendencies of the technological system itself. Thus Nature reasserts itself on all our scientific planning, for the technical and human perspectives alike.

There have been other episodes in history when science has been transformed, when a particularly successful problem-solving activity has displaced older forms and become the paradigmatic example of science. These

transformations have been identified with the names of such great scientists as Galileo, Darwin and Einstein. They have mainly affected theoretical science, because until quite recently technology and medicine were not generally influenced in the short term by the results of scientific research. The challenges to science were largely in the realm of ideas. Now, as the powers of science have given rise to threats to the very survival of humanity, the response will be in the social practice of science as much as in its intellectual structures.

Centrality of uncertainty and quality

Now that the policy issues of risk and the environment present the most urgent problems for science, uncertainty and quality are moving in from the periphery, one might say the shadows, of scientific methodology, to become the central, integrating concepts. Hitherto they have been kept at the margin of the understanding of science, for laypersons and scientists alike. A new role for scientists will involve the management of these crucial uncertainties; therein lies the task of quality assurance of the scientific information provided for policy decisions.

These new policy issues have common features that distinguish them from traditional scientific problems. They are universal in their scale and long-term in their impact. Data on their effects, and even data for baselines of 'undisturbed' systems, are radically inadequate. The phenomena, being novel, complex and variable, are themselves not well understood. Science cannot always provide well founded theories based on experiments for explanation and prediction, but can frequently achieve at best only mathematical models and computer simulations, which are essentially untestable. On the basis of such uncertain inputs, decisions must be made, under conditions of some urgency. Therefore policy cannot proceed on the basis of factual predictions, but only on policy forecasts.

Computer models are the most widely used method for producing statements about the future based on data of the past and present. For many, there is still a magical quality about computers, since they are believed to perform reasoning operations faultlessly and rapidly. But what comes out at the end of a program is not necessarily a scientific prediction; and it may not even be a particularly good policy forecast. The numerical data used for inputs may not derive from experimental or field-studies; the best numbers available, as in many studies of industrial risk, may simply be guesses collected from experts. Instead of theories which give some deeper representation of the natural processes in question, there may simply be standard software packages applied with the best fitting numerical parameters. And instead of experimental, field or historical evidence, as is normally assumed for scientific

theories, there may be only the comparison of calculated outputs with those produced by other equally untestable computer models.

Despite the enormous effort and resources that have gone into developing and applying such methods, there has been little concerted attempt to see whether they contribute significantly either to knowledge or to policy. In research related to policy for risk and the environment, which is so crucial for our well being, there has been little effort of quality assurance of the sort that the traditional experimental sciences take for granted in their ordinary practice. Whereas computers could in principle be used to enhance human skill and creativity by doing all the routine work swiftly and effortlessly, they have instead in many cases become substitutes for disciplined thought and scientific rigour [7].

Even when there is empirical data for policy problems, it is not really amenable to treatment by traditional statistical techniques. As J.C. Bailar puts it:

All the statistical algebra and all the statistical computations are of value only to the extent that they add to the process of inference. Often they do not aid in making sound inferences; indeed they may work the other way, and in my experience that is because the kinds of random variability we see in the big problems of the day tend to be small relative to other uncertainties. This is true, for example, for data on poverty or unemployment; international trade; agricultural production; and basic measures of human health and survival. Closer to home, random variability-the stuff of p-values and confidence limits, is simply swamped by other kinds of uncertainties in assessing the health risks of chemicals exposures, or tracking the movement of an environmental contaminant, or predicting the effects of human activities on global temperature or the ozone layer [8].

Thus, by traditional criteria of scientific method, the quality of research on these policy-related problems is dubious at best. The tasks of uncertainty management and quality assurance, managed in traditional science by individual skill and communal practice, are left in confusion in this new area. New methods must be developed for making our ignorance usable [9]. For this there must be a radical departure from the total reliance on techniques, to the exclusion of methodological, societal or ethical considerations, that has hitherto characterized traditional 'normal' science.

An integrated approach to the problems of uncertainty, quality and values has been provided by the NUSAP system. In its terms, different kinds

of uncertainty can be expressed, and used for an evaluation of quality of scientific information. We have to distinguish among the technical, methodological and epistemological levels of uncertainty; these correspond to inexactness, unreliability and 'border with ignorance', respectively [10]. Uncertainty is managed at the technical level when standard routines are adequate; these will usually be derived from statistics (which themselves are essentially symbolic manipulations) as supplemented by techniques and conventions developed for particular fields. The methodological level is involved when more complex aspects of the information, as values or reliability, are relevant. Then, personal judgments depending on higher-level skills are required; and the practice in question is a professional consultancy, a 'learned art' like medicine or engineering. Finally, the epistemological level is involved when irremediable uncertainty is at the core of the problem, as when computer modellers recognize 'completeness uncertainties' which can vitiate the whole exercise, or more generally in post-normal science. In NUSAP these levels of uncertainty are conveyed by the categories of spread, assessment and pedigree, respectively.

Quality assurance is as essential to science as it is to industry; and whereas in traditional research science it could be managed informally by a peer community, in the new policy issues of risk and the environment, quality of science must be addressed as a matter of urgency. The inadequacy of traditional peer review has been extensively analysed for the different areas of 'core science' [11], 'mandated science' [12], and 'regulatory' science [13]. As we see, the evaluation of quality in this new context of science cannot be restricted to products of research; it must also include process and persons, and in the last resort purposes as well. This 'p-fourth' approach to quality assurance of science necessarily involves the participation of people other than the technically qualified researchers; indeed, all the stakeholders in an issue form an 'extended peer community' for an effective problem-solving strategy for global environmental risks.

Problem-solving strategies

To characterize an issue involving risk and the environment, in what we call

'POSTNORMAL SCIENCE', WE CAN THINK OF IT AS ONE WHERE FACTS ARE UNCERTAIN, VALUES IN DISPUTE, STAKES HIGH AND DECISIONS URGENT.

Figure 1. Problem-solving strategies
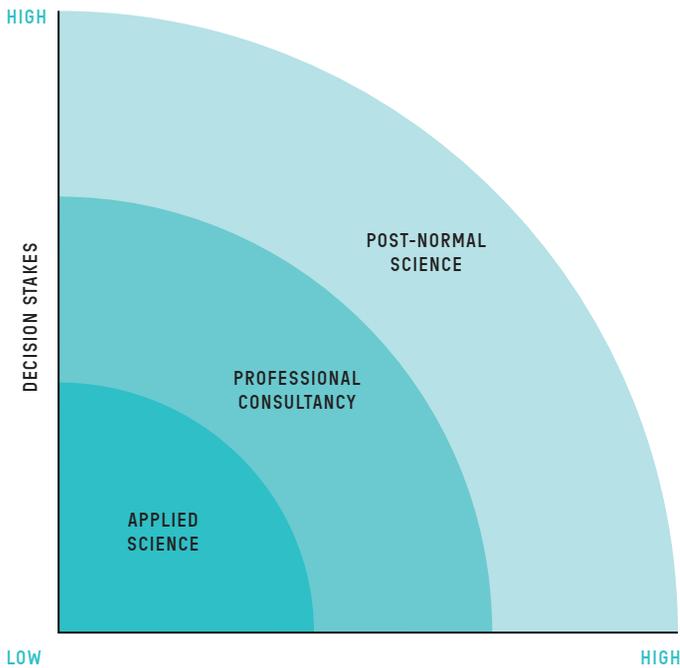
In such a case, the term 'problem', with its connotations of an exercise where a defined methodology is likely to lead to a clear solution, is less appropriate. We would be misled if we retained the image of a process where true scientific facts simply determine the correct policy conclusions. However, the new challenges do not render traditional science irrelevant; the task is to choose the appropriate kinds of problem-solving strategies for each particular case.

Figure 1 involves three distinctive features. First (and this is an innovation for scientific methodology), it shows the interaction of the epistemic (knowledge) and axiological (values) aspects of scientific problems. These are depicted as the axes of the figure, representing the intensity of uncertainty and of decision stakes, respectively. We notice that uncertainty and decision stakes are the opposites of attributes which had traditionally been thought to characterize science, namely its certainty and its value neutrality (this is the second innovative feature of our analysis). Finally, the two dimensions are themselves both displayed as comprising three discrete intervals. By this means, we achieve a diagram which has three zones representing and characterizing three kinds of problem-solving strategies.

Figure 2. Applied science
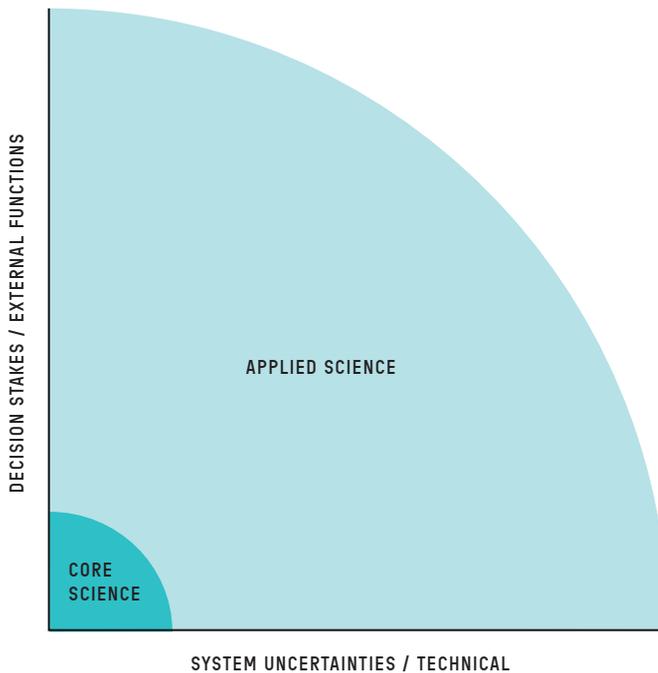
The term 'systems uncertainties' conveys the principle that the problem is concerned not with the discovery of a particular fact, but with the comprehension or management of an inherently complex reality. By 'decision stakes' we understand all the various costs, benefits, and value commitments that are involved in the issue through the various stakeholders. It is not necessary for us to attempt now to make a detailed map of these as they arise in the technical and social aspects of dialogue on any particular policy issue. It is enough for the present conceptual analysis, that it is possible in principle to identify which elements are the leading or dominant ones, and then to characterize the total systems by them.

The explanation of the diagram of problem-solving strategies starts with the most familiar strategy. We call this applied science. This is involved when both systems uncertainties and decisions stakes are low. The systems uncertainties will be at the technical level, and will be managed by standard routines and procedures. These will include particular techniques to keep instruments operating reliably, and also statistical tools and packages for the treatment of data. The decision stakes will be simple as well as small; resources

have been put into the research exercise because there is some particular straightforward external function for its results. The resulting information will be used in a larger enterprise, which is of no concern to the researcher on the job. We illustrate this in Figure 2.

In Figure 2, traditional 'pure', 'basic' or 'core' science can be considered as concentrated around the intersection of the axes. By definition, there are no external interests at stake in curiosity-motivated research, so decision stakes are low. Also, the research exercise is generally not undertaken unless there is confidence that the uncertainties are low, that is that the problem is likely to be soluble by a normal, puzzle-solving approach. Clearly, highly innovative or revolutionary research, either pure or applied, does not lie within this category, since the systems uncertainties are inherently high, and for various reasons the decision stakes are also. Thus Galileo's astronomical researches involved the whole range of issues from astronomical technique to religious orthodoxy; so even though it was not directly applicable to industrial or environmental problems, it was definitely extreme both in its uncertainties and its decision stakes. The same could be said of Darwin's work in *The Origin of Species*. In this respect there is a continuity between the classic 'philosophy of nature' and the post-normal science that is now emerging.

We can usefully compare core science and applied science in relation to quality assurance. Where uncertainties and external decision stakes are both low, the traditional processes of peer review of projects and refereeing of papers have worked well enough despite their known problems. However, when the results of the research exercise become important for some external function, the relevant peer community is extended beyond one particular research community, to include users of all sorts, and also managers. The situation in quality assessment becomes more like that of manufacturers and consumers, bringing different agendas and different skills to the market. For an example of how criteria of quality can differ between producers and consumers, we may consider product safety; a rare accident may be less significant to manufacturers (especially if product liability laws are lax) than for consumers. In the case of applied science, a result validly produced under one set of conditions may be inappropriate when applied to others; thus if measurements of a toxicant are given as an average over time, space or exposed populations, that may be adequate for general regulatory purposes, but that set-up could ignore damaging peak concentrations or harm to susceptible groups.

IT FREQUENTLY HAPPENS THAT THE RESULTS OF AN APPLIED SCIENCE PROJECT ARE NOT 'PUBLIC KNOWLEDGE', FREELY AVAILABLE TO ALL COMPETENT USERS, BUT RATHER ARE 'CORPORATE KNOW-HOW', THE 'INTELLECTUAL PROPERTY' OF THE PRIVATE BUSINESS OR STATE AGENCY THAT SPONSORS THE RESEARCH EXERCISE.

If the information is relevant to some policy issue, the tasks of quality assurance may become controversial, involving conflicts over confidentiality; and the decision stakes may be raised over that non-scientific aspect. Then, the actual problem-solving strategy is no longer applied science, for the issue may involve struggles over administrative and political power, and constitutional principles of 'right to know' of citizens (for example, concerning environmental hazards or technological risks). The relevant peer community is thus extended beyond the direct producers, sponsors and users of the research, to include all with a stake in the product, the process, and its implications both local and global. This extension of the peer community may include investigative journalists, lawyers and pressure groups. Thus a problem which may appear totally straightforward scientifically can become one which transcends the boundaries of applied science, giving rise to a more complex problem-solving strategy, such as 'post-normal science'. When scientists with a traditionalist outlook bemoan the bad influence of 'the media,' it is sometimes because of their difficulty in comprehending this new feature of science when it is involved in policy.

Professional consultancy
The diagram for professional consultancy (Figure 3) has two zones, with applied science nested inside. This signifies that professional consultancy includes applied science, but that it deals with problems which require a different methodology for their complete resolution. Uncertainty cannot be managed at the routine, technical level, because more complex aspects of the problem, such as reliability of theories and information, are relevant. Then, personal judgments depending on higher level skills are required, and uncertainty is at the methodological level.

The relation between systems uncertainties and decision stakes are well illustrated by the task of incorporation of error-costs in a decision. For exercises in applied science, these are generally subsumed implicitly in standard statistical methods. Confidence limits, and bounds for the two

Figure 3. Professional consultancy
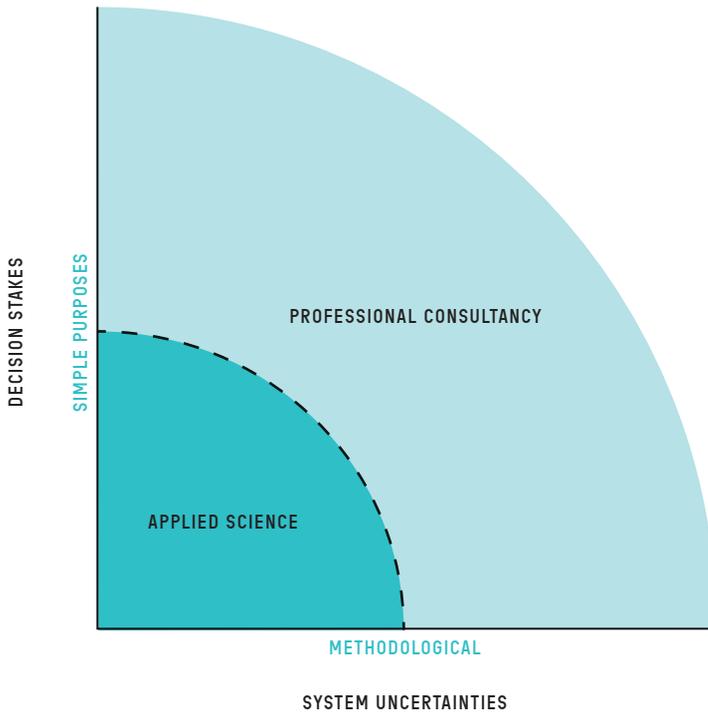
types of inference-errors, are normally employed at pre-set constant values, without reflection. But in professional tasks, error-costs may be so large as to endanger the continuation of a career. Hence they must be treated as risks, where some calculation may be employed but where judgment will necessarily predominate. When in a forensic situation, the professional will need to take account of the burden of proof for the particular problem, which will reflect the values of a particular society (whose harm is the more important to be prevented?). The same consideration holds for any policy issue; thus a problem of environmental pollution will be handled differently depending on whether a process is deemed safe until proved dangerous, or vice versa. Alternatively, we might ask whether absence of evidence of harm is interpreted as evidence of absence of harm. Although such methodological issues are quite beyond the ken of applied science, in professional consultancy they strongly condition all the work; and the simple descriptions as given here do not encompass the subtleties of burden of proof as it is used in practice.

Professional consultancy shares many features with applied science, distinguishing them both from core science. Both operate under constraints of time and resources, with projects funded and mandated by external interests; and their products frequently lie outside the 'public knowledge' domain. For much of the time professional tasks can be reduced to routine exercises, as the work becomes standardized in its technique and in the management of uncertainty. But professional consultancy involves the readiness to grapple with new and unexpected situations, and to bear the responsibility for their outcome. Engineering is on the border between the two, for most engineering work is done within organizations rather than for individual clients; and yet the problems cannot be completely reduced to a routine, so that 'engineering judgment' is a well known aspect of the work. Of engineering we could say that most routine engineering practice is a matter of empirical craft skills using the results of applied science, while at its highest levels it becomes true professional consultancy.

A contrasting intermediate case is that of the role of the 'expert'. This is normally someone who advises, but whose responsibility is defined by his position as an employee; hence it is not the client's interest that defines his role but that of his employer. In that respect, his decision stakes are simpler than those of the professional consultant, and the systems uncertainties as he sees them are correspondingly reduced. It is possible for a single individual to occupy these three roles, alternately or even (to some extent) simultaneously, giving rise to confusion among his audiences or perhaps even for himself! An academic researcher may give advice on a policy-related issue; his prestige and legitimacy derive from his reputation in research, either in core science or applied science; he assumes the authority of the professional consultant when offering his judgments; and if his research is too closely controlled by some funding organization, then in fact he might be acting as an expert on their behalf. This is why the possibility of 'conflict of interest' is raised when scientists make public pronouncements, without anyone impugning their personal integrity as perceived by themselves.

As a problem-solving strategy, professional consultancy has important differences from applied science. The outcomes of applied science exercises, like those of core science, have the features of reproducibility and prediction. That is, any experiment should in principle be capable of being reproduced anywhere by any competent practitioner, for they operate on isolated, controlled natural systems. Therefore the results amount to predictions of the future behaviour of natural or technical systems under similar conditions. By contrast, professional tasks deal with unique situations, however broadly similar they may be. The personal element becomes correspondingly important; thus it is legitimate

Figure 4. Post-normal science
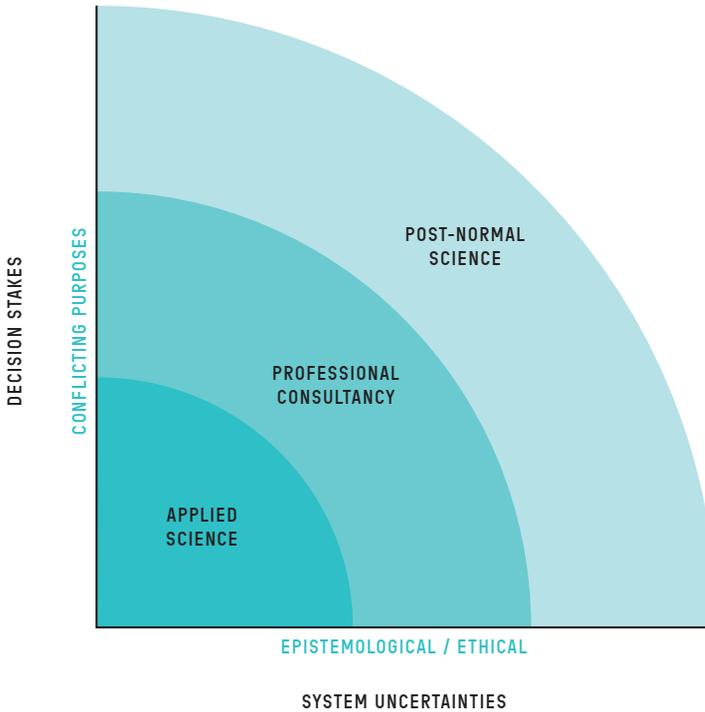
to call for a second opinion without questioning the competence or integrity of a doctor in a medical case. Alternatively, who would expect two architects to produce identical designs for a single brief? In the same way, it would be unrealistic to expect two safety engineers to produce the same model (or the same conclusions) for a hazard analysis of a complex installation. The public may become confused or disillusioned at the sight of scientists disagreeing strongly on a problem apparently involving only applied science (and the scientists may themselves be confused!). But when it is appreciated that these policy issues involve professional consultancy, such disagreements should be seen as inevitable and healthy. The gain in clarity should more than compensate for the loss of mystique of scientific infallibility.

This last phenomenon reminds us of the differences in quality assurance that emerge when we extend from applied science to professional consultancy. We can envisage four components in the problem-solving task; the process, the product, the person and the purpose. This is the 'p-fourth' approach to quality assurance mentioned above. In core science, the main focus in the task

of quality assessment is on the process; the assessment is made on the basis of the research report, and it requires a community of subject-specialism peers (who can 'read between the lines' of the research report) for its performance. In applied science, the focus of assessment extends to products, and is done by users, for it is on their behalf that the research exercises are done. Quality assurance is then not so esoteric, since the users have less need to understand the research process; and thus there is an automatic extension of the community with a legitimate participation in evaluation. In professional consultancy there can be no simple, objective criteria or processes for quality assurance (beyond simple competence). The clients become an important part of the community that assesses quality of work, although they have no relevant technical expertise. Thus in these three cases, we see an expansion of the 'peer community' involved in quality assurance. In this respect, the 'extended peer community' of post-normal science is a natural continuation of this tendency.

Post-normal science

We now consider the third sort of problem-solving strategy, where systems uncertainties or decision stakes are high (Figure 4).

The policy issues that drive post-normal science may include a large scientific component in their description, sometimes even to the point of being capable of expression in scientific language. In this sense they are analogous to the 'trans-science' problems first announced by Alvin Weinberg [14]. But it seems best to distinguish the problems analysed here from that earlier class; for Weinberg imagined problems that differed only in scale or technical feasibility from those of applied science. They were scarcely different from those of professional consultancy as we define it [15]. In the terms of our diagram,

POST-NORMAL SCIENCE OCCURS WHEN UNCERTAINTIES ARE EITHER OF THE EPISTEMOLOGICAL OR THE ETHICAL KIND, OR WHEN DECISION STAKES REFLECT CONFLICTING PURPOSES AMONG STAKEHOLDERS.

We call it 'postnormal' to indicate that the puzzle-solving exercises of normal science (in the Kuhnian sense) which were so successfully extended from the laboratory to the conquest of Nature, are no longer appropriate for the resolution of policy issues of risks and the environment. We notice that in Figures 2–4, applied science appears three times and professional consultancy twice.

Do these labels refer to the same things when they are included in a broader problem-solving strategy as when they are standing alone? In the sense of their routine practice, yes. But when they are embedded in a broader problem-solving strategy the whole activity is reinterpreted. The problems are set and the solutions evaluated by the criteria of the broader communities. Thus post-normal science is indeed a type of science, and not merely politics or public participation. However different from the varieties of problem solving that have now become entrenched and traditional, it is a valid form of enquiry, appropriate to the needs of the present.

Examples of problems with combined high decision stakes and high systems uncertainties are familiar from the current crop of policy issues of risk and the environment. Indeed, any of the problems of major technological hazards or largescale pollution belong to this class. Post-normal science has the paradoxical feature that in its problem-solving activity the traditional domination of 'hard facts' over 'soft values' has been inverted. Because of the high level of uncertainty, approaching sheer ignorance in some cases, and the extreme decision stakes, we might even in some cases interchange the axes on our diagram, making values the horizontal, independent variable. A good example of such an inversion is provided by the actions that will need to be taken in preparation for mitigating the effects of sea level rise consequent on global climate change. The 'causal chain' here starts with the various outputs of human activity, producing changes in the biosphere, leading to changes in the climatic system, then changes in sea level (all these interacting in complex ways with varying delay-times). Out of all this must come a set of forecasts which will provide the scientific inputs to decision processes; these will contribute to policy recommendations that must then be implemented on a broad scale. But all the causal elements are uncertain in the extreme; to wait until all the facts are in, would be another form of imprudence. At stake may be much of the built environment and the settlement patterns of people; mass migrations from low-lying districts could be required sooner or later, with the consequent economic, social and cultural upheaval.

Such far-reaching societal policies will be decided on the basis of scientific information that is inherently uncertain to an extreme degree; even more so because plans for mitigation must be started with a long lead-time so that the huge rebuilding and resettlement programmes can get under way. The rise in sea level would not be like a slow tide, but more likely in the form of floods of increasing frequency and destructiveness. Unprepared harbour cities (as most of the worlds political and financial centres) could be devastated. A new form of legitimation crisis could emerge; for if the authorities try to base their appeals for sacrifice on the traditional certainties of applied science, as on the

model of Pasteur, this will surely fail. Public agreement and participation, deriving essentially from value commitments, will be decisive for the assessment of risks and the setting of policy. Thus the traditional scientific inputs have become 'soft' in the context of the 'hard' value commitments that will determine the success of policies for mitigating the effects of a possible sea-level rise. In this way we see how the 'systems' involved in environmental policy issues are truly 'emergent', comprising dimensions of cognition and value which transcend those of the systems studied by traditional systems theory and its modelling techniques. Thus post-normal science corresponds to an enriched systems theory, deriving analytical rigour from it, and providing it with experience and insights.

The traditional fact/value distinction has not merely been inverted; in postnormal science the two categories cannot be realistically separated. The uncertainties go beyond those of the systems, to include ethics as well. All policy issues of risk and the environment involve new forms of equity, which had previously been considered 'externalities' to the real business of the scientific-technical enterprise, that is the production and consumption of commodities. These new policy issues involve the welfare of new stakeholders, such as future generations, other species, and the planetary environment as a whole. The intimate connection between uncertainties in knowledge and in ethics is well illustrated by the problems of extinction of species, either singly or on a global scale. It is impossible to produce a simple rationale for adjudicating between the rights of people who would benefit from some development, and those of a species of animal or plant which would be harmed. However, the ethical uncertainties should not deter us from searching for solutions; nor can decision makers overlook the political force of those humans who have a passionate concern for those who cannot plead or vote. Only a dialogue between all sides, in which scientific expertise takes its place at the table with local and environmental concerns, can achieve creative solutions to such problems, which can then be implemented and enforced. Otherwise, either crude commercial pressures, inept bureaucratic regulations, or counterproductive protests will dominate, to the eventual detriment of all concerned.

All these complexities do not prevent the resolution of policy issues in post- normal science. The diagram should not be seen statically, but rather dynamically; different aspects of the problem, located in different zones, interact and lead to its eventual solution. There is a pattern of evolution of issues, with different problem-solving strategies successively coming to prominence, which provides a means whereby dialogue can eventually contribute to their resolution. For as the debate develops from its initial

confused phase, positions are clarified and new research is stimulated. Although the definition of problems is never completely free of politics, an open debate ensures that such considerations are neither one-sided nor covert. And as applied science exercises eventually bring in new facts, professional consultancy tasks become more effective. A good example of this pattern of evolution is lead in petrol, where despite the absence of conclusive environmental or epidemiological information, a consensus was eventually reached that the public health hazards were not acceptable. Such a resolution does not always come quickly or easily; some substances might be called 'yo-yo risks' because of the way they go up and down in the experts' perception; Dioxin seems to be one such. In those cases, effective public policy would be better based on an appreciation of the inherent uncertainties rather than on the illusion that *this* time applied science has given us the true verdict of safe or dangerous.

Extended peer communities
The dynamic of resolution of policy issues in post-normal science involves the inclusion of an ever-growing set of legitimate participants in the process of quality assurance of the scientific inputs. As we have seen, in applied science and professional consultancy the peer communities are already extended beyond those for core science. In post-normal science, the manifold uncertainties in both products and processes require that the relative importance of persons becomes enhanced. Hence the establishment of the legitimacy and competence of participants will inevitably involve broader societal and cultural institutions and movements. For example, persons directly affected by an environmental problem will have a keener awareness of its symptoms, and a more pressing concern with the quality of official reassurances, than those in any other role [16]. Thus they perform a function analogous to that of professional colleagues in the peer-review or refereeing process in traditional science, which otherwise might not occur in these new contexts.

On occasion, the legitimate work of extended peer communities can even go beyond the reactive tasks of quality assessment and policy debate. The new field of 'popular epidemiology' involves concerned citizens doing the disciplined research which could, or perhaps should, have been done by established institutions but was not [17]. In such cases they may encounter professional disapproval and hostility, being criticized either for lacking certified expertise or for being much too personally concerned about the problem. The creative conflict between popular and expert epidemiology not only leads to better control of environmental problems; it also improves scientific knowledge. A classic case is 'Lyme disease', where local citizens first identified a pattern in

the vague symptoms which later characterized a previously unknown, but not uncommon tick-borne disease.

WHEN PROBLEMS LACK NEAT SOLUTIONS, WHEN ENVIRONMENTAL AND ETHICAL ASPECTS OF THE ISSUES ARE PROMINENT, WHEN THE PHENOMENA THEMSELVES ARE AMBIGUOUS, AND WHEN ALL RESEARCH TECHNIQUES ARE OPEN TO METHODOLOGICAL CRITICISM, THEN THE DEBATES ON QUALITY ARE NOT ENHANCED BY THE EXCLUSION OF ALL BUT THE SPECIALIST RESEARCHERS AND OFFICIAL EXPERTS. THE EXTENSION OF THE PEER COMMUNITY IS THEN NOT MERELY AN ETHICAL OR POLITICAL ACT; IT CAN POSITIVELY ENRICH THE PROCESSES OF SCIENTIFIC INVESTIGATION.

Knowledge of local conditions may determine which data are strong and relevant, and can also help to define the policy problems. Such local, personal knowledge does not come naturally to the subject-specialism experts whose training and employment predispose them to adopt abstract, generalized conceptions of genuineness of problems and relevance of information. Those whose lives and livelihood depend on the solution of the problems will have a keen awareness of how the general principles are realized in their 'back yards'. They will also have 'extended facts', including anecdotes, informal surveys, and official information published by unofficial means. It may be argued that they lack theoretical knowledge and are biased by self-interest; but it can equally well be argued that the experts lack practical knowledge and have their own unselfconscious forms of bias.

The new paradigm of post-normal science, involving extended peer communities as essential participants, is clearly seen in the case of AIDS. Here the research scientists operate in the full glare of publicity involving sufferers, carers, journalists, ethicists, activists and self-help groups, as well as traditional institutions for funding, regulation and commercial application. The researchers' choice of problems and evaluations of solutions are equally subjected to critical scrutiny, and their priority disputes are similarly dragged out into the public arena. There are some costs; thus it is no longer easy for scientists to exercise their benevolent dictatorship over passive

test subjects in the 'double-blind' procedure where some get no treatment. But unless we believe it right that the sufferers from this dread disease should depend entirely on the zeal and dedication of researchers, manufacturers and regulators, they should be included in the dialogue, however fractious it may sometimes become.

As yet, such cases are still the exception. Extended peer communities generally operate in isolation, on special policy issues in isolated localities, with no systematic means of financial support, and little training in their special skills. On many occasions, there is insufficient competence in dialogue and communication with other stakeholders [18]. Recognition of their role is very variable; in the USA, with its traditions of devolution of power to the local level, 'intervenors' in some decision processes are provided with support; in other countries they may be ignored or actively hindered. Within such extended peer communities there will be the usual tensions between those with special-interest demands, and the outside activists with a more far-reaching agenda, along with the inevitable divisions along lines of class, ethnicity, gender and formal education. However, all such confusion is inevitable, and indeed healthy, in an embryonic movement which is fostering the transition to a new era for science. It could be that the field of health, where individual 'consumer preferences' can operate more effectively on a mass scale than in environmental policy issues, the rise of post-normal science will occur more smoothly. 'Complementary medicine' could in many ways be considered a typecase for post-normal science; and in spite of the inevitable external opposition and internal confusions, it grows steadily.

It is important to appreciate that post-normal science is complementary to applied science and professional consultancy. It is not a replacement for traditional forms of science, nor does it contest the claims to reliable knowledge or certified expertise that are made on behalf of science in its legitimate contexts. The technical expertise of qualified scientists and professionals in accepted spheres of work is not being contested; what can be questioned is the quality of that work in these new contexts, especially in respect of its environmental, societal and ethical aspects. Previously the ruling assumption was that these were 'externalities' to the work of science or technology; and that when such problems arose an appropriate response would somehow be invented by 'society'. Now the task is to see what sorts of changes in the practice of science, and in its institutions, will be entailed by the recognition of uncertainty, complexity and quality within policy-relevant research.

As in any deep transition, the present contains seeds of destruction as well as renewal. Some participants in environmental struggles come to

see scientists merely as hired guns, who should provide the data that 'we' need and consent to the suppression of the rest. Others will be personally impervious to any arguments and evidence that weaken their prejudged case. Are such participants legitimate members of an extended peer community? Even traditional science has always included such types, but there has been an implicit ethical commitment to integrity whereby the community as a whole has maintained the quality of its work [19]. The maintenance of quality, without which all efforts to solve policy issues of risk and the environment are doomed, is a major task for the methodology of the science of the future.

Conclusion

In every age, science is shaped around its leading problems, and it evolves with them.

THE NEW POLICY ISSUES OF RISK AND THE ENVIRONMENT ARE GLOBAL NOT MERELY IN THEIR EXTENT, BUT ALSO IN THEIR COMPLEXITY, PERVASIVENESS, AND NOVELTY AS A SUBJECT OF SCIENTIFIC INQUIRY.

Until now, with the dominance of applied science, the rationality of reductionist natural-scientific research has been taken as a model for the rationality of intellectual and social activity in general. However successful it has been in the past, the recognition of the policy issues of risk and the environment shows that this ideal of rationality is no longer universally appropriate.

The activity of science now encompasses the management of irreducible uncertainties in knowledge and in ethics, and the recognition of different legitimate perspectives and ways of knowing. In this way, its practice is becoming more akin to the workings of a democratic society, characterized by extensive participation and toleration of diversity. As the political process now recognizes our obligations to future generations, to other species and indeed to the global environment, science also expands the scope of its concerns. We are living in the midst of this rapid and deep transition, so we cannot predict its outcome. But we can help to create the conditions and the intellectual tools whereby the process of change can be managed for the best benefit of the global environment and humanity.

The democratization of this aspect of science is not a matter of benevolence by the established groups, but (as in the sphere of politics) the achievement of a system which despite its inefficiencies is the most effective means for

avoiding the disasters that result from the prolonged stifling of criticism. Recent experience has shown that such a critical presence is as important for the solution of the policy issues of risk and the environment as it is for society. Let us be quite clear on this; we are not arguing for the democratization of science on the basis of a generalized wish for the greatest possible extension of democracy in society. The epistemological analysis of post-normal science, rooted in the practical tasks of quality assurance, shows that such an extension of peer communities, with the corresponding extension of facts, is necessary for the effectiveness of science in meeting the new challenges of global environmental problems.

This analysis is complementary to that of our previous article on postmodernity [20]. Both deal with the loss of hegemony of a single worldview based on a particular vision of science. The post-modern phenomenon is one of a deepening disillusion and a consequent fragmentation at all levels including the ideological and the societal. One reaction, as among some leading exponents of postmodernity, is despair. Another reaction is to reassert 'normality'; thus some leading scientists claim that the solution of our ecological problems lies through funding their large programme of relevant basic research, in which uncertainty is never mentioned [21]. Indeed, the suppression of uncertainty in 'normal' science makes it compatible with quite extreme reactions to the contemporary condition; thus it has been noticed that some religious fundamentalists find no difficulty in practising scientific expertise of various sorts, as the two dogmatisms can, with appropriate boundary drawing, coexist comfortably [22]. Finally, the post-normal response is to recognize the challenge, with all its dangers and promise; and then to start towards a reintegration, through the acceptance of uncertainty and the welcoming of diversity.

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WELCOME TO POSTNORMAL TIMES

Ziauddin Sardar

It never rains but it pours, says the proverb. And it has been pouring a lot in recent times. If the multiple threats from climate change were not enough to give us sleepless nights, we are now in the grip of one of the worst recessions in history. Overnight, banks collapsed like houses of cards, giant insurance companies buckled, household names began to disappear from the high street. Our government had to pump in an astounding £1.3 trillion in guarantees and quantitatively ease our financial system just to keep it ticking. Before we had time to draw breath, a pandemic of swine-flu threatened to engulf the globe. Lurking behind all this is the energy crisis, dwindling natural resources – such as oil (possibly) and fish (definitely), the continued threat of nuclear proliferation, and the ever present menace of terrorism. Not to mention the pensions crisis, the crisis of gang violence and knife killings on our streets, and the crisis facing the 'Mother of all Parliaments'. We hate the bankers, distrust our politicians and worry constantly about the security of our jobs, safety of our children and the blight of our communities. Nothing is definite, truly guaranteed, or totally safe.

Welcome to postnormal times. It's a time when little out there can be trusted or gives us confidence. The *espiritu del tiempo,* the spirit of our age, is characterised by uncertainty, rapid change, realignment of power, upheaval and chaotic behaviour. We live in an in-between period where old orthodoxies are dying, new ones have yet to be born, and very few things seem to make sense. Ours is a transitional age, a time without the confidence that we can return to any past we have known and with no confidence in any path to a desirable, attainable or sustainable future. It is a time when all choices seem perilous, likely to lead to ruin, if not entirely over the edge of the abyss. In our time it is possible to dream all dreams of visionary futures but almost impossible to believe we have the capability or commitment to make any of them a reality. We live in a state of flux beset by indecision: what is for the best,

which is worse? We are disempowered by the risks, cowed into timidity by fear of the choices we might be inclined or persuaded to contemplate.

In the normal scheme of things, we know where we stand. The winters are cold and the summers are hot, the seasons flow – spring forward, fall back like clockwork – in a natural cycle. The economy grows steadily, at rates varying from sluggishly to dramatic, but guaranteeing a reliable general increase in prosperity and security. Markets work, warts and all, they regulate prices and we have confidence and trust in our financial institutions. Politicians, never the most trustworthy of breeds, acknowledge, and by and large adhere to, accepted principles of behaviour as they legislate effectively to order the affairs of society. When we are faced with a new disease or danger, science and medicine come galloping to our rescue. A global balance of power, with all its imperfections, maintains a semblance of peaceable law and order; tin pot dictators, fearing the consequences of their actions, know where to draw the line. We live in coherent and cohesive communities, safe in the knowledge that the futures of our children are secure.

In normal times, when things go wrong, as they so often have, we know what to do. We identify and isolate the problem and apply our physical and intellectual resources to come up with a viable answer. The solid foundations and proven theories of our disciplines, from economics and political science to biological and natural sciences, guide us towards a potential solution. The weight and sheer power of intellectual, academic and political orthodoxy ensures that we successfully ride the tiger of change.

Little of this now holds true. Much of what we have taken as normal, conventional and orthodox just does not work anymore. Indeed, normality itself is revealed to be the root of all our ills. Take the current economic crisis, for example. This provides ample evidence that the old business model on which we have relied for centuries is bust. Not only has free market capitalism become dangerously obsolete but the branch of economics, which provided theoretical justification for this edifice, is also intellectually bankrupt [1]. Economic man, the intellectual construct underpinning the edifice, a species once vaunted for his rationality, is extinct [2]. Markets propelled only by the profit motive have become ungovernable, predicated only on personal greed and unconscionable accumulation of unimaginable private wealth concentrated in few hands. Competition and the free flow of capital around the liberalised, deregulated globe is a revolving tale of beggar my neighbour to produce ever cheaper consumer goods that leave more and more 'rust belt' communities as de-industrialised wastelands while the realignment of global trade imbalances increases volatility and mutual distrust within and between nations [3].

The world itself is now a far more uncertain place than it was during the second half of the twentieth century. It is not just that our own political system, based on self-regulation and comradely rules of gentlemen's clubs, is irreparably broken; the more politicians legislate, reform and amend the less significant and effective laws seem in achieving or delivering appreciable social benefit, the more unintended and undesired consequences appear. The global geopolitical landscape is also changing rapidly. There is hardly a country where politicians, of whatever persuasion, are either trusted or respected. Even the regular cycles of our weather cannot be trusted anymore – thanks to global warming, with its attendant rises in temperatures and sea levels, changing ocean composition and transformed ecosystems.

THE FIRST DECADE OF THE 21ST CENTURY HAS BEEN A SERIES OF WAKE UP CALLS,

says an advertisement for IBM. 'These are system crises—from security, to climate, to food and water, to energy, to financial markets and more' [4]. What is unique about these crises is that they have occurred simultaneously: 'we have never seen any era when we have been hit by all these multiple crisis at the one time', says UN General Secretary, Ban Ki-moon [5]. It is not just that things are going wrong; they are going wrong spectacularly, on a global scale, and in multiple and concurrent ways. We thus find ourselves in a situation that is far from normal; and have entered the domain of the postnormal.

The concept of 'postnormal' was first introduced by Jerry Ravetz, the celebrated British philosopher of science, and the Argentinean mathematician Silvio Funtowicz [6]. Working on the mathematics of risk, they noticed that the old image of science, where empirical data led to true conclusions and scientific reasoning led to correct policies, was no longer plausible [6]. There was a great deal of uncertainty in scientific work, which together with changes to funding, commercialisation, social concerns about developments in science and the complex issues of safety, all meant that science was no longer functioning in the 'normal' way. 'Whenever there is a policy issue involving science', wrote Ravetz and Funtowicz, 'we discover that facts are uncertain, complexity is the norm, values are in dispute, stakes are high, decisions are urgent and there is a real danger of man-made risks running out of control' [7]. They described the emerging developments as 'postnormal science', which has now become an established field of inquiry.

Much of what Ravetz and Funtowicz said about science in the 1990s is now equally true about other disciplines – indeed, society as a whole. Everything from economics to international relations, markets to products in local shops, politics to dissent has become postnormal. There are very good reasons for this state of affairs. All of them are related to three c's: complexity, chaos and contradictions – the forces that shape and propel postnormal times. It is important for us to understand these forces to negotiate a viable way forward.

Complexity

Let us take the first of the three 'c's'. Almost everything we have to deal with nowadays is *complex*. There is nothing simple about fixing the economy, or securing our energy supplies or even doing something about the floods that seem to plague Britain every other year. One reason for this is that we are a small, and some would argue not that significant part, of a globalised world. To 'fix' things here in Britain we also need to do something about them in other countries as well as on the global level. For example, to guarantee our energy supplies we need to pay attention to both local and international issues. The local would mean providing energy at reasonable cost to consumers and avoiding involuntary interruptions of supply by accidents or malicious disruption. International issues would include ensuring that our foreign policy is not too antagonistic towards those on whom we rely for our energy supplies, as well as avoiding energy dependence on a small subset of nations. But this is only half the equation. We also need to take action on carbon emissions, promote energy efficiency, accelerate deployment of low carbon technologies, and ensure that energy markets remain reasonably competitive and are not disruptively manipulated by speculators. Bringing all these different elements of our energy security into a coherent policy is far from easy. Complexity is a natural by-product of the fact that most of our problems have a global scale.

MOREOVER, GLOBALISATION ENHANCES COMPLEXITY
NOT SIMPLY BY MAKING US INTERDEPENDENT BUT ALSO
BY INCREASING OUR INTERCONNECTIONS.

In a globalised world, everything is connected to everything else. Nothing exists or happens in isolation. Take, for example, the recent emergence of swine flu. It is not simply a health and medical problem. It is also a problem of intensive farming. It is probably not a coincidence that the epicentre of

the outbreak, the Mexican town of La Gloria, is only five miles from a giant industrial pig complex, owned by the world's largest pig producer, Smithfield Foods. But, of course, Smithfield Foods would not be mass producing cheap factory-farmed meat if consumers were not happily gobbling it up. So swine flu is also a problem – one of the consequences of what, and how, we eat at the price and availability consumers demand – ever cheaper, more abundant and available all year round irrespective of seasonality. Moreover, it would have remained localised if holiday makers and travelling businessmen were not jet setting around the globe. In fact, a localised endemic became a pandemic thanks to the speed with which we travel to different parts of the globe. Once the pandemic spread, it also became a problem of health education. Hence the advertisements on television telling us to cover our mouths when we sneeze and the sudden emergence of antiseptic hand washing gel in public places.

If this wasn't enough, there is yet another trend that makes things even more complex. In postnormal times, things change rapidly and often happen simultaneously. Notice how, for example, the global economy was transformed during the single weekend of 13–14 September 2008. The US government, struggling with the weakness and instability across its financial sector, found the collective task was monumental. The complex interconnections between banks and financial institutions did not admit of limited and piecemeal solutions. After saving one bank, denying a rescue to Lehman Brothers, precipitated a ripple effect of general collapse. American banks were failing at the same time and for the same reasons as banks in Britain and elsewhere. Once one bank actually fell, closing its doors for business, the collapse of the financial sector was both global and simultaneous.

Things are also happening simultaneously in the geopolitical landscape. American power is shrinking as China takes on the mantle of a new superpower, as India flexes its economic muscle, as Brazil emerges, as Russia regains its confidence, as Japan's influence declines, as Europe consolidates its experiment in shared sovereignty, as non-state actors (from multinationals to Al-Qaeda) grow in power and influence, as relative wealth and power moves from West to East [8]. When so many changes occur at once and multiple developments and patterns come together, we find the emerging complexity hard to comprehend; and almost impossible to cope with.

The nature of the problem we face is ably spelled out by Australian philosopher Paul Cilliers. 'To fully understand a complex system', he writes, 'we need to understand it in all its complexity. Furthermore, because complex systems are open systems, we need to understand the system's complete environment before we can understand the system, and, of course, the environment is complex in itself. There is no human way of doing this. The

knowledge we have of complex systems is based on the models we make of these systems, but in order to function as models – and not merely as repetition of the system – they have to *reduce* the complexity of the system. This means that some aspects of the system are always left out of consideration. The problem is compounded by the fact that that which is left out, interacts with the rest of the system in a non-linear way and we can therefore not predict what the effects of our reduction of the complexity will be, especially not as the system and its environment develops and transforms in time' [9].

So complexity, which has as much impact on physics and biology as on ecology, economics, security and international relations, teaches us an important lesson: the notions of control and certainty are becoming obsolete. There is no single model of behaviour, mode of thought, or method that can provide an answer to all our interconnected, complex ills. The 'free market' is as much a mirage as the suggestion that science or liberal secularism will rescue us from the current impasse. The world has long been a complex place, always interconnected. The era of globalisation we are living through, however, differs in scale, depth of interconnections and immediacy of consequences and reactions. In our time we no longer have the luxury of time to reflect, to observe and respond to undesired outcomes, to debate and manage with some semblance of order. The simple recognition of the fact that all our problems are intrinsically complex teaches us the old fashioned and much neglected value: humility.

Chaos

Complexity is a precursor to, and a necessary condition for the second of our three 'c's: chaos. Postnormal times exist in an epoch of chaos, where acceleration is the norm, predictability is rare, and small changes can lead to big consequences [10]. Chaotic behaviour is not an uncommon phenomenon; it has always existed in our weather patterns. But it is rather unusual to see civilisations, whole societies or indeed the entire inhabitants of the globe, behaving according to the dictates of chaos theory.

The main reason is the changed nature, scope and functioning of networks. We are more connected and interconnected than any other time in history. The entire globe is a network criss-crossed by networks of individuals, groups, communities, institutions constantly connected to each other by e-mails, e-lists, internet newsgroups, mobile phones, text, video conferencing, blogs, twitter, Facebook, MySpace, interactive digital television and 24-hours news broadcasts. There is hardly a place in the world where we can be alone. The mobile phone in your pocket tells those who want to know exactly where you are and enables you to communicate with any one at any

time (almost) anywhere. More and more, communication is becoming instant, all encompassing, and ever present. Indeed, it seems that nowadays we don't communicate to live; but live to communicate.

Of course, it is not just the individual who is constantly connected. All the major institutions in society are now networked. The global economy is totally digitised, so now it's not the traders but computer programmes, designed to react instantaneously, which actually do the trading. Power grids, utilities, transport, and even the institutions of governance are all networked. There is nothing out there of any significance that is not connected to one network or another – which means that the notion of 'national security' takes on a whole new dimension [11].

Since everything is linked up and networked with everything else, a break down anywhere has a knock on effect, unsettling other parts of the network, even bringing down the whole network. Moreover, the potential for positive feedback, for things to multiply rapidly and dangerously in geometric progression, is enormous. This is where those small, insignificant, initial conditions come in: they can trigger major upheavals, even a small change can lead to collapse with accelerating speed. A computer virus, a strike, a single resignation, can set off a chain reaction that can bring a nation or the whole world to a grinding halt. Just think how many competing companies, regulatory bodies, health and safety institutions, government ministries and passenger groups make up the entire British railway network, all with different interests, competing plans, and differing remedies. A minor hiccup at one particular point of the network – leaves on a track, for example – has a knock on and sometimes multiplying effect on the whole network, not to mention the long-suffering commuters.

The most visible example of chaotic behaviour is provided by the stock markets. A network of computers links them all into a single, global market. Investments, capital transfers, share dealings happen in the blink of an eye by electronic signals. There is constant feedback from all parts of the global economic system. Small changes matter. Ups and downs trigger reactions. The computer programmes that trigger the trades respond to numbers, irrespective of cause. Discretionary power is bled out of the system in favour of instant, inevitable reaction, even when this is entirely counterproductive. We do not always know which small change is significant, exactly what local conditions far away made it happen, or where it will lead. Market sentiment, influenced by the buy or sell computer generated orders, responds and can quickly multiply small changes into a serious economic crisis. From the perspective of chaos, the current economic meltdown was an accident just waiting to happen – and had been predicted by many experts in various fields.

J.K. Galbraith, the veteran economist who cut his teeth on the Great Depression and New Deal, had been warning for more than a decade before his death in 2006 that the economic bubble would inevitably burst [12]. Books charting historic economic bubbles, the tulip variety in the seventeenth century and South Sea of the eighteenth century, became fashionable coded warnings available in bookstores.

Chaotic behaviour in the social and cultural sphere is a bit more difficult to discern. We had an inkling of chaotic behaviour during the 2004 orange revolution in Ukraine, the 2005 cedar revolution in the Lebanon, and more recently in the attempted green revolution in Iran. When demonstrators start to behave as a network and create positive feedback through the use of the web and mobile phones, they swell their numbers rapidly and acquire a self-perpetuating momentum.

The most vivid example in Britain of how social networks can turn an ordinary situation into a chaotic one is in the petrol protests of September 2000. These protests started as a simple, unorganised demonstration. But every protesting trucker was talking through his mobile, or sending e-mail or text massages to every other trucker. Instant communication turned a series of protests into an interconnected network, with positive feedback. Thus, the same small group of truckers were able to move quickly and easily from one depot to the next and were able to stop lorries leaving depots. This is spontaneous self-organisation in action. Like the weather, the trucker's protest looked the same from all perspectives – both the government and the public saw it as a collective, impulsive, disordered event, not to be taken too seriously. But as the protest took chaotic proportions, it nearly brought Britain to a halt.

Thanks to mobile phones, e-mails, blogs, tweets and 24-hour news media, we are constantly in the know. We are thus primed to react instantly, equipped with the means to set off new patterns of chain reactions. The more communications technology expands to make communication easier, faster, instant and reflexive – the more we are likely to cause self-organised panics and live life at the edge of chaos. Self-organised panics, like self-organising popular revolutions, are increasingly potential phenomena that cannot be predicted. They are a perennial possibility on the horizon of anticipation to be factored into a volatile and destabilised social landscape. They engineer, influence and alter the processes and calculations of governance and decision making, though whether they bring to the fore issues that are vital, marginal, purely sectional and self-interested or even trivial and therefore justify or produce substantive change is an entirely different matter.

LIKE COMPLEXITY, CHAOS TOO HAS A FUNDAMENTAL LESSON TO TEACH US: INDIVIDUAL AND SOCIAL RESPONSIBILITY AND ACCOUNTABILITY ARE ALL PARAMOUNT FOR OUR COLLECTIVE SURVIVAL.

The actions of any individual or group, from unscrupulous politicians to a neglectful social worker, can cause serious instability and upheaval. On the other hand, individualism, the notion that an individual can fulfil himself and do anything he or she wishes, is a recipe for catastrophe. The cult of individualism exists in the context of an environment of power and hierarchies, of complex interconnected networks and disproportion. Individualism empowers the powerful; those most adept at utilising the levers of power and can deliver power to self-selecting groups. There is no necessity or inevitable rule that such individual empowerment will be inclusive, extensive and equitably distributed or dedicated to collective benefit. Notice that it took the actions of relatively small numbers of greedy bankers to bring down the economy of the whole world. An even smaller bunch of 9/11 terrorists triggered a chain reaction that led to the ascendance of neo-conservative ideology in the US and Europe, changed the course of Iraqi, Afghani and Pakistani history, redefined the notion of security, revealed the limits of American power, and galvanised mass protests and dissent throughout the world, not to mention the millions who have been killed, maimed or been made homeless. In post-normal times, the world can really be laid to waste by the actions of a few toxic individuals.

Contradictions

A complex, networked world, with countless competing interests and ideologies, designs and desires, behaving chaotically, can do little more than throw up contradictions – the third of our three 'c's. It's the natural product of numerous antagonistic social and cultural networks jostling for dominance. After all, as Newton pointed out, every reaction has an equal and opposite reaction. 'Contradictions also point to the fact that everything, every policy, has a cost', says Ravetz who celebrated his 80th birthday last month. 'No matter how we may perceive progress, how beneficial we may think it is, it always has detrimental side effects. There is no achievement of good without some production of evil' [13]. And contradictions can come in various verities: they can be complimentary, where the opposed forces are kept in dynamic equilibrium; or destructive, where the struggle leads to collapse; or creative, where the contradiction is resolved by transformation.

In postnormal times, there are two contradictions that need our particular attention.

The first concerns change. It is now fashionable to argue that we are going through unprecedented change. Things have always changed but they have not changed with the accelerating pace we are witnessing nowadays. Take, for example, information technology, which doubles its power, as measured in price, performance and bandwidth capacity, every year. In 25 years, it would have multiplied by a factor of a billion as we move from transistors to more powerful technologies such as nanotechnology or molecular computing. Similarly, our capacity to sequence genetic data has doubled every year. While it took 15 years to sequence HIV, the SARS virus was sequenced in a matter of 31 days. So it is not just that change is rapid but the actual rate of change is itself changing – exponential acceleration has now become the norm.

Yet, vast segments of the planet and swathes of our social life are quasi-static. The structure of British society, with its class privileges, and in-built bias towards Eton and Oxbridge, has not changed for centuries. Britain's newly created Supreme Court is composed of law Lords only two of whom, representatives from Scotland and Northern Ireland, were not educated at Oxbridge colleges. Grinding poverty in Africa is as bad as colonial times – if not for many, worse. The distribution of wealth within nations is as skewed towards the elite as it has always been [14]. Indeed, the dynamic of disproportion is itself increasing. The period after World War II saw rising economic standards coupled with wider distribution of wealth producing more equitable societies, most particularly in the developed, industrialised nations. Since the 1980s not only has wealth distribution reverted to nineteenth century patterns it has continued an exponential progress beyond those norms. The differential between the remuneration of the CEO of a company and the generality of the employees is now commonly greater by a factor of 3–400 times. More of the wealth of countries like Britain and the USA is concentrated in the hands of the top 1% than is owned by 90% of the rest of the population put together. In a world of superabundant food, around 850 million still go to bed hungry every night [15]. Although women tend to be the main producers of food in the developing world, more than 60 per cent of the world's hungry are females. Wars and violent conflict are as present as ever. The more things change, the more they seem to stay the same.

The second contradiction concerns knowledge.

WHILE OUR KNOWLEDGE HAS INCREASED, AND IS INCREASING, BY LEAPS AND BOUNDS IN ALMOST ALL SPHERES, WE ALSO SEEM TO BE MORE IGNORANT THAN EVER.

Notice how limited is our knowledge of other cultures – Islam, for example; or the indigenous cultures of Latin America; or the super diversity of India or China. The increase in xenophobia across the world is not only alarming but an indication of deep ignorance. While we are bombarded with information on almost all and every subject, we have very limited capability to actually discern what is important and what is trivial.

Moreover, postnormal times have added extra dimensions to our ignorance. Many contemporary problems have an in-built uncertainty that can only be resolved sometime in the future. Take the swine flu virus. We do not know precisely how this virus will mutate in the near future. This is something we cannot know till the virus actually mutates – and it can mutate in a number of forms and a number of ways. The same can be said for food that has been genetically modified. We cannot be absolutely sure if such food is completely safe until it has gone through the food chain and become part of our daily diet. These are things we can only discover ten, twenty years from now. The same can be said about nanotechnology and the many consumer products that use Nano-materials from skin creams to disinfectants. Only through their sustained use over a period of time will we discover their true second and third order side-effects. Until such time we have to live with the risks and our ignorance.

Given that we cannot isolate interconnected problems and solve them in neat packages, we find that whatever solutions we produce there are always those extra bits that are not solved and cannot be solved. Often we are not even aware of the unsolved bits of the problem until either it emerges in a different form or it is too late. The crisis in the car industry is a good example. Much of our efforts have been directed towards rescuing car manufactures such as GM, Vauxhall and LDV. It is a crucial part of the manufacturing sector, a vital part in our economy, and thousands of jobs depend on them. We know that exhaust fumes play a major part in global warming and cheap petrol is fast disappearing so we demand that car manufacturers switch production to electric cars or hybrid vehicles. But in attempting to solve the problems of car manufacturers, economy, employment, the environment and natural resources, we overlook a vital component of the interconnected problems: the car itself. After all how many cars can we physically put on the planet? What could replace the car as a viable mode of transport in the future? What would a

world without cars look like? As Kingsley Dennis and John Urry show in their brilliant study, *After the Car* [16], we just don't know because this dimension of the problem is totally excluded from our view; to discover the alternatives we have to think the unthinkable, and ask questions that are overshadowed by our ignorance. On the whole, we remain ignorant of alternatives and the chance of gaining new knowledge is lost. Ignorance is not soluble by means of ordinary research; we therefore have no notion of its existence.

SO, WE ARE FACED WITH A TRIPLE WHAMMY OF IGNORANCE – OR IGNORANCE-CUBED: THE IGNORANCE OF OUR IGNORANCE, THE IN-BUILT IGNORANCE OF THE POTENTIAL RISKS OF RECENT DEVELOPMENTS, AND THE IGNORANCE GENERATED FROM INFORMATION OVERLOAD. UNLIKE ORDINARY IGNORANCE, WHICH IS A VOID TO BE FILLED BY RESEARCH AND KNOWLEDGE, DEALING WITH IGNORANCE-CUBED REQUIRES RADICALLY NEW WAYS OF THINKING.

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. Though this is by no means a foregone conclusion. The most succinct statement of the propositions of ignorance cubed was produced by former American secretary of defence, Donald Rumsfeld, who articulated the condition without ever altering the one dimensional, remorseless course of the policy he first thought of [17]. Both complexity and contradictions suggest that any given problem has multiple dimensions; and that no particular partial view can encompass the whole. It follows that a given problem does not necessarily have a 'right' or 'wrong' answer. Indeed, in postnormal times Aristotelian logic is part of the problem and not the answer. To get a better understanding of the problem we need to consider that the answers could include both (good and bad) as well as neither (good nor bad). Such four-fold logic enables us to think in multiples and thus get a better grip on complex problems with contradictory tensions. And the best way of thinking in multiples is through dialogue and discussion. Most non-Western philosophies are based on and adept at such ways of thinking –

we could, if we would, gain a great deal from taking such traditions seriously. Even a very basic understanding of a problem requires a dialogue on its various dimensions, involving a whole range of perspectives and interests including those of experts, lay adults as well as children, people of different social and cultural backgrounds, different ethical notions, and even consideration of the needs of non-human species. Contradictions may not be resolved through debate and discussion, but they can certainly be managed and negotiated through consensual dialogue.

Uncertainty

When contradictions, complexity and chaos combine with accelerating change the only definite outcome is uncertainty. In normal times, uncertainties are small and manageable. But in postnormal times, uncertainty takes centre stage [18]. Since everything is interconnected, complex and chaotic, and changing rapidly, nothing can actually be described with any certainty. Old fashioned predictions, on which our economy and policy relies so much, have no value in situations of rapid, abrupt and unknown change. The Treasury's growth forecast for the next six months will immediately be contradicted by the Bank of England; while a number of prestigious think tanks will produce different and contradictory forecasts from their studies. They are all wrong and right, both and neither. We need to grapple with the uncertainties inherent in these forecasts to make any sense of them. Uncertainty may be the only thing of which we can be sure, but it is not a comfortable, nor as yet a politically or socially acceptable, basis on which to debate real hard choices.

In any given policy issue, there are a host of uncertainties that we have to grapple with. Consider the case of bovine spongiform encephalopathy (BSE), a disease that affected the brains of cows, which arose in the UK in the 1980's and is now known to have been caused by intensive agriculture and unnatural feeding practices (grass-eating cattle being fed with the remains of sheep and cows). As the epidemic spread, scientific advisers had to juggle the uncertainties of its ultimate economic cost, the price for control by mass slaughtering, and the unlikely but still conceivable possibility of its spreading to humans. Even after cats had caught the disease in 1990, there was still uncertainty about its danger to humans. By 1996, when a human form of the disease was confirmed, there was a brief general panic, and the nation settled down to wait and see whether there would be isolated tragedies or a mass horror. By February 2009, 164 people had died in Britain by contracting the human form of BSE known as Creutzfeldt-Jakob disease.

Uncertainties become severe in almost any planning activity. For example, after the 2008 floods in Britain, planners had to assess the future possibility of

floods in the same areas, the prospects of conflicts between areas (preventing flooding upstream can increase the threat downstream), threats to property values and businesses, and face the problems of insurance and liability for past and future damage. Each component of the problem had inbuilt uncertainties that had to be grappled with.

On a global scale, uncertainties represent both enormous opportunities and risks. By gambling on the outcome of uncertainties, certain institutions, such as hedge funds and currency manipulators, can make gigantic profits. In postnormal times, individuals acting at a global level can acquire astronomical riches at an astonishing pace. Notice the sudden increase in billionaires in recent times. In his book *Superclass* [19], David Rothkopf, a scholar at Carnegie Endowment for International Peace, has estimated that just over 6,000 people have become enormously rich over the last two decades. These people, mostly in business and finance, have 'vastly more power than any other group on the planet'. This new superclass is self-made and like all self-made plutocrats of bygone eras attaches itself to the established power hierarchies generated by inherited wealth and privilege. The effect is to increase the distortions and disproportion inherent in the social order. But this new superclass is distinctive in being 'globally oriented, globally dependent, globally active', it exists beyond national loyalties and commitments which can be used and changed as strategic devices to further enhance their prosperity. Their wealth is generated largely by being members of networks and playing on global uncertainties.

While the opportunities are limited to a few, the risks are shared by the rest of the planet. Economic prosperity for the few means financial and ecological disasters for the many. In a postnormal society, uncertainty and risks, real and perceived, becomes a dominant feature of everyday life for the planet's population. In poor societies, new and emerging risks become life and death issues, and lead to the collapse of existing institutions and life support systems. The impact of climate change, for example, is much more dramatic on the developing countries. According to a new report by the Global Humanitarian Forum, global warming is now causing 300,000 deaths a year and is directly affecting 300 million people in the least developed countries [20]. Over half of the world's poor are vulnerable and some 500 million are at extreme risk from weather related disasters that bring hunger, disease, poverty and lost livelihood.

The combination of ignorance and uncertainty, as well as a tendency to chaotic behaviour, contradictory analysis and the complex issues of safety and risks – all this means that our current options for 'business as usual' are now dangerously obsolete. In postnormal times, conventional modes of thinking and behaving are nothing more than an invitation to impending catastrophe.

Some of the notions that underpin western, capitalist society, such as, 'progress is essential', 'modernisation is good', and 'efficiencies are necessary', are well passed their 'sell by' date.

Progress, Modernisation, Efficiency

Take the idea of progress based on continuous and perpetual economic growth. There is a natural limit to how far we can grow: the finite boundaries of our planet and the limits of our resources. But it is precisely unchecked linear progress and accelerating growth that has brought us to the edge of chaos – further linear progress, with attendant monumental global risks, would tip us over the precipice. We need to move from the notion of progress to the idea of steady-state. Trees, for example, do not continue to grow after they have reached their natural heights – to do so would mean self-destruction. Many archaeological studies suggest this fate has befallen human societies before: ancient civilizations which grew beyond the capacity of the ecological, technological political and social carrying capacities precipitating catastrophe and collapse [21]. To assume that our economies will continue to grow at an accelerating pace would be the height of folly. There is nothing new in the idea of limits to growth: it is the old Malthusian proposition which was confounded in the 19th century by industrialisation and an agricultural revolution – not to mention the distorting and determining powers of colonial domination. The seminal report *Limits to Growth*, produced by the Club of Rome in the 1960s made the entire concept part of our consciousness [22]. Yet the report's publication has been followed by the greatest expansion in human history of consumer affluence with its attendant profligate use of natural resources in generating ever more disposable, easily replaceable and annually upgraded gadgetry and resource consuming lifestyles [23]. And now some of the most populous nations on earth, not unnaturally, perceive the possibility of grasping hold of their place in this consumerist nirvana. Their quest, founded on the proposition of lifting billions of their people out of poverty, is unanswerable as an ethical and humane proposition. Yet the aspiration, however unquestionably ethical and sound, poses enormous dilemmas for everyone. What has been taken as normality simply cannot cope.

Modernisation too has now become a toxic notion. Witness just what the so-called modernisation of the NHS has achieved: the more it is modernised the less effective it becomes. The more you network an institution like the NHS, the more complex and chaotic it becomes, more contradictions and ignorance come to the fore, the more prone to risks and failure it becomes. These risks are inherent, they are generated solely by modern institutions; and they strike these very modern institutions as a boomerang, before

engulfing the rest of us. Moreover, to modernise is to deprive an institution of social function and conscience. The basis of modernisation has been bureaucratisation and as the classical formulation of Max Weber pointed out bureaucracy is intentionally by design faceless, impersonal in the sense of being impartial, treating everyone by the same routine procedures. At one level it works for fairness and equity. However, the faceless, impersonal, remorseless aspects of bureaucracy, as commentators from Kafka [24] to Zygmunt Bauman [25] have pointed out, can defy humanity, reason and logic and work as effectively for pure evil as for the common good. Those who work in a bureaucracy follow procedure, follow the rules without a sense of personal responsibility and are forbidden to exercise discretion in the face of human realities as they present themselves. They neither own nor direct the course of the institutions. Those served by bureaucratic institutions equally feel alienated and powerless before the over-weaning might of a faceless behemoth. The more we modernise bureaucratic institutions the more dissatisfied, alienated, disempowered and angry people become.

Modern institutions, such as banks and corporations, are highly networked organisational structures that have no morality and feel no remorse. Their function is to maximize profit by a process of reduction, by accumulating more and more power and resources, which is exactly what they do by taking more and more risks in an environment of ignorance, uncertainty and chaos. India had 130,000 different varieties of rice before its agriculture was modernised in 1970s; after modernisation, Indian varieties of rice had been reduced to only 3000. Modernisation reduces diversity, bureaucracy by definition offers a one size fits all set of regulations. When a bureaucracy seeks to moderate itself to encompass the complex diversity of human circumstance it becomes more remote, more intractable, less transparent, comprehensible or adaptable. Modernisation and bureaucracy turn everything into a value neutral, heartless routine which sponsors and facilitates selfish business, and increases risks for everyone. Given that modern institutions are the cause of the problem, they cannot be part of the solution.

Much the same can be said about efficiency, a concept closely associated with modernisation.

THE SUGGESTION THAT WE SHOULD, INDIVIDUALS AND INSTITUTIONS, BECOME MORE AND MORE EFFICIENT, AND USE ALL OUR RESOURCES MORE EFFICIENTLY, HAS NOW BECOME ABSURD.

There is a natural limit to how efficient anything, including the NHS, can be. Bureaucracy is the agent of efficiency, working by reductive choice and ever increased levels of management that fail to generate more effective control. Paradoxically, there is something intrinsic in the notion of efficiency that actually produces inefficiency. We can see this most vividly in terms of traffic on a motorway. To reduce congestion on a two lane motorway we build two new lanes. But a four-lane motorway does not reduce traffic – it increases it. So we build six-lanes. But the traffic rises again. Eight-lanes and the traffic continues to rise. So we develop more energy-efficient cars. But car owners increase their leisure driving; as the performance of the car improves, the number of miles driven increases.

The simple observation that an increase in the efficiency of using a resource leads to an increased use of that resource is known as the 'Jevons paradox'. First described by William Stanley Jevons in 1865 in relation to coal, it has been recently used to show that drives for efficiencies in numerous areas, such as fossil fuels, makes matters worse rather than better. *In The Myth of Resource Efficiency: The Jevons Paradox* [26], John M. Polimeni and his co-authors provide numerous examples from economics and ecology to technology and environment. The increase in efficiency in food production in India, for example, did not solve the problem of hunger – it made it worse (not least by reducing seed varieties). Fridges have become more efficient but also bigger. The promotion of energy efficiency at the micro level – households and individual consumers – increases energy consumption at the macro level of society as a whole. What this means is that we cannot rely on future technological innovations to help us reduce consumption of resources, and thus somehow usher in a more sustainable world. Efficiency increases complexity and chaotic behaviour; and can lead to all kinds of unforeseen disasters.

Liberal free market deregulated capitalism, the acme of supposed normal times, has become postnormal, a recipe for calamity. The system itself is now the problem we must negotiate our way out of. It has generated institutions, forms and practises which are contradictory, complex beyond any real prospect of effective management and control. It stimulated wants and desires which cannot be fulfilled, except for the few. It produces aspirations for individual freedoms which mask the endurance, at ever higher levels of consumption, of disproportion in power that entrenches enduring hierarchical structures. The middle class, once in the western world the prime beneficiaries of the system, are now being squeezed and seeing their living standards drop while the enduring comparative and absolute poverty of the underclass endures. Clearly, progress, modernisation and efficiency have now become redundant if not dangerously obsolete terms.

Virtues

We need to negotiate our way towards new normal times. The problem, however, is that the space, time and willingness to engage in coherent debate has become scarcer, the more complex, contradictory and chaotic things have become. Liberal democracy and its historic forms of organisation – from voter turnout to membership of political parties – engage fewer and fewer citizens. Spontaneous self-organising activism, such as global anti-capitalist protests, while attractive, is self-selecting. Its membership and agenda is often transitory. Such movements can dissipate as quickly as they spring into life without their activism necessarily being transformative. Spontaneous and reactive they can come and go without creating any new and lasting political structures or changing those that already exist. Moreover, self-organising networks and movements can as easily be motivated by panic, fear and xenophobia, a recipe for populist mobilisation and fascist activism, as demands for social justice. So the self-organising networks provide no guarantees: there is no natural law that states that activism will, should or ought to be, dedicated solely to the common good. Nor is there any rule that they should take a balanced view and think through the risks and benefits of their agenda. Indeed it is in the nature of many of the self-organising networks that have emerged to confound the times by offering simplistic, single issue, one dimensional prescriptions and thereby increase the toxicity, animosity and dissatisfaction of society as a whole.

To negotiate our way out of postnormal existence we have to learn how to negotiate, how to translate aspiration into transformation. How do we organise, listen and sensibly engage everyone in a discourse of doing for mutual benefit?

THE MORAL TO BE DRAWN FROM THE CHARACTERISTICS OF POSTNORMAL TIMES ARE AGE OLD VIRTUES: HUMILITY, MODESTY AND ACCOUNTABILITY.

We must begin by appreciating that in many respects, we do not know, and we cannot know, how our safety as individuals, societies and species will be compromised.

THE SUGGESTION THAT THINGS CAN BE TOTALLY 'CONTROLLED' AND 'MANAGED' HAS NO MEANING WHERE PROBLEMS DO NOT HAVE 'RIGHT' OR 'WRONG' ANSWERS BUT REQUIRE MULTIPLE PERSPECTIVES SIMPLY FOR US TO GRASP THEIR TRUE DIMENSION

Humility, modesty and accountability are not added extras but indispensable virtues, essential requirements of living with uncertainty and complexity [27]. As we can never eliminate uncertainty and have total control of any situation, our claims must by definition be humble. Similarly, we can never have complete knowledge of a complex system; it will always be tentative and provisional. We have to acknowledge the ignorance attendant on everything we think we know. So we have to be modest about the claims we make about such knowledge. The failure to acknowledge the uncertainty and complexity of certain situations is not only a *technical* error, as Paul Cilliers notes, but also an *ethical* one [9].

Indeed, it is ethics, and only ethics, that can guide us out of the postnormal impasse. A new normality negotiated within the conditions of postnormal times must be rooted in ethical debate if it is to operate the necessary virtues. Ethics are neither remote nor impersonal; they can apply as readily to the personal as the global. It is their ability to transcend scale which makes them such priorities for conceptualising a new normality. Ethics can provide the guiding principles for a unifying sense of direction at all levels of organisation by anchoring the virtues – humility, modesty and accountability – we need to ensure take centre stage. The discourse we need must clarify what ethical principles we are accountable to, which must be upheld in the choices we make, with all the humility and modesty we apply to our understanding of our problems, searching for solutions with all the uncertainties, and hence risks and imperfections, we accept as routine elements in our affairs.

The ethical response to our postnormal dilemmas is by no means easy; and for many may sound like a return to old fashioned values rooted in religious beliefs. In which case it would be worthwhile remembering that modernity, the bedrock of normality, was itself in many ways a belief system. Modernisation, progress, bureaucracy, science and all the disciplines of modern knowledge emerged complete with a rich sustaining mythology whose most basic tenet was the delusional notion that they were value neutral, universal and inherently good. We have arrived at the postnormal in part by allowing this way of thinking to convince us the systems we constructed would inevitably,

invariably in and of themselves answer all the needs for human betterment. In short, that essentially we had made ethics redundant. We have lived to learn that this is no longer a tenable proposition. Logic and rationality, the virtues of modernity, alone will not secure the changes we need to make in our lifestyle to meet the challenges of postnormal times. Ethical accountability that emphasises both values and virtues must come to the aid of logic and reason. Without an overriding sense of ethical responsibility it is hard to imagine convincing the rich and powerful to become more modest in their demands and lifestyle, more humble, indeed ready to temper the profligacy of their lifestyles and the disproportionate use of limited global resources this requires.

There is one other important point that needs to be made. Every social, cultural, political, philosophical and religious outlook known to humanity needs to relearn how to engage with its own ethical precepts. And this brings us to the other elephant in the room, in fact more of a monstrous woolly mammoth. Value neutral universals embedded in systems of knowledge, progress, modernisation and bureaucratisation were supposed to enable us to transcend the intractable problems of the diversity of belief. The different formulations of belief, each with their particularities and constraints, each making exclusive claims to possess the only right answers, were seen as barriers to expansive critical inquiry and therefore restraints on human advancement. In one sense the nexus of secular modernity has done its job – it has landed the entire globe in the same dilemma: the postnormal dispensation. The ethical debate and accountability we need to create has to transcend the limitations of both tradition and modernity. It must begin with accepting the postnormal axiom that there is no monopoly on truth and therefore no guarantee of possessing the means to find answers to all questions. To accept that there are no right and wrong answers does not mean we abandon the search for truth or solutions but it does entirely change the process and kind of objectives we set for our endeavours. When there are no right or wrong answers everyone, every perspective, has a contribution to make, anyone is as likely as another to have some part of a potential solution. Instead of returning to old exclusivities and determinisms we make the transition to a new kind of adaptability and flexibility in which every perspective and worldview participates in seeking solutions to our collective problems. Indeed, we are not looking for one answer, the answer to everything. Taking uncertainty, risk and ignorance seriously, embracing humility and modesty as essential attributes of our approach to the search for appropriate answers, enables us to uncover alternatives. It becomes possible to have shared objectives which are realised in different and locally appropriate ways and understand common shared principles through difference.

We cannot wipe the slate clean and begin again. The road to a new normality begins with all the complexity and contradictions of our messy reality. Accountability begins with taking responsibility for what we know and cherish, which comes wrapped in all the diversity of our cultures, histories and beliefs. What we have to add to this is an ethical clarity, a state of mind which acknowledges we are all beset by ignorance and none of us, no one tradition or outlook, has all the right answers.

A new normality cannot look for simplistic universals. It has to negotiate through and with the multiple and diverse formulations of all the universalist outlooks that exist. It has to engage with the complexity of humanity as much as it considers the complexity of the global environment we share in such different ways. Only ethical clarity about the responsibilities of being human, in each and every distinct worldview, can edge us towards the better understanding that allows us to provide the simultaneous translation, the seeing common principle through difference, which will make for effective global negotiation. In postnormal conditions, flexibility, adaptation and sensitivity to markedly different initial conditions require that we develop our ethical acuity to increase the diversity of our response. We are not looking for one solution but many alternatives which create positive feedback and momentum for common principles. Such an approach demands new thinking, effort and participation by everyone.

Imagination

The most important ingredients for coping with postnormal times, as Paul Cilliers suggests and I would argue, are imagination and creativity. Why? Because we have no other way of dealing with complexity, contradictions and chaos. Imagination is the main tool, indeed I would suggest the only tool, which takes us from simple reasoned analysis to higher synthesis. While imagination is intangible, it creates and shapes our reality; while a mental tool, it affects our behaviour and expectations. We will have to imagine our way out of the postnormal times. The kind of futures we imagine beyond postnormal times would depend on the quality of our imagination. Given that our imagination is embedded and limited to our own culture, we will have to unleash a broad spectrum of imaginations from the rich diversity of human cultures and multiple ways of imagining alternatives to conventional, orthodox ways of being and doing.

To a very large extent our current impasse represents a failure of imagination. Or rather, subservience of imagination to orthodoxy. History, said Ibn Khaldun [28], the fourteenth century historian and sociologist, moves in cycles. Arnold Toynbee [29], the twentieth century historian

of civilisations, concurred. Neither of them pointed out that the cyclic momentum of history actually preserves orthodoxy. Once the pain and suffering is over, and things appear to swing back to normalcy, the straitjacket of orthodoxy returns society to conformity. Notice how quickly the financial markets have returned to bad old ways: the recession is nearly over, green shoots are appearing in many locations, and, we are told, we can return to business as usual, shaken but unstirred. Of course, we will learn from our mistakes and the future will be better and more prosperous. This is a dangerous illusion. The easy slide back into the security and conformity of the past all too often means we are creating the conditions to repeat historic mistakes. Conventional thought and market driven consumerist ways of being, as Tim Jackson shows so vividly in *Prosperity Without Growth* [30] and Britain's Sustainable Development Commission has consistently argued, have now become so pathological and so toxic that the exit crisis, the next economic meltdown, the next pandemic, the next effect from global warming, would really spell the end of civilisation as we know it. We have to imagine better ways. We all need a clearer, stronger ethical compass, one we can never again be content to be tucked away in an attic drawer while we rest content with the complacent self-congratulation that the system will take care of us, itself, as well as the fragile and finite earthly home on which we all depend.

The postnormal world is a world of disproportion. Disproportionate distributions of power, wealth, resources and the effective demand to command the use of these resources are matched only by the disproportionate power our knowledge and techniques have given us to destroy the environment on which our affluence depends. We have become convinced the past is a different place, no longer able to comment upon the power and sophistication of our lives today and the complexity of the world we now inhabit. If we cannot learn the lessons of history we need another source for the imagination to conceive of more sustainable and attainable futures.

WE NEED NOT ONLY IMAGINATION BUT AN ETHICAL IMAGINATION THAT CAN ACKNOWLEDGE THE UNCERTAINTY AND RISKS WE FACE AND WORK THROUGH COMPLEXITY AND DIVERSITY CHERISHING THE VIRTUES WE ARE MOST IN NEED OF: HUMILITY, MODESTY AND ACCOUNTABILITY.

It is our best hope of taking responsibility for the choices we will have to make to ensure we can arrive at our imagined futures with our humanity and our planet intact.

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POSTNORMAL TIMES REVISITED

Ziauddin Sardar

In 'Welcome to Postnormal Times' [1], I argued that we are entering an era where complexity, chaos and contradictions will become the dominant themes; and uncertainty and ignorance will increase drastically. The paper was written to mark the end of my fifteen years editorship of *Futures*; and was meant as a summary of what I had learned from careful perusal of hundreds of papers, accepted and rejected, submitted to the journal. A text, Roland Barthes [2] has written, is a collection of quotations drawn from numerous centres of cultures. 'Welcome to Postnormal Time' is an attempted synthesis of ideas culled from the fabric of foresight and futures studies. Of course, what other futurists make of it, the meaning it imparts, is quite independent of its author: it depends on what the readers read in the text, rather than what I intended to say, what I did or did not say. Nevertheless, I was pleasantly surprised at the reaction and debate the paper stimulated. It generated a special issue of *Futures* on 'Postnormal Times' [3]; and the term itself has gained some currency. Postnormal analysis has now spread from science, where it is well established, to futures studies, political analysis, economic intelligence and architecture and cultural heritage.

Here, I would like to critically engage with some of rejoinders to the paper, attempt to answer some of the questions that have been raised, pin down a few characteristics of the postnormal condition, highlight the postnormal that lurks over the horizon, and explore what it means to 'be postnormal'.

PNT and Its (Dis)Content

An obvious question, raised numerous times, is: how can we have postnormal when there is no such thing as normal? Anyway, who defines what is normal? Clearly, what may be regarded as normal nowadays is quite different to what was seen as normal, say during the medieval times, or the colonial period. Once slavery and serfdom was seen as normal; and the colonial subjects were regarded as inferior people and cultures when compared to Europe.

Thankfully, we have moved on; or evolved morally. Moreover, what may be seen as normal in one culture may appear as aberration in another. Sadness in one culture may be regarded as normal, while another may classify it as 'depression' needing clinical intervention. Thus, 'normal' can have a variety of meanings, something psychologists know well. The opposite of normal is not postnormal but abnormal.

IN POSTNORMAL ANALYSIS, WE TAKE NORMAL TO BE THAT WHICH IS FREQUENTLY ENCOUNTERED: WHAT IS ACCEPTED AS THE DOMINANT WAY OF BEING, DOING AND KNOWING, CONVENTIONALLY SEEN AS THE STANDARD, DICTATED BY CONVENTION AND TRADITION, BACKED BY DISCIPLINARY STRUCTURES AND SCHOLARSHIP AND WHAT WE ARE ABLE TO PREDICT AND CONTROL. THE NORMAL IS THUS LOCATED IN THE WELL-ESTABLISHED MODES OF THOUGHT AND BEHAVIOUR:

modernity, postmodernism, predatory capitalism, market fundamentalism, hierarchical structures of society, institutions and organisations, standard scientific procedures, recognised academic disciplines such as economics and political science as well as disciplinary structures, top down politics, broken government, polluting industries, runaway technology, marginalisation of the vast swathes of humanity, xenophobia, racism and misogyny, unjust social and political policies, scientism, and everything else that has shaped and defined the 'modern world'.

It is the primary contention of postnormal times (PNT) theory that in the current epoch, when, as the formula developed in postnormal science discourse states, 'facts are uncertain, values in dispute, stakes high, and decisions urgent' [4], the accepted normal does not work. The basic concepts and assumptions of normality, such as progress, modernisation, growth, development, and efficiency are becoming dangerously obsolete [1]. In fact, the normal has now become the domain of old, dying axioms, thesis, conventions and canons. That there is something profoundly wrong with today's world, that we are heading towards a 'paradigm shift', is fast becoming a common argument and position. James Galbraith simply describes it as the *End of Normal* [5], while Michael Harris laments the *The End of Absence* [6].

'The "signals" that are being constantly generated within the global system', Richard Slaughter notes, amount to *The Biggest Wakeup Call in History* [7]. The 'implicit calculus' of earlier periods has now become irrelevant, argues Henry Kissinger. The changes that are now occurring are rapid and instantaneous and 'draw humanity into regions hitherto unexplained, indeed unconceived' [8]. According to Ulrich Gehmann, we are living in 'a period of time where new perceptions of the world are emerging, where our relevant ways of conceiving "world" at all, and what it means for us as a whole, is subject to dramatic change' [9]. Elizabeth Kolbert points out that 'no creature has altered life on the planet' in the way humans have; and we are now witnessing a great transformation in the life history of the planet [10]. Various terms have been coined to describe what we are going through and what we are about to encounter. Ulrich Gehmann and Matin Reiche called it the age of 'Real Virtuality'. Kolbert describes it as *The Sixth Extinction*. American biologist Michael Soule labels it as the 'Catastrophozoic' era [10]. Dutch chemist and noble prize winner, Paul Curtzen [11], calls it the age of Anthropocene, emphasising the extent of human activities with significant global impact. Peter Allan and Liz Varga have suggested that the period 'separated by instability, breakdown and collapse of old structures as new features, technologies, variables and characteristics emerge and lead to a new period of qualitative stability' recall the 'Long Waves' of Krondatieff and Schumpeter's view of waves of 'creative destruction' [12]. Others have referred to this era as 'global weirding' [13] and 'global swarming' [14].

Those of us working on PNT theory have opted for postnormal times for five basic reasons. First, it avoids apocalyptic tones; it is a fairly neutral term, which does not imply that the world system has 'entered an Omega phase' as suggested by Gary [15]. In fact, PNT has been deliberately defined as transitory: 'an in-between period where old orthodoxies are dying, new ones have yet to be born, and very few things seem to make sense' [1]. 'Postnormal' suggests that there is something called the 'normal' that preceded it; and there will be a new normal after it. Second, it emphasises agency. What comes after PNT need not be a function of dangers and threats we face; but the new normal, fundamentally different from the old one, can be consciously shaped to be better, saner, more globally and ecologically relevant, more pluralistic, more humane and more peaceful alternative. Third, it emphasizes and focuses our attention on complexity, contradictions and uncertainty that we need to grasp to really understanding how the world is changing. PNT is not a 'binary metaphor' either. Indeed, PNT theory insists that (binary) 'Aristotelian logic is part of the problem and not the answer'; and contends that we urgently need to move beyond binary logic and find new way of thinking and analysing our current problems and new methods for discovering viable solutions. Fourth,

PNT has a sound theoretical base, thanks to decades of work on postnormal science, complex emergent systems, and more recent efforts of PNT theory itself. Fifth, theoretical work enables us to develop policies in a plethora of areas and issues to actually navigate postnormal times towards positive futures.

Rakesh Kapoor [16] has argued that PNT is western theory or concept. Nothing could be further from the truth. It is neither western nor eastern concept; it is simply a theoretical framework which describes and explains our epoch; and like most theories, it ought to have some predictive element, it should be able to envisage the emergence of postnormal phenomenon. As I have written elsewhere,

To talk about a neat division between East and West in a globalized, diverse, interdependent world of common problems and shared human destiny is dangerous and absurd. The boundaries and dividing lines of East and West have not only changed but have become blurred and indistinguishable. There is as much East in the West as there is West in the East. The West cannot continue to perceive the East as inalienably different; the classic tirade against the West that promotes the innocence and vaunts the superiority of the East is meaningless. The potency of the ideas that impelled western imperialism is alive and well and operated by the East within itself, by itself.

Searching out the original miscreant and apportioning blame is a way of continuing the game of implacable opposition, and, thereby, keeping all its necessities - suspicion, military preparedness, manipulation of public opinion, double standards and neglect of pressing human needs - in place. The East has been complicit in the perpetuation of the ethos of binary oppositions. The more the East has unquestioningly sought to appropriate the means of the West, to become modern in an uncritical, slavish manner, the more it demands to be seen as different, the more it has romanticized the superior perfections of its own traditions and values. But no matter how bad things get the East has an immediate escape clause, thanks to the prevailing Kiplingesque understanding of the world. Condemnation of the West for its acts of commission (colonialism, neo-imperialism, political and economic dominance) and omission (failure to understand or appreciate and implacable opposition to the worth of Eastern values and ideas) suffices. It covers all contingencies with complacency and avoids the East's need to examine its own internal shortcomings. East is East and West is West serves everyone [17].

However, it is true, as Kapoor argues, that the world looks very different 'from the vantage point of a person sitting in New Delhi', or other parts of Asia, such as China and Vietnam. The countries of 'emerging markets' have not enjoyed the level of development enjoyed by the western industrialised countries. But 'the world' is also a deeply interconnected, globalised system. The subsystems of such a planetary system cannot escape the effects of what happens elsewhere in the system. India cannot be immune to global economic shocks; climate change knows no borders; new communication technologies will have as much social, cultural and economic impact on the non-west as the West; emerging developments in synthetic biology will reshape the social fabric of industrialised countries just as much as 'emerging markets'. The very fact that power is now shifting from 'the West' to India, China, Russia and Brazil, and we are moving towards a multi-polar, multi-civilizational world, is a postnormal phenomenon.

What about the argument that we have faced similar hurdles and 'strange times' in the past and, as Sam Cole [18] states, given our 'sufficient latent reserves of knowledge' and our superior state of evolution, we can solve all our problems and therefore should continue in our present path. This is, as Merryl Wyn Davies notes, 'optimism of a monumental nature based on the assumption that because we have managed to solve our problems in the past we will continue to do so forever' [19]. The harsh truth to realise here is that our 'sufficient latent reserves of knowledge', by which I assume Cole means the dominant structures of academic disciplines, are not fit for the purpose of postnormal times. Economics, as it exists today, is a major cause of our problems and a major factor increasing inequality. Development studies have systematically devastated non-western societies for the past several decades. Political science is perhaps the most Eurocentric enterprise ever designed by man [20]. Many issues in science have gone postnormal, from specific disciplines such as climate change and fisheries science, to the structure of scientific activity itself [21]. As Stephen Healy argues, scientists should now abandon 'ideas of control and management' and 'become the servant of outcomes framed in, primarily, societal terms' [22]. The conventional disciplines are part of the problem in that they have led us to our current predicament. While not all knowledge is irrelevant, a great deal of what modernity has produced is steeped in ignorance – the ignorance, for example, of traditional cultures and indigenous ways of knowing and being. In fact, PNT theory postulates three varieties of ignorance: the general ignorance of the complexity of the world around us as well as our knowledge of other cultures and societies; the built-in ignorance within certain problems we face, the answers to which can only be discovered in future times ('known unknowns');

and what in PNT theory is called the 'Unthought', the ignorance we have and promote because we are incapable of or unwilling to look in certain directions (thanks largely to the established disciplinary structures) or think beyond the dominant paradigms ('unknown unknowns'). We have never faced so many problems simultaneously; we have never experienced such accelerating pace of change, or such globalised interconnections and complexity, and have never been so steeped in ignorance of things that have such extensive consequences beyond our own context. The established ways of knowing, doing and being are just not up to the task of moving us beyond postnormal times with our humanity, sanity and the planet intact.

Cole also takes a playful swing at the three C's that frame postnormal analysis: chaos, complexity and contradictions. He suggests that the triad constitute an Alliterative Logic, and traces the origins of this logic to the fourteenth century Black Death. The critique is based on the assumption/ assertion that 'in the absence of empirical connection between ideas, humans theorize through alliterative word-triads' [18]. Fortunately, there is no lack of evidence of 'empirical connection' for the advocates of postnormalcy. Ravetz and Functowicz, and a growing number of researchers working on postnormal science, have toiled for several decades to accumulate evidence of postnormal science that is truly formidable [23, 21, 4, 24–27]. The evidence for complexity of our world is now overwhelming. And evidence for PNT, in most disciplines, is accumulating steadily. It would be more productive, I would argue, to look at the 'empirical connection' between the idea of PNT and what's actually happening around us than to play with questionable theories of Alliterative Logic. Alliteration, by the way, as Davies points out, is 'the point from which thought, as well as emotion and remembrance, begin'; the device is designed 'to stir people to stop and think and more importantly remember the vital connective lineaments of information and argument' [19].

However, Cole, Gary and Kapoor have made useful contributions to the development of PNT theory. We should take heed of Cole's warning that any attempt to explore the future does not become a litany, a form of prayer. Gary's assertion that PNT theory needs more work, and a robust framework, is a valid observation. Kapoor rightly points out that large swathes of India and Asia, not to mention Africa and South America, have been untouched by modernity. In rural India, illiteracy is the norm, agriculture is in bad shape, towns and villages lack basic amenities, such as electricity, water and health care. Surely, such a system, that is not networked or full of self-contradictions, cannot exhibit chaotic behaviour and go postnormal? The answer to this query lies in the answer to the question raised by Merryl Wyn Davies: 'Are we there yet?' Yes, and no. We are there and not there. Postnormality is not a homogenous

phenomenon: it does not affect all segments of the planet equally. It can be witnessed in certain global and regional events but not in others. It can shape the developments of trends in certain countries but not in every country. So not every part of the world has gone postnormal; but every part of the globe *can* go postnormal. It can be recognised in certain systems – ecological, economic, social, political, and cultural – but not in all systems. It all depends on whether the system meets the basic conditions of networks, complexity, positive feedback, and contradictions. As we become more and more connected, as networks become more and more dominant, we will move closer and closer to the postnormal condition.

The Postnormal Condition

The postnormal condition is the particular mode of being and existence we find ourselves in. We are facing problems that are vastly different in scale and are interconnected and embedded in accelerating pace of change. Scale, networks and acceleration generate the 3C's – complexity, chaos, and contradictions – of PNT, which lead us towards uncertainty and ignorance. As an example of postnormal phenomenon, think of Greece, a relatively wealthy state that was reduced to abject poverty almost overnight. Consider how quickly the landscape of the Middle East has been transformed. The Tunisian dictator was brought down in 28 days; and replaced with a parliamentary democracy. In three years, Egypt spun like a top from dictatorship to democracy and back to dictatorship [28]. The Syrian insurgency started with clearly defined actors: the democratic opposition against the brutal regime of President Assad. It soon became a complex web of numerous actors – democrats, revolutionaries, Islamists, the Hezbollah of Lebanon, Iranian militias, Shias, Sunnis, Alawis, pro- and anti-regime groups, making contradictory demands and fighting each other. It became impossible to tell who was who and who and which side the West should support [29]. The conflict in Syria gave birth to a hitherto unknown group that called itself the Islamic State of Iraq and the Levant (ISIS). Within months, it controlled an area, larger than UK, from Aleppo in Syria to Mosul in Iraq; became, as the *Guardian* put it, 'the most capable military power in the Middle East outside Israel'; amassed billions of dollars in cash; and transformed the very notion of terrorism, to use the words of US Secretary of State Chuck Hagel, 'beyond anything we have seen' [30]. The scale and speed, accomplished partly with savvy use of digital and global media, with which the extremist of 'Islamic State', so barbaric that even the old terrorist groups such as al-Qaeda shunned them, laid the foundations for substantial financial, military and political growth, is truly astonishing. 'The certainties of the old Middle East', notes Paul Danahar, have 'crumbled' in months [31]. On

the other side of the world, Russia was able to annex Crimea within a week; and the competing and contradictory interests in the Ukraine are no less complex. To resolve the issue of the Taliban in Afghanistan and Pakistan, one has to deal with hundreds of different types of Taliban, covering the whole tribal and political spectrum, each with its own specific demands.

Recent political events demonstrate that we are no longer dealing with isolated sequences of events, local in nature, separable in time, affecting a handful of individuals or a small community, and perturbing a small number of processes. The changes we witness today are swift and global; they reach out to touch every aspect of individual human life and social, political, economic institutions. The 'world order' is changing, notes Kissinger, with 'few if any limits', in such a complex way that there is no 'common interpretation – or even understanding' [8]. Yet, under postnormal conditions, events and situations develop rapidly to become chaotic and envelope the world. The rich, for example, get richer at super-speed; there are more billionaires now than before the global financial crash of 2008/9: 1126 in 2012, compared to 739 in 2009. In April 2013, the Bitcoin was valued at $213. Eight days later it was $63. A few months later it was $1200. Within a year of its launch, Wikileaks had amassed 1.2 million confidential documents [32]. Twitter emerged from nowhere to be floated on the market within seven years at a value of $34.7 billion (in truth, no one knows how much it is really worth). A volcanic eruption in Iceland in April 2010 created chaos in Europe and brought airline traffic to a halt for over a week. Malala Yousafzai, the school girl shot by the Taliban, rose from an obscure blogger to become a global icon within six months; within a year she was lecturing the United Nations and had published her autobiography [33]; within two years she had won the Noble Prize for Peace! On the other end of the political spectrum, Pastor Terry Jones, an unknown priest of an insignificant nondenominational Christian outreach centre in Gainesville, Florida, became a chaotic event when he threatened to burn the Qur'an in September 2010. His threat was broadcast on global television channels as though they were on a never-ending loop. The whole Muslim world reacted instantly and unthinkingly: demonstrations were held, embassies were burned, innocent people died, shops and public transport were torched – all of which generated even more television coverage, and sent social media into a frenzy. The then US Secretary of State, Hilary Clinton, was moved to say: it is 'regrettable' that a tiny congregation had gotten so much attention for a 'distrustful and disgraceful' act [34]. However, not all chaotic events generate 'the world's attention'. Consider the 'flash crashes' that can knock trillions off the stock market in minutes. One particular flash crash occurred on 6 May 2010, when at 2:30 pm local time something unexpected appears:

A flutter in the price of E-mini futures contracts, an investment vehicle traded on the Chicago Mercantile Exchange and regarded as a bellwether of wider sentiments. Almost no one notices, until the flutter becomes a shiver, then a spasm, amid whipsawing prices as the E-mini's vertigo spreads to other stocks exchanges, and indices begin to plummet.

Within seconds, the Dow has lost 100 points. Finance workers turn back to their screens. But seconds later, another 100 has been shed and managers fly from their offices, yelling 'Pull everything', as traders hit buttons and hammer keyboards, cancelling orders in an attempt to limit damage. In horror, they gather in communal spaces and watch price lines dive with eerie, implacable momentum, like lines scratched by an angry child.

300 points down…

400 points…

500 points…

At 600 down, the Dow has fallen further than it did on news of Lehman Brothers' collapse in 2008. But that crash took a day: this spasm minutes…Even 9/11 failed to rock the market like this – which implies that something catastrophic has happened… (no one can shut down the system because) the circuit breakers designed to halt trading after unnatural swings work only until 2:30pm and it is now 2:47pm, with the Dow racing towards an unprecedented 1000 point loss and almost 11tn wiped from balance sheets.

Then something even stranger happens as, with Armageddon approaching, the market turns tail and begins to rise, just as impossibly as it fell [35].

Such chaotic 'flash crashes' are a natural product of a complex networked system that accelerate at astonishing speed. The market and the economic system are now run not by conventional traders but complex mathematical formulae, software algorithms and networks of computers – all of which provide a coating of scientific respectability to its intellectual foundations. For example, one widely used derivative model, known as the Black–Scholes model [36], supposedly gives a theoretical estimate of European-style options. It provided scientific legitimacy to the activities of the Chicago Board Options Exchange and led to a spectacular boom in option markets around the world. But stock exchanges are no longer what they used to be. The conventional stock market, as Michael Lewis shows in *Flash Boys* [37] has disappeared. The New York Stock Exchange, for example, is no longer a physical place –

it is over a dozen 'stock exchanges' dotted around New York, each a server farm of computers running algorithms. In this virtual space of networked servers of monumental complexity, stocks are bought and sold at the speed of light – even an advantage of a millisecond can produce massive profits. Predator algorithms hunt slower players 'in the same way a shoal of piranhas might an ox'. Not surprisingly, like most computers and networks it has a tendency to go chaotic and crash.

Climate Chaos

The chaotic behaviour of the market and the political upheaval across the globe are only two illustrations of the postnormal phenomenon that we can observe currently. Another obvious candidate is climate change. Extreme weather events are now as common as common cold. The Panjab region of South Asia, covering both Pakistan and India, is flooded on a regular basis killing hundreds every year. During 2013, the world had a record 41 weather disasters, topping the previous high of just three years previously. California has been going through a severe drought for a number of years; 2013 was the driest year in California since 1580. In 2014, Chicago experienced a historic 'polar vortex': the entire city was frozen solid, including the Great Lakes. Britain faces exactly the opposite problem: Biblical flooding. The great deluge across south-western England during 2013–2014, accompanied by widespread flooding, broke a 250 year record. The river Thames has been flowing at its highest level since 1883. Typhoon Yolanda, that travelled across the Philippines in November 2013, moved at the unimagined speed of a Japanese bullet train (topping 320 km/h) destroying everything in its path [38]. The world's oceans are becoming warmer, while polar ice sheets are melting and glaciers around the world are shrinking. The combination of these changes is raising sea levels. The entire Florida coast is being eroded by sea surges, with the west coast of Miami facing an imminent danger of going under the sea [39]. Maldives, described as 'ground zero' of climate change, is in danger of being submerged under the sea – entirely. On the other end of the spectrum, huge swathes of the world are drying up. Australia has faced several years of severe drought; the 2006 drought was said to be worse in thousand years and almost 80% of Queensland is affected. California is on 'the verge of such an epic drought, with its backup systems of groundwater reserves so run down that the losses could be picked up by satellites orbiting 400km above the Earth's surface' [40].

Rising temperatures has produced an imbalance in nature caused by movement of species as they try to find cold water or adapt to rising temperature. The scale and speed at which invasive species are spreading around the globe is unprecedented. In the US alone, there are over 50,000 alien

species causing havoc with the flora and fauna: 'in the Caribbean, lionfish scour coral reefs of sea life; in Texas, feral hogs rampage through farmers' fields; in the Northwest, emerald ash borers turn trees into kindling; in the Great Lakes, zebra mussels encrust pipes and valves, rending power plants worthless' [41]. In the shores of British Isles, the warmer seas have forced Britain's favourite fish, cod, to look north for cold waters; other popular varieties, such as plaice and sole, are also declining. In contrast, the warming of seas has been good for the jellyfish: their population is increasing rapidly. If you travel from Malaysia to Indonesia by ship, all you will see is endless swarms of jellyfish. In 1999, jelly-fish clogged and caused the closure of the Sual coal-fired power plant in Luzon, Philippines, causing a mass panic. In 2006, jellyfish bloom clogged the coolant system of USS *Ronald Reagan*, which at the time was world's most advanced aircraft carrier, disabling the $5billion ship. In September 2013, a massive bloom of Moon jellyfish clogged the Oskarshamn nuclear power plant in Sweden and forced a shutdown [41]. As the warm water sends 'normal' shoals of fish to search for cold water, other wild life is affected. The puffins in the Gulf of Maine, for example, are dying out because their chicks couldn't swallow the fish that is now available. Indeed, the rising temperatures have wiped out the zooplankton that supports the entire food web of Maine [42]. Elsewhere, 'starfish are dissolving into goo, and no one knows why' [43]. If the trends continue, one-fourth of Earth's species could be headed for extinction by 2050.

On 9 May 2014, the atmospheric concentration of carbon dioxide, the gas that contributes most to global warming, reached the critical level of 400 parts per million (ppm) – a level not seen in history. Climate change is thus no-longer a theoretical future threat but a reality of postnormal times; and, in a globalised, interconnected world, there is no hiding place from climate change.

Climate science also provides us with a good illustration of postnormal science. As Hans von Storch et al note in their introduction to the special issue of *Nature and Culture* on 'Postnormal Climate Science', climate change 'has many characteristics that make it hard to tackle with normal scientific procedures'. In general, decisions need to be made well before conclusive supporting evidence can be available and decision stakes are high: the potential impacts of wrong decisions can be huge. In such situations actors tend to strongly disagree on the values that should guide the decision making, for example solidarity or economic growth. The available knowledge bases are typically characterized by imperfect understanding (and imperfect reduction into models) of the complex systems involved. Models, scenarios, and assumptions dominate assessment of these problems, and many (hidden) value loadings reside in problem frames, indicators chosen, and assumptions made.

In such circumstances, simple assumptions of cause and evidence, controlled experiments that are reproducible, are not of much use. We are faced with a plethora of uncertainties that cannot be resolved. 'We cannot perform a statistically satisfying series of reproducible experiments to test the effect of higher atmospheric greenhouse gas concentrations, because there is only one Earth available, and even the one available is poorly monitored'. Moreover,

scientific assessments of climate change are unavoidably based on a mixture of knowledge, assumptions, models, scenarios, extrapolations, and known and unknown unknowns. Because of the limited knowledge base, scientific assessments will unavoidably use expert judgments and subjective probability judgments. It comprises bits and pieces of knowledge that differ in status, covering the entire spectrum from well-established knowledge to judgments, educated guesses, tentative assumptions, and even crude speculations. Research on climate change comprises a large variety of scientific disciplines leading to the well-known problem that when quantitative information is produced in one disciplinary context and used in another, important caveats tend to be ignored, uncertainties compressed, and numbers used at face value [44].

The main problem here is the application of 'normal science' and its methodologies to postnormal conditions.

But it is not just in its method and policy that science has become postnormal. Conventionally, science has been funded by governments and corporations, what President Dwight Eisenhower described in his farewell address, in January 1961, as the 'military-industrial-congressional complex'. While some science is still funded by governments and multinational companies, an increasing proportion is now paid for by individual hedge fund managers, software billionaires, business moguls, oligarchs, and tycoons – what the *New Internationalists* [45] describes as 'the feral rich'. People like Sergey Brin of Google, Paul Allen of Microsoft, Richard Branson of Virgin, and Jeff Bezos of Amazon, and numerous others, have poured staggering sums into scientific research that outweigh anything that the government can come up with. Of course, they don't promote all science. Only what they prefer – perhaps because a member of the family has died of a particular cancer, or it opens up a new market, or its grand scale massages their egos. These people are not interested in basic research but grand schemes such as space exploration, sea mining, or as in the cast of the Russian oligarch Dmitry Itskov, a former

media mogul, lifelike avatars. As Steven Edwards of American Association for the Advancement of Science notes, 'the practice of science is becoming shaped less by national priorities or by peer-review groups and more by the particular preferences of individuals with huge amount of money' [46].

All this is not the future. This is the postnormal present: the condition of the world, *Espiritu del tiempo*, the spirit of the age.

The Postnormal Extended Present

However, postnormality is set to increase in the near future. In postnormal theory we call it the 'extended present' – that is the immediate future of the next ten to fifteen years that will be shaped by the entrenched trends and developments we can identify today. This is not to suggest that these trends cannot be derailed or that they present us with an *a priori* given future. Trend, as it has been said so many times before, is not destiny. But to argue that if these trends continue, we are bound to find ourselves in an increasingly postnormal world. More specifically, trends associated with capitalism, health and medical systems, big data and the social landscape are rapidly taking us towards a postnormal extended present. It is worth noting that the 3Cs – complexity, chaos and contradictions – do not operate at equal levels on all situations. In some cases, complexity may be the biggest component; in others, it may be chaos or contradiction. But, in general, as the Cs accelerate and grow, they combine to produce a postnormal situation.

Consider capitalism. The abnormalities and contradictions of the capitalist system are not simply a product of 'the Great Recession of 2008–2009'. They are deeply intrinsic to the system, which has become too complex, too interconnected, too contradictory, too steeped in deep uncertainty and ignorance to be anything else but chaotic. Indeed, any system based on the conception that economy is the sum of atomised action of millions of rational, profit-seeking individuals, where markets are stable, facts are certain, values clear, and there is equality all-round, is bound to implode in a world where 'facts are uncertain, values in dispute, stakes high, and decisions urgent' [4].

According to Bernard Schwartz, an investment expert and publisher of the journal *Democracy*, 'a sea change has occurred' in the financial system. Instead of building badly needed roads and bridges or running manufacturing plants that created goods and provided jobs, business people became fixated on complicated debt swaps and other abstract "products" that make money only for the broker. Some of these were so complicated and arcane, we now know, that they were beyond the comprehension of executives running the investment houses'. The most common comments Schwartz hears from 'more and more people' are: 'our primary system is broken' and 'the financial system

is not working' [47]. But it is not just the financial sector but the whole damn economic system that is now beyond repair.

Capitalism has become a 'horror show', according to David Simon, the creator of the celebrated television show 'The Wire' [48]. Bankers are not out of control, they are 'beyond control', says Joris Luyendijk, the Dutch economic writer, talk show host and blogger for the *Guardian* [49]. After conducting interviews with over 200 bankers, Luyendijk concludes: 'employees at the big banks themselves do not believe their top people know what's going on; the big banks have simply become too complex and too big to manage'. Running a bank nowadays is like 'playing Russian roulette with someone else's head'. The whole system is 'highly dysfunctional, deeply entrenched, and enormously abusive, both to its workers and the society it operates in'. Similar arguments and sentiments are echoed in a string of recent books such as Naomi Klein, *This Changes Everything* [50]; Paul Krugman's *End This Depression Now* [51]; and David Harvey's *Seventeen Contradictions and the End of Capitalism* [52]. All of which suggests that

CAPITALISM AND THE ENTIRE ECONOMIC SYSTEM BASED ON IT IS NOW RAPIDLY BECOMING POSTNORMAL. IT IS ONLY A MATTER OF TIME, THE PNT THEORY TELLS US, BEFORE IT TAKES US TO THE EDGE OF CHAOS

– and either implodes and collapses, or creates a new order, a radical transformation to a more viable way of doing business and commerce.

At the heart of the economic system are assumptions that present us with is basic contradictions. For example, that growth is essential and will continue into the far future. The ideal figure that any country should aim to grow at is said to be 4.5%. However, as the investment banker Jeremy Grantham notes, 'the fact is no compound growth is sustainable' [53]. To show just how unsustainable this is in reality, Grantham suggests that we imagine an ancient Egyptian culture that seeks a growth rate of 4.5%. How much wealth would they have accumulated after 3000 years? The answer: 2.5 billion billion solar systems worth! At 1% compound growth their wealth could not be accommodated on the planet. Even a lowly 0.1% rate of growth would break the system. Thus the seeds of postnormality are inherent in the very idea of growth. The more economic growth we have the more postnormal we become.

There is also the issue of inherent inequality in the capitalist system. As Thomas Piketty shows in his brilliant study, *Capital in the Twenty-First Century* [54], capitalism has actually increased inequality over the past two centuries. Piketty's main argument, supported by massive data, is that when the rate of return on capital exceeds the rate of growth of output and income, capitalism automatically generates arbitrary and unsustainable inequalities. If we continue with business as usual, we will return to, and in many countries may already have attained, the levels of inequality characterised in the medieval period. The latest OECD forecasts for the global economy up to the year 2060 suggest exactly such a scenario [55]. The OECD predicts growth slowing to two thirds of its current rate with massive increases in inequality despite the world becoming four times richer, more productive, more globalised, and more highly educated.

The absurd disparity between the salaries of managers and workers has attracted much public attention. But there is another kind of inequality over the horizon. The people who write and run the market algorithms are not financiers, brokers, investment bankers, or even programmers. They are quantum physicists, climate scientists, and theoretical mathematicians – known as Quants. Their technical abilities not only enable them to by-pass public regulation and oversight but also bring enormous power, creating a new kind of inequality. And the algorithms themselves are designed to enrich certain people over certain others and privilege certain aspect of the globalise world at the expense of more important life-enhancing aspects. As Costas Lapavitsas shows in *Profiting Without Producing: How Finance Exploits us All* [56], toxic finance has entered every aspect of our globalized world from carbon markets to biodiversity derivatives, catastrophe bonds to weather derivatives.

Moreover, algorithms produced by Quants are now set to take over most of our lives. They are already been used in online dating services. Soon, algorithms will be used in recruitment, student assessment, delivering benefits, health service, and much else besides. The potential for 'flash crashes' and chaotic behaviour will thus increase manifold. As will protests against inequality, corruptions and malpractice of governments. The mass demonstrations we have witnessed in the world over the past few years, including those that engendered the Arab Spring, are essentially about inequality. But they are not conventional demos: they are complex networks; protestors react instantly on social media, and move rapidly towards the edge of chaos. The workers at the Yue Yuen factories in Dongguan, southern China, for example, use an instant messaging app called QQ and Weixin to 'create numerous overlapping groups', and use Weibo, a Twitter-like service, to disseminate news [57]. Similarly, strikes by truckers in England, USA, and elsewhere are fuelled by social

media. The probability of the protests becoming chaotic is thus very high. Not surprisingly, in some cases, protests have brought governments down. The anti-government protests in Thailand, between November 2013 and May 2014, were largely about inequality and corruption; they succeeded in bringing down the democratically elected government of Prime Minister Suthep Thaugsuban, which was replaced by a military junta. During September 2012, half a million people rallied against the government of President Cristina Fernández de Kirchner of Argentina. The demonstration were triggered by a rise in the price of public transport but soon escalated throughout the country and nearly brought the government down. The Gezi Park protests in Istanbul on 28 May 2013 became chaotic and destabilised the government of the ruling Justice and Development Party [58]. The two mass-demonstrations in Pakistan during August 2014, led by Imran Khan, leader of the Justice Party, and Tahir-ul-Qadri, a cleric who heads a religious movement, were motivated by inequality, corruption and elite dominance of politics. The protests brought Pakistan to a standstill for months. All of these protests were fuelled by digital media and whipped up by 24-hour global media coverage – and transformed into chaotic events.

Big Data

The potential for chaos is further enhanced by Big Data, which is being collected, stored, copied and analysed from every conceivable source. In 2013, there were an estimated 4.4 trillion gigabytes of globally available data – equivalent of 120 DVD movies for every person on the planet. It is set to rise by 40% annually over the near future. But Big Data is not just big in scale, it is also complex and high velocity stuff: it has to be collected and analysed at the same rate it is collected to be useful. And it is high variety: it exists in many forms and collected from a plethora of sources. However, it may be big and fast, but it can also be inaccurate and highly unreliable as well as have qualities that may change over time. So while big data has now become a standard source of all kinds of analysis, used to identify all variety of correlations, and is set, as the subtitle of recent book suggest, to 'Transform How We Live, Work and Think' [59]**.** But it is also set to make Big Mistakes in the future. Correlations may be useful for predicting or measuring previously unknown or unseen behaviour, provided they are reliable. But correlations can be misleading. A frequently cited example states that knowing that a huge number of people are using Google to search for flu epidemics at a particular time may be useful for targeting sales of flu remedies but it tells us nothing about an imminent flu epidemic [60]. As Butler and others have pointed out, this data is theory free; in other words there is no hypothesis that provides a useful link between

search terms such as 'flu symptoms', 'flu remedies' and 'pharmacies in my area' and 'flu epidemic'. If you simply take a cluster of top terms and run the algorithm you are not going to get a meaningful answer. Correlation does not tell us anything about the causes of flu, the only real basis for understanding the spread of an epidemic.

This type of 'predictive analytic' has other inherent dangers. Someone researching terrorism for example may end up being suspected of terrorism, as happened to Rizwaan Sabir a PhD student in Britain, who was working on UK counter-terrorism at the University of Nottingham [61]. And someone collecting knives as a hobby could end up being targeted for stop-and-search by the police. After the Boston marathon bombing, a New York writer googling 'pressure cookers' and 'backpack' found armed police hammering on her door [62]. The Metropolitan police in London are already using big data analysis in a Minority Report-style predictive tactics to tackle burglars and muggers. In the film a 'precrime' department stops offenders before they commit their acts. The Metropolitan police deploy officers to areas of 'future crime maps' that are generated daily. The maps are produced using computer algorithms that combine local crime patterns, mathematics, and theories of foraging wild animals to pinpoint where crimes will happen next. Each map has a 'predictive area' of a typical radius of 300 metres, usually covering a number of defined streets [63]. Given the fact that scientists can now distinguish between a scan of a 'normal' brain and that of a criminal, the trends are well established to take us towards a brave new postnormal world – a point well made in a new adaptation of George Orwell's *Nineteen Eighty Four* by Robert Icke and Duncan Macmillan. Winston, the protagonist, finds himself in two overlapping time zones: the landscape of the novel with its two-minutes of hate, Ministry of Love and the terrifying Room 101 and an unspecified near future. The parallels are striking. The extended present through which a shattered Winston staggers appears 'normal' but where privacy and individual liberty are conspicuous by their absence, there is always a camera watching you, and you are always at the edge of chaos.

Privacy evaporates with the arrival of big data. Often the data is collected automatically and anonymously, although sometime we are forced to tick a box to give our 'permission'. As John Naughton, Emeritus Professor of the Public Understanding of Technology at Open University, UK, and a columnist of the *Observer*, notes big data comes with a big price tag: 'the systematic elimination of personal privacy, which in turn implies the emergence of a society in which surveillance is comprehensive and pervasive. We may be headed in that direction anyway, courtesy of the intelligence agencies and the internet companies...Big data is a technology for the big battalions, not the rest of us.

It will further increase the power of large corporations and governments, and further disempower the poor and the socially excluded' [64].

Just how extensive is this surveillance is brought into sharp focus by the classified documents made public by Edward Snowden, a right wing contractor to America's National Security Agency (NSA). During the Cold War, it would be an achievement for a spy to steal more than a document or two after years, if not decades, of espionage. In postnormal times, Snowden managed to steal a staggering 1.7 million files, neatly tucked up in a flash drive. As Luke Harding's *The Snowden Files* [65] reveals, Snowden was particularly alarmed at the sheer scale and complexity of NSA, its formidable technological reach, its ability to cross borders freely, and capacity to co-opt technology giants such as Google, Facebook, Twitter, as well as telecommunication companies like Vodafone. It had become a monstrous machine that automatically and comprehensively sucked all human communications, with mindboggling capacity to snoop on anyone, anywhere in the world, at any time, where no one seems to have any responsibility or knew what was going on. Indeed, it was so gigantic and so unwieldy that it did not even notice what Snowden was up to, even though he was already under suspicion at his former post at the CIA. Once the data was in the public domain, no amount of skulduggery could get it back or erase it!

As privacy dissolves, the boundary between public and private becomes increasingly diffused. It is interesting to note that while there is a great deal of concern about erosion of privacy, there is a simultaneous and contradictory desire to put our private lives in the public domain. We provide a running commentary on our lives on Facebook; we publish every thought we have, however absurd, on Twitter; and we put pictures of our babies, birthdays, cats, food and everything in between on Instagram. Yet, at the same time, we want 'inadequate, irrelevant or no longer relevant' aspects of our lives deleted from the internet. We have, as the European Court has announced, the 'right to be forgotten' [66]. But how can we be 'forgotten' when our very sense of who we are and what is important to us is now embedded in our intense desire to share every aspect of our life. And these include images of our bodies, which were normally seen as our most sacred, private parts. The importance of something – an idea, an image, an argument, a policy – notes James Graham, author of the play 'Privacy', 'is no longer measured by its quality but on how far it is shared. The measure of your impact on Twitter is called "clout" – a value determined not on the quality of what you write but on how many people will see it. The value of life experience is reduced to how many likes you get on Facebook' [67]. Every newspaper or magazine article, every blog or post, asks you to share it and tell your friends you have read it.

The more we rely on digital media and the internet the more we expose ourselves to fraud, scams, and criminal activities. It is hardly surprising that data breaches are becoming bigger and frequent. In 2013, over 800 million records were stolen from a whole range of industries from financial services to health care, education, pharmaceutical, consumer, energy, media, transport and retail. Amongst the most prominent victims in the USA were the retail store Target, eBay, Sony, LinkedIn, RockYou.com, and the software giant Adobe. A computer virus known as Shamoon wiped the hard drives of a network of tens of thousands of computers at Saudi Aramco, the Saudi Arabia oil and natural gas giant. The cost to the global economy of cyber-crime stands at $455 billion a year – about as much as the GDP of Austria [68].

So imagine, against this background, the chaotic potential of 'Internet of things': when your fridge, cookers, smoke alarms, door locks, home security system, webcams, televisions, cars, medical devices and much else besides is connected to the internet. 'First, we'd install cameras in our kitchens to receive better instructions', writes Evgeny Morozov, 'then food and consumer companies would tell us that they'd like us to keep the cameras to improve their products, and, finally, we'd discover that our cooking data now resides on a server in California, with insurance companies analysing just how much fat we consume and adjusting our insurance premiums accordingly. Cooking abetted by smart technology could be a Trojan horse opening the way for far more sinister projects' [69]. We will surely be riding a wave to postnormal existence. Of course, all that cooking data could be hacked with little special knowledge. No matter how good the software, there are always inherent weaknesses. A recent discovery is the Heartbleed bug, a serious vulnerability in the popular OpenSSL cryptographic software library. It allows anyone on the internet to read the memory of the system, identify service providers, and the names and passwords of the users and the actual content; and allows attackers to eavesdrop on communications, steal data directly from the services and users and to impersonate services and users. Software makers usually issue 'patches' to fix their software. But there is always a time-lag between the discovery of a new vulnerability and the appearance of a 'patch' that fixes it. The in-between time, when the hackers first begin to exploit the vulnerability and cause chaos and the developers realize that there is a problem and produce a patch to fix it, is called zero-days. Up to now zero-days have been rare; the flows remain undetected for an average of ten months. But as software become more and more complex, and more and more things are connected to the internet, zero-days will escalate with obvious postnormal consequences.

JUST THINK HOW MUCH OF OUR CRITICAL INFRASTRUCTURE IS ON-LINE. THE MORE NETWORKED COMPUTERS ARE DEPLOYED ON NATIONAL GRIDS, SUCH AS ELECTRICITY (EVEN A 'SMART METER' DOES THE JOB), THE MORE 'ATTACK SURFACE' THE GRID PROVIDES.

The greater the 'attack surface' the higher the probability of the grid going down. Almost all industrialised countries are now involved in cyber warfare, with the US leading the way [70]. In 2012, there was a rise of 52 per cent in cyber-attacks on power and nuclear targets in the US alone. Once again, we are faced with a system that according to PNT theory is ripe for chaotic behaviour and catastrophic consequences.

Health and Medical Systems

The health system is also going postnormal. Over the last decade, despite many medical advances, there has been an accelerating rise in modern diseases. Of course, diseases have been with us throughout history. They spread at the rate that was the speed of travel of a particular period. During the fourteenth century, expanding trade routes spread rat-borne Black Death across Europe and smallpox to the Americas by ship. In more recent times, the interconnected world has seen the spread of SARS, Swine flu, West Nile virus, H5N1 bird flu and Ebola at jet-speed. Moreover, the rate at which pathogens are emerging is accelerating, even with the increase in awareness and surveillance. A modern outbreak, caused by a previously unknown virus, can envelope the globe with frightening speed.

But it is not just new pathogens that are of concern. The world is facing a whole series of epidemics brought about by modern lifestyle: obesity, diabetes, asthma, hay fever, eczema, food allergies, oesophageal reflux and cancer, coeliac disease, Crohn's disease, ulcerative colitis, and autism [71]. In the US, one in 13 children has a food allergy, and the number with peanut allergy tripled from 1997 to 2007. Globally, over 1.4 billion people are overweight, around 300 million qualify as obese. An estimated 800,000 children develop Type 1 Diabetes annually around the world. In UK alone, 5.4 million people suffer from asthma. Childhood asthmas increased by 50% in the US from 2001 to 2009. Some 30 per cent of Australian children develop Eczema in their first year. Food allergies – from peanut to milk, bread, eggs, soy, fish and fruits – are everywhere. The incidence of inflammatory bowel disease, including Crohn's and ulcerative colitis, is rising. These disorders suggest that children

throughout the world are experiencing levels of immune dysfunction never seen before, observes Martin Blaser, author of *Missing Microbes: How Killing Bacteria Creates Modern Plagues* [72].

But that is only a small part of the story. A recent report by WHO suggests that 'a post-antibiotic era—in which common infections and minor injuries can kill—far from being an apocalyptic fantasy, is instead a very real possibility for the 21st century' [73]. Effective antibiotics have been one of the pillars of modernity allowing us to live longer, live healthier, and benefit from modern medicine. But antibiotic resistance, which is 'is complex and multidimensional', is spreading rapidly and 'involves a range of resistance mechanisms affecting an ever-widening range of bacteria, most of which can cause a wide spectrum of diseases in humans and animals'. The resistant pathogens travel the globe with ease. According to WHO, pneumonia will again become a feared killer, diarrhoea deadly, and drug resistant tuberculosis, which requires more than a year of treatment, fatal. Gonorrhoea resistant to antibiotics is set to make a comeback, as are the treatment-resistant strains of HIV. The widespread resistance to fluoroquinolones – one of the most widely used antibacterial drugs for the treatment of urinary tract infections caused by E. coli – presents us with a truly frightening scenario. There are no new antibiotics to replace the old one; in fact, there have been no new antibiotics for the last 25 years.

Medicine is a complex ecosystem. The absence of antibiotics will have an impact across medicine in all branches. Surgery will become risky. Cancer treatment will be compromised: cancer patients undergoing chemotherapy need antibiotics to handle otherwise potentially fatal side effects as their immune systems reel from the impact of chemotherapy. Antibiotics don't just kill bad bacteria; they also kill the good bacteria. The overuse of antibiotics means that we have less and less good bacteria in our bodies, which means our immune systems are less and less able to cope. Thus, antibiotics affect not just the person who takes them; they affect the entire planet. The abuse and overuse of antibiotics in humans and animals is set to nudge our entire health system towards postnormality.

The emergence of antibiotic resistant pathogens is only one reason amongst many for the rapid rise of new maladies. Some disorders, such as the rise of allergies, can be explained by the fact that we live in 'germ-free bubbles'; our immune systems have had little chance to develop responses to allergies. But such single-cause explanations do not take us very far. As Blaser states: 'a single cause is easier to grasp; it is simpler, more parsimonious. But what cause could be grand enough to encompass asthma, obesity, oesophageal reflux, juvenile diabetes, and allergies to specific foods, among all of the others?

Eating too many calories could explain obesity, but not asthma. Air pollution could explain asthma but not food allergy'. Blaser suggests that a major cause is the loss of microbial diversity, which 'changes development itself, affecting our metabolism, immunity, and possibly even our cognition. Microbes in our guts have a role in the production of some of the building blocks of the brain, as well as the molecules that provide signals from one brain cell to another'. Blaser calls the process 'the disappearing microbiota'; and predicts that 'it will be worse in the future. Just as the internal combustion engine, splitting the atom, and pesticides all have had unanticipated effects, so, too, does the abuse of antibiotics and other medical or quasi-medical practice'. We are heading towards 'an "antibiotic winter". We know that the "good bacteria" protect us against the "bad" ones, the pathogens that we may encounter over the course of a lifetime. As our populations of good bacteria become depleted, our susceptibility to the bad ones grows' [71].

WHAT IT MEANS TO BE HUMAN IS ALSO ABOUT TO CHANGE RADICALLY.

For centuries, the West has assumed there is only one way to be human: the modern way. This assumption has been the biggest hurdle in the appreciation of human diversity. Now advances in genetic engineering and synthetic biology are undermining the conventional view of what constitutes a human being. Consider, for example, the experimental treatment called mitochondrial replacement: it involves taking the genetic material from a man and a woman and cellular material from a third person to create an embryo. The faulty mitochondria from the mother are replaced with those of a healthy donor. The resulting foetus thus has not two but three parents. Or, as another example, think of pre-implantation genetic diagnosis (PGD), which was initially developed to help families with a history of serious genetic disorder to select embryos for IVF that are unaffected by the condition. But it can be equally used, and has been used, to select an embryo's sex. The practice has been widely used in India and China. In China, around 118 boys are born to every 100 girls; India has a national average of 111. But the practice is also gaining ground places like Azerbaijan, Armenia, Georgia and Albania [74]. Apart from sex selection, one can also tweak the baby. Indeed, in India, where bleached, fair babies are preferred by the rich middle class, PGD has been widely used to produce 'milky-white' babies. Moreover, just as easily, one can choose to have a child with a disability!

Developments in biosciences and computer technologies have been so rapid that a scholarly cult of 'transhumanists' now argues that 'within the next few decades enhanced human beings will be walking the earth' [75–76]. Or as 'Dr. Will Caster' put it, during his presentation at 'Evolve the Future' conference in the 2014 film *Transcendence*, 'for 130,000 years our capacity for reasoning has remained unchanged...once online a sentient machine will quickly overcome the limits of biology. And in a short time its analytical power will be greater than the collective intelligence of every person born in the history of the world. Imagine such an entity with a full range of human emotion, even self-awareness. Some scientists refer to this as the singularity. I call it transcendence'. By the mid-century, the transhumanists argue, a 'singularity' will result through which a genetically engineered and enhanced post-human species will emerge – far stronger, wiser, and able to live much longer than mere mortals [77]. We may dismiss this as dystopian fantasy; and *Transcendence* is certainly meant to be seen as such. It ends with a complete shutdown of the internet, which places the whole world in total darkness. But this should not blind us to the fact that

HUMAN ENHANCEMENT THROUGH TECHNOLOGY IS SET TO BECOME A COMMON PRACTICE.

In the last two to three years, gene editing has become faster, cheaper and more precise. When technology is cheap and widely available it tends to get used.

Indeed, artificial life has already been created if we are to believe Craig Venter, the American geneticist who was amongst the first to sequence the human genome. In *Life at the Speed of Light: From the Double Helix to the Dawn of Digital Life* [78], Venter describes how he created the world's first synthetic life. Synthetic bacterial genome is constructed from chemical in the laboratory and then 'booted up' by inserting it into living single-celled bacterium. The cell replicates itself into a colony of organisms containing only the synthetic DNA. 'It's like a whole new concept of life', Venter says. 'There is not a single molecule of the original from there – it's like converting you into a frog'. More sophisticated organisms can be made by using 'connectable pieces of DNA called BioBricks, which program a host of bacterium to perform specific tasks. Each BioBrick is capped at both ends with DNA sequences that enable it to be connected to other bricks and integrated into a plasmid that can be inserted into a bacterial cell' [78]. There is even a Registry of Standard Biological Parts that one can use. Soon, life will finally be 'able to travel at the speed of light, the universe will shrink, and our own powers will expand' [78]. In an interview with the *Observer*, Venter warns not to dismiss this as a fantasy: 'we are actually doing the future'.

Indeed, what Venter is doing is not 'the future' but, what is called in PNT theory, 'the extended present': the consequences of his work can be seen in the present and will unfold within the next few years. As will the current research on human biology which enables us to generate body parts, such as livers, from stem cells that are taken from human skin and reprogrammed to an embryonic stage. Which raises the question: What is 'the body' when it consists of parts printed on a 3D printer? As Warren Ellis, the novelist and Marvel comic writers, notes: 'everyone talks about disruptions to the norm – whether it is synthetics or 3D printing or whatever. What they don't get is that it's a feral process; once disruption is out in the wild, it doesn't stop. In 10 years' time, there are going to be kids in basements 3D printing additional organs and working out ways to stitch them into their bodies' [79].

Social Landscape and the Next Generation
Finally, the social landscape itself is about to be radically transformed. The 'normal' notions of what is a marriage, what is a family, and the idea of childhood innocence have already gone, or are about to go, postnormal. The old idea of marriage between a man and women now has a new addition: homosexual marriage – at least in the West. One could just as easily have two fathers or two mothers, as a mother and a father, or indeed three parents. Indeed, monogamy itself seems to be slowly evaporating. According to Deborah Anapol of *Psychology Today*, 'our cultural obsession with monogamy is going the same way as prohibition, slavery, the gold standard, and mandatory military service. In other words, while serial monogamy is more popular than ever, lifelong monogamy is pretty much obsolete, and for better or worse, polyamory is catching on' [80].

Children are growing up with a drastically different set of values than their parents. Prominent amongst things that teenagers share in digital media is pornography. It is not just that 'sexting' has now become a routine activity, but young teenagers have, as *Sunday Times* put it, 'a smorgasbord of unimaginable depravity at their fingertips'. When you consider that over 36% of the internet is devoted to pornography, one in four search queries is about porn, and a third of all downloads are porn, you realize the true extent to which pornography has penetrated everyday life. It has been suggested that the average age of first exposure to pornographic images in the West is between eight and six. Whatever the ethical arguments for or against pornography, the fact is that it has a devastating effect on the nascent young cannot be dismissed: 'they think these gross scenes are normal and set out to copy them as they take their first steps into sexual activity' [81].

Six is also the average age when a child masters digital technology. A recent report by Ofcom, the Independent regulator and competition authority for the UK communications industries, suggests that children born in the new millennium are exceptionally technology savvy. As they have grown up in the digital age, their communication habits are quite different from older generations. According to Ofcom, children between 12 to 15 spend more time communicating then sleeping [82]. Six to seven year old, who have grown up with YouTube, Spotify, Facebook and Instagram, have knowledge of superfast broadband, 4G mobile phones, how to operate tablets and apps that is exceptionally high. Their Digital Quotient (DQ) is even higher than 16-24 year group.

This age-cohort will grow up with wearable cameras that record their every move and utterance, where lives are completely lived on-line, where every face and every word can be instantly retrieved [83]. Like climate change, the digital effects on this generation will be global, unparalleled and complex. As Susan Greenfield argues, social media is actually altering the brain, decreasing empathy and reducing the ability to communicate of excessive users [84]. When this age-cohort takes positions of power, within two decades, its focus will not be on whether things are true or false, good or bad, but on how and how fast they work. This generation, brought up on the global language of emoji, will have its own specific desires, expectation, and way of seeing and shaping the world: a world of instant and perpetual change, instant gratification and utility, where every aspect of life is networked, and complexity, contradictions and chaos are upfront. In other words, a truly postnormal ecosphere.

The future of science may also look very different given the crisis in physics. The unresolved problems of supersymmetry [85], the anomaly in the proton radius [86], the issues of dark matter and dark energy, the famed black hole information problem (if the incoming particles start in a pure quantum state, Hawking's calculation predicts that the black hole evaporates into a mixed, thermal-like final state, with a massive loss of quantum information – which violate quantum mechanics), may all lead to an epochal paradigm shift in physics. We may be on the verge of a radically new perspective and understanding of the cosmos – a truly postnormal proposition.

'Be Postnormal'
So how do we cope with postnormal times, given that the notions of progress, growth, control, efficiency and even management are increasingly becoming irrelevant? How do we move forward without falling prey to chaos? How do we survive increasing uncertainty and the different varieties of ignorance that we face? How do we transcend the obvious failings of capitalism and promote

equity and social justice? What should follow the dissolution of 'world order' so perceptively noted by Kissinger? How can we overcome the dangers of 'life designed to order' [87]? How do we meet the challenges to our health systems in a 'post anti-biotic' era?

The answers to these, and a plethora of other questions raised by postnormal times, begin with awareness and end with creativity and imagination.

We need to be aware that we cannot manage and control postnormal times, but we can navigate through them. We need to be aware of the fact that the multitude of problems we face simultaneously cannot be solved in isolation: when you look at a problem you also have to look at all the other problems it is connected with and to. As Jordi Serra notes, the linear cause and affect relationships do not hold anymore: 'action on just one element is not only futile but often also quite dangerous. Action on A triggers myriads of reactions in B, C, D all the way to Z; and many of these reactions can acquire chaotic proportions at lightning speed' [88]. Moreover, given that these problems are complex and are embedded in a complex environment, there solutions cannot be simple. A major principle of survival in a complex environment is that the mechanism that deals with it must itself be complex – what is known as Ashby's Law of Requisite Variety [89]. The larger the variety of actions available to a system, the larger the variety of perturbations it is able to compensate: or to put it in other words, only variety can cope with variety. Thus, plurality, diversity and multiple perspectives are essential for understanding and steering through postnormal conditions. Furthermore,

THE WEB OF OUR INTERCONNECTED PROBLEMS CANNOT BE SOLVED BY OLD FASHIONED BINARY LOGIC AND REASONING. IT NEEDS A HIGHER FORM OF LOGIC

and what Jennifer Gidley calls 'postformal reasoning' [90]: complex thinking, the ability to handle multiple perspectives with competing notions of truth, the capability to transcend contradictions, and the intuition to deal with ambiguous knowledge and epistemological uncertainties. To be aware of this actuality is to 'be postnormal'.

What does this mean in terms of futures studies – how it is done and conceived? I would argue that futures must now incorporate postnormal landscapes in its purview, methods and analysis. Given that the extended present and the near future will be dominated by postnormal events, it is imperative that futures research and scholarship focuses on detecting and

scrutinising postnormal trends and developments; and methods and tools are developed to analyse the complex and interconnected consequences of postnormal phenomenon. It is no longer enough to simply explore a variety of possible futures; we also need to give serious attention to how we are going to navigate the postnormal condition – the ever present potential economic collapse, the drastic consequences of climate change over the horizon, the possible failure of the human immune system – to reach sane and viable futures. On the whole, futurists have avoided big questions (normally seen as the subject of philosophy) and concentrated on analysing trends, horizon scanning, building global models and creating scenarios, visions, images of alternative futures [17]. But in postnormal times, when what constitutes economic activity is being questioned, when the body is itself being reshaped, when social relations are being reconfigured, and the very idea of what it means to be human is being transformed, big questions cannot be ignored in futures work. Considering that postnormal times are hinting at changes of fundamental nature, it is important that we explore what these changes mean for all the diverse human and non-human cultures of our planet, and what radically different alternatives could emerge. Almost all the changes that postnormal times are ushering have deep ethical connotations. This means that exploration of futures must explicitly engage with ethical issues. Ethics is not just about how we, human beings, are located in the world; it is also about the human that is thus located. It is not just about being-in the world, but also about being-with the world. It is about how we are related to the rest of the world – the individual within a web of community, the resources we share and distribute amongst ourselves, our relationship with the flora and fauna, nature and environment, planet and the cosmos. Therefore, futures studies cannot simply be about what could happen in the future, or what can be done to shape a future, what is possible and what is not. It has to be largely about what ought to be done *for* the preservation of sane, ethical futures. Or to put it another way: futures studies ought to be exploring other ways of being human in all our futures.

Perhaps the most fundamental shift that postnormal times will usher will be in the power to define. During the eras of colonialism, modernity and post-colonialism, the West had defined what it is to be human and 'modern': what is freedom, rationality, science and civilization, what is 'free market', 'democracy' and 'international law', what are 'human rights' and 'humanitarian causes', and is economics, political science, architecture, art, history and tradition, what is sacred and what is not. The real power of the West rested on its power to define the key concepts of humanity and human society. But postnormal times tell us, if it tells us anything at all, that these definitions

have passed their 'sell by' date. This is where creativity and imagination enter the equation.

Alfonso Montuori has pointed out that creativity and imagination are being transformed, as a by-product of PNT, from the individualistic/atomist view of modernity to a more contextual, collaborative and complex approach [91]. Sean Cubitt and his colleagues have argued that a new arrangement of networks now possess as much power as nations and markets, and the challenge for PNT is to 'imagine the future by imagining the political consequences of recognising non-human agencies as political actors' [92]. Alfonso Montuori and Gabrielle Donnelly have suggested that we need to focus our attention on 'open source' creativity to move from 'zero-sum relations in the old worldview' to 'win-win relations' that transcend contradictions, difference and conflict [93]. We need to take these suggestions seriously. But there is another reason why imagination and creativity will become paramount: we will need new and more inclusive definitions of numerous things that we have taken for granted from what is the body to what constitutes social relationships, what does good health mean, what is freedom, to what it means to be human. As power shifts from West to East, and as we navigate the 'damaging tendencies' of capitalism, new definitions of our fundamental notions will emerge from non-western cultures as they exercise their muscles. Even though China and India tend to follow the western capitalist model, they may still produce radically different versions – although not necessarily inclusive, open and pluralistic ones. We need to extend the horizons of our creativity and imagination to ensure that requisite variety, complexity and postnormal reasoning are central to the new definitions. In other words, we need creativity and imagination to shape a Postnormal Ethics that can guide us through the turbulence of postnormal times.

A good illustration is provided by Frances Whitehead, artist and professor of sculpture at School of the Art Institute of Chicago, who sees urban landscapes as 'complex, ambiguous, and contradictory physical spaces', 'symbols of a passing era of material prosperity', which 'continue to affect and be affected by the local community, ecosystem and infrastructure'. Whitehead consciously describes her work on urban renewal and cultural heritage as postnormal: the prefix 'post', she writes, 'serves as a reminder of the embedded complexity', describes 'the current state of ecological, economic and social-cultural affairs, and implies that we are indeed living in the future of a past era. This trope also implies that we invoke our past as part of our current paradigm –*Post-carbon, Post-industrial and Post-colonial* are inherited cultural landscapes, literally *Post-Normal Cultural Heritage*' [94]. Her work emphasises the interconnection of things, uses locavore logic and brings ethics and aesthetics into high relief. In one of her projects in Chicago, called The 606 (after the first three digits of the

zip code) and involves transforming a huge dilapidated area into multipurpose recreational trail and park system, Whitehead has introduced the concept of 'Slow Cleanup', which 'moves Post-Carbon environmental remediation into the territory of Post Normal Science as it engages the Chicago community and leverages underutilized capitals (assets) of space, time, and human capacity'. In another project in the historic center of Lima, a crumbling UNESCO heritage site that is the abode of the urban poor, she and her colleagues are trying to create 'meaningful urban agriculture program, integrating architectural conservation and the needs of current inhabitants'. Connections are made through potato research to colonialism, Peruvian culture, modern urban interventions, to the rural countryside of west Ireland. Here, she notes, 'we return full circle to Post-Normal Cultural Heritage, manifest in the underlying ethical and even pragmatic dilemma of sustaining a desert city that is arguably in the wrong place – a perpetual colonial legacy that must be examined as an unsustainable settlement pattern' [95].

Whitehead is literally imaging herself out of the postnormal times. She will surely be followed by others who will use their creativity and imagination to produce new definitions of everything from art to architecture, politics to policy, science to spirituality and what it means to be human in postnormal times. Time for me to listen to 'Arctic Blood and Ice' by the Canadian experimental band 'Post Normal'. Their music combines postnormal science, themes and images from different ethos, including indigenous cultures, with glam rock and pop to point out that something is terribly wrong with our times; we ought to be able to do better. 'I am hunting for a song to sing'.

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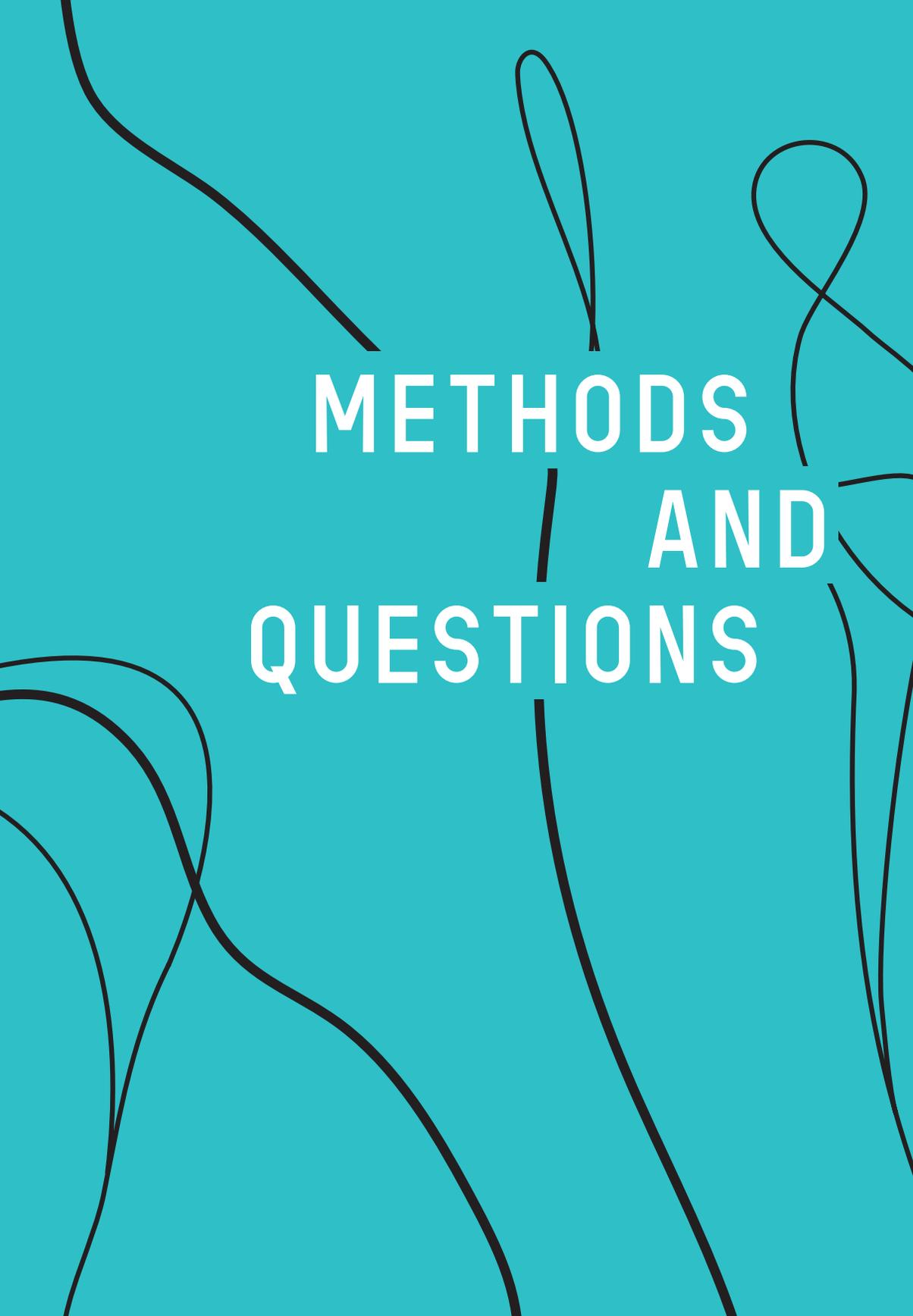
METHODS AND QUESTIONS

THE THREE TOMORROWS OF POSTNORMAL TIMES

Ziauddin Sardar and John A. Sweeney

Introduction

'Everything changes and nothing stands still'. So said Heraclitus, as reported by Plato in *Cratylus* (402a), over two millennia ago [61]. 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 [11] or the more radical concept of the Technopocene [4, 66] 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' [18]. Globally, rates of obesity in humans nearly doubled from 1980 to 2014 [73]. In the US alone, the rate of autism rose by 119 per cent from 2001 to 2010 [9].

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' [7]. The world faced a daunting list of crises – which ought to be read chaotic behaviour – 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?

All of the above adds up to a snap shot of our lives in Postnormal Times [56, 57]. 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 [28, 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 modelling fit for purpose in PNT? Do scenarios about future(s) take note of changing change? Do existing scenario modelling 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 behaviour?

'When all is uncertain, nothing is predictable', writes Gardner in *Future Babble* [20, 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 [70]. 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' [20]. 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' [22, 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' [14].

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 analysing imaginings of futures, then perceptual plausibility is certainly something to be considered when modelling 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 changeover time [12, p.4]. Moving beyond standard management-oriented approaches, Three Horizons received a major overhaul through the work of Sharpe and Hodgson, who reframed the tool to 'see our current situation in a variety of ways and help illuminate the choices available' [62, p.6]. 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 Figure 1.

Figure 1
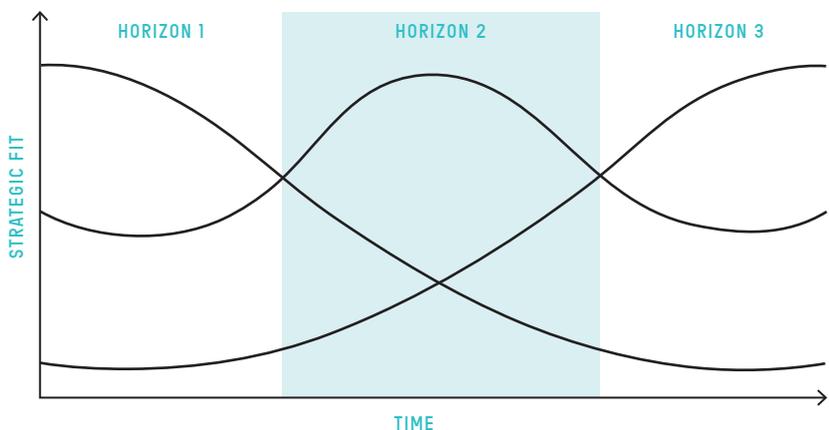
Next, one plots the three horizons. The first horizon articulates the predominant paradigms and ideologies of today, which, as the method presumes, will decline as one moves forward in time. Then, one charts the third horizon, which is composed of emerging issues or weak signals— including those most 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, centres 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 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 emphasise their dynamic and mind bogglingly diverse nature, chaotic potential, contradictory possibilities, and invoke imagination and creativity [45]. This is why we, as well as others, prefer to speak of 'global weirding' 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 [66]. 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)' [58].

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 [72].

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 [50]. 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' [50]. 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 [38].

Coined in 1977 by Kristeva, who has a book with the same name, polylogues
denote 'multiple logics, speeches, and existences' [10]. 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. 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'
[37, 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' [39, 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 on-going discourses on the present and futures. Establishing such
zones through the formation of event or issue-specific polylogues will not be an
easy task, especially as this endeavour demands that we rethink deeply held
traditions, practices, and customs of knowledge sharing and 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.

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 3C's)—'the forces that shape and propel postnormal times' [56, p.436]. Equally, not all systems are inherently postnormal and will become postnormal in the same way. For example, isolated communities, structures and organisations 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 3C's 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 [29] and refrigerators [23]. 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' [51]. 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 organisations, 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' [51]. Indeed, we change our mental models and behaviours 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' [51]. 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 [51].

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. Figure 2 provides a rendering of this relationship.

Figure 2
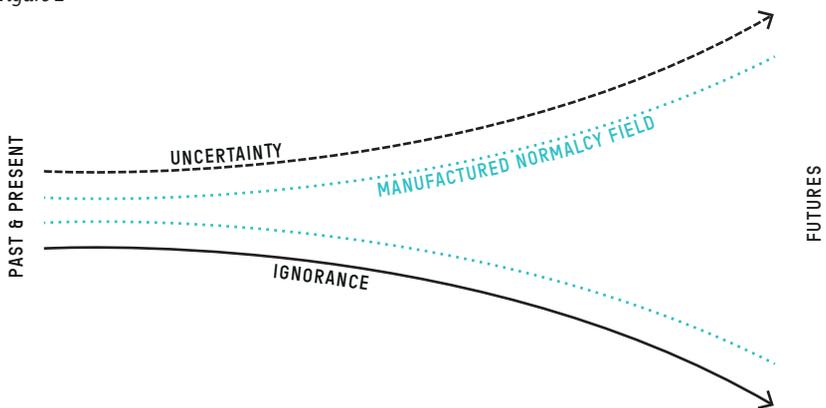
'Normal' phenomena move towards postnormalcy through the process of Postnormal Creep (hereafter PNC): when systems become interconnected and complex, when social media, 24-hour television and other forms of technologies are used to generate positive feedback, chaos emerges, sometimes rapidly, and things 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' [14]. 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' [63, 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 US 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 towards 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' [53, 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 [47]. As the Sacco example illustrates, PNB can have a range of effects on a number of scales, including the intensely personal.

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).

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; it is what most people mean when they talk about 'the future'. 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 colonised [15, 55]. Here the best we can do is use the lens of PNT to identify systems that may be creeping towards postnormality, or on the verge of PNB. To suggest that the Extended Present is already colonised 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' [30]. Hill's prediction is not exceptional or right. The trends towards 'wearable computers' was well established by 2008 [52], and as the corporation that had established the 'i' line of products that made Apple a '$1 Trillion Company' [74], 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 smart watch, 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 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 [49]. Or, how built environments and urbanisation 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 behaviour of the characters in *Mad Max* (1979, 2015) is replicated by the fanatical Jihads of the 'Islamic Caliphate' [27]. 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 [31]. 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 suit. 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 [32]. 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' [56, 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 [8, 26, 69, 70, 71], to show the relational dynamics between each horizon. Figure 3 shows the perceived relationship between each of the 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.

Figure 3
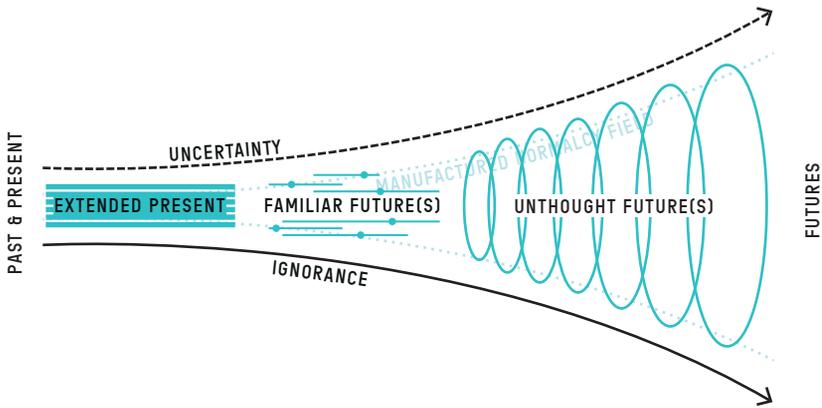
Although this two-dimensional image suggests separation, the 3T's are not isolated entities but deeply interconnected spatial and temporal zones of actual and perceptual phenomena that have a dramatic effect on the here and now. The Familiar Future(s) is an integral part of the Extended Present; and both contain a great deal of Unthought Future(s). It is also important to emphasise 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 Figure 4.

Figure 4
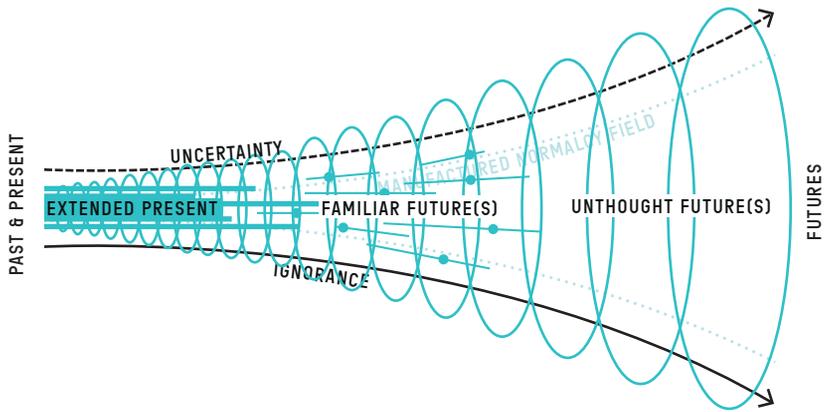
Ignorance, Uncertainty and Menagerie of Postnormal Potentialities
Each tomorrow has a particular type of uncertainty and ignorance attached
to it. When complexity, chaos and contradictions come together, it should
not surprise us that uncertainty is the result. The most basic variety
of uncertainty emerges 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 colonised 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. Figure 5 captures how we striate the three uncertainties.

Figure 5

SURFACE

SHALLOW

DEEP
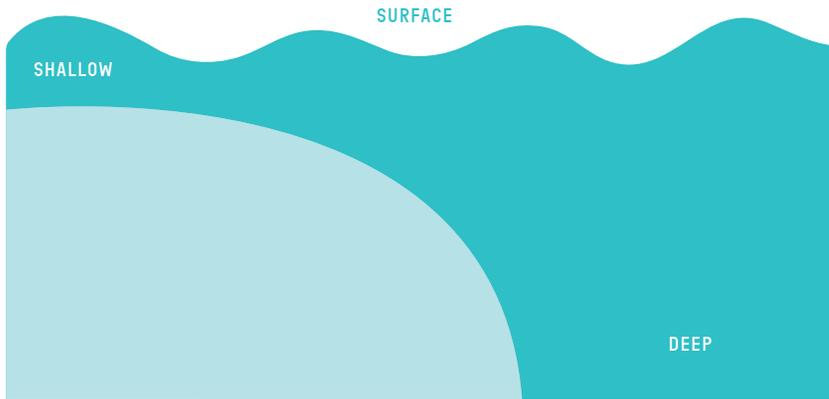
Each type of uncertainty is associated with a particular category of ignorance. The simple or Plain Ignorance (signified as i^1) can be defined as the absence of knowledge; it relates to those items or phenomena that we do not comprehend. This is the ignorance we may encounter in a complex or contradictory situation, which may be overcome by understanding the 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' [67] 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 Ignorance: 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' [46]. It is related to the Deep Uncertainty of the Unthought Future(s) and is categorized as Invincible Ignorance (signified as i^3).

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' [56, 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. Figure 6 captures how we situate a unique uncertainty and ignorance within each horizon.

Figure 6
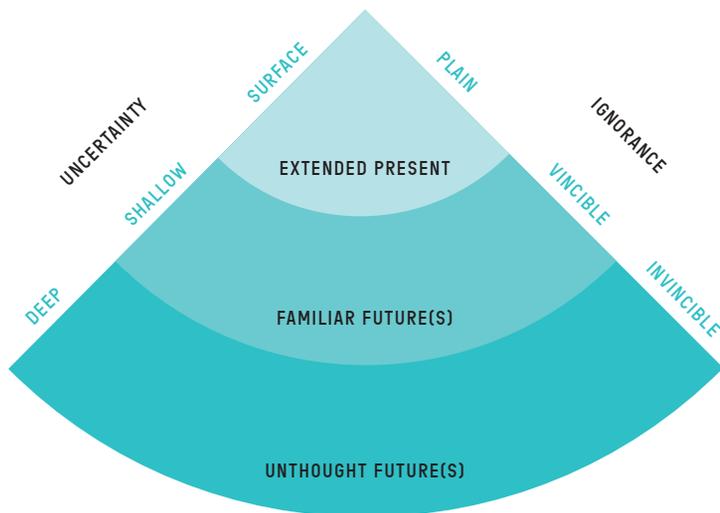
The three levels of uncertainty and ignorance enable us to begin to understand and chart the degree of actual and perceptual postnormalcy surrounding a particular issue, system, or horizon. In the Extended Present, we attempt to reduce Surface Uncertainty by processing the available information to produce 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 towards 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 towards an alternative, better paradigm.

However, all three horizons – Extended Present, Familiar Futures and Unthought Futures – include systems and sub-systems 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.

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 RECOGNISED, 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' [25]. 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...' [41, 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 [5]. 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 [35, 54]. 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 [46]. 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' [68, 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 towards 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 [21]. Epitomizing the weirding inherent to unthought futures, jellyfish are also known for 'undermining the world's largest military and fostering political unrest' [65, 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 centring 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 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 follow the famed S-curve model of change [44], 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' [59, p.7]. As with de Jouvenel's concept of *futuribles*, 'there is not time at which we can enumerate' Black Jellyfish 'exhaustively' [17, 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' [3, p.79]. While we believe that modelling 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. 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 or our perceptions of risks—from 'inevitable surprises' [60] 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' [43, p.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.

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:

Extended Present

- What trends are embedded in the Extended Present?
- What do we not know? (Plain Ignorance)
- What are the Surface Uncertainties 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?

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?

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 point towards 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 faze 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 globalised 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 towards 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 towards 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 towards 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 [36]. 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' [64]. 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 [34, p.52] or the proliferation of Guardians of Future Generations, we have yet to see PNP emerge.

3T's Place in the Futures Field

While Futures Studies emphasises alternatives, many methods of futures and foresight seldom incorporate pluralism and diversity intrinsically in their frameworks, and few, if any, emphasise the dynamic and merging nature of futures 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' [13, 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 [36, 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 modelling to visioning and back casting to cross-matrix analysis, 3T can amplify how ignorance and uncertainty are analysed, framed, and/or mapped. We have already seen our Menagerie adopted by a UK 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 centres 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 compartmentalised, 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 towards a more contextual, collaborative, complex approach—breaking with the mythology of genius and inspiration that informs philosophy, ethics, and action [45]. This is the direction the 3T framework ultimately takes us—towards the unthought.

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INFECTIOUS CONNECTIVITY: ILLUSTRATING THE THREE TOMORROWS

John Sweeney

Until 2011, the only thing notable about Le Roy, New York was that it gave birth to Jell-O and housed a museum in honour of the well-known, yet perhaps not very well-liked, American delicacy. All this changed when a group of teenage girls and one boy at Le Roy High School began displaying uncontrollable spasms, tics, seizures, and stuttering. At the peak of the outbreak, 20 people – including a few non-students – were suffering from Tourette-like symptoms. Local media coverage quickly turned into national news, and experts of various pedigree submitted myriad postulates – infections, environmental pollution, and Lyme disease were the most popular. An in-depth study by the New York State Department of Health concluded: "The healthcare providers and public health agencies involved in this investigation consider this cluster of cases to be the result of conversion disorder/mass psychogenic illness" [1]. A diagnosis of mass psychogenic illness (hereafter MPI), which used to be known as mass hysteria, is not without controversy (or detractors), especially as the Diagnostic and Statistical Manual of Mental Disorders (hereafter DSM) offers no specific guidelines, which is to say that the diagnosis is entirely subjective. Indeed, the diagnosis is just as mysterious as the illness, and the public pronouncement of MPI did little to quell the media circus surrounding the outbreak, which only worsened the situation by serving as a contributing factor in the contagion's spread [2]. As Dimon reports, "Some believe that the Le Roy outbreak was a direct result of videos posted to YouTube by Lori Brownell, a girl with severe tics in Corinth, New York, 250 miles east of Le Roy" [3]. Early reports note how the initial group of teenage girls to be affected were watching videos on YouTube and mimicking what they saw. At the height of the incident, Dr. David Lichter, a Neurology Professor at the University of Buffalo, commented to a local news station: "I think you do have the potential

for people going online and witnessing other student's behaviour, then I think this medium has the potential to spread it beyond the immediate environment" [4].

Dr. Lichter's prescient premonition seems to have come to fruition in Le Roy as Marge Fitzsimmons, a 36-year old nurse who had no direct contact with any of the students, started displaying the same symptoms, ostensibly contracted through social media, which was the primary means by which she accessed and acquired information and updates on the afflicted. Again, Dimon reports, "Facebook was not only increasing the spread of the illness to new people, it was also exacerbating the stress, and therefore the symptoms, of those already suffering" [3]. Reflecting on the Le Roy contagion and how future MPI outbreaks might propagate, Dr. Robert Bartholomew, a sociologist specializing in MPI incidents, put forward an ominous potentiality: one of "a far greater or global episode, unless we quickly understand how social media is, for the first time, acting as the primary vector or agent of spread for conversion disorder" [3]. How might one imagine such future(s) possibilities? A look into the past might be useful for thinking about future(s) possibilities.

In the summer of 1518, scores of people in Strasbourg took to the streets to dance. There was no festival or special occasion that inspired them to do so; they were inexplicably compelled. An unknown force drove some to their death, and this feverish plague struck suddenly and swiftly, engulfing the town and surrounding areas in terror. The Dancing Plague of 1518 was not the first of such pandemics to strike Europe in the Middle Ages, but it is one of the most notable and well-studied. What maddened 400 people into a dancing frenzy? As Waller [5] explains,

It was a hysterical reaction. But it's one that could only have occurred in a culture steeped in a particular kind of supernaturalism. The people of Strasbourg danced in their misery due to an unquestioning belief in the wrath of God and His holy saints: it was a pathological expression of desperation and pious fear [5].

Waller's speculation about the causes of the Dancing Plague are amongst the most well-regarded, but the author, who wrote two monographs on the 1518 incident, is also quick to point out how much remains unknown and that contemporary diagnoses of such phenomena remain decidedly speculative. Again, Waller notes,

In an age dominated by genetic explanations, the dancing plagues remind us that the symptoms of mental illnesses are not fixed and

unchanging, but can be modified by changing cultural milieus. At the same time, the phenomenon of the dancing mania, in all its rich perversity, reveals the extremes to which fear and supernaturalism can lead us [6].

While Wallace focuses on supernaturalism as a basis for situating the psycho-social conditions of the Dancing Plague that struck Strasbourg, others note a variety of epigenetic factors and variables, although everyone who writes on the Dancing Plagues ultimately reverts to speculation on the psycho-social state of the inflicted dancers. As Donaldson, Cavanagh & Rankin [7] observe,

A dietary, toxic or infectious component are all possibilities. However, it seems to have been a psychological disorder which occurred where there was a predisposing cultural background, and to have been triggered by adverse social circumstances – a sign of times which have long past [7].

If cultural background is a contributing factor in such incidents, how might this help one understand what happened in Le Roy? Given the immense popularity and increasing ubiquity of social media, might this interface be considered a cultural background? What affects might unfold in future(s) incidents?

In spite of the meteoric rise of social media and unanswered questions surrounding incidents such as Le Roy, many, if not most, of the scenarios for the futures of the World Wide Web (hereafter www) refrain from engaging with affective phenomena. I have intentionally selected the less-used www designation rather than the Internet as the former identifies the primary, albeit not sole, means by which digital information is accessed and shared rather than the physical infrastructure, although one clearly needs the other to subsist. This is not to say that this analysis is agnostic with regards to the massive technical constructs that are necessary to upload a video on YouTube or share a Facebook status using one's smartphone, quite the contrary; none of these actions could or would exist without accelerating advancements in the Internet's materiality, which has its own set of affects, but most who access the www have little contact with such mechanisms beyond the illuminated screens of various size in front of them. As Galloway notes, "The open-source culture of new media really means one thing today, it means open interfaces" [8]. And it is precisely the radiant screen in front of us that *affects* us most, which is to say that humanity is itself an open interface – one beholden to a range of affects, including infectious connectivity.

Offering a useful framing of affect that distinguishes between emotion, feelings, and the very context for infectious connectivity, Massumi argues:

Reserve the term "emotion" for the personalized content, and affect for the continuation. Emotion is contextual. Affect is situational: eventfully ingressive to context. Serially so: affect is trans-situational. As processional as it is precessional, affect inhabits the passage. It is pre- and post-contextual, pre- and post-personal, an excess of continuity invested only in the on-going: its own [9].

Affect has become a popular concept in theoretical circles as it points toward our inherent plasticity as "porously open systems" [10]. As Hemmings explains, "[Affect] is transferred to others and doubles back, increasing its original intensity. Affect can thus be said to place the individual in a *circuit* of feeling and response [...]" [11]. In challenging the hegemony of agency, affect suggests a host of social and political implications – the most profound of which is that our brains and bodies are so highly susceptible to a range of epigenetic forces that the very categories used to designate individuality– in many places, the basis for rights and citizenship – are, at best, ambiguous, if not entirely arbitrary. In our all-too-modern world, this plasticity is integral as a cause and effect of infectious connectivity. For many, infectious connectivity is the nagging impulse to check your email; the desire to click the refresh button on your social media feed when you have just loaded the page; the frustration of tossing and turning at night only to be comforted by the soft illumination of a familiar screen. For others, infectious connectivity is what happened to Marge Fitzsimmons; the neuro-somatic impulse to live away from the modern world; the push of a digital future, the weight of an all-to-human past, or something in-between that can and might shape what lies just over the horizon. Infectious connectivity, then, is affect incarnate – the trans-situational context for our all-too-human bodies engaging with "mutative" media in the extended present and a range of alternative futures [10].

Can *effect* explain the outbreak in Le Roy? Does the www have the capacity to infect someone? Could infectious connectivity be exploited or perhaps even weaponized? While some scenarios for the future of the Internet focus on e-health [12] and many more entertain a host of possibilities on cyber security [12][13][14], few, if any, confront the implications of infectious connectivity, even though such interests have become a focus for those seeking to profit from our all-too-permeable humanity. As Sampson reports, "Infectable emotions, feelings, and affects have in effect become the favored focal point for experience designers and neuromarketers" [15]. From the Facebook-approved,

yet covert, experiment on users' emotions [16] [17] to the advent of Internet fasting camps in Japan [18], the affective impact of the WWW has never been more felt.

Using the lens of Postnormal Times to investigate the WWW's infectious connectivity, this study deploys a new foresight method to explore the emerging forces and issues pushing and weighing the WWW in the years to come. Developed in 2010 by Sardar, the concept of Postnormal Times argues that we inhabit "an in-between period where old orthodoxies are dying, new ones have yet to be born, and very few things seem to make sense" [19]. This global phenomenon is experienced in highly localized ways and does not suggest that there is such as a thing as "normal" in an absolute sense; rather, it aims to provoke a critical look at normative constructs and perceptions while illuminating the often implicit sense that many, if not most, have about on-going changes in the present and what lies just over the horizon.

How are Postnormal Times?

In late September 2013, unit three at the Oskarshamn nuclear power plant in Sweden was forced to shut down. As the world's biggest boiling-water reactor and the largest nuclear facility in the Nordic region, Oskarshamn's sudden closure raised more than a few eyebrows, especially in the wake of the on-going, which is also to say unresolved, Fukushima crisis. While workers at Oskarshamn were quick to dispel the possibility of a meltdown on the Baltic, the cause of the stoppage is actually far more troubling: a massive bloom of Moon jellyfish clogged the site's intake piping, which provides cool water for the 1,400 megawatt unit [20]. While the Oskarshamn incident received significant media attention, this is not the first time that jellyfish, which are actually not fish but rather invertebrates, impacted unit three's operations. In 2005, Oskarshamn, which provides roughly 10% of Sweden's power, was forced to power down for the same reason. This phenomenon has not been limited to Oskarshamn as massive blooms have created similar shutdowns at nuclear facilities in the United States, Israel, Scotland, and Japan. In addition to wreaking havoc on power grids, jellyfish have also prompted the relocation of major film productions and caused headaches for the organizers of oceanic sporting events, including Sydney's Olympic Committee, but the recalcitrant invertebrates are also known for undermining the world's largest military and fomenting political tension.

In 2006, the USS *Ronald Reagan*, which at the time was world's most advanced naval vessel, experienced what the Commander of United States Naval Air Forces called an "acute case of fouling" while docked in Brisbane, Australia [21]. Although the ship and her 6,000-person crew have the tactical

capability to engage a small country, a jellyfish bloom clogged the *Reagan's* coolant system forcing the shutdown of all on-board activities and sending the ship back to sea. In 1999, the meddlesome invertebrates led to the closure of the Sual coal-fired power plant in Luzon, Philippines. The brief blackout left 40 million without power and incited "fears that a long-rumored military coup d'état was underway" [22]. Although the power was only off for about ten-minutes, President Estrada issued a statement ensuring the public that the blackout was "not part of an attempt to destabilise the government" [23].

Perhaps what is most troubling about these weird occurrences is that they are expected to multiply as the convergence of overfishing, marine pollution, and rising oceanic acidity and temperature levels, which are all the result of human activity, create favourable conditions for more blooms, especially near coastal areas, which is where one can find many of the world's 430 commercial nuclear power plants [24]. In response to these incursions, scientists from the Korea Advanced Institute of Science and Technology (KAIST) designed the "Jellyfish Elimination Robotic Swarm" or JEROS. These autonomous jellyfish terminators are programmed to seek and destroy coastal blooms, which in Korea alone impact local fisheries an estimated $300 million a year [25].

If anything, these weird events, as well as some of the responses to them, are signs that we do in fact live in postnormal times – an epoch where escalation has become common. As Sardar notes, the inspiration for Postnormal Times is Postnormal Science, which is "characterised by high stakes, uncertain facts, disputed values and urgent decisions, hence the cost/benefit equation will invariably be fiercely debated. In these situations, peer acceptance is low or non-existent, theoretic structures are based on statistical processing and data input and the uncertainty tends towards ignorance" [26]. Ultimately, postnormal times demand new modes of inquiry and analysis, if only to deal with the chaos, contradictions, and complexity of life in an era of recalcitrant uncertainty and accelerating change. As Sardar notes, "it is clear that the predicaments of postnormal times cannot be resolved with existing tools. They require new modes of thinking and new way of doing things [...]" [19]. However, finding new and more efficacious ways of navigating postnormal times is easier said than done, especially when many, if not most, remain ensconced within the *manufactured normalcy field*. As Rao explains,

There are mechanisms that operate – a mix of natural, emergent and designed – that work to prevent us from realizing that the future is actually happening as we speak. To really understand the world and how it is evolving, you need to break through this manufactured normalcy field [27].

For Rao, the manufactured normalcy field is what keeps one from coming to grips with postnormal times, although phenomena such as climate change and jellyfish blooms are doing their utmost to catalyze a dramatic shift in thought and action. At the intersection of the chaos, contradictions, and complexity of postnormal times lies the *weirding* inherent to our historical moment. In this liminal state, it is impossible to go back to a state of manufactured normalcy – one cannot simply reboot one's perceptive attunement. With the above framework in mind, the Centre for Postnormal Policy and Futures Studies developed a new method for analysing emerging forces driven by the key concepts underlying postnormal times.

In conventional futures and strategic foresight work, the future is often divided into near future, medium future, and far future or, worse yet, high, medium, and low future scenarios. While this approach has been widely utilized for thinking about and modelling futures in the past (and the present), these divisions are too broad, too general, and too simple. They lack the requisite complexity of the world itself, and, thus, will always fail to generate truly new insights and novel queries. In postnormal times, one must think of alternative futures in terms of specific clusters of interconnected tomorrows – a complex ecology of possibilities for what might lie ahead. Furthermore, questions are far more important than answers, and Futures Studies has been plagued by an incessant drive towards strategic actionability rather than critical and creative analyses of the assumptions, blind spots, and manufactured normalcies that exert a tremendous influence in the here and now, the extended present, and in a range of alternative futures. As Sardar argues:

It is no longer enough to simply explore a variety of possible futures; we also need to give serious attention to how we are going to navigate the postnormal condition […] to reach sane and viable futures. On the whole, futurists have avoided big questions (normally seen as the subject of philosophy) and concentrated on analysing trends, horizon scanning, building global models and creating scenarios, visions, images of alternative futures [28].

As affect signals that which is most fragile about our porously open humanity, the degree to which we continue to be human in a variety of futures is crucial to this analysis. Another point raised by Sardar is critical for making some sense of what might lie ahead: it is no longer sufficient to talk about alternative futures as some phenomena, such as global warming, must now be included in all scenarios, even if only addressed in the past tense in light of as yet unthought remedies – this intentionally awkward designation signals

a juxtaposition between that which is unthinkable versus unthought, or that which forces us to think beyond our current challenges, paradigms, and assumptions. Jim Dator has recently made a similar point with regards to what he calls the "UnHoly Trinity" [29] and the "new normal" for the Manoa School scenario modelling method [30]. Hence, this study uses the intentionally awkward *future(s)* to promote a double reading of things to come. On one hand, there are always futures – a multiplicity of possible, however improbable and implausible, alternative futures. On the other hand, "the" future suggests a requisite commensality – a common space defined by collective challenges and opportunities situated firmly within the dynamics of Postnormal Times. The three tomorrows (3T) is a method to model these dynamics and provide a more robust framework and approach for futures research. Providing a means to explore interconnected alternative futures scenarios of various scope and scale, 3T uses a single phenomenon or theme, in this case affect and the www, to investigate possibilities for what might lie ahead. As such, scenarios produced using 3T method focus on emerging issues and are meant to raise previously unthought concerns and questions.

Modelling *The Three Tomorrows*

The first tomorrow is simply the Extended Present: that is to say, the trends and developments one can identify today will shape the future of the next 10 to 15 years, and this is what most people mean when they use they invoke "the" future. This is not to say, however, that the Extended Present cannot be affected by the turbulence of postnormal times. But on the whole, change in the near future will be determined by the momentum of the present. In this period dominated by trends (mega- and otherwise) and populated with weak signals, Gupta's notion of the "black elephant" captures the essence of this horizon. He explains, a black elephant

is an event which is extremely likely and widely predicted by experts, but people attempted 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 [31].

Black elephants, then, are "in the room," so to speak, which is why they are integral to the Extended Present.

Beyond the Extended Present, one finds the Familiar Future(s), which exists beyond the next 15–20 years and, yet, has no definite time horizon. The Familiar Future(s) refers to scenarios for which we have (often mediated)

desires (created by dominant images and metaphors around us), futures we may have worked for and/or negotiated, and futures consciously shaped or unconsciously realised. Inayatullah's notion of the "used" and/or "disowned" future resonates with this conceptual lens, but the Familiar Future(s) does not necessarily imply a negative or alienating context [32]. The Familiar Future(s) is where most futures work and research is concentrated, especially since "images" or "imaginings" of the future remain at the core of Futures Studies [29]. Scenarios developed to forecast or imagine the future(s) of the Internet – regardless of time horizon – fall squarely into this horizon. Taleb's popular notion of the "black swan" captures the essence of this tomorrow [33]. In contrast to the black elephants of the Extended Present, black swans in the Familiar Future(s) are not perceptible or articulated, even by experts, which is to say that they can and might appear seemingly "out of the blue" but, as Taleb notes, they do make sense in hindsight.

Finally, the Unthought Future(s) constitutes the third tomorrow. These futures remain outside the framework of current thought, and this tomorrow forces one to re-examine the very premise of one's worldview and the assumptions underlying our preferences for what might lie ahead. As such, the Unthought Future(s) is a radical space of pure possibility – it is not unthinkable, as the title suggests, but rather a space populated with seemingly infinite alternative futures. Anything goes, so to speak, in the Unthought Future(s), and there are always questions to be asked about this future(s). In order to account for this dynamic, I developed the notion of the "black jellyfish" to capture the essence of this horizon.

As the introductory examples sought to demonstrate, postnormal times demands that we attend to the complexities of both large and small phenomena. As with the black elephant and the black swan, black jellyfish are "high impact," but they are "normal" phenomena driven towards a postnormal state by positive feedback – or increasing growth leading toward systemic instability. As Sardar explains:

Since everything is linked up and networked with everything else, a break down anywhere has a knock on effect, unsettling other parts of the network, even bringing down the whole network. Moreover, the potential for positive feedback, for things to multiply rapidly and dangerously in geometric progression, is enormous. This is where those small, insignificant, initial conditions come in: they can trigger major upheavals, even a small change can lead to collapse with accelerating speed [19].

When put side-by-side, black elephants, black swans, and black jellyfish form the core of analysis within 3T, and constitute CPPFS's menagerie of postnormal potentialities. The next three sections outline some black elephants, black swans, and black jellyfish pushing and weighing the WWW.

The Extended Present's Black Elephants

In 2013, an online coupon site performed a survey of 2,403 parents on gadget usage with small children. An extraordinary, yet perhaps unsurprising, 86% of respondents admitted to using a smartphone to either pacify or babysit an upset child [34]. Around the same time of the survey, the American Academy of Pediatrics released a policy statement entitled: *Children, Adolescents, and the Media*. The statement encourages parents to "discourage screen media exposure for children < 2 years of age" [35]. As the rising ubiquity of smartphones and tablets is a fairly recent phenomenon, there are no long-term studies that can substantiate, or even speculate, on the far-ranging impacts or affects, although numerous calls have been made to remedy this oversight. Writing in the journal *Paediatrics*, Radesky, Schumacher, and Zuckerman [36] contend,

New guidance is needed because mobile media differs from television in its multiple modalities (e.g., videos, games, educational apps), interactive capabilities, and near ubiquity in children's lives. Recommendations for use by infants, toddlers, and preschool-aged children are especially crucial, because effects of screen time are potentially more pronounced in this group [36].

While the WWW's affects remain speculative, not all experts agree about what the increasing digitalization of play, if not life itself, for (most but not all) children portends. As Holloway, Green, and Livingstone [37] observe:

Children's advocates and media commentators tend to blame each new ICT technology (television, computers, gaming platforms, touchscreens) for the erosion of children's playtime – often without reference to other social and economic changes that have progressively eroded children's play time over the last few generations [Ginsburg, 2007]. For instance, working parents tend to have less time to supervise outdoor play [McBride, 2012]; generations of parents have progressively restricted the places or boundaries where children can play unsupervised [Louv, 2005; Tandy, 1999]; and spontaneous play has progressively been replaced by adult organised activities [Skår & Krogh, 2009]. This gradual reduction in children's play

opportunities brings into question whether or not home-based
entertainment technologies are the single, or even the major, reason
for the decline in spontaneous play [37].

Given the constraints of the digital divide, which is to say that only half the
world has ever accessed the www, the effects of increasing screen time appear
to be decidedly provincial – unless Nicholas Negroponte's experiments in
Africa scale-up.

In 2012, Negroponte's One Laptop per Child (hereafter OLPC) initiative
dropped off boxes of pre-loaded Android tablets to two remote villages in
Ethiopia. As Talbot [38] reports, "The goal: to see if illiterate kids with no
previous exposure to written words can learn how to read all by themselves,
by experimenting with the tablet and its preloaded alphabet-training games,
e-books, movies, cartoons, paintings, and other programs" [38]. Apparently,
Negroponte's experiment "worked," and children began using the devices
and accessing programs for learning, which was verified by technicians
who collected the device's memory cards. By 2014, however, optimism
turned into realism as reports of sharp drops in usage and poor results in
other localities crippled the once steamrolling start-up. Focusing on OLPC's
570,000 laptop project in Uruguay, a report by researchers at Universidad de
la República′s Economics Institute found that the initiative had no impact
"on test scores in reading and math. This result is consistent with estimates
for Israel, Peru, Romania, Nepal, and the US (North Carolina)" [39]. Aside from
the lack of impact on the educational development of OLPC's subjects, there is
little, if any, evidence to suggest that OLPC took any precaution with regards
to the affect that such devices might have in various sociocultural contexts.
What infectious connectivity might arise from such interventions? As the
child subjects of these experiments grow up, what affects might emerge?

The Familiar Future(s)'s Black Swans
There is no shortage of scenarios for the future of the Internet; in fact, a litany
of studies producing a range of plausible, probable, possible, and preferable
futures are readily available [40] [12][13] [14]. However, many, if not most, focus
solely on the Internet, which is to say infrastructure and the various devices
and services surrounding it, rather than the www's potential affects, but a few
exceptions muse on the www's diffuse affects. The Oxford Internet Institute's
*Toward a Future Internet: Interrelation between Technological, Social and Economic
Trends* offers conclusions on future needs and directions by identifying 11 main
drivers, including: "Environmental affects, positive and negative at personal
to planetary levels" [40]. Although the report mentions health services and

healthcare repeatedly, it never makes an explicit connection between the www's various interfaces and the potentiality for a range of developmental and psychosocial affects, although a generous reading of the above driver could be extended to personal, environmental effects. In a similar vein, a report by the International Institute for Sustainable Development notes,

While the energy and emissions issues currently dominate discussions about the footprint of the Internet, less obvious, but of considerable concern are the issues around materials consumption in the production of equipment and the related implications of e-waste, including exposure to and disposal of the hazardous substances contained in electronic products. [13]

As most, if not all, images of the Internet's future focus on access, services, and infrastructure, Black Swans within this horizon ought to land within convergence of the www's possible affects and the aforementioned materiality of the Internet. Additionally, given the broad interest in securitization of the Internet – from personal privacy to cyber war – generating a wildcard, which might act as a push toward the Familiar Future(s), within this sphere is critical. Sometimes, however, the best means of looking ahead involves analysing past images of the future.

Zbigniew Brzezinski's *Between Two Ages: America's Role in the Technetronic Era* [41] provides a sweeping take on a range of future possibilities. Noting America's transition toward a technetronic society, Brzezinski outlines the advent of a society "that is shaped culturally, psychologically, socially, and economically by the impact of technology and electronics—particularly in the area of computers and communications" [41]. Although Brzezinski's forecast does allude to networked communication technologies, his attention toward securitization and militarization are worth invoking and relate directly to this inquiry's interest in affect. Quoting Gordon J. F. MacDonald, Brzezinski writes:

It may be possible – and tempting – to exploit for strategic-political purposes the fruits of research on the brain and on human behaviour. […] 'One could develop a system that would seriously impair the brain performance of very large populations in selected regions over an extended period' […]. [41]

That Brzezinski's invocation of environmental warfare came at the same time that the United States engaged in covert cloud seeding missions during its engagement in Vietnam to produce more rain and thereby disrupt supply

routes speaks to the prescient nature of his work and predilection for radical possibilities [42].

One such radical possibility serves as the basis of a scenario devised by Dunagan, who writes, "Another devastating terrorist attack leads to not only total neural information awareness policies but legitimizes the wartime strategy of enemy mind control. Mind-altering drugs and weaponized neural technologies become standard military operations" [43]. While the utilization of such technologies by statist – and specifically military – actors would not constitute a far stretch for one's imagination, or serve as an adequate black swan, especially given the CIA's rather colourful history of experimenting with fringe tactics and methods, such as project MKULTRA [44], the potentiality for a non-state actor with an aptitude for contemporary mediation technologies to undertake such an initiative using a range of WWW interfaces definitely fits the bill. What if the attention of non-state actors turns from securing nuclear, biological, and/or cyber arms to clandestine neurosomatic weaponry using existing WWW interfaces? Could one weaponise social media?

The Unthought Future(s)'s Black Jellyfish
Over the past decade, the population of Green Bank, West Virginia has swelled to 147 residents. While Green Bank's serene environs are reason enough to lure people seeking a slice of small town America, all of the hamlet's most recent transplants relocated due to the community's position within the National Radio Quiet Zone (hereafter NRQZ). Developed by the Federal Communications Commission in 1958 to facilitate an unobtrusive environment for radio telescopes, the 13,000 square mile NRQZ also houses military intelligence facilities. How might people endure without accessing the WWW? Why would anyone want to live in a community where most electronic communications are strictly regulated? Although Electromagnetic hypersensitivity (hereafter EHS) remains an unrecognized medical syndrome, many report physical ailments – such as headaches, fatigue, and burning sensations – based on varying degrees of sensitivity to electromagnetic fields (hereafter EMF). For many EHS victims, there is no such thing as low-level radiation; even the minute doses emitted by smartphones are enough to bring on a range of painful symptoms.

But, as Stromberg reports, "the best predictor for whether a hypersensitive person will experience symptoms isn't the presence of radio frequency – it's the belief that a device is turned on nearby" [45]. Furthermore, results of various provocation studies point toward the most elusive cause – affect. As Mild et al. explain:

When provocation studies with foods, clinical ecology provocation/
desensitization methods, household or industrial chemical agents,
fragrances, and electromagnetic fields are conducted under
methodologically sound double-blind, placebo-controlled conditions,
symptom responses do not correlate with exposure. The implication
is obvious; the perceived reactions are cognitively mediated [46].

If EHS victims are not actually sensitive to EMFs but rather the perceived presence of EMFs, then the condition's pathology is acutely neurosomatic, which is another way of saying that EHS is an effect of infectious connectivity, which impacts various people – including some children – in different ways. As McCarty et al. report, "Within the limitations of the study, we concluded that we demonstrated the neurological syndrome in the subject we studied. The question of whether EMF hyper-sensitivity is a significant public-health problem was not addressed here" [47]. It is impossible to analyse the potentiality for EHS becoming a "significant public-health problem" without indulging an array of conspiracy theories; however, this is precisely what the Unthought Future(s) necessitates.

Black Jellyfish are all about scale. They require that one take something small and imagine it on a much larger and more impactful scale. What if 10%, 20%, or 30% of the global population experienced the symptoms of EHS? What if the dynamics and drivers underlying climate deniers and the more recent anti-vaccination movement were applied to EMF? In short, what if a positive feedback loop emerged surrounding the perceived – and not actual – effects of EMF? Could the NRQZ be expanded? Might the afflicted become refugees? How might national and international interests collide and compete over the public health implications? Such inquiries are very clearly not unimaginable, but the potential ramifications require one to confront the unthought.

Scenarios
The Extended Present
What began as the online grumblings of a few parents quickly mutated into a grassroots movement seeking answers. A mysterious pandemic has scientists scratching their heads and thousands of children in 27 countries displaying a range of abnormal behaviours – from uncontrollable spasms to near-catatonic states. The only common denominator linking the afflicted is the utilization of a popular early-childhood language learning application, which became a global phenomenon in 2018. By mid-2019, the app had registered millions of downloads, although it instantly drew warnings from medical professionals concerned over its engrossing interface and addictive gameplay. Many

esteemed scientists spoke out at the height of the buzz, but their informed concerns were drowned out as parents cheered the developmental leaps and bounds made by their children. An investigation by the Centre for Disease Control has not yet returned any conclusive results, and political leaders have called numerous hearings in an effort to assuage irate constituents. Increasingly, protests are turning violent as enraged parents take to the streets in anger. With high-level international meetings underway to discuss multilateral measures to keep the incident from spreading, some are already looking ahead to the next incident.

The Familiar Future(s)

Following the release of thousands of classified government documents in the wake of yet another whistle-blower scandal, one report on a covert government-funded program is reigniting anger amongst bereaved parents who lost their children during a mysterious pandemic that struck over a decade ago. Chronicling the government's involvement in aiding research and development of neuro-affective manipulation technology via a range of online media interfaces, which was later used to build innovative child learning applications, the report also notes how the technology was part of a cache of data lost during a massive cyber-attack in 2028. Although this detail was buried in the initial news coverage, health providers and a number of veterans' groups have pressed for more information and swift action in light of the enigmatic neurological symptoms experienced by thousands of soldiers who served in Africa during a number of UN-led military operations in the 2030's. Compounding the situation, a prominent extremist group in the region has proclaimed the dawn of a new age of combat and exuberantly pronounced how "new weaponry" will secure victory and allow them to conduct large-scale offensive strikes abroad.

The Unthought Future(s)

When news outlets began reporting on the content of a recovered video from an extremist group announcing an attack on New York City using an unstoppable, invisible weapon, many, including senior government officials, immediately downplayed the threat. While the government responded with calm, the public response was fear. Fuelled by rampant speculation and wariness from suspicious outbreaks in the recent past, including damaging information from an array of leaked documents, panic transformed into phobia as thousands began to seek medical attention for an array of symptoms. Seeking treatment for everything from mild, yet recurrent, headaches to debilitating nausea, the afflicted refused to believe that they were well, even though many, if not

most, were given a clean bill of health. Online support groups for the afflicted grew exponentially driven by the hypothesis that shielding one's self from electronics, specifically Internet-enabled devices, would provide relief. What began as the migration of a few families quickly turned into the departure of thousands seeking refuge, and the government was forced to provide aid to the encampments, which were intentionally setup in rural areas. Communication with the encampments has been nearly impossible due to the strict anti-electronics rules and securitized perimeters of the camps.

Pushing and Weighing the Future(s)

AFFECTS ARE PROJECTILES JUST LIKE WEAPONS; FEELINGS ARE INTROCEPTIVE LIKE TOOLS. [...] WEAPONS ARE AFFECTS AND AFFECTS WEAPONS [48].

The public revelation of the Stuxnet virus, which was designed to cripple Iran's nuclear program, came as a surprise to many and garnered international media attention, and some declared its entrance onto the international stage a "declaration of cyber-war" [49] and the arrival of a "cyber weapon of mass destruction" [50]. While Stuxnet was designed with a very precise target in mind, it has subsequently been released into the "wild" and has since infected a Russian nuclear reactor and the International Space Station [51]. Writing on the nature of a computer virus, Sampson opines,

The digital virus is, like a shipwreck or plane crash, understood as integral to the technology from which it came: an **accident of substance**. It is, accordingly, the invention of the network that "provokes" the accident because the potential to break down pre-existed, **pre-force**, in the substance of its invention [15].

Much like the networks infected by a computer virus, our porous humanity is also prone to accidents, but affect as invited accident is only one way of reading the dynamics of the MPI outbreak in Le Roy, small children's exposure to and usage of WWW interfaces, the possibility of non-state actors deploying neurosomatic weaponry, and the potential scaling-up of EHS into a significant public health problem. There are other ways of reading these disparate, yet interconnected, phenomena.

All of the above phenomena are entrenched within the dynamic machinations of infectious connectivity, and each relies on neurosomatic exploits inherent to our all-too-human interfaces with contemporary www-Internet-based technologies, if only to be truly affective. Human beings have always employed tools to enhance the limits of our being in the world, but increasingly our tools are becoming more pronounced prostheses, which portend a range of radical, and perhaps unwelcome, possibilities – we are, then, perhaps more accurately *"prosthetic becomings"* whose very sociality has come to rely upon a range of things [10]. As Stone notes, "Prosthetic sociality implies new and frequently strange definitions of space, volume, surface, and distance; in prosthetic sociality the medium of connection defines the meaning of the community" [52]. What if the medium of connection is infectious? What if some are compelled to connect just as some were compelled to dance in the streets of Strasbourg in 1518? The degree to which affect might act as a push versus a weight toward the future of the www/Internet remains to be seen, and one of the critical concerns of this analysis centres on how such events might unfold, which necessitates a more dynamic approach to alternative future(s) scenarios planning. While the queries posed might appear too big, complex, and insoluble, this is precisely what Postnormal Times demands.

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IGNORANCE, UNCERTAINTY AND 'WHAT-IF?'

Jerome Ravetz

It is, by now, nearly universally acknowledged that the heart of the scientific enterprise is no longer discovery, the triumphant advance of certain knowledge into the unknown. Only the spokesmen for 'public understanding of science' still remain unaware that the leading problems for science now derive from the challenges (and threats) presented by the hitherto blind and uncontrolled growth of our total scientific-technical-industrial system. Whether the issue is global carbon emissions, climate change, man-made diseases, invasive alien substances such as xeno-estrogens, or even the social and cultural consequences of our runaway information-technology, both the problems and their appropriate styles of solution are new. They are radically different from those of the traditional curiosity-motivated researcher, or even of the mission-oriented technology development team.

Let us consider the following statement:

With issues as complex as the impact of human activity on the natural environment, the search for simple truths may obscure the uncertainty of reality. Almost anything we do, consume, or are exposed to has some risks. We have to decide which risks require tackling, with what priority, in what way, to what extent, and at what cost. Environmental science is complex; describing technical data and detailed risk evaluation is difficult, but it reflects the reality of the choices society must make. The issues are not simple and science matters.

Those who are familiar with my critical writings will recognise some of the themes, although perhaps the language is not familiar. The quotation is not from myself or some other environmental-activist science critic, but from Dr. Chris Fay, Chairman and Chief Executive of Shell UK Limited. It was made in May 1966, and is available on Shell's website named 'brentspar' [1].

Clearly, Dr. Fay received an education about the social problems of scientific knowledge which was not easily available in universities, but which was presented to him, rather unexpectedly, in the course of his work.

The quotation reminds us that the loss of certainty and the intrusion of ethics are central to this new syndrome of science. With it comes the loss of hegemony of scientific experts in the area of discussion and debate of science-related policy questions. A coherent understanding of this new situation is only now developing. For it, we can draw on some elements of the critical tradition in studies of science that has developed over recent decades. The demystifications of Feyerabend, followed by the social-reductionist anthropological studies, have made 'objectivity' a problem rather than a foundation for science. My own work was originally a mixture of radical social criticism of 'big science' with conservative nostalgia for 'little science'. More recently, with Silvio Funtowicz, I have placed traditional science in a framework that combines methodology with epistemology. We use the term 'post-normal science' [2], with its ironic reference to Kuhn's seminal work, to provide a historical location for this new sort of science.

The concept of post-normal science rests on a three-fold distinction among different sorts of problem-solving practices, based on the severity of either of the two attributes, systems uncertainties and decision stakes. The 'inner' zone, where both are low, we call 'applied science' (traditional 'core' or 'basic' science might be placed at the very corner of the diagram). When either is 'medium', we have 'professional consultancy', such as the practice of the surgeon or the consulting engineer. When either is severe, we are in the domain of 'post-normal science'; and we argue that, in such circumstances, the quality assurance of the whole process requires an 'extended peer community' including all the relevant sorts of concerned lay persons. They bring with them their 'extended facts' based on their lived experience of the issue. Examples of post-normal science can be found in modern medicine, as with AIDS research [3], and also public health in pollution and environmental issues. In the latter, the 'extended facts' provided by investigative journal ism can be as crucial as the selected sample of the research results which is permitted to enter the public domain.

Up to now, Silvio Funtowicz and I have not systematically discussed the different styles of enquiry appropriate to the different sorts of problem-solving; this is the topic that I explore here. For this I offer a threefold typology, in some ways paralleling that of post-normal science. By its means, we can see more clearly why new attitudes, giving credence to new sorts of questions, are necessary if science is to adapt to its new leading challenges.

A multiplicity of styles of research has long been recognised in science. At any time there is a hierarchy among disciplines; recently it has privileged

those studying the more abstract and simple aspects of the external world. By the dominant criteria, data should be quantitative, and patterns of argument should be deductive and, if possible, formal. Disciplines operating closer to our experienced reality tend to be considered as 'soft', and are forced into a state of 'physics-envy'. The styles of investigation appropriate to their objects and functions (more intuitive and informal) are systematically squeezed out by imitations of physics, which possess plausibility and effectiveness in varying degrees (frequently little). Every now and then, this awkward fact is admitted by a significant set of practitioners; and then the public learns of a degeneration within the field. Such now seems to be the case in economics, where the style of abstract mathematical exercises is currently exposed for all as vacuous [4]. The causes of such pathologies are little studied; I discussed the problems of quality in my old book [5]. More recently, I have considered the ways in which social aspects of scholarly disciplines can completely dominate their criteria of quality, at the expense of their positive content [6].

Leading Questions

Accepting the idea of different styles of research, with varying degrees of appropriateness, we can proceed to my classification, which is organized around 'leading questions'. We may start with three sorts of enquiry, which we may call research, design and exploration. For each of them, we have the relevant questions: respectively, 'what/how?', 'how/why?' and 'what-if?'. This classification by questions is reminiscent of Aristotle's four types of explanation, originally expressed like 'the what', 'the how', 'the which' and 'the why', later called the 'material', 'efficient', 'formal' and 'final' causes. Aristotle's classification was designed for his general theory of the acquisition of knowledge, with the principle of an analogy between 'art' and 'nature', so that every living thing is explained as if it had been designed. My classification, by contrast, is organized around the different functions of a scientific enquiry, and so my categories will overlap with Aristotle's.

These 'leading questions' are nothing like an absolute classification, nor should they be taken as defining the totality of any given sort of research. They are intended to illuminate rather than to define; and the term 'leading question' allows us to imagine that in any particular inquiry, all three sorts of questions appear in their appropriate places. For research, the outcome of which is a statement intended to be factual, the leading question is 'what/how?' In Aristotle's scheme, these questions deal with substance and agency: 'What is this made of?', 'how does this cause that?'. Just as significant as the sorts of questions that are contained in 'what/how', are those which are excluded. These appear in the next leading question, 'how/why?' were a 'final

cause', a 'function' or even a 'purpose', is allowed. Such questions are applicable to the explanation of any artefact, a device or a tool. For what counts there, usually, is not so much its material substance or inner workings, but rather how its *design* enables it to perform its given *function,* to do its job. Of course there will be many overlaps between the two sorts of inquiry. Even in research, instrumentation involves a design process, and so 'how/why?' is involved, though as a subsidiary rather than leading question in the research project; and in the sciences explaining structure (Aristotle's 'the why?') including much of biology, there is an inescapable rhetoric of design, in spite of the rigorous insistence on the absence of a Designer.

The leading question 'what if' is quite different in kind from the other two. In the familiar sorts of scientific inquiry, it only appears in the earlier, exploratory phases of the work, starting things off before problems are clearly defined and hypotheses hardened. In those contexts, 'what-if?' expresses the spirit of creativity, of inventiveness, of forays into an unknown that is passive and expectant. In the context of the new challenges for science, 'what-if?' becomes the leading question, with a new urgency. Now our ignorance is no longer benign, but threatening. 'What-if?' a pathogenic agent in cattle is concentrated in infected feedstuffs and thereby made more virulent and transmissible? What if front loading gates are not checked as secure before an inherently unstable ferry gets underway? What if we continue to breed microorganisms that are resistant to ever more of our antibiotics? What if artificial oestrogens enter all animal food chains? Perhaps nothing, for some, most or all of the time; but perhaps something, just once, or once too often.

The use of 'what-if?' as a leading question is already enshrined in the practice of risk assessment. In the case of hazards of chemical plants, the HAZOP methodology [7] analyses unit actions in all their aspects: existence, space-time location and extent, as well as quantity and intensity. Check listing all the parameters, it asks 'what-if' any one lies outside the expected range. Then there might be an incident, an accident, or even a precursor to a disaster. By check listing all the possibilities of 'what-if?', the HAZOP methodology assures an effective management of this aspect, at least, of the concatenation of unexpected, unanticipated, or unknown circumstances that eventually constitute a disaster. Not all hazards can be so neatly broken down into known unit events; and in spite of HAZOP, major chemical plant accidents still occur. However, the recognition of 'what-if?' as a legitimate leading scientific question, along with 'what/how?' and 'how/why?', would help us shape an effective scientific response to the new challenges and threats arising from our disturbance of the natural environment.

WITH 'WHAT-IF?' AS THE LEADING QUESTION, OUR WHOLE CONCEPTION OF THE SCIENTIFIC ENTERPRISE COULD EVOLVE IN A FRUITFUL WAY. THE PREVAILING ATTITUDE TO UNCERTAINTY AND COMPLEXITY WOULD BE TRANSFORMED.

In traditional science, as popularised and taught, uncertainty is an embarrassment. Normally, it is mentioned only when it has been completely tamed, as by the application of statistical routines. Until very recently, philosophers of science have searched for some simple methodology to explain the successes of science, smoothing over the real work of research in grappling with uncertainties of every sort. In the 'how/why?' research, oriented around 'missions' or devices performing a function, uncertainty is respected, but only as something requiring to be managed. For in that case the task is to ensure that the uncertainties of the working environment of the system intrude only to an acceptable degree; and in much design and engineering practice, uncertainties are already filtered through regulations or standard codes of practice, so that the problem-solving exercise deals mainly with these well-defined proxies for an uncertain reality. To enable a systematic confrontation of problem-solving practice with the world out there, we need the 'what-if?' approach.

Along with the uncertainty of the real world, we also need to deal effectively with its complexity. For centuries since Galileo and Descartes, our science has been built around the principle of studying the world in simplified, isolated bits. This approach pervades our whole scientific and technological culture; it is most easily noticed when it becomes challenged. Thus, we now begin to appreciate the limitations of a medical practice which identifies disease with germs, and healing with germ-killing, thereby tending to neglect both individual differences and the whole ecological and societal context of disease. Of course, successful routine practice of any sort requires simple tasks with only moderate uncertainty. All we need is to appreciate that this 'reductionism' is a partial view, and then to be open to the importance of perspectives that are complementary to it. Indeed, it is when we are accustomed to asking 'what-if?', and, as it were, expecting the unexpected, that we fully appreciate how no single perspective can completely capture any real situation. This is what genuine complexity, as opposed to mere complication, is all about.

The adoption of 'what-if?' as a scientific style will also have important effects on the policy process. We now know that the application of science to policy is very different from a simple process of 'getting the facts'. For the facts are not merely 'got'; to secure them requires an initial setting of priorities so that research is supported; and then the research must be designed around

appropriate questions; for every policy issue is complex, including aspects of both nature and society, and where the 'cause' of the problem will be equally complex. The history of the BSE disaster shows how research that is too little, too late, and focused away from the crucial policy questions, can allow a crisis to mature over the years to the point of no return, in spite of the best efforts of sincere and dedicated scientists.

The style of 'what-if?' is also an expression of the Precautionary Principle, which is becoming increasingly important in environmental policy. It protects scientists against a premature choice of research problems to be investigated, and a hasty closing down of exploration. One could imagine a continuous dialogue among the participants of the different sorts of inquiry. Although 'what-if?' necessarily moves from centre stage once the research effort gets underway, it should always be fostered as an essential complement to the puzzle-solving from which the relevant 'facts' eventually emerge.

There are good reasons why 'what-if?' science should emerge just now. The question of 'safety' is emerging as a great task for science, as a successor to the twin goals of knowledge and power that were articulated nearly four centuries ago in the Scientific Revolution. We find ourselves in a somewhat paradoxical situation: on the one hand, people in many different societies have never been so safe; and on the other hand there has never been so great a public consciousness of danger. In some ways, the paradox is in our minds, for as we come to believe that (thanks to science) our lives can be truly safe, we demand the elimination of any danger that we encounter (and frequently blame science for its presence). However, there is something real out there as well; as the dangers have diminished, their character has changed. They are no longer typified by the devastating plagues and widespread natural disasters of the past. They have tended to become more subtle, perhaps more insidious, even menacing. We experience threats which are totally novel, such as genetic damage from nuclear radiation that will extend indefinitely into the future; and we confront new diseases whose origins are as uncertain and complex as their treatments. In the face of such novel sorts of dangers, there is no effective alternative to a 'what-if?' style of science. The complex condition of safety will not be achieved by the simplistic, reductionist tradition of science embodied in the 'what/how' and 'how/why?' styles. We need 'what-if?' as a complement to them, to be developed and employed in the appropriate contexts in the appropriate ways.

Finally, there are the social implications of the 'what-if?' style of science. The puzzle solving exercises of 'normal science', or indeed of any routine practice, require and foster a 'convergent' style, in which a standardized expertise is necessary and dominant. The 'what-if?' style operates on the

margins of that sort of expertise. Insights and suggestions from people with different sorts of expertise or even none at all, must be accepted into the dialogue. In connection with post-normal science we have described this as an 'extended peer community'. There we introduced the idea in connection to the quality-assurance of the scientific materials introduced into the policy process. The 'what-if?' style performs another function for these extended peer communities; and even more strongly it justifies their 'extended facts'. These are data which derive from sources outside orthodox research; they may come from anecdotes, traditional knowledge, informal studies, or investigative journalism. Since so many of the 'what-if?' questions are prompted by such unorthodox data, the adoption of the 'what-if?' style is inseparable from the recognition of extended facts, extended peer communities, and the approach of post-normal science.

Conclusion: the contexts of 'what-if?'

In the context of a collection of essays on 'Visions of Science', this exploration of a methodological idea might seem rather pale and tame. What about the 'critical science' of a generation ago? [8] There are two related reasons for my setting aside such a politicised approach, at least for the moment. One is the state of the politics of science at the present time. For a while, when the reality of the 'military-industrial-scientific complex' was a fresh discovery for a broad public, in connection with The Bomb and Vietnam, it seemed possible that a radical movement could be organized around science itself. The American 'Science for the People' and the British 'Society for Social Responsibility in Science' were optimistic responses to the militant mood of the later 1960s.

However, in the short run at least, that enthusiasm could not be sustained. The focus of protest shifted to 'the environment', in which science itself was not seen as problematic; and the really corrosive criticism of science, demystifying its claims to objective knowledge, was conducted ostensibly as an academic exercise, by the post-Feyerabend critical schools. In the meantime, politics itself has changed. The collapse of Socialism as a viable alternative social system has gravely weakened the radical forces on the traditional issues of distribution. The 'leading contradiction' of the industrial system has shifted to that of 'sustainability' or, in other words, survival. If science is to become a central issue within that new context, debate will focus less on distributional aspects (access to jobs, and utilisation of results), and more on its philosophical foundations.

This new focus is expressed in Sardar's campaign for 'Others' [9]. As it matures, this should provide us with the precious gift of 'seeing ourselves as others see us'. On that basis, we might accomplish the necessary reform of

science, in its social functions, working methods, and conceptual objects. This change could be as profound as that which took place four hundred years ago, in the Scientific Revolution. However, this new reform is, as yet, in a very early stage, partly because the cultures which are candidates for leading 'Other' status still lack the coherence and self-confidence that would enable them to engage in a dialogue. It is likely that each of them will need to go through a phase of rejection and hostility (in the religious sphere manifesting as 'fundamentalism') before any cross-cultural dialogue, however critical, could emerge.

A complementary development could now be taking place within accidental culture, among the tendencies variously labelled 'green', 'feminist', or 'New Age'. The variety of names indicates the great variety of issues and styles, some overlapping but some mutually incompatible and hostile. Any consistent vision of science based on one section of this diverse movement would certainly alienate most of the other sections in some way. However, this movement, based on a widespread disillusion with one or another pretension of our modern industrial system, is still in an early stage of growth. Scarcely a generation separates us from the 'counter-culture' of the 1960s, when it all exploded.

For the moment, then, my approach has been to develop ideas on particular pieces of the jigsaw. These include my previous studies on uncertainty and post-normal science conducted with Silvio Funtowicz, and those done with or for Sardar, as were published in *The Merger of Knowledge with Power* [10]. None of those explorations has yet had (to my knowledge) a resonance anywhere in the West. From this, I infer that any synthesis I attempted now would be either far ahead of its time or off the mainstream of development. So I prefer not to rush the work, but instead to cultivate my understanding on various special problems. The 'what-if?' style of science is one of these; at the same time I am working with Silvio Funtowicz on the theory of 'reflexive complex systems'. After that should come a study of dialectics (as I understand the idea), which should deepen the theories of knowledge and of practice which I first articulated in *Scientific Knowledge and its Social Problems* [11].

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HERE BE DRAGONS: EXPLORING THE 'UNKNOWN UNKNOWNS'

Shirin Elahi

Introduction

Engraved on the copper face of the Lenox Globe, one of the oldest known terrestrial globes that dates back to circa 1500, are the evocative words: HIC SVNT DRACONES. This phrase, 'here be dragons', was used to signify dangerous or unexplored territories. It draws on a long history from Greek and Roman times, when lack of knowledge equated to danger. This danger was illustrated visually by cartographers, who filled blank areas of maps with fierce looking sea serpents, dragons or mythological creatures to warn travellers of the risks they might face as they extended the geographical boundaries of the world they knew. For any user of the map, understanding where the boundaries of knowledge lay was almost as important as the knowledge itself. Illusion of knowledge was the greatest danger of all [1].

In the modern world of today, *where be dragons*? They are conspicuous by their absence from the practice of managing risks and uncertainty. It is becoming increasingly clear that they lie all around us: on the fringes of institutional boundaries, outside the silos of academic disciplines, beyond the risk metrics so carefully calculated... In each instance they are the unacknowledged blind spots, spanning scientific, geographical, temporal and institutional boundaries but unrecognised due to the challenges they represent to our human desire for order and control.

If ignorance, uncertainty and risk all lie on a spectrum of unknowing, our focus here is on the uncharted issues at the far end of the spectrum. There are countless treatises defining and analysing the differences between uncertainty and risk [2], and any attempt to do this is beyond the scope of this paper. Our interest is whether the 'Here be Dragons' that denote indeterminate uncertainty are ignored – and why.

Examples of 'Here be Dragons'

'Here be Dragons' are unrecognised, therefore there is little research on the subject. This paper has identified three examples, namely 'wicked problems', 'Black Swans' and 'Post Normal Science', which are set out below.

'Wicked problems' or messes are not simply complicated problems. They are ambiguous, highly constrained, tightly interconnected, complex, social, technical, economic and political dilemmas. Their changing nature and complex interdependencies, makes it almost impossible to define them collectively because there are so many different perspectives and issues at stake [3].

Another example is the 'Black Swan', an unpredictable, improbable event characterised by its massive impact on the status quo [4]. What is interesting is that after a 'Black Swan' occurrence such as the 9/11 attacks by Al-Qaeda the event becomes rationalised and reframed as something more predictable, using hindsight to prove the existence of foresight [5].

A third version is the 'Post Normal Science' categorisation, used to denote controversial often novel forms of technology, such as genetic engineering, nanotechnology or nuclear energy [6]. Post Normal Science is characterised by high stakes, uncertain facts, disputed values and urgent decisions, hence the cost/benefit equation will invariably be fiercely debated. In these situations, peer acceptance is low or non-existent, theoretic structures are based on statistical processing and data input and the uncertainty tends towards ignorance.

These examples are very different, yet there are similarities. In each instance, they are complex societal problems with many dimensions. They all deal with interactions between multiple interconnected interdependent systems with many different actors, so information will always be incomplete. Political, social and technological systems are all subject to reflexivity making it impossible to accurately calculate probabilities. Another marked similarity is their ability to challenge conventional thinking and the status quo.

The value of 'Here be Dragons'

'IGNORANCE IS LIKE THE BLANK SPACES IN OUR MAP OF
KNOWLEDGE: WITHIN THEM, THERE IS NO DETAIL, NO USABLE
INFORMATION. ON THE RENAISSANCE WORLD MAPS... THE
MAPMAKERS UNDERSTOOD THAT WORSE THAN IGNORANCE OF
FACTS IS IGNORANCE OF IGNORANCE; THE ILLUSION OF KNOWLEDGE
COULD THEN LEAD THEM CONFIDENTLY TO DISASTER' [7].

The success of any attempt to manage uncertainty or risk depends on analysis appropriate to the issue. In cases of indeterminate uncertainty, this means recognition of the unknowing. Socrates claimed that he knew nothing except the fact of his ignorance [8], yet today ignorance is not associated with wisdom.

Due to the lack of acknowledgment, 'Here be Dragons' generally remain hidden, unwanted and unrecognised – an omission that can be critical when dealing with controversial issues involving scientific complexity, inherent uncertainty [9], multiple stakeholder groups, complex interdependent systems [10] or longer time frames. The consequences of airbrushing out the 'Here be Dragons' can also lead to sub-optimal decisions, unreliable trade-offs, erosion of institutional credibility and serious research implications [11]. Most importantly, given that we live in postnormal times [12], is it not time to abandon the ideas of 'control and management' and accept the value of 'Here be Dragons' as a warning signal in order to navigate and adapt in the face of uncertainty?

The critical issue to understand is why the existence of 'Here be Dragons' provokes such widespread and complete denial. This paper attributes the lack of recognition to three factors, namely:

- Human psychology and the desire for control
- Institutional pressures and boundaries
- Scientific convention and the pressures of the rational mind set

Human psychology and the desire for control
All human beings share the innate desire to exercise control over their environment. Some researchers argue that the feeling of control, whether real or illusory, is one of the wellsprings of mental health [13]. In terms of perception of risk, the two critical factors influencing human judgement are

the 'dread' factor, i.e. whether the risk is controllable and not easily reduced and the 'unknown risk', i.e. whether the risks are known to science – i.e. the level of uncertainty [14].

Unexplained or incomprehensible events have qualities that amplify and extend their emotional impact. Because they are perceived to be out of the ordinary we are more likely to keep thinking about them, trying to explain them and control or avoid future similar occurrences.

'Once we explain an event, we can fold it up like freshly washed laundry, put it away in memory's drawer, and move on to the next one; but if an event defies explanation, it becomes a mystery or a conundrum...they generally refuse to stay in the back of our minds.' [15]

In an attempt to understand and control events that are out of the ordinary, human beings draw on their imagination. However, this is limited by our experiences, culture and worldviews. For example, in 1520 Ferdinand Magellan sailed into Tierra del Fuego, on the tip of South America. He and his crew were surprised to find that the Del Fuego Indians had not spotted their boats entering the bay. It became clear that the Indian concept of a vessel was a small dugout canoe, and nothing in their past experience and understanding had prepared them for large sailing ships with furling sails [16]. Similarly, our experiences are bounded by our concepts of reality, and it is difficult to imagine potentially disruptive events that have no historical precedent. However, by denying that such unimagined events, we make ourselves not merely ignorant of the facts, but ignorant of our own ignorance.

There are differences in the extent to which societies feel threatened by uncertain or unknown situations. These differences in the tolerance that we display with regard to uncertainty depend not only on culture, affluence and socio-political institutions, but also on worldviews [17]. Despite these differences, there are foresight tools such as scenarios that enable groups with diverse and conflicting views to collectively explore weak signals of potentially disruptive change and assess intractable uncertainty together, so bridging the psychological barriers set out above.

Institutional responses to Uncertainty

Although policy makers and institutions are neatly divided into constituent parts; complex human, technological and environmental systems are not. More often than not, analysis or decision-making impacting on such multi-facetted issues is tackled piecemeal within institutional boundaries using a single-issue lens. This enables policymakers to be perfectly right within a narrow model under precise assumptions – or absolutely wrong should any of the assumptions prove to be incorrect.

Modern post-industrial society is one where a preoccupation with risk and risk avoidance is high in the collective consciousness. As the originator of the Risk Society concept describes: "The movement set in motion by the risk society… is expressed by the statement: I am afraid!" [18]. For institutions responsible for managing society and the risks it faces, this poses real challenges. A critical question is whether to acknowledge and communicate uncertainty to the public. Clearly, this is advisable given that transparent communication is a key element of public trust. Admitting uncertainty can enhance the credibility of the communicator; however, it also could also escalate public fear or erode trust by creating perceptions of incompetent decision-making [19].

In many cases, institutional responses err on the side of familiarity and opt for uncertainty denial, so avoiding the institutional discomfort that acknowledgement of the 'Here be Dragons' type of risk might provoke. The result is that they neatly sidestep many difficult political, social and technological issues.

There are several ways in which institutional uncertainty denial takes place. Higher level conflicts with high levels of scientific uncertainty can be reframed into lower level ones where there is more scientific certainty and where scientific experts can debate with greater authority [20]. Alternatively, the institution can transfer the responsibility for risk assessment to the producers of the risk in question, or if this strategy is unsuitable, by simply avoiding the onus of decision-making and leaving a policy vacuum [21]. The result of this abrogation of responsibility is that citizens who participate in the discourse are forced to debate the issues they raise within a narrow technocratic framework drawing on factual arguments. This ensures that concerns regarding contested values and worldviews are rationalised and in most cases unarticulated, so discouraging meaningful debate and gradually creating public alienation in the decision-making process [22].

'Here be Dragons' are ignored by policy makers for a number of reasons. Sometimes this is done to reassure the public, sometimes because experts do not want to expose their ignorance, sometimes because the scale of the task is so great that institutions cannot expose the scale of the gap between regulatory remit and reality. Whatever the reason, there is one certainty:

DENIAL OF THESE UNCERTAINTIES DOES NOT MAKE THEM DISAPPEAR, IT SIMPLY MEANS THAT THERE ARE NO MECHANISMS TO MONITOR THEIR WHEREABOUTS AND THE POTENTIAL DANGER THEY POSE.

Perhaps it is time to focus more on the systemic nature of risk and uncertainty, by acknowledging the 'Here be Dragons' and finding tools to better identify, monitor and manage the most serious ones.

Scientific Convention in the face of Uncertainty

While the medieval world recognised both the concept and the value of 'Here be Dragons', science, based on the principles of observation and experiment, approaches the issue of indeterminate uncertainty from a different standpoint. The very essence of science is the notion of conjecture and test. Science cannot provide certainty – at its core is the current best working hypothesis. At any time new data can emerge to refute current theories and require them to be modified. In principle, science is therefore a dynamic process, accepting and encompassing fallibility, evolving as more accurate theories replace earlier ones. However, the success of scientific thinking in driving rapid and radical technological innovation and the accompanying economic growth has meant that in practice it has become almost impossible to challenge the trajectory of scientific endeavour and the inherent risks the new technologies it spawns might pose.

Science relies mainly on two processes, namely abstraction and analysis. The process of abstraction is used to establish organising principles that enable scientists to deal with large groups of ideas and things on the basis of their common features, and the process of analysis enables scientists to fragment a subject to the smallest possible scale [23]. This narrow lens view encourages the perception that the modern world is ordered and predictable. In addition, the reductionist nature of both processes is based on an assumption that the detail under analysis is representative of the whole – thereby ignoring the innate complexity of many human and natural systems [24].

This scientific convention has resulted in the modern perception of a rational, measurable and quantifiable world. There are many approaches to risk and uncertainty, drawing upon various base units, methodologies, risk measures and objectives: decision analysis, quantitative risk analysis, psychometric game theory, risk communication, bounded rationality, insurance calculations, and natural hazard research [25]. What these different outlooks all have in common is an underlying assumption of rationality. This rational model is underpinned by the perception that uncertainty has been bounded and that risks can be identified and controlled – the inconvenient 'Here be Dragons' therefore successfully ignored or slain.

According to the National Research Council "uncertainty analysis is the only way to combat the "false sense of certainty," which is *caused* by a refusal to acknowledge and (attempt to) quantify the uncertainty in risk predictions" [26]. However, there is still no recognised guidance on a scientifically defensible and

consistent approach to uncertainty analysis [27], particularly as even experts are likely to use intuitive processes or biases where there is indeterminate uncertainty [28]. One approach is the NUSAP set of guidelines devised to quantify the extent of uncertainty inherent in Post Normal Science. The NUSAP notation is an acronym for five categories which reflect the quality of the information on uncertainty, 'Numeral', 'Unit', Spread', 'Assessment', and 'Pedigree' [29]. Other possibilities are the 'social arena', where various actors struggle to mobilize social resources and evidence to gain public support, under the watchful eye of a governmental rule enforcer and the media or an 'agora', a public arena where science and society, the market and politics can negotiate the context of future scientific knowledge and the uncertainties it produces [30]. These proposals all include both 'expert' and 'public' inputs, the questioning and broadening of the knowledge base and an explicit acknowledgement of the 'Here be Dragons'.

Acknowledging the 'Here be Dragons'

In the previous sections I have argued that human psychology, institutional frameworks and scientific convention have all conspired to remove 'Here be Dragons' from the collective consciousness. I have also mentioned the dangers that arise from the reluctance to recognise these areas of uncertainty. Here, I set out how this process might be countered, utilising the new digital tools and processes available to draw on wider societal framing. By doing so, it should be possible to incorporate disparate cultural values and worldviews, so achieving greater societal legitimacy and also acknowledging and locating more 'Here be Dragons'.

There are other potential advantages. In today's networked society, there is unprecedented and possibly limitless access to knowledge. The information available to society impacts on its perception of the world together with the risks and opportunities that this represents [31]. Without the information constraints of the past, today's interconnected society has a stark choice of two potential outcomes: a modern-day Babel, or alternatively, greater collective societal wisdom.

How does one avoid the Babel result? There are certain characteristics required for a group of people to have the 'wisdom of crowds' [32]. Critically, the group must possess sufficient diversity in order to produce varied opinions and independent thinking, together with the ability to challenge other viewpoints, and access to context specific knowledge, be it of a specialist or localised nature. However, it requires suitable tools to turn many individual judgements into an aggregated collective decision, and the digital era has spawned different types of these.

Some examples include *Wikipedia*, the collaborative encyclopaedia website; *Slashdot*, a technology-related website with news submitted by its readers, and evaluated by editors; or the *Open Directory Project* which draws on sixty thousand volunteers. The United States Patent and Trademark Office recently established a Peer-to-Patent pilot process that enabled members of the public with a certain level of expertise to become community reviewers and assist the patent office in finding information relevant to assessing the claims of pending patent applications [33]. During the 2008 presidential election TechPresident, a cross-partisan group blog set up the Personal Democracy Forum, an interactive website monitoring how voters responded to the candidates, but also how the content they generated affected the campaign [34]. In each case the knowledge and talents of a group were leveraged to create content, predict problems or to organise issues [35].

Crowds are not always wise and under certain conditions the Babel result is a more likely outcome. Without sufficient diversity or the ability to challenge the views of others, there is the likelihood of 'groupthink', the psychological avoidance of dissenting opinions [36]. For example, *digg*, an internet site using online technology to rate issues by the votes they receive, was manipulated by an author keen to influence the opinions of the group. He simply bought votes in order to achieve sufficiently high popularity – but interestingly, once he had reached a certain level, he no longer needed to buy votes, as his intervention had created its own momentum [37]. The human desire to be associated with success and group acceptance led to a 'tipping point', where ideas, products, messages and behaviour spread the way viruses do [38]. This phenomenon can result in suboptimal decision-making or sophisticated manipulation by certain stakeholders.

In today's networked information economy, the sheer volume and complexity of information available means that some form of editing of available information usually takes place. There are many web-based tools and processes available to provide such an editorial function, but this position is associated with great power. The gatekeeper/editor is able to control the flow of information and filter its contents, thereby impacting not only the information available, but also the site's perception of the world and its 'Here be Dragons' – or lack of them.

A more rigorous approach to exploring different perceptions of a particular risk is the CMU Mental Models methodology, initially developed to explore public perception of radon, a dangerous substance that can contaminate indoor air quality and cause lung cancer. The methodology has been adapted for use in other contexts and provides a theoretical framework for the systematic analysis of the attitudes, values and perception of the public, together with the ways in which they process their information [39].

Another approach to collate and locate 'Here be Dragons' is information mapping. A characteristic of 'Here be Dragons' is their multidimensional aspect which creates complexity that is difficult to grasp. This information can be transferred onto a large mural, illustrating relationships and interconnections with adjacent issues and creating a visual lexicon and shared mental map that can be both duplicated and amended – complete with the 'Here be Dragons' located where appropriate [40].

There are many issues that need to be addressed if the desired wider societal framing is to be achieved. One issue is whether the public is able to freely select and change their editor and, if not, what the levels of dependence and choice might be. A second concerns the interest level of contributors necessary in order to warrant their input into the collective process, and what form of reward is implicit in the process. Ultimately, the critical question is whether these new digital tools and processes could result in growing awareness and acknowledgement of the 'Here be Dragons' – or whether the pressures of human psychology, institutional frameworks and scientific convention continue to maintain their stranglehold on acceptable knowledge. My personal belief is these tools, used in conjunction with scenarios and foresight methodologies discussed below, could ensure that the 'Here be Dragons' become located on our collective mental maps.

Scenarios as Meta Risk Analysis

Foresight is the process of exploring the future. Our human powers of foresight allow us to imagine what has not yet happened in order to protect ourselves from the harsh realities of actual experience. We undertake this process in order to understand and shape the direction in which the future might unfold, as some futures are infinitely more desirable than others. However, there are cognitive processes and heuristics that will bias the information we draw on [41]. This can thwart attempts to locate and understand the 'Here be Dragons.'

The scenarios methodology is a foresight methodology that lends itself to the exploration of complexity as well as conflicting belief systems. Scenarios offer a means of collectively exploring uncertainties and so generating a common understanding of the underlying dynamics and issues that might impact the future. Because scenarios adopt a longer time horizon, scenario builders have a license to look beyond the short-term interests and issues that characterise much institutional and political decision-making, thereby giving scenario builders 'permission' to explore the 'Here be Dragons'.

Although not an end in themselves, scenarios are a useful tool to understand a range of possible options as well as to identify possible risks

and opportunities. They are built by a diverse group of people incorporating expertise from a wide range of disparate disciplines, thereby encouraging collaboration and cross fertilisation and minimizing potential groupthink. Scenarios come in a set, containing several alternative, equally plausible future states, so forcing disparate groups to acknowledge some information that challenges their worldviews, but at the same time recognises their perspective. The process increases the likelihood of discerning possible 'Here be Dragons' and ultimately, should create greater awareness of and responsiveness to our complex world of today.

THE USE OF SCENARIOS AS A FORESIGHT TOOL HAS INHERENT LIMITATIONS: THE OUTCOME WILL ONLY BE AS GOOD AS THE INPUTS.

The quality will depend on the process and the requisite variety of the collective minds of the participants in the room, or those whose thinking has in some way been incorporated. Although scenarios are an imperfect tool, they facilitate preparedness for the future. In the absence of a crystal ball, it is usually better to be partially right across a wide range of possible assumptions than totally wrong.

People and their institutions are usually resistant to change. Almost five centuries ago Machiavelli said: 'It ought to be remembered that there is nothing more difficult to take in hand, more perilous to conduct or more uncertain in its success than to take the lead in the introduction of a new order of things. Because the innovator has for enemies all those who have done well under the old conditions, and lukewarm defenders in those who may do well under the new' [42]. However, there has never been greater need for societal adaptability in the face of exponential change. Human societies today are so interconnected and interdependent that there is a great need for resilience, yet this will require recognition of the 'Here be Dragons' and strategies to deal with their materialising. For this reason, I believe that scenarios provide a potential tool for meta risk analysis of the 'Here be Dragons' systemic issues society faces. They could overcome the illusory security created by societal myopia and also address issues of procedural fairness, and possibly outcome fairness [43].

Conclusion

Science has provided many answers to the world we live in. The result has been unprecedented technological progress and economic development. However, ignorance, ambiguity and scientific uncertainty have all too often been conveniently airbrushed off our knowledge maps. 'Sound science' is usually invoked as the basis for policy decisions, yet with scientific experts available to argue either for or against as the need arises, any semblance of neutrality and rationality is undermined.

It is now time to acknowledge the 'Here be Dragons' and explore which ones pose the greatest risk to the society we desire for ourselves and our offspring. This would ensure that short-term decision-making is not at the expense of the long-term prospects for Humanity. It should also result in a fairer and more effective allocation of scarce resources.

The world is forever changing. The only certainty in this uncertain world is that the 'Here be Dragons' of tomorrow are unlikely to be those of today. Today's dragons might be hidden, unwanted and unrecognised, but they will not remain outside the confines of our collective mental map for ever. Our decision-making today will impact the world of tomorrow – including the whereabouts, size and scale of the 'Here be Dragons'. Whatever the conclusions reached by policymakers and institutions, ignorance increases the potential for systemic volatility and disruptive change. The 'Here be Dragons' are around us, and human beings dependent on the complex webs of interconnected human and natural systems ignore them at their peril.

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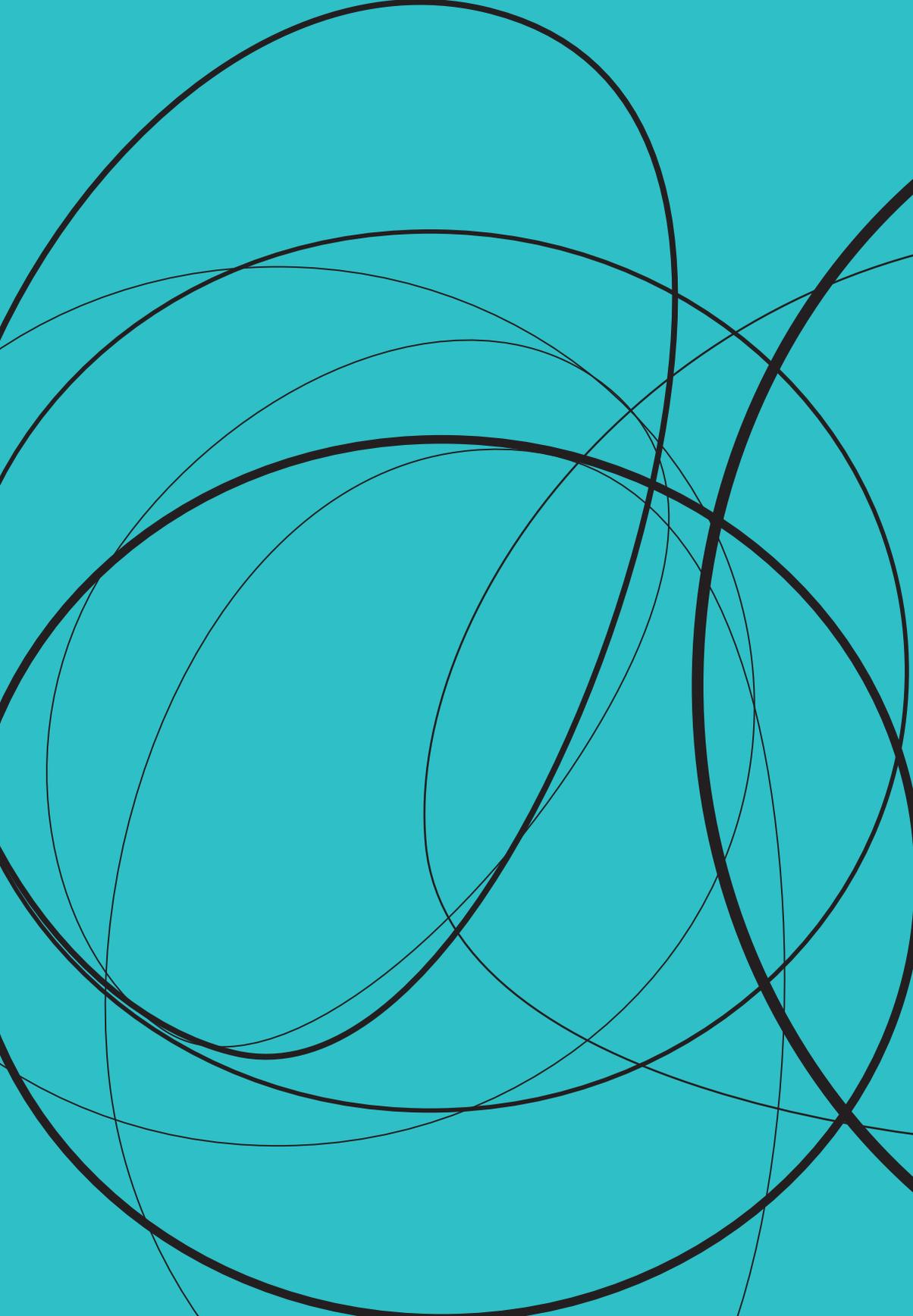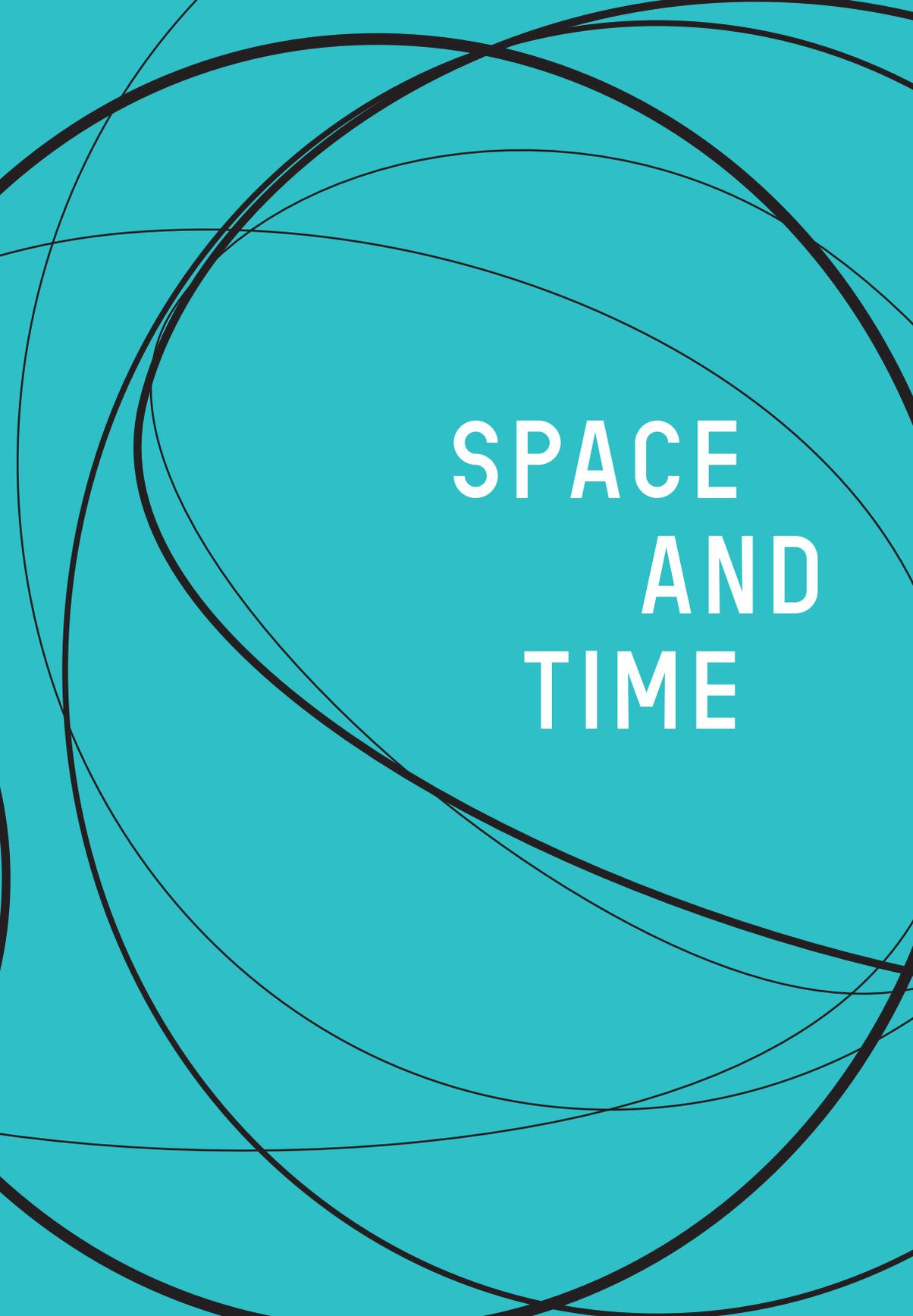
SPACE AND TIME

POSTNORMAL ARTEFACTS

Ziauddin Sardar

We like to divide history into neat periods. It helps us see how history moves, what progress has been made, and take account of paradigm shifts, if any. The tendency to categories history has its own history and can be traced back to the Greek poet Hesiod who divided pre-history into the Golden Age, the Silver Age, the Bronze Age, the Heroic Age and, finally, the Iron Age. Ovid, the Roman poet, concurred; and produced similar myths in his *Metamorphoses*. Except he saw only four ages; there were no heroes who improved the sad state of humanity in his categorisation. However, justice and peace reigned during the Golden Age; perhaps because, as Ovid tells us, man could not navigate, was confined to where he was born, and did not encounter the Other. In contrast, astrologers shunned metals and opted for the signs of the Zodiac. So we have the Age of Taurus, Aries, Pisces, and so on, including 'The Age of Aquarius', which was much in vogue during the 1960s and 1970s when I too was a flower child and joined the crowd to be astonished by 'Hair', 'the American love-rock musical'. Christianity has Six Ages of the World; while Hinduism has Four Yugas (Satya, Treta, Dvapara and Kali) during which we successively become more and more immoral and brutish!

In general, the divisions of history are viewed from three main perspectives: cosmological, geological, and historical. The cosmological perspective, as one would expect, goes back to the Big Bang, 13.8 billion years ago. Initially it proceeds in attoseconds: Planck Epoch (10–43 seconds after the Big Bang), Grand Unification Epoch (between 10–43 to 10–36 seconds after the Big Bang), Electroweak Epoch (between 10–36 seconds to 10–12 seconds after the Big Bang as the universe cools down), Inflationary Epoch (between 10–36 seconds to 10–32 seconds after the Big Bang as the universe flattens). After these periods, we move all the way through elementary particles (quarks, hadrons, leptons, photons). When we reach minutes, we have Nucleosynthesis Epoch (3 to 20 minutes after the Big Bang) and then we have to wait for 377,000 years before the arrival of Recombination Epoch, and 150 million to one billion years when the first stars begin to form in the Reionization Epoch. Geological perspectives has Cenozoic, Mesozoic, Paleozoic, Neo-Proterozoic, Meso-Poterozoic and Paleo-Proterozoic Eras, each sub-divided into Periods, Epochs and Ages,

with layer upon layer of evolutionary events. When it comes to historical perspective, periodization becomes simple or problematic, depending on your viewpoint. The dominant scheme begins with Ancient History (3600–500BC), then humanity disappears for centuries and nothing really happens (from Western perspective) until we come to Postclassical Era (500–1500) and move rapidly to Modern History (1500 onwards), which is divided into Early Modern, Mid Modern and Contemporary. Essentially, history is largely seen as the History of Western Civilization, assumed to be the apex of human achievement; and its periodization reflects this Eurocentrism. We normally begin with Greece and jump to the Middle Ages – as though nothing happened in between. Islam and China are marginalised, if not forgotten; history and ideology are seldom apart. Of course, different cultures, civilizations and nations would have their own periodization; and different authors have produced their own divisions.

The fourteenth century Muslim historian Ibn Khaldun divided history into only two parts: manifest and gist [1]. For Ibn Khaldun, the periodization of history was not important, nor the actual events of history, but looking at how history shaped social life and the local and world environment. In *The Decline of the West* (1981), German historian Oswald Spengler rejected the notion of linear history, divided into immaculate epochs with 'ancient-medieval-modern' headings [2]. Spengler suggested that history should be seen in terms of cultures which grow organically into a civilisation; and recognised eight 'high cultures': Babylonian, Egyptian, Chinese, Indian, Mexican (Mayan/Aztec), Classical (Greek/Roman), Arabian, and Western. The American historian of science, George Sarton, separated historic periods by assigning each half century to a dominant intellectual personality [3]. So we begin with 'The Age of Homer' and systematically move forward from the Greeks to 'The Time of Hsuan Tsang', 'The Time of I-ching' and 'The Time of Bede', the first half of the eighth century. From now on it's the time of Muslim thinkers: 'The Time of Jabir ibn Hayan' the father of chemistry; 'The Time of al-Khwarizmi', the inventor of algebra; 'The Time of al-Razi', and so on all the way to Copernicus and the western luminaries. The British historian Arnold Toynbee saw history in terms of rise and fall of civilisations; and described 23 civilisations [4]. Of course, you could also divide history by empires, monarchs, wars, and conquests, including imperialism and colonialism, which many historians have done. More recently, the British Marxist historian Eric Hobsbawm divided post-Enlightenment history into The *Age of Revolution 1789–1848*, *The Age of Capital 1848–1875*, *The Age of Empire 1975–1914* and *Age of Extremes 1914–1991* [5–8] – the titles of his four-volume monumental work. In his new book, Henry Kissinger [9] divides history into four 'world orders':

Islamic, Chinese, European and American.

But it is not just historians and political scientists who have been busy dividing the past into digestible chunks. Futurists too have been playing the game. Alvin Toffler saw history move in three waves. The first began with agricultural society and replaced hunter-gathers with cultivators and farmers. The second with the Industrial Revolution in Europe, which introduced mass production and mass consumptions, and Toffler romantically believed mass education. *The Third Wave* [10] was going to be the post-industrial society, or if you like, the information society. Less optimistic futurists saw recent history lurching from crisis to crisis. Ronald Higgins suggested that we have moved from six threats – population explosion, food scarcity, resource depletion, environment degradation, nuclear threat and abuse of science and technology – to *The Seventh Enemy* [11]: political inertia and industrial blindness. Both Toffler and Higgins were partly correct. Perhaps recent developments in synthetic biology, 3-D printing, and the 'Internet of Home' is pushing us beyond the third to fourth wave. And even if we have not successfully tackled six threats of Higgins, political inertia and all round blindness to global chaos is all too evident.

However, there have been some interesting interventions in the periodization of history which suggest that we are moving towards a paradigm shift. For example,

IT HAS BEEN SUGGESTED THAT HUMAN BEHAVIOUR IS NOW SO DEEPLY IMPLICATED IN CLIMATE CHANGE AND CHANGES IN EARTH'S ATMOSPHERE THAT IT SIGNALS THE ARRIVAL OF A GEOLOGICAL AGE: THE ANTHROPOCENE, A NEW GEOLOGICAL EPOCH MEASURED FORM THE TIME WHEN HUMAN ACTIVITIES BEGAN TO HAVE A GLOBAL IMPACT ON THE EARTH'S ECOSYSTEM.

Science writer Elizabeth Kolbert argues that the rate of extinction of species is increasing so rapidly that we are now heading for *The Sixth Extinction*. The previous five resulted in profound loss of diversity: 'the first took place during the late Ordovician period, some 450 million years ago, when living things were still mainly confined to water. The most devastating took place at the end of the Permian period, some 250 million years ago, and it came perilously close to emptying the earth out altogether. (This event is sometimes referred to as "the mother of mass extinctions' or "the great dying"). The most recent –

and famous – mass extinction came at the close of Cretaceous period; it wiped out, in addition to dinosaurs, the plesiosaurs, the mosasaurs, the ammonites, and the pterosaurs' [12]. A quick look at the current rate of extinction amongst amphibians indicates, notes Kolbert, an event of similar catastrophic nature is on its way.

But no matter how you divide history, you should be able to associate your divisions with some sort of artefacts – a record of ideas, outlooks, achievements, documents, sites, objects – that highlight the specific character of each division. Archaeology, for example, is essentially based on the study of artefacts – objects that our ancestors produced in glass, ceramics, wood, metal and stone – which say something about the past. So, for example, large monumental displays are associated with the Neolithic period. The artefacts of the Bronze Age include weapons such as daggers, utensils, ornaments like rings and necklaces, pots and vases, miniatures of horses, tigers and humans as well as machinery made of bronze. Similarly, we can identify specific artefacts and particular characteristics – objects as well as ideas and changes in political and social institutions – with other periods.

From the perspective of postnormal times [13–15], a natural question arises: if postnormal times is a distinct epoch of history, and marks a departure from other recent periods of history, what artefacts and unique features it has produced or is likely to produce? 'Stuff', as the jargon has it, which identifies it as a distinct period?

The first thing to note here is that the time scale we are talking about is quite different from large scale measures of history. Accelerating change continues to shrink and collapse historical periods. For example, history of technology divides the modern period into Machine Age (1880–1945), Age of Oil (after 1901), Atomic Age (after 1945), Space Age (after 1957) and Information Age (1970–present). Notice how the periods shrink as well as overlap. The Information Age has led us into The Internet Age (1985 onwards), The Multimedia Age (1987–2007), and the Age of Big Data (2007-present) [16]. The Information Age gave rise to Postmodernism, the dominant outlook from 1970s to 2000s; which itself was a reaction against the excesses of modernity, the period identified as 'modern'. Of course, these are not neat and clean divisions; they overlap considerably. Postnormal times emerge after the postmodern decades, during what we may call the Contemporary Period.

The Contemporary Period generally covers history still in living memory. Traditionally, we believed that living memory goes back about 80 years – most people in their 80s and alive today will remember their childhood (if they are not suffering from the modern plague of dementia and Alzheimers). So it is roughly the period spanning from the Second World War, which marks

the emergence of the Atomic Age that separates the past eras from what is considered the newest stage of world history: the present time.

If postnormal times have produced their own artefacts we should be able to distinguish them from the artefacts of other Contemporary Periods such as the Modern or Postmodern Age. Let us, for the purpose of this exercise, divide Contemporary Period into four divisions:

Classic: 1920–1950
Modern: 1950–1975
Postmodern: 1975–2005
Postnormal: 2005–

This division is just as arbitrary as other periodizations, other attempts to categorise history into named blocks. But the point is that we can identify artefacts associated with Classic, Modern and Postmodern periods and see if postnormal times have produced something that is distinctively different. But first let us define our three predecessor periods to postnormal times a bit more carefully.

Classic should not be confused with *classics*, which refers specifically to the cultural products of Ancient Greece and Ancient Rome. When we study classics we study the language and literature of Classical Antiquity (600BC-600). Clearly we are not talking about Plato or Philo of Alexandria. But we are using the term in the sense of something having an enduring appeal and a lasting and timeless quality; both as an adjective (a classic car) or a noun (a classic of literature). A classic can be something old but it is not an antique; it is still prized and seen as of intrinsic value. It can be an idea, such as progress, or a social institution, such as marriage.

But we are referring specifically to classic products of the Contemporary Period. Cadillac V16 and a pre-1940 Rolls Royce, for example, are regarded as classic cars. When we think of classic Hollywood cinema, a term used in Film Studies, 'Gone With the Wind' (1939) and 'Citizen Kane' (1941) come to mind. This is roughly the period between 1920s and 1950.

The modern era is a little tricky to define. Early modern period goes back to Columbus and moves on to the Renaissance and the Enlightenment and leads into the Victorian Era. Late modern period starts with the Industrial Revolution and comes down to the Cold War. Clearly, this is not what we mean by modern. We are using modern as it is used in art history, where 'late modernism' is the period that begins after the Second World War. (It should be noted that modernism, which is a movement in art, and modernity, which is a conceptual outlook are not the same and cannot be interchanged). For our

purpose, the Modern era begins in 1955, when television, nuclear submarines, music synthesizers and televised presidential press conferences first make their appearance.

Ironically, the postmodern era is easier to pin down. It is heralded with the publication of *The Postmodern Condition* by Jean-François Lyotard [17]. Although there is some confusion here too with British sociologist Zygmunt Bauman talking about *Liquid Modernity* [18] what others have called Late Modernity, but which verges into and is indistinguishable from postmodernism. American literary critic, Fredric Jameson, describe postmodernism, in the subtitle of his famous book, as 'the Cultural Logic of Late Capitalism' [19]. Of course, there had to be something there in the first place for Lyotard to give us a 'State of the Art Report'. So we can mark the beginning of the Postmodern era from 1975.

By 2005, postmodernism was largely discredited; although it is still energetically defended in certain academic quarters. So we can mark the beginning of postnormal times from 2005, when the verb 'to google', ie, to use Google gained wide currency.

We can associate certain characteristics with each of these periods. For example, change was slow, if not quasi-static in the classic era; it increased during the modern era, becoming increasingly rapid during the postmodern period, and is accelerating and becoming chaotic during the postnormal times. Politically, the world was organized into empires in the classic era, and became fragmented into nation states during modern period. While nation-states still persist, regional groupings and alliances – such as European Union and Association of Southeast Asian Nations (ASEAN) – become important during the postmodern period. In postnormal times, power is shifting from non-state commercial actors such as Google and Facebook; and even terrorist groups such and Al-Qaeda to name but one. The world order was dominated by competing colonial powers (Britain, France, Holland, and the USA) during the classic decades. The modern era ushered the Cold War and a bi-polar world with the US and Soviet Union as two competing Superpowers. We entered a uni-polar world with the collapse of the Soviet Union, with the US as the only Superpower, in the postmodern age. Now, in postnormal times, we are heading towards a multi-power world as power shifts towards China, Russia, India and Brazil. The key concepts of the classic era were conquest, supremacy and progress. The modern period continued to emphasize progress but shifted its attention to efficiency and modernization. Postmodernism announced the dissolution of all 'Grand Narratives' including progress, ideology, and religion; and highlighted multiple truths and pluralistic voices. Postnormal times put the accent on complexity and chaos and underlines uncertainty and ignorance. Memory plays an important part both in classic and modern eras. But

postmodernism is characterised by amnesia. Writing in 2003, Timothy Melley noted that 'Mnemonic aids have come back into fashion. A new literary culture has shaped itself around the memoire. Innumerable critics have asserted that we live in "an age of forgetting" and that United States suffers from "historical amnesia"' [20]. But it was not just the US that postmodernism affected;

AS A GLOBAL CULTURE POSTMODERNISM TENDED TO ERASE MEMORY FROM ALL CULTURES. IN POSTNORMAL TIMES, ERASING UNWANTED MEMORIES FROM THE INTERNET HAS BECOME A BIG ISSUE.

We can go one with other examples. But perhaps it would be better to present the differences between classic, modern, postmodern and postnormal times in a more concise form. Given that we are at the very initial stage of postnormal times, we can only be tentative. Moreover, we ought to point out that these are not 'predictions' about the future. Rather, they are the products of the trends already deeply embedded within an 'extended present', and as such, descriptions of what is actually happening.

So, here then, is my cautious list of emerging postnormal artefacts.

Meaning
Classic: 'I think, therefore I am'
Modern: 'I progress, therefore I am'
PostModern: 'I shop, therefore I am'
Postnormal: 'I share, therefore I am'

Truth
Classic: Monolithic
Modern: Monolithic
PostModern: Relative and Pluralistic
Postnormal: Contradictory

Identity
Classic: 'I am tradition and culture'
Modern: 'I am science and technology'
PostModern: 'I am what I buy'
Postnormal: 'I am my Facebook page'

Change
Classic: Quasi static, slow
Modern: Fast
PostModern: Increasingly Rapid
Postnormal: Accelerating, Chaotic

Systems
Classic: Simple, Closed
Modern: Complicated, Closed
PostModern: Complex, Open
Postnormal: Open, Interconnected, Complex, Chaotic

Key Concepts
Classic: Conquest, Supremacy, Progress
Modern: Progress, Efficiency, Modernization
PostModern: Dissolution of Grand Narratives (meaning),
Multiple Truths, Plural Voices
Postnormal: Complexity, Chaos, Contradictions, Uncertainty, Ignorance

World Order
Classic: Competing Colonial Powers (Britain, France, Holland, USA)
Modern: Bi-Polar World; 'Cold War' (USA, Soviet Union)
PostModern: Unipolar World (USA)
Postnormal: Multi-Polar World (USA, China, Russia, EU, India, Brazil)

Knowledge
Classic: Pursuit of Reasoned Inquiry...
Modern: ...Acquired through Scientific Progress and Development
PostModern: Socially Constructed and Relative, Wikipedia
Postnormal: 'Extended Facts', Embedded in Uncertainty and Ignorance

Science
Classic: Pursuit of Truth, funded largely by the State
Modern: Scientific Method as Neutral, Objective Truth; funded
by the State and Corporations (Military-Industrial Complex);
Peer Reviewed Publication
PostModern: Socially Constructed; funded largely by Military-Industrial-
Corporations Complex; Peer Reviewed Publication
Postnormal: 'Facts are Uncertain, Values in Dispute, Stakes High and
Decisions Urgent'; Driven by Mega Corporations (Google, Microsoft) and
Billionaire Philanthropists; 'Extended Peer Communities' but still largely
funded by Military-Industrial-Corporations Complex

Technology
Classic: Slow Application of Science to Make Work Easier
Modern: Ideologically Driven to 'Improve Society', Antibiotics
but also Nuclear Weapons
PostModern: Embedded in Politics; Genome Sequencing, Biotechnology,
Information and Communication Technologies
Postnormal: Human-Machine Synthesis, DNA editing, Drones, Cyborgs

Medicine
Classic: No Antibiotics, or appropriate Anaesthetics
Modern: '**Modern** Surgery', Antibiotics, Electrocardiogram (EKG)
Monitoring, Open Heart Surgery, Kidney Transplantation
PostModern: Electronic Monitoring of Patients, Microsurgery,
Face Transplant
Postnormal: Remote Surgery, Stem Cell Therapy, Synthetic Organs

Communication
Classic: Telephone, Telegraph, Morse Code, Radio
Modern: Microwave Ovens, Television
PostModern: Mobiles, e-mail, Internet, World Wide Web
Postnormal: Instant, Perpetually Connected, 24-hour Global News
Channels, Facebook, Twitter, 'Internet of Things'

Political Organization
Classic: Empires
Modern: Nation States
PostModern: Regional Groupings and Alliances (EC, ASEAN, OIC)
Postnormal: Power shifts to Non-State Actors

Governance
Classic: Representative Democracy
Modern: Interest-Based Democracy (neo-liberal, hyper Modern)
PostModern: Deliberative Democracy (diversity, plurality, 'politics of difference')
Postnormal: Complex, Chaotic, Unmanageable

Economy
Classic: Classical Macroeconomics (Adam Smith)
Modern: Capitalist (free market), Communist (centrally controlled)
PostModern: Neo-Liberal Economic Globalization (large-scale, corporate commerce and the privatization of resources)
Postnormal: Digital, Runway Monetarism

Religion
Classic: Monotheism
Modern: Monotheism
PostModern: New Age, Fundamentalism
Postnormal: Eclectic, Fundamentalist, Polytheistic

Equality
Classic: Legislated discrimination, Poor Law,
Modern: Welfare State, Equality before the Law (assumed), Trickle Down Effect will improve the lot of the poor
PostModern: Multiculturalism, Integration, Assimilation,
Postnormal: Acceleration of Inequality, Rich Grow Richer at Lightning Speed

Boundaries
Classic: Fixed
Modern: Flexible
PostModern: Porous
Postnormal: Dissolving

Nature
Classic: To be Tamed, and Exploited
Modern: Tamed, Under Control, but 'Limits to Growth'
PostModern: Social Construction of Nature, Eco-Politics
Postnormal: Feral, Climate Change, Disappearing species

Environment
Classic: Relatively Healthy
Modern: Polluting
PostModern: Toxic
Postnormal: Catastrophic, Climate Change

God
Classical: God is Everywhere and Everywhen
Modern: God is Truth (big T) (early Modern) God is Dead (Late Modern)
PostModern: God is the machine or God is me
Postnormal: God is Ignorance

Religion
Classical: Religion Explains the World
Modern: Religion Helps Us Understand the World
PostModern: Religion was a Lie; Liberal Secularism is the new Theory of Salvation
Postnormal: Religion is Uncertain, therefore must be Open to Multiple Interpretations and made Complex

War
Classic: The First World War
Modern: Holocaust
PostModern: 'The Gulf War' (as seen on TV)
Postnormal: Drone Attacks, Cyber War, Militarised Robots (war is a game, removed of humanity)

Protests
Classic: Civil Disobedience (African American Civil Rights Movement), Non-Violent Resistance (Gandhi)
Modern: Anarchist Subversion, Violent Demos (Black Panthers), Peaceful Marches (CND)
PostModern: Mass Mobilization ('Gay Pride', Gulf War Protests)
Postnormal: Propelled by Digital Media, Interconnected, Complex and Chaotic ('Arab Spring', Truckers Protests in Britain, US and elsewhere, Argentinian Public Transport Protests)

Terrorism
Classic: Urban Gorillas, Terrorism for Independence ('Battle for Algiers')
Modern: Local, with Specific Goals (IRA, Basque Separatist)
PostModern: Global, Suicide Bombers, non-State Actors (al-Qaeda)
Postnormal: Global, Interconnected, Social Media Savvy, Seeking Territory ('Islamic State of Iraq and Syria', Taliban, Boko Haram)

Body
Classic: Muscular
Modern: Athletic
PostModern: Androgenic
Postnormal: Enhanced

Cities
Classic: Mississippi, Cape Town (under apartheid)
Modern: New York, London, Paris
PostModern: Tokyo, Dubai, Putra Jaya (Malaysia)
Postnormal: Baghdad (after the Allied withdrawal), Cairo (after two Uprisings), Aleppo, Ferguson, USA

Films
Classic: Mr Smith Goes to Washington
Modern: Invasion of the Body Snatchers
PostModern: Sex, Lies and Videotapes
Postnormal: Her

Television
Classic: I Love Lucy
Modern: Mission Impossible
PostModern: Star Track: The Next Generation
Postnormal: Silicon Valley

Music
Classic: Jazz, Big Band Swing
Modern: Pop, Rock n Roll, Disco, Heavy Metal
PostModern: New Age, Psychedelic, East-West Fusion, Punk, Grunge, and House
Postnormal: Yet to make an appearance (but Canadian experimental band 'Post Normal' is making an effort)

Hollywood Heroes
Classic: Clark Gable – 'Frankly, my dear, I don't give a damn'
Modern: James Dean – 'The bad boy from a good family'
PostModern: Arnold Schwarzenegger – 'Hasta la vista, baby'
Postnormal: Johnny Depp: 'Honestly it's the honest ones you have to watch out for; you never can predict if they're going to do something incredibly stupid'

Sex Symbol
Classic: Mae West – 'Is that a gun, or are you just please to see me?'
Modern: Marilyn Munroe – 'Gentlemen Prefer Blondes'
PostModern: Madonna – 'I am a material girl'
Postnormal: Laverne Cox – 'Faking It'

Sex
Classic: The Hayes Code (no double beds, no kisses lasting more than ten seconds, no nudity)
Modern: 'Wham, Bam, Thank You Mam'
PostModern: Cybersex – Log on, Log up, Log off
Postnormal: Pornography is Normal

Marriage
Classic: Monogamy
Modern: Serial Monogamy
PostModern: Serial, Multiple, Monogamy
Postnormal: Hetero, Homo, Trans, Serial, Plural

Buildings
Classic: The Empire State Building, New York
Modern: The Guggenheim Museum, New York
PostModern: The Portman's Bonaventure Hotel, Los Angles
Postnormal: The Clock Tower, Mecca

Painters
Classic: Picasso
Modern: Jackson Pollack
PostModern: Andy Warhol
Postnormal: Banksy

Novels
Classic: Fitzgerald, *The Great Gatsby*
Modern: Camus, *The Stranger*
PostModern: Rushdie, *Midnight's Children*
Postnormal: Wilson, *Alif the Unseen*

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GLOBAL WEIRDING

John A. Sweeney

**WHEN THE GOING GETS WEIRD, THE WEIRD TURN PRO
– HUNTER S. THOMPSON**

Bandar Mahshahr is no stranger to heat. It is not uncommon for this northern Iranian hamlet to experience consistent highs above 45 degrees Celsius during the summer. But, when the heat index topped 74 degrees Celsius (165 degrees Fahrenheit), which was the second highest heat index ever recorded globally, the world took notice. Bandar Mahshahr is now inextricably linked to the extreme impacts of global warming. For years, reports have warned that extremes would overtake the global climate system, and this inhospitable 'normal' ripe with 'heat waves, floods, droughts and wildfires' would become 'the new reality of an ever warming world.' However, just because we have been told to expect more extremes does not mean that we have, or will gain, the capacity to forecast and/or mitigate them. Indeed, the causal relations underlying the global climate system are decidedly complex, and climate change is complicating things further. As noted in *Nature*:

Extreme weather and changing weather patterns — the obvious manifestations of global climate change — do not simply reflect easily identifiable changes in Earth's energy balance such as a rise in atmospheric temperature. They usually have complex causes, involving anomalies in atmospheric circulation, levels of soil moisture and the like. Solid understanding of these factors is crucial if researchers are to improve the performance of, and confidence in, the climate models on which event attribution and longer-term climate projections depend [1].

While the extreme heat of Bandar Mahshahr was short-lived, the prospects for limited certainty, if not absolute ignorance, concerning the global climate system are all-too-long-term in scope and scale. In short, the climate system as we know it—and have flourished and adapted to it—is going postnormal, and

attempts to map the territory ahead are appearing increasingly Sisyphean. Such is life in the Anthropocene—an epoch of extreme weirding. How weird are things going to get? This might be the defining question of the 21 century.

The Mauna Loa Observatory reported in May 2013 that atmospheric carbon dioxide reached 400 parts-per-million for the first time in 'more than 2.5 million years.' Putting this disturbingly symbolic, and extreme, milestone into perspective, scientists note that the last time atmospheric carbon levels were this high 'the globe's temperature averaged about 3 degrees C warmer, and sea level lapped coasts 5 meters or more higher,' which is to say that the world was a radically different place—one, as it were, absent of humanity. Although there continues to be debate about the diffuse effects of increasing atmospheric CO_2 levels, there is little debate about the cause: human activity, particularly the energy-intensive mechanisms of industrial and post-industrial capitalism. In short, we have *weirded* the global climate system, and as this process is on-going, we live in a world subject to *extreme weirding*.

Global Weirding, rather than global warming, is more than just a play on words—it is a prognosis. As I have argued elsewhere, global weirding 'is a fitting moniker for the emerging meshwork of

- increasing technological advancement, dependence, and ubiquity,
- impending ecological catastrophe(s), and
- the transnational drive and reach of postnormal actants.'

By postnormal actants, I am referring explicitly to the networked relations underlying and surrounding us all, which becomes especially apparent in what Ziauddin Sardar has called Postnormal Times (hereafter PNT). In PNT, things we take for granted become uncertain, our understanding of things can become a form of ignorance, and longstanding norms, if not the very idea of normalcy itself, break down before our very eyes. This, if anything, is what is meant by global weirding, and extreme weirding points toward the increasing power of severe phenomena to mutate our sense of being in the world. In the parlance of PNT, the convergence of 'complexity, chaos, and contradictions' is already and will continue to result in systemic disruptions, which can and might begin with actors of various scope and scale.

When a street cart vendor immolated himself in Tunisia in December 2010, few, if any, could forecast the impacts to come. In a time of extreme weirding, Mohamed Bouazizi is a quintessential example of a postnormal actant. However, it is only when we understand his selfless act of protest in light of the networks—many of which used online platforms to organize—formed around political critique in the region that the weird dynamics of PNT become most

apparent. Thanks, at least in part, to networked media, the uprisings across the Middle East and North Africa spread like wildfire. Such metaphors are more than fitting, especially as some point toward the extreme impacts of climate change as a factor in the spread of protests throughout the region. As a report on the systemic disruptions underlying the protests in Egypt notes, 'a once-in-a-century winter drought in China reduced global wheat supply and contributed to global wheat shortages and skyrocketing bread prices in Egypt, the world's largest wheat importer. Government legitimacy and civil society in Egypt were upset by protests that focused on poverty, bread, and political discontent.'

Although political discontent was certainly present during Mubarak's despotic rule, an extreme rise in the price of bread was a unifying force that brought together various interests—it literally *weirded* the Egyptian political landscape. It is certainly the case that humanity has always been susceptible to extreme events, but it would be foolish to assume that history holds the key to understanding and navigating PNT. How can we think through such changes? What conceptual lenses might aid in making sense of the seemingly implausible? How weird are things going to get? To account for and ordain humanity's extreme impacts on the global climate system, two internationally renowned scientists, Paul Crutzen and Eugene Stoermer, coined the term Anthropocene 'to emphasize the central role of mankind in geology and ecology.' [2] Given the extreme weirding to come, it might be of use to employ a long view—both backward and forward—to understand what the Anthropocene might portend.

In 1873, an Italian geologist, Antonio Stoppani, used the phrase 'Anthropozoic era' to conceptualize the geologic-scale impact of human activity. Although noted by Crutzen as an intellectual forebear, the extent of Stoppani's insight has only recently emerged, at least for an English-speaking and reading audience. Expressing his wonder at advent of the Anthropozoic epoch, Stoppani exclaims, 'We are only at the beginning of this new era; still, how deep is man's footprint on earth already! Man has been in possession of it for only a short time; yet, how many geological phenomena may we inquire regarding their causes not in telluric agents, atmosphere, waters, animals, but instead in man's intellect, in his intruding and powerful will.' As one of, if not, the earliest scientific voices to note the abiding, which is also to say extreme, impact of human activity, Stoppani's prescient pronouncement was rare for its time, if only for its attentiveness to scale, but such sentiments would soon become commonplace among those within the emerging discipline of ecology.

While this nascent scientific area of inquiry developed in the latter half of the nineteenth century, the critical concept of an ecosystem did not become widely accepted until the release of Arthur Tansley's *The Use and*

Abuse of Vegetational Terms and Concepts in 1935. The advent of the ecosystem concept did much to further the systemic analyses of human activities on the biosphere, but a host of thinkers around the turn of the century were already making grander claims about the role and possible outcomes of human-driven changes to the planet's operations, which is to say that some had theorized the world as a single, unified system—one, as it were, increasingly coming to grips with the extremes of human control.

Less than a century later, however, notions of command and control, if not stability, concerning the global climate system were being called into question. In 1988, James E. Hansen from NASA provided testimony at a Congressional hearing on climate and specifically used the term 'global warming' to describe 'a cause and effect relationship between the greenhouse effect and the observed warming.' With the publication of Bill McKibben's *The End of Nature* [3], which many consider 'one of the first books for a general audience about global warming,' the stage for the Anthropocene was set. Many were keen to find a way to conceptualize the extremes of life in 'the Anthrocene,' which is the proto-term used by Andrew Revkin, an author and journalist writing for the *New York Times*, in *Global Warming: Understanding the Forecast* [5] to denote 'a geological age of our own making.' By the time Crutzen 'made up the word on the spur of the moment,' [4] which is perhaps a bit of an embellishment given the term's rich conceptual history, not to mention Stoppani's Anthropozoic and Revkin's Anthrocene, the idea that human activity was having extreme impacts on the planet's biosphere. It was well-established in the scientific community, but the existential implications of the term, which suggests that nature no longer exists, continues to be a point of contention for many.

SO MANY THINGS WE TAKE FOR GRANTED AS 'NORMAL' HAVE NOW BECOME EXTREME THAT IT IS NOT EASY TO HAVE ALL EXTREME BEHAVIOUR ENCAPSULATED IN A SINGLE TERM.

Our technology has become extreme, modernity has acquired extreme connotations, our economic system is extreme, corporate behaviour is extreme; almost every ideology has gone extreme. Not surprisingly, some experts are trying to coin terms that focus on particular aspect of our extreme epoch.

In light of the role of technological advancements, from the advent of the steam engine to the apotheosis of algorithms, in precipitating and, assuaging

the extremes of the Anthropocene, Pierre Berthon and Brian Donnellan, two ecologists from Bentley University, Boston and National University of Ireland respectively, suggest that a more fitting moniker might be the Technopocene. This, they argue, promotes 'a new level of mindfulness on the part of humans for themselves and their technological offspring.' [6] Humanity has never limited itself to natural processes, although it remains intimately interconnected and intertwined to the workings of the world. As such, the Technopocene provides a more acute diagnosis, and, perhaps, prognosis of/for the challenges of the Anthropocene, especially as many feel that the only way to avert crisis may be to double-down, so to speak, by engineering the planet's complex adaptive life systems. The Technopocene, then, should not be understood as an extreme version of the Anthropocene but rather be seen as its conceptual antecedent as there have never been humans devoid of technology, which continues, for better or worse, to define us as a species. While the Technopocene lacks the lustre and shine of the Anthropocene, there is much to be said for selecting an appropriate designation for what humans have done and are continuing to do to the planet.

As a means to capture the extreme human impact on the planet, Jussi Parikka, a Finnish academic focusing on media studies, coined the term 'Anthrobscene' to mark the 'various violations of environmental and human life in corporate practices and technological culture that are ensuring that there won't be much of humans in the future scene of life.' Arguing that the only means to make sense of contemporary techno-culture is through the lens of geography, Parikka emphasizes the immense materiality of our all-too-modern lives and, as it were, futures. As with atmospheric carbon levels, which will continue to increase for 50 years even if all emissions ceased tomorrow, there is no way to undo the structural changes that techno-culture has had on the planet. This extreme is easy to see when one looks at aerial images of the mines used to harvest the precious minerals and metals necessary to the devices all around us, and the Anthrocene forces us to confront how 'media feeds back to earth history and future fossil times.' In short, Parikka reminds us that the tenets of modernity are all too contemporary.

In *We Have Never Been Modern*, Bruno Latour, the French philosopher and sociologist of science, poses an incisive critique of the causes and effects of modernity's enduring, albeit affectively per formative, legacy: humanity's separation from nature. From the modernist purview, the task of the sciences, especially physics, was to examine *nature* as object and report back accordingly. In separating politics and physics into two different worlds, modernity was trenchantly Newtonian in its perspective of the natural and, by extension, the social. In affirming the discreetness of natural objects, modernity inculcated a pathological fixation on progress and growth that drove the greatest expansion, and by extension concentration, of wealth in

human history, but this story, as it were, may not have a happy ending. As Latour notes, 'So long as Nature was remote and under control, it still vaguely resembled the constitutional pole of tradition, and science could still be seen as a mere intermediary to uncover it. Nature seemed to be held in reserve, transcendent, inexhaustible, distant enough. But where are we to classify the ozone hole story, or global warming or deforestation?' [7] In calling into question the limits and destructiveness of the modernity's false notion of nature, Latour argues that global warming was always-already human *and* natural, which is to Say that *we have never been modern*, or separate from nature. This, if anything, is what the Anthropocene, and its many variants, are meant to convey. But can this idea truly prepare us for what might lie ahead?

Although many are struggling to see an end to the bloody conflict in Syria, some have sought to understand its origins, and climate change is a key suspect. According to a study published in the *Proceedings of the National Academy of Sciences of the United States of America*, 'the conflict in Syria shows an impact of an extreme climate event in the context of government failure, exacerbated by the singular circumstance of the large influx of Iraqi refugees. Multiyear droughts occur periodically in the [Fertile Crescent] due to natural causes, but it is unlikely that the recent drought would have been as extreme absent the century-long drying trend.' Although some, notably Canadian journalist Gwynne Dyer, believe that climate wars are likely in the years ahead, the recent escalation of refugees into Europe, primarily from Syria and Libya, signals that extreme weirding is having and will continue to have mortal consequences [8]. While there is plenty to be concerned about now, many think the worst is yet to come, although it is hard to ignore the extreme weirding happening all around us.

Ground zero for extreme weirding in the United States is California. The state's motto is Eureka, which harkens back to its gold rush days. This exclamatory phrase translates as 'I have found it!' and is linked to the Greek inventor, Archimedes, who is said to have uttered the phrase upon making a great discovery. Unfortunately, all that California has discovered is how extremely weird the world has become. At present, 97% of the state 'is experiencing some degree of drought,' and the area has seen such little precipitation that the Sierra Nevada snowpack is at its lowest point in '500 years.' Conditions are perfect for forest fires, and the state's governor recent declared a state of emergency after a mega-fire burned '50,000 acres' in the northern part of the state. While many residents might welcome a record storm, scientists predict that the beleaguered state will face one of the strongest El Nino events on record. Driven by warm ocean temperatures, which are a direct consequence of climate change, the impacts of a 'Godzilla

El Nino' might be nothing short of catastrophic as flooding and landslides are certain to wreak havoc on already stressed response systems. As California's GDP is over \$2 trillion, which puts it just ahead of Brazil, the effects of a massive El Nino event are sure to have global consequences.

The extreme weirding brought about by climate change has led some to consider radical 'solutions,' which remain speculative and host a range of uncertainties. While some believe that the only way humanity might abate extreme weirding is through climate modification initiatives, others have turned to consider more confined, yet equally contentious, 'remedies.' In 2012, Mathew Liao et al, a group of scientists from Oxford and New York Universities, published an article, 'Human Engineering and Climate Change,' in *Ethics, Policy, & Environment* to much fanfare. Arguing that 'the biomedical modification of humans' should be on the table in the light of the extreme weirding to come, the authors suggest that enhancing empathy, fostering a pharmacological intolerance to carbon-intensive products like red meat, and engineering shorter people are reasonable and, perhaps, less risky than large-scale climate engineering initiatives [9]. Although Liao and his colleagues make it clear that they do *not* advocate involuntary human engineering as a course of action, they are firm in their conviction that wilful bioengineering initiatives should be 'considered and explored further,' especially as this course of action 'could make behavioural and market solutions more likely to succeed.' While humans have always experimented upon themselves, if only as a result of technological innovation, intentional biophysical modification as a means to mitigate climate change represents an extremely weird response to a daunting challenge. Extreme leading to more extreme!

In a world overcome by extreme weirding, humans might not only have to worry about novel threats but also dangers from the past that are expected to resurface as the global climate system goes postnormal. This dynamic is most apparent in the tundra region where permafrost traps the things of nightmares. The 2003 discovery of a giant virus, which is still microscopic, startled the scientific community, and while scientists are confident that none of what has been found so far poses any 'threat to humans or animals,' the same scientists concede the possibility that 'dangerous viruses do lurk in suspended animation deep belowground' as the prehistoric permafrost creates conditions whereby infectivity endures. Although such a scenario comes off sounding like science fiction, the effects of extreme weirding cannot be underestimated or resigned to whimsy. This, if anything, is what the Anthropocene—as an epoch of extreme weirding—can and might teach us: the unthinkable is increasingly becoming the unavoidable.

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EAST-WEST IN POSTNORMAL TIMES

Ziauddin Sardar

**OH, EAST IS EAST, AND WEST IS WEST,
AND NEVER THE TWAIN SHALL MEET,
TILL EARTH AND SKY STAND PRESENTLY
AT GOD'S GREAT JUDGMENT SEAT.**

When Rudyard Kipling wrote these lines in 'The Ballad of East and West' [1], they were applauded and became a raging success because they expressed precisely how the world was viewed in the heyday of Empire. Unfortunately, mental structures long outlast the work of human hands. Ideas conquer more territory and maintain more authority than all the armies of the Queen Empress eulogized by Kipling, who was deeply ambivalent about his own origins in the East as an Anglo-Indian. Despite the evidence of history, politics, economy and culture, Kipling's simplistic dictum still remains the preferred approach to understanding the world.

What is just so about Kipling's lines is not its beginning. East and West are different, and the differences are substantive and of enduring import. Civilization, culture and the experience of history distinguish discrete diversity that makes the East eastern and the West western. The wrongheadedness comes in the conclusion 'and never the twain shall meet', at least not till Judgment Day! It is in the conclusion that the power and authority, the potency of simple binary opposition resides. It is not because the East and the West are genuinely different that there is a problem. The problem arises because difference is taken to be an unbridgeable gap: 'never the twain shall meet'. Difference has the force of a negative value. What is encoded by this negative value is the basis for fear, doubt of the other, perpetual insecurity and prejudice. In operation, the negative value becomes an active value judgment,

a ranking principle. In such simple oppositions the other pole must be inferior, inimical to 'our' wellbeing, otherwise differences would be surmountable, and there would be no threat. Thus unbridgeable difference becomes the doctrine of maintaining distance, keeping oneself pure, and ensuring that two sides never actually meet. The formula fulfils its own prediction and sustains the manipulation of power and authority on both sides to maintain an implacable eternal opposition. The truth of the premise, East is East and West is West, taken uncritically at face value, substantiating the implications and construction of meaning placed on evident differences.

Even though Kipling was mistaken at the outset, partial in his premise, and wholly wrong in his conclusion, his reward has been the staying power of his simplistic dictum. The dissipation of the simple binary opposition of superpower rivalry, the end of 'the evil empire' of Communism, provided the occasion for Kipling's much older, more instinctive opposition to return with a vengeance to rescue business, politics, history and everything from the horrendous prospect of thinking through a new perspective. We have had the 'end of history', where Western liberalism was declared undisputed victor and 'clash of civilizations', where the West was up against all the other civilizations of the world. The speed with which Communism died and the Samuel Huntington's thesis of 'clash of civilizations' emerged and became the centre point that constructed how we debate the future is truly astonishing. An impeccable proponent of the Cold War ethos of relentless opposition, Huntingdon analyzed the post-Communist future within exactly the same framework. The fault lines of future opposition, which was inevitable, essential and not be questioned, would be seven 'civilizations' he identified as opponents of the West: Confucian, Japanese, Islamic, Hindu, Slavic-Orthodox, Latin American and 'possibly' African [2]. The essential point is that what stimulates these fault lines are exactly Kipling's dictum and its old familiar oppositions. 'Civilizations' is an evocative archaic sounding expression for the operative reality: inimical, unbridgeable difference. Not all the panoply of nation states, development, globalisation and ingested modernity can disguise the ultimate reality, and only meaningful point, that the rest of the world is different and will therefore act and contend with the West in the old familiar way. Whatever we think of the clash of civilizations thesis it become pervasive because it represents so accurately how the past, present and future are conceived. The sentiments its substitutes for reason were at work before Huntington propounded them as a theory of international relations.

THE EAST, IN ALL ITS COMPLEXITY, CONTINUES TO BE SEEN AS THE PROVIDER OF A BASIC SERVICE TO THE WEST: THE PROVISION OF 'BOGEY MEN' AND VILLAINS; BARBARIAN HORDES MARCHING TOWARDS OUR BORDERS AS 'IMMIGRANTS' AND 'ILLEGALS'; MUSLIMS OUT TO TERRORIZE US; OLD AND NEW VILLAINS THAT MATCH THE VILLAINS OF COMMUNISM, FROM PUTIN'S RUSSIA TO A THREATENING CHINA. SO IT WAS, AND IT REMAINS JUST SO.

But time has now come for us to transcend this pernicious binary logic. To talk about a neat division between East and West in a globalised, diverse, interdependent world of common problems and shared human destiny is dangerous and absurd. The boundaries and dividing lines of East and West have not only changed but have become blurred and indistinguishable. There is as much East in the West as there is West in the East. The West cannot continue to perceive the East as inalienably different; the classic tirade against the West that promotes the innocence and vaunts the superiority of the East is meaningless. The potency of the ideas that impelled western imperialism is alive and well and operated by the East within itself, by itself.

Searching out the original miscreant and apportioning blame is a way of continuing the game of implacable opposition, and, thereby, keeping all its necessities – suspicion, military preparedness, manipulation of public opinion, double standards and neglect of pressing human needs – in place. The East has been complicit in the perpetuation of the ethos of binary oppositions. The more the East has unquestioningly sought to appropriate the means of the West, to become modern in an uncritical, slavish manner, the more it demands to be seen as different, the more it has romanticized the superior perfections of its own traditions and values. But no matter how bad things get the East has an immediate escape clause, thanks to the prevailing Kiplingesque understanding of the world. Condemnation of the West for its acts of commission (colonialism, neo-imperialism, political and economic dominance) and omission (failure to understand or appreciate and implacable opposition to the worth of Eastern values and ideas) suffices. It covers all contingencies with complacency and avoids the East's need to examine its own internal shortcomings. East is East and West is West serves everyone.

In as much as East and West are human products – human societies, human cultures, human civilizations, human categories of thought – they are both endowed with goodness and evil. No society is purely evil – that would make it an impossible proposition. But neither is any society totally good – that would make it angelic, not human. Any attempt to move from binary oppositions must take into account the goodness in East and West as well as the evils within both. Only by acknowledging there is no-one with clean hands can we accept that we all have to find new ways of washing away the grime of our own imperfections, both East and West. To make sense of what is wrong in our world we must make visible what is identical and unacceptable in both the West and the East, what is good and wholesome wherever it is found on the planet.

A globalised world is a world in which everyone has problems, and no society has all the answers. We have to learn from each other – whoever 'we' are. The differences between East and West are not unbridgeable; they have been made so by the perversity of human understanding. We have to create a mutually comprehensible language in which to explore how analogous principles and shared values inform the diversity of our systems of thought and social organization. This is difficult territory. Nevertheless there are values, principles, imperatives, reflexes for justice, equity, tolerance, the right to individual liberty and responsibility to community and much else in each and every evidently different society, people and civilization. We need a language that focuses on these similarities and brings them to the fore. We have to be able to think our way forward to the realization that East is East and West is West and that is the last best hope for everyone East and West. Unless we can embrace the possibilities of truly plural futures we have to resign ourselves to the despairing conclusion that contemporary problems have no solution, East or West, but are just so.

The need to bring East and West together becomes even more urgent when we consider the truly global nature of many problems that beset us – from climate change, threat of pandemics, increasing competition for energy to growing political and financial instability and increasing inequality. None of these problems can be 'fixed' by individual states; and they affect every person on the planet. And they are not simple: there is nothing simple about fixing the economy, or securing our energy supplies, or fighting pandemics or ensuring our security or even doing something positive about climate change that in 2012 alone brought floods to Manila and drought to several states in the us. These are complex problems; indeed, almost everything we have to deal with nowadays is complex. Complexity is enhanced by the fact that all our problems are interconnected, occur simultaneously, are global in nature and subject to a rapid pace of change.

There is another added dimension. Complex, interconnected problems often lead to chaos. Chaotic behaviour is evident not just in the markets and our financial institutions but also in our social, individual and institutional activities. Thanks to mobile phones, blogs, e-mails, and 24-hour news media, we are constantly in the know. We are thus primed to react instantly, equipped with the means to set off new patterns of chain reactions. Things multiply quickly and change occurs in geometric proportion. Thus small perturbations rapidly acquire global proportions. The behaviour of a handful of unscrupulous bankers can lead to financial collapse. A vegetable vendor can start a freedom and democracy movement, what came to be known as the 'Arab Spring'.

When complexity and chaos combine with accelerating change the only definite outcome is uncertainty. The first decades of the twenty-first century have made it abundantly clear that we are living in a period of uncertainty, rapid change, ambiguity, upheaval and realignment of power. It is a time when old orthodoxies are dying, new ones have yet to be born, very few things seem to make sense, and there is little out there that can be trusted or gives us confidence. Elsewhere, I have characterised this period as 'postnormal times', an in-between era where nothing which we conventionally took as normal makes sense.

What is so different about post-normal times?

In normal times, a generalised acceptance of the existing distribution of power and the hierarchy of interests is maintained. Normal times are not without dissent or dissatisfaction but change is overwhelmingly accepted as working through and with the way things are. The social compact that holds society together is the acceptance that the vested interests and power holders care for the common good. Therefore, the powers that be and the hierarchical order of things are the basis from which a better future is envisioned and the premise on which we direct our efforts to realise the future. In normal times, a rich mythology underpins popular understanding and support for society, science and economy. There are caveats, escape clauses which allow for imperfections in the systems that govern our lives. But the caveats do not undermine collective belief in and acceptance of our institutions: intellectual, academic, political, social and cultural. Heroic science, the will of the people heroically translated into laws and good governance, prudence and probity as the routine principles governing economy and government, instil confidence in the present and hope for the future. If things are not right or even far from perfect we remain convinced we have the means, capability and collective intent to make them not merely work but work better. The mythological underpinnings also create the most sought after luxury of normal times:

time. Things may be interconnected but there is confidence that problems are not immediate, there is always time to solve them. Problems could be dealt with in an ordered episodic progression where knock on and even unforeseen consequences would be managed sensibly. In normal times we believe or at least accept the ability of the institutions of society – politics and governance, science and economy, financial organisations and social relations, health and welfare – to generate solutions. This is what institutions are for: solving problems to sustain the society they represent. The system may be imperfect, but it has the ability to rectify problems and contain its abnormalities within its competence.

In postnormal times it is the institutions, the system itself which constitute the problem. Moreover, there is no luxury of time: problems need immediate and urgent attention, and even as we attempt to solve them they entangle themselves into a complex web, and multiply rapidly, concurrently and dangerously. All that we took for granted seems to evaporate and cannot be trusted to deliver what it supposed to deliver. The emperors in whom we placed confidence – scientists, economists, accountants, bankers, politicians; governments, markets, financial institutions, drug companies, technology giants – are seen to have no clothes. It is not that we ever saw the foundations of our societies as perfect. Rather, it is the realisation that these foundations are perilously shaky, unable to resolve the enduring imperfections of our world order, and can in fact lead society towards a potential collapse. The entire system is geared to disproportionately rewarding the few at the expense of the majority. The selfish self-interests of power and the powerful are revealed as the only mechanism that works and the reality on which everyone is dependent. Control and management become the grand illusions. All overarching explanations, the mythology that bound and made society viable, become toxic, the bearers of pathogens that infect society with distrust and lack of confidence. In postnormal times we know we have abilities but not the systemic, ethical and organisational capacity to translate our abilities into providing sustainable solutions to our endemic, interrelated and proliferating problems. In normal times, uncertainties are small and manageable. But in postnormal times, uncertainty takes centre stage. Since everything is interconnected, complex and chaotic, and changing rapidly, nothing can actually be described with any certainty. Moreover, given the complexity of the increasing web of problems and the rate of change, we are unable to relate our present predicament to any past. We are thus unable to learn from anything from the past, even when we know there have been comparable systemic failures in history.

It is clear that the predicaments of postnormal times cannot be resolved with existing tools. They require new modes of thinking and new way of doing

things, East and West. There are, however, lessons to be learned from the dominant characteristics of postnormal times itself. Complexity tells us that the notions of control and certainty are becoming obsolete. There is no single model of behaviour, mode of thought, or method that can provide an answer to all our interconnected, complex ills. The 'free market' is as much a mirage as the suggestion that science and technology, or liberal secularism, or religious fundamentalism, will rescue us from the current impasse. It is thus foolish to place our faith in a single ideology or a monolithic notion of truth. Diversity and plurality are essential both to understand and deal with complexity. Chaos teaches us that individual and social responsibility and accountability are all paramount for our collective survival. The actions of any individual or group, from unscrupulous bankers to a neglectful social worker, can cause serious instability and upheaval. On the other hand, individualism, the notion that an individual can fulfil himself and do anything he or she wishes, is a recipe for catastrophe. In post-normal times, the world can really be laid to waste by the actions of a few individuals.

When chaos and complexity come together, often the end product is contradictions. One year London is ablaze with riots and multiculturalism is declared to be an unmitigated disaster; the next year multiculturalism is hailed as a great success as the city celebrates its diversity and Olympic triumphs. India is supposedly an economic superpower, yet vast majority of its population lives in abject poverty. As societies become more diverse and plural, large segments of national populations become more and more nationalistic, fundamentalist and narrow minded. While certain segments of the globe are experiencing unprecedented change – information technology doubles its power every year, our capacity to sequence genetic data doubles every year – large segments of the planet and swathes of our social life are quasi-static. While technology forces us to work faster and quicker, the speed of air travel, since the demise of Concorde, has actually slowed. While billionaires and millionaires have increased throughout the world, grinding poverty in Africa is as bad as in colonial times – if not worse for many. In a world of superabundant food, around 850 million still go to bed hungry every night. While our knowledge increases by leaps and bounds in almost all spheres, our ignorance of other cultures is pitiful.

Not all the obvious contradictions around us are a product of postnormal times. But postnormal times have brought specific types of contradictions to the fore. Take ignorance. Many contemporary problems, such as tackling global epidemics, effect of GM foods and nano materials, have an in-built uncertainty that can only be resolved sometime in the future. We therefore remain ignorant of their consequences in the present and the near future. Rapid change in an

uncertain environment also means we remain ignorant of alternatives and the chance of gaining new knowledge is lost. Ignorance is not soluble by means of ordinary research; we therefore have no notion of its existence. We are thus hit by a triple whammy of ignorance. We need to negotiate the future in a state of constant uncertainty, and if not in total ignorance, then at least with only partial or inadequate knowledge. Consider innovation. We imagine that new and innovative products are being constantly produced as technology moves forward with leaps and bounds. In fact, innovations have radically slowed since 1970, as Tyler Cowen points out in *The Great Stagnation*. Most 'new and improved' products, from consumer electronics to supermarket goods, are not real innovations but minor tweaks. Some 85–90 per cent of new drugs are anything but new: they are minor alterations to existing drugs with virtually no clinical advantage [3]. Innovations have now been replaced with rent-seeking as Joseph Stigletz shows so brilliantly in *The Price of Inequality*. In fact, rent-seeking has now become the norm as it delivers far greater profits for big business and benefits for executives than socially beneficial innovations [4].

Contradictions too have lessons for us. They focus our gaze towards what Amin Maalouf calls the threshold of 'moral incompetence'. The stark contradictions of our economic and financial system, the modus operandi of drug industry and corporations, the behaviour of politicians, and so on are essentially issues of ethics and morality that we have long ignored [5]. In postmodern times, old fashioned ethics move from the periphery to the centre. Contradictions also teach us to accept and appreciate different perspectives. There is no right or wrong answer to any given problem. Even a very basic understanding of a problem requires a dialogue on its various dimensions, involving a whole range of perspectives and interests including those of experts, citizens, adults as well as children, people of different social and cultural backgrounds, different ethical notions, and even consideration of the needs of non-human species. Contradictions cannot be resolved, they have to be transcended. That means we need to put our differences aside, East and West, and manage contradictions and complexity through negotiated consensual dialogue, where all participants are given equal voice. There are no violent means to resolve contradictions or dealing with complexity. Violence only adds further complexity – and takes us even closer to the edge of chaos, as demonstrated so well by Afghanistan and Pakistan. Military action to remove a perceived threat only generates more chaos, leading to further new and unseen threats.

Humility, modesty, accountability, responsibility, diversity, and dialogue are not added extras but an essential requirement for surviving postnormal times of uncertainty, chaos, complexity and contradictions. There is no place

in postmodern times for Kipling's simplistic dictum of East and West as two fuming bulls in a boxing ring. Rather, East and West have to come together and employ the best that their tradition, history and societies have to offer to negotiate our turbulent times with our sanity and humanity intact.

Both East and West, there are more ways of thinking, principles for defining inquiry, shaping theory and informing understanding, than we have ever imagined. To get beyond the impasse of the just so predicament of our times we need new questions and new insights before we can hope to have new, better answers.

This is the explorative journey that we need to undertake.

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EUROPEAN UNION'S CONTRADICTIONS

Jordi Serra

A spectre is haunting the European Union (EU) — the spectre of its own contradictions. These contradictions suggest that the EU is turning into a truly postnormal institution. They also indicate that it is heading towards irrelevance. The contradictions are a product of the EU's economic policies, the main driving force that shaped the Union. But it is its political, social and even cultural dimensions that will ensure its significance in the future.

It is easy to imagine the context of post-World War II Europe that witnessed the creation of the 'European Coal and Steel Community' and the 'European Economic Community' in 1957, two institutions that were the seed of the EU. There can be little doubt that, back then, it was a remarkable achievement that six countries that had been enemies until recently (Belgium, France, Italy, Luxembourg, the Netherlands, and West Germany), agreed to establish a customs union and some shared economic policies. Surely, back then, starting with economic questions made it easier, but the fuel to keep it going and to enlarge that seminal project had to combine political will and social progress.

Or so it seemed until 2004. During that year the members had to ratify the European constitution. However, the negative results in the French and the Dutch referendums brought the process to a premature end. It is pertinent to examine why it happened. The evolution of the EU was founded over a multiplicity of treaties, three being the main ones: the Treaty on the Functioning of the European Union, the Treaty Establishing the European Economic Community (both signed in Rome in 1958) and the Treaty on European Union (signed in Maastricht in 1992). By 2001 it was clear that the Union needed a qualitative step forward and thus at the Laeken European Council it was agreed to draft a European constitution. The aim was to unify the diverse legislation and to galvanize its political momentum. Yet the commission to write it, chaired by former French President Valéry Giscard d'Estaing, soon encountered serious limitations. Perhaps it was the result of having a representative of the most statist country leading the process, but the

fact is that what should have been the foundation of a truly supra-state entity became the blueprint of a state-only members club.

Thus the European constitution emerged as the first contradiction ailing the EU: it falls too short as an international body and it goes too far as a state club. Bluntly put, too often the EU lacks the muscle to deploy joint policies, but the states also frequently lack enough influence to defend its specific interests. We could sum it up by saying that frequently the members want the EU policies to protect their interest regardless of any general perspective (or, more precisely, at the expense of any joint policy). As a result, many policies are not ambitious or brave enough to tackle the deep issues affecting Europe. And that explains why European policies are always muddled, have to muddle through minimum compromises, and never actually fulfil anything positive that satisfies the majority of the Union citizens.

Nevertheless, the EU was seen as an example of successful international governance; at least, until the 2008 crisis came along. The specificity of this crisis is that it is systemic and global. On the whole, the financial meltdown presented both a challenge and an opportunity for the EU. But the challenge was not taken up, and the opportunity was missed. If we accept that the main cause of the crisis was the persistence of an economic model that is unsuited for requirements and needs of postnormal times, then it begins to be clear why it could have been a great opportunity to reform the design of the European Union. Instead, the European members have decided to bet on solutions that were already part of the problem. Austerity is the key word here; yet, now that we know that the economic foundation of legitimate austerity is questionable, to say the least, we have to come to terms with the fact that it is just a political option. And political options are open to debate, to explorations of pros and cons, and need a collectively consensus to arrive at a better and available alternative. Instead the European institutions embraced austerity with the faith of new converts and told the people of continent to accept it without question or be doomed.

Paradoxically, the severe budget cuts look like the most consistent solution given the constraints of the European design. For instance, European economic policy revolves around the Euro which places severe conditions and limitations on the EU's options. The Euro was defined in 1995, enacted in 1999, and turned into usable coins and banknotes in 2002. At that time it epitomized the political push to attain a higher level of integration, a common currency for a stronger Union; unfortunately it has also become a metaphor for a lack of political will. The Euro was and is insufficient to generate a joint economic policy and without a joint policy it is doomed; indeed, the Euro was born deprived of the necessary conditions for its true success. We can say

the same about the European Central Bank: the ECB. The ECB cannot really act like a central bank such as the American Federal Reserve or the Bank of England. The conditions Germany imposed on the ECB were that it could only act to keep inflation at a low level and it would be specifically prohibited from lending money to state members (although this particular aspect was ameliorated in 2012 when ECB started to buy state members sovereign debt). However, in many respects, the ECB still looks like a blood bank run by the Jehovah's witnesses.

Thus the Euro suffers from two severe weaknesses. First, it defines a common currency for countries with deeply divergent economic conditions and dynamics. Second, its management is in the hands of an institution, the ECB, which is totally independent from state control. Not surprisingly, and understandably, some countries (Denmark, Sweden and the United Kingdom) foresaw that the costs of joining the Euro exceed its benefits. The financial crisis has revealed that the Euro-emperor is naked. Unlike the USA and the UK where the central banks have been able to dodge some of the worse effects of the recession, the ECB has only been able to offer cheap money to European private banks in the hope that these banks would help their national states. But what have these banks done? Until the ECB started buying state's sovereign debt directly, they were using the ECB money (at an interest rate of 1% or less since 2011) to buy sovereign debt (at a much higher rate) and making neat profits in the process. In any case, to reduce their sovereign debt, EU states could only do one thing: cut their budget expenditures. Ultimately, austerity has been more an attempt to provide a dubious moral foundation for budget cuts than a real economic argument.

THE OBSESSION WITH AUSTERITY HAS LED TO THE EMERGENCE OF A SECOND CONTRADICTION: CAPITAL COMES BEFORE PEOPLE. IT MAY BE HARD FOR MEMBERS OF THE EU TO REACH AGREEMENTS, BUT THERE IS ONE DETACHED EXCEPTION: THEY COME TOGETHER INSTANTLY TO PROTECT BANKS.

The EU has poured millions into a programme to ensure the viability of the financial systems, but very few of them have been lending to struggling businesses or hard-pressed mortgage dependent individuals. Still, let us not

forget that the source of this funding (including direct injections and cheap loans from the ECB) is public money, money that comes from citizen's taxes and ultimately from the pockets of everyone in the Union. The rationale has been that the fall of the banks would have had a systemic effect that would have worsened the crisis and extended its effects. The tragedy is that the crisis was a great opportunity to rethink the European financial system. Of course, there would have been objections that such a reform could cause more hardships and sufferings for the citizens. But I bet that, right now, many Greeks, Irish, Portuguese, Italians and Spaniards would take that risk without hesitation. Not only that, given the context and all the effort put in strengthening the European banking system, its logical conclusion would have been to set up a joint banking policy and joint financial system. But no such luck. Some member states, led by Germany, have prevented any meaningful talk of reform and alternatives from emerging. The system serves a select few who are making truckloads of money while many have fallen into structural poverty.

The end product of the EU's attempts to navigate the financial crises has produced a deep fracture within its boundaries, generating more contradictions. Currently, there are first class and second class citizens within the Union; that is, people from rescued countries (the second class) *versus* the rescuing ones (first class). The bailout mechanism has been a severe test for EU cohesion: the Northern countries accuse the southern ones of being careless with their expenditure; the southern ones shout back that the Northern countries have also benefited from that expenditure and that some of them have also needed, and got, help in the past – as, for instance, in the cast of the German reunification process. However, it would be unfair to say that the fracture is between citizens of Northern state versus the Southern ones. The real division, in fact, within all and each country is between those who are doing well and those who are not. Germany is a perfect example: while its macro figures are positive, the truth is that many of its citizens are surviving on menial jobs that can barely sustain them. More and more Europeans are coming to terms with the certainty that their children and grandchildren may never achieve the welfare level they have enjoyed. Again, it is difficult to escape the conclusion that the original design of EU favoured those who possess capital over those who rely on their intellectual or physical labour for survival. Which, in turn, reinforces the notion that there is a growing contradiction between the economic goals and social concerns within the EU.

Globally, the bailout has revealed just how fragile the fabric of the European Union is. But within the Union, the bailout has reinforced the perception that the EU favours economic stability over democratic legitimacy. Consider the case of Italy. Many things can be said about the shambolic government led by

Silvio Berlusconi; and I will be the last person to defend him. But Berlusconi was democratically elected, with an ample majority. Yet, the EU blessed the appointment of a technical government that wasn't elected; indeed, it was overwhelmingly rejected by the Italian voters. The Cyprus crisis provides another example. When the Cyprian government requested a bailout from the European Stability Mechanism on 2012, the original European proposal was to impose a levy in all deposits and bank accounts (contradicting its own legislation that guarantees all deposits to a maximum of 100.000 €) and, in order to prevent a bank run, a 'corralito' was established. The term 'corralito' was coined in Argentina in 2001 when the government froze all bank accounts and prohibited withdrawals in order to avoid a bank run. Thus, Cyprian citizens were prevented from accessing their savings and deposits. Even when the Cyprian parliament rejected the proposal, the 'corralito' was maintained. As resentment grew in Cyprus (as well as fear amongst most European savers), it was finally decided to forsake accounts under 100,000 € and charge deposits over that figure with a levy no lesser than 20% of the total amount (it could have been up to 60% in some cases). This is not democracy as understood by anyone but economic authoritarianism of the worse kind. Again, it tells us that some citizens of the EU are more equal than others.

So what's the bottom line? The EU has to make a transcendent decision. Is it a union based on the logic of late capitalism or something else? Is its purpose to unite its citizen, promote flow of people and labour between European states, bring the people of Europe closer, celebrate their intellectual and cultural histories, or enrich its bankers and financial institutions? The EU has to address some deep, core issues. At the very least, the European Community has to ask, is it:

- A market?
- A currency?
- An unfinished project on supra-state governance?
- All of the above?

The future of the EU and its relevance in the postnormal age depends on the answer.

I would argue that limiting the EU to its economic dimension, or, even worse, letting economic logic dictate how it functions, is a great mistake. Europe has always been a tapestry of territories, peoples, cultures and all sorts of allegiances; it has never operated in harmony (actually, warfare has been the norm in European history), and it can hardly be considered as a homogenised unit by any stretch of the imagination. So it should come as no surprise that it

is so (damn) complicated to make it work as a unit. But even when it is made to work as an economic unit, economic features do not really reflect the real essence of the EU. As a coherent union, its real success lies elsewhere.

Two examples come particularly to mind: rights and environmental protection. If we consider the normative corpus of the EU, the so-called 'Community acquis', we can acknowledge that it is a remarkable compendium of rights that perhaps define the most democratic region in the world. Consider, for example, the issue of human rights: European citizens are invested with rights that people from other parts of the World can only dream of. The fact is that the European Union is one of main actors in promoting human rights; more to the point, these rights has been one of the main criteria when judging the adequacy of any new state member to join the Union. Moreover, the role of the European Court has been decisive in upholding and defending those rights. When a country has been careless in safeguarding human rights, the citizens know that there is a higher authority where they can finally obtain justice. Indeed, many member states with a lax attitude towards the application of human rights, such as the UK, bear witness that the European Court of Human Rights has been a scourge for them. The same can be said about the environment. The EU has developed one of the most advanced legislation on environmental questions. Granted that some may object that it is too shy or short-sighted, others would argue that it does not go far enough. But it is also true that a majority of the member state members would have done a lot less without EU directives. Not only that, European commission reports on subjects such as health, education, gender equality, labour conditions, and minority rights have forced several states to move forward in their respective legislations to conform to EU principles.

But these genuine achievements are often overlooked due to over emphasis on the economy which swamps and rumps everything.

I would argue that most citizens of the EU now realise, explicitly or implicitly, that it has reached a turning point.

THE TEMPTATION OF THE LEADING ELITE IS TO TINKER WITH THE EDGES TO KEEP ALL THE REST UNTOUCHED, IN OTHER WORDS, TO KEEP BUSINESS AS USUAL. BUT THIS OPTION IS NOW DANGEROUSLY OBSOLETE.

The EU needs to deepen its political process to become a truly transnational entity – not just a super-state but it has to produce a new innovative design and structure of international governance. Some of its member states present a major obstacle to this goal; they are part of the problem not of the solution. Some are too powerful and thwart meaningful changes; others are too weak to initiate and make change happen. States also blur the perception of the citizens making them feel that their interests can only be protected and defended by their own nation state; and, therefore, prevent a more direct connection between the European institutions and their citizenship.

The European elections in 2014 were the first sign. With far-right parties on the rise, the parliament accommodated the highest percentage of anti-Europe representatives in its history. The problem here is that, beyond the demagogy, the message of these parties included some grains of truth: there is a problem with the EU, it is too overloaded with contradictions, too complex, unable to adjust to rapid change, and is thus just not working. In other words, it is out of sync with postnormal times. For the right (and far-right) wing parties the solution is less EU, for other the only logical alternative is just the opposite: more EU.

Yet, the events in 2015 proved both sides right and wrong. During that summer a combination of factors provoked one of the greatest human migrations in Europe. Millions of refugees, from Syria and other countries started to get into Europe through Greece and the Balkans. Since they were escaping from a terrible (and worsening) situation, few rejected them openly at the beginning. But as the numbers escalated, objections grew as well. Very few countries rose to the challenge of accepting and hosting the refugees, most just closed their borders, some even build barbed wire fences around them. The internal contradictions of EU burst out into the open. The worse face of the Union came to the fore: rampant hypocrisy and bigotry. Some member states, such as Hungary, Slovakia, and Poland openly defied European agreements, not to mention its own human rights principles. The management of this humanitarian crisis has been a source of shame for many Europeans ever since. Whatever moral standpoint the EU might have had has been lost. All and all, I would argue that the EU, as a project of transnational cooperation, is dead. Nowadays, very few people feel that the EU serves their interest or needs; and it is no wonder that most consider that there is nothing in the Union for them. Brexit, a major wakeup call for European authorities, is an eloquent proof of this if nothing else. Now, many officers in Brussels wonder in awe why so many British believed that the EU is more a deterrent than an incentive to their prosperity and wellbeing. And the truth is that, up to a point, it does not matter if they voted for Brexit for the wrong reasons. The fact remains: many

European citizens are convinced that the EU is just a bureaucratic structure willing to favour economic powers over ordinary people and, even worse, will force them to accept newcomers from other countries. The British are just the first ones to voice their grievances and act accordingly; they may not be the last.

So the option now is either to take the EU to a civilized and dignified end, or for it to transcend its contradictions, and navigate postnormal times with insight and anticipation. The second option requires that at least three conditions are fulfilled. First, the awareness of the people about the importance of regional dimension in a progressively interconnected, complex and chaotic world has to be improved. Political and economic power is increasingly shifting towards a network of nations, and away from individual states (unless, of course, you are a superpower). Second, the EU needs a new design fit for postnormal times that takes into account both the economic wellbeing of its entire people as well as its governance structure – a system that puts people before capital. Third, the European Union is in urgent need of new leadership. In postnormal times, ethics plays a very important part – indeed, sometimes it is the only compass that we can use to navigate turbulent times. The current leadership, as is all too evident, is ethically bankrupt. To survive the future, the EU needs a new generation of leaders able to navigate postnormal times, devoted to the wellbeing of all European citizens, and inculcate a genuine sense of belonging.

Perhaps this is too much to ask. But who said transcending contradictions is going to be easy?

POSTNORMAL AMERICA AT THE MOVIES

C Scott Jordan

At moments of key transformation, American cinema has used Others, internal and external, to measure itself against. The pre-war classics, *The Jazz Singer* (1927) and *Gone with the Wind* (1939) used African-American characters. Post-World War II cinema was haunted by the spectre of communism: *I Married a Communist* (1949) and *Invasion of The Body Snatchers* (1956) are just two of many examples. Orientalist imagery came to the vogue in the 1960s and 1970s, before the 'Arab terrorist' emerged as a full blown ever-present menace in such movies as *True Lies* (1994) and *Executive Decision* (1996) [1]. There has been a slight shift during the last decade: the fear of the Other has now replaced the fear of our times: the fear of climate change (*Waterworld* (1995), *The Day After Tomorrow* (2004)) [2]; the panic about financial crisis (*Inside Job* (2010), *Wall Street: Money Never Sleeps* (2010), *The Big Short* (2015)); the anxiety about the internet and WikiLeaks (*The Fifth Estate* (2013), *Mr Robot* (2015)); and the apprehension about automation, artificial intelligence and cloning (*Ex Machina* (2015), *Her* (2013), Channel 4's *Humans* (2015), HBO's *Westworld* (2016)). Given that film and television often reflect the zeitgeist, it is not surprising that this new crop deals with various aspects of postmodern times.

I would like to discuss two films that I think reflect the contradictions, complexity and chaos of postnormal America: Clint Eastwood's *American Sniper* (2014) and Alejandro Gonzáles Iñárritu's *The Revenant* (2015). Ostensibly, they appear to have little or no relation to postnormal times. But we can derive metaphors [3] – which may not be immediately obvious – that shed considerable light on America's internal fears, ignorant angsts, and its apprehension of uncertainties.

American Sniper is loosely based on the book by the same name that gives us the story of the late Navy SEAL, Chris Kyle – a man who became famous for killing people. When I think of other such Americans, I think of Timothy McVeigh or Charles Manson, yet this man has been made into an iconic celebrity. An American hero. By his own account, 'The Autobiography of the

Most Lethal Sniper in U.S. History' [4], he is your average American, born in Texas, simplistic, and a good friend. He came from your typical *Leave It To Beaver* style family and dreamed of being a cowboy. The *Autobiography* is 377 pages of remorseless arrogance with a soupçon of love letters to his departed fellow American troops. The film is more nuanced and gives us the development of a character in contrast, the book, from its first sentences, reveals a monstrous product of the American mind. There is no development, the damage is done. The training is complete, his humanity striped. One is amazed at how good a distance shot he was when one doubts this individual had the ability to see beyond a mirror to discover what else exists in this world. His volunteering after his tours of duty, that gives him the impression of being a real hero, is only a minor end note to the book and appears more as a distraction or something other to do than war. War and killing were his only problem solving mechanism. Tragically, he met his end at the hands of another twisted mental product of contemporary America. The vicious cycle goes on.

Clint Eastwood's film takes this tragic American alloy and turns his story into a surreal metaphor for postnormal America. Much of the film has the all too familiar feel of your prototypical dystopian post-9/11 American war flick. It opens with your cliché American troop caravan moving through a generic Middle Eastern 'urban warzone'. A background, not to down play its significance, story developed that even gave one the feel of a Robert Ludlum cat-and-mouse suspense. The audience is also given a tasteful broad brush stroke approach to post-traumatic stress disorder (PTSD) and naïve youth's loss of innocence to modern warfare. As the film progresses a deep significance is revealed.

Bradley Cooper portrays Chris Kyle, our sniper. The film plays with the idea of Kyle's legacy. By its conclusion, he remains, at the very least, a metaphor for the good ole U. S. of A. A metaphor of what the United States has become since its rise to global dominance, leaving the audience with a choice as to the trajectory of the future course. We meet a young Kyle in an America long tarnished by recent history. His father has taken him for his first kill, a buck. A prodigy is born, as he sets his gun aside to bask in its glory, but his father is quick to scold him for he is never to leave his gun in the dirt. We see him save his younger brother from a bully as his father gives us the good old romanticized idea of a world where there are the meagre, the predators, and then, a superior being, the guardian. He loves Texas, he loves guns, and he wants to be a cowboy. More importantly he has the classic American, preternatural sense of justice. Bullies must always be finished. The father uses an interesting choice of words for his children's lesson. The metaphor used resembles countless other empty metaphors about wolves and sheep that draw on a fundamental world view disconnect from reality that exists in the radical realist American psyche.

Then Kyle is given a higher calling, similar to America's call to protect the world. While America's need to be the globe's shield against evil perhaps predates the Monroe Doctrine, a heightened divine calling follows George W. Bush's presidency. In the film, Kyle watches a news report of the US Embassy bombings in Kenya in 1998 as though he is seeing his little brother beneath the bully's pummel. This minor shot elegantly captures this world flipping moment. A society so bent on a fundamentalist individualism suddenly feels for strangers only when connected to them by the word 'American'. This feeling is echoed later in the film as Kyle and his wife watch the horror of 9/11 play out on their television screen, an all too familiar memory for Americans who lived through that particular day.

The news commentary spews forth chaotic fear and a deep uncertainty over the new enemy. This enemy is not as easily identified as our prior enemies. The Communist, The Japanese, The German, all with distinguishable characteristics easily caricatured, now are usurped by a shadow.

THE ENEMY IS NO LONGER A HUMAN WHO CAN BE DIMINISHED THROUGH MULTIPLE LENSES OF NATIONALISM AND RACISM. THE ENEMY IS A SPECTRE, ALMOST INHUMAN.

Thus, America must also lose its humanity. We watch Kyle's SEAL training, which is expected to be a striping of humanity, but instead the training feels more like manual online training, a nuisance that we must all endure in order to get an extra hour of pay for the week. Then reality settles in.

Just as Kyle has it all, a perfect bride, a child on the way, the American dream, we learn shooting deer or paper targets is no preparation for killing living humans. The enemy is not simply military age males. In fact, the enemy is an evil force that can possess children and women as well. Contradictions compound as the glorious duty of war turns into a historically ignorant euphemism for murder and assassination. America watches the world through a high powered scope and to be the shield the world needs, it must decide through this false buffer who lives and who dies. The tragedy begins as we find out a simple fact: Kyle is really good at what he does.

The defence of the greatest country on earth makes him a legend. Americans long to have a symbol to stand behind like Captain America, but punching Hitler on the nose is not enough. The enemy is brutal, savage, and merciless. War for Americans is not men against men, good versus evil, it is what remains of the sacred human verses Lucifer himself. This is how we

justify our own savagery. They are waiting to kill when we least expect it and so we must be ever ready. There is the belief that the enemy is no longer human. Much like aliens in sci-fi flicks, they are simply beasts and killing them is no big deal. The other soldiers around him echo the themes of American exceptionalism, racism against the people of the Middle East, and an overall blood lust surrounds questions of good and evil, the nature of God, and the sanctity of life. All of this is a haze of white noise surrounding the cold omniscient scope's eye that Kyle becomes.

He is even faced with the Other in the form of an allusive enemy sniper. He is the American stereotype of today's terrorist. He is Al-Qaeda, he is ISIS, he is the next Western public atrocity. He wears all black, is clean cut with a mix of ethereal youth and devilish sex appeal. Bouncing from roof top to roof top, this enemy sniper is a ninja with perfect accuracy and precision. He even wears a headband. He calls Kyle out and becomes the microcosm of evil as his and Kyle's game echo the War on Terror as if it were a one-time Pay Per View event that no one will want to miss.

The very term 'hero' is put to the pitch like a soccer ball, kicked back and forth, transformed before the audiences' eyes. Chris Kyle is our hero. He is not simply a man looking to overcome a challenge and grow from it. Kyle's war is multifaceted, complex. He has the internal challenge of maintaining his own sanity in the face of utter destruction. The challenge of maintaining his humanity and his family weigh on Kyle's shoulders as he must persevere the chaotic character changes that mould him throughout the film. His duty is to kill anyone who tries to kill him or his brothers before they can accomplish their missions. We watch a simple boy from Texas become a complex man caught on the fault line between killing machine and superhero guardian. All the clearly shown contradictions in his values pull Kyle into the deep uncertainty of postnormal times. The result is a self-detached, quixotic hero whom the audience is perpetually shifting between rooting for and hoping he fails so that he can simply go home and no one has to die.

But the world is no longer that simple. We live in a world where complexity is the norm, characterized by a plethora of independent parts interacting with each other in a great many ways. Everything is connected to everything else in networks upon networks that generate positive feedback that amplify things in geometric proportions leading to chaos. We thus end up with many positions that are logically inconsistent and contradictory. The end products are uncertainties and ignorance. In Postnormal times, you cannot be saved by Superman flying faster than the bullet or by *The Matrix's* Neo accepting his being the chosen one and defeating the Agents. The hero of postnormal times cannot simply defeat the bad guy or defuse the bomb, for postnormal times

cannot be managed towards a resolution. The postnormal hero is a navigator above all. This hero is challenged by the complexity of the world and our multiple selves, he is at the mercy of utter chaos, and subdued by countless contradictions. The postnormal hero is faced with taking our old conceptions, putting them to the test, and demanding that we re-educate ourselves or be doomed to fall at the hands of the true enemy – ourselves. He is not an antihero per say, but he is by no means something that can be easily be made into an iconic action figure either.

The first of these heroes are almost certainly damned to become tragic heroes, for an unfamiliarity with postnormal times will prove a deadly challenge. I am not ruling out that the postnormal heroes will come in all shapes and sizes. Some will accept the complexity and contradictions all around us, others will look to transcend it, and still others will be killed by it. The specific type I investigate here are characters faced with a growing complexity that presents greater chaotic challenges which in turn bring out the contradictions within their very foundational values. These characters will be swallowed by the uncertainty surrounding them; and their options are limited to how they handle their own ignorance. Of course, authentic American characters are inherently assured. The choice they must now make is whether to remain stubborn to their old ways, or to take a new approach to their own ignorance.

And Kyle comes face to face with this choice. A scene gives us Kyle on a distant roof top providing support for his team on the ground. A faceless man with an RPG peels around the corner, his aim set on Kyle's men. Kyle spots him. BANG. The man is taken out. Easy, classic, our hero beats evil. Then, we see a native boy watching from a short distance, shocked, pensive. The boy drifts towards the dead, faceless man. He picks up the RPG. Kyle watches, beginning to pray out loud, please put it down. The perfect metaphor for America! We watch through a sniper's scope as history develops into the chaotic cradle to grave mess of killing and fear. Put it down. Kyle is faced with an impossible decision. Women and children must be spared at all costs. Americans, fighting for justice, must be kept from harm, at all costs. All bullies must be finished. The uncertainty and contradictions play out in a postnormal burst as the audience's heart rates rise.

After a multi-toured back and forth between Kyle and Mustafa, the superhuman shadow, Kyle finally has Mustafa in his scope, a shot over a mile away, an impossible shot. Kyle knows he can take it and finish his own war. The man who has killed several American's can be taken out. Justice. Other soldiers call for him to stand down. If he takes the shot, he will give away their position and they will be swarmed. Kill this one man and Kyle ends his

war, the war. Kill one to save a thousand, but in killing this one, you condemn all your men, the men you are sworn to protect faced with certain death. A sandstorm approaches. Kyle takes the shot and the sandstorm consumes the building where the American troops are positioned. Kyle sets his rifle to his side, in the dirt, and produces a radio phone. He calls his wife, sand zipping about in all directions. He pleads to his wife that he is ready to go home. He finds himself in a nearly literal postnormal event, and his attempts to control the convergence of complexity, chaos, and contradictions have landed him in an unmanageable pit of uncertainty. Only navigation will bring him out again. The old methods and the old mind-set will not work any longer. His mind is reverted back to a primitive childhood notion of needing security. The man who never wanted his tours to end, who only wanted to be with his brothers, killing the monsters, now wanted more than anything to go home. A long mental recovery awaits Chris Kyle beyond this deployment. The stories of our childhood that take us to such horrible places but always manage to have a happy ending are, after all, just fictional stories.

There is no awareness in *American Sniper* of the theory of postnormal times; it's the reality of postnormal times that is shaping the narrative of the film. And, of course, it provides no answers for how we are going to navigate postnormal times. Yet, quite unconsciously, it portrays the basic dilemmas, internal contradictions and deep ignorance of America in postnormal times. But I suspect that metaphors are too deep to persuade my fellow Americans to reflect on the ridiculous condition we find ourselves in. We still hold to the 'laws of Americana' Ziauddin Sardar and Merryl Wyn Davies ascribed to the American mind in the current era [5]. 'Fear is essential,' 'War is necessary,' and 'Ignorance is bliss'. We live in an America where there are more guns than human beings (an estimated 350 million), campus shootings are the norm, and exporting war is an essential component of foreign policy. We idolize men who are really good at ending human life, and our politics are driven by what we fear: we want guns so no one shoots us, we oppose difference because we don't want it to rub off on us, we support foreign engagement to kill them before they kill us.

AMERICA, THE PROVERBIAL 'GREATEST COUNTRY ON EARTH', IS SKEWED BY FALSE BELIEFS IN PERMANENCE, THE INNATE SUPERIORITY OF ITS VALUES, AND AN INABILITY TO ADAPT TO A RAPIDLY CHANGING WORLD.

For all its faults, *American Sniper* gives us an American portrait in dire need of reflection and adjustment. A mirror is presented, revealing our half-cocked mind-set that is hurling us towards perpetual violence. Racism, rash decision making, and an attempt to hide from trusting humanity is juxtaposed with a hope that we will stop living in the dark. America's continued war against shadows fuelled by deep uncertainty and a dedication to ignorance of the world beyond its borders is always going to spell tragedy for our postnormal hero. And, as the metaphor goes, for America herself.

Postnormal Times are turbulent and uncomfortable. A hint of how American can come to terms with postnormal times is provided in Iñárritu's *The Revenant*. At face value, it is a story of a man, Hugh Glass, who survives a brutal bear attack to then seek revenge on those who killed his son and left him for dead. While Iñárritu's last film, *Birdman* (2014), received critical acclaim, it is really curious why the Mexican filmmaker would choose such a subject as Hugh Glass. Glass is a nineteenth Century American frontiersman who famously survived and crawled to safety after being left for dead by his crew following a bear attack in modern day South Dakota. His miraculous journey was the subject of American West folklore and was immortalized in Michael Punke's 2002 novel [6] of the same name; Iñárritu film is roughly based on the novel. Punke's book was hailed as a classic revenge story, rugged, an ideal example of the American Western genre. Not exactly the calling of Iñárritu's worldly and complex style. Prior to *Birdman*, most Americans would probably confuse Iñárritu with Alfonso Cuarón or Guillermo Del Toro. Prior to *Birdman*, his works come from an international perspective tackling issues such as faith and Christianity or the struggles concerning justice with a Latino perspective. *Birdman* marked a radical departure; and *The Revenant* continues the journey. What remains throughout all of Iñárritu's films is a requisite of deep thought on the part of the viewer. In this new phase of Iñárritu's career, we see a world in trouble. *Birdman* provides us a world lost in complexity, riddled with chaos, reflecting on its own contradictions. Postnormal Times on the big screen. In *The Revenant*, Iñárritu provides us with his attempt at a navigation of these worrisome times. It may be set in the nineteenth century but it deals with the issues of our postnormal times.

To set up our navigation, the film begins in an odd place. Running water. Water, being a key element of life, is a fitting place to begin. From it rises trees, the Earth, and two humans. A father and a son. An almost unrecognizable Leonardo DiCaprio portrays the rugged Hugh Glass and Forrest Goodluck makes his debut as Hawk. Then there is something not of the Earth per say, their guns. A buck with countless delineation within its antlers, the tree of life made flesh. BANG! The unnatural sound begets our journey which will be rife

with natural sounds of life's struggle. Nearby we see an encampment of men living in nature, yet slowly corrupting it, fires burning, the act of shaving, and the bundling of furs. The progression of morning is paused by the gunshot. John Fitzgerald (Tom Hardy) expresses concern over the unnatural noise to the authority figure of Captain Andrew Henry (Domhnall Gleeson). The ominous Other lurks all about.

The one unnatural sound launches countless arrows that lead the distant stomp of a herd of stallion's hooves. An endless and repetitive war cry plays first chair to the agonizing cries and pleas made by the men under attack. The camera soars and swoops panning 360°. The audience is shown the entire world around, yet sees nothing. Suddenly the small eye the picture's view provides is not enough. Arrows come from ahead, behind, and beyond. All is insanity as the men seek to use the Earth to hide, seemingly, from the Earth itself which has launched this savage attack against them. Glass and Hawk explode onto the scene, running. The mission is to get to the boat; and Glass needs to keep Hawk protected. It becomes apparent that the attack is by Natives and Hawk himself is a Native. This world is far too complex for such simple racism. Captain Henry is unable to save the men under his protection; he is lost, drowning in uncertainty. The water rises as they make for the boats. The endless war cry rings louder, the arrows more frequent, the breathing heavier, dominating over the other sounds. It is important to note here that Glass leads his son to safety, yet remains behind him at all times.

The story here is essentially a father's guide to postnormal times. The film is unclear as to the biological certainty of Glass being Hawk's father, one could take the opinion that Glass is merely an adoptive guardian to Hawk, yet this does not detract from his dedication to Hawk's well-being. Glass's role as a father is interestingly complicated. Hawk's face is scared from burns whose receipt is slowly reviewed throughout. The simple metaphor is that Glass, like the misguided political view of America, is carrying the beaten uncivilized world into prosperity. Glass cannot foresee a light at the end of the tunnel in this journey. He is just trying to get them to the safety of a nearby fort. He is coerced into being the father of this group of white men who look to only him to save them from the ever present possibility of another attack by the Arikara tribe. Hawk is Pawnee, a more peaceful, and thus unfortunately a dying tribe. Glass, not persuaded by a White Man's Burden, is attempting to save the Pawnee culture, one which he himself has adopted. The quest has a high probability of failure, and even upon reaching the fort, what then? Glass must embrace the uncertainty of postnormal times, attempting to not prolong ignorance, for ignorance can be fatal.

Fitzgerald, likewise, is a sort of father. Let us call him the father of ignorance and Postnormal Lag. Fitzgerald takes the young Bridger (Will Poulter) as his son, corrupting him with the old paradigms that are slowly crumbling at the end of an epoch. Fitzgerald sees all Natives, be they Arikara or Pawnee, as savages. He recognizes labour not as a becoming of humanity, but a simple means to money, the only chance man has for wielding power over his destiny. His philosophy is every man for himself, suffering is completely unnecessary, and lying is justifiable. All of these will collapse in the face of uncertainty. Bridger, desperately in need of navigation, freezes during the Arikara attack. He latches onto Fitzgerald and falls subject to the sins of this involuntary father. Bridger is then tied to Fitzgerald's crimes and his world view. Bridger must love thy father and refuse to accept the breaking paradigm Fitzgerald is faced with, that will sink both of them in the depths of ignorance.

Captain Henry is the false father. This is the father that we demand our governments and various subscribed organizations be. The tragedy being that they are at the mercy of experts and public opinions, both subject to the damning fate of chaos and inevitable contradictions. Henry cannot save his children, his men. His faith in his own leadership and dedication to the military system cannot allow him to undo what has occurred. He is faced with the same problem of the false fathers in the real world. Governments and organizations have a real challenge in accepting change, for it admits fault in their system and exposes the fragility of their holding of power. Chief of the Arikara provides a sort of antithesis to Captain Henry. He is motivated, and thus his tribe, to find his daughter. He remains true to his identity but embraces the advantages of the white man's guns. He even goes through the trouble of learning their language. His defiance of ignorance provides a potential for all the false fathers as they face tomorrow's uncertainty.

This film is a story of the convergence of these various fatherly technics and gives us an interesting experiment in postnormal times. This convergence is wrought with confrontation, the most noticeable being that of Glass with the Grizzly Father.

My own father's view of bears is greatly influenced by his Cold War life. The bear was the ever wondering ball of furry power in the forest. The Soviets. The Reds. May the democracy eagle kill the communist bear. In my own life time, bears have gone from pacified cartoon to force of nature. I grew up with Winnie the Pooh, Yogi Bear, and Baloo. All of them playful, dim-witted, and generally harmless. Theodore Roosevelt's dream of the friendly bear realized. They were natural beings, something to be saved along with the rainforests and abused pets. Then came Werner Herzog's *Grizzly Man* (2005). This documentary was

fuelled by the spirit of saving nature and respecting its beauty, but taught us a valuable lesson. Nature is wild and those who walk on its territory are bound by its rules. America has no lions or tigers. The bear is the king of the American jungle. So why not let it be the natural father in Iñárritu's film?

Glass scouts ahead, looking for a path through the uncertainty before the men he has been chosen to lead. His breathe is wild, that of a natural beast, ever watchful. Then we hear a strange noise, followed closely by a ruffling in the foliage. Two young bear cubs are at play. Glass freezes. He knows something that is far from uncertainty and the audience also knows what is to come next. For when there are children at play, a parent is never far. Based on the size of Glass's rifle, it will be hard for him not to be perceived of as a threat. Again the camera takes us on a three hundred and sixty degree move. Our eyes desperately tear apart all of the empirical data. Where is it? And then we hear it, a shrill, yet bellowed growl. Glass freezes. We are not the masters of the world as we once thought. Then the trees hurry to get out of the bears way as it approaches. Once the bear's view sees Glass, the defensive attack comes. The attack is two phases of agony, strain, and destruction of the body. It literally appears to be the classic man versus nature conflict. But this film is not about man versus nature. Battle always has an objective, a gain. Neither man nor nature gain from this battle. Instead this is a film that watches man conflict within man himself. As man corrupts nature, nature gets weird and devises ways to destroy him. Nature retains a position in the background, yet remains an active force, a character of sorts. Nature is the unchanged because it is in constant flux.

The tragedy of this film is that the conflict is amongst fathers. Like a father-son picnic, the winner of this competition is not dependent on who loves the most, who has the most innate fatherly prowess, or some other sense of the romanticized parental bond. It is mostly a function of uncertainty and ignorance. Glass, Fitzgerald, Henry, the Arikara Chief, nor the Bear are heroes in this story. They are also not anti-heroes of each other. Their conflict is superfluous and entirely accidental. These characters only converge due to the ignorance they all bear and in their approach to the uncertain future. Had the Arikara Chief's daughter not been kidnapped, their attacks would not have been so vicious. Had Fitzgerald not been the victim (or perhaps survivor) of an attempted scalping, his ignorance would not have ran so rampant. These major ignorance-fuelled actions propel the narrative; indeed, they are the original impulse of the story. In postnormal times, the heroes (or the close approximation of such) are not characters challenged to overcome a conflict that tests their being. Instead, these characters are faced with certain destruction, a force that we are the antagonist against. In *The Revenant* this is encapsulated in the concept of breath.

A vision of Glass's wife speaks to him during a dream. She says: 'when there is a storm. And you stand in front of a tree. If you look at its branches, you swear it will fall. But if you watch the trunk, you will see its stability.' The wind and breath are these invisible forces that appear to have minds of their own. They are the continuity of time in postnormal times. While they contribute to wonderful sound mixing in the film, they give us a hint at the truth at play in the film.

BREATH HAS OFTEN BEEN IMPORTANT TO THEOLOGY. FOR INSTANCE, YAHWEH, THE HEBREW WORD FOR GOD, IS ALSO THE PHONETICALLY APPROXIMATION OF A BREATH. THE SUFIS SAY 'HUWA, HUWA' – THE BREATH THAT SPELLS 'HE IS HE'. GOD BREATHED LIFE INTO ADAM. IN THE SINGING OF JUDAISM AND CHRISTIANITY, AND ZIKR (REMEMBRANCE OF GOD) IN ISLAM, GOD IS PRAISED IN THE SUPERNATURAL UTTERANCE. IN THIS FILM, AS IN REALITY, IT IS LIFE OR DEATH. THIS UTTERANCE IS A FORCE, THE CONTRA TO THE EARTH'S WIND. A RESISTANCE. IGNORANCE ON THE OTHER HAND IS A CORRUPTED BREATH, A FORCE THAT PLUNGES THE AGENT INTO DEEPER UNCERTAINTY AND PROBABLE ANNIHILATION IN POSTNORMAL TIMES.

The film makes a point of revenge. Revenge is sought out. From certain perspectives it is obtained. But this is not a revenge story. Rather, this is the deconstruction of the concept of revenge. Revenge presupposes justice and morality. In other stories, revenge is taunted as a hollow victory. Here revenge is looked at through a higher lens. Various characters refer to revenge being that of God and God alone. This reference brings to light Gandhi's quote of the blinding result of an eye for an eye justice. In the end, it is just a balancing of debits and credits, not between humans, but in general for the Earth. Wind versus breath.

One of the closing images of the film leaves us with running water charging through a tundra landscape, but now a massive blood stain dements the

water's bank. A stark image. Hauntingly impermanent. For wind, water, and a fresh snow can return it to the beauty at the film's start. These are the stakes of postnormal times. The old concepts make less and less sense in practice. The sand castles paradigms that have been constructed for protection from the almighty wind are being revealed for their true natures. A deeper thought must be taken into the breaths we take. No amount of 360° camera pans can reveal the whole truth. The truth is not simply empirical, but requires the second degree of reflection. Ignorant breaths will be defeated by nature's wind.

How will America make its breaths in postnormal times?

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POSTNORMAL GOVERNANCE

Jordi Serra

Even a casual glance at recent world events reveals how politics and governance is rapidly going postnormal. But before we examine how governance is changing, a few words about the category itself. The selection of the label is quite relevant here. 'Postnormal' connects two pertinent notions: it indicates that what we are experiencing is not normal or, at least, what we could expect as normal. The conventions by which we have lived over the past decades are increasing becoming irrelevant. But the term also signifies that what we are experiencing is not exactly abnormal. Rather, what is happening is that we are transcending the usual meaning of normalcy and entering an uncharted territory, the domain of the 'postnormal'. But in what sense are we surpassing normality? The short answer would be in the modern-industrial sense. Modernity appeared as the answer for a new kind of power that needed a new legitimate source that would break up with medieval traditions and structures. Hence it witnessed the emergence of a new leader, Machiavelli's *The Prince*, who ruled over a new concept, the state or more specifically, 'the nation-state'. Science served as a useful tool to cut the remaining allegiances to the old feudal system and to provide new foundations for the new structure. Science and (colonial) politics combined to produce the Industrial Revolution with an accent on modernity that became the main criterion for regulating our life. Modernity, the industrial worldview and science had a symbiotic relationship as all three advocated standardization, imposing some sort of statistical average as the reference for normalcy. There were standard rules that applied to everyone and served all; and solved all our problems. These standards were conventionally seen as 'universal'; and western civilisation, with its hallmark features of 'democracy' and 'human rights', was projected as the future of all cultures and societies.

But these assumptions of an assumed monolithic world, with a single source of power – western culture, led by the United States and Europe – are no longer valid in a multipolar, multicultural world. Modernity is a state of crisis;

and its successor, postmodernism simply turned out to be a 'new imperialism of the Western culture' [1]. Even the science it is based on turns out to be not as objective and neutral as we liked to think. What Funtowicz and Ravetz postulated in their seminal work [2] on postnormal science is that we need to go beyond the normal emphasis of science that focuses on results or products to include procedures, purposes and persons in our analysis. That is, the value of scientific research cannot rely solely in its conclusions but also in the choice of the method, the objective pursued, and the politics and worldview of the people in charge. In other words, science ceases to be an absolute and becomes contextual – just like most human endeavours.

What applies to science also applies to governance and society. The conventional modes of governance are becoming dangerously obsolete; society is in a state of total confusion. As a result, most people have lost all interest in politics. The differences between the Republican and Democratic parties in the United States, for example, have now become a chasm that seems impossible to bridge. The differences within single parties, are just as deep: the Conservative Party in Britain is torn between pro and anti- European factions; the Republicans denounced their own Presidential candidate, Donald Trump, in the 2016 General Elections. Indeed, the very fact that a business tycoon with insalubrious opinions and attitudes, who is almost universally detested within the Republican party, could gain the Presidential nomination, itself suggest there is something profoundly wrong with the American political system. It is a system that often leads to gridlock with the strange spectre of the unprecedented shutdown of the US Federal Government in October 2013. As the conservative American commentator and a Republican stalwart, P.J. O'Rouke told BBC's *Newsnight*, 'Trump underlines the frustration with the modern state – it has shown itself with all sorts of popular outbreaks around the world. A phenomenon like Trump is a rather comic version of that. Marine Le Pen rather less comic. And if you want truly tragic, Putin. Putin too is a populist. And so is Brexit. And so is the rejection by the Colombians of the peace treaty'. The best option for America is the candidate for the Democratic party, Hilary Clinton, who is 'wrong on everything' but 'wrong within the normal parameters of wrong' [3]. The problem is that 'normal parameters' are evaporating precipitously.

THE ZEITGEIST OF THE MOMENT IS A MIX BETWEEN UNCERTAINTY AND ANXIETY PROVOKED BY OUR INABILITY TO UNDERSTAND WHAT IS HAPPENING.

People want to cling on to whatever little they have that provides certainty: nostalgia for the glorious past, naked nationalism and protectionism. As accelerating change increases the sense of uncertainty, ignorance comes to the fore. Truth and facts lose their value. Empty slogans – such as Trumps 'Make America Great Again' or Brexits' 'We Want Our Country Back' – stimulate passion and outrage. Conventional and digital media whips up the frenzy. A positive feedback loop is established. Populism is a natural outcome of postnormal times. Political developments emerge and proliferate at such a pace that we barely cope with them. We constantly find ourselves in a state of baffling chaos and contradictions.

Consider, for example, the case of Ukraine. It all began with demonstrations against the government in Kiev. President Viktor Yanukovych's government was indeed corrupt but it was democratically elected. His main crime, however, was not that he was corrupt but that he wished to align Ukraine with Russia. From the western perspective, it was good for him to join NATO but bad to go into alliance with Russia. Soon armed protestors in Kiev took over government buildings and demanded a change of government and constitution. Politicians from the US and Europe stood side by side with the demonstrators, including the leaders of the far-right Svoboda party, to declare their support. When the parliament voted to oust the President, the political order in Ukraine was turned upside down in a single day. President Yanukovych fled to Russia; and the equally corrupt former Prime Minister, Yulia Tymoshenko, was wheeled out from jail to address the demonstrators.

A decade or so ago, that probably would have been the end of the affair. Western powers would have established a government of their choosing in Ukraine, just as they had done during the twentieth century in numerous other places, from Iran, where the US overthrew democracy to install the Shah in 1963 to Chile where the democratically elected Marxist government was ousted in 1973. But in a multipolar postnormal world, things are not as straight forward as they use to be: the generalized acceptance of the conventional distribution of power and the hierarchy of interests are not valid. A re-emergent Russia flexed its muscles and moved swiftly by taking over Crimea. The speed with which Crimea was seized was as astonishing as the speed with which the government in Kiev was brought down. Apart from issuing threats of sanctions, and actually imposing a few, western powers seem impotent. Not because, as it is widely assumed, the will is not there; but because the means has evaporated. The reality that power has genuinely shifted is hard to comprehend let alone face.

Notice the complexity and the resulting contradictions in the Ukraine affair. It is not just the interests of two competing powers that are at stake,

Ukraine has 120 different minorities, each with its own reasonable and unreasonable demands. There are the democratic aspirations of large communities such as the Ukrainians, Ukrainians Russians, the Russians of Eastern Ukraine, and the Muslim Tartars in Crimea who have historic reasons to hate Russia. The undemocratic goals of nationalists and far-rights groups of both Ukrainian and Russian colours. The helplessness of the western backed regime in Kiev. The militancy of the nostalgic pro-Russian communities in the industrial east. The civil war. The peril of a global conflict that should concern us all. The contradictions were equally glaring. Western interests were paramount but Russian interests were irrelevant. The democratically elected President of Ukraine was replaced by an entirely unconstitutional and undemocratic takeover. The democratic demands of the mob in Kiev were seen as legitimate; but the democratic demands of the mob in Crimea, where a referendum was held, were deemed 'illegal'. Our fascists, who are an integral part of the new government in Kiev and where they control a number of ministries, are benign; there fascists are racist brutes. These sorts of rhetoric, and the policies based on them, are now dangerously obsolete.

IF YOU LIGHT A TOUCH PAPER IN THE POSTNORMAL WORLD, YOU ARE AS LIKELY TO BURN YOURSELF AS MUCH AS YOUR INTENDED TARGET.

This is well illustrated in the case of Egypt, where another democratically elected government was overthrown by military-backed demonstrations. The government of President Muhammad Morsi was not corrupt; but the Egyptian Constitution he introduced made the Sharia (conventional Islamic Law) supreme and declared Egypt to be a Sunni state which was seen to give preference to Sunni Muslims. The initial demonstrations against the Mubarak government were initiated through Facebook and rapidly escalated into a chaotic phenomenon that led to the overthrow of the regime. The demonstrations against the Morsi governments followed the same course: the same group of demonstrators now demanded a secularism government and used the same means to overthrow a democratically elected government – with the full support of the military. Perhaps many secularists involved in anti-Morsi demonstrations wanted a genuinely pluralistic democracy, an acknowledgement of diversity, and genuine freedom of thought and action.

But what they actually got was something altogether different. But positive feedback that rapidly turns into a chaotic phenomenon can either lead to collapse or total transformation. The anti-Morsi demonstrations led to collapse. The omnipotent Egyptian military took advantage of the chaos, and the gullible secularists played into their hands. The end product: a legitimate, democratically elected government, albeit an autocratic one, was replaced by military rule. A 'coup' was not a coup. An entire segment of the population – because of their support for the Muslim Brotherhood – was now considered 'terrorists'. Mass death sentences were handed out. No one in the West stood up against these executions; no demonstrations were held in support of the victims of a coup that was not a coup. Far from nudging Egypt towards more democracy, the secularists succeeded in turning it into a nightmarish police state, ever on the verge of civil war.

Consider the postnormal plight of my own country, Spain. After a golden period in real estate business, which turned Spain into some sort of 'economic miracle', the subsequent burst of the housing bubble came as a chaotic implosion. Although Spain was not formally rescued like Greece, Portugal or Ireland, it had to ask for European Union bailout to sanitize its banking system. And, as expected, in return the EU was granted a high degree of control over Spain's economy. To comply with European directives, Spain has had to endure severe budget cuts and some structural reforms that, basically, have resulted in a drastic reduction of the Spanish welfare system. All in all, the unemployment rate in Spain escalated over 20% (it peaked at 27.2% in the first quarter of 2013) producing no less than five million unemployed people during this period; including a large group of older citizens who – most likely- will never get a job again and will face retirement with meagre pensions. To make the situation worse, as the Spanish sovereign debt finally jumped above the country's GDP in June 2016 [4], it is forcing the Spanish government to devote a growing part of the national budget to the payment of the debt interest rates, a bigger share than the one devoted to unemployment, and it looks that it will remain this way for a long time. The political situation is as grim as the economic landscape. For a number of years, the Spanish politics has grinded to a halt thanks to a four-way deadlock. An election in December 2015 was held to resolve the deadlock but it only brought the complexity of forming a workable government to the fore. The differences between the positions of the four dominant national parties – the conservative Peoples' Party (PP), the moderate Spanish Socialist Worker's Party (PSOE), the liberal Ciudadanos and the progressive Podemos – are too deep and too entrenched to be resolved. As such, forming a coalition between these parties is a complex task. The deadlock kept Spain paralysed for months. It has been partially resolved with

a fragile coalition; but it is only a matter of time before it falls apart again.

The resolution has brought Spain back to the status quo with a caretaker government led by an acting Prime Minister – the conservative Mariano Rajoy. And Rajoy acting government is as mired in corruption scandals as the old and new ones in the Ukraine. In the eyes of most the population it is as self-interested and interested only in making profit at the expense of the society as autocratic rulers elsewhere! Rajoy's conservative government won the 2010 elections with the promise that it would overcome the crisis and get the country back on the track towards growth. But after the four years in government, the truth dawned: managing a national economy in postnormal times is a complex affair. In fact, the conservative government ended up doing just the opposite of what it said it would do: far from reducing they increased taxes, far from decreasing unemployment they saw it rise sharply. But the economy was not its main challenge. That comes from Catalonia. For various reasons, ranging from economic to cultural and identity issues, Catalonia wants to secede from Spain and become an independent state. As polls have consistently shown, the independent movement has mass support from the Catalan society. Truly it is not the best of times to govern Spain.

So what have the Spanish Conservative government, the 'acting' and previous one, done to tackle these issues? It has chosen to turn its back from the future and hark back to history. First, it granted the Catholic Church an authoritative position, not unlike the Constitution of ex-President Morsi, on several social issues. The abortion law was reformed to accommodate the position of the Church (something that should not come as a surprise as the Justice Minister at the time is a member of the *Opus Dei*). The Catholic religion was reinstalled as a compulsory subject in school curricula. In return, the Catholic hierarchy has positioned itself against the secessionist Catalan movement labelling it as 'immoral'. Thus seeking sovereignty becomes both a religious and a moral issue! But the most bizarre action was the bestowing of the golden medal of police merit to the Virgin Mary by the Interior Minister. To be more precise, it has been given to the Virgin Mary of the Very Sacred Love (*Virgen María del Santísimo Amor*) because 'she shares the values of dedication, wakefulness, solidarity and sacrifice that Spanish police uphold' – clearly the Virgin goes regularly on patrol with policemen. This decision was taken to court by some secular organizations; [5] however, this did not prevent the minister from giving a second medal to another virgin, the Very Holy Virgin of the Pains (*Santísima Virgen de los Dolores*) while the first medal suit was still in court! [6] Later, it seemed that all this was a part of larger scheme to get Divine help as it seemed that Saint Teresa was making 'important intercessions in Spain in these rough times' [7]. So in the face of a highly complex and

contradictory economic and political situation, where viable policies are difficult to perceive let alone formulate, the government has turned to Saints and religious dogma for help!

Second, it truncated or simply abolished many democratic rights. The right to demonstrate, for example, has been curtailed by the so-called 'Gag Law'. The strategy is to turn some public actions, like street rallies and demonstration, into administrative misdemeanours. So they are taken out of the jurisdictions of the courts and placed in the hands of bureaucrats and administrators. Thus, some legal guaranties, such as habeas corpus or the compulsory presence of an attorney, are wiped out. All of which makes it easier to charge the promoters or supporters of publics demonstrations. This triggered another lawsuit against the Spanish government, this time at the European Court of Human Rights [8].

Third, it aligned itself with free-booting capitalists. The most poignant example is provided by its opposition to reform the mortgage regulation. Currently, Spanish mortgages are not really mortgages; they are personal credits with real (meaning housing) guaranties. Unlike other places where the lack of payment implies the loss of the property and the end of credit, in Spain the loss of the property only entails the end of credit if the selling value covers the total amount of the credit, otherwise the former owners will still owe the remaining part of the borrowed money. As the property values have dropped considerably, many people have lost their homes. By 2015 it was estimated that, since the beginning of the crisis, more than 100,000 families have been evicted from their homes. The real tragedy is that most of these people are unemployed and still owe a lot of money to the banks. These are the same banks that received €41,000 million from the European rescue package, in addition to enormous public funds, to cover their losses!

These policies, if one can call them as such, are a recipe for disaster in postnormal times when a tiny perturbation in the system – a demonstration against economic injustice, or a rally in Catalonia for independence, or a boycott of schools where philosophy and music have been removed from the curricula and Catholic dogma has been made compulsory for all – could have big unintended chaotic consequences. As we see on YouTube, just such sparks produced serious perturbations in Turkey and Venezuela, as well as Egypt and Ukraine. And, of course, it is not just Spain but other western countries are facing similar problems. Brexit and the housing bubble in Britain is bound to lead to a catastrophe; and United Kingdom may not be all that United and not much of a Kingdom if Scotland gains independence. Italy has suffered one political deadlock after another. Ditto Greece, Belgium, Norway, Iraq, Afghanistan...In fact, political deadlocks are the new norms in postnormal times!

It seems to me that governments still act on the basis of the normal

assumption that their actions would cause exactly the effect they intend to achieve.

POLICIES ARE MADE ON THE CONVENTIONAL DIRECT LINEAR CAUSE AND AFFECT BASIS: ACTION ON A WILL TRIGGER THE DESIRED RESULT ON B. BUT IN POSTNORMAL TIMES, THERE IS SELDOM A DIRECT CAUSE AND EFFECT RELATIONSHIP. NOWADAYS PHENOMENA ARE THE RESULT OF COMPLEX NETWORKS OF CAUSALITY IN WHICH MANY CAUSAL FACTORS ARE INTERMINGLED; IN SUCH CASES, ACTION ON JUST ONE ELEMENT IS NOT ONLY FUTILE BUT OFTEN ALSO QUITE DANGEROUS. ACTION ON A TRIGGERS MYRIADS OF REACTIONS IN B, C, D ALL THE WAY TO Z; AND MANY OF THESE REACTIONS CAN ACQUIRE CHAOTIC PROPORTIONS AT LIGHTNING SPEED. POLICY HAS TO TAKE A QUANTUM LEAP TO BE MEANINGFUL IN POSTNORMAL TIMES.

To be honest, we do not really know how to shape viable policies for postnormal times. But there are three basic principles that can guide us. First, we need to acknowledge that no one is in control, at least not in a democratic society. The bottom line is that those who think that only governments can deliver, cause or achieve whatever needs to be done, are deluding themselves. Indeed, the scope of any government intervention has been progressively eroded so it is always incomplete, much less than most policy makers assume. More and more aspects of governance fall out of the executive competence or capacity; in some cases, it takes the collaboration of several administrations to attain the desired goal, often involving interventions of a host of different social agents. So, by definition, policy making must consider and involve a host of different perspectives and competing, even contradictory, interests. In international relations, 'our interests' are not served by focussing on what 'we desire'; our goals will be contested, just as we would contest 'their goals'; and only through

a process of contested negotiations a positive outcome can be realised.

In postnormal science discourse, the contested negotiations take place within what is called an 'extended peer community'. Apart from scientists and academics, it includes a variety of other social actors, from environmentalists, critics, sceptics, writers, to housewives and shift workers. Infect, everyone who is affected by the products of science joins in and participates in the discussion and assessment of any given work. The notion of extended peer community must now apply to all issues of governance as well as to social issues at large. Elsewhere I have shown how this idea could be used in intelligence communities [9]. It is equally valid and important for political, administrative, cultural and corporate institutions. Of course, it requires that we enlarge our conception of participation. Most executives are wary of participation, and feel that participation processes are too much of an annoyance and there is little to be gained from them apart from a certain degree of legitimation. Therefore, the impulse of most administrations is to tame and restrict participations within a limited number of channels. For the purposes of postnormal governance participation should be enriched and diversified, not only granting access to the widest variety of actors but also establishing many different ways and procedures to shape policy. Technically this is not a problem; the main obstacle would be adherence to the modern ideal of control that is totally counterproductive for postnormal times.

Second, we need to appreciate that in a complex environment the guiding mechanism must itself be complex – this is known as Ashby's Law of Requisite Variety. In other words, plurality and diversity have to be at the heart of governance, and reflected in all state institutions, for democracies to endure. When this does not happen, even the most successful states face serious chaotic obstacles. Third, a policy worthy of the name must consider the impact of positive feedback loops. How are we going to cope with myriads of unintended consequences? How are we going to negotiate chaotic upheavals? While we cannot predict the outcome of a policy, we ought to have some awareness of its potential consequences.

The answer to postnormal challenges is not to hark back to some perceived normal (or pre-normal) responses – as demonstrated so well by the situation in the Ukraine, the fall of President Morsi and the rise of military dictatorship in Egypt, and the inane religious sentiments of the conservative government in Spain. It is to understand and embrace the dynamics of postnormal times and act accordingly. We have lost our capacity to control and steer change. We could mourn that loss. Or make the most of the postnormal condition.

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POSTNORMAL JAPAN

C. Scott Jordan

There is nothing 'normal' about Japan. Normalcy has never been Japanese style; and there are few signs that the trend will change in the future. Indeed, Japan has been dealing with internal chaos, uncertainty and contradictions for decades – a rare state amongst world's nations. The movement towards, turned hastily into an endorsement of, postnormal times in Japan was not so much a murder of tradition, but rather a systematic shedding of classical elements from its society. This orderly peeling occurred on a gradual scale. It became most pronounced first during the industrial revolution at the turn of the century leading into World War II, then in more rapid succession since the 1951 Treaty of San Francisco. An extrapolation of Japanese policy and actions reveals how the country practically navigated itself through to postnormal times.

How this system of navigation developed provides needed insight into the concept of change. In the past, change has been a concept states have kept a close eye on in their efforts to maintain control and order. China, for instance, looks to constant revolution to use change for its own hold on power. In contrast, North Korea pretends the concept itself does not even exist, and choses instead to remain in a cryogenic state that even global warming cannot thaw. Most Western states uphold a love/hate relationship with change which has become standard operating procedure since they climbed out of the Enlightenment into modernity. Japan, on the other hand, has taken a radically different approach to change: the Republic of Japan, standing currently without a national motto, has bravely donned the 3c's of postnormal times: contradictions, complexity, and chaos as it paces towards a new tomorrow.

When investigating postnormal times in terms of policy and the state, an important premise must be kept in mind. The old world method shows that each state (the same could be said of intergovernmental and nongovernmental organizations) has its own rubric by which everyday problems are solved.

LIFE USED TO BE COMFORTABLE WHEN FOR EVERY PROBLEM X, THERE WAS A RATIONAL AND EASILY ARRIVED AT SOLUTION Y. IN POSTNORMAL TIMES, THIS SIMPLE EQUATION YIELDS A PLETHORA OF DIFFERENT ANSWERS: FOR EVERY SOLUTION Y, PROBLEM X IS EXPONENTIALLY INCREASED, AND MANY MORE PROBLEMS, A, B, C, D AND SO ON EMERGE, EACH WITH AN UNKNOWN THAT HAS YET TO BE DETERMINED.

The comfort and security of the old world approach to problem solving makes the initial push into postnormal times appear as though one is venturing into a dangerously rocky sea. It is an environment that cannot be controlled or conquered. Japan realized this some time ago; and this understanding is perhaps its greatest contribution to the study of postnormal times.

Since Japan's opening up to the Western world, particularly with the signing of the Treaty of Kanagawa in 1854, the country's society has become more complex. The resultant opportunities for chaos, and rampant contradictions in policy and culture, have given ample signs of the coming of postnormal times in the land of the rising sun. The Japanese artist Katsushika Hokusai painted the Great Wave off Kanagawa, his most famous and celebrated work, between 1830 and 1833, during the late Edo period. It depicts an enormous wave – or it is a 'tsunami of change' – threatening boats off the coast of the prefecture of Kanagawa. Since Kanagawa, Japan's history has been told in frequent paradigm shifts, one change leading to another, that eventually turned the historically grounded traditional Japan into an engineered child of Western power and culture. But the prodigal son returned to surmount the father. Japan entered the world's stage through industrialization, colonization, global war, and finally globalization to an extent no other non-Western nation had at the time. It even played the game of peace, which few Western states have dared to play. This experience of rapid change and embrace of uncertainty provides us with a clue to why Japan might be able to navigate postnormal times more successfully than most other countries.

The Great Wave off Kanagawa, Katsushika Hokusai (ca. 1829–1833)

To understand why Japan is best equipped for postnormal times, we must first see how the country navigated the 3c's in history.

Let's begin with complexity. Sure, it is easy to say, no matter where you are in the world, that the world in 2015 is far more complex than it was in 1954. But complexity can manifest itself in a number of forms. Let me illustrate this with the example of the Rubik's Cube. If you gave one of these devises, with all the small squares mixed up, to an average person, he or she will find it quite complex. But as middle school level puzzle-philes have displayed time and time again, there is a pattern by which the cube can quickly, and simply, be solved, making each of its six sides one solid colour. In fact, the Rubik's Cube is not complex, but rather simple. Let us change the rules slightly. First you are colour blind, second for every shift you make in the cube, another automatic and random shift is made without your approval. Suddenly the simple solution devised by our middle school students is rendered obsolete.

Complexity is by no means a foreign concept to Japanese society; rather it has been a resident feature of its history. Life and the structures of society in Japan are riddled with rigid expectations of hierarchy, loyalty, respect, and ritual. Even a casual glance over Japanese history shows a complex feudal system amongst the imperial state and even amongst the Samurai, who were supposed to lead life marred in strict discipline. The introduction and

adoption of Confucian ideals from China established a code of hierarchy and morality. A Japan influenced by the West only compounded its complexity as ideas of growth, industry, conquest, and democracy were added to the equation. The story of Japanese history is more a story of the fusing of the new, the outside, with what was local and indigenous, to make something anew, yet that retained its old, traditional values. The combinations of traditional and ritual met Western rationality and innovation to form a harmonious blend, elements of each complimenting the other to produce a pragmatic outcome for Japanese culture and life [1].

This formed an intricately woven fabric comprised of multitudes of varying strands that still permeates Japanese thought. After each additional layer of complexity, Japan experienced a new renaissance. Always new and yet always thoroughly Japanese. Elegantly crafted systems of education, governance, and military were reformed to become new products, recognizant of the old, yet engraved with a distinctive Western signature. Education is still held paramount, yet new concepts are added to the curriculum and student gain a conglomerate education accumulated abroad. The absolute rule of the emperor is supplemented by a very Western style parliament, but this parliament practices ritualistic respect while still holding on to the idea of democracy. Later, we see the government become more oligarchical in nature as the emperor's power diminishes and an institution of many voices rules the land. Later still, nepotism and political families entrench themselves into the Japanese political system [2]. But despite all this, the very democratic idea of equal representation is seen by the parliament itself as strictly one Japanese voice. A loyal, specialist trained force of warriors and guardians, sworn to protect the emperor is systematically replaced with an industrial military complex, still the new formation still holds on to the old 'loyal to the death' pledge [3]. Eventually, all elements of a warring society are removed, only to be reshaped, years later, to a military loyal to 'peace and the security of all humanity'.

The Japanese have morphed again and again in an organic flux of East and West. But chaos is never far removed from a complex system. And Japan has almost constantly been on the edge of chaos in its attempts to steer the course of events. Let us add an extra layer of complexity to the Rubik's Cube. Imagine that all 54 squares within the cube can communicate. For each shift you make in the cube, one of the nine squares on each side randomly changes. Chaos now grips the reins of this postnormal ride and the smallest changes produce radical outcomes.

The complex changes, internal and external dynamics and blends of ideals meant that spurts of chaos have provided the rocky bed on which

the river of Japanese transition had to flow. Chaos in Japan has largely been observed through its power struggles. Individuals and small groups were responsible more and more for drastic changes to Japan's policy and direction. The object of power, and those who sought after it, drove the nation's military through a tumultuous evolution, leading to its eventual extinction. Western thought may have produced economic dividends, but it also led to periodic emergence of nationalist fervour, and bitter chaotic internal struggles. The nationalists pushed the state to move and gain control of Asia and the Pacific, pushing it into World War II; while educated advisors sought to eradicate the Samurai tradition and concentrate on building modern industrial military. These internal dynamics came to a head with the dropping of two atomic bombs and the most awful loss of life in human history. Post-war Japan was heavily influenced by foreign inspiration and the embrace of such ideals as efficiency and development heavily controlled Japanese Policy. Even foreign conflicts were taken on board, such as the Cold War and the War on Terror. Most recently, tight ropes are walked between economic dominance and economic catastrophe, technological leadership and environmental plunder, and harmonious peace and hostile security. The value of tomorrow's yen is determined by how 'cool' the latest gadget or the new manga comic or animated movie is perceived in industrial states today. The country is gasping to keep up with the latest developments in technology while neglecting infrastructural maintenance ignoring disastrous ecological threats. A handful of rocks between Japan and China threaten the balance of power for the entire region. The frequency of chaotic events, propelled by the complexity of the new Japan, introduces dangerous irrationalities in a fatal dance with uncertainty.

Against this background of complex and chaotic state, the natural outcome is contradictions. Let us return to our Rubik's Cube. Previously we have introduced random changes: a random move is made for each one you make and a random square is allowed to change its colour with each move you make. This allows a new possibility to surface. The random changing of small squares allows, for example, for the cube to contain ten red squares. With ten red squares, the game's objective cannot be completed.

In our picture of Japan thus far, a problematic contradiction is already present between the new Western 'wisdom' and old loyally bound tradition of the totalitarian empire [4]. This conflict grew to produce two incompatible and devastating contradictions: foreign influence usurped the emperor while the Japanese themselves remained totally loyal to the monarch. Indeed, it is a contradiction that has even resurfaced today as the pressure of outside powers (particularly the United States, China, and Russia) has attempted to

override constitutional law and the governance of the Diet. The paradoxical structure of power in Japan was evident during the World War II. Different branches of the military flexed their influence on policy, resulting in a contradictory war strategy. The army declared the Soviet Union the greatest enemy to the Empire, while the navy made the same claim against the United States. Not only did this split the policy and thus the aim of the war strategy, but it also resulted in Japan's surrendering itself to two powerful enemies simultaneously [5]. Examples like these have left Japan defeated and exhausted. But other examples show how change to overcome the contradictions works with Japanese policy formation today.

The post-war Diet was meant to be one of the greatest success stories for democracy. Unfortunately it quickly turned a nightmare [6, 7]. Although the country had many opposition parties, there was only one clear ruling party, the Liberal Democratic Party (LDP). This contradiction was corrected in favour of democracy with reforms made in the mid-1990s; there results are still being seen in the current shift in the politics of Japan. A current debate is the contradiction between the security of the state and the strict mandate presented in Article 9 of Japan's Constitution preventing the formation and maintenance of a standing military. Over the course of this recent history, Japan has become more complex and chaotic and torn between contradictory policies. These markers of postnormal times still permeate the state's affairs.

Even in the business world, Japan's approach to capitalism appears conflicted to Western business professionals. Capitalism is fuelled by competition, which, the theory goes, creates a never ending struggle to produce the best products in the best possible ways. Japanese tradition does not regard competition as a virtue. The Japanese business world is composed of fewer businesses covering greater demands. Monopoly is not a dirty word in Japan. Rather, if one business comes to control a certain market, the Japanese respect that and other businesses look to other markets. Internal competition is virtually non-existent, and small business is much more difficult to establish. Instead of using internal competition, Japanese business looks to compete on the global market; and Japan, the nation, is seen as a corporation competing against other corporations on a global scale. Just how successful is this approach is hard to judge since Japan has been one of the worlds' top economies while also experiencing the same pains from crisis that has rocked economies across the world in recent years.

Despite all these problems and contradictions,

JAPAN HAS MANAGED TO SUCCESSFULLY RIDE THE COMPLEXITY AND CHAOS OF ITS OWN SOCIETY AS WELL AS THE UNCERTAINTIES OF THE GLOBAL ENVIRONMENT.

Some truly magnificent work has been done in Japan over the last seventy years. Tokyo may be one of the most contradictory and chaotic cities on the planet, but it still leads the world on technological innovations. I would not suggest that Japan has been a beacon of success or a model we should emulate and strive for. But Japan's recent history does provide us with a few key lessons to how the postnormal storm can be navigated in the future.

Three elements of the Japanese navigation plan provide important knowledge for postnormal times. The first one is simply the Japanese Diet. While at face value the institution appears just one of a vast number of parliaments across the world, it has in fact developed and evolved into something quite unique, capable of force many other legislatures lack. What started as a council of scholars for the emperor has evolved into civic minded academics fighting to preserve Japan's deeply rooted ritual; what once looked like the board of a corporation has finally become a ruling body of many voices, a force in the global economy and an important litigator of global affairs. While other legislative bodies tend to be comprised of duelling extremes hoping to meet in the middle, the Diet has been reformed so as to direct itself from being a one-party or even two-party dominated system, hoping to allow for the greatest representation of the Japanese voice. This mixed with the rigid background of tradition requires each faction to take different approaches to thinking, speaking, and presentation in order to get through their initiatives [8]. The Diet also retains special attention from the outside world, which only a few other nations receive except when potential conflict is in the air.

This outside attention is coupled with the second element of Japanese postnormal navigation, a global consciousness. Japan realizes it is not alone in this world and knows it both effects and is affected by what is going on around the rest of the planet. This may be a recent realization but it is an important one as it not only changes the game Japan plays with politics, but also the mind-set of the Japanese politician. Their very survival depends upon it. Militarily, Japan must be ever conscious, especially following World War II, of the security structure of its region and now, with the rise of global terrorism, the rest of the world. In economics, they have seen the good and the bad and especially with the ever-present spectre of financial collapse in postnormal times, Japanese policy must reflect a careful understanding and appreciation of the global economy.

The third element is forward thinking. It sounds simple but in balancing domestic and foreign policy it is not unrealistic that a government would rapidly be caught up in the immediate present and unable to see much further forward than the pressing current events. But the position Japan currently finds itself necessitates forward thinking; Japan must remain several steps ahead in its policy in order to survive. Being a nation without a standing military, with neighbours who have rapidly become major military powers, and historical tensions resurfacing, the country is forced to give utmost priority to international peace. The last time Japan experienced similar conditions, it had the strongest military in the region. Now it must rely for its security on the United States, which is already committed to conflicts of its own and would have serious hesitations over waging a war against China and losing its soldiers to a foreign cause. Japan has also risen from nothing on the world economic comparison charts to being in the top five consistently. Becoming a top economic power requires more than a casual understanding of international markets and finance. Japan needed to have the foresight to not only be competitive in the global market, but also to develop the most price effective and attractive products so as to be on top as it did in the late 1980s and early 1990s. To maintain this level of innovation, it needs to be able to think and plan ahead for decades.

As the phenomenon of postnormal times becomes ever more evident, it would be interesting to see how Japanese decision makers shape their state policy and adjust to an increasingly uncertain global environment. The new randomized Rubik's Cube cannot be solved, but from it we can learn a great deal about ourselves and how we ought to walk upon this planet. The radical changes that have occurred in Japan since its opening up to the Western world in the mid-1800s, and especially following the conclusion of the Second World War, give essential clues and lessons that provide insight into how other states may be able to cope with postnormal times. Of course, Japan is not the only country to have navigated nor experienced postnormal times, but it does furnish us with an example of how a modern state adjusts to change and uncertainty. By studying Japan we may be able to develop a deeper understanding of postnormal phenomena; and perhaps map out how postnormal change can be navigated on a personal, regional, and global level so as to prepare ourselves for and embrace the world that lies before us.

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THE MIDDLE EAST IN POSTNORMAL TIMES

Ziauddin Sardar

The Middle East has seen unprecedented changes during the last decade. There was much hope for democracy and a viable future for the region with the emergence of the 'Arab Spring'. The 'revolutions' across the Middle East were not just a product of discontent and fury against dictatorships; after all, the Arabs have been raging against their rulers for well over half a century. The Arab Spring was also a creation of a particular period of time, a time where globalisation, interconnection and instant communication are the norm, and authority and political legitimacy are in flux. Its precipitating factors were also economic: climate change is affecting the region seriously and drought and shortage of food were common themes amongst poorer Arab nations. But within a couple of years, the Arab Spring turned into an Arab Winter. Mayhem and counter-revolutions followed with the same astonishing speed as the original uprisings spread through the region. Egypt returned to an even more suppressing military rule. Libya fragmented between warring tribes. Iraq collapsed as a viable state. And Syria became mired in an intractable civil war. Things changed. But, on the whole, they became worse.

To appreciate the reality of contemporary Middle East, it is important to realise that the problems of the Arab state, indeed problems of all societies are complex. The politics of a democracy, the questions of economic reforms, the hopes and aspirations of a diverse and pluralistic society, the stubbornness of entrenched institutions such as the police and the military, are all complex issues that do not have simple or straightforward answers. Complexity is enhanced by the fact that all such problems are interconnected, have a direct bearing on each other, occur simultaneously, and can multiply rapidly. When international actors are involved – and they are always involved – complexity can be further enhanced. The Middle East has the second largest mobile-phone population in the world; and the use of smart phone is doubling every year. It also has the youngest population in the world: almost 65 per cent of the people in the region are fewer than 30. And three-quarters of

these young men and women are perpetually glued to their smart phones: tweeting, blogging, and using social media to upload pictures, comments, news, as well as organising petitions, demonstrations and engaged in other political activities. The rooftops in most major cities in the Arab World look like a canopy of satellite dishes. There are more than 300 satellite stations broadcasting 24-hours – mostly propaganda of one sort or another, but there are also a handful of genuine news channels such as Al-Jazeera. This all-pervasive interconnectivity can often generate positive feedback. The angry and restless young are primed to react instantly and set off new patterns of chain reactions. Not surprisingly, the Middle East is constantly at the edge of chaos. As such, the problems of the Middle East cannot be solved in isolation. There is little that can be hidden from the global gaze. A single problem requires inputs from a multiple of perspectives and actors; but that problem may itself be connected to a host of other problems.

An authoritarian state at war presents us with even more bewildering complexity. Consider the battle fields of Syria and Iraq, where it is not easy to discern who is fighting who. The Syrian Democratic Forces (SDF), dominated by the Kurds, are supported by the CIA and the Pentagon. But the CIA faction has been fighting the Pentagon division as much as both are fighting Isis or the so-called Islamic state, the al-Nusra Front, Bashir al-Assad regime, as well as the Russians. There are also factions within the SDF who do not enjoy American support and who are fighting the CIA and Pentagon backed factions. The al-Nusra, originally affiliated to al-Qaeda and sometimes supported by Saudi Arabia and Qatar, was fighting the secular SDP but then joined forces with them to defend Aleppo from the Assad regime. Turkey is fighting Isis as well as bombing the Kurds even though the Kurds are fighting Isis. Russia is allegedly fighting Isis but is in fact bombing everyone perceived to be anti-Assad, including civilians. US and Britain back secular fighters and Sunni groups against the Shia Alawites and the Shia Hezbollah militia from Lebanon but have never bombed Assad forces despite showing concern about civilian causalities. In Iraq the situation is reversed: here US and Britain support the Shia government against the Sunni insurgency. The Iranian Shia militias and the Hezbollah are fighting Sunnis everywhere. Loyalties and sides change often and then change back again! This level of complexity cannot be untangled easily.

Apart from chaos and complexity, which are interlinked and feed on each other, the Middle East is riddled with contradictions. The contradictions in the theatre of wars in Iraq and Syrian are all too visible. Equally visible are the contradictory aspirations of the people and their political leaders that pull and push in different directions. Tradition and modernity are perpetually

at loggerheads. There is a constant and perpetual clash of contradictory perspectives such as 'religious' and 'secular', 'liberal' and 'fundamentalist', 'national' and 'ethnic', and 'sectarian' and 'linguistic'. Tribes jostling for power and influence, with their own specific and often contradictory agendas, at each other's throat. The glaring disparity between rich and poor within and between Arab nations, the desire to preserve local culture while enjoying the financial benefits of globalisation, and the fact that certain segments of society and culture are going through unprecedented change while other aspects of social life remain quasi-static. And an absence of a language for negotiating difference and transcending contradictions add to the anger and frustration of the citizens who demand instant solutions for pressing problems such as unemployment, basic utilities and security. In a complex and chaotic context, such contradictions become magnified and more visible.

So understanding the nature of postnormal times in general, and complexity in particular, is essential for navigating the Middle East towards peaceful stability. The real solutions to the problems of the Middle East require long term policies and effort. And a leadership that has some inkling of how to ride the tiger of postnormal change.

THE ARAB SPRINGS THEMSELVES WERE A PRODUCT OF A PERIOD OF GLOBALISATION, COMPLEXITY, CHAOTIC BEHAVIOUR, CONTRADICTIONS AND RAPID CHANGE [1] – WHERE SMALL PERTURBATIONS IN ANY POLITICAL OR ECONOMIC SYSTEM CAN MAKE A BIG DIFFERENCE AND LEAD A SOCIETY TO THE EDGE OF CHAOS WITH THE POTENTIAL OF TOTAL COLLAPSE OR GENERATING A NEW ORDER [2].

Hence, an angry and frustrated self-immolating vegetable vendor in Tunis became a global television event and was able to start a revolution that quickly crossed national boundaries and spreads throughout the region. A software specialist working for Goggle could initiate a mass demonstration in Cairo's Tahrir Square with a quick post on Facebook. But once a chaotic event is triggered it is not easy to predict where it will lead.

To appreciate the special character of postnormal times, it is worth comparing them with what we may call 'normal time' – that is, the time before

the Arab Spring. In normal times, a generalised acceptance of the existing distribution of power and the hierarchy of interests is maintained. There may be a corrupt dictator at the top, but most people know their position in relation to power. Normal times are not without dissent or dissatisfaction, including attempted rebellions, but change is overwhelmingly accepted as working through and with the way things are. The political and social compact that holds society together is the acceptance that the vested interests and power holders, however corrupt and greedy, will ultimately do something for the nation and the common good. Indeed, some of them actually did. Therefore, the powers that be and the hierarchical order of things are the basis from which a better future is envisioned and is the premise on which a society directs its efforts to realise the future. In normal times, a rich mythology underpins popular understanding and support for society and economy. The mythology may glorify the army or the 'nation' or the supreme leader; it may even be based on a dissenting vision of an alternative ideology that will, one day, usher a utopia, such as the notion of an 'Islamic state' based on the Sharia. There are caveats and escape clauses which allow for imperfections in the governing system; but the caveats do not undermine collective belief in and acceptance of the national narrative. The mythological underpinnings also create the most sought after luxury of normal times: time. Things may be difficult, rulers may be oppressive, but there is some confidence that problems will eventually be sorted out given ample time.

In postnormal times, there is no luxury of time: liberated from the shackles of a dictator, and with rising hopes and expectation, citizens demand immediate attention to their problems and urgent solutions. But attempts to meet their demands and solve their problems only lead to further entanglement in a complex web, and multiply rapidly, concurrently and dangerously. The problems are aggravated. Disgruntled citizens and groups with vested interests, freshly empowered, take over the streets again, generate positive feedback, leading rapidly to chaotic behaviour and a new impasse. It is important to note that protests in postnormal times work not as conventional demonstrations with an identifiable leader, such as a politician, a union spearhead, or a student trailblazer, but as a networks without leaders. A network is an elusive entity manipulated by nodes of communication. Street politics thus acquires a new and powerful dimension: instant communication means that massive crowds can appear rapidly; the presence of global media ensures that a national issue becomes an international event. The potential for chaos to emerge, as we saw in the 28 May 2013 Gezi Park demonstrations in Istanbul, are exceptionally high. The impact of this chaotic event was to reverberate in Turkish politics for years to come.

Moreover, in postnormal times there is no confidence in the institutions of the society. All the basic institutions of the state – the bureaucracy, the judiciary, the police, the army – are despised and identified with the old regimes. But at least, they got things done, and kept a lid on warring tribes and sects, which are now free to vent their suppressed anger on each other. All that the citizens took for granted seems to evaporate and cannot be trusted to deliver what little it is supposed to deliver. There is no new narrative to replace the mythology of normal times; the utopians have won, democracy has been delivered, and there are no alternative narratives of hope. So in postnormal times, the problem is society itself. And it is a complex, iterative problem that has no simple or immediate solutions, while the citizens demands instant quick fixes.

In normal times, uncertainties are small and manageable. But in postnormal times, uncertainty takes centre stage. Since everything is interconnected, complex and chaotic, and changing rapidly, nothing can actually be described or trusted with any certainty. The citizens are totally bewildered: the past was so radically different from the present that there is no history to learn from, the contradictions of the new polity seem impossible to deal with, and the euphoria of the revolution gives way to new anxieties.

Seen from this perspective, it is not too surprising that the Arab Spring turned into a winter. The elected rulers of Egypt, Tunisia and Libya discovered that to become thriving democracies they needed to deal with, or in some cases establish, complex systems of governance. In a democracy, governments are made up of many people and groups, with different vested interests, some armed with weapons, within entrenched institutional frameworks such as bureaucracies, judiciary and army with their own privileges to preserve, all regulated with pre-democracy norms, procedures and precedents. It is not just a question of many different and diverse parts, but how these parts interacted to produce a complex whole. Moreover, the leaders of new democracies have to deal with this diversity and complexity in a rapidly changing environment, rising expectations, and constant threat of chaotic behaviour from disgruntled citizens or groups with vested interest.

HIGHLY COMPLEX FUNCTIONAL AND SUCCESSFUL SYSTEMS DO NOT EMERGE OVERNIGHT. THEY EVOLVE GRADUALLY AND TAKE GENERATIONS TO REACH A STABLE STATE.

But to be successful they have to be able deal with some of the basic characteristics of the postnormal world. Take, for example, globalised markets that serve only those who pay; or democratic politics which is all about the balance of power. So any post-spring economy that is purely market based is not going to cater for those who are, and were systematically, marginalised by mainstream financial and economic sectors. And any polity that is not inclusive and pluralistic will not be stable. If governance is dominated by a particular segment of society – as in Syria or Post-Gulf War Iraq – or certain national stake-holders feel totally powerless, or if attempts are made to impose the will of a particular segment of society on others, politics comes to a grinding halt. Empowered citizens take to street – and chaos takes its natural course. One of the main principles of survival in a complex environment is that its controlling mechanism must itself be complex – what is known as Ashby's Law of Requisite Variety [4]. In other words, plurality and diversity have to be at the heart of governance, and reflected in all state institutions, for new democracies to endure. When this does not happen, even the most successful states face serious obstacle.

A good example is provided by Turkey. Here we have one of the most successful economies of the Muslim world, led by a pragmatic and moderate Islamic party, the Justice and Development Party (AKP). The AKP has not only improved the economic lot of the vast majority of the citizens, it has even managed to force the military, the guardians of Turkish secularism, to abandon all concern with politics. Indeed, it is the most popular, democratically elected government in Turkey's history. Yet, as the May-June 2013 Gezi Park protests in Istanbul's Taksim Square demonstrated, the Sublime Porte, an apt term to describe contemporary Turkey as it seeks to rediscover its Ottoman heritage and culture, has little understanding of postnormal times. Despite the popularity of the AKP government, the country is constantly being pulled in different directions by secularists, Kamalists, Kurds and supporters of different outlooks on Islam. Given the plethora of shopping malls already in Istanbul, some felt that another one was unnecessary, especially if it meant losing a much loved historic park. Shopping malls are the inevitable result of market driven economies, societal 'progress' and consumer demand for choice. Gezi Park, however, is not just a park: it is a metaphor for a particular notion of 'Turkishness' that AKP promotes but other groups in the country reject. In other words, it is as much about a politics of identity as markets. The AKP is proud of its Islamic identity – and rightly so. But identity is not something that can be manufactured let alone levied; and the values it generates have to be intrinsic and not imposed from the outside. Those who embrace AKP's Islamic values in Turkey do so willingly; and those who reject them should

also be equally free do so. The type of secular nationalism that AKP seeks to promote is based on socially conservative Islamic values that cannot, or will not, be uniformly embraced by all segments of society. The plan to ban alcohol is also a metaphor for individual freedom. No one can force anyone to drink. But in a pluralistic democracy, those who wish to drink have the right to do so. Moreover, to impose a single notion of identity on a diverse society is to go against the forces of complexity and postnormal times, with all its attendant consequences. This is perhaps the most difficult thing to grasp for all varieties of Muslims in the Middle East. In the contemporary world plurality has a very specific meaning: its means all members of society, including those who reject your values and embrace values you abhor, are included within the overall framework of the nation. Of course, you can disapprove; but you cannot ban, exclude or marginalise.

There is an unstated assumption that Islamic thought results in Islamic values, however they are defined, which are 'natural' and benefits society and its citizenry. The dilemma for a government with Islamic leanings is to provide leadership and promote these Islamic values without eroding freedom – a balancing act between promoting and enforcing such values. It is policies based on this assumption that led the then Prime Minister Recep Tayyib Erdoğan to face the accusations of 'totalitarianism'. Of course, he is anything but: it is totally ridiculous to accuse a democratically elected Prime Minister, who has won election after election, of 'totalitarianism'. But he can be blamed for a category mistake: confusing populism with pluralism. The complexity of postnormal times meant that when confronted with the demands of the Gezi Park protestors, Erdoğan was unprepared for their reaction – they didn't want 'intervention' in their lifestyles. Ozhan suggests Erdoğan needs to overcome his nineteenth century positivism to 'be free of accusations of totalitarianism. I would argue there is also need to transcend ninth century Islamic thought and an awareness of postnormal reality and its complexities.

Ironically, both populism and postnormality came to the rescue of Erdoğan during the 15 July 2016 military coup. It has been blamed, on the followers of Fethullah Gülen, a teacher turned venerable leader, who was a former ally of (by now) President Erdoğan [6]. While the Gülen movement ostensibly has Sufi tendencies and preaches love and good will to humanity, it has historical links that reach deep into all aspects of Turkish society. Turkey is no stranger to military coups; and the 15 July coup followed a familiar historic pattern. The coup leaders blocked one of the bridges connecting the Asian and European sides of Istanbul, surrounded Istanbul's airport with tanks, and soldiers seized control of a television station and proceeded to make their demands. But in postnormal times, the communication channels are not limited to a

single television station. Moreover, given that the citizens are primed to act instantly, thanks to social media, a certain level of popular support is essential for a coup to succeed. President Erdoğan was able to tap into another television channel: he addressed the nation using Facetime on his iPhone, urged his supporters to take to the street. What could be more postnormal? But it was not just his legions of supporters who answered Erdoğan's call; members of all parties, as well as secularists and Kemalists (this, despite the fact that Mustafa Kemal Atatürk, the founder of modern Turkey, made the military the guardians of secularism and Kemalism [7]), people from different ethnic groups and different allegiances, came out on the streets. Unlike the liberals and secularists in Egypt, the Turkish counterparts preferred democracy – however defective and compromised – to military rule. Once the streets were occupied by the citizens, the old fashioned coup reached its inevitable postnormal conclusion: collapse.

In contrast, the military coup in Egypt had huge popular support. The Tahrir Square demonstrations of 2011 toppled Hosni Mubarak and brought President Mohamed Morsi into power. Morsi, a well-meaning man, belonged to another century in another place. That his traditional Islamic thought was totally inapt in dealing with plurality became evident in the new Egyptian Constitution [8] he tried to shape. Most members of the Constitution drafting committee belonged to the ruling Islamist party, the Freedom and Justice Party (FJP), and the ultra-conservative Nour Party. Article 1 of the Constitution described the 'Arab Republic of Egypt' as 'an independent sovereign state, united and indivisible, its system democratic'. Article 2 declared that 'Islam is the religion of the state and Arabic its official language', which is fair enough given that Egypt is an Arab Muslim country. But then Article 2 went on to state: 'principles of Islamic Sharia are the principal source of legislation'. Given that Sharia means different things to different people, even amongst Muslims let alone non-Muslims, this was a recipe for inviting dissent, inevitable disaster, and a clear attempt at suppressing diversity and plurality. Once the Sharia was into play, Egypt could hardly remain, as subsequent events demonstrated, 'united and indivisible'. To ensure that traditional ideas about gender, non-Muslims, and other equally inequitable notions of the conventional Sharia remain intact, Article 4 gave power of interpretation to 'Al-Azhar Senior Scholars' who 'are to be consulted in matters pertaining to Islamic law'. This was, of course, not all that different from the Constitution of Iran which gives these powers to a Supreme Leader and a Council of Guardians. The basic assumption inherent in these articles was that the people cannot be trusted, the very people who led the revolution, with issues of public morality or with knowing what it means to be a Muslim in the twenty-first century: they have

to be instructed and shepherded by a select elite. Finally, in case there was
any doubt, Article 219 made it clear that 'the principles of Islamic Sharia
include general evidence, foundational rules, rules of jurisprudence, and
credible sources accepted in Sunni doctrines and by the larger community'.
So the Shia, the Sufis, the Ismailis, and other variety of Muslims who do
not subscribe to the Sunni tendency need not apply for citizenship; women
should remain at home, their obligations towards family and society are
enshrined in the Constitution; and the non-Muslims should make for the
exit. Moreover, the President appoints one-tenth of the members of the Shura
Council, whose members are supposed to be elected by a secret ballot (Article
128). He appoints the heads of all national institutions, including the central
bank and audit bureau, which makes labelling them as 'independent' a bit
of an anomaly. This means that the President has almost complete control
over the legislative process. There was a string of other equally obnoxious
articles in the Constitution. While Article 45 granted freedom of thought and
opinion in absolute terms, the previous Article 44, prohibited defamation of
messengers and prophets thus opening the door to blasphemy a la Pakistan
where numerous innocent people have suffered from such a legislation, and
even young Christian boys have been sentenced to death. Indeed, it was not
just the prophets, but one could not show any contempt to any other human
being according to article 31. Given that the President is a human being too,
so any criticism directed towards him would lead a citizen directly to jail for
'insulting the President'. And if you were to insult the army, say by accusing it
of corruption, heavy-handedness or mismanagement, you would be tried in a
military court for 'crimes that harm the armed forces'.

Not surprisingly, Islamists and ultra-conservatives were more than happy
with the proposed Constitution. 'Supporters argued that the constitution would
bring stability', noted Ahmad Taher, 'and therefore enable the development
and foreign investment that was required to achieve ambitions and aspirations
of the Egyptian people. They also claimed that Article 2 and Article 219 would
work to moderate Islamic Shariah rule' [9]. The problem is that 'Islamic
Shariah rule' is seldom moderated; far from bringing stability, development
and foreign investment, it has always resulted, wherever it has been imposed,
in injustice, oppression, and strife. It is a monolithic institution in a world that
requires complexity to deal with complex problems. It curtails freedom and
equality in a world that demands it. It drags society back into ancient history
when the world itself is moving forward. Perhaps that is why the segment of
the Egyptian population not enamoured with 'Islamic Shariah rule' shivered
at the very idea. 'The opponents claimed that the constitution would bring
about a new tyranny by equipping the president with absolute authority and

broad powers while leaving no room for accountability and oversight. It was thought to reduce citizen's rights and impose restrictions on freedom to such an extent that opponents demanded a reinstatement of the 1971 Constitution along with a new Constitute Assembly', wrote Taher [9]. In other words, half of Egypt's population was so horrified that it preferred legislation drafted by previous dictators! It became apparent that the revolution succeeded in breaking only the outer layers of despotism: it left the bureaucratic, police and military structures, as well as mental authoritarianism, intact. Soon demands for the overthrow of Morsi began to escalate.

Having tasted the power of the internet to mobilise people and create chaotic events, the disgruntled segments of society took to the streets once again. The demonstrations against Morsi in Tahrir Square consisted largely of the same people - secularists, liberals, modernists – who removed Mubarak from power. This time they had a strong ally: the military. Indeed, the military not only used social media to mobilise the crowds but also used conventional media to whip up an anti-Morsi frenzy. Once again chaotic events took their normal course. The 3 July 2013 Egyptian take-over, that brought General Abdel Fattah el-Sisis into power and led to the suspension of the Morsi Constitution, was seen by many outsiders as a coup against a democratically elected President. But the army itself reject the label; after all, it was accomplished by full participation of the bulk of the citizens who urged the military to intervene and cheered the army and the police as it moved in for the kill. Followers of Morsi were slaughtered mercilessly in their thousands. Yet, no one protested – in Egypt or the West. Hundreds of Morsi supporters were tried and sentenced to death in bulk; still, on one raised an objection. The events in Egypt teach us important lessons about postnormal times: change is rapid and can upturn a system a number of times within a few years; chaos can lead to liberation as well as subjugation; postnormal times cannot be navigated successfully either with traditional Islamic thought or with autocracy and authoritarianism; and that dealing with plurality requires complex approaches.

When King Salman bin Abdul Aziz al Saud took over as the head of the House of Saud in Saudi Arabia in January 2015, he inherited a Kingdom that was falling apart, and an economy full of contradictions. The price of oil, the sole source of the income of the Kingdom, had fallen drastically - from $100 to around $30 per barrel. The budget deficit had reached the astronomical sum of $100 billion. An economy with a sovereign wealth fund that is envy of the world had to plead for a five-year loan of $10 billion in the open market. A population that never paid tax had to accept the unthinkable and start paying tax. A country rich in energy, where the population considered electricity and water subsidies as their basic rights, had to face the reality of austerity.

THE HOUSE OF SAUD FIGURED THAT THE COUNTRY NEEDED A VISION.

The Saudi Vision 2030 [12] declares that it is based on the firm belief that Saudi Arabia is God's unique gift to humanity. The arid, monolithic and oppressive Wahhabi interpretation of Islam will reign supreme and the Saudi Arabia will become 'the heart of Arab and Islamic world', which will serve as a springboard for the Kingdom to develop into 'a global investment powerhouse' and 'a global hub connecting three continents, Asia, Europe and Africa'.

Societal visions cannot be purchased off the shelf nor can they be imposed from the top. They emerge from full participation of the citizens, through debate and discussion – something that still needs development in the Kingdom. The region's turmoil and instability in postnormal times is hardly likely to leave the Kingdom untouched.

In sharp contrast, Tunisia has shown more awareness of post-normal reality. The dominant political party in Tunisia, Ennahda, like President Morsi's Muslim Brotherhood, is a product of the Islamic movement. It won the 2011 General Election that followed the fall of the government of Zine El Abidine Ben Ali – the first major event of the Arab Spring. And, like Egypt, Tunisia too had to go through a tough process of creating a new Constitution [13], which emerged after a number of different drafts. But unlike the Muslim Brotherhood of Egypt, Ennahda realised that ninth century Islamic thought is ill suited for navigating the complexity of postnormal times. Tunisia is as 'Islamic' as Egypt or Turkey, the Preamble to the Constitution seems to say, and will 'remain faithful to the teachings of Islam'. Article1 states Tunisia's 'religion is Islam, its language is Arabic', but the country trusts it people and Article 3 announces that 'sovereignty belongs to the Tunisian people' (not to God, Who is the ultimate Sovereign in any case, which is the demand of most Muslim fundamentalists and takes pride of place the Constitution of Pakistan, a source of endless confusion and scholarly amusement). Moreover, there is absolutely no mention of 'Islamic Sharia' but the focus is on human rights, rights to work, health care and education, and separation of powers are emphasised. Thus, legislative power belongs not to the President but to a Chamber of Deputies 'elected by universal, free, and secret vote' (Article 18) who advise and authorise the President 'for a set period of time and for a specific purpose, to issue decrees which he submits, as the case may be, to ratification by the Chamber of Deputies' (Article 28). Moreover, there is a formula to ensure that Chamber of Deputies is representative of the society as a whole with appropriate representation from regions, employers, farmers,

workers – and the Deputies represent not their own interest but that of the entire nation. The Judiciary is independent and selects judges from amongst its own ranks and local authorities have autonomy to run their own affairs.

It is worth noting that while *Ennahda insisted in creating a parliamentary system with checks, balances and full accountability, the secular parties fought for a semi-parliamentary system, with an active President with much greater powers. These* irresolvable (and ironic) contradictions between the different positions were *eventually resolved through dialogue and negotiations. Ennahda's aim was not to produce a constitution that is about* management and control but one that represented the views and aspirations of the diverse society of Tunisia and involved all sections in nation building. Apart from being more open and inclusive, the Tunisian Constitution recognises the plurality and diversity of the society it seeks to guide. It provides a complex system of governance for a complex society and times. Despite this, Tunisia has not been free of protests, mostly a product of high youth unemployment and economic depression about which the government, indeed any government, can offer no instant solutions. But the only protest that acquired a chaotic proportion was the riots initiated by the Salafists, during June 2012, after they attacked an art exhibition. There was also an attack by terrorists associated with Isis in June 2015 at the resort town of Sousse. However, such turbulence notwithstanding, Tunisia seems to be able to negotiate a cautious way forward. Unlike the Saudi clerics who enforce laws that persecute and denigrate women, or the Muslim Brotherhood who were happy to apply the oppressive injunctions of 'Islamic Sharia', Ennahda championed women's rights and enshrined equal opportunity in the 2014 Constitution. Almost a third of its parliament consists of female MPs. In 2010, a third of the judges and one-fifth of lawyers in the country were women. In 2013, a third of engineers in the country were women. There are over 700 civil society organisations working on shaping a civic society, including gender issues, sexual harassment and violence against women [14]. In 2016, Ennahda introduced an innovative bill in the Parliament to strengthen legislation on sexual harassment and violence against women – covering psychological as well as economic harm in the public and domestic spheres. Unlike Saudi Arabia's imported vision that is imposed on society, Tunisia is shaping a vision of its future that has emerged from the grassroots, involves all segments of society, seeks to transcend contradictions, acknowledges complexity and diversity – and, as such, is a better instrument for navigating the choppy waters of postnormal times.

The difference between Tunisia and Egypt, as reflected in their respective attempts to shape a new constitution, is essentially a difference of mode of thought and an appreciation of postnormal reality. Egypt is back in the grip

of totalitarians, and facing the prospect of a civil war, precisely because the Muslim Brotherhood leaders were struck in an ossified framework of Islamic thought which has never really been able to deal with diversity and plurality. It is a linear structure that shuns complexity. Saudi Arabia is deeply entrenched on a similar path, now aggravated with a poisonous dose of neo-liberal economics. Tunisia's stability, even though it may be a bit wobbly, comes from the very fact that it has embraced the diversity and plurality of its citizens; and placed complexity at the heart of governance.

The predicaments of postnormal times just cannot be resolved without genuine plurality or transcending deeply entrenched differences in society. Ironically, for those who are most concerned and obsessed with 'Islam', beat their chests and shout the loudest about 'defending Islam' and 'Islamic Sharia', Islam itself presents the greatest danger. Complexity tells us that no single mode of thought, or model of behaviour, or method can provide an answer to all our interconnected, complex ills. The neoliberal 'free market' is as much a mirage as the suggestion that liberal secularism, or some idealised monolithic notions of Islam, will rescue us from the current impasse. It is thus foolish to place our faith in a single ideology or a monolithic notion of truth. Diversity and plurality are essential both to understand and deal with complexity; and resolve our interconnected problems.

IN POSTNORMAL TIMES, THERE IS NO WAY OF CONSTRUCTING A MORAL ORDER EXCEPT ON THE BASIS OF EQUALITY AND DIALOGUE.

Contradictions teach us to accept and appreciate different perspectives and be humble. There are no absolutely right or absolutely wrong answers to any given problem. Even a very basic understanding of a problem requires a dialogue on its various dimensions, involving a whole range of perspectives and interests including those of citizens of different faiths, Muslims of difference persuasions, men, women as well as children, people of different social and cultural backgrounds, and different ethical notions. As contradiction cannot be resolved, we need to put our differences aside and manage contradictions and complexity through negotiated and consensual dialogue, where all participants are given equal voice. There are no authoritarian or violent means to resolve contradictions or dealing with complexity.

Virtually all the Middle Eastern states are standing at the edge of chaos.

They will either totally collapse – if they have not done so already – or transform themselves into a new order of existence. It all depends on how each state navigates the complexities and chaos of postnormal times in its own particular way according to its own specific situation.

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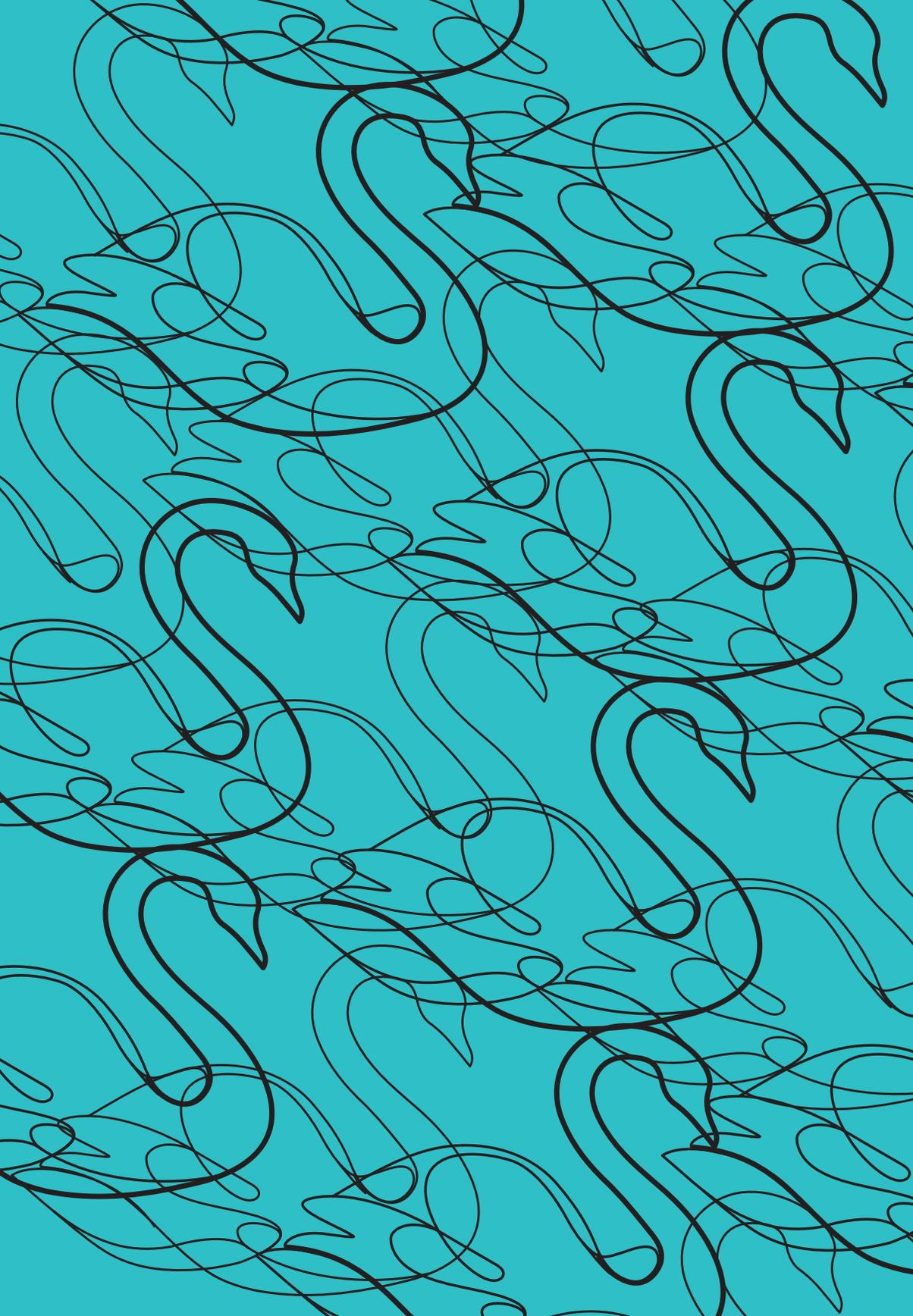
LIVES
AND
WORKS

THE GAME OF RELIGIOUS THRONES

C. Scott Jordan

Whether we believe in anything or not, we seem to take a radical position when it comes to defending our little sacred terrain. Who has provided the fodder for this fire of change? Who stood with ideology from the very beginning, only to become its Brutus? One word, one name. Uttered through song, prose, image, and practice radiating from ancient times up through to the popular today. God. A specific God? No. This is religion in all its multitude of representations that have permeated society, the mind, and life in general. Contrary to the myths of the enlightenment and postmodernism, God is alive and kicking – He is in our money, our government, our politics, our culture, and our hearts. From the most devout to the most rigidly atheist, God is as much a part of our identity as our social security number.

At face value this provides no immediate concern. We live, after all, in the sophistication of the twenty first century. You have your opinions and I have mine. Until I choose to kill you. This ultimate contradiction haunts political assassinations, attacks on religious centres, school shootings, wars, summer camps, suicide bombings, ISIS, and political elections. An old saying goes 'the greatest trick the devil ever pulled was convincing the world that he didn't exist'. Religion has pulled this very trick in our time. We think we live in a secular age, yet God is everywhere.

A certain school of thought deems that all fiction ought to be an escape from the grinding reality of the day to day. But sometimes the 'escapism' of fiction is just enough of a stretch to reveal deep insights into the reality we ourselves are blind to as we go about our days. This point is well illustrated by the popular HBO television series *Game of Thrones* and the series of books it is based on by George R.R. Martin [1]. The world Martin created respects and explores religion as it exists in the real world, as oppose to sweeping it under the carpet as most other works of fantasy [2]. Martin does not superimpose Christianity, Islam, or Hinduism onto his world, but rather creates a world of competing religions, mythological and political ideals, subject to the delusion of wealth, family, and

power. In doing this he gives us a clever allusion to the religious interactions of our own world and the contradictions that arise therein.

The episode titled 'What is Dead May Never Die' from the series' second season explores the themes of this interplay particularly well. From the very beginning until the rolling of the credits at the end we see wonderful examples of norm altering events that shake the course of narratives, taking it into unfathomable directions, as the series continues forward. We see a woman defeat one of the greatest male knights in a country largely built on patriarchal hierarchy, the youngest brother claiming his right to a throne built on this very hierarchy, and religious and mystical occurrences beginning to creep into a world now known to be devoid of magic (be that gods walking among men, men controlling the bodies of animals, or the possibility of dragons again roaming the land). From this arose themes that demonstrate Westeros and the rest of Martin's world is moving towards postnormal times.

In one particular scene, one of main characters, Tyrion Lannister, a dwarf who at this point is also Hand, or Chief Advisor, to the King of Westeros, is posed a riddle encapsulating the roots of power in Martin's world. The riddle is delivered by the spymaster Varys, another member of the King's Council. 'Three great men sit in a room, a king, a priest, and a rich man. Between them stands a common sell sword. Each great man bids the sell sword kill the other two. Who lives? Who dies?' After asking his riddle, Varys waits in eager, yet unanswered anticipation of Tyrion's response. Tyrion instead grows displeased as he has much more pressing matters on his mind and concedes to Varys. Varys responds with his wise lesson: 'Power resides where men believe it resides. It's a trick, a shadow on the wall and a very small man can cast a very large shadow.'

Varys has explained the postnormal state of the Seven Kingdoms to its new Hand, but also gave us a vital reflection on religion in contemporary times. Of course, religion and power have gone hand in hand throughout history. The Enlightenment, modernity, secularism and, more recently, postmodernism, consigned the 'grand narrative' of religion to the dustbin of history. But religion has now returned to take a centre stage: both as a power and as a system of policy and decision making. But something strange has also happened: thanks to social media, 24-hour news channels, and other forms of instant communication,

SMALL MEN CAN NOW CAST REALLY LARGE, GLOBAL, SHADOWS.

Consider, for example, the Reverend Fred Phelps and his followers known as the Westboro Baptist Church (WBC). They are known for their extravagant and pot stirring protests against funerals and other events supporting military service members and the LGBT community. Through their literal interpretation of the Bible, they have concluded that being an LGBT individual or dedicating one's life to military service is an affront to God and an express ticket to Hell. They have even gone as far as to make claims that these instances are the direct cause for natural disasters (such as Hurricane Katrina in 2005) and general dangers to America (for example the 11 September 2001 attacks). This church at the time of Phelp's death was reported to have 40 members [3]. Phelps' is by no means the only radical Christian Church in America, and unlike his contemporaries, has managed to accumulate a lot of America's attention, the world's attention, and thus cultivated enormous power. Every action they take, becomes an instant mega-event thanks to Twitter, Facebook, and the media hungry to fill their slots with sensational items. Their actions have given the world a general impression that all members of the Christian community, numbering around two billion worldwide, behave in such a manner. Even within Christianity itself, particularly in America, the example of the Westboro Baptist Church has put a dark mark on all followers of the specific Baptist denomination and the higher division of Protestantism. Baptists around the country have had to make great strides to separate their Baptist belief from the declaration of Reverend Phelps. This is awfully confusing to non-Christians and the breaking down of the system's structure becomes more apparent; and is on par with comparing one's dedication to one's US citizenship based solely on one's opinion of the William Henry Harrison presidency (which only lasted thirty days).

Pastor Terry Jones provides us with another example. Jones was a pastor of the Dove World Outreach Center, a nondenominational church in Gainesville, Florida. He was one of many anti-Islamic Christians who announced one day that he is going to burn the Qur'an [4]. His intention was instantly transformed into a global event: footage of the Pastor making his announcement was repeated endless on news channels. Twitter feeds went into a frenzy. Within hours there were demonstration in Egypt, Pakistan and Malaysia. Buses were burnt; McDonald's were ransacked; even some people were killed. Hillary Clinton, then Secretary of State, had to ring Pastor Jones and plead with him not to translate his intention into a real act. Through the actions of Jones, who had no more than two dozen followers, and the speed with which communication technology turned his intention into a global phenomenon, anti-Islam not only became a Christian idea, but an American, European, and generally Western sentiment in the eyes of outsiders. Jones did not end up burning a Qur'an and it

is unclear that he had any intention of carrying the act out.

What we witness it not a simple paradigm shift, but a fundamental reconstruction of what is and what is not normal in religions. The outreach of the extremist, the literal fanatic, the puritan and violent adherents, who would normally exist on the fringes, has expanded: it has become global in scale and scope. Only two decades ago, it would have been virtually impossible for these people to broadcast their opinions. Today, they have their own television channels; and they can upload their content on YouTube to be broadcast to the world in an instant.

Ironically, while we are constantly connected to virtual communities, real communities have almost disappeared. Rather than talk to each other face to face, people increasingly prefer to communicate via text, Facebook, Twitter, and numerous other social media technologies. In the absence of community, young people have become more and more alienated. In the face of increasing uncertainty, engendered by accelerating change, they long for certainty. In a world of disputed and contested values, they seek and fall back on absolutes. In an age where meaning has been abolished they seek meaning in their increasing alienated, uncertain, ambiguous lives. The contradictions of postnormal lives of today's young people play out in headlines that echo the concern of Vary's riddle. Consider these headlines:

MR. YAKEN WANTED TO BE A FITNESS INSTRUCTOR. HE TRAINED RELENTLESSLY, HOPING THAT HIS EFFORT WOULD BRING HIM SUCCESS, GIRLFRIENDS AND WEALTH [5].

SHE LISTENED TO COLDPLAY, READ HARRY POTTER NOVELS, AND DRANK IRN BRU, A SCOTTISH SOFT DRINK.

SHE WAS A CHEERLEADER, AN HONOUR STUDENT, THE DAUGHTER OF A POLICE OFFICER AND A MEMBER OF THE HIGH SCHOOL HOMECOMING COURT WHO WANTED TO BE A DOCTOR;

SHE ASPIRED TO BE A PHARMACIST OR A DOCTOR... [6]

HE WAS A QUIET BUT EASY-GOING PSYCHOLOGY STUDENT [7]

These appear to be rather typical descriptions of the up and coming generation, also known as millennials. They share ambitious future goals, school involvement, middle class upbringing, and demonstrable intelligence. They differ in where they come from. The first quote describes Mr. Islam Yaken from Cairo, Egypt. The second describes Ms. Aqsa Mahmood from Glasgow, Scotland. The last two are Ms. Jaelyn Young and Mr. Muhammad Dakhlalla from the state of Mississippi in the United States. They share one other important detail in common; they all desired to leave home for Syria, to join ISIS. But these students are not alone. This is not simply a phenomenon of the oppressed, secluded to a small corner of the Earth. It is global. And it is a specific product of our postnormal times, where the God-shaped hole in people's mind can only be filled with something spectacular.

Normally, trends followed by wealthy and educated societies should show a decreased influence on the part of religion or religious institutions. Classical definitions of religion made it a ripe fruit for the poor and uneducated, a form of empowerment. However, as society became more 'advanced' traditions and principles were skewed in the name of progress. God in a sense is tested as man took control of his own destiny and created a world for himself of robotics, artificial intelligence, virtual reality, medical advancements, and Twitter. Where God was once reconciliation for humanity's mortality, now science and technology fill that void of angst and inquiry [8]. God for all intents and purposes should have faded like any old theory, paradigm, or fashion trend. But God has returned with a vengeance. And the actions taken by these young people, simply do not make sense to most people. This phenomenon is not related to Islam. It applies to all religions. Notice how ready to kill and be killed are the young Hindu fundamentalists in India. Or the religious right youth in Eastern Europe. Or the Christian fundamentalists in Africa and the gun-toting evangelists in the US. They are all just as keen to create their own religious states in their own countries.

Uncertainty has fragmented religions beyond the conventional sectarian divides. In *The Game of Throne's* Westeros, there are several religions beginning with the most dominant of the Seven Kingdoms, The Faith of the Seven, in which, like the trinity of Christianity, believers pray to seven essences of one god. Prior to the Faith of the Seven being brought over by foreign invaders, Westeros largely believed in a polytheism similar to Native American and

Shinto religions that place a god in all aspects of nature from the skies, to the earth, and the seas. These 'old' gods are still widely prayed to by the ancient families of the North, such as the Starks, at the time of Martin's story. The Drowned God of the Iron Islands is praised in conflicts contrast to the Storm God of King Robert's homelands, aptly named the Storm Lands. It is even revealed that one of King Robert's brothers has converted to a radical religion from the East, the Faith of the Lord of Light, R'hllor. This is a radical religious group built on one god lighting the world against the dark and with violence creating a new world order. Other gods are mentioned in the East that derives from a cultural or geographical derivation in their basis. Almost as a jest, or to bring home a controversial point on religion in general, Martin gives us the Faceless Men, servants of the Many-Faced God. Unlike the other religions of Martin's world, the Faceless Men are silent assassins as oppose to evangelizing practitioners of one kind or another. The followers of the Many-Faced God do not oppose any of the other gods; in fact their temple is lined with iconoclasts of the other gods. For them, everyone is worshipping the same god, the one god of multiple aspects. This God is often referenced to as Death.

In the real postnormal world, the divisions and complexity of religions is just as daunting. Much is made of the Shia-Sunni divide in the Muslim world. But as Fredric Wehrey [9] shows in his edited anthology, the sectarian divides in the Middle East have become much more complex. Political economy, social media, state and non-state actors, charismatic clerics and tribal allegiances have produced truly bewildering sectarian identities. The sect, with its deep historic roots, and not citizenship, serves as the main gateway between individual and the state. In the US, Christian sects and divisions are increasing day by day – ranging from the Christian Zionists who want apocalypse and want it NOW, to a plethora of old and new evangelical groups. Check the list of Christian denominations on Wikipedia and be amazed! This, before we mention such 'oddities' as Scientology, Nuwaubianism, Church of Euthanasia (which demands that we kill ourselves to save the planet), Church of the SubGenius, the Church of All Worlds, The Nation of Yahweh, Creativity Movement, and Thee Temple ov Psychick Youth devoted to guiltless sexuality. Almost anyone with a little charisma and a Facebook account can start a new religion – and he (for he is usually a male) will not be short of followers.

Religion is a funny, troublesome word, not easy to define. Is Scientology a religion? Can the followers of a particular celebrity, who they worship unquestioningly, be said to be following a religion? Are those who kill in the name of religion religious? These are complex questions that cannot be answered easily. No wonder that contemporary scholars of religion avoid asking 'what is *a* religion' or 'what is *religious*?' The word itself has become

too complex, wrapping itself in preconceived notions, making any attempt to analyse it futile and probably fruitless [10]. Take, for instance, the debate over what exactly Buddhism is. According to David Brazier, British psychotherapist and Zen master, *Buddhism is a Religion*, like Christianity and Islam: 'you can believe it' [11]. But according to Steve Hagen (aka Roshi), the American Zen Buddhist, Buddhism is not a religion; it is 'beyond beliefs' and about seeing the world at each moment [12]. Both are equally good at talking about Buddhism; neither able to answers the question convincingly. The pitfall of definitional approaches is that the religion being examined is isolated in a vacuum, but like anything else that exists in the world, religion does not exist in a vacuum. An alternative approach raises questions about the essence of religion. For example, one might ask instead, after Martin Craig, is religion in and of itself violent [13]? But this too does not yield a satisfactory answer either. Some versions of a religion may well be violent at a particular time; but they may not be violent in another time and place.

THE RELATIONSHIP BETWEEN RELIGION, STATE, AND POWER HAS BECOME SO INTERTWINED, SO COMPLEX, THAT IT IS DIFFICULT – IF NOT, WELL NEIGH IMPOSSIBLE – TO SEE THE PROVERBIAL WOOD FOR THE TREES.

Contemporary thinkers have taken a perspective on religion that puts it in a historical and sociocultural context. The Swiss Catholic priest and theologian, Hans Küng, bluntly categorized religion in much the same way Thomas Kuhn categorized science – as a series of epochs [14]. One epoch exists until a revolution throws out the old idea and a new one comes to fill the explanatory vacuum. Küng defined religion as a mere set of beliefs, rules, and ethics which lead him towards concluding that the next step is a world ethic, where the fundamental principles of all religions will get themselves out of a 'postmodern slump' [15].

The post-colonial scholar Talal Asad takes a more anthropological approach to the question of religion. In his *Genealogies of Religion*, Asad examines the 'transhistorical' and 'transcultural' nature of religion. His approach is sceptical on multiple fronts. He is weary of contemporary approaches to history (mostly being a Western Capitalist march towards a World System), the Victorian idea of religion being the evolutionary origin of advanced

thought (such as politics and science), and the modern notion that religion is the primitive that was replaced by the civilized in terms of law, politics, and science [16]. Asad focuses his definition of religion on the investigation of the phenomenological approach provided by anthropologist Clifford Geertz which focuses on symbols and rituals. The end product is a sort of chicken and egg question over meaning and practice or meaning and thing itself. To put it a little more simply: does a religious symbol provides meaning, or does meaning bring about the symbol. Likewise, is ritual a practice of a meaning or did ritual create meaning through its practice [17]. These questions seem ancillary, but are in fact key when examining the rise of fundamentalism in contemporary Islam and Christianity. They point to an inherent paradox between practice and belief, and the historical conflation of politics, culture, and religion. Probably the same historical processes have led to the emergence of Hindu, Buddhist, Jewish and other religious fundamentalisms.

Karen Armstrong uses the same historical approach in *The Great Transformation*, beginning with the Axial Age (900-200 BCE) religions. For Armstrong, the fundamental concept of religion is compassion. Once humans felt for the other, the axial religions were born. The key insight she presents is that as the newer evolved forms of these religions ran into trouble, they fell back to the still intact axial foundations. Armstrong points to the desire for empire and political power as the breaking point for these religious paradigms. Her prescription for moving forward is to reflect upon the axial religions (Greek reason, Hinduism/Buddhism, Daoism/Confucianism, and Judaism), seek out common denominators (e.g. Love Thy Neighbour), and find the fundamental principles underlying these basic religions [18]. This suggestion can be thought of as a method for navigating the current postnormal times in religious thought, but it does require transcending the notion that 'My Religion is the Only True Religion'.

The analysis of Küng, Asad, and Armstrong suggests that religion often expresses itself as a super-self belief: not just a belief in the supernatural but also a belief in one's conviction of possessing the Absolute Truth. The super-self beliefs are expressed as super-self moves intended to shape the world. Thus, religion moves out of the boundaries of faith and becomes a decision making process; and inevitably comes in conflict with other decision making processes such as politics, science, state and secularism. In normal circumstances, one can have a separation of 'Church' and 'State' – something that has worked reasonably well for a few centuries in Western civilization. But things change radically in times of turbulence, uncertainty, complexity and chaos. Now, religion becomes the sole source of certainty for the believers; not just religion in the overarching sense but certainty is sought in one's particular sect. And

if all the sects out there do not provide the required certainty new sects, based around tribes, communities, historical links, political beliefs, grievances, aliens, and charismatic leaders are created to fill the gaps. The Self and Belief become one and the same thing as the Self becomes deeply ingrained in the religion. An attack on religion is perceived as an attack on the Self, the abandonment of religious principles in society is seen as a loss of the Self. And the lost Self is a dangerous thing; it is what leads to extremist groups in the Middle East or fundamentalism found in the United States and Europe.

This is what postnormal times have done to religion. When events that are product of contradictions and complexity converge towards chaos, a state of confounding uncertainty and deep ignorance is produced. Conventional religions cannot cope. Indeed, the founding principles and key dogmas of religion, its paradigm, begin to fall apart. A state of crisis is produced that feeds on itself generating a string of other crises. Thus complication within religion become as complicated as the Self. Even labelling becomes problematic. Who is a Muslim or a Christian? The generic followers, who label themselves as Muslims or Christians may be denounced by the 'more' faithful as liberals, moderates, secularised, or even heretics. Follower A claims to practice a religion that Follower B also practices, but in fact, both followers may base their beliefs on radically different theological or interpretative frameworks. Naturally when leaders rise, claiming dogmatic truths, the complexity implodes on itself, resulting in a flurry of chaos.

If you travel through the smaller towns of the Midwestern region of the United States, you will note that the boundaries between cities are defined by trafficked street with all the churches and bars on it. In fact, some of these towns will have a different church for every corner of an intersection. Generally, these are all Christian Churches, but differ in denomination and if you're lucky they may even have different motivational marquee messages. So the First Baptist Church may be quite different from the Second Baptist Church or the First Methodist Church while all may be on the same cross street address. They will have unique congregations living very close to each other. They will all agree that Jesus Christ is the son of God, but will differ in adherence and degree of devotion to other minor principles. When the lead pastor of one given Church speaks beyond his pulpit, his claim to the will of God will clash with the sermons of other pastors. Most often the clashes go unnoticed. But sometimes such small perturbations can lead to significant incidents. In postnormal times, one individual or a small group can have tremendous power to unleash chaotic events. Think of Reverent Phelps or Pastor Jones. Or the fact that only 19 individuals caused the most horrific atrocity in the history of the United States and set off a chain of reactions that lead to a 'war on terror',

the hunt for Bin Laden, the invasion of Afghanistan and Iraq and the collapse of both, the destabilisation of Pakistan, and the plethora of horrors we see in the Middle East today. Chaos theory in action!

EACH DENOMINATIONAL CHURCH AT THE CORNER OF EACH STREET HAS THE POTENTIAL TO TRIGGER CHAIN OF EVENTS THAT CAN LEAD TO SOMETHING BIG.

A pronouncement by a local pastor can be tweeted, it could start 'trending', and go viral. 24-hours news channels would pick up the trend and turn the storm in a tea cup to a global event with potentially serious consequences. Chaotic event. Even if the 'event' does not become global, it will have a major impact on how a particular faith or sect is perceived by others. Phelps and Jones seriously altered the perception of Baptism, a massive denomination of American Protestantism predominant in the American South. They become the personification of Baptism, and many people who directly oppose their opinions, had to be apologetic about being Baptists, Protestants, Christians, even Americans, Men, and Human!

In postnormal times, this phenomenon is going to multiply manifold: the cycle of a lost Self making an unpalatable pronouncement that gets picked up by another and then tweeted endlessly on social media till it breaks a trending threshold and goes out of control. A great deal of religious hatred is going to be perpetuated this way in postnormal times. It will be a cause of perpetual offence in the future. It will perpetuate false stereotypes, and promote facile assumptions of others. The platform developed to bring people together in a new form of society only brings us together to push us apart, highlighting our differences, and demolishing our Selfs in the process.

But there is more: the phenomenon can even exist without an original triggering person. The 2015 'Red Cup' is a case in point. It started when social media began trending that Starbucks' decision to continue the annual red cup tradition, but without the cup saying the phrase 'Merry Christmas', was a deliberate attack on Christians and Christmas [19]. The scary reality of this event is that no one knows who started the trend. It just emerged – spontaneously! Something similarly weird happened in the summer of 2016. On 12 June, Omar Mateen, an American, shoots up a nightclub in Orlando killing forty nine people [20]. Mohamed Lahouaiej, a French, drives his truck

through a crowd in Nice on 14 July killing 84 people [21]. Riaz Khan Ahmadzai, an Afghan refugee living in Ochsenfurt, Germany, attacks several people with a hatchet and knife on a train in Würzburg on 18 July [22]. These are but a small sampling of the numerous attacks that took place in 2016. What makes these attacks in the name of Islam, or as homage to the Islamic State, so weird is they do not have a causal relation to the cause they are supposedly proclaiming or the attackers supposedly stand for. While the US attacks of 2001, London attacks of 2005, and even the Paris attacks of 2015, provide fairly solid evidence of intricate planning, conspiracy, and ties to larger groups, albeit with confused causes, the summer of 2016 attacks were perpetuated by individual lost Selfs again with no bearing on the causes of Islam. The striking similarity is that these attacks are carried out not by apparent sleeper cells or imbedded soldiers but common residents of the West. There is also an arresting consistency that ulterior motives provoked these attacks beyond the common assumption and claims of their being landmark battles for the Islamic Caliphate. Even if the Islamic State takes credit, it is hard to say it had any hand in the happenings of these chaotic events other than the power provided to them through the influences religion has on action. I could construct an immaculate artisan sandwich and proclaim it in the name of the Islamic State, but to turn around and say that the Islamic State had a hand in orchestrating my sandwich craft is quite a leap.

In postnormal times, the actions of separate individuals assemble into an intricate stage play of false stereotypes and billowing ignorance. Yet, the individuals themselves can also exist in an insulated cocoon: exposed only to views that reflect their own, believing that everyone else shares their beliefs, and they can acquire all the necessary skills and equipment needed to enact their plans with the click of a mouse. Everything that Anders Behring Breivik needed was provided for within the comfort of his bubble. In the summer of 2011, he sat set off a van bomb killing eight people in Oslo and then drove to the island of Utøya where he systematically shot 69 summer campers. Prior to this, Breivik had been electronically releasing messages, laced with a right wing, fundamentalist Christian sentiment, against socialism, multiculturalism, and Islam in Europe. A product of a society that is seen as peace loving and a vanguard of progress, that consistently comes near the top in global rankings on education, social assistance, and economic stability [23], he saw himself as heir to the Knights Templars. On the five-year anniversary of Breivik's massacre, Ali Sonboly, a German of Iranian descent, followed on the footsteps of Breivik and went on a shooting spree in Munich that left nine dead and twenty two injured. The 18-year old, intelligent and shy boy, was able to acquire most of the books and documents, as well as a

Glock 9mm pistol and 300 rounds of ammunition simply by using WhatsApp. What these examples demonstrate is that the echo chamber of social media not only nurses and nourishes religious extremism it can also deliver the means to enact extremist fantasies.

SOCIAL MEDIA GIVES YOU EXACTLY WHAT YOU WANT. ALL THOSE FILTERS, SEARCHES AND LIKES AND DISLIKES, FEED YOUR PREJUDICES BACK TO YOU: YOU READ THE NEWS YOU WANT TO READ, YOU SEE THE BLOGS THAT ENFORCE YOUR VIEWS, YOU GET PROMPTED – AGAIN AND AGAIN – TO BUY THE GOODS AND SERVICES THAT WILL FULFIL YOUR DESIRES.

You thus exist in a manufactured normalcy: a field is created giving you the impression that everyone believes like you, thinks like you, behaves like you, and wants to be like you. And if you are a believer, it is a small step to conclude that it is the will of God. That's what God wants you to do. In November of 2015, Robert L. Dear, Jr. carried a semi-automatic assault rifle into a Planned Parenthood building in Colorado, killing three and injuring nine others. He claimed he was doing the work of God [24]. Dear, an art dealer, was raised a Baptist though he was not a regular church goer. He lived an isolated life in a remote cabin in Colorado, spending most of his time on the Internet searching for partners for sadomasochistic sex. He did love his Bible, which he read cover to cover; but what he learned about doing the work of God was acquired on-line.

Of course, there have always been people who would denigrate religion or use it for their own purpose. But the point is that postnormal times has given them enormous opportunity and power, and provides the means for encouragement and proliferation. Thus, such incidents are bound to increase in the coming years. Which leaves all those who believe in a Christian God preached by one Jesus Christ in the holy book, the Bible, who believe in love above all else in a limbo. Even the love of God has become, to use the term of Zygmunt Bauman, 'liquid love' [25]. It can easily mutate into extreme love for extreme violence – as ISIS demonstrates so well. The great power amassed and generated through these violent chaotic events lead only to enhancing ignorance towards religion and all that Abrahamic faiths have stood for centuries. Thus

TO BE GENUINELY RELIGIOUS, IN THE BEST SENSE OF THE WORD, IS TO ATTEMPT THE IMPOSSIBLE. TO BE CHRISTIAN OR TO BE MUSLIM IS BEYOND THE HUMAN MIND'S LINEAR COMPUTATION, TO WHICH EVERYTHING IS NOW REDUCED. IT IS THE EQUIVALENT OF ATTEMPTING TO DIVIDE BY ZERO ON YOUR CALCULATOR. THAT HAUNTING 'ERROR' MESSAGE IS THE RELIGIOUS METAPHOR OF OUR POSTNORMAL TIMES.

The contradictions, complexity and chaos of postnormal times produce a feeling of helplessness in those with religious and spiritual leanings. In a world where very little makes sense, meaning evaporates. But our longing for meaning increases – and we often find it wherever we seek it. And beliefs often translate both as identity and meaning. This dementing of the self's identity, far from providing a true sense of belonging and meaning, actually increases alienation. The more desperately we try to seek meaning in our super-self beliefs, the more alienated we become. In many ways, postnormal times are the epochs of lost Selfs frantically seeking to self-broadcast through Facebook, Twitter, YouTube and the plethora of other digital outlets. Not surprisingly, in this time of uncertainty, climate change, war and global weirding, apocalyptic beliefs have become widespread. ISIS's basic message is that the end of the days is near. Almost half of the population of Iran expects the Mehdi to arrive any time now. Look at just how many Christian sects are preaching that the end of times is neigh – even categorising them is a daunting task as they range from Millennialism, Premillenialism, Dispensationalism, Postmillennialims to Amillennialism! And they all have their own television channels, YouTube channels, Facebook pages, websites, Twitter feeds and what have you. All frantically ushering in the Rapture in their insulated bubbles, awaiting the accumulation of comments, retweets, or likes.

Yet, there has never been a greater need for people and communities with genuine religious and spiritual values. Many of the contradictions of postnormal times require old fashioned religious virtues of humility, patience, love, compassion, and compromise to transcend. Technology simultaneously connects and divides the human community as never before: this tension cannot be resolved without the love of the other. Soon most of our decisions will be made by machine. How will we retain our humanity in a world dominated by machines, genetic engineering, and artificial intelligence?

Indeed, what does it mean to be human in these turbulent, uncertain epochs of deep ignorance? Religion cannot remain silent in the face of such complex ethical questions and monumental changes and challenges.

It has been repeatedly pointed out that postnormal times cannot be managed or controlled; it can only be navigated. So how can religion steer through postnormal times and take us towards a saner, responsible, pluralistic, and genuinely enlightened futures? Of course, there are no easy solutions. But there a couple of cherished notions that monotheistic faiths need to transcend to prepare themselves for the times ahead.

I would suggest that the purpose of religion cannot be to perpetuate super-self-belief but to show love, compassion and provide service to others. Surely the love of God that the Abrahamic faiths emphasise is best expressed in the love of all others, including the love of nature and the planet – all those who are not 'us'. It is also as a basic courtesy that others too many have some inkling of Divine Truth; that our faith is not the only True faith. The diversity and plurality of postnormal times can only be navigated by acknowledging that the faith of others is as important to them as our faith is to us – and everyone must be allowed to accept what they see as true and reject what does not seem true to them, including within the boundaries of a single faith. The notion of a single, monolithic religious truth is dangerously obsolete in postnormal times and serves only as a source of strife and violence.

The division between State and Church as two distinctive concepts and spheres of existence is equally irrelevant. In postnormal times, everything is connected to everything else: nothing exists in splendid isolation, unconnected to anything else. The fact is that both these concepts are the same, differing only in name. Both state and religion seek to order and explain the world. Both are a form of the decision making process. Both can be, and are, exported into modes of power: nationalist and religious passions often lead to the same consequences. We praise, pay homage, and fight for 'our nation' just as we praise, pay homage and fight for God. Both religion and state have the ability to possess our hearts and mind. Of course, this does not mean that we should embrace theocracy. But it does mean that religion must be given full access to public space and it should openly participate in the democratic processes. This is the best route to reducing contradictions and to handle the complex diversity of our societies. Both religion and state have to recognise their own limitation and ignorance, and the complexity and true uncertainty of our times. Both have to be encouraged to evolve into new modes of being.

We also need to transcend a string of false dichotomies that plague our societies. The tension between the individual and collective, Self versus Community, Right and Left, Capitalism versus Socialism, East and West. Such

contradictions make little sense in a world of multiple selves that requires pluralistic solutions from multiple perspectives. The preposterous assumption that one has to be either individualist or collectivist has fuelled war, hate, and death. The truth is that both individual and community are equally important and one cannot exist without the other. A viable economy that caters for the market as well as the community needs a balanced dose of both – capitalism and socialism. To emphasise one particular concept, ideology or worldview at the expense of other is to encourage an ignorance that has left humanity in one of its longest and most destructive phases of its history. I would argue that it is the function of religion to emphasise holism, reduce irrelevant and dangerous dichotomies, and bring the lost Selfs to sanity.

Above all, religion must stand against ignorance of all types, and see uncertainty not as a threat but an opportunity to shape more desirable futures. In postnormal times, as we have seen, small acts can have large impacts and usher considerable change. There is hope in the actions of Pope Francis I who is attempting to transform the Catholic Church to prepare it for the postnormal turbulent ahead. There is hope too in the numerous reform movements within Islam that seek to rethink Islamic law, reframe the relationship between Islam and politics, and produce new readings of religion. A beautiful optimism resides in the initiative known as 'hug a terrorist' in Denmark, where citizens welcome back and help reacclimatize, as appose to ostracize, youth who have fled to Syria to join ISIS [26]. These initiatives may appear small and isolated, but they are 'strange attractors': they reconcile contradictions, attract other positive trajectories that converge onto them, and, as such, they can become catalysts for monumental changes. And: they show, that God does not intend to sit this one out.

In a later episode of *Game of Thrones*, Tyrion finds himself in a prison cell awaiting trial. He stands accused of regicide of the former King of Westeros. His fate will be decided through trial-by-combat, a method where by an accused party can battle against the accuser or elected champions of each. The winner of combat has been obviously favoured by the gods who actually decide the guilt or the innocence of the accused. Tyrion is accompanied in the cell by his brother, Jamie, known as Kingslayer, for he was previously pardoned for his own regicide against the former Mad King of Westeros. They discuss the variety of words that exist to express what a human kills. For example, patricide is the murdering of one's father or infanticide is the killing of children. Jamie quips that there is no word for killing a cousin. Tyrion asks what this must say of the gods and what can we infer from that about human beings. Tyrion then discusses his and Jamie's cousin from back home, Orson. Orson was dropped on his head as a child and throughout their youth would

spend all day crushing beetles. 'I want to crush beetles', he would cry out again and again. Greatly disturbed by Orson's actions, Tyrion tried very hard to find a satisfactory answer for his cousin's behaviour. Is there a reason, a motive behind his actions? But Tyrion could never come up with a satisfactory answer. Jamie can give no satisfactory answer either. Tyrion than suggests that perhaps gods are being used to justify human behaviour. Is there higher calling for humanity than to simply to crush each other over and over again, he asks?

Postnormal times have made 140 characters as powerful as the phrase 'Jesus wept' - or any quote from the religious text of your choice. We return to Vary's riddle and are left wondering who lives and who dies. And are forced to ask: where do religiously inclined people want power to reside in the future?

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ISLAMIC FUTURES IN POSTNORMAL TIMES

Ziauddin Sardar

Prelude

Today's Islamic discourse is, for the most part, a future free zone. Virtually everything written about Islam is about the past or the present. Given that the world is going through a period of rapid change, indeed accelerating change where peoples' values, attitudes and even long-held, cherished beliefs change almost as swiftly as new inventions and innovations are produced, our focus should be towards the future. Every individual has an investment in the future: from how our personal lives and environment will change the impact of new advances in science and technology, economic developments or lack of economic progress; to shifts in global power and what kind of society and planet we want our children and grandchildren to inherit. The future is a subject that should concern every Muslim. Yet, talk of the future is conspicuously absent in Muslim circles.

Why is this so? It doesn't help that there are hardly any scholarly works on the future of Islam and Muslim societies that one could engage with. There are some books where the word 'future' appears in the title: Reza Aslan's *No God But God: The Origins, Evolution and Future of Islam* [1]; Tariq Ramadan's *Western Muslims and The Future of Islam* [2]; Hans Kung's, *Islam: Past, Present and Future* [3]; and, John Esposito's more explicitly entitled *The Future of Islam* [4]. But the term 'future' here is an appendage; there is no acknowledgement that 'the future' is a developed and sophisticated field of exploration and study. Aslan's otherwise excellent book, which devotes the last chapter to 'Islamic reformation', does not even an index entry for future. Ramadan's book is mostly about Muslim engagement with the West, with an examination of various attempts at reform. Kung's monumental and magnificent study devotes a quarter of the book to 'possibilities for the future'. But again the analysis is firmly focussed on contemporary issues, such as human rights, equality for women, the relationship between religion and state, and economic reforms. Although the last section on hope does provide a potential image for the future. Most

disappointing is Esposito's *The Future of Islam*; given the title we would expect it to be devoted to the coming issues of the next few decades. Yet, it has little to say about the future. It emphasises the diversity and plurality of Muslims, issues of jihad and state, building bridges between America and the Muslim world, discusses questions of reform, and also includes a discussion of 'gender jihad' and tele-evangelists. Under another title it would be a fine book.

For a book that lives up to the title, we have to turn to Wilfrid Scawen Blunt's *The Future of Islam* [6], written as a series of essays for the *Fortnightly Review* and published as a book in 1882. A close friend of Muslim revivalist Jamaluddin Afghani, Blunt was concerned with certain trends in Muslim societies; these pointed towards a particular future. Now Blunt was not a 'futurist' in the contemporary sense nor was he a 'foresight specialist' as the term has become known in government and business circles, but he did have the insight to realise that historical trends can be arrested, and changed and that an alternative future for Muslim societies can be shaped through policies. In other words, there is no such thing as 'the future', *a priori* given and seen as inevitable destiny. There are a plethora of futures; and a desirable one can shaped.

The trends that concerned Blunt included the invasion of Tunis by the French who, he wrote, precipitated the 'Mohammedan movement' in North Africa; national and religious reforms in Egypt; the decline of the Ottoman Empire; the emergence of 'progressive thought in Islam' and an 'Arabian theology' based at al-Azhar. Where would these trends lead? Blunt's answer was to promote these trends so a 'liberalising' Islam and 'a liberal Mohammadan Government of free Mohammedan people should establish itself firmly on the Nile' which then serves as 'the basis of a social and political Reformation for all Islam' [7]. So a series of trends come together to produce a major transformation in the long-term future. Considering when the essays collected in *The Future of Islam* were written, Blunt demonstrates impressive understanding of how political and intellectual trends can be analysed. Of course, he has a political agenda. He predicts the end of the Ottoman Empire with ferocity and repeatedly, knowing that 'such prophecies often work their own fulfilment'. He predicts the transfer of Islam's 'metropolis' from Constantinople to Mecca, and to a certain 'triumph of her arms', leading to revolts against colonial powers. And, like the good futurist that he was, he wants to turn his analysis and predictions into policies. England, he argues, should prepare for the fall of the Ottoman Empire, and should provide political guidance to the various nations of Islam. After the Ottomans, the Muslims of the Indian Subcontinent will be the most numerous and wealthy (he deduces this through an analysis of pilgrim statistics) and this newly

acquired position should be used to strengthen the British Empire. Q.E.D.

Blunt was thinking at least fifty hears ahead; and within that time many of his predictions had become reality: the Ottoman Empire did disintegrate, a Mahdi did appear in the Sudan, Muslims in various regions did take up arms against colonial powers, liberal reforms were taken by the Egyptian *ulema*, power did shift from Istanbul to Mecca after the demise of the Caliphate, and Britain (along with other powers) did meddle and become stronger as a result. His predictions and policies became an integral part of British colonial policy. Blunt envisaged a particular future for the Muslim world and he helped to produce a mechanism to shape it.

Our understanding of how the future unfolds has come a long way since Blunt's days. But Blunt does illustrate the basic ingredients of a futures-based analysis. It is about understanding change and the rate of change. It is not so much about current concerns but more about long-term threats, potentials and possibilities. It is about understanding trends and extrapolating them to see what kind of future they could generate. It is not about a single future but about a spectrum of alternative futures. It is about forecasting but also about shaping. And it is about formulating policies and taking actions in the present that promote a desirable future [8]. Blunt also illustrates another key point: if Muslims do not engage in thinking and shaping their own futures, other would happily do it for them; and they would become enveloped in someone else's future [9].

Of course that is exactly what has happened during the last few centuries. Colonisation of the Muslim world during the eighteenth and nineteenth centuries meant that the future of the *ummah* was shaped by colonial powers. At the dawn of the twentieth century Jamaluddin Afghani called for the revival of *ijtihad*. Through a global pan-Islamic alliance he urged Muslims to embrace science and technology, and 'modernise Islam'. After the fall of the Caliphate, nationalist struggles to gain independence began throughout the Muslim world. By the middle of the twentieth century, a host of new independent states had emerged. But they soon discovered that politically and economically their futures were still being shaped by their former Colonial masters. During the 1970s and 1980s, there was much talk of 'Islamic resurgence' but that soon fizzled out when the reality of decades of 'westernisation' and 'development' revealed that Muslim futures were being shaped by western visions and planning. Now the 'Arab Spring' has ushered in a new hope; but it seems to turning, once again, to another *cul de sac*. The lot of the vast majority of Muslims, mired in poverty and turmoil, appears to have no solution. In a rapidly changing world, the structures of oppression and suppression are becoming even more entrenched.

The kind of despair now being visited on Muslim societies is well illustrated by Yasmin Alibhai-Brown in her painfully felt *Independent* column. Oppression

and tyranny, writes Alibhai-Brown, is common in non-Muslim countries too but in the Muslim world they are 'indicative of a pattern, a widespread cultural sickness'. Violence is endemic and is seen as 'the easy answer for all Muslim problems'; around the world 'the most horrific violence is perpetuated by Muslims, most often against fellow believers. Promises of democracy fade faster than a summer tan; freedoms are snatched, liberties crushed, equality excised from the official vocabulary. Misery, misery everywhere'. This is not a specific but a general sentiment. As Alibhai-Brown notes, some Muslims now believe that 'this is the Dark Age, when rage rules and there is no place for the intellect, humanity, love, civic responsibility and co-operation that we are all part of our great civilisation of the past' [10].

There is little that can be done about this state of affairs in the short term.

THERE ARE NO QUICK FIXES OR INSTANT SOLUTIONS. CENTURIES OF SHORTCOMINGS AND PROBLEMS, THE INABILITY TO GRASP CONTEMPORARY REALITY, THE ENTRENCHED INABILITY TO ADJUST TO RAPID CHANGE CANNOT BE OVERCOME WITHIN A FEW YEARS.

Indeed, attempts to solve problems quickly generate its own problems: you are forced to react to one challenge after another. You get trapped in a cycle of iterative problems, and end up in one dead-end after another. Indeed, it seems to me that Muslim societies are largely reactive societies, reacting to one crisis after another – mostly unsuccessfully.

The only way out of the current impasse is to think boldly in terms of long range futures. We need to chart a path towards a desirable future, develop insights into managing and anticipating change, and work systematically to achieve our desired goals. We need to move forward from antiquated and ossified modes of Muslim thought to a fresh, deeper, futuristic understanding of Islam and a conscious, collective, will to overcome the present impasse. Most of all, we need intellectual boldness and imagination. We need to imagine what has hitherto been impossible to imagine, to develop ideas that have hitherto been seen as heretical or exist only on the margins, and envision alternative ways of what it may mean to be a Muslim in the coming decades and centuries. In other words, we need to develop a vibrant future consciousness.

Locating the Future

What exactly do I mean by a 'future consciousness'? I mean an appreciation of accelerating change, an awareness of potentials and pitfalls lucking over the horizon in the not-too-distant future, and a commitment to shaping a desirable future. Understanding and managing change is an enterprise that takes place in the present; and it naturally requires a cognisance of contemporary reality, to which I shall turn shortly. But first, how do we become aware of future possibilities and work towards shaping a future that we desire?

Thinking about the future is daunting. Unlike the past, with its histories, tradition, memories and identity, the future has no 'facts' we can relate or refer too. The future is unknown; and in most Muslim traditions it has largely been consigned to the domain of 'God's will'. (But, as the Quran tells us in 13:11, 'God does not change the condition of a people unless they change what is in themselves'). The difficulty is compounded by the fact that the future does not really exist: it is always a time that has yet to arrive. But the future will not exist even in the future for the future exists only when it becomes the present at which point it ceases to be the future.

However, just because the future does not exist, and indeed cannot exist, it does not mean that we cannot study it, develop ideas, images and metaphors about it, and attempt to understand and shape its direction. Ideas and images about the future are as important as ideas and notions about the past because our thoughts and actions are influenced not just by our understanding of what happened in history but also by what may yet happen in the future. The future may be elusive and uncertain but it is a domain over which we can exercise some power. We cannot change the past. We can study and interpret history but we cannot change it. We cannot change the present either: that requires instantaneous change which is impossible. But our inability to have definite knowledge about the future is balanced by our ability to mould it. It is within the capabilities of individuals and societies to shape their own future [11].

To say that an individual can shape his or her own future sounds a little pretentious. However, most people with goals in life do in fact work towards shaping their own future. If you want to become a surgeon or a lawyer, for example, you have to consciously work towards your goal. You will start with an image of what it would be like to be a surgeon or a lawyer in the future; you will obtain the right education at an appropriate institution; you will seek opportunities wherever they may be; you will seek out those people who will help you achieve your goal.

Let's take a more specific example. Consider a Muslim, who wants to go for Hajj for the first time. He or she knows how the Hajj is performed, even though he or she never performed the Hajj before and is not in Mecca now.

There is no room for this image in the past or the present; but there is room
for this cherished image to perform the Hajj in the future. Future time is the
only domain where he or she is able to perceive as 'possible' an image which
is 'false' in the present. And the future in which he or she now places the
cherished image, reaches out to make the image a reality. To transform this
future image into reality, the potential haji begins to save; and if poor, may
have to save for a number of years before there is enough money to journey
to Mecca. But our future haji's plans are not just concerned with financial
resources, he or she must also make arrangements for the family and business
to be looked after while he is away, perhaps as long a month. If the potential
pilgrim is a woman, then, given the nature of Islamic law, she may have to
consider a number of other factors such as taking a *mahram* with her. There
are also other contingencies. Given that pilgrims are chosen in most Muslim
countries through a lottery, the potential hajji may have to wait for a number
of years before his or her name turns up. Despite all the uncertainties, the
pilgrim shapes a desired future, works towards it, and which is finally – God
willing! – becomes an actual present.

Notice how many contingencies and uncertainties there are even in the
simple example of our prospective pilgrim. It is still possible that, despite
all the preparation, our potential haji does not make it to Mecca. Despite
the ardent desire, the financial resources may not be there. His or her name
may not come up in the national Hajj lottery. They might not live to see their
dream. Or, when their name comes up, family circumstances could mean
that the Hajj cannot be performed that year. The potential haji could be taken
ill in Mecca, or even die there. Thus, while one particular future is desired,
there are in fact a number of possible futures. The singular term 'the future'
focuses our attention on only one future, blinding us to the possibility that
futures is deliberately plural. It also has serious political implications: if
there is only one future then we are all, whether we agree or not, like it or
despise it, part of the same future; and it is usually based on the desires of
the powerful who dominate the world. Think of totalitarian states and you
will know what I mean. To talk of a single, all-embracing future is in fact to
colonise the future.

What is true of individuals is also largely true of societies. To shape a viable
future, a society needs an image, a vision, of its future. It then has to map out
a path towards the realisation of that desired future: how is it going to move
from 'here' to 'there'? Incorporated in that map must be a host of 'what if?'
questions: the variables that could go wrong, the hurdles that could appear
almost as though from nowhere, the different paths that are available, and the
different alternatives and options that will generate different choices that will

have to be made. What we are then presented with is not just one future but a whole array of alternative futures.

This is why the emphasis is always on futures, with the accent firmly on the plural. We do not study 'the future' but futures. The disciplined inquiry of futures is called 'futures studies'. The journal that I edit is called, appropriately, *Futures* [12]. The pluralisation of futures opens up the territory to all sorts of potentials and possibilities, from the perspective of different worldviews, cultures, and values, where we can envision and create alternatives and preferred futures. It also makes it highly contested territory.

The time horizons of futures extend from now to infinity. So talking vaguely without some notion of the period we are dealing with does not make much sense. We have to focus on a more meaningful time scale, a period we can study and try and grasp.

THE PRESENT CONSISTS OF NOW: THIS MOMENT, THIS HOUR, TODAY. BUT THIS PRESENT ALSO INCORPORATES A FUTURE THAT WILL BE, MORE OR LESS, LIKE THE PRESENT.

If something unexpected does not happen, tomorrow will be much like today. Indeed, barring a surprising event with radical significance, the next year will be more or less the same and nothing much will change. This is what I consider to be the 'near future', which is in fact the 'extended present'; and it extends up to five years. This is the period in which economic forecasts are made, government policies are initiated, and development plans are constructed. Many technological innovations will make an appearance 'in the near future'– but, on the whole, they will be an extension of existing technologies. There will be elections in democracies during this period; but normally a new government continues with the policies of the old one for the first couple of years of its term. This future – the extended present – is reasonably stable and has discernible trends that can be known. Most meaningful predictions and forecasts (which are two distinct things) are made for this period.

However, if we are concerned with transforming society, we have look beyond the five year period of the extended present where we can change little. A ten year period provides us with more potential. But twenty years from now we can change almost anything. The choices and decision we make today may not change our societies in the next five years but they can radically transform the world in the next twenty– a period pregnant with social,

cultural, technological and political transformations.

The twenty year horizon is also a period during which a whole generation grows and matures. The Muslim historian ibn Khaldun (1332-1406) studied how one generation replaces another. In an illuminating piece of work he predicted that cultures and civilisations rise and fall within four generations [13]. The first generation creates and innovates, while the second produces by observing the first. The third generation imitates; and adds nothing of value. The fourth generation lives off the wealth, which it sees as its rightful inheritance, of previous generations. The wealth evaporates, creativity and innovation disappears, and the culture stagnates. For the culture to rise again, the cycle has to repeat itself, and a new generation has to create and innovate. One could argue that Muslim history never turned the corner to produce new generations that created and innovated like the generations in the formative phase of Islam.

In the modern age, changes in the behaviour of generations are studied using what is called age-cohort analysis [14]. An age cohort is a generation growing up in the same place at the same time; and the people belonging to that generation tend to share the same ideas and beliefs about the world. But the ideas and beliefs of different age cohorts are quite different from each other. For example, the worldview of a generation growing up in the 1990s in a particular city, say such as Kuala Lumpur, would be quite different from a generation growing up in the same city during the 2010s. When one age cohort retires or is removed from power, its political and economic power passes to a new age cohort with a different worldview, and the world and the future changes. The in-coming age cohort implements different policies and different ideas and beliefs gain currency. Thus by studying the behaviour, ideas and thoughts of the incoming age cohort we can have a good idea of what the future will look like when it becomes the dominant group of society. Moreover, by influencing the incoming generation, by inculcating certain ideas, ways of thinking and doing, we can have a direct impact on the future – and prepare for it. But if we wish to travel towards our preferable futures we have to be proactive.

How can we proactively shape futures of Muslim societies a generation or two from today, twenty or forty years from hence?

We need two essential tools. We need to have an understanding, a picture, or what futures await us if things continue as they are. And we need an image, a vision, of alternative possibilities: the futures we desire and prefer. Both require creativity and imagination, the latter more than the former; and there are different types of methods for dealing with each approach.

To gain some idea of how the future is shaping up, we can, for example, extrapolate trends from the recent past to the present and examine how they would continue into the future. For a more sophisticated analysis we can

take into account how various trends relate to each other, the probabilities of their interdependence and occurrence – what is referred to as morphological analysis. Or we can seek the opinions of experts who professionally study trends: this is known as the Delphi method, where experts are polled systematically till a consensus emerges amongst them. We can also make computer models of the world, an economy or a city, and use it to study what happens in a given future when particular variables change. We can use these and numerous other methods to make predictions, reasonably confident statements about a future state of affairs. Or we can produce forecasts: that is make a more guarded statement of possible future outcome, if a certain trend continues, and certain conditions are fulfilled, then we can expect a certain outcome with a certain level of confidence. Pictures and images produced by such predictions and forecasts can be turned into scenarios, a description of future situations complete with a progression of events that take us to the future that is described.

Predictions and forecasts make us aware of the potential threats and dangers ahead. They serve as early warning signals so that we may change course, develop contingency plans, prepare ourselves to confront emerging challenges. But such conjectures have limitations too. As they rely on historical momentum and current trends they do not have transformational potential. They tell us what the future may look like, not what we would like the future to be. To invent and shape our preferable futures we need to look elsewhere.

The process of shaping a desirable future is much like travelling. You need to have some idea of your destination; where you actually want to go. You need to decide on a mode of transport; what will actually get you there. And you need to have some sense of direction; an internal navigation tool that keeps you orientated in the right direction so you don't end up at a railway station when you actually need to be at an airport. In working towards a desired future, the destination is a vision; the mode of transport is an iterative planning process called backcasting (as opposed to forecasting); and the sense of direction comes from the consensus one builds around the vision as a viable future and the collective effort that is put in working towards the vision.

A VISION IS A SHARED IMAGE OF A DESIRED FUTURE.
BUT UNLIKE OTHER IMAGES OF THE FUTURE, A VISION IS A
HIGHLY ENUMERATED IMAGE OF THE FUTURE, WITH MOST
OF THE CONTOURS AND DETAILS WORKED OUT, AND THE
FUTURE HISTORY DESIRED BY A COMMUNITY SPELLED OUT
QUITE SPECIFICALLY.

It has to be both: real, that is, it has to be achievable; and compelling so
that it can motivate people to act. Our images of the future, both individual
and collective, play an important role in determining the future. Thus
visions have transformational power: they stimulate thought and guide
the behaviour of individuals and collectives towards a desired future. A
vision is like a magnet that pulls the present towards an imagined future;
and like a compass, a vision can indicate the future direction towards which
we wish to travel. Cultures and societies break out of their cocoon through
well-articulated visions that surpass their limitations, and transform them,
like a butterfly, into higher levels of existence. Think of how modern Europe
was shaped by the vision of the Enlightenment. Or how 'Arab Spring' was
sprung by the vision of a secular democracy (even though Islamists, with few
exceptions, have little idea how democracy actually functions, and equate
secularism with atheism).

There is, however, a downside to visions. Visions can become utopias
– that is, they become an imagined place where everything is perfect. So
perfect in fact that it is 'no place' (the literal meaning of utopia), or a place
where an imperfect human being cannot possibly exist! Utopias often
become dystopias: totalitarian nightmares. Both utopias and dystopias
have tremendous visionary pull and motivational power. Notice how post-
revolutionary Iran was constructed as a theocratic utopia that most Muslims
around the world subscribed too till it became obvious it was a tyrannical
nightmare. Witness the Islamic utopia constructed by the Salafis, and their
various off-shoots – the Taliban of Pakistan and Afghanistan, the Shabab
of Somalia, and various al-Qaida affiliates. It has motivated a generation of
young Muslims to become Jihadis.

Ironically, the Salafis can be said to be the only Muslims with an
awareness of the future, albeit an unconscious one. Even though their utopia
is located not in the future but in seventh century Arabia, the period of the
Prophet and his successors, it is constructed as a romantic ideal and a perfect

society. It is a fully-fledge utopia: complete with laws, codes of morality and gender relations, a system of governance, warfare, policies towards outsiders, and even international relations. The Salafis work towards the realisation of their utopia without any hesitation, with brutal and inhuman violence, and unerring self-believe. Such traditional utopias, as the noted Indian intellectual and philosopher, Ashis Nandy, has pointed out are by nature tyrannical and totalitarian.

But a utopia need not degenerate into a dystopia and a closed authoritarian system. To avoid this real possibility,

A UTOPIA NEEDS A 'GET OUT' CLAUSE: IT HAS TO BE OPEN, PLURALISTIC AND ALLOW THOSE WHO DO NOT SUBSCRIBE TO THE UTOPIAN VISION TO DISSENT AND LEAVE. IT MUST 'SHOW SOME CAPACITY TO LIBERATE THE UTOPIAN FROM ITS OWN STRAITJACKET'.

It should be open to criticism – from other visions and utopias. It cannot claim 'a monopoly on compassion and social realism'; or on truth, law or morality; or presume to hold 'the final key to social ethics and experience' [15]. If a utopia has these characteristics, it can serve as a useful tool for improving our understanding of future landscapes. Virtually all notions of sustainability or democracy are utopian in nature.

Historically, Muslims have constructed such open and self-critical utopias. A good example is *The Perfect City* by al-Farabi [16], where a good and virtuous city is compared to a functioning, healthy human body. Both ibn Tufayl's *Hayy ibn Yaqzan* [17] and *Awaj bin Anfaq* [18] written in the thirteenth century by physician and astronomer al-Qazwini, offer a universal vision of human betterment based on Islamic ideals. Indeed, *Hayy ibn Yaqzan*, is both a defense of rationality as well as a utopian vision of a better society. In *Awaj bin Anfaq*, published around 1250, a man from a distant planet arrives on earth and is intrigued by human behavior. The objective of the narrative, considered the first proper science fiction novel in history, is to examine universal aspirations for building a just society. More recently, in Naguib Mahfouz's *The Journey of Ibn Fattouma* [19] the protagonist, looking for his lost wife and son, spends time in two distinct religious utopias, one where freedom is valued above all and one where justice reigns supreme.

Thus utopias need not be dystopias. They can function as visions, as well as complement them, to provide a shared image of a possible future that a society

can aim for. However, developing a collective vision, which involves all the diverse stakeholders in a society, is not an easy task.

Once we have the vision, we need a potential date by which the vision has to be realized; the time needed to reach our destination. We should be able to reach our destination within a generation or two, say forty years from now. In contrast to forecasting--which involves looking from the present to the future--working with visions, which are located in the future, involves looking from the future to the present. So instead of forecasting we undertake backcasting. We start from the future in which our vision is located and work backwards, asking a series of questions. If, for example, the vision is that of a city in 2050, we ask: what must happen in the city in 2049 for the vision to be realised in 2050? What must happen in 2048 to trigger the relevant, desired events for 2049? And so on. But we do not have to work in single years; we can backcast in two, three or five year periods. The objective of the exercise is to identify milestones that must occur at each juncture, and identify the steps that need to be taken to achieve each milestone. A timeline can thus be created linking the present to the vision; and polices, programmes and actions needed to achieve the milestones can be developed. The end product is a detailed plan that could be used to move forward from the present, step by step, moving from milestone to milestone, towards the desired vision. The quality of backcasting, and the eventual plan, depends on how carefully the conditions for attainment are defined at each particular stage. The mechanism we have built for dealing with contingencies or 'wild cards', unexpected events that can through us off course. And how participatory the whole process has been.

Let me illustrate this with a simple example. Consider, for example, a vision of a city that many of us will be familiar with. Let us consider Karachi forty years, some two generations, from today. What is my vision of Karachi in the year 2040? I envision a Karachi free from ethnic and communal strife, pollution and traffic congestion, with most of its inhabitants in gainful employment, adequate housing, clean water and electricity and a good network of public transport. In my Karachi of 2040, business is booming thanks to the port which has become a focus for shipping in South Asia, there is law and order and a responsible and accountable local government. Now, while this could be a realistic vision of Karachi in the future, it is far removed from the Karachi of today.

To make this vision into a workable proposition we begin our backcasting and work backwards from the year 2040: what conditions must be fulfilled in the year 2038 for my vision of Karachi to be in place by 2040? Well, for most of the inhabitants to be in gainful employment some sort of employment

policy must be in full swing, the basic infrastructure of the city, including the public transport system, should be in position, an adequate number of low cost housing units directed towards the urban poor must have been build, etc. So, for these things to have occurred by 2038, what should have happened by 2036? And 2034, 2032, 2030… and so on to the present time.

We also have to explore negative possibilities: what can happen to undermine successful implementation of certain targets? What could possibly go wrong? At the completion of the exercise, we have two products: a vision of Karachi in 2040 and a detailed plan, worked out backwards from 2040, with yearly goals and target, providing a step by step action plan to how my vision could be realized. This kind of planning is a highly empowering tool. It brings what appears to be an unachievable, distant goal, into the realms of the realizable, possible alternative. The more detailed and realistic the vision, the more thorough the backcasting, the more amenable the future! Of course, my individual vision and backcasting exercise is neither adequate nor, by itself, able to shape a viable future for Karachi. To be meaningful, both envisioning and backcasting must be a collective, social endeavour: shaping the future is a participatory endeavour [20].

While visions provide a society with a future destination, backcasting furnishes it with paths, ways and means to get 'there' from 'here and now'. It always ends with the first steps that have to be taken in the present. Moreover, backcasting is not a once-and-for-all process; it has to be continuous, iterative, and it has to keep all stakeholders actively involved. It invites participation in both the formulation as well as developing routes towards desirable futures; and, by making what appears to be 'impossible' accessible to systematic action, it makes belief in the genuine transformation of society possible. Exploring and shaping alternative futures is by its very nature an optimistic endeavour.

There are numerous other methods, simple as well as complex, for exploring futures [21]. I have concentrated on a few, notable ones I have used in my own work. But whatever method is used, the overall purpose of generating images of futures is to improve our decision making processes in the present. Most of our contemporary problems have not appeared suddenly, but have existed for decades, if not centuries, simmering away till they reach boiling point. Many could have been tackled earlier when they were more manageable. The past enters the future not just as trends but with a historic momentum that is often difficult to disregard and sometime cannot be ignored.

Positioning the Past
Our futures are also a product of decisions our ancestors took in the past. History not only tells us something about our past, it also influences our

present and shapes our futures. All societies have living histories, often described as tradition, which mould their identity. A future without identity is no future at all. However, not all our history has a part in our futures; if it was, we would be living in history. There are aspects of the past that become an unbearable burden and actually foreclose the future. What we are concerned about are not the facts of history, which in themselves have no meaning. They acquire meaning within a framework of ideas; and it is ideas in and about history that play positive or negative roles in shaping futures.

To appreciate how history can thwart the emergence of viable futures consider the idea that the ideal model of society existed during the time of the Prophet Muhammad and the Right Guided Caliphs. This is the closest Islam gets to a perfect society. The paradigm for most believing Muslims is that deviation from perfection, rejection of the ideal model, can only mean one thing and that is decline. Moreover, if we have to follow the Salafs, the first generations of Muslims, we are following people who are systematically moving away from imagined perfection – that is, declining. What I am saying here is that to construct the society of the first three generations of Muslims as a utopia is to place the Muslim civilisation within the framework of a theory of decline. Or if we think that the only valid interpretations of the Qur'an are the ones made in history by classical scholars, and they are quite uniform and unanimous in their exegesis, then no radically new interpretations can be made. All these ideas are in fact disguised theories of decline. No progress is possible if all progress has already been made in history.

Consider also the idea that 'Islam is a complete way of life'. Again this is a paradigm belief for most Muslims, whatever their sectarian tendency. The statement suggests that all issues of ethics, morality, law, governance, indeed all human life, have been settled in history. If this were so then ethical and moral evolution, developments in law and other critical areas of human thought, come to a grinding halt. Even a casual observation reveals the statement to be false: you don't need Islam, for example, to become a surgeon, or a software engineer or an accountant, you need to go to an appropriate institution of learning. Islam says nothing about traffic regulations, or bureaucratic procedures, or genetic engineering, or dealing with complexity, and numerous other aspects of contemporary life. But if you think all answers have already been provided in a 'complete way of life' then you are not going to be too bothered with pressing issues lurking over the horizon, let alone seek new and innovation solutions. Moreover, if all questions have already been answered, and problems solved, then what use is human life anyway. We might as well exist as cattle on a farm.

One can make a similar argument about the Shariah. If Shariah is Divine than there is no argument: the legal injunctions developed to solve the

problems of a bygone era based on the social and cultural circumstances and understanding of a medieval society become the law and morality of Muslim societies for all times – past, present and the future. This means morality cannot evolve, our notions of equality cannot be broadened, our ideas about plurality cannot be extended, and our efforts to create a just and equitable society in a rapidly changing world are frozen in history.

MUSLIM HISTORY IS FULL OF IDEAS THAT CLOSE RATHER THAN OPEN UP THE FUTURE TO ALTERNATIVE POTENTIALS AND POSSIBILITIES.

These ideas are embraced not just by Wahhabis, Salafists, Islamists, Islamic movements like the Muslim Brotherhood and Jamaat-e-Islami, but also by the majority of believing, mainstream Muslims. They (we) are responsible for the fact that Muslim societies have been drifting from one undesirable future to the next for centuries; and represent the most serious threat to shaping viable and more fruitful futures for ourselves. These ideas serve as fixed boundaries, like the tracks of a train, ensuring that the future moves in a single, given direction with a single a *priori* destination. Attempts to change the course amount to little: the tracks are fixed, the direction determined in some distance past. This is fatalism in action. Not surprisingly this train of Muslim future often travels backwards. This is also why Muslims have been living in history rather than making history.

The Qur'an gives us ample warning of such follies. 'When they are told', states a beautiful verse, '"beware of what lies before you and behind you, so that you may be given mercy", they ignore every single sign that comes from their Lord' (36:45). The verse suggest that we need some awareness of what is 'before us', that is in the near future, and 'behind' us, the momentum of history, to achieve the mercy of God, that is prosperity in this world and reward in the Hereafter. The past is connected to the future in two ways with the word 'beware': when suffocating aspects of history are projected on to the future it is choked, and the mercy of God is denied; but when life-enhancing ideas are projected, the future is enlightened and is opened to all conventional as well as dissenting possibilities, and the mercy of God is granted. This verse is preceded in Surah Ya Sin with a passage that talks about natural laws ('The sun, too, runs its determined course laid down for it by the Almighty, the All

Knowing': 36:38), suggesting that it is also a natural law that certain aspects of history will only shape certain types of futures. Moreover, the passage that follows 36:45 also throws light on the past-future connection: 'And they say, "When will this promise be fulfilled, if what you say is true?" But all they are waiting for is a single blast that will overtake them while they are still arguing with each other' (36: 48). The promise in question is the promise of a vibrant, dynamic future, 'with lofty dwellings built for them, one above the other, graced with flowing streams' (39:20). But this promise is not fulfilled by doing nothing, by just 'waiting' for the 'single blast' of the Day of Judgement, or arguing over trivia and speculative points of faith. It is achieved by proactively shaping the future.

Just as Muslim history is full of ideas that foreclose history, it also brims with concepts with liberating potential that open up the future to multiple alternatives. Perhaps the most proactive idea, that involves constant engagement with the present as well as the future, is *ijtihad*, normally translated as 'independent reasoning'. Clearly, reasoning is not something that can be done once and for all; and reasoning often leads to innovation. Yet, for one reason or another, somehow the 'gates of ijtihad' have been closed as though matters of faith, ethics, morality, law and governance are in no need of reasoning. When ijtihad is used, as sometimes so-called 'scholars' boast, it is confined to dumbfounding matters with obvious answers: where is the *qibla* in space, can fertility treatment be used by Muslims, can women become members of a Majlis-e-Shura! Yet ijtihad, the basic idea for adjusting to change in Muslim history, is about grand notions and challenging received wisdom. It's about reformulating the Shariah, demarcating interpretative power and religious authority, opening up Islam to pluralistic and future possibilities. In a poem entitled 'Ijtihad', which appears in his anthology *Zarb-e-Kaleem* [22], Muhammad Iqbal, one of the most profound thinkers of the twentieth century, makes some apt points:

> Where in India does one find the wisdom of faith
> Where are men of character, where worthy thoughts
> Where are those who dare to doubt
> Alas! This slavishness, allegiance to received wisdom,
> Absence of the questioning mind
> Rather than embrace change, they misread the Quran
> Oh! the death of imagination in the interpreters of faith.
> It is the belief of these slaves that the Quran is deficient
> For it does not educate the Believer on the protocols of bondage

Ijtihad is about questioning, embracing change, and translating the certainties of history into doubts. It liberates us from being slaves to history and becoming victims to its 'protocols of bondage'. It's about thinking boldly and imaginatively about possible, probable and desirable futures. And it is about critical thinking in the theoretical sense of deconstructing structures of power and knowledge in all forms.

Take, as another example, the concept of Khilafa, the trusteeship of human beings that has played such an important part in Muslim history. It is intrinsically a future oriented concept. As trustees of God we are required to manage the trust – the Earth, the environment, the soil, resources as well as cultural and historic property – in an ethically and socially responsible way: it must be delivered to future generations in at least as good, if not much better, conditions than it is at the present. Certain Islamic social institutions developed specifically to meet this challenge. For example, throughout history, Muslims have been keen to establish *waqfs* (pious foundations) for both social and individual purposes. Waqfs are inherently future-oriented. How? They fund educational institutions which could educate the coming generations; they fund research and development work that could ease the pain and enhance the life of future generations; they are used for feeding and providing water to the needy and the travellers, today and tomorrow. The same future orientated logic is evident in the establishment of haram, inviolate zones in which development was prohibited by Islamic law, and in the creation of *hima*, reserves for the conservation of wildlife and forests. Muslims built cities, like Fez and Aleppo with an appreciation of carrying capacity and inviolate zones around them, where development was forbidden. Development was also not allowed around water courses, wells, crops and settlements. Other land was protected for public good: grazing, cutting of trees and hunting were prohibited in woodlands or forests around cities. Both the institutions of *haram* and *hima* were intrinsically futuristic: their main purpose was to preserve natural resources for all times. A supplementary source of the Shariah, much overlooked, is *Istislah* (public interest), which is aimed at preserving what is good and beneficial in society for future generations.

We can also see an awareness of the future in the life of the Prophet Muhammad. For example, he forbade cutting of trees and hunting of wildlife in the woodlands around cities, including Mecca, Medina and Taif, because they provided sustenance for humans and animals and protected the cities with a green belt. He constantly anticipated future possibilities before taking action. The *hijra*, the migration from Mecca to Medina, was made on the anticipation of a more viable future for the then small Muslim community. It was planned meticulously, and the path for the migration was systematically cleared over

several months. The Prophet anticipated the Quraysh uprising against him, prepared in advance and met the advancing army outside Medina, at a point he knew will give the small Muslim army a strategic advantage: this was the well of Badr. Similarly, he went out to Uhud to secure an advantage at the top of the mountain, where he placed a group of archers, during the battle of Uhud. Months before the battle of trenches the Prophet anticipated the coming conflict and prepared to defend Medina by digging a trench around the city thus actually preventing a major conflict. These examples show that the Prophet engaged in strategic planning and constantly anticipated what was lurking over the horizon.

Muslims see the Prophet as a model to imitate, but we focus our attention on the minutiae of his life – from how he ate, sat, walked to how he dressed, the colour of his clothes, style of his turban and, yes, the length of his beard. But these are contextual and specific matters of history: the Prophet could only conduct his daily life according to the dictates and the situation of the period in which he lived. They have no universal import. Such imitation may provide a sense of righteousness to individuals and collectives but it plays no part in shaping a future according to Islamic principles and morals. What is universal about the Sunnah, or the example of the Prophet, is how he behaved at certain key junctures of his life and the moral principles that his actions engendered. It is these principles that have a direct bearing on shaping more positive futures for Muslim societies.

There are three pivotal moments in the life of the Prophet that need our attention. After the hijra, one of the first acts of the Prophet was to establish the Constitution of Medina. The point to note is that it makes no mention of God or revelation at the beginning. If the Prophet saw the Qur'an as a 'constitution', as many Muslims now claim, he would have used it as such. Rather, his action suggests that constitutions are framed by stakeholders in society – not revealed. Moreover, the Constitution of Medina is an inclusive document that includes not just the Muslims of Medina and the Muslims who migrated from Mecca, but also Jews and polytheists. It does include certain articles aimed specifically at Muslims, but it gives other religious communities their rightful dues. It provides the legal framework for the governance of Medina, a multi-religious society, where everyone is treated equally on the basis of law and does not refer to any other extra-judicial authority. The guardians of the Constitution are the citizens of Medina who 'form one people'. God enters the Constitution towards the end as 'the protector of him who is righteous and God fearing' [23].

At Hudabiyah, the Prophet foresaw that the future of the nascent Muslim community of Medina, exhausted after two major battles, and the third which was only avoided by his foresight, depended on a negotiated peace. The

Hudabiyah Agreement is model of compromise; even the name of God and the fact the Muhammad is His Messenger, the cardinal statements of Muslim beliefs, were expunged from it. Not surprisingly, the Muslims saw it as a defeat and a disgrace, yet the Qur'an describes it as 'a clear victory' that will result in forgiveness of 'past and future sins' (48:1-2). Here, the Prophet demonstrates that sometimes a compromise, even though it may be painful and may undermine your cherished beliefs, is a vital instrument for shaping a more productive and prosperous future. The self-righteous who refuse to comprise when compromise becomes essential ruin their present and their future.

And finally, at the conquest of Mecca, the Prophet stands victorious in front of arch enemies. He is addressing a gathering that includes those who tried to murder him, killed and tortured his followers, drove him out of the city of his birth and waged wars against him. What does he say? 'Go your way for you are the freed ones' [24]. He declares a general amnesty forgiving his enemies of any crimes they may have committed in the past thus demonstrating that the injustices of history should be left to history. If recourse is sought for historic injustices in the present they will be perpetuated in the future. Forgiveness is perhaps the most sublime lesson we can draw from the Prophet's life. It is an essential virtue for working towards any future that is not mired in intrinsic conflicts and strife.

And after the Prophet, the Rightly Guided Caliphs continued the tradition of future orientated thinking and actions. Abu Bakr, the first Caliph, foresaw the expansion of Muslim lands and realized that future needs could not be fulfilled with the existing system of administration. He therefore developed a new, and profoundly flexible, system of administration and management which could adjust to future needs. Umar, the second Caliph, realized that the future survival of the Muslim community was dependent on available resources, and that all resources could not be consumed by one generation. Against the explicit wishes of his companions and even at the risk of a conflict, he refused to distribute the conquered lands of Syria, Iraq, Iran and Egypt amongst the conquerors. Declaring that they were for 'succeeding generations', he set them aside as future resources for the rapidly expanding Muslim community.

There is thus no lack of future-oriented ideas in Muslim history. Indeed,

I WOULD ARGUE THAT ISLAM IS INTRINSICALLY FUTURE ORIENTED;

and insists that the believers should actively shape their futures. By the very nature of their faith, Muslims are required both to engage with the world and change it. The Qur'an repeatedly asks the Muslims both to change themselves and to constantly strive to change the world so that it could become a more just, equitable and peaceful abode for humanity: 'Man will only have what he has worked towards, that his labour will be seen and in the end he will be paid in full for it'(53: 39-41). So both as individuals and societies, Muslims have to 'labour' and 'work towards' the future that they desire. Viable, desirable futures do to happen by chance; they require effort, thought, thinking, strategic planning, visioning, and hard graft.

The past thus has a significant role to play in the future. But a past that consists of worship of people of bygone age, with objects that are worthy only of being in a museum, and ideas that have no contemporary value, does not enhance life – it takes us backwards and not forwards. Tradition is an important component of our identity. But tradition can also become toxic, a life-denying force that kills innovation and critical thought. Indeed, traditions remain as traditions only by changing; otherwise they become fossilised customs that suffocate and drain life from a living culture. It is only when the past provides us with meaning that it turns from a jumble of facts and events, rituals and pieties, great deeds of reverential figures, futile power struggles, glories and setbacks, into a historical consciousness that shapes and guides us towards viable futures.

We therefore have to examine our past critically. Not everything in our history is of value in the present or will be of significance in the future. In particular, we have to examine and rethink our most cherished historical beliefs that actually foreclose the future; and go forward with those ideas and concept that open up Muslim futures to alternative horizons. When the past connects with the present as historical consciousness, history is made as a lived reality. It is history as ideas and concepts that shape the present and the future. Indeed, as soon as concepts are formed, ideas are fashioned, they start changing and influencing the world. They fuse with contemporary reality and become an integral part of it. They are internalised by cultures and societies and continue to be effective. We thus experience history as consciousness as well as make history. As such, history transcends time, it moves beyond our pasts and the present to the future; this is precisely why Islam places so much emphasis on history.

Situating the Present
This very moment in history - now - is the present; and it has a natural role in determining our futures. But the present is not static. As today becomes tomorrow, the present changes. Indeed, the present is forever changing. Moreover, the present incorporates the future that will be. The near future, the next few years,

as we noted earlier is the 'extended present' it incorporates the futures that have already been triggered, by emerging technologies for example. So we need to see the present as dynamic, changing and constantly incorporating new elements and situations of contemporary reality. There are five distinct elements of this dynamic present that we need to consider in shaping sustainable futures: globalisation, complexity, chaos, contradictions and uncertainty.

First: the obvious fact that we live in a globalised world. It is an interconnected world with no boundaries in which things do not exist in isolation and many problems are not limited to the national domain. The problems of climate change, economic and financial issues, and infectious diseases are obvious examples with international dimensions. But even what we may consider as specific local problems, such as unemployment in a particular area, or culturally based gender issues, have global dimensions. In a globalised world every society has problems; and no society has all the answers. Moreover, globalisation also means that all societies are now intrinsically heterogeneous – diversity of beliefs, different ways of thinking, different traditions, cultures, and lifestyles exist side by side. Thus, Muslims have to deal with diversity within their societies and have to work across cultures and societies to tackle some of their pressing problems.

However, this is not possible if by definition other cultures are seen as antagonistic or inferior or somewhat lacking in moral fibre. Muslims have never been at ease with the Other – whether it is the internal Other such as women, people in same sex relationships, members of other sects, atheists, or external Others, such as Christians or Hindus or 'the Secularists'. Indeed, much of Islamic law seems to demean the Other; and cultural prejudices and attitudes draw sustenance from the Shariah. As such, Muslims have no language to explore analogous principles and shared values of different systems of thought and social organization [25]. Under globalization, where different cultures and worldviews are jostling for power and position, there is a great deal of criticism and counter-criticism across the world. Just as Muslims have a right to critique others, describing the US as 'the Great Satan' for example, others have equal right to criticize Muslims. But Muslim societies in general have not been very good at taking criticism, particularly if it is directed at our sacred symbols such as the Prophet Muhammad, as exemplified by blasphemy laws that we find both in the Morsi constitutions and in Pakistan's constitution, as well as laws that forbid mocking the President, that are also present in otherwise secular Turkey. This inability to take criticism and deal with diversity and plurality suggests that Muslims have not been able to adjust to the new dynamics of a globalized world and their current problems and trends are set to multiply enveloping and suffocating their futures.

Second: the problems we face nowadays are not simple. There is nothing simple about producing a working democracy in a state with a plethora of political parties and numerous interest groups, fixing the economy, securing our energy supplies, fighting pandemics, providing security, sorting out youth unemployment or dealing with impacts of climate change that has brought havoc to Pakistan, Bangladesh, and the Sub-Saharan Africa. None of these problems can be 'solved' in isolation or 'fixed' by single groups or parties or individual states. These are complex problems; indeed, almost everything we have to deal with nowadays is complex. The accent in the present is on complexity.

Complexity is a natural by-product of the fact that most of our problems are on a global scale [26]. Globalisation generates complexity not just by making us interdependent but also by increasing our interconnections. In a globalised world, everything is connected to everything else. The most obvious example is, of course, the internet and social media. But there are also 24-hour global news networks that beam pictures of any event, anywhere at any time to everyone else on the planet. Notice how an epidemic that may start in a remote village, such as swine flu, spreads rapidly to become a global pandemic thanks to international networks of travel. Or that 'haze', generated by burning forests in Indonesia, spreads quickly to choke populations in Malaysia and Singapore. Or a terrorist attack on the United States leads to war and mayhem in Iraq and Afghanistan, which then feeds terrorism from the North of England to the North of Nigeria. Nothing really exists or happens in isolation.

There is another trend that enhances complexity: the rate of change. It is not just that things are changing rapidly but the rate of change is itself accelerating. Information technology, for example, doubles its power, as measured in price, performance and bandwidth capacity, every year. In 25 years, it would have multiplied by a factor of a billion as we move from transistors to more powerful technologies such as molecular computing or nanotechnology. And it will, as technology always does, rapidly transform social behaviour. Similarly, our capacity to sequence genetic data has doubled every year. While it took 15 years to sequence HIV, the SARS virus was sequenced in a matter of a month. At the right price, you can now have your genome sequenced within a single day. Revolutions took years to plan and implement: the French revolution took eleven years, while the 1917 series of revolution in Russia took nine months to complete their objective. The Iranian revolution took just over a year to happen and years of planning. Nowadays revolutions can be generated spontaneously. Dictators are overthrown within weeks. The global economy can collapse, as it did during 13-14 September 2008, within days.

What makes complexity hard to comprehend is that, along with accelerating rate of change, things are also happening simultaneously. So, for example, as American power shrinks, as China takes on the mantle of a new superpower, as India flexes its economic muscle, as Brazil emerges as a new economic powerhouse, as Russia regains its confidence, as Japan's influence declines, as Europe consolidates its experiment in shared sovereignty, as non-state actors (from multinationals to terrorists organisations) grow in power and influence, as relative wealth and power moves from West to East. The entire geopolitical landscape changes rapidly and simultaneously.

This means that Islam and Muslims face a particular dilemma. Complexity cannot be dealt with using simplicity; complex problems need complex solutions. Yet what we regard as 'Islam' today is little more than a jumble of simple statements. Islamic law has been reduced to a list of do's and don'ts. Hence, Muslims find themselves trying to manage and control a world by means of simplistic age-old formulae, ossified tradition and customs, obscurantist law, pious utterances and vacuous slogans. The late and noted Pakistani scholar Fazlur Rahman called this 'minimal Islam' which just cannot cope with contemporary complexity.

Complexity also suggests that simplest notions of 'Islamic states' ruled by 'the principles of Shariah' under autocratic rulers are dangerously obsolete. Such states essentially attempt to reduce complexity by banishing all diversity and plurality, and are thus inherently unstable. Their survival becomes questionable if they attempt to severe all connections with the world, as theocratic Iran illustrates so well. Indeed, the only way an allegedly monolithic Islamic state can survive is by becoming a client of a superpower that props it up as in the case of Saudi Arabia. Complexity just cannot be expunged; it's a basic component of contemporary times. Which means any state with the adjective 'Islamic' in front of it has a limited shelf life.

Third: we are constantly on the edge of chaos [27]. Interconnected, complex problems generate positive feedback. Things multiply quickly and change occurs in geometric proportion. Thanks to mobile phones, blogs, e-mails, and 24-hour news media, Facebook, Twitter and other forms of social media, we are constantly in the know. We are thus primed to react instantly, equipped with the means to set off new patterns of chain reactions which culminate in chaos. When complexity is combined with networks and interconnected it leads rapidly to chaotic behaviour. It is evident all around us from the way the markets and financial institutions function to collapse of ecosystems, flash mobs, the 2010 Europe wide chaos created by volcanic ash from Iceland to the 'Arab Spring'. Indeed, even the sudden rise to global stardom of Malala Yousafzai, the teenager shot the by Taliban, is a product of chaos.

Chaos always begins with it small perturbations that rapidly acquire global proportions. The suicide of an unemployed vegetable vendor in Tunisia triggered the Arab Spring, the misdeeds of a small group of bankers led to the financial meltdown of 2007-2008, a new strain of influenza appears in a small village in the state of Veracruz, Mexico, and rapidly becomes the 2009 swine flu pandemic. Thus both minor seemingly insignificant events as well as individuals have the capability of triggering reactions that can quickly lead to chaotic behaviour. A good example is provided by Muhammad Tahir-ul-Qadrii, a Pakistani law professor and Sufi scholar. He was a little known leader of a non-governmental organisation, Minhaj-al-Qur'an, who lived in exile in Canada. He returned to Pakistan in December 2012 to agitate for political reform, and called for a 'million men' march against government corruption. Only 10,000 people turned up in Lahore to protest. But continuous television coverage, frenzy whipped up through social media, turned the protest into a major chaotic event. Behind a bullet proof booth, Tahir-ul-Qadri organised a sit-in in Islamabad, with dozens of television channels covering and reporting his every word. The government was paralysed; the nation was transfixed. The spectacle ended when the government promised electoral reform and an agreement was signed between Tahir-ul-Qadri (who basically represented no one but himself) and the government.

Pastor Terry Jones provides another illustration of how individuals can initiate and promote events of chaotic proportions. An unknown priest of an insignificant nondenominational Christian outreach centre in Gainesville, Florida, Pastor Jones threatened to burn the Qur'an in September 2010. His threat was broadcast on global television channels as though they were on a never-ending loop. The whole Muslim world reacted instantly and unthinkingly: demonstrations were held, embassies were burned, innocent people died, shops and public transport was torched – all of which generated even more television coverage, and sent social media into frenzy. Pastor Jones became a precooked global celebrity. The then US Secretary of State, Hilary Clinton, was moved to say: 'it's regrettable that a pastor in Gainesville, Florida with a church of no more than fifty people can make this outrageous and distressful, disgraceful plan and get, you know, the world's attention'. The President pleaded with the pastor not to go ahead with his plan. Even though the plan was not implemented, in an interconnected and globalised world, chaos took it course. Yet another example is provided by the Tea Party, a tiny minority of Republicans, who, in October 2013, held the entire US government to ransom, forced the government to shut down, and nearly brought economic catastrophe to the planet.

Chaos, complexity, globalisation and information technology has created a

new present that is radically different from all our recent pasts. We have entered a period where rapid change, uncertainty and ambiguity are ever present and the individual has tremendous power to do good or bad. In these postnormal times, our traditional and conventional ways of solving problems does not work. What is conserved normal increasingly makes less and less sense.

In postnormal times the conventional institutions, notions, ideas and outlooks of society constitute the problem. Not only are these seen as deeply flawed but their failure, sometimes spectacular, is quite evident – such as the failure of the markets, the intrinsic inability of capitalism to promote equality and its natural tendency to encourage monopolies, the feral greed of executives and management. Moreover, there is a general sense that little can be trusted and checks and balances in society do not work. The more politicians legislate, reform and amend the less significant and effective laws seem in achieving or delivering appreciable social benefit the more unintended and undesired consequences appear. Moreover, there is no luxury of time: problems need immediate and urgent attention, and even as we attempt to solve them they entangle themselves into a complex web, and multiply rapidly, concurrently and dangerously. All that we took for granted seems to evaporate and cannot be trusted to deliver what it supposed to deliver. The emperors in whom we placed confidence – scientists, economists, accountants, bankers, politicians; governments, markets, financial institutions, drug companies, technology giants – are seen to have no clothes. It is not that we ever saw the foundations of our societies as perfect. Rather, it is the realisation that these foundations are perilously shaky, unable to resolve the enduring imperfections of our world order, and can infect lead society towards a potential collapse. The entire system is geared to disproportionately rewarding the few at the expense of the majority. The selfish self-interests of power and the powerful are revealed as the only mechanism that works and the reality on which everyone is dependent. Control and management become grand illusions. All overarching explanations, the mythology that bound and made society viable, become toxic, the bearers of pathogens that infect society with distrust and lack of confidence. In postnormal times we know we have abilities but not the systemic, ethical and organisational capacity to translate our abilities into providing sustainable solutions to our endemic, interrelated and proliferating problems. In normal times, uncertainties are small and manageable. But in postnormal times, uncertainty takes centre stage. Since everything is interconnected, complex and chaotic, and changing rapidly, nothing can actually be described with any certainty. Moreover, given the complexity of the increasing web of problems and the rate of change, we are

unable to relate our present predicament to any past. We are thus unable to learn from anything from the past, even when we know there have been comparable systemic failures in history. Furthermore, individuals and groups have tremendous power to generate chaotic reactions thus further complicating the situation.

Much of the same argument applies to Islam, however we perceive it. It is quite evident that historical examples of Islam's success and failures are not particularly relevant to the postnormal condition.

SMALL NETWORKS OF TERRORISTS HAVE NOT ONLY BELITTLED ISLAM, MAKING IT THE MOST HATED RELIGION IN THE WORLD, BUT ARE ALSO HOLDING THE ENTIRE MUSLIM WORLD TO RANSOM.

We normally regard the Shariah as intrinsically good and yet wherever the Sharia is applied it produces nothing but injustice and inequality. Indeed, the Sharia is so inadequate in dealing with the issues of women that a woman who has been raped often ends up being charged with adultery – and severely punished. Infant Christians can be accused of blasphemy and sentenced to death. We take it for granted that 'Islamic values' are natural and moral yet they are out of sync with the ethics and morality of a world where freedom of choice and conscience are paramount. We rejoice when someone converts to Islam (even though he may be a criminal), yet seek to execute those who want to leave Islam for other faiths. The system of religious authority is geared towards providing unaccountable power and its attendant benefits to the few at the expanse of vast majority of ordinary Muslims. The selfish self-interests, self-righteousness and greed of the clerics, who behave much like bankers, corporate executives and autocratic leaders as we see in Saudi Arabia and Iran, piles misery upon misery on the believers. The ideals of Islam, the justice and equity it is supposed to promote, have become a grand illusion. All of this means that there is little trust in traditional Islamic institutions or in the ability of those who advocate Islamic alternatives to solve complex problems of our times – as President Morsi and the Muslim Brotherhood discovered in Egypt to their costs. Indeed, given a free choice, vast majority of believing Muslims would not chose to live in a society that is governed by conventional rules and regulations of Islam. Of course, we can retreat to the age old position and declare that Islam is perfect, majority of Muslims are misguided, and the rest of the world that is totally wrong. Or we can grasp the postnormal nettle and admit that orthodoxy and the conventional system, what we always assumed to be normal, is irreparably broken.

Fourth: the present is full of contradictions. Indeed, contradictions are a natural product of a complex, networked world, with countless competing interests and ideologies, designs and desires, behaving chaotically. Of course, not all the obvious contradictions around us are a product of postnormal times. But postnormal times bring contradictions into sharper focus and generate specific types of contradictions. For example, while certain segments of the globe are experiencing unprecedented change, large segments of the planet and swathes of our social life are quasi-static. While technology forces us to work faster and quicker, the speed of air travel, since the demise of Concorde, has actually slowed. As nations become more diverse and pluralistic, segments of populations with nationalist, fundamentalist and narrow outlooks actually increase. While governments and administrators try to increase efficiency of institutions, such as the UK's National Health Service, efficiency actually goes down (this is known as 'Jevons' paradox [28]). One year London is ablaze with riots and multiculturalism is declared to be an unmitigated disaster; the next year multiculturalism is hailed as a great success as the city celebrates its diversity and Olympic triumphs. India is supposedly an economic superpower, yet vast majority of its population lives in abject poverty: a point well illustrated by the title of the book by Amartya Sen and Jean Dreze, *An Uncertain Glory: India and Its Contradictions* [29] China has become the world's leading economic superpower even though it is a command economy and a communist state, a contradiction brought out by *How China Became Capitalist* by Ronald Coase and Ning Wang [30]. The Unites States is the richest nation on earth yet it has a debt of over 16 trillion. In Egypt: one year a popular revolution replaces a dictatorship with democracy, the next another popular revolution replaces democracy with military rulers. So contradictions abound.

Contradictions cannot be resolved; they can only be transcended. They point to the fact that progress, however it is perceived, always has a detrimental side effects. Or as the philosopher Jerry Ravetz puts it, 'there is no achievement of good without some production of evil' [31]. Contradictions also help us prevent oversimplified analysis of problems or situations. We are forced to consider clashing trends, opposing viewpoints, conflicting facts, and diverging hypothesis and theories and realise that the world is not amenable to naive one-dimensional solutions. Both complexity and contradictions suggest that any given problem has multiple dimensions; and that no particular partial view can encompass the whole. In general, problems do not have a 'right' and 'wrong' answers; indeed, answers can be simultaneously right and wrong. The only way to negotiate contradictions is through debate, discussion, and consensual dialogue.

Fifth: uncertainty is the norm [32]. When contradictions, complexity and chaos combine with accelerating change the only definite outcome is

uncertainty. In normal times, uncertainties are small and manageable. But in postnormal times, uncertainty takes centre stage. Since everything is interconnected, complex and chaotic, and changing rapidly, nothing can actually be described with any certainty. Postnormal times, as recent events in the Middle East demonstrate so clearly, is all about living with uncertainty.

So this is the present – moving and changing, complex and chaotic, contradictory and full of uncertainty – that will, to a large extent, determine our future. This is where we stand as we look over the horizon towards distant futures. If the current trends in Muslim societies continue, the future would be a continuation of the ossified past and contemporary impasses; this will be the probable future – the future that is most likely to be realised. It will contain all the authoritarianism, inequalities, oppression, sectarian divisions, social strife and violence that we find in Muslim societies today but taken to new levels. The probable future is also a colonised future: it is a future in which Muslim societies are actually subjugated by and into a future created by another culture or civilisation according to its own values, outlooks and worldview and its own economic, cultural, technological and political needs and requirements. Probable futures serve as warnings; they highlight the potential dangers and threats that lay ahead. However, the future need not be predetermined or simply be an extension of the past and the present. There are other options: possible futures, an amalgam of different possibilities we can imagine; plausible futures, that is futures we determine, given current conditions and historic momentum, that has a high probability of being realised; and preferable futures which we actually desire and consciously work towards. Preferable futures could have components of plausible futures combining what we actually desire with what is actually possible.

What would preferable futures for Islam and Muslim societies look like? And what would we have to do to realise them?

Preparing for Futures

Suppose we were to ask a random selection of Muslims what kind of future they envision for their societies. Most of them would surely want a future that is free of sectarianism and civil strife, violence and terror, torture and brutality, where their children can grow healthy and prosperous and where society is at peace with itself. They may also wish to live in peace and mutual respect with people of different faiths, Christians, Muslims, Hindus, Buddhists and people of little or no faith – secularists, agnostics and atheists. Moreover, most Muslims would wish to see a future where there is no difference between 'Arab and non-Arab', as the Prophet said in his Farewell Sermon, or, between 'believing men and believing women' as the Qur'an states. So all whatever

their race, gender and belief have equal status in society and the elderly and the disabled are treated with respect and dignity. Everyone, rich or poor, ruler and the ruled, men and women, are equal before the law and wealth is not accrued in the hands of a select elite. Dissent and criticism are not just tolerated but encouraged, pluralism and diversity are acknowledged and actively embraced. No doubt, some members of our random sample would hark back to the better periods of the Abbasid Caliphate or al-Andalus at its peak and wish to see science, technology, philosophy, thought and learning of all kind flourish; and art and culture, from literature, architecture, music, dance, to theatre and cinema flourishing and become a major global export. So Muslims far from being just consumers become producers of goods, services, innovations as well as new thought and knowledge. Moreover, most Muslims would wish for a future where there is accountability at all levels of society from those in power to bureaucracy, civil service, police, secret service, local councils and business right down to the ordinary citizen – they kind of accountability that Umar, the Second Caliph, tried to institutionalise in the classical period.

Of course, this vision is not a utopia. It is just a picture of a preferable future. People will still disagree with various interpretations of Islam, different people would emphasise different aspects, some would see something as halal or haram, but, on the whole, people respect different interpretations and different ways of being Muslim. Sunnis can be Sunnis, and Shia and other sects could define themselves in any way they wish, and Sufis could do whatever they do. No one will be accused of being a heretic or outside the bounds of Islam. The problems and disputes that arise, both within and between societies, could be solved by debate and discussion, with mutual respect, and there will be mechanisms and a strong general will solve to some of their problems and sort out their disputes.

Although this is both a preferable and a plausible future, it is not particularly ambitious. However, even to realise such a future a generation or two from now, in twenty to forty years, we would have to rethink Islam quite radically.

IT IS EVIDENT THAT TRADITIONAL ISLAMIC THOUGHT, WITH AUTOCRACY AND AUTHORITARIANISM AT ITS CORE, IS NOT GOING TO PROVIDE US WITH A FUTURE OF EQUALITY OR PLURALITY; INDEED, IT CANNOT EVEN COPE WITH THE REALITY OF POSTNORMAL TIMES.

The unstated assumption in Islamic dogma and values, however they are defined, are 'natural' and handed down by God Himself is patently false [33]. If traditional thought was capable of solving our problems, Muslim societies would not find themselves in such dire state; or if 'Islamic values' were as natural as laws of physics then Muslim societies would be free of the suppression, oppression, inequality, discrimination, violence and inhumanity that we witness every day. The way we have traditionally perceived and understood Islam just cannot cope with the complexity and contradictions of our messy post-normal reality.

We thus need a new base from which to move forward to desired, preferable futures.

WE NEED TO SEE ISLAM NOT JUST AS FIXED RELIGION BUT AS A WORLDVIEW THAT PERMITS A PLETHORA OF RELIGIOUS PRACTICES AND EXPERIENCES WITHIN ITS CONCEPTUAL AND ETHICAL BOUNDARIES.

Complexity tells us that no single mode of thought or model of behaviour can provide answers to our interconnected problems. On a social level, in a globalised and interconnected world, we act not in terms of belief but ethics. Moreover, we engage with the world, change and transform it with ideas and concepts. Our 'interpretation' of Islam has thus to encompass a worldview based on certain concepts, derived from the Qur'an, and an ethics that can deal with the complex social, cultural and technological reality of postnormal times. The conceptual matrix of a worldview serves not just as a methodology for tackling problems, raises issues of ethics and morality that can be debated and discussed, but also generates future choices and possibilities for Muslim societies.

In part this requires us to bring back the human in Islamic discourse, whilst acknowledging traditional thought and theology. The Prophet is seen not as a human struggling with tremendous odds within a specific historic context. But, contrary to what the Qur'an declares, as a superhuman whose every action is perfect and has to be copied to minute detail irrespective of its historic, social, cultural, and technological context. The Shariah is Divine and cannot be altered. The problem is if everything is God given then what role is there for humans in the development of religious thought and morality, in order to construct a new ethics for our postnormal times.

The declaration of the Qur'an that 'Muhammad is God's Messenger and the seals of the prophets' (33:40) is significant here. It suggests not only that there

is no Divine Revelation after Muhammad but also that the burden of creating a good society is now firmly placed on human shoulders. It would be a category mistake to assume that all knowledge, morality and religious thought comes to an abrupt end with the Qur'an and the Prophet. Rather, it marks the beginning of human endeavour to constantly refresh and reinterpret Divine teachings according to changing circumstances, whilst respecting the guidance of the Qur'an and the Sunnah.

In the swiftly changing environment of postnormal times, where complexity, uncertainty and chaos are ever present, a moral order can only be constructed on the basis of equality and dialogue, with appreciation of different perspectives. A representative government, for example, cannot function unless it takes the concerns and perceptions of all its citizens: Muslims of different persuasions, non-Muslims of various faiths and people of no faith, and people of different social and cultural backgrounds, and different ethical notions. In a globalised environment, with contradictory perspectives, one cannot assume that symbolic expressions of Islam will not ignite inflammatory concerns. As contradictions cannot be revolved, Muslims need to learn to negotiate contested issues through consensual dialogue on the basis of equality.

Ironically those who are most concerned and obsessed with 'Islam', beat their chests and shout the loudest about 'defending Islam' and 'Islamic Sharia', insist on politicising their identity and expressing it stridently and visibly (in their niqabs or hijabs, or the lengths of their beards, for example), represent the greatest threat to Islam and its future. Such monolithic and inflexible constructions of Islam can easily propel chaos to catastrophic proportions. Moreover, as complexity tells us, no single mode of thought or model of behaviour can provide an answer to our interconnected, complex problems and issues. Complexity can only be tamed through encompassing diversity and plurality.

There are two prerequisites in preparing and working towards preferable, plausible and viable futures. Both require abandoning major pillars of traditional Muslim theological outlook and are long overdue but postnormal times have increased their urgency. First, the goal that Muslims cherish above all others: to impose a single truth on a diverse society and a plural globe. It is the belief that Islam is not only true but that it is the only Truth; not just that all other religions are false but inferior to Islam; that all other ways of appreciating the Divine, the awe and wonder of the Universe, are not only misguided but positively immoral. The notion that Islam is the only truth sets up false oppositions, within Muslim societies as well as between Muslims and non-Muslims. If all truth is the same for everyone at all times, then if I am right, you must be wrong. And, if I really care for truth, I must convert you, by persuasion, legislation or force if necessary, to my view; or, at the very least, I

must ensure that my truth somehow remains dominant in society. Indeed, there are Muslims, as we all know, who think that their Islam is the only Truth and they have a Divine mandate to impose it on other Muslims as well as on all Others, by violent means. This construction of Truth has generated untold war and strife in Muslim history and has generated sectarianism, terrorism and bloodshed in our own time. It is thus imperative that Muslims move forward from the old recipe that 'Islam is supremely important, and therefore all men/women must have one true Islam' to the new formula that 'Islam is supremely important, and therefore every man/woman must be allowed to live by the Islam which seems true to him/her, or reject what does not seem true to him/her'. This is something the pious and conservative will find hard to swallow. But the reality is that their historic and traditional notions of 'Islamic truth' is dangerously obsolete in postnormal times and serves only as a source of strife and violence.

Second, we need to appreciate that the Sharia is a human construction of fallible man in history. Our understanding of our Sacred Sources can only be a human interpretation, an attempt to understand the Divine within a particular historic context. This is precisely why the bulk of the Sharia actually consists of fiqh or jurisprudence which is nothing more than legal opinion of classical jurists. We need a Sharia that is fit for postnormal times, takes the interconnections and complexities of a globalised world in consideration, that opens up Islam as an inclusive worldview, that promotes equality and plurality at all levels of society and that brings Muslims and non-Muslims together to work for a sustainable world and viable futures for all. Thus, the Shariah must be reformulated but not as law but as contemporary morality and a methodology for solving ethical problems. Perhaps this can be achieved on the basis of maqasid, the goals of the Shariah, with emphasis on public interest, human rights, equal opportunities for women, freedom of conscience, the right to dissent, criticism and counter-criticism, mutuality, respect for other religions, and universality [34].

The major currency in postmodern world, and an essential source of power, is culture. Even the modest preferable future we envisioned requires that we begin by promoting culture in all its different manifestation in Muslim societies. Or to put it another way: we need to learn to appreciate beauty in all its form, in all human endeavours, and its necessity for human survival. For the future to be beautiful we need to ensure that beauty is incorporated in the present [35].

Coda

In our quest for preferable, worthwhile futures for Islam and Muslim societies, we need to ensure that the future is open to all potential and dissenting

possibilities. Without forward thinking Muslims may only become an appendage to other cultures and civilizations, forever dependent on the generosity and good nature of others. However, as the current trends suggest, Muslims may simply be isolated and make no real contribution to shaping the world. Muslims do not have to become people without history or tradition. If history is present as consciousness, rather than obscurantist beliefs, we move forward towards preferable futures not by looking backwards to history but by experiencing history as a living reality in the present. We don't wait for things to change; but actively change things and thereby make history.

BY FAR THE BIGGEST PROBLEM IN THINKING ABOUT THE FUTURE FROM AN ISLAMIC PERSPECTIVE IS THE ABSENCE OF AN APPROPRIATE LANGUAGE. THE FUTURE IS THE ONLY DOMAIN WHERE ANY MEANINGFUL CHANGE IS POSSIBLE – WE MUST CHANGE THE PRESENT IN ORDER TO CREATE THE FUTURE – A FUTURE WHICH IS DIFFERENT AND BETTER FROM THE PRESENT.

Given that we understand and engage with the world through discourse, it suggests that Islamic discourse must be capable of addressing the problems of the world as it is and facilitate change for the better in the future. A language is not just a tool of communication; it is also a tool through which social and cultural needs required to survive are negotiated. There is thus an urgent need to infuse Islamic discourse – its assumptions, statements, ideas and framework of social and cultural knowledge - with future consciousness and develop a language that motivates us to look forward rather than backwards. We direly need metaphors and images of Islamic futures that create new meaning.

In a beautiful allegorical essay, written over twenty years ago, Pakistani Canadian architect and theorist of aesthetics, Gulzar Haider, goes in search of a name for his yet unborn grandson. He wants to give him a name that has meaning he can fulfil. Sitting in his favourite place between the Hagia Sophia and the Blue Mosque in Istanbul, he reflects that names are embedded in the very cosmogony of the Qur'an, as the primordial medium for the knowledge that God gives to Adam. 'It was the "names of entities", subscribed on the memory of Adam, that placed him and his children to a status incomparable and higher than that of angels. And where they not "Beautiful Names" through which the Creator chose to introduce Himself to His favourite creation,

mankind?' Under the shadow of the tall minarets, 'suspended between childhood and grandfatherhood, trying to manage familial joy and a general sense of planetary doom', he finds himself weightless and floating. Projected two decades into the future, which is to our present, he arrives in Mecca on Arafat day. He mingles with pilgrims from all over the Muslim world, moving from tent to tent, eavesdropping on conversations between different types of Muslims: orthodox, Sunnis, Shias, Wahhabis', Salafis, Jihadis, modernists, traditionalists, conservatives, liberals of different background and ethnicities. He discovers that the future has not changed; while the world has changed and passed them by the language and rhetoric of Muslims has remained static, as if they were buried 'in the graveyard of stones on the north side of Sophia'. No development or evolution of any kind has taken place. He finds his grandson, sitting and listening to this rhetoric with confusion. He returns to the Blue Mosque, 'the grand junction of time where memory collages with imagination and both past and future surrender themselves to a capricious sensory present', pained and disillusioned. And decides to write a letter to his grandson:

It is true that I prayed for a name for you that you would fulfil. But now I know that by giving you a name I will precast your future into a stone monolith. Allow me to be only a loving observer who will try answering your questions and help you in making your inner and outer environment peaceful and beautiful. The future, as you will know later, is a space in which we contemplate the consequences of our present actions. And it is not knowledge of the future but its ethically disciplined vision, and it is not its control but its intelligent contemplation, that makes us the envy of angels. I have seen the landscape of Muslim futures and it looks fragmented, bounded, a controlled city of discrete tents. There are some who are alive and awake but are cast out of the city. They continue their search for the Medina, and till then they keep reading, writing and speaking without fear except of their God and His Prophet. But none of them has a name [36].

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SCIENCE AND SCIENTISTS IN THE POST-NORMAL AGE

Jerome R. Ravetz

It is well known that the new technologies of information are revolutionising practice in a great variety of fields, now even including the cheap manufacture of material objects. The powers of research science in many fields are being enhanced and even transformed. Generally these changes in technical practice take place within social and conceptual structures that were inherited from previous epochs in science. They are important new developments, but not necessarily 'new forms' of science. Here we consider the practices and structures that cause surprise and concern when they are noticed, and that have their own momentum to continue rapid change. Generally they show the effects of the new technologies of information, combined with ideas and practices imported from the wider political sphere. Since this is all happening so recently and so rapidly, there is hardly any reflective scholarly literature on the subject. So we have to take our insights from the standard contemporary sources while discounting their more speculative conclusions.

But before we examine how the structure of scientific activity is radically changing, effecting persons, procedures, property, publicity, quality assurance in, and consequences of science, a little historical background is necessary.

Historical Background

About a half-century ago there was an awareness among scientists that things had changed. The transition was captured in the seminal book *Little Science, Big Science*, by Derek Price [1], which reflected on the rapid expansion of science, particularly in the USA, and its harnessing to production and war as in the Manhattan Project. Over the following decades, this new situation became the occasion for many reflections, along with new lines of debate that developed gradually. The current situation of science is one of very rapid change. Attitudes and activities that were unthinkable only a decade ago are now well established. Few would have imagined, for example, that eminent scientists would organise a boycott of a leading scientific publisher. But that

is what the leading mathematician, Timothy Gowers, did to Elsevier, with the support of thousands, with the slogan 'academic Spring'.

The changing self-consciousness of science during that previous period is a reminder that in the socio-technical system of science, the intellectual and material aspects of the system are deeply implicated in one another. As we move, perhaps headlong, into a new set of relationships of the material and the conceptual, it is as well to gain perspective by going further back than 'big science'. Since it is the means of communication that are most obviously being transformed by 'digital' media, we can recall the impact on science of printing in the Renaissance. This enabled the diffusion of knowledge in obvious ways, feeding its growth in both quantity and quality. The earliest examples of publication in modern science and technology appeared then, as with the books by Agricola, Birunguccio and Vesalius. They enabled independent practitioners to advertise their talents, and thereby to obtain the best patronage available on the market. Galileo exploited this technique, parlaying his *Sidereus Nuncius* first into a pay rise in Venice, and then to a coveted position as 'Chief Mathematician and Philosopher' at the Medici court back home in Florence.

By the end of the sixteenth century the great national industries of conquest, war and royal display gave employment as never before to practitioners with mathematical skills. The traditional status barriers between 'liberal' knowledge and 'mechanical' practice were lowered, for a few generations at least. Simon Stevin was a genius who worked as a practitioner but showed philosophical ambitions; while Galileo was just on the other side of the class/culture divide and was determined to stay there. William Gilbert was the first to unify 'philosophy' and experimentation in his *de Magnete*; there he also rigorously reported which experiments worked and which did not! Bacon's rhetoric about 'torturing nature' became a successful practice among the 'experimental philosophers', most notably in the great English school with Boyle, Hooke and Newton. By the eighteenth century, the union of theory and practice was fully established, and philosophers in the 'highland zone' of Britain combined ideology and improvement (with profit where obtainable) to great effect.

As the powers of technology grew through the nineteenth century, scientists (who then got the title!) could study natural powers under artificially controlled situations, notably electricity and magnetism, but also both old and novel chemical substances. The cross-fertilisation of heavy industry with mission-oriented scientific research was established, first in Germany (starting with Liebig) and then elsewhere, notably in the USA in the great labs dominated by such iconic inventors as Edison and Steinmetz, along with the quasi-magical Tesla. On the German example the university system was eventually forced

to graft research onto its traditional roles of teaching and socialising the young elite. One later product of this merger was a collective amnesia among scientists and scholars about the role of that organised, industrialised research and development during the 'little science' period, a misunderstanding which led to much confusion when 'big science' arrived in full force.

In the epoch that was inaugurated by the Manhattan Project and just ending, science became 'industrialised' in several respects: in overall size, in scale of individual enterprises, and in its ever closer relations with industry. It also became 'incorporated' [2], that is involved in a variety of ways in the affairs of the state, far beyond the traditional connection of warfare. Somewhat naively scientists believed that they were being asked to speak 'truth to power', when their clients frequently wanted 'policy-based evidence'. Traditional stable subject-specialty research has been displaced by 'Mode 2', in which scientists are fungible units of production, to be deployed or discarded as the needs of mission-oriented projects dictate. In its relations to the broader society, the manipulations and distortions of research that are now familiar in connection with profit-making industry (as tobacco, food and pharmaceuticals *inter alia*) are mirrored in the less notorious, but equally important practices of ministries and state agencies. The 'Gemeinschaft' research communities of yesteryear survive only on the margins, although Steven Shapin has argued that they are being re-created out of necessity in the fast-moving fields of innovative entrepreneurial science [3].

Structures of Scientific Activity
Having very briefly reviewed the historical background, we can now sketch the relevant structures of scientific activity. Then we will be equipped to understand the influence of the new technologies on the new forms of scientific practice. It is now commonly appreciated that the old picture of 'the scientist' making a discovery and then turning it over to 'society' is very radically oversimplified. First, the possible motivations for engaging on, or supporting, research are varied. Aside from the traditional 'curiosity', there is also 'mission-oriented', 'mandated', 'regulatory', 'amateur' and (we must now add) 'critical'. The relations with broader society, the internal social structure, and the ruling criteria of adequacy and value, all depend on that initial motivation. Appreciating that basic variety in the production systems of scientific knowledge, we can then consider the cycle of activities through which knowledge-production goes.

That initial motivation is but the first step in a multi-phased cycle. We might call it 'issue', as that is where policy-relevant science gets its start. Next comes 'policy', which expresses the hoped-for solution and defines the parameters of

the design of the project. This is most easily seen in research on risks; for 'the risk' is itself always complex, and simplifying design choices must be made on the subjects to be studied and on the nature of the hazard they experience (e.g. adults, children, pregnant mothers, and chronic or acute doses, average or peak exposure, etc.) And 'problem', giving greater specificity to the inquiry, perhaps stating a statistical hypothesis to be tested, comes soon after. A most important early step is 'persons'. Whenever policy is at stake, this can be quite crucial; rather like judges, even if scientists all have integrity that does not prevent them from leaning this way or that when confronted with uncertainty and value-conflicts. This step has become problematic in several ways recently, and is closely related to the new politics of science. Then comes 'procedures', which are necessary because research is never straightforward, but is rather the study of the 'proxies' for the conceptual things and events which are of concern. In all such cases, there are numerous standards and conventions defining acceptable good practice, designed and implemented for avoiding the known pitfalls of the creation of data and of their interpretation and inference. A high-quality scientific paper contains dense descriptions of those procedures, thereby assuring its readers that its results are robust. At the core of the investigation there is 'production', where someone interacts with equipment (or respondents) to obtain the primary data, which will be the intended representatives of the proxies for the defined objects of inquiry. Out of this comes 'product', realised in an 'inscription' which may function as 'paper', report, or patent application. Beyond that there is 'property', which also includes control over 'publicity'. It was once assumed that the public sharing of results was definitional of science as opposed to invention. But it has recently emerged that the publication of data is by no means universal in spite of being formally required by many funders and journals. Of course,

WHEN DATA IS WITHHELD IT IS IMPOSSIBLE TO OPERATE THE NORMS OF 'COMMUNALISM' AND 'ORGANIZED SCEPTICISM' WHICH HAD BEEN ACCEPTED AS FUNDAMENTAL TO REAL SCIENCE.

Near the end of the cycle are the traditional 'applications' and the recently recognised 'consequences'. These are now sometimes appreciated as critical to the inquiry, and will include the 'bads', or 'unintended consequences' that arise from the applications of scientific results. The relevant sciences here are almost polar-opposite in character from the traditional lab disciplines.

For the problems are usually 'post-normal' in having high uncertainties and high decision-stakes, politicised debates over the assignment of burdens of proof, plus imbalances of prestige and of conventional institutional funding, with whistle-blowers sometimes being as important as researchers, and open conflict breaking out between pressure-groups and vested interests.

Such a cycle helps to explain the complexity and confusion that attends debates when science is involved with policy. Without a shared awareness of the different phases of the production cycle, debates can wander inconclusively through a maze of topics. Moreover, each of those phases of the production cycle has its own 'quality control cycle'. This feature establishes the true complexity of the process. For whenever there is an action conducted within an organised system, it will be subject to 'control' for its quality. This operation will include particular agents, operating by particular criteria of quality, and adopting particular procedures. Whenever a regulatory body comes to public notice, it will be seen that it has these elements, agents, criteria and procedures. Moreover, the control cycle is itself subject to control cycles! Lest this seem paradoxical, we recall the Latin epigram, "Quis custodiet ipsos custodes?" – Who guards the guardians? Sheila Jasanoff first called attention to this phenomenon in science advice, in her pioneering work *The Fifth Branch* [4]. Such an iteration is familiar in connection with the administration of justice, with a sequence of courts of appeal, right up to some highest court from which some political influence cannot be excluded. More to our present concerns, quality has replaced truth as the effective guiding principle for science. The 'quis custodiet' iteration is a reminder than quality cannot be maintained by enforcement. It requires an ethical commitment, one that must be seen to be practiced at the top of any institution. In its absence, corruption and vacuous research is sure to follow. We have previously remarked on the paradox that the successful production of objective scientific knowledge depends critically on this subjective ethical commitment [5].

Persons
We can now look at the production cycle of scientific knowledge in greater detail, identifying important points of novelty. In recent decades there has been a growing recognition that policy-relevant science is done better if the early stages, as Issues and even Problems, draw on a broader experience than that of politicians, science advisors and experts. Some time ago the term 'Extended Peer Community' was coined, [6] and since then, under many different names, the involvement of citizens has become increasingly accepted as desirable and useful. The obvious constitutional problems of these exercises in 'participation' have somehow not proved insuperable. Particularly

on public health issues, broader participation in problem-definition has become established, starting with the campaigns by AIDS activists. Such developments have diluted the original force of the very idea of 'scientist', as the sorts of persons involved in the research cycle become ever broader. In conventional scientific research, there is a long continuous tradition of amateurs making a contribution, but more recently they had been relegated to the role of lower-status assistants. Such were the neglected sisters of astronomers in the past, and the numerous bird-watchers in the present. That approach to broader involvement is the least threatening to established orders, and it motivated the pioneering 'Galaxy Zoo'. There the groups of amateurs can even suggest topics for closer investigation. But a more active involvement is developing all the time, such as in the websites for folding of molecules, and even for solving difficult mathematical problems. In another direction, there is 'garage biology', still very small and marginal but with great potential. More serious is the parallel universe of the informally trained hackers of IT, including everything from pranksters and libertarians over to gangsters and State agents. As a result, the status of 'scientist' is being progressively diluted; one no longer needs to have gone through the lengthy process of selection and training, culminating in a PhD at the top of the cleverness pyramid, in order to be accepted as a member of a recognised knowledge-producing community. The status of 'expert', someone who has authority to solve particular problems on the basis of his scientific training, is being eroded even more rapidly.

WITH THE GROWING CONTESTATION OF SCIENCE-POLICY ISSUES (RANGING FROM NUCLEAR POWER TO VACCINATION), ALONG WITH THE INCREASING USE OF CROWD-SOURCING FOR DECISIONS, EXPERTISE IS BECOMING A BELEAGUERED ROLE.

A most important recent development has been the loss of the presumption of 'disinterestedness' in someone certified as a scientist. Authors of papers are now routinely required to declare any potential conflicts of interest, on the assumption that these are relevant to their claims. Also, research done with industrial support has its quality discounted, on the basis of presumed bias that is supported by surveys of outcomes [7], to the point where some firms are abandoning the sponsorship of public research. Since a very large proportion

of ostensibly public scientific research has been supported by industry and the military, this new awareness can destabilise long established patterns.

Procedures

A similar process of change, variously seen as erosion or democratisation, affects Procedures. For a long time, there was a common belief in a Scientific Method, those procedures whereby science unerringly produced the correct answers to its problems. It was the job of history of science to show that science always got it right, and of the philosophy of science to show how this was so. With the rise of uncertainty, first in theoretical physics, and then of complexity in knowledge and policy, this motivating faith gradually lost plausibility. The inability to specify a Method that is not logically fallacious has contributed to the difficulty. Popper's philosophy of 'falsificationism', so valuable as a moral injunction, turned out to be vacuous for the construction of knowledge. Once scientific practice is dominated by statistics, there is no question of 'truth' as traditionally understood, for the results depend on counterintuitive and obscure reasoning about null hypotheses and confidence limits? Even the standard statistical techniques, applied unreflectively in all of 'normal' science, have been severely criticised, as by Ziliak & McCloskey [8]. As to models, which absorb ever more research effort in all fields, and squeeze out the more expensive and time-consuming traditional methodologies, the best that can be said is the classic 'all models are wrong; some are useful'. The 'quis custodiet' iterative principle applies most strongly to procedures. The products of inquiry are subjected to direct testing, however imperfect; but the testing of procedures is of an entirely different order of complexity and difficulty. It is not surprising that one author [9] has found multiple examples of shoddy and low-grade work leading to unreliable and unworthy science. It is impossible to say how much of this depressing development is actually new; certainly, poor quality science has always been with us and has been noted in the past. But there does seem to be a much heightened awareness of these problems within scientific communities; and this could simultaneously have the opposite effects of stimulating reform while also reinforcing cynicism.

Property

In the previous epoch, the social relations of Property had not been changing with great rapidity; there was a steady displacement of the traditional 'public knowledge' by what we might call 'corporate know-how'. However, there has been a recent recognition of a deeply paradoxical situation in the management of intellectual property. In the new emerging technologies, notably in nanotechnology, there is a confused mixture of systems of intellectual property. Much work is done on public funds and in the public domain, while much

else is proprietary. And this division is not restricted to results, but also to the ancillary information that is essential for the research. There has been a recent warning that the progress of the field is being seriously impaired by the thickets of property rights that surround the various bits of knowledge and technique that are necessary for research. Thus, right here in science we have an example of Marx's description of the replacement of one mode of production by another in the *Communist Manifesto*: "the feudal relations of property became no longer compatible with the already developed productive forces; they became so many fetters. They had to be burst asunder; they were burst asunder." We can see a sort of parallel in science, whereby the small-scale semi-independent handicraft researcher has recently been displaced by the knowledge-worker in industrialised, or 'Mode 2', science. Marx saw the boom-and-bust cycle of modern industrial capitalism as a sign of a similar deep systemic crisis for itself, and imagined that the revolutionary proletariat would soon step in. That was not to be, at least on his time-scale. However, it is now widely recognised that in order to maintain the momentum of scientific innovation, the self-strangling hybrid system of intellectual property requires supplanting by the new social relations of production, characterised as 'open source' or 'creative commons' on the example of the IP systems of some key IT industries [10]. Without indulging in rhetoric about 'bursting asunder' the fetters of the IP rights enshrined in patents, we can see that deep change is inevitable and already underway. Even Big Pharma has taken the point, as with the Gates Foundation on TB, and GlaxoSmithKline in its Tres Cantos Open Lab Foundation [11]. Under these new circumstances, the 'gravediggers of (scientific) capitalism' will not be Marx's proletarians 'with nothing to lose but their chains', but rather Clay Shirky's possessors of 'cognitive surplus, spreading creativity and generosity in a connected age' of digital knowledge [12].

Publicity

Innovation is even more rapid in the phase of Publicity, which is after all the life-blood of science and which consists of information. What is significant for the self-consciousness of science is the sudden discovery that there actually is an urgent and deeply problematic political economy of publicity. Previously accepted as the unproblematic norm with occasional deviations, publicity has rapidly become the focus of concern and even of grievance. This issue, even more than property, may become the lever whereby the idealistic ethical assumptions of 'little science' come to be seen rather like liberty in the political sphere, not to be assumed but requiring vigilance and struggle for their preservation. The distinguished mathematician invoking Tahrir Square against the publishers Elsevier may be iconic for the emerging contestations over public knowledge in

science. The issue of secrecy and publicity emerged almost incidentally in the rather troubled evolution of the well-intentioned science of Global Warming. Leading scientists were affronted by demands for their data that were made by unqualified critical outsiders, notably Steve McIntyre. Eventually it required Freedom of Information processes against individuals and institutions, in the USA and UK, to unlock data that had been produced on public funds. The critics could not be isolated and neutralised as in previous debates (notably BSE), as they formed an 'extended peer community' on the 'blogosphere', the most popular site enjoying both a readership in the millions and prizes for quality (see www.wattsupwiththat.com). The issue of secrecy of publicly funded data became so urgent that there was an official response from the Royal Society of London, in the form of a working party chaired by Professor Geoffrey Boulton. (The Royal Society Policy Centre 2012) [13] In its report it strongly recommended procedures for insuring that such data should be public, although it did not extend its recommendations to the computer codes whereby such raw data was converted to usable information. In the ensuing discussion, it emerged that many rules for data publicity already existed, but that they were generally ignored by all parties to the publication process. The awareness of the problem soon extended from research data to those used in the regulatory process. It became realised that public regulators commonly make decisions based on secret data. In the atmosphere of mutual suspicion, the principle was invoked, "If they're hiding something, they must have something to hide". Accusations of possible malpractice by leading pharmaceutical companies, and of serious incompetence in data management by European regulators, have been made in the most authoritative quarters [14]. It is only natural that the issues of publicity and quality should become entangled in this way. The most effective way to seize the moral high ground in a science-policy debate is to call for transparency and openness, thereby invoking the traditional norms of science combined with the modern imperatives of participatory democracy.

On another front, ethical issues in fairness to access to information have suddenly become urgent. Scientific publication is not free, nor even particularly cheap. How are the publishers to be recompensed? The problems of cost and recompense in the digital age that had already afflicted the creative industries have suddenly arrived in science. Previous cosy arrangements whereby academic libraries subsidised publications through their subscriptions (and also provided a hefty profit), no longer go unchallenged. Also, it is suddenly realised that there are many worthy people out there who need access to nominally public information, and who cannot or even should not pay large fees for the privilege of sampling it.

ALL THAT INFORMATION WAITING THERE ON THE INTERNET, OR CLOUD, TURNS OUT TO BE FREE ONLY FOR THOSE WHO ARE SUBSIDISED BY AN INSTITUTIONAL LIBRARY THAT CAN AFFORD THE FEES FOR AN EXTENSIVE LICENCE.

Without membership of such a wealthy institution, the would-be researcher must produce significant payments for each item of essential information in the nominally 'public knowledge' sector, even for research to which they have contributed through their taxes. The publishers are now suddenly subjected to outrage, as academics accuse them of getting all their editorial services for free and then securing super-profits through their quasi-monopoly control of high-prestige outlets. The whole social system of scientific publication, which had been a model of success for generations, performing a great variety of functions (diffusion, archive, quality-control, evaluation and allocation of resources), is suddenly required to rethink itself. And this crisis occurs in conjunction with the arrival of the new technologies of publicity, which threaten the monopoly of paper-publication with all its very useful structures and constraints. We should not underestimate the severity of this challenge to the social institution of science as we have known it.

In science, as in other areas of knowledge production, the new technologies dissolve previous boundaries. Previously the forms of publicity were atomised, in harmony with the production process and the conceptual objects. That is, 'the paper' was realised in a congealed text, printed in multiple identical copies on paper. It was the product of a defined original study by 'an author' (or, in industrialised conditions, a defined collection of authors). That study had its own distinct closed cycle from inception to completion, as reported in the paper. Even quality control was atomised, with anonymous reviewers reporting to a single editor, determining the fate of 'the paper'. The social conditions of industrialised knowledge production, particularly in relation to the reward system which determined career opportunities, militated against leisurely investigations, as of the traditional natural history or even the reflective natural philosophy characteristic of 'gentleman-amateur' science. Accordingly, the atomised quick-returns project has come to dominate all aspects of the cycle. A parallel development in what can be called the practical ontology of science, fitted in with this style: the effort was to study simple, or simplified, systems, using conceptual objects and tools, usually statistical and mathematical, which enabled simple judgements to be made. Thus among biologists the emphasis became to focus on the smallest scales possible, from biochemistry down to

genetics; whole, complex systems were deemed incapable of scientific study, as indeed they were under this definition of science. The process can be seen in its extreme parodic form in mainstream economics, where abstract mathematical models of the decisions of mythical atomic actors served to reinforce the politically driven assumptions of the discipline [15] In strong contrast, thanks to digital publication, the on-going inquiry can now be a focus of a continuous flow of communal dialogue and development, in which there may be a temporary crystallisation of a 'product' as a matter of convenience. Leading journals in all fields now run blogs on their websites, providing alternate and informal channels of communication and dialogue. Thus, all the previous atomised social structures of quality, social control, publicity and access, and by extension the practical ontology of science, are thrown into confusion. Along with 'interdisciplinarity', complexity is now becoming a keyword in all sciences relevant to policy. We see here how all the different aspects of the production of scientific knowledge are mutually implicated in this transformation; starting with publicity, we have just shown how research practice and even practical ontology are affected.

Quality Assurance

The effects of the new technologies on the quality assurance cycle are, if anything, even more dramatic. Traditionally the quality assurance systems of science were run largely informally and largely confidentially. The mere fact of publication of a paper was taken to be its stamp of quality. All the processes of criticism and improvement were kept secret; the atomic unit of established knowledge embodied in the paper carried no penumbra of uncertainty or quality. Of course this system generally performed well, but it is highly sensitive to the quality of the quality-guardians. It is all too easy for peer review to degenerate into 'pal review'. For quite some time, the deficiencies of the peer-review system have been aired and considered, and the conclusion has always been that, rather like democracy, it is the worst possible system except for all the others. However, the function of publication in evaluating scientists has led to extreme stresses on the system, as 'publish or perish' becomes the rule in an age of constriction of resources and loss of job security [16]. The traditional technology of information has contributed to this stasis and overload: the sheer bulk of papers containing reviews, reports and revisions for a single publication would be inconvenient and expensive to make available for a wider scrutiny. Opening the files of documents on all publications would be impossible. But with the new technologies of information, we have new devices. Perhaps the most revolutionary of all the 'apps' recently invented is the Wiki. For, as Wikipedia itself has shown, with

wiki all the editorial processes can be both convenient and transparent. On Wikipedia, every article appears with a sort of pedigree, and co-creators are invited in to contribute to the public quality assurance process. Of course the process can be, and often is, abused; but then the abuses are usually spotted quickly and a lively open debate ensues. In many ways, this approach is being incorporated into research science. What had hitherto been a remarkably closed institution, with little public scrutiny of its workings and hardly any investigative journalism is now starting to be opened up. We can hope that the transition to effective 'openness and transparency' in the governance of science, starting with quality assurance, will be smooth; but it must come, and will come.

Consequences

Near the end of the cycle is Consequences. Traditionally it had been assumed that this had nothing to do with scientific discovery. The consequences of science were assumed to be essentially good and overwhelmingly benign in practice, and so the scientist could, with a good conscience, turn over his products to society for development and control. During the twentieth century, first in war and then in the fields of Safety, Health and Environment, consequences obtruded with increasing salience. A natural reaction was to bring all those issues under scientific control, with 'risk' becoming the dominant concept, displacing 'safety' and 'danger' in scientific discourse. This was defined as the product of the quantities probability and harm (always assuming that these had precise measures). There was even an ethical application: if a novel risk was no greater, quantitatively, than one already accepted, then only those who were misguided or malevolent would reject the new risk. Such analyses were applied in the early debates over civil nuclear power, and were discredited, along with the industry itself, by the disasters in the USA and USSR. By the end of the century, the inescapable presence of risk (still not 'danger') along with its characteristic politics, was analysed in the classic work *The Risk Society* [17]. Now the issue of consequences is recognised as crucial in policy debates on new technologies, be they genetically manipulated crops or nanotechnology, as well as in broader policy debates, such as those on climate change resulting from industrialisation. However, the science that is universally accepted as necessary, finds it very hard to develop strength that is adequate to its tasks.

To understand this imbalance, we can see its task as dealing with Bads, rather than with the Goods that are the traditional goals of science. These problems will usually be 'post-normal' in having significant uncertainties and decision stakes. Even when there is little scientific uncertainty, vested interests

can delay action by manipulating all relevant processes. The US tobacco industry's 'manufacturing doubt' is the classic case; more are to be found in the seminal work *Late Lessons from Early Warnings* [18]. Then, normally the bads are unintended consequences of mainstream science/technology done in the standard mainstream atomised way. For their study, the relevant fields will usually be marginal, and weak institutionally and politically, and perhaps even weak scientifically as well. Without any conscious intention, the rules of the mainstream scientific game are rigged against those who would pursue the science of bads. All this is changing rapidly under the new conditions of scientific practice. First, there is an asymmetry in the opposing sides of any debate on possible bads. The proposers are concentrated and organised, institutionally and personally. The opposition are typically a coalition of scattered aggrieved citizens joined up with underfunded NGOs. But just as the printing press and the rotary duplicating machine facilitated protest in earlier ages, the mobile phones and social media do so now. Also, since the protection of bads involves secrecy, the powers of new information technology to penetrate records and expose secrets redresses imbalances of knowledge and hence of power. Further, in modern society there are many protestors with education and applicable skills, so the traditional class divides are dissolved. The technique of 'Community Based Audit' where the data, methods and paradigms of proponents of developments are scientifically scrutinised by scientist-citizens and citizen-scientists working together as a preliminary to dialogue, is a valuable contribution to the science of bads [19]. We will know that science has genuinely entered its new epoch, when the science of bads becomes recognised as a subject worthy of being taught as part of a liberal education in science. A good start has been made in the announcement of the 'Oxford Principles' for responsibility in the governance of geoengineering research [20]. They could provide the same service for the post-normal science of bads, that the 'Mertonian norms' for scientific integrity have done for traditional research.

A role for Post-Normal Science

Consciousness always lags behind practice as the world changes. The older generation of eminent scientists are still mainly trapped in the old image of science as an independent noble pursuit, supplying goods for humanity and speaking truth to power. Indeed, we have scarcely begun to develop an ideology whereby the morale of scientists and hence the quality of science could be maintained under these new conditions. The task is urgent, for the corruption of the scientific enterprise is well advanced.

THERE IS NO GUARANTEE THAT SCIENCE AS WE KNOW IT, WITH CENTRES OF EXCELLENCE PRODUCING REAL INNOVATION, WILL SURVIVE.

Even within modern Europe, science has gone through national cycles of excellence of about three generations' length; first Italy with Galileo, then England with Newton, then France with Lavoisier, Laplace and others, then Germany with Liebig, Einstein and others, and most recently America with the help of the refugees. It now remains to be seen whether China can pick up the baton of 'Western' science and leaven quantity with quality, or whether European civilisation, like others before it, has now exhausted its reserves of creativity.

In my old book *Scientific Knowledge and Its Social Problems* [5] I addressed this problem, and imagined a 'critical science' that would arise in opposition to the 'industrialised science' that I saw was becoming dominant. It was necessarily quite speculative, and I drew on a variety of '60's countercultural themes, and concluded with Francis Bacon's prayer for charity in knowledge. The later concept of post-normal science was a first attempt to articulate that idea of 'critical science'. In its way it was, and to some extent still is, heretical: I imagine a class of problems with a scientific statement, but where uncertainties and value-loadings are severe. Since in the course of a scientific education students are totally shielded from such problems, they become disoriented when they first encounter them in practice. Worse, when they try to share their worries with colleagues, they are frequently shunned as the bearers of uncomfortable knowledge. In many cases, the thesis of postnormal science has served as liberation: the dirty secret does after all have a name and a respectable place in a public discussion somewhere.

For some time I wondered whether the notion of postnormal science would become obsolete, as the consciousness of science caught up with practice. After all, the core message, conveyed in the mantra 'facts are uncertain, values in dispute, stakes high and decisions urgent' is quite simple. There is no mention of complexity (which was brought into play some years later), nor indeed of incorporated science, unintended consequences, corruption, and sloppy science (on the downside), nor of the science of 'bads' and of activists, citizens, garages, or creative commons (on the upside). But perhaps that simple message can provide the scaffolding for the new, enriched insights that we need to articulate and develop.

A reflection on history provides support for this interpretation. Our modern vision of science stems from the prophetic writings of Descartes and

Galileo. Theirs was a simple vision, easily grasped, unlike that of Bacon, which had nuance and complexity. From Descartes we got certainty or freedom from doubt, and from Galileo objectivity or freedom from values and judgement. It is worth quoting both of their crucial passages in full, for they are so fundamental to the modern European scientific world-view.

Descartes tells us the source of his faith:

Those long chains of reasoning, simple and easy as they are, of which geometricians make use in order to arrive at the most difficult demonstrations, had caused me to imagine that all those things which fall under the cognisance of man might very likely be mutually related in the same fashion; and that, provided only that we abstain from receiving anything as true which is not so, and always retain the order which is necessary in order to deduce the one conclusion from the other, there can be nothing so remote that we cannot reach to it, nor so recondite that we cannot discover it. And I had not much trouble in discovering which objects it was necessary to begin with, for I already knew that it was with the most simple and those most easy to apprehend. Considering also that of all those who have hitherto sought for the truth in the Sciences, it has been the mathematicians alone who have been able to succeed in making any demonstrations, that is to say producing reasons which are evident and certain, I did not doubt that it had been by means of a similar kind that they carried on their investigations [21].

Galileo is more restricted in his scope, but equally confident:

If what we are discussing were a point of law or of the humanities, in which neither true nor false exists, one might trust in subtlety of mind and readiness of tongue and in the greater experience of the writers, and expect him who excelled in those things to make his reasoning most plausible, and one might judge it to be the best. But in the natural sciences, whose conclusions are true and necessary and have nothing to do with **l'arbitrio humano**, one must take care not to place oneself in the defence of error; for here a thousand Demostheneses and a thousand Aristotles would be left in the lurch by every mediocre wit that happened to hit upon the truth for himself [22].

I have left the crucial phrase in the original: 'arbitrio' is ambiguous, referring to will ('arbitrary') or judgement ('arbitrate'). Either way or both, the meaning is clear: knowledge has nothing to do with us mere humans. As to the classical learning, which humanistic culture prized as the true education of a cultured person, Descartes assassinated it systematically in his *Discours* (Part 2) and Galileo dismissed it here in a sentence. As later interpreted, this scientistic vision became the motivating vision of all the technocracies that followed, from the founders of the metric system in revolutionary France, to the prophets of behaviourist psychology, mathematical micro-economics, the game-theory of nuclear deterrence, and the recent probabilistic theory of financial products. In the same spirit, those who claimed that 'the science (of global warming) is settled' could not imagine how the global climate models, having been so successful at retrodicting the previous century, could ever possibly be wrong about the future.

In relation to this founding faith of modern European science, postnormal science is truly radical, heretical, or revolutionary, depending on your interpretation of contemporary history. It opens the way for plurality of perspectives, of the right to be wrong, of awareness of ignorance, of humility. With its simple core ideas, it enables us to see how the received image of science has fostered narrow-mindedness, intolerance and pride.

What is the synthesis of all these new forms of scientific practice, discussed above? In some ways the problems have been here all along; but now they are becoming acute, and can no longer be denied. In this sense science as an institution is being forced to look at itself realistically and not through ideological spectacles. We might call this a process of maturation, in which the core ideas of postnormal science have a role to play, until such time as the self-consciousness of science has been transformed and they become merely obvious common-sense. That may still be a little way in the future.

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CREATIVITY AND LEADERSHIP IN POSTNORMAL TIMES

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Introduction

The world is in the throes of a great transformation [1–4]. The complexity, pluralism, and uncertainty of life appear overwhelming. From Beijing to Rio, from Cairo to Los Angeles, the rate of change is not letting up. Indeed, it seems like the rate at which we take radical change and radical changes for granted is also accelerating. A recent cartoon showing the evolutionary development of humans has our latest instalment losing the erect posture in favour of the now familiar hunched over position of individuals checking their smart phones. We should keep in mind that smart phone technology is less than 10 years old: the first iPhone came out in 2007, but in 2014 it seems almost inconceivable for a considerable majority of people to live without one. Nevertheless, the changes brought about by the new technology and the relatively seamlessness with which it has been accepted hide the fact that we are talking about very, very new phenomena, and are potentially blind to the implications of our new hunchbacked posture.

Ziauddin Sardar argues that we are in postnormal times, 'an inbetween period where old orthodoxies are dying, new ones have not yet emerged, and nothing really makes sense' [5]. The new technology makes it increasingly possible to follow our every move through the internet, CCTV, satellites, and other means. The dramatic news about climate change, terrorism, the abuses of power and rampant inequality, coupled with our seeming inability to make sense of them, means the *Future Shock* discussed by Alvin Toffler [6] several decades ago, is upon us. Toffler's Future Shock was a play on the term Culture Shock: the future is as disorienting and shocking as being in a foreign country, where the most taken for granted things are done

differently, disorientingly weirdly, in a way that is just not…normal, and the world truly doesn't seem to make sense.

The sociologist Zygmunt Bauman writes that modernity has gone from being 'solid' to 'liquid': everything is fluid, changing, there is no predictability, no certainty, no stability, and human beings have to become flexible, adaptable, capable of working under conditions of great uncertainty [7–9]. The US army describes the present world with the acronym VUCA: Volatile, Uncertain, Complex, Ambiguous. In the business world, the acronym FUD is used to describe a condition of Fear, Uncertainty, and Doubt [10]. In this complex, fluid, uncertain *interregnum*, Sardar argues that creativity and imagination are essential to address the 'complexity, contradictions and chaos' of postnormal times:

IMAGINATION IS THE MAIN TOOL, INDEED WE WOULD SUGGEST THE ONLY TOOL, WHICH TAKES US FROM SIMPLE REASONED ANALYSIS TO HIGHER SYNTHESIS.

While imagination is intangible, it creates and shapes our reality; while a mental tool, it affects our behaviour and expectations. We will have to imagine our way out of the postnormal times. The kind of futures we imagine beyond postnormal times would depend on the quality of our imagination. Given that our imagination is embedded and limited to our own culture, we will have to unleash a broad spectrum of imaginations from the rich diversity of human cultures and multiple ways of imagining alternatives to conventional, orthodox ways of being and doing [10].

For Sardar, imagination, and its broader umbrella, creativity, are essential 'to imagine our way out of the postnormal times.' As the old ways of thinking and doing are failing, creativity is as a vital resource to envision and develop alternatives, whether technological, economic or social. Creativity has gone from being a fascinating, marginal, odd and inexplicable phenomenon to becoming the engine social change and transformation. It has become central in the transition from an Industrial-Machine worldview to a new world, as yet unarticulated. But creativity itself is changing dramatically. Whereas 20 years ago the lone genius was still the iconic model of creativity, today creativity is viewed increasingly as a relational, collaborative everyday/everyone/everywhere process that is not limited to the arts and sciences and the 'big idea.' The change in creativity is both driven by, and in turn itself drives, social trends and social change.

Two key aspects of the old worldview are what we'll call the 'Hobbesian Machines.' This is a combination of the Newtonian/Cartesian Machine, Clockwork, Industrial view of the world [11–14], with an assumption that the world is fundamentally shaped by a hierarchy of ruthless competition and a mentality of us against them, Hobbes's 'Homo homini lupus' (men are as wolves to each other). [15–18, 4]. This combines to make what Slater calls a 'Control Culture,' and Eisler has called a Dominator culture [15][4]. An alternative to this view is that the Universe is fundamentally a creative process [19–24], and that human beings *can*—although are by no means *determined* to—develop collaborative or 'partnership,' win-win relations.

Edgar Morin has argued that what is needed now is a thought that is *radical*, by which he means a thought that goes to the roots of our assumptions and issues, and a thought that connects and distinguishes rather than one that separates and fragments [2]. In transitional time such as ours, we believe that it is necessary to follow his advice, and step back and look at the big picture, to situate ourselves in space and time. We need to be able to understand the forces that shaped our old worldview, and how it informed our choices. We need to understand where we have come from, and how we have been shaped by our times, in order to move towards a different future. In this paper we trace the evolution of creativity and leadership, and explore how and why they have changed in the emerging networked society. We describe these changes, and then conclude with a brief discussion of how creativity and leadership that might address some of the more problematic aspects of recent developments.

Historical Roots

In the West, the concept of creativity as we know it today emerged in the 15th century during the Renaissance, [25]. It coincided with the birth of humanism and individualism [26], and a reaction against theocracy. It blossomed with the Genius myth of Romanticism in the late 18th century [27]. Until the 1980s, research on creativity in the West was situated mostly in the discipline of Psychology. It focused primarily on what were known as the three Ps: Person, Process, and Product [28]. In the romantic mythology underlying this atomistic, individualistic view, the creative person was mostly a lone, often eccentric, genius [29]. The unit of analysis was almost exclusively the exceptional or 'eminent' individual [30].

The 'how' of creativity occurred exclusively 'inside' this individual, the creative person. The classic image of the creative process was of a light bulb going on over the creator's head during the 'Eureka' moment. The creative process was viewed as a solitary one, at first with mystical or divine sources, and then increasingly associated with unusual mental states and psychopathology [31].

The 'what' or creative product was associated with 'big bang,' earth-shaking insights and products [32][33][28]. The 'where' of creativity was confined to specific domains, almost entirely in the arts and sciences. We can see this in the great traditional exemplars of creativity, almost entirely male and almost entirely made up of artists and scientists such as Van Gogh, Einstein, Mozart, and Feynman [34].

The Changing Face of Creativity and Leadership
At the beginning of the 21st century the way we understand, practice, and express our creativity is changing. These new developments are in turn influencing how society is changing [35]. Creativity leads to change, and change leads to creativity. Three main trends involve a) viewing creativity as a more networked, collaborative process, b) as an everyday, everywhere, everyone process, rather than something confined to exceptional geniuses [36][37], and the articulation of creativity as a form of leadership and leadership as a form of creativity [38–44].

Not surprisingly, the discourse and practices of leadership in postnormal times are changing too. Two of the most important social movements of the last few years, the Arab Spring and the Occupy movement did not have a heroic, 'Great Man' leader, or even a media-genic individual representative [45][37]. Modern conceptions of leadership and creativity trace their roots to the same theoretical assumptions and research approaches. We briefly trace their history and then point to different ways in which they are changing at the beginning of the 21st century. New assumptions and theoretical frameworks, as well as specific practices of leadership and creativity, can inform one another and reflect a more distributed, relational view.

Leadership and creativity are shifting from a Heroic, Great Man view to a more relational, distributed, everyone/everywhere/everyday process. Of particular relevance in postnormal times is the emerging view of leadership as a creative process, and creativity as a leadership process. Leadership can be a form of self-creation in the context of social responsibility and the development of possibilities and alternatives in the world: if creative ideas and processes can change the world, where and how do we want to ourselves and others? How do we channel our creativity? Creativity is increasingly being applied to social problems in movements focusing on Social Innovation, Social Entrepreneurship, and Social Labs, defined broadly as generation and implementation of new ideas about social relationships and social organization [46][47]. Turning possibilities into realities requires that creators also become leaders. Leadership needs to account for and be responsible for the direction and application of human creativity, and creativity needs to

infuse leadership with new possibilities and opportunities to move beyond postnormal times. The interrelated duo of creativity and leadership can begin address the problems of the old world, and develop and guide us towards alternative, more humane, more just, and more conscious times.

Historical and Conceptual Origins of Creativity and Leadership

Modern conceptions of creativity and leadership in the West can be traced to the Romantic Hero, the 'Lone Genius' myth [29] and its 'Great Man' image [48]. Until the second half of the 20th century, the study of leadership was largely about individual leaders, and the study of creativity the study of creative persons [49][28][50]. The focus was on what made particular individuals exceptional, and hence a focus in both fields on traits, personality, and cognitive dimensions [48][51][50]. Informed by such classic dualisms of Modernity as creativity/conformity, genius/masses (and of course, genius/madness), as well as leader/follower, this approach has been 'exceptionalist': leaders and creators were assumed to be exceptional persons with unusual gifts in a limited number of areas such as politics, business, the arts and sciences, or the military. A historical review of individuals considered great creators and leaders in the West shows a preponderance of white men while people of other ethnic and racial identities, as well as women in general, are notably absent [52–53]. It is only recently that the discourse has begun to integrate women, while the number of possible examples is increasing exponentially, and Mohandas Gandhi, Martin Luther King, Nelson Mandela, and Malcolm X have become the icons of non-western, non-white leadership.

20th century developments

A number of intellectual developments in the 20th century have led to a thorough questioning and critique of the dominant atomistic views of leadership and creativity:

- Social constructionists have argued that what we call 'creative' or who we call a 'leader' is the result of a judgment, and creativity and leadership are therefore socially constructed: there is no 'essence' of leader, there is a social judgment that labels people leaders and behaviours as 'leaderly.' The relationship between self and society must be viewed more relationally, and essentialist perspectives on the self ('a born leader,' 'you've either got it or you haven't') are critiqued [54–60].
- The intellectual movement loosely known as postmodernism has critiqued the notion of the individual, essentialism, the 'subject' and the 'author,' as well as demonstrated the commercial and political interests

embedded in the discourse of creativity and leadership [61–67, 54, 29].

- Systems and complexity approaches have stressed the importance of an open systems perspective –specifically, the interactions between individual and society –and the role of context. They have highlighted the 'self-organization' of natural and social phenomena, with a bottom-up, distributed rather than top-down approach, and thus the significance of recursive, mutually causal interactions, with implications for both creativity and leadership [68–75].

- The emerging Networked Society (with the rise of social media, the internet, and relatively cheap global transportation) has led to an increased awareness of the role of interactions, networks, and collaborative processes, leading to greater openness to more relational, networked understandings of agency and the unit of analysis [76–82, 68]. This is particularly evident in the so-called 'Millennial' generation [83] [84][10].

The atomistic, individualistic, 'Great Man' views of creativity and leadership were already problematic: it is becoming clear that both creativity and leadership were much more networked and collaborative than was originally assumed, not least because the exclusive focus on individuals did not account for the role and importance of interactions, social contexts, organizational structures, political interests, the dynamics of race class and gender, and a variety of other factors [29].

The emerging practice and acceptance of collaborative creativity and leadership [36][85] coincides with the rise of the Millennials, a new generation that came of age in the year 2000 and considerably larger even than the Baby Boomers, the needs of industry for collaborative creativity in R&D, and with the larger number of women, as well as more people from diverse ethnic and racial identities being able to participate in, and recognized in, creative and leadership roles [86][10].

Transforming Creativity

Recent scholarship has led to new ways of conceptualizing self, society, production, art, science, and creativity, stressing the social construction of a self-embedded in relationships, situated in a cultural and political context [87–91, 65–66, 51]. In the arts and entertainments we see this in a shift to what has been called a *participatory culture*, which involves a blurring of boundaries between 'artist' and audience [92]. The seemingly trivial example of karaoke provides a glimmer of how entertainment now involves greater and more active audience participation. It's not a passive audience listening to music.

Audience members are also the performers. *Wikipedia* is another example of the admittedly controversial 'wisdom of crowds,' with participatory entries and editing processes. Video games have users design their own series of levels. In R&D, end-user participation in the design process is increasingly becoming the norm. According to Jenkins, participatory culture reflects a shift from individual expression to greater community involvement, towards emergent, bottom-up, and even grass-roots processes and away from the traditional reliance on a top-down approach.

Research on the psychology of creativity now includes a strong emerging focus on *everyday* creativity rather than exclusively on 'eminent creatives' and major contributions. It is by no means limited to the arts and sciences [93][94]. The notion of everyday creativity suggests creativity can occur in everyday life, in less traditionally exalted domains, and does not have to take the form of a major work of art or scientific discovery. This opens up the possibility of the recognition of creativity as a phenomenon that can permeate every dimension of life. The *Where* of creativity is now potentially *everywhere*. There is also an increasing recognition of group and collaborative creativity. This can be found in new research on innovation, group creativity, jazz, and an increasing appreciation of 'the wisdom of crowds,' the creative potential of 'open innovation,' where difficult problems are shared with the public and useful answers emerge [95][67][79][96][29][32][97][98][99].

GENERATIONAL TRENDS ARE BECOMING INCREASINGLY OBVIOUS AND INFLUENTIAL.

Research conducted in 2010 showed millennial college students associated creativity with everyday activities and social interactions [82]. Whereas for Baby Boomers creativity is associated with 'eminent creatives' such as Einstein, Van Gogh, or individual popular artists, in today's 'participatory' culture [91][100] the focus is not so much 'eminent creatives,' but on participatory, relational processes with peers and family, where 'making is connecting' [101].

What might appear as great participation also arguably lends itself to great manipulation and exploitation. As Douglas Rushkoff points out in his Frontline Documentary *Generation Like*, the movie *Hunger Games* has a website with a competition for the best, most committed fan. What this means is essentially that the fans are now using social media to promote the movie, and the reward of promoting the movie through social media is being '#1 Fan,' and potentially a mention by one of the movie's stars. This way the movie gets constant grass-roots promotion, and the fans gain in social status by

being 'retweeted' or responded to by the stars of the movie, which increases the fan's peer group social status and the number of 'likes' they get in social media. There has been a considerable shift towards a much more interactive, participative relationship between audience and the 'content providers.' It's obvious that business interests have learnt how to leverage this for their own interest. But while this is perhaps the most obvious expression of this transition, it is by no means this only one.

Many of the most interesting innovations in the social sphere over the last 20 years or so have been about networking, participation, and grass-roots efforts. These innovations are connected to the emergence of the Internet, social media, the rise of a networked society, the changing role of women, the values of the Millennial generation. An assortment of examples of more participatory, grass-roots creativity include (and this is limited to mostly US/ UK examples): YouTube, Etsy, Facebook, Wikipedia, WebMed, Lord of Warcraft, farmers' markets, artisanal foods and the Slow Food movement, MySpace, blogs, vlogs, Twitter, flash mobs, *Britain's Got Talent*, independent music labels and movies, Garageband, DIY culture including DIY education [102], Yelp, TripAdvisor, Craig's list, *Dancing with the Stars*, *American Idol*, and all sorts of 'reality television.' The phenomenon of 'crowdsourcing' to solicit funds via social media has also opened up new avenues of funding for entrepreneurial activities. The emerging Makers movement is another sign [103], as is Toffler's related concept of 'prosumer' which brings together the terms producer and consumer to illustrate how the traditional opposition between the two roles is becoming blurred [104].

This new grass-roots participation is not unproblematic, as the *Hunger Games* example illustrates. Critics have also argued that there is a move towards amateurism: It's not clear that the fact that art and travel critics are replaced by blogs with reviews and the comments of Trip-Advisor users is necessarily an improvement, and newspaper and magazine critics are losing their jobs. Any semblance of standards and high culture, any valuing of expertise and craft is being replaced by vulgar, amateurish know-nothings, in this view [105][106]. The alleged democratizing process can also be a flattening where traditional standards of excellence and values are all but lost. The threat of manipulation by governments and big business is ever present, and grass-roots, networked group can also include terrorists and hate groups [107][108].

Questions are now being raised as to whether what we are calling 'everyone, every day, everywhere' creativity will lead to a growing narcissism (and an obsession for one's 15 minutes of fame) a consumerist self-absorption, and a flattening of all values that will make the 'Me Generation' seem positively

altruistic ('Must keep up with the latest, even if it's only the new operating system without which none of my apps will work'), or whether it can be channelled towards worthy human aspirations. At this point, the jury is out, with wildly different prognostications [104][109][110]. The question now is not so much whether we are creative, but what are going to do with our creativity? Where and how are we going to channel it?

Reinventing Leadership

Let's step back now and look at leadership more closely. Leadership is an established area of academic study, with departments and degrees. The literature on the topic is extensive, confusing and often contradictory indeed Kellerman has written about of the *end* of leadership [111][112][113]. As we can see, its conceptual roots parallel those of creativity research: the study of exceptional individuals.

Already in 1985 Bennis and Nanus [114] wrote that

Literally thousands of empirical investigations of leaders have been conducted in the last seventy-five years alone, but no clear and unequivocal understanding exists as to what distinguishes leaders from non-leaders, and perhaps more important, what distinguishes effective leaders from ineffective leaders [114].

Not very much has changed in the last 25 years [50]. In the same year, a critique of leadership emerged that questioned the 'romance' of the heroic leader [115]:

It appears that as observers of and participants in organizations, we may have developed highly romanticized, heroic views of leadership — what leaders do, what they are able to accomplish, and the general effects they have on our lives. One of the principal elements in this romanticized conception is the view that leadership is a central organizational process and the premier force in the scheme of organizational events and activities. It amounts to what might be considered a faith in the potential if not actual efficacy of those individuals who occupy elite positions of formal organizational authority [115].

This critique of the heroic Great Man coincided with a shift out of one era and into a new era [16][116][2][5][4]. In this transitional, postnormal period, we see the demise of one guiding model of leadership and the birth of new forms of leadership [117].

For our purposes we begin our discussion of leadership very simply, by asking, who can be a leader? A brief review of the history of the world's great leaders shows that widely recognized, celebrated, as well as despised leaders, have been overwhelmingly male representatives of the dominant culture, embodying characteristics that can be summarized (but are of course not limited to) the 'heroic' model. It is becoming increasingly apparent that leaders are now emerging from traditionally underrepresented groups, such as women and minorities. US President Obama is perhaps the most dramatic case in point. In the global 'social imaginary' there is now an African-American President of the United States. This does not mean that leadership opportunities have opened up for one and all, but it does signal the beginning of a shift towards greater openness towards traditionally under-represented groups in leadership roles.

The shift in the 'who' of leadership extends in other areas: it is not confined to the position of arguably the most powerful man in the world. As an example, the *Goldman Environmental Prize* is handed out every year in San Francisco to individuals described as 'grassroots environmentalists' from all over the world who have made a considerable and often courageous contribution to protecting the environment. The winners are not individuals who strike one as 'heroic leaders' in the dramatic mould of a General Patton. They are not great warlike leaders, orchestrating armies of soldiers or engineering corporate take-overs. They are ordinary men and women who prove they are also quite *extra*-ordinary when circumstances require.

While not traditional in how they view and present themselves these individuals *are* heroic in the sense that they regularly take on multinationals or governments or both, often at great personal risk. They are involved in struggles against deforestation, privatization of water supplies and other projects that affect the well-being of their communities or involve the destruction of nature. One of these leaders and Goldman Prize recipients, Ken Saro-Wiwa of Nigeria, was hanged by a corrupt government on trumped up charges because his work put multi-million dollar deals at risk. The Goldman Prize winners are not individuals who had ambitions to be CEOs, generals, or elected officials. They did not see themselves in the traditional mould as 'leaders of men.' They simply responded passionately and thoughtfully to what they perceived to be an injustice. They felt they had to do something beyond their own personal survival and well-being. They almost fell into being leaders because they felt they had to develop a coalition of people to fight injustice.

The message is clear. The 'who' of leadership has changed: if leadership is about making a contribution to the global transition, making a contribution

by taking the initiative, then the field is wide open. And as members of traditionally underrepresented groups become leaders, we can safely say that the concept of leadership will be irrigated by new streams of values, creativity and cultures, new perspectives and potentials. Eventually it should not be the case that now underrepresented groups may also join the *existing* leadership club and play the game. The very definition of leadership, the rules of game themselves, will be changed, and are already changing.

The 'who' of leadership also ties in directly with a central postmodern concern: *self-creation* [118]. The assumption is not that leadership is a fixed characteristic one either has or doesn't have. In an era of transition, there are few certainties, and great opportunities for creativity. We are not bound by fixed roles or destinies. It is possible to *create* oneself as a person, and as a leader. The new leadership does not assume one has to be a leader all the time. Leadership is also increasingly viewed as heteroarchical, based on aptitude for a particular context, task, and situation.

Creativity researchers differentiate between big C creativity and little c creativity—eminent and everyday creativity [28]. It seems that the notion of big L leadership and little l leadership might offer a starting point to differentiate between, say, the President of The United States, whose role is formal and fixed and viewed as a central symbol of leadership for an entire country, and the everyday 'leaderly' activities of individuals engaged in social change movements, organizations, or daily activities who may step in and out of leadership activities in a more heteroarchical mode.

Tribes and Factories

A significant and underlying tension in the study of both leadership and creativity lies in two opposing perspectives with two different and opposing units of analysis. In the philosophy of social science these perspectives are known as atomism and holism [119]. In the study of leadership, atomism is articulated by Carlyle with the great man theory, focusing on the individual (at the exclusion of social factors) and holism is articulated by Tolstoy, with the forces of history and society, the individual simply a representative of these forces [120]. In creativity these opposing perspectives are represented in the dominant research discipline, psychology, focused on the creative person, and the related sociological perspective, focused on the role of social factors and the overall *zeitgeist*, with both of these perspectives viewing the other's focus as epiphenomenal [121].

Ogilvy has addresses this issue repeatedly and convincingly in his articulation of a radically pluralist social philosophy of Some [122][123]. His argument, too complex to summarize here with anything but a sketch, involves taking both individualism and collectivism to their dialectical extremes, and showing the extent to which both are human-made distinctions that arise in opposition to each other and therefore not recognizing the extent to which on the one hand, individuals exist in and because of a social context, and collectivities exist as collections of more or less organized individuals. The social philosophy of Some proposes a radical intra-psychic, interpersonal, and social pluralism that is not bound by fixed disjunctive separation, with a logic of either/or, but is a more fluid, complex process that recognizes the on-going interconnectedness and interdependence of these terms, and their expression in human thought and action.

Seth Godin's popular *Tribes* provides us with two useful images that can orient us to the emerging understanding of leadership [124]. His argument is that we are moving out of the age of the Factory and are now in an age of Tribes. 'A tribe,' he writes, 'is a group of people connected to one another, connected to a leader, and connected to an idea' [124]. The term tribe might strike one as amorphous, as 'pre-modern' as the word 'factory' seems quintessentially 'modern.' The crucial difference now is in the word 'connected.' The new social media have connected individuals all across the globe. Whereas in pre-modern times a tribe was a local phenomenon strongly defined by physical proximity, it is now possible to be part of a planetary tribe—whether fans of some obscure indie band, coming together to support earthquake victims in Abruzzo, or, in the shadow side of this phenomenon, organizations like Al-Qaida and the Aryan Brotherhood. Tribes can emerge and disappear: the search for Malaysian MH370 has involved a 'tribe' of individuals scanning regularly updated images of the Pacific Ocean on their computers for traces of wreckage. The operations of Wikipedia can be said to be performed by a tribe devoted to writing, assessing, and correcting entries. And tribes are not only the most important new form of social organization and social change, they also drastically change the who, what, where, and how of leadership. For our purposes, we might think of Tribes as a pointer towards Ogilvy's pluralist philosophy of Some.

Factories are large, hierarchical, unwieldy, inflexible, and generally not prone to innovation. In a factory, leadership is confined to a few. Command and control are the central features of leadership in factories. Factories are like armies. The US army defeated the Iraqi army in a matter of days, but that was hardly 'Mission Accomplished.' The awkward fact, of course, was that Iraq had nothing to do with 9/11. It is far from clear what exactly the accomplished

'mission' was, and there was much 'mission creep' in attempts to reframe, justify, and rationalize an invasion that reflected a mind set rooted in a different age. The assumption was that a nation is attacked, which is an act of war, and this can only be done by another nation. This requires retaliation against that nation. There is a logic and a clarity and a simplicity here. In postnormal times, a distributed network of terrorists living all over the world cannot be defeated by an army in a head-on battlefield confrontation. It is not a hostile nation in the traditional sense. The 7/7 bombers in London lived in England, and the 9/11 bombers lived in the US. They were 'a group of people connected to one another, connected to a leader, and connected to an idea.'

Tribes are networked, flexible, and heterarchical, allowing leadership to emerge in a plurality of sources [3][81]. In fact, if in the Modern factory world there was a focus on one leader for each system and subsystem, in the world of Tribes, everybody can be a leader, and that is Godin's point. The democratization of leadership is becoming an increasingly mainstream perspective. Nye sums up the new view [125]:

Almost anyone can become a leader. Leadership can be learned. It depends on nurture as well as nature. Leadership can exist at any level, with or without formal authority. Most people are both leaders and followers. They 'lead from the middle.' [125]

This is a far cry from the heroic, 'great man' leadership picture, the captain of industry, Jack Welch, General Patton, Napoleon, and the classic figures associated with leadership, or even the rather nerdier but no less commanding figures of Bill Gates and Steve Jobs, with their devoted followers. What seems clear though, is the shift in both leadership and creativity from a Great Man model to 'everyday, everywhere, everyone,' with a new emphasis on the role of followers and even 'leaderless' organizations [126–128]. More distributed models of leadership, drawing, as is the case in creativity research, from a variety of sources including complexity and chaos theories and the recent study of swarms, are beginning to provide alternative models that recognize the centrality of collaborative creativity [129].

Concluding Reflections

We live in postnormal times. An old world is dying, and a new one has yet to emerge. Creativity and imagination are necessary to envision the new world, to invent and articulate alternatives to the old world. Creativity is *leading* us into this new world—it is the way we conceive of alternatives. This means that creativity, at this particular point in time, requires more *responsibility* than

ever before. Creators are leaders. We have seen how new trends suggest that creativity is now becoming more relational, and more focused on every day, everyone, everywhere phenomena. This makes sense: alternatives are being articulated and developed collaboratively by tribes, by 'some' people all over the world, in every aspect of their lives. Generative, participatory processes are becoming increasingly popular. People are learning to work together, across differences, to develop creative solutions to old problems. Very often, these problems were themselves once solutions, but the solutions have become the problem.

The new creativity and leadership are different from the old in a number of ways, as we have suggested. But these changes, while in and of themselves interesting and suggestive, are not enough. If we are to move through these postnormal times towards a new world, we need to be aware of the roots, branches and fruits of the 'old world' and present alternatives to them.

We conclude with a brief sketch of some of the larger issues. A postnormal era is the result of the exhaustion of the 'old paradigm' or of the worldview of Modernity. This exhaustion is visible in a number of areas. As we pointed out earlier, we can see that many of the solutions offered by Modernity, mostly having to do with controlling the natural environment, have now themselves become the problem. As Ogilvy suggested, the 'alien environment' we must now confront is not, as it once was, the natural environment, but rather technology and politics [122]. What we need to confront is not 'out there' so much as our own creations and our own ways of thinking, feeling, and being, institutionalized and made 'real.'

The shift to this emerging worldview will very much depend, as Sardar stresses, on creativity and imagination, and specifically how what were perceived to be zero-sum relations in the old worldview can be turned into win-win relations. How conflict and difference can, in other words, be mediated, leveraged, and perhaps even transcended by creativity. Fostering and drawing on creativity everywhere, every day, from everyone, will not be an easy or fast process, but this kind of networked, 'open source' creativity seems essential to go beyond the limitations of 'Hobbes and the Machine.'

Given the urgency of global problems, the task seems daunting, at best. But we are suggesting that the new, global networked creativity, channelled into collective problem-solving and the generation of alternatives, can also provide us with remarkable potentials and opportunities that were unimaginable a mere 20 years ago [37][130]. Life may never be 'normal' again, but if that is a result of losing the shackles of 'Hobbes and the Machine,' we may actually have something to look forward to.

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