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Contents lists available at ScienceDirect

Futures

journal homepage: www.elsevier.com/locate/futures



Welcome to postnormal times[☆]

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ARTICLE INFO

Article history:

Available online 20 November 2009

ABSTRACT

All that was 'normal' has now evaporated; we have entered postnormal times, the in-between period where old orthodoxies are dying, new ones have not yet emerged, and nothing really makes sense. To have any notion of a viable future, we must grasp the significance of this period of transition which is characterised by three c's: complexity, chaos and contradictions. These forces propel and sustain postnormal times leading to uncertainty and different types of ignorance that make decision-making problematic and increase risks to individuals, society and the planet. Postnormal times demands, this paper argues, that we abandon the ideas of 'control and management', and rethink the cherished notions of progress, modernisation and efficiency. The way forward must be based on virtues of humility, modesty and accountability, the indispensable requirement of living with uncertainty, complexity and ignorance. We will have to imagine ourselves out of postnormal times and into a new age of normalcy—with an ethical compass and a broad spectrum of imaginations from the rich diversity of human cultures.

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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 *espíritu 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.

[☆] This paper was first delivered as a City Leaders Lecture, at the City University, London, on Wednesday 28 October 2009.

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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 Ravetz, the celebrated British philosopher of science, and the Argentinean mathematician 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.

1. 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 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 handwashing gel in public places.

If this was not 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.

2. 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-h 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 do not 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 counter productive. 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 messages 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-h 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 destabilise 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 postnormal times, the world can really be laid to waste by the actions of a few toxic individuals.

3. 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 is 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 in June 2009. ‘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 10, 20 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 do not 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 ignorance³ 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 or 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.

4. 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 6 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 1980s 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 in-built 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], Rothkopf, a scholar at Carnegie Endowment for International Peace, has estimated that just over 6000 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.

5. 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 civilisations which grew beyond the capacity of the ecological, technological, 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 in Britain 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 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-weening 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], Polimeni et al. 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.

6. 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 demand 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 [27].

Humility, modesty and accountability are not added extras but indispensable virtues, essential requirements of living with uncertainty and complexity. 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 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.

7. Imagination

The most important ingredients for coping with postnormal times, as 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 Khaldun [28], the fourteenth century historian and sociologist, moves in cycles. 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 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 ext 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 in tact.

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