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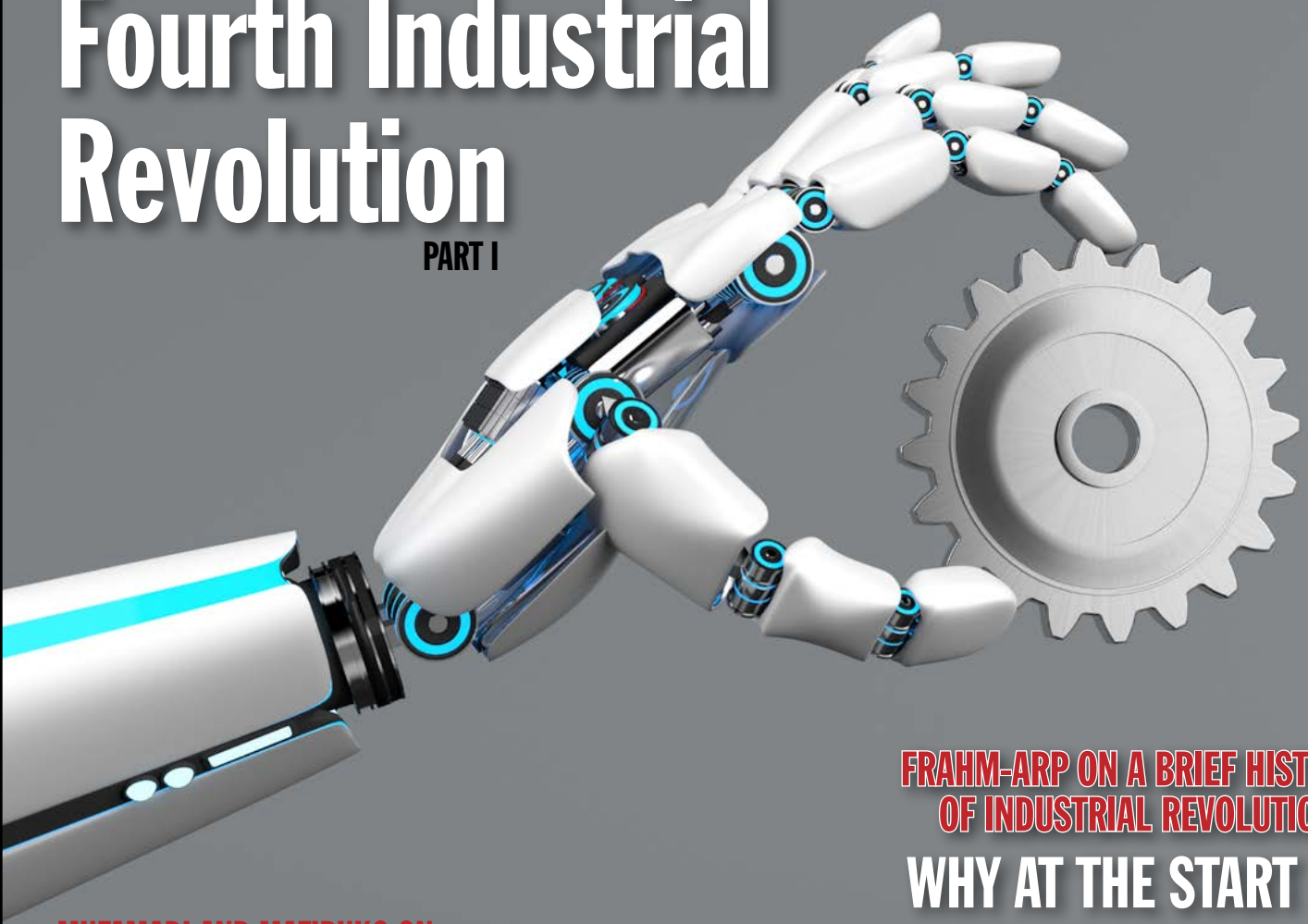
The Thinker

A PAN-AFRICAN QUARTERLY FOR THOUGHT LEADERS

SPECIAL EDITION:

African futures and the Fourth Industrial Revolution

PART I



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In This Issue

NOTE FROM THE EDITOR

The University of Johannesburg acquired *The Thinker* in April 2019 from Dr Essop Pahad. Over the last decade, *The Thinker* has gained a reputation as a journal that explores Pan-African issues across fields and times. Ronit Frenkel, as the incoming editor, plans on maintaining the pan-African scope of the journal while increasing its coverage into fields such as books, art, literature and popular cultures. *The Thinker* is a 'hybrid' journal, publishing both journalistic pieces with more academic articles and contributors can now opt to have their submissions peer reviewed. We welcome Africa-centred articles from diverse perspectives, in order to enrich both knowledge of the continent and of issues impacting the continent.

Prof Ronit Frenkel

CONTRIBUTORS TO THIS EDITION – All contributing analysts write in their personal capacity

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A BRIEF HISTORY OF INDUSTRIAL REVOLUTIONS:

Why at the start of the Fourth Industrial Revolution do we see a **rise in cult-type Pentecostal churches** in South Africa?

By Maria Frahm-Arp

In 2013, we saw one of the first broad-based consumer applications of Article Intelligence in Apple and Smartphone devices that began to predict how we wrote text messages. This was just one example of how the Fourth Industrial Revolution (4IR) began, and how it directly affected our lives. Klaus Schwab, the founder and executive chairman of the World Economic Forum, first coined the term 'Fourth Industrial Revolution' to describe the new era of machine and human augmentation and integration. He suggests that this is a time of enormous promise as machines can enhance the way people live, but if we are left behind by this revolution or it is not correctly regulated, it could also be a time of increasing peril for humanity (Schwab 2016).

In South Africa, President Ramaphosa is trying to ensure that South Africa moves into the 4IR. He has spoken about it in his last two State of the Nation addresses and appointed a Commission on 4IR. Many South Africans are not exactly sure what 4IR is or how it will impact their lives, and many fear that it will take away jobs in a country that already has an unemployment rate of 29% and youth unemployment rate of 52% (STATS SA 2019).

The Rise of Pentecostal-Charismatic Cult-type Churches in South Africa

As 4IR began to gain ground, the first wave of reports in the media (in 2015) about cult-type churches that seemed to be springing up all over South Africa from Limpopo to the Eastern Cape began to emerge. Pastors were telling their congregants to eat grass, drink petrol and allow themselves to be sprayed with pesticides all in an effort to affect miracles. In horror, the media reported on this, often infantilizing congregants who were 'so gullible' as to join these churches.

The rise of cult-type churches (like 'Seven Angels Church' in the Eastern Cape, Professor Lesego Daniel's grass-eating church in Pretoria or Shephard Bushiri's 'Enlightened Christian Gathering' or ECG),

is in part, I argue a reaction to the 4IR and ordinary South African people's sense of alienation from this revolution. For many, this is a revolution that seems to be when computers will do the work of people, leaving them unemployed and destitute.

Industrial and Knowledge Revolutions and Christian Disruptions

While Schwab and others think of this as an Industrial Revolution, I think we are also witnessing a Knowledge Revolution, mainly because data/information is at the very heart of this revolution. Many like Gates and Matthews (2014) argue that data will become the new currency of this revolution. A powerful example of this is Cambridge Analytica that used data collected from consumers in order to give political parties the information they needed to manipulate voter behaviour. For retail stores, an essential commodity is customer data, which allows them to target their marketing specifically to the needs and desires of individual customers. Your store loyalty card means that the store knows exactly what your spending habits are and that, for example, at five in the evening, you are most likely to be craving a bar of chocolate. All of this data is a form of knowledge and has revolutionized marketing already.

In this article, I give a brief historical overview of Christianity and show that whenever we have a significant knowledge or industrial revolution, we see both positive and negative religious reactions to this revolution. Often these have sparked the beginnings of new Christianities such as the rise of the Protestant church, following the knowledge revolution that came with the advent of the printing press or the Methodist church following the advent of the first industrial revolution in England and Wales.

The First Knowledge Revolution

One of the most critical knowledge revolutions was the invention of public libraries. The first library was set up in the seventh century BCE and known as the "royal contemplation" of Ashurbanipal, the Assyrian ruler. It was located in Nineveh (in modern-day Iraq) for his personal use. The real revolution in libraries came about in the 300s BCE when public libraries were established. Under the Romans, the library at Alexandria became the most important intellectual centre in the ancient world. It housed scrolls of history, philosophy, mathematics, and literature. What made this library so revolutionary was that it was accessible to the public and was not just a private collection of manuscripts for private use. Collecting data or information in one central space changed the way people had access to information and how they understood the world. This information or knowledge revolution was central to many of the political, social, and engineering feats that were the hallmark of the Roman Empire, particularly over the first three centuries of its existence. Over time people moved away from writing on scrolls and began to write in leather-bound books. An essential part of the work of many monasteries during the Middle Ages was copying out bibles and selling them to rich feudal lords, the church, and kings.

The Second Knowledge Revolution and the Rise of Protestantism

The invention of the printing press in 1440 led to the second knowledge revolution making information accessible to larger groups of people, particularly the emerging middle class that began to form through the centres of commerce in City-States like Amsterdam, Geneva, and London (Woodhead 2004:163-5).

It took three years for Gutenberg to print 200 bibles, a major technological feat in the mid-1400s, but he died penniless because at first the consumption of books and bibles was slow as few people could read. During the mid to late fifteenth century, pamphlets, usually four pages long, were printed with news, political ideas, religious devotions, and stories. Often these were read out loud by a paid reader who read to crowds in pubs and taverns. Over the decades, the demand for information began to increase steadily. The technological advance of mechanized printing meant the wide-spread consumption of ideas as

"I give a brief historical overview of Christianity and show that whenever we have a significant knowledge or industrial revolution, we see both positive and negative religious reactions to this revolution. Often these have sparked the beginnings of new Christianities."

people began to consume tracks, pamphlets, and later books.

Books, including bibles, could now be 'mass-produced,' and these bibles and books could be produced outside church structures because printers could print books using a printing press and were not dependant on cheap, educated labour in the form of monks. This technological advance separated the production of bibles from the Catholic Church in Europe. While the Catholic Church did not want people to read the bible in vernacular languages, it, in effect, no longer had direct control over the means of production of bibles.

Before Martin Luther famously pinned his 95 theses on the door of the church in Wittenberg in 1517 calling for a reformation within the Catholic Church, many others, such as Wycliff and Oakham, had campaigned for the bible to be translated into English, German and Dutch (Woodhead 2004). Printed versions of one of the gospels or a book of the Psalms began to grow in popularity as people started to demand greater access to information, including religious texts and ideas. A central argument within this call for reform was that people should be allowed to read the bible in their vernacular languages and challenge the teachings of the Catholic Church, particularly around 'indulgences'. 'Indulgences' was a system set up by the Catholic Church, which taught that by paying money to the church, people could minimize their sins and therefore their time in purgatory would be shortened. If they paid enough money, they might even be able to go directly to heaven without having to go to purgatory. There is no reference to indulgences or the sale of indulgences in the bible, and therefore, the Catholic Church was keen to ensure that laypeople did not have access to bibles. As most laypeople could not read or understand Latin, the sale of Latin bibles was less problematic, but once translated into vernacular languages, laypeople might begin to use scripture to challenge the Catholic Church's methodologies at the time (Woodhead 2004).

"The printing press enabled ordinary people to have access to information either by reading it or having it read to them. The consumption of information created the necessary intellectual groundswell for a Christian revolution, which blazed to life when Luther nailed his thesis to the church door in Wittenberg, and the Protestant Reformation was born."

The technological revolution of the printing press separated the means of the production of Bibles from the Catholic Church in Europe. The 'fast' production of Bibles also meant that they became more affordable, enabling more people to buy Bibles, gospel booklets or books of Psalms. The printing press enabled ordinary people to have access to information either by reading it or having it read to them. The consumption of information created the necessary intellectual groundswell for a Christian revolution, which blazed to life when Luther nailed his thesis to the church door in Wittenberg, and the Protestant Reformation was born.

The First Industrial Revolution and the Rise of the Methodist Church

In England, the Protestant Reformation led to the establishment of the Church of England and the wider Anglican Church. The First Industrial Revolution, in the mid-1700s, occurred with the invention of steam power to fuel engines. The revolution first took root in England and soon led to the first wave of mass urbanization as people flocked to industrial centres like Liverpool and Manchester to work in the factories. The living conditions in the cities were appalling as there was often poor sanitation, housing or access to fresh drinking water. Many of the slum housing built for factory workers, coupled with the appalling working conditions in factories, led to high mortality rates. Luddites were amongst the most vocal group fighting against all the negative changes brought about by the new (steam based) technologies that fuelled this revolution (Deanne 1979).

John Wesley, an Anglican priest, began to call for change within the Anglican church. In 1744 he held the first 'Methodist' conference after attracting crowds to his open-air sermons in coalmines, brickyards, and factors in the emerging industrial cities of Great Britain. Wesley called people to a new intensely personal spirituality in which they were held accountable to their brethren in small chapel communities rather than large traditional churches. He encouraged the formation of small

meeting groups in which people shared their spiritual struggles and religious journeys.

As people began to move to the new industrial centres to work in factories and coal mines, they felt alienated and alone, often losing touch with their home churches. The Methodist Movement with its powerful message of evangelism, personal discipline, hard work and leisure time, was particularly appealing to working-class people as industrialization changed people's working patterns and social networks from rural settings to towns and cities (Hempton 1996:4). Connected to most chapels or Methodist meeting rooms were schools for children, welfare activities and mechanisms through which poor people could access loans. During the nineteenth and twentieth centuries, people argued that Methodism slowed down the industrial revolution in Britain, particularly when compared to the fast pace of invention, production, and change in France. Others suggest that Methodism channelled people's discontent towards religion rather than politics, thereby slowing down desperately needed political reforms (Semmel 1973; Walsh 1979).

The Second Industrial Revolution and the Rise of Classical Pentecostalism

The late nineteenth and early twentieth centuries saw the rise of the Second Industrial Revolution. This revolution made the relatively affordable mass production of goods, from clothes to cars, possible on a larger scale. With the growing demand for consumer products came the need for cheap labour to make these goods as cost-effectively as possible. Working-class laborers had to deal with the poverty, oppression, illness and alienation experienced in mass production-based factories. Pentecostalism taught people that, through the power of prayer, they would be able to take on a new agency in their lives by praying for the miracles of healing and work in order to sustain their families in the turbulence brought about by the second industrial revolution.

A vital feature of the Methodist Movement, both in Europe and North America where it proved so popular, was revival meetings. These revival meetings, often lead by lay preachers, another critical aspect of Methodism, took place at various times and with different intensities throughout the nineteenth century – particularly in North America and to a lesser extent in Britain. Towards the end of the century, many revival preachers began to espouse a Holiness Gospel arguing that sanctification took place through the Holy Spirit. In the early 1900s, some preachers began to claim one could determine if a person was baptized in the Holy Spirit if they were able to speak in tongues, as the disciples had done at Pentecost. One of the most famous of these preachers was William Seymour, who began to preach his message of Pentecost in Los Angeles in a store-front church on Azusa street (Synan 1997).

Places like Los Angeles in the early 1900s teemed with poor, dispossessed people who streamed to large cities in the hope of finding work. Cities like Los Angeles attracted triply dispossessed migrants from all over the world who had no money, could hardly speak the language of the country, and were often not citizens of that country and were therefore vulnerable to extreme exploitation. The Pentecostal movement, with its focus on speaking in tongues that no one but God and his angels could understand, opened up a new form of Christian worship freed from the constraints of prayer books and hymns in particular languages (Synan 1997).

In South Africa, the first Pentecostal missionaries arrived in 1907 and began to attract followers, particularly in mining communities on the Rand. People shared extraordinary miracles of healing in testimonies, and many new converts gave up alcohol and gambling, thereby enabling them to take better care of their families (Maxwell 1999). The Assemblies of God and the Apostolic Faith Mission were among two of the earliest forms of Classical Pentecostal churches established in South Africa. Many of the ideas of the Pentecostal movement sparked the emergence of Zionist and Apostolic type African Indigenous forms of Christianity (Anderson 2000) in Southern Africa that emerged in the face of coping with racism during changes in work regimes.

The Third Industrial and Knowledge Revolution and the Rise of the Health and Wealth Gospel

Fast forward to the 1960s and we encounter the beginning of yet another revolution. This Third Industrial Revolution is also arguably the third knowledge revolution, as the invention and use of computers not only changed how people worked, what work they did, and what work computers

did, but also their access to information. The invention of the internet in the 1990s radically changed people's access to information with the world wide web, making information accessible to everyone at the click of a button. This was also a time of remarkable economic growth in which capitalist machinery and the marketing industry sold people the dream of' rags to riches', while dot. com millionaires in their twenties seemed to prove this idea that anything was possible (Piketty 2017).

Before the Third Industrial Revolution, two influential new waves took place within Christianity. In the 1950s, the Evangelical Movement swept through the Christian world and was followed in the 1960s by the Charismatic Movement. The Charismatic Movement emerged in mainline churches and was very similar to the Pentecostal Movement but did not believe that speaking in tongues was the only sign of Holy Spirit baptism. Charismatics instead argued that any form of spiritual gift, from prophecy to teaching, including speaking in tongues or translating tongues, was a sign of Holy Spirit baptism. In the 1970s, a new variant of Christianity emerged that drew from all three traditions and preached a gospel of health and wealth, otherwise known as the Prosperity Gospel. This movement rapidly grew in popularity as televangelists like Kenneth Hoggin used the medium of television to spread their gospel to millions of Americans first and was then televised throughout the world (Bergunder 2010).

In the age of rampant capitalism, everyone could apparently become wealthy, and anything was possible, if only people were positive and worked hard according to the Prosperity Gospel which offered believers a secret weapon. The Holy Spirit gave them exclusive access to a power that would make them wealthy and healthy. This wealth could be obtained through prayer and not just through hard work. God wanted to bless all 'His children' with extreme wealth (Daniels 2015) in the language of this health and wealth gospel -and being thin, fit, tanned, and shining with good health – just like a movie or soap opera star meant 'health'.

In South Africa, Pentecostal-Charismatic Churches (PCC) were preaching a similar message of a watered-down version of personal wealth and healing. Churches like Grace Bible Church and Rhema became mega-churches in the late 1980s and early 1990s. They attracted thousands of followers who were not the dispossessed but were rather upwardly mobile, or those who aspired to upward mobility. These churches taught people that through hard work, prayer, and a disciplined lifestyle, an individual could attain their dreams. They encouraged people to break with their families and their past, and commit to God and their own path to upward mobility (Martin 2001; Meyer 1998) through the church. As South Africa moved out of the dark days of apartheid, these churches offered social skills and business training that equipped believers for success in the modern world (Frahm-Arp 2010).

The Fourth Industrial and Knowledge Revolution and the Rise of Cult-type Pentecostalism

However, the optimism and economic growth of the new South Africa began to fade when Jacob Zuma and his followers took office. By 2015 the Rand had fallen, unemployment levels were at very high levels, and the investment grade of the country was heading towards junk status. State capture had happened, and survival, not mobility, became the goal. Onto the religious stage, Professor Lesego Daniel burst telling people to eat grass and drink petrol. In 2016, Lethebo Rabalago, started to spray his congregants with Doom.

These churches loosely form some variant of the Prosperity Gospel. I suggest that they are a cult-type movement because they met the criteria as identified by sociologists of religion (McGuire 2008). They are hierarchical, with a charismatic leader who has all the answers but who only gives selected information to chosen people. Cults tend to attract young adults and encourage people to make a complete break with their families and friends, while giving enormous amounts of time, money, and energy to the church. In many ways, cults often become new religious movements (Beckford 2003). New religious movements often begin within a particular religious tradition. Very often, it is mainly social, economic, political, or technical factors that drive a group of people who feel dispossessed into cult-like systems, thus pushing them to find answers or a sense of belonging in a new religious movement or a re-shaped form of a religious tradition.

In much the same way, the rise of the cult-type churches in South Africa should be understood, at least in part, as people's attempts to try and make

sense of a world that they feel alienated from and are struggling to comprehend. Statistics show that around 50% of young adults in South Africa are currently unemployed, and unless something changes dramatically in South Africa's economy, these people will never find salaried employment. Finding a job in their experience of the world is akin to experiencing a miracle.

A church that 'teaches' them how to pray and perform their faith by eating a snake or being sprayed with a pesticide, is a church that is giving them the 'tools' or agency which they need to show God how much faith they have and how they are more deserving of the miracle of a job or a husband who has job then the people around them. These extra-ordinary religious feats of putting oneself into mortal danger, like drinking petrol or being sprayed with the insecticide Doom, is a way for people who have no or little money to show their extraordinary faith and commitment. The Prosperity Gospel maintains that the more money people give to the church, the more God will bless them. By giving away all money, they have show just how strong their faith is. In poverty-stricken peri-urban environments of South Africa where people do not have access to money, proving their faith through another means has become very popular. While abusing people, putting their lives in danger and teaching them that further impoverishing themselves by giving all they have to the church in order to experience a miracle, goes against the teaching of Christ, these cult-type churches highlight the desperation and alienation that many people feel at the beginning of this Fourth Industrial/Knowledge Revolution.

Conclusion

As I have shown with the previous knowledge and industrial revolutions, within the Christian context, these revolutions have led to the establishment of new forms of Christianity. The nature of these new forms of Christianity are usually in direct response to the needs of ordinary people living through a technological revolution. In each previous revolution, profound technological changes have led to extraordinary social, political, and economic disruptions. These changes have often, but not always, led to the socio-economic dislocation and dispossession of groups of people. Different forms of Christianity have emerged with these various revolutions as churches and church leaders have sort to offer people a means to cope with change. Not all these revolutions have been positive, but to the believers, these different Christianities facilitate hope and a sense of agency to those who felt dispossessed, alienated and oppressed, as these revolutions changed the world and the place of people in that new world order. Perhaps the key lesson to be learned from this overview of history is that as we embrace new technological changes, we as a society also need to find mechanisms to help those who are negatively affected by these disruptions. ■

“Perhaps the key lesson to be learned from this overview of history is that as we embrace new technological changes, we as a society also need to find mechanisms to help those who are negatively affected by these disruptions.”

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A BEGINNER'S GUIDE TO THE FOURTH INDUSTRIAL REVOLUTION IN AFRICA:

Concepts and Debates

By Abel Matheba

What is a revolution?

A revolution is change that happens over a length of time. This type of change is driven by human beings. It starts as an idea in the minds of a few, and then spreads out into the minds of more people so that it gains momentum to force a change in the world. A political revolution is often forced through protests or policies, where the majority of the affected people drive this change in their desired direction. An industrial revolution is a change in economic power, where the main driver of the economy is changed from a certain technological sector to another.

Industrial Revolutions' main fields

The various industrial revolutions have always depended on changes in the main technological fields. During the first industrial revolution, the mechanical engineering field was the main driver of the revolution. During the second industrial revolution, the field of electrical engineering was the main driver (in collaboration with mechanical). During the third industrial revolution, computers were the main drivers (in collaboration with mechanical and electrical engineering). In today's fourth industrial revolution, the internet and AI are the main drivers (in collaboration with mechanical, electrical and computers). Each industrial revolution then contains elements of the previous ones and thus builds upon them.

What influences these changes or industrial revolutions that happen over time

I believe that these changes are natural. The various industrial revolutions are a result of natural changes, or in scientific terms, these changes are called evolution. The source of innovative ideas are a type of intellectual evolution as technological advancements or developments are part of leaps in thought. Every revolution is then part of the evolutionary process. Evolution is not just about natural changes over millennia but it is also about change in human behavior over a shorter period of time that can be witnessed by people over the course of their lifespan. This can be illustrated with current ideas of generations: we have the silent generation (born 1945 and before), Baby Boomers (born 1946 – 1964), Generation X (born 1965 – 1976), Millennials (born 1977 – 1995) and Generation Z

(born in and after 1996). All of these generations have a different view of life, they approach life in different ways and that is why people of certain generations usually think that people belonging to a different generations are 'weird'. This kind of change in human behaviors is influenced by nature (evolution), and it first starts in the mind (where every type of change is initiated). So by simple definition, a revolution can be seen as basically the evolution of consciousness.

Adapting to a revolution (change)

Charles Darwin's theory of the survival of the fittest still applies to revolutions in industrial ages; he defined it this way: "It is not the strongest species that survives, nor the most intelligent, but the ones most responsive to change" (Vergata, 1994). We have witnessed the rise of various nations who have been able to take advantage of or adapt to the changes in technology that each industrial revolution brought about, in order to become the powerful nations in this world. Africa has largely been behind with these developments, and that is partly why Africans have been spectators rather than leaders for so many years. Africa's history of subjugation has led to this predicament. It started with the international slave trade, when Europeans used more technologically advanced means of transportation and weaponary to subjugate and then transport millions of Africans across the world as slaves. Had they found Africa with similar weapons, Africans' international enslavement would have been difficult to establish in the way it was done. If Africa had had more advanced technologies for the mining of minerals, it would have been a wealthier continent as it is a fact that Europeans found Africans already mining for minerals (Mapungubwe's golden rhinoceros being the evidence) (Moffet, 2014) when they arrived on the continent. China is one of the leading nations in terms of technology globally today, and they have been investing and loaning funds to many of African countries. Some analysts see this as a strategy that China is using to recolonize Africa, just in a friendlier way (Kinyondo, 2019). This begs the question of what the African continent would look like with its own technological innovations.

Shaping Africa for the 4IR

African leaders today have to be careful when it comes to working with other nations in the wake of the 4IR - that is, if they want to lead the continent into a better position, where it could be a globally competitive continent and have no other nations colonizing it again in any form. This new industrial revolution can work to Africa's advantage, since Africans are now exposed to technological information and education which they were deprived of during the past industrial revolutions. To achieve this, African leaders must give more attention and invest more in technologies and innovations in Africa. An example of such technological innovation is 'Libby' – a robot that was introduced at the University of Pretoria's library in South Africa. South African developed, 'Libby,' is used to help students with library usage such as to finding books or accessing content. The fact is that while this robot has put some jobs at risk as there is no longer a need to have a human do this kind of work manually, there are other benefits to be had here. If the robot is developed and manufactured locally, it would create more jobs for the manufacturing and maintenance of the robot. This means that while one job sector shrinks, another grows. The method of relying mostly on locally produced innovations will be the beginning of Africa's self-reliance, which is one of Pan-Africanist ideologies' important goals.

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One of the other disadvantages of relying on technologies from elsewhere is that we are not sure if we are going to be 'friends' with these nations forever. Machines and AI in particular can be controlled from afar, so what will happen if we are no longer on good terms with whatever country a machine came from? Is it not a risk that the behavior of these machines can be remotely controlled and they become our enemies? We have already witnessed this kind of interaction happening between America and China with the Huawei scandal. This type of trade war could have a huge impact on everyday life if the scale

expands.

Since we know that connection to the internet is based on transnational undersea cables running from continent to continent, what could potentially happen with the main servers based in, and owned by, other countries? If the countries in charge of the servers decide to stop Africa from using the internet due to political reason, what would happen? Imagine life without the internet... how will we communicate since we have already adapted to this kind of communication?

Decolonizing technology

African leaders need to start giving more attention and invest more funds in local innovators working on new technologies relevant to this 4IR. I am talking about prioritizing investing in local research and innovation in the technological field. We are already educating people in this new age of technology where some institutions, like the University of Johannesburg, have placed 4IR technologies at the forefront of education. This innovative approach is part of a long history of calls for the decolonization of knowledge from the African continent. Both Robert Sobukwe and Steve Biko called for self-reliant economies in Africa. This idea is not limited to land politics, but can also be achieved through a different way of using the 4IR to drive African economies into a better state. In fact, Africa is in a better position to turn things around than ever before by investing time, money and energy, however limited, in locally produced technologies. The problem with the many analysts in this 4IR age is that they are talking about the impact this new industrial age will have on our lives, and not how Africans can use this new age to our advantage to take Africa forward and make it a better continent.

But what can be done in using 4IR to improve Africa?

Africa is an economically poor continent and young innovators need to work at any job that they can find in order to merely eat, leaving little time for invention. Most African governments, South Africa included, are investing more money in conventional businesses than innovations, but conventional business models like the ubiquitous tender system in South Africa do not create real jobs. Many of the people running these tendering companies are not problem solvers and are more interested in gaining material wealth for themselves than actually creating value for the people that they are meant to serve; in addition, this system has proven to be filled with corruption as the Zondo commission has exposed and therefore this sort of business model does not really solve Africa's economic problems. Another problem that delays Africa's progress in general is corruption, but that is a topic for another day. Centers like the Innovation Hub in South Africa that are aimed at supporting innovation among youth, but they do so at a very slow pace and with very minimal funding. They initially cover the funding needed to pilot an idea, but do nothing to support the innovators' personal expenses, even basic ones, at that time. In reality, personal expenses are of extreme importance in poorer countries where most young people do not have surplus income from their families to support them through this process, regardless of the veracity of their ideas. This is a short sighted approach as innovation has long term potential to uplift people and countries out of poverty.

In technology leading countries like China, it takes a shorter time to take an invention from idea stage to commercialization stage, while in Africa it takes longer and that is only if the innovator does not lose hope and give up (Rees, 2018). This results in a lag for African countries in general when it comes to developments. African governments should give more support to innovators if they really want to take this continent forward and, they must do so at this early stage of the 4IR. This new industrial revolution is taking place at an exponential speed as compared to the previous revolutions, where a waste of more time will only lead Africa to becoming worse off as change will not wait for it. The only constant thing that remains unchanged in this world is change itself. Nothing remains the same forever. What we need to do as Africans is to adapt to this change as early as possible, and then drive it in our own direction for our own benefit. ■

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The Convergence of Nanotechnology, Biotechnology and Cancer Medicine in the Fourth Industrial Revolution

By Steven Mufamadi and Zamanzima Mazibuko

Medical technologies of the fourth industrial revolution (Industry 4.0), such as nanotechnology, biotechnology, artificial intelligence (AI), 3D printing and advanced materials are already transforming medical technology and the pharmaceutical industry by offering accurate diagnoses, targeting therapies with fewer side effects, and providing better medical imaging and personalised medicine. Industry 4.0 will be driven by the convergence and synergy of innovative technologies, including nanotechnology and biotechnology, and not by these technologies working in isolation. Nanotechnology is defined by others as the prime mover of Industry 4.0. It provides new tools that boost the performance and functionality of other emerging technologies, while offering unique properties to these technologies. While biotechnology deals with the manipulation of molecular and biological systems and processes to make or modify products and services, the advantage of using nanotechnology is that it deals with the creation and manipulation of the chemical and physical properties of a substance at the nanoscale and molecular level (i.e. 1-100 nm). These characteristics of nanotechnology and biotechnology allow for the treatment of complex health conditions, such as cancer, whose early diagnosis and targeted treatment provides for better patient prognosis.

The convergence of nanotechnology and biotechnology

The intersection of nanotechnology and biotechnology created a new subject - i.e. nanobiotechnology or bionanotechnology or nanobiology. The role of nanotechnology in this convergence is to equip biotechnology with tools and materials that can interact directly with biomolecules. In medicine, the convergence of these two technologies offers innovative solutions to unmet needs such as early detection of disease, rapid diagnostics, imaging, target delivery and personalised medicine. In addition, nanotechnology will allow biological scientists to recognise, measure and interact with single biological events, changing the dynamics of diagnosis and treatment. The convergence of nanotechnology and biotechnology is maturing and currently progressing at a rapid rate, particularly in cancer medicine.

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The convergence of nanobiotechnology and cancer nanomedicine

The number of cancer cases are on the rise in Africa, with the most common being cancers of the cervix, breast, liver and prostate, as well as Kaposi’s sarcoma and non-Hodgkin’s lymphoma. Approximately 14 million people were diagnosed with cancer and more than 8 million people died from various cancers in 2012. More than half these cases, and almost two-thirds of deaths, occurred in Africa and other low to middle-income regions. It is estimated that these numbers will increase to approximately 22 million cases and 13 million deaths by 2030. The growth of cancer cases on the continent can be attributed, amongst various factors, to population growth and lifestyle changes - smoking, unhealthy diets, physical inactivity, obesity, etc. Infection is also important in the pathogenesis of cancers especially in Africa. The WHO estimates that 22-24% of cancers are due to infectious aetiologies.

Most cancer cases are diagnosed at an advanced stage in Africa, which contributes to poor prognoses. Furthermore, there is a scarcity of cancer treatment (over 20% of African countries have no access to medications and access is sporadic in others) and limited access to conclusive diagnoses at various healthcare facilities on the continent. With a general move towards technology-based solutions globally, tackling the rising cancer crisis in Africa by using technologies that will drive the fourth industrial revolution should be explored.

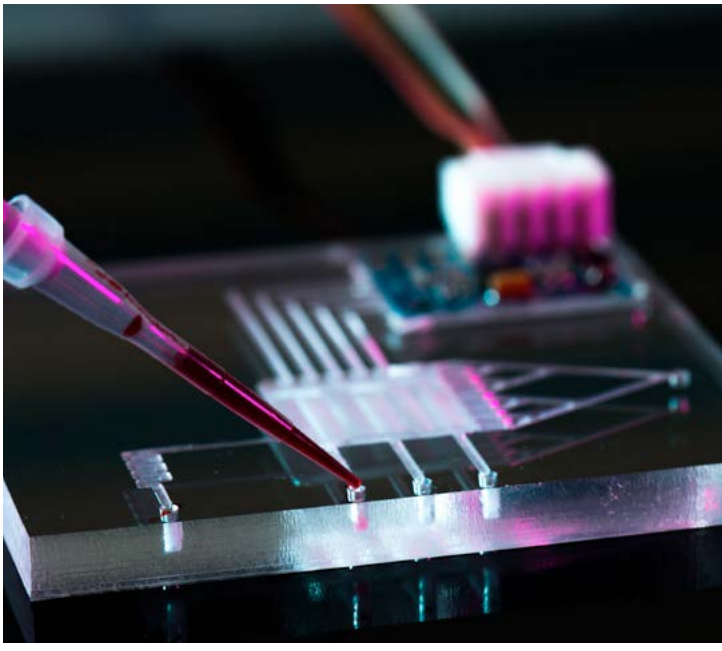
The challenge of treating various cancers is that most types of cancer can only be detected once the tumour has already developed, making very early detection difficult with prognosis then being worse as treatment is then less effective. The convergence of nanobiotechnology and cancer nanomedicine has immense potential towards the advancement of early diagnosis and hence

“Although nanotechnology promises endless opportunities in medicine, one cannot discount that this emerging technology might have unintended effects on human health and the environment. Nanoparticles are relatively new; their risks are largely unknown due to insufficient data on possible risks, therefore there is a need for further studies to explore the long-term harmful effects.”

more effective treatment for cancer patients. Nanobiosensors and quantum dot imaging are examples that promise better approaches towards identifying cancer at an early-stage, before the tumour develops. Nanobiosensors and quantum dot technologies are highly sensitive and biospecific, with the capability to detect a specific cancer through cell-surface biomarkers. Furthermore, bionconjugated quantum dots can detect small numbers of malignant cells in the early stages of cancer or metastasis, which is very difficult with current imaging techniques such as X-ray imaging, magnetic resonance imaging (MRI), and computed tomography (CT).

Another advantage of using nanobiotechnology in combating cancer includes targeted drug delivery - i.e. the capability of delivering anticancer drugs to where they will be most effective. Nanoparticles incorporated with active pharmaceutical ingredients (APIs) can be surface functionalised with different biological ligands such as proteins, monoclonal antibodies, folic acid, carbohydrates, fructose, and receptors so that they can be localised at the cancer sites, without affecting the normal cells and/or healthy tissues. Targeted drug delivery reduces side-effects while improving drug safety and effectiveness. This means better cancer treatments, less medications and lower costs. The use of nanoparticles to deliver the CRISPR-Cas9 gene editing tool holds promise for cancer treatment by deleting and/or editing the defective genes that cause cancer. The arrival of fully autonomous DNA nanorobots, that are capable of transporting anticancer drugs, to target and destroy tumours, will revolutionise the way cancer is treated in the 21st century.

Although nanotechnology promises endless opportunities in medicine, one cannot discount that this emerging technology might have unintended effects on human health and the environment. Nanoparticles are relatively new; their risks are largely unknown due to insufficient data on possible risks, therefore there is a need for further studies to explore the long-term harmful effects on both human health and the environment. In recent studies, researchers have found that inhaling airborne nanoparticles, or oral or dermal exposure to some nanomaterials, may lead to pulmonary diseases and/or induce skin aging through oxidative stress. The gap between the development of nanotechnologies and nanoethics is wide: there remains a substantial lack of suitable and thorough risk and life cycle analyses of nanotechnologies. Thus, due to unknown long-term impacts on both health and the environment, many countries are starting to look at the establishment of a nano code of conduct for nanotechnology research and development (R&D) to protect students, research participants, patients and the environment. To support sustainability for nanomedicine or nanotechnology, R&D will require implementation of a nano ethical code of conduct that includes educating the public about the benefits, limitations and perils associated with this emerging technology. Essentially, the regulation of nanotechnologies needs to be firm enough for effective nanoethics, but also flexible enough to allow for innovation. ■



A lab-on-a-chip (LOC) is integration device with several laboratory functions - Image

Talking responsibly about **medicine** in the Fourth Industrial Revolution

By Alex Broadbent

A lot of what is currently being said about the future of medicine in the fourth industrial revolution (4IR) is irresponsible: it appears to be uttered without regard for whether it is true or false. The philosopher Harry Frankfurt argues that we should define and use the word "bullshit" as a technical term to cover speech of this sort (Frankfurt, 2005). In order to respect the reader's potential sensibilities, I will not follow his tempting suggestion, although I do in my recent book (Broadbent, 2019). (The interested reader may like to consult either Frankfurt's or my work and decide for his or her self whether the term is applicable in the present context). Regardless, irresponsible speech is something that medicine itself has been accused of, in the form of quackery, charlatanism, and so forth. David Wootton argues that, in effect, quackery was universal in the past (Wootton, 2006). He suggests that the entirety of medicine prior to 1865 was "bad", and suggests that doctors often knew it, or else simply didn't care, and thus knowingly or at least carelessly gave false hope for personal profit. I've defended medicine against this charge, notwithstanding its patchy track record and the existence of real quacks (Broadbent, 2018b, 2018a, 2019). Nonetheless, the high hopes we have for medicine and the difficulty of assessing its effectiveness render it an easy victim of negligent

talk, and I'm depressed to see this happening in some of the contemporary discourse about the 4IR.

It is sometimes acceptable to speak without regard for truth or falsity: to embellish for purposes of entertainment, as in after dinner speech, or to pass the time, as in the idle banter in the Uber, or when everyone knows what is going on and nothing hangs on it, as in the dean's word of welcome at a university event. But it's problematic when people might take it seriously, and especially so when it concerns medicine, about which people rarely doctor the truth for a joke. I want to discuss two categories of pronouncement on the future of medicine. One is almost always irresponsible, and I'll not hesitate to say so. This category comprises bold general pronouncements about the future of medicine. The other category is considered and careful; all the same, claims in this category are not true, and there are systematic mistakes that need to be highlighted. This category comprises serious research which nonetheless ignores limits on what one can learn from patterns in data alone, independent of what the data is about.

General Pronouncements on the Future of Medicine

General pronouncements on the future of anything are always to be treated with skepticism. That's not to say they can't be true. It's to say that we should be doubtful of their truth. That's because such claims have a terrible track record, and are subject to all kinds of well-documented biases, including financial bias (or bias for other personal gain–ego fulfilment, or whatever), confirmation bias, the base-rate fallacy (Kahneman, 2011; Kahneman, Slovic, & Tversky, 1982; Kahneman & Tversky, 1973, 1982), and plain old over-excitement. We are not driving flying cars or living on Mars or speaking to personal robot assistants–prospects that already seemed within reach in the 1960s.

How different is our epistemic position now from what it was in the 1960s? Our technology has advanced, but I've yet to see good evidence that our powers of prediction have kept pace. In fact, the last fifteen years have seen spectacularly unpredicted events: 9/11 in 2001, the crash of 2008, and in 2016 the doubly pundit-slamming Brexit vote and Trump victory. Our predictive inadequacies as humans were being studied as far back as 1973 by Amos Tversky and to-be Nobel winner Daniel Kahnneman (Kahneman & Tversky, 1973). Yet we continue to love our pundits even though we should know they are mostly bad.

> "Nonetheless, the high hopes we have for medicine and the difficulty of assessing its effectiveness render it an easy victim of negligent talk, and I'm depressed to see this happening in some of the contemporary discourse about the 4IR."

What's more, expertise seems not to make much difference; academic pundits with doctorates who write books nearly 400 pages long are as likely to be wrong as the most gung-ho Fox News opinionistas, at least according to the body of empirical evidence amassed by psychologist Philip Tetlock (Tetlock, 2005). That's because taking a strong stance and sticking to it is a common factor in being both a pundit and a bad predictor–in fact a terrible predictor, worse than random. Pundits keep their jobs because of our hardwired psychological traits rather than their competence.

I've explored these general failings of general predictive competence elsewhere, and will do so in more detail in future. The present topic is medicine, and here, too, general predictive claims are usually incredible–and I'll explain why, after giving an example.

The general nature of this example is the "Magical Internal Doctor Hypothesis". It occurs to different authors in different forms. Klaus Schwab imagines "smart dust" consisting of tiny robots that could circulate in our blood stream, detecting and destroying pathogens before we even know it (Schwab, 2016). Noah Yuval Harari imagines something remarkably similar:

Within a few decades, Big Data algorithms informed by a constant stream of biometric data could monitor our health 24/7. …by 2050, thanks to biometric sensors and Big Data algorithms, diseases may be diagnosed and treated long before they lead to pain or disability. (Yuval Harari, 2018, p. 49)

The Magical Internal Doctor Hypothesis might be true. Who am I to say it's not? Both the authors just mentioned pepper their work with qualifiers

to the effect that they are not saying that these scenarios will be actualized. They are not making specific predictions. These are just imaginary scenarios, used for illustrative purposes only (the actual contents of 4IR may differ). This is meant to excuse the complete lack of systematic marshalling of evidence, and of the systematic consideration of, and testing against, contrary hypotheses that are fundamental to science. Yet the pronoucements are often as close as can be to categorical predictions. They are written to sound plausible, as if the person writing believes them. Saying "by 2050", for example, suggests that there is some sort of basis for picking that date. If one says, "By next Tuesday, we might see a new president in charge", that implies that one has some reason to think that a change of power is imminent. So it won't do simply to say that the predictions are "mights" and "maybes". They are expressed as if they are based on sound reasoning from serious consideration of the evidence.

However, they are not. They are mere speculations. That is why the authors, and many others like them, periodically remind the reader that they are not making specific predictions. They know that they don't know what is going to happen. But it suits them to sound as if they do, without quite committing to anything. In the context of medicine, I regard this as irresponsible speech. These predictions are not innocuous, despite the qualifiers.

In the first place, even if the specific predictions are not supposed to be essential to any particular arguments made about how we must prepare ourselves for the future, it is obvious that these claims (or claims of this kind) are at least rhetorically essential to their respective books, and thus essential to the popularity and ensuing fame and wealth of the authors of these works in which they are found. In my view, it is intrinsically unethical to knowingly or carelessly allow people to believe falsehoods for personal profit. I believe that it matters what people believe.

In the second place, there is a danger of raising expectations about medicine, which is already a serious problem for clinical practice. People are already prone to expect modern medicine to painlessly cure everything, maybe with the exception of hereditary cancers (and even then, it's common to encounter the impression that a cure is round the corner.)

"But modern medicine can't cure everything, and isn't painless. To promote excessive expectations of modern medicine places great pressure on medical practitioners, who have to find a way to puncture these inflated expectations. False hope creates acrimony in the consultation room and devastating disappointment outside it."

But modern medicine can't cure everything, and isn't painless. To promote excessive expectations of modern medicine places great pressure on medical practitioners, who have to find a way to puncture these inflated expectations. False hope creates acrimony in the consultation room and devastating disappointment outside it.

You might be wondering whether my stance towards medicine is unduly cynical. But I have the greatest respect for medicine and its achievements. But this shouldn't prevent a sober assessment of its achievements. Of the top ten causes of death in America in 1900, six are recognizable on the 1998 list (Rockett, 1999, p. 8). In the intervening century, antibiotics made a huge difference, and the four departures from the list are all infectious diseases. But their success was not the start of an upward trend, let alone an exponential curve (Stegenga, 2018). Viruses failed to fall to medical innovation, and remain basically intractable. Lifestyle-related diseases claim more lives than they used and suicide has made an appearance in the top ten—perhaps a symptom of the wider perplexity and disillusionment that has characterized the postmodern era (Tarnas, 1991). Mental illness generally is not proving especially tractable for modern medicine. Surgery is not the miracle it is sometimes thought to be; different surgical procedures have different success rates, and of course are hard to test empirically because of the lack of a plausible placebo, and so forth.

I'm not saying that modern medicine has enjoyed no successes. It definitely has. However, most of these successes were concentrated in a dramatic medical revolution running from around the end of the 19th century through the middle of the twentieth (Stegenga, 2018). Then the revolution stopped. Mere progress settled in: slow, painful progress. And the big picture remains

one of isolated successes amid a general sea of well-intentioned efforts to varying degrees of uselessness (Broadbent, 2019; Stegenga, 2018). This story is familiar from the pre-twentieth century history of medicine, and it's nothing to be ashamed of. It is what it is, which is considerably preferable to what it was. I'm no anti-medicine warrior. But the fact is that we're nowhere near what one might call a "completed medicine".

To hold out any hope that we are near a "completed medicine" in this situation is irresponsible, unless it is based on a proper assessment of the evidence. And artificial intelligence, machine learning, "Big Data algorithms", "biometric sensors", and so forth do not change the situation of medicine. Maybe some algorithmic panacea is just around the corner; but we have no more reason to think so in 2019 than we did in 1719, strange though that sounds to the inflated collective ego of the contemporary era. Even if that general claim is wrong, the Magical Internal Doctor Hypothesis that I've described is most emphatically not based on the discovery of any such reason. Rehearsing the familiar technobabble about algorithms and sensors and the latest advances in epigenetics available to us in 2019 simply does not cut the mustard, any more than the creation of the Principality of Liechtenstein three hundred years earlier gave reason to think that world peace was round the corner.

There are large-scale consequences of holding out false hope of imminent medical breakthroughs. Public sector funding is politically guided, and political guidance can be quite sensitive to irresponsible speech of the kind I'm describing. (In particular, Klaus Schwab appears to seek to influence policy.) As a consequence, money may be ploughed into one or another channel of research, sub-optimally. Maybe the development of deep learning tools for clinical application becomes all the rage, and swallows money that could be spent assessing the effectiveness of sugar taxes on reducing diabetes incidence. Maybe money is directed (even more) into genetically-oriented biomedical research, when it could be put into implementing known-effective health-related measures, like improving education (strongly correlated with longevity, among other obvious benefits), improving living conditions for the poorest, or even biomedical research directed at developing better cures for neglected tropical diseases.

Even if it had none of these consequences, however, it would be ethically problematic to be negligent in making bold factual claims for personal profit.

I've focused on one particular idea, the Magical Internal Doctor Hypothesis, but there are many other examples of similarly unfounded pronouncements. For example, a recent press article announced that robotics was the future of medicine. This is weird, because robotics is hardly a 4IR technology. The robotics revolution in the automotive industry brought Detroit to its knees in the 1990s (and in doing so incidentally spurred the rise of techno music). Even setting this historical point aside, however, it's obvious that there is more to medicine than surgery, and moreover that the abilities of surgeons to operate with greater precision and less invasion have in any case considerably increased over past decades. It's plausible that continued efforts to develop robotic aids for surgeons will continue this trend (although it would be nice to see a bit more thought given to whether there may also be reasons to doubt this). But it's a long leap from there to the future of medicine. Will robotics be increasingly developed for medical applications? Probably. Does that make robotics the future of medicine? No. Does it matter? Yes, because it might lead to research funding being sub-optimally deployed.

The limits of pure data

There are more serious attempts to predict or project the future of medicine, which do not amount to irresponsible speech. However, some of them are wrong, and for a specific reason, which I want to illustrate with an example.

The August 2019 issue of Nature reported on a tool built by Google Health for predicting acute

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“However, it is far less clear that machine learning can satisfactorily justify the hypotheses they create. This is because merely working with data can only get us so far. We need to relate the data back to what it is about. We need to interpret these hypotheses.”

onset kidney disease with impressive accuracy (Tomašev et al., 2019). It claimed that the tool was “clinically applicable”. Aside from the specific significance for acute onset kidney disease, the claim to clinical applicability suggests that there might be a completely new way to understand, predict, and ultimately make health decisions of all kinds.

The usual process is a slow, painful accumulation of knowledge across multiple long and costly studies. Their results may be hard to synthesise, their transportability unknown, and after all that, we may not have a clear idea of how a system will respond to an intervention (Hernán & Robins, 2020; Pearl & Mackenzie, 2018). Instead of all that, we simply give a suitable dataset to Google (all data arising from hospital admissions), along with the questions we want answered (“Who is going to get acute onset kidney disease?”). Google then comes back with a plug-and-play programme that answers our questions. “Clinically applicable” means we can use this programme in a live clinical setting, and the fact that it learns as it goes means that its accuracy may be expected to improve over time.

It won’t answer the questions that epidemiologists have traditionally asked. It won’t tell us, for example, why certain patients are highly likely to develop acute onset kidney disease. But it will tell us that certain patients will develop acute onset kidney disease, with remarkable accuracy, 48 hours before it happens. And that, ultimately, is what the clinician wants—isn’t it?

This is a familiar story: artificial intelligence radically outperforming old ways of doing things. It’s also one that presents challenges very familiar to philosophers. Inductive inference in general is not susceptible to formalisation: that is, the form of the inference does not guarantee that it works. It matters what the inference is about. But machine learning, however sophisticated, deals only in data that could, so far as the machine is concerned, be about anything at all. We therefore know that machine learning has in-principle limits. These limits correspond to the familiar problem of external validity or transportability, where we face the inferential challenge of understanding whether, when and how knowledge gained in relation to a studied population can be applied to a target population. Substitute “data set” for “population” and you have an expression of the exact same problem as it faces machine learning. The glitz of the new is apt to dazzle us to this old problem, however; hence the inappropriate use of “clinically applicable” in the above-mentioned article.

Machine learning can be an extremely important source of hypothesis generation, but there must be a distinction drawn between the context of discovery and the context of justification (Popper, 1959). This distinction isn’t as influential as it was; it doesn’t dominate the philosophy of science any more, and it isn’t immune to criticism. Nevertheless, it has its uses, and this is one of them. Data-driven methods powered by machine learning are surely great for generating hypotheses. These may be highly creative, from our perspective—things we never would have thought of (as illustrated by chess computers, which conceive of plays that are, from the point of view of chess knowledge, novel and highly original). There is a separate question to be explored as to how this is so; the point is that it may be so.

However, it is far less clear that machine learning can satisfactorily justify the hypotheses they create. This is because merely working with data can only get us so far. We need to relate the data back to what it is about. We need to interpret these hypotheses. If we don’t, then we cannot justify what we have hypothesised. This is because no inductive inference is ever justified by its form alone. That’s in the nature of an inductive inference. Instead, it is facts about the things that the inference is about that provides the warrant. In this instance, it would be facts about acute kidney injury. What features of the incoming patients is the machine detecting, through the lens of the data? How do these give rise to, or arise from causes of, the onset of kidney failure?

Answering these questions is essential to

determining whether the machine has found a chance pattern in the data—any dataset large enough will contain all sorts of interesting-looking patterns that arise by chance alone—or if it corresponds to something real. This is important to our decision as to whether indeed to apply this approach in a clinical setting. But it's also important to the advance of medical knowledge. Exciting though machine learning is, nearly all our existing medical success stories have a basis in biomedical theory—even if their discovery was somewhat fluky in some cases, and even if some, such as anaesthesia, remain inadequately explained. None was discovered, let alone justified, by appeal to mere patterns in data.

A deep learning approach to de novo small molecule design was also published in a Nature group journal the following month (Zhavoronkov et al., 2019). This approach included empirical testing, with the "lead candidate" demonstrating "favourable pharmacokinetics in mice". This is hardly a randomised controlled trial, and I reserve my right to scepticism about the results. Nonetheless, the approach shows a laudable effort to understand the physical reality beneath the patterns in the data. This is how machine learning can really advance medicine.

Towards better predictions

I've heavily criticized some predictions for being irresponsible, and argued that others are well-researched but misguided. How can we do better?

Properly considering the evidence for a prediction means testing it against contrary hypotheses, and I've given a detailed account of how to do this in the context of public health predictions previously (Broadbent, 2011, 2013), which is readily extended to cover the categories of prediction about medicine covered here. There is a simple test you can apply: what could possibly go wrong?

Consider scenarios in which the prediction you are making comes out false. (For any machine-led discovery process, this will include the scenario in which the pattern discovered by the machine has no basis in reality, and is a data-fluke. That's why trying to understand the reality beneath the hypothesis is so important.) Search for the most plausible of such scenarios, the ones that are the likeliest, the ones that are compatible with your current evidence as far as possible, the ones that are best supported by the data. These are competitors to your favored hypothesis. Then set about looking for evidence that will discriminate between, on the one hand, your hypothesis, and on the other hand, the competitors. The more you iterate this process, the stronger your prediction becomes. It won't necessarily guarantee truth. But it certainly secures you from negligence, since you can take proper care over what you say, yet still come a cropper. And it has a place in protecting serious research, such as the research underlying the Nature paper discussed above, from over-reach, as when an entirely data-driven approach is pronounced clinically applicable without any consideration of the possible physical and biological explanations for the model's success, as if it were an oracle rather than a tool for scientific discovery. ■

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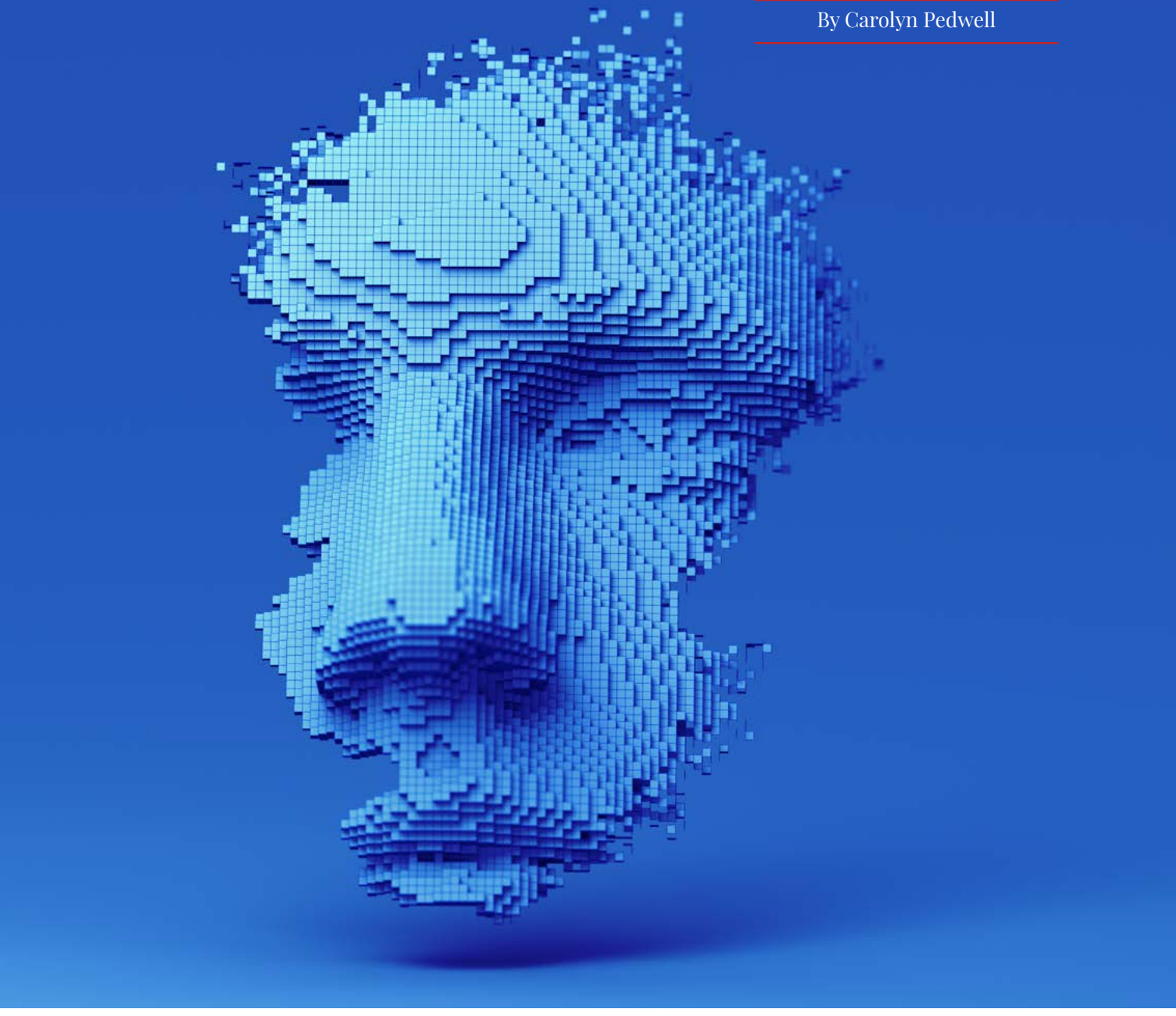
TRANSFORMING THE HUMAN:

Algorithms, Intuition and Networked Activism

By Carolyn Pedwell



In the midst of the Fourth Industrial Revolution, digital, smart and algorithmic technologies, it is claimed, may be fundamentally transforming 'the human'. They may, that is, be radically re-mediating human senses, habits and capacities. In *Thumbelina* (2015), for example, the late French philosopher and media theorist Michel Serres argues that millennials are not only the first generation to experience the internet and related forms of digital media in their adolescence, they have also been comprehensively '[re]-formatted by the media', and, thus, 'no longer have the same body or behavior' as previous generations (2015: 5-6). While 'Thumbelina' and 'Tom Thumb', as Serres affectionately names his millennial prototypes, are characterised by their profound affinity with digital technologies - their ability to send a text message (*with their thumbs hence the nicknames for millennials)* in an instant - they have limited 'faculty of attention'. Indeed, through their immersion since birth in mass media and advertising cultures, their attention spans have been 'meticulously destroyed' (5). Although they 'can manipulate several forms of information at the same time', Serres' millennials 'neither understand it, nor integrate it, nor synthesize it as we do, their ancestors' (6).

Yet, as Serres contends, Thumbelina and Tom Thumb do not possess the same cognitive habits or capacities as their parents or grandparents because *they do not need them*: 'With their cell phone, they have access to all people; with GPS, to all places; with the Internet, to all knowledge' (6). Just as the advent of previous communications technologies—from the practice of writing, to the printing press, to the telegraph—transformed the workings of human cognition and memory by making the need to mentally store huge amounts of information redundant, with the rise of digital media and smart technologies, 'this head has now mutated yet again' (Serres 2015: 12). Thumbelina does not have to work hard to gain or memorise knowledge, Serres argues, because 'it is already in front of her, objective, collected, collective, connected, accessible at her leisure, already reviewed and edited' (19-20). As such, Serres extends a long genealogy of media theory - from Marshall McLuhan and Friedrich Kittler to Bruno Latour and Donna Haraway - which has explored how various 'new' technologies act as

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'extensions[s] of ourselves'; functioning to shape 'not only habits of life, but patterns of thought and valuation' (McLuhan [1964]1994: 1, 12).

Although tertiary memory is vital to social and cultural transformation—as James Ash notes, 'when information is stored outside of human memory it can be reliably recalled into the future' (2015: 121)—in the context of late capitalism, it is also associated with more disquieting effects. For Bernard Stiegler, efforts by a range of cultural industries to manipulate the content of digital tertiary memory in the interests of profit generation have led to a 'fundamental disaffection on the part of people who become oversaturated by the media that swamp their lives' (2015: 121). This saturation, he suggests, has fundamentally transformed the 'functioning of the nervous system', reducing human attention span and hindering 'critical and creative thought' (2012: 186). Digitally re-programmed to accede to the will of corporate capital, contemporary subjects are increasingly trapped within 'cycles of mindless consumption' (ibid) and thus estranged from engagement with the political concerns and complexities of everyday life.

These perspectives on human cognition and behaviour in the digital age would seem to paint a rather bleak picture of the future of radical politics and social transformation. If, as the digital media scholar Wendy Hui Kyong Chung puts it, 'through habits users become their machines' (2016: 1), then it might be argued that our contemporary media habitus is producing an *army of automatons*: digital humans programmed in what Serres (2015) calls an 'algorithmic mode of thought.' An algorithm is 'a finite set of instructive steps that can be followed mechanically, without comprehension, and that is used to organise, calculate, control, shape and sometimes predict outcomes' (Coleman et al 2018: 8). In our current age of media analytics, an ever-

> “In this context, the term ‘algorithmic thought’ can be employed to refer not only to the ways in which people think *about* algorithms but also to how our intermeshing with algorithmic technologies may be *changing the nature of thought itself.*”

growing swath of ‘our cultural experiences, social interactions, and decision-making are governed by large-scale software systems’ that operate via algorithmic procedures (Manovich 2013: online). Indeed, whether via the aggregative nature of social media, the filtering of results on search engines, or the dynamics of contextual advertising and automatic news production, algorithms now play an increasingly central role in everyday life. In this context, the term ‘algorithmic thought’ can be employed to refer not only to the ways in which people think *about* algorithms but also to how our intermeshing with algorithmic technologies may be *changing the nature of thought itself*. As we become increasingly algorithmically mediated by digital capital at the micro-level of affect, gesture and habit, the above perspectives imply, our embodied capacity for political resistance and solidarity may be progressively diminished - or even irreparably destroyed.

However, as this essay explores in an analysis that brings together theories of mediation, philosophies of habit and affect and writing on new social movements, these emerging digital forms of personhood are also subject to more hopeful political visions. This occurs in a context in which associations between digital media, capitalist colonization and political disaffection have become automatic and smart phones and social media are widely assumed to be detrimental to young people’s subjectivity. Thinking speculatively, I will argue, can open up and complicate these processes of mediation in ways that may help us to imagine and enact other possibilities for techno-social life.

Habit, intuition and the sensation of change

Although *Thumbelina* describes millennials as having diminished capacity for sustained attention and conceptual thinking, Serres nonetheless proclaims that ‘this newly born individual is good news’ (2015: 5). What their digital re-programming has made possible for Thumbelina and Tom Thumb, he argues, is ‘*an innovative and enduring intuition*’ (italics mine, 2015: 19). That is, precisely because millennials no longer have to dedicate so much mental energy and neural capacity to gathering, storing and organising information, they may develop greater aptitude for a different, more intuitive, mode of being-in-the-world. In delegating habits of mental synthesizing and processing to digital technologies, Thumbelina and her peers are participating in the development of ‘new genius’ and ‘inventive intelligence’ – ‘an authentic cognitive subjectivity’ (19). *Thumbelina* thus compels us to confront how the idea of ‘human-machine hybrids’ has taken on new significance in an age characterised by media analytics and algorithmic technologies.

To be sure, Serres’ view of the potentialities of such techno-cultural transformations could be described as unrealistic or utopian - and certainly in stark contrast to more prevalent reports of the damaging impact of digital culture on young people’s subjectivities and mental health. In her bestselling book *iGen*, for example, the psychologist Jean Twenge argues that the generation of American youth born in 1995 onwards, who ‘grew up with cell phones, had an Instagram page before they started high school, and do not remember a time before the Internet’, are ‘at the forefront of the worst mental health crisis in decades’ (2017: 3). Similarly, a 2017 study by the UK’s Royal Society for Public Health (based on a survey of 1,479 14- to 24- year-olds) reported that social media platforms including Instagram, Snapchat, Facebook and Twitter were experienced negatively by many young people who found that they functioned to ‘exacerbate body image concerns’ and ‘worsen bullying, sleep problems and feelings of anxiety, depression and loneliness’. At its worst, social media is linked to increased feelings of ‘self-loathing’ and a growing risk of suicide (Campbell 2017: online). Moreover, given everything we know about the pernicious interaction of networked technologies with global capitalism, international securitisation, racial profiling, political interference in national elections, ‘fake news’, conspiracy theories, echo chambers, trolling, and so forth, such an *affirmative* engagement might seem

wilfully blind to the more disturbing realities of our contemporary digitally-mediated world.

My argument, however, is that precisely because accounts of the corrupting influence of digital technologies have become so pervasive, it is increasingly difficult to imagine how human-technology co-production could be otherwise. To start, I want to return to the term 'intuition' that Serres associates with the emergent digital subjectivities of millennials. As 'the ability to understand something immediately, without need for conscious reasoning' (OED), intuition is often connected with direct sensing, instinctive reactions and 'gut feelings'. Extending these everyday associations, the French philosopher Henri Bergson famously figured intuition as an experiential mode of engagement with the richness and flux of material life. Highlighting the difference between intuition and what might now be referred to as 'representational thinking', Bergson contrasts the sense of a town one would gain from viewing photographs 'taken from all possible points of view' compared to the visceral experience of walking through it. While there is value in both encounters, he suggests, the two can 'never be equivalent' because only the latter allows for the 'unity' of experience ([1903]1999: 22). Unlike 'analysis', which reduces objects to 'elements already known', intuition is, for Bergson, a form of immersive inhabitation which connects one with 'what is unique' and 'consequently inexpressible' in an object ([1903]1999: 24). It is embodied experience before, or outside of, its translation into the categories of representational and analytical thought.

What is also important for Bergson is that both we and the objects we encounter are never static but are rather always moving and becoming. Intuition thus allows us to appreciate change *as it is happening*: It is, as Sarah Kember and Joanna Zylinska put it, 'a moment of our own duration that enables us to connect with a wider one' (2012: 15). Bergson's interest in temporality and mobility, as well as the non-representational thrust of his approach, resonates with more recent work associated with the 'turn to affect'. This is perhaps most notable in the work of the cultural anthropologist Kathleen Stewart in her book *Ordinary Affects*: Through inhabiting the varied sensations of everyday life - from the feeling of being part of the mainstream to the lived textures of racism - Stewart seeks to interrupt the automatic 'jump to representational thinking and evaluative critique' (2007: 4). Similar to Bergson, she is interested not in processes of demystification 'that support a well-known picture of the world,' but rather in 'speculation, curiosity and the concrete' (1). In socio-political terms, what is vital about Stewart's approach – and *intuition as method* more generally – is its ability to register that which *exceeds* weighty terms such as "neoliberalism", "advanced capitalism", "liberal democracy" or "populism" and yet nonetheless 'exert[s] palpable pressures' (3). That is, intuition as a method's capacity to viscerally grasp how "the social" and "the political" are actually much more fragile, ambivalent and mobile than is usually conveyed.

What, then, might be distinctive about the workings of intuition in the digital age? This is a salient question given that, as Rebecca Coleman notes, for Bergson, 'true intuition' was 'an empiricism' that implied the need for direct embodied experience rather than technologically-mediated perception (2008: 112). Returning to Thumbelina, she is, on the one hand, skilled in a mode of algorithmic thought that seems antithetical to the kind of affective inhabitation that Bergson and Stewart advocate. When asked 'what beauty is', for instance, Thumbelina responds not with an incisive unpacking of the concept, or a rich description of its felt qualities, but rather in the manner of a search engine: 'a beautiful woman, a beautiful dance, a beautiful sunset…' (Serres 2015: 42). On the other hand, what Thumbelina's endless list of examples may be seen to express is a resistance to unnecessary or stultifying abstraction. As Serres suggests, Thumbelina and Tom Thumb seem to understand intuitively that, while conceptual thinking has its place, 'we do not have an ineluctable need for concepts' and that

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there is value in lingering 'as long as necessary in narratives, examples, singularities…' (2015: 42-3). As such, although their experience of the world is continually mediated via networked technologies, these 'new humans' would seem to excel at the very kinds of more-than-representational thinking Bergson associated with intuition.

From this perspective, we can begin to appreciate how, precisely because they are not preoccupied by a particular kind of analytical labour, Thumbelina and her millennial peers may hone their capacity to engage those moving forces that escape the analytical purchase of our most prominent socio-political concepts. In doing so, these emergent digital subjects might also helpfully illuminate the ways in which, as Stewart suggests, 'politics starts in the animated inhabitation of things' (2007: 16).

What I am suggesting here, then, is that the 'authentic cognitive subjectivity' that Serres speculatively attributes to Thumbelina and Tom Thumb is characterised by two key features: first, an emergent capacity for intuition (made possible, in part, through the delegation of human memory functions to digital technologies) which pushes against dominant modes of representational thinking to *connect with moving events as they unfold*, and, second, an algorithmic mode of thought (conditioned by our growing intertwinement with computational technologies) which is *procedural, technical, calculative and data-oriented*. While Thumbelina's intuitive orientation attunes her to change as it is happening, and thus the potential inherent in the present for things to be otherwise, her algorithmic aptitude allows for a more precise 'arraying of possibilities such that they can be acted upon' in the future (Amoore 2013: 23).

Importantly, these newly ascendant cognitive and affective features continue to work in and through multiple other human modes of sensing, perceiving, thinking and acting – including more conceptual, analytical and representational registers. The rise of algorithmic thought, from this perspective, does not inevitably function to erode young people's abilities to engage contextually, critically and politically. Rather, in its articulation with intuition, speculation and the pre-emergent, it might constitute a vital form of 'quantum literacy' which enables millennials to navigate networked relations across (non-linear) time and (non-bounded) space, and to recognise the 'principle inadequacy of thinking about numbers and letters, mathematics and language, as two separate domains' (Coleman et al 2018: 8).

Of course, Thumbelina and Tom Thumb are themselves abstractions – in 'reality' they exist only in the multiple; at lived intersections of gender, sexuality, race, class, ability and nation, and the various material, social and geo-political differences and inequalities such shifting relations entail. To the extent, however, that Thumbelina is a *useful* abstraction to think through, she compels us to deconstruct dualistic figurations of millennials as either apolitical automatons or overly-sensitive 'snowflakes'. Indeed, from Serres' perspective, 'the new democracy in knowledge' that digital media and tertiary memory offer - and which Thumbelina and Tom Thumb both cultivate and rely on - corresponds to a political 'democracy-in-formation' that will soon 'become inescapable' (2015: 55).

Movement, affect and digital activism

There is clearly no necessary link between intuition and socio-political change in the interests of freedom and social justice. As an embodied capacity and form of relationality, intuition is, in principle amenable to mobilisation by 'progressive' and 'regressive' ideologies alike. For example, as the political geographer Louise Amoore (2013) explores, a 'politics of possibility' premised on intuitive engagement with pre-emergent flows and relations characterises not only certain strands of continental philosophy and cultural theory, but also practices associated with capitalist financialization and international securitization. Algorithmic processes, moreover, are increasingly associated with problematic socio-political patterns and prejudices. Safiya Umoja Noble

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argues, in this vein, that algorithms created and employed by global platforms such as Google are 'serving up deleterious information about people, creating and normalizing structural and systematic isolation, or practicing digital redlining, all of which reinforce oppressive social and economic relations' (2018: 10).

As such, I do not wish to downplay the importance of engaging critically with mobilisations of intuition and algorithm that perpetuate dominant relations of power and violence. Keeping these political dynamics in mind, however, I also seek to complicate narratives that associate digitally re-mediated forms of personhood predominately with capitalist colonialization and political apathy - or interpret engagement with the pre-emergent primarily as a mode of violent capture - to explore how these phenomena might be conducive to more affirmative modes of political relationality and solidarity.

In particular, there are, I want to suggest, significant resonances between the 'intuitive digital subject' that Thumbelina represents (or may become) and the logics and sensibilities of contemporary networked movements for social justice – including Occupy and Black Lives Matter as well as various feminist, queer, trans and anti-fascist mobilisations gaining momentum in the wake of Trumpism. As the 'movement' in social movement signifies, these forms of collective action and solidarity are continually *in process* – evolving and transforming as they attract new members and respond to unfolding events and emerging socio-political and environmental conditions. To the extent that 'being moved' is a necessary catalyst for participation in, or alignment with, particular political visions, these new forms of activism (like older ones) are also highly *affective* – they are both fuelled by, and productive of, 'bodily intensities, emotions, feeling, and passions' (Gould 2009: 3). What is perhaps most distinctive, however, about current forms of 'progressive' political mobilisation is their *digitally networked* nature.

Extending technological techniques pioneered by the Arab Spring, the Occupy movement, launched in New York City in 2011, used a range of digital platforms both to 'spread the word' and to coordinate embodied activity as it unfolded. As Paulo Guerbado argues in his comparative analysis of the Arab Spring, Occupy Wall Street and the Indignados movement in Spain, social media within new protest cultures are not simply means to 'convey abstract opinions'; they also enable forms of *affective choreography* that give shape to how people feel, move and act together (2012: 13). Across these various networked movements, social media, and particularly Facebook and Twitter, have been 'instrumental in instigating an emotional condensation of people's anger' and 'acting as a spring-board for street-level agitation' (2012: 15). Digital applications have also enabled protesters to re-direct crowd activity in real-time to avoid the containment strategies of authorities. During the student protests against the increase in UK university fees in 2011, which was linked in with Occupy UK, for example, a new digital app 'Sukey' enabled activists to avoid police kettleing in London by allowing them to both 'submit and access information about which road junctions are clear and which are blocked by the authorities' (Geere 2011: online).

Various digital technologies and forms of techné have also, of course, been vital to the emergence and effectivity of the Black Lives Matter (BLM) movement. Since its inauguration in 2013, BLM has, as Barnor Hesse and Juliet Hooker discuss, harnessed social media to 'organize, heighten immediacy, and widen the scope of the public that acts as witness to the disposability of black lives' (2017: 451). While repeated exposure to violent images tends to be associated with political desensitization and disaffection (Pedwell 2017), BLM's mobilisation of a 'continuous loop of viral videos showing police killing unarmed blacks' has made 'viscerally accessible' to millions worldwide the habitual violent targeting of black bodies by the carceral state (Hooker 2017: 491) in ways that have intensified (rather than dissipated) collective anti-racist affect and activism. Moreover, Twitter hashtags such as #Ferguson, #Baltimore and #Cleveland (associated with the police killings of Michael Brown, Freddie Gray and Tamir Rice respectively) have functioned not only to expand the movement's evolving digital network but also to convey instantaneous 'information about unfolding events' (Bonilla and Rosa 2015: 8) - thus enabling BLM to connect with and respond to *that which is in process*.

The fluid intersection of 'the moving', 'the affective' and 'the digital' characterising these

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movements, I want to suggest, is precisely the terrain with which Thumbelina’s combination of intuitive sense and algorithmic thought resounds. If intuition is ‘a moment of our own duration that enables us to connect with a wider one’ (Kember and Zylinska 2012: 15), Thumbelina is primed for this union. As Serres notes, Thumbelina and her millennial peers, via their propensity for movement and action, are ready to connect with moving events – to resonate with the rhythm of bodies coming together to occupy space, to protest the status quo and to engage ‘the modalities of the possible and the contingent’ (43). Although, as Sara Ahmed (2014) underscores, the embodied cadence of social movements is not simply about synchronicity: It may also involve the sensation of being ‘out of time’ with the mainstream.

Moreover, if Thumbelina’s capacity for intuition attunes her to the mobility and affectivity of new social movements, her algorithmic capacities align her with the digital modes of communication and choreography central to these networked activisms. Indeed, in Serres’ view, ‘the objective, the collective, the technological, the organizational’ now ‘depend far more on this algorithmic or procedural cognition’ than they do on ‘the declarative abstractions’ of ‘philosophy’ (2015: 71-2). This is not to invalidate the ongoing salience of conceptual and analytical thinking but rather to highlight what may be generative about algorithmic thought in a context in which it has been consistently devalued or aligned exclusively with that which is politically and ethically suspect. Think, for example, of the powerful (if contentious) political function of algorithmic practices of listing, counting and cataloguing within contemporary digital activisms – whether via the collective naming online of alleged sexual abusers by the #MeToo movement, or the real-time tally of unarmed people of colour killed by the police in the United States maintained by BuzzFeed and Gawker in solidarity with #BlackLivesMatter.

Indeed, the ‘hashtag activisms’ associated with these and other contemporary movements can be considered vital forms of *algorithmic politics*. As Yarimar Bonilla and Jonathan Rosa discuss in their digital ethnography of BLM and #Ferguson, in the immediate aftermath of Michael Brown’s death, social media users ‘well aware of the algorithmic nature of Twitter’ were ‘purposefully hashtagging to make Ferguson “trend”’ (2015: 7). Such aggregative practices allowed Brown’s murder to be connected to the perceived ‘expendability of black bodies’ underlying a multitude of past killings of people of colour by law enforcement in the United States (2015: 10). They also, however, facilitated connections with wider social and geo-political struggles - through tweets such as ‘#Egypt #Palestine #Ferguson #Turkey, U.S. made tear gas, sold on the almighty free market represses democracy’ (2015: 10, 6) –enabling opportunities for transnational collaboration and solidarity (Hesse and Hooker, 2017).

Significantly, while such algorithmic dynamics enable the itemising, indexing and interlinking of ‘the quotidian struggles against dehumanization every brown and black person lives simply because of skin color’ (Rankine 2015: 14), they also offer potent opportunities for reimagining black materiality beyond mainstream mediations. For example, through memes such as #IfTheyGunnedMeDown - in which young people of colour posted two contrasting photographs of themselves along with the text ‘which one would they use’ (referring to which image authorities and mainstream media would print if they were killed by the police) – Twitter users were able to ‘contest the racialized devaluation of their person’ and ‘rematerialize their bodies in alternative ways’ (Bonilla and Rosa 2015: 9). More generally, BLM’s intersectional ethos, and its intertextual articulation with other feminist, queer, trans and anti-capitalist movements online, has enabled ‘the complexity of black lives inscribed differently and multiply … to be seen, heard, and encountered politically’ (Hesse 2017: 600) – illustrating how algorithmic politics are not simply antithetical to political complexity and expansiveness.

Political tendencies and pre-figurative politics

Of course, there is no guarantee that the emergent cognitive and embodied features Serres ascribes to Thumbelina and Tom Thumb will orient millennials towards participation in progressive or left-wing movements rather than politically conservative, or even fascist, forms of mobilisation. It is clear that the 'alt right' and other forms of fascist politics aligned with Trumpism have adopted similar digital techniques and strategies to those employed by progressive movements for social justice. As Yochai Benkler et al discuss in *Network Propaganda*, alt-right memes are amplified by major right-wing outlets such as Fox News in the US, which 'are adept at producing their own conspiracy theories and defamation campaigns' (2018: 13). Consolidating 'long-term changes in American politics' and 'the already present asymmetric architecture of news media' (2018: 21, 2), such digital dynamics leveraged a media ecosystem ripe for the violent re-emergence of far-right ideologies.

However, if regressive politics depend on rigid identity positions and seek a return to exclusionary versions of an imagined 'the past' (i.e. 'Make America Great Again' and the colonial nostalgia of 'Brexit'), many of the new broadly leftist activisms are characterised precisely by their *openness* to the future – that is, by a deep commitment to pursuing democracy, freedom and solidarity that does not assume that we can know deterministically in advance what 'social justice' might constitute in a given context or indeed how, specifically, it might be delivered. As such, these various, broadly leftist, forms of political mobilisation can be considered part of what the political thinker and activist Chris Dixon calls '*another politics*': a shared politics bound together not by political party affiliation or sectarian lines, but rather by a '*political tendency*' – a tendency aligned with 'a rich democratic vision of everyone being able to directly participate in the decisions that affect them' and resistant to 'all forms of domination, exploitation and oppression' (italics mine, 2014: 6, 3).

From this perspective, if many of the movements which comprise the political tendency Dixon describes are not led by a clearly defined set of policies, goals or 'end-points' (which was, of course, one of the dominant critiques of Occupy), this is, in part, because they appreciate the importance, in a complex and shifting social world, of sensing and responding to change *as it is happening*. Moreover, they understand the political risks, as John Dewey puts it, of simply 'substituting one rigidity for another' ([1922]2012: 52). As an alternative to more rigid or essentialist modes of political mobilisation, these movements enact a *pre-figurative politics* which aims to 'manifest and build, to the greatest extent possible, the egalitarian and deeply democratic world we would like to see through our means of fighting in this one' (Dixon, 2014: 7). As such, they highlight the vital links between social change and the affect, gestures, habits and solidarities of daily life. They pursue a 'politics of habit' and 'politics of feeling' that are, as Ann Cvetkovich puts it, 'manifest not just in overt or visible social movements of conventional politics but [also] in the more literal kinds of movement that make up everyday life' (2012: 199).

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Consider, for example, not only Occupy, but also other anti-capitalist movements including the Indignados of Spain and the Outraged of Greece, which have repeatedly assembled to protest neoliberalism and austerity. As Judith Butler and Athena Athanasiou discuss, in performing habits and routines of everyday life in the public space of the square - sleeping and living there, cooking for one another, working remotely together - 'taking care of the environment and each other' – such activists are pursuing pre-figurative politics; they are cultivating 'the relations of equality that are precisely those that are *lacking* in the economic and political domain' (2013: 102). While calling attention to the insidious harms of neoliberal governance and induced precarity, they also *constitute* collective relations and capacities which

might support a range of immanent political possibilities.

If pre-figurative politics are unfolding in public squares around the world, they are also ongoing within a multitude of digital spaces and circuits – via practices of tweeting, meme-making, blogging and virtual community-building. Bonilla and Rosa, for instance, highlight the experience of a 25-year-old American protestor, Johnetta Elzie, who first encountered other activists online, with whom she 'live-tweeted, Vined and Instagrammed' every BLM protest in Ferguson during the summer of 2014 (2015: 10). Coming to call themselves 'Millennial Activists United', these social media users eventually expanded 'their role from "documenting" their actions to "generating" new forms of community' – including the use of the hashtag #Ferguson Friday to curate a weekly digital space for political reflection and 'national "fireside" conference calls during which activists based in Ferguson could speak directly with those following the events from afar' (2015: 10). In addition to 'forging a shared politics through struggle' transnationally (Dixon 2014: 3), these digital practices enable millennials to develop vital political *techné* - the embodied skills, techniques and habits of 'doing politics' online (Rentschler and Thrift, 2015). Such 'learned and socially habituated way[s] of doing things with machines, tools, interfaces, instruments, and media' (2015: 241) are amenable to mobilisation for multiple, yet to be imagined, political enactments.

In practical terms, this intuitive and speculative approach to politics is enabled, in part, by these movements' networked qualities, including the capacity of digital and algorithmic media to connect members to *moving events as they unfold*. Much has been written about the propensity of social media to produce 'echo chambers' that polarize ideological differences rather than exploring what might be generative about their grey areas. Through a pre-figurative lens, however, we can alternatively consider how the immanent, 'real-time' dynamics of networked media might enable (potential) activists to 'learn and act in the midst of ongoing, unforeclosed situations' (Anderson 2017: 594). This is significant because, as the philosopher Erin Manning (2016) argues, it is through inhabiting the gestures, habits and relations of life *in process* that we can discern and exploit the potential for dominant cultural and socio-political tendencies to *become otherwise*.

Of course, we know algorithmic media *tend in certain directions* and thus the forms of socio-political becoming they might support are by no means open or unlimited - a reality that makes ongoing work to expose and contest 'algorithmic oppression' and the pernicious links between digital media and capitalism increasingly vital (Noble 2018; Fuchs, 2014). Yet, for movements such as Occupy and BLM, staying 'in the midst' of socio-political and material relations in process (Manning 2016), also means recognising that there is no *politically pure* position from which to operate *outside* the dynamics of neoliberalism or racial capitalism. Rather, what is required are a means of working speculatively within existing (infra)structures and relations of power, in order to reorient the tendencies that comprise them. In this vein, one of the strengths of the pragmatic coalitions that algorithmic technologies enable is that they are flexible and responsive, and can form and recalibrate tactics as situations unfold – thus potentially 'mobilis[ing] a lithe and powerful response able to resist, rework, and undo [hegemonic] social relations and practices' (Katz 2017: 598).

What is perhaps most important from a pre-figurative perspective is that networked projects of social justice remain 'in process and unfinished, something that consciously pushes beyond available political categories, and yet something that can be shared, held in common' (Dixon 2014: 6). It is precisely this kind of openness, inclusivity and 'processuality', I want to suggest, that constitutes the power of Occupy and Black Lives Matter as movements, statements and rallying calls. When those marching, occupying, filming or live-tweeting *repeat* 'Black Lives Matter', the

"One of the strengths of the pragmatic coalitions that algorithmic technologies enable is that they are flexible and responsive, and can form and recalibrate tactics as situations unfold – thus potentially 'mobilis[ing] a lithe and powerful response able to resist, rework, and undo [hegemonic] social relations and practices.'"

'sense of being present in a particular space is evoked and remains open'; the *reiteration* 'makes common a way to be in the future' that is 'always becoming, always in formation' (Mirzoeff, 2017: 33, 92). The injunction to '#Occupy', and the parallel anti-capitalist slogan 'we are the 99 per cent', work similarity (Fuchs, 2014) – they provide the basis for inclusive modes of collective political action and solidarity that remain open to a host of material and ethical possibilities. Millennials have been at the heart of these activisms in part, I have argued, because they practice forms of pre-figurative politics that combine 'the moving', 'the affective' and 'the digital'. While exploiting the aggregative capacities of algorithmic media to live-chronicle everyday inequalities and choreograph collective action and affect, these movements also cultivate transformative relations and capacities with the potential to actualise pre-emergent techno-social futures.

As my speculative engagement with Serres' *Thumbelina* has suggested, embodied and socio-political change is continually unfolding through ongoing processes of *mediation* - multiple, overlapping, non-linear processes that work primarily at the level of affect, sensation, gesture, habit and tendency. 'The digital' and 'the algorithmic' are central to such dynamics; indeed, we are all now 'digital humans' – but what this means (or has the potential to mean) materially, politically and ethically is not straightforward or pre-determined. It may, however, be through cultivating a more intuitive mode of engagement with everyday life that we are better able to sense and apprehend these kinds of transformations as they are happening - and the potentialities that they entail. ■

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Digital media, literacies and African literature

In this article, we explore the impact of digital media on African literacy practices and literature. As our starting point, we want to problematise the notion that digital media spell doom for reading generally and for African literature in particular. Versions of this argument include perturbations that 'African readerships are under siege' by 'the cost of books, varying degrees of general literacy, inadequate library services and the seductions of the web and social media' (Ojwang and Titlestad, 2014). The latter are held responsible for the decline in modes of attention attuned to 'older forms of "deep" and refined literature,' in favour of 'visual salience, speed, brevity and the predominance of surface over depth.' In this view, the information flow of new media has rendered the pastime of reading fiction, with its affects and 'stylistic or literary pretensions to beauteous form, [...] seem evermore superfluous' (De Kock, 2015).

Pier Paolo Frassinelli and Lisa Treffry-Goatley

Anxiety about technology is nothing new among traditional intellectuals. The Greek philosopher Plato worried that writing would produce forgetfulness – if you can write things down there is no need to remember them – while the English poet Alexander Pope described the invention of printing as a 'scourge for the sins of the learned.' Narratives about literature being shunted aside by other media go back to the advent of visual media such as movies or television, long before the rise of the internet.

Then as now, the view of a present where deep thinking and reading are relegated to the margins of cultural life by new technologies is overstated. Firstly because reading, and especially the reading of high literary forms, has always been an activity for a minority with a particular set of literacy skills, surplus money and the leisure time to pursue it. As US media scholar Kathleen Fitzpatrick notes, narratives of cultural decay have more or less overt ideological motivations. The subtext of recent statements about the decline of a reading culture in the age of digital and social media is usually something like: 'No one reads [anything (I think is) good] anymore' (Fitzpatrick, 2012, p. 42).

It is not that people, including Africans, who are active online do not read, and write, anymore. The digitally connected tend to read and write a lot. It is just that they often read and write short, small size chunks of text: WhatsApp messages, tweets, and Facebook and Instagram posts. The key shift here is that digital media users bypass the divisions between the written, the visual, the oral and the aural. We read and write texts, look at images, play videos and listen to music or speech on the same device, often at the same time. We have created new ways of communicating in

which the written, the visual, the oral and the aural are constantly mixed and remixed. The results are hybrid and complex messages that produce their own discourses, modes of engagement, codes and forms of attention (Frassinelli, 2019, p.16-17; 67-71).

Ng gĩ wa Thiong'o has theorised the implications of this mixing of modes, codes and forms for African literature. In particular, he has highlighted the challenge cyberspace poses to 'aesthetic feudalism:' where, in modern western culture and its colonial outposts, a hierarchy is established between the written and the oral whereby the latter, 'even when viewed as being "more" authentic or closer to the natural, is treated as bondsman to the writing master' (Ng gĩ, 2012).

The multimodal and transmedia forms of expression and communication that we encounter online interrupt the hegemony of writing and open up new possibilities for its hybridisation with the oral:

> The lines between the written and the orally transmitted are being blurred in the age of internet and cyberspace. This has been going on for some years with the writing down of the orally transmitted; the electronic transmissions of the written as spoken through the radio and television; or simply the radio as a medium of speech. But it has surely accelerated with all corners of the globe becoming neighborhoods in cyberspace. Through technology, people can speak in real time face to face. The language of texting and emailing and access to everything including pictures and music in real time is producing a phenomenon that is neither pure speech nor pure writing. The language of cyberspace may borrow the language of orality, twitter, chat rooms, we-have-been-talking when they mean we-have-been-texting, or chatting through writing emails, but it is orality mediated by writing. It is neither one nor the other. It's both. It's cyborality. (Ng gĩ, 2012)

Media convergence and cyborality are especially apt points of entry into the work of some of the best-known contemporary African writers, not in the least because of their engagement with different media, and especially their digital media presence.

The first example that comes to mind is the internet celebrity status of Nigerian novelist Chimamanda Ngozi Adichie. At the time of writing, in October 2019, Adichie's talk 'The Danger of a Single Story' has hit over twenty million views on ted.com and over five and a half millions on YouTube, with well over one thousand comments for each video, while her TedxEuston talk 'We Should All Be Feminists,' sampled in Beyoncé's 2013 single '***Flawless,' has scored over five and a half million views on YouTube.

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Digital media also finds its way into and out of African and diasporic authors' books. Again, the best known example comes from Chimamanda Ngozi Adichie's *Americanah* (2013, p.418-423), whose main character, Ifemelu, sets up a blog called 'Raceteenth or Various Observations about American Blacks (those Formerly Known as Negroes) by a Non-American Black.' Her anonymous blog postings, typed in a different font from the rest of the text, provide a counterpoint to the unfolding story, in which Ifemelu first migrates to the United States and then comes back to Nigeria, where she starts a new blog, 'The Small Redemptions of Lagos' (Adichie, 2013). The second blog has had a life of its own outside the covers of the book. Between 27 August and 2 November 2014 a series of posts on topics ranging from everyday life in Nigeria, to responses about the representation of Africa in western media were uploaded, as if Ifemelu had written them, at https://americanahblog.com/, where they are still accessible.

The impact of digital media on this body of literature, in fact, goes beyond this description into other uses and references. Contemporary narratives of migration by African authors have articulated the complex relations between the rupture produced by migration, and the role and limits of new communication technologies in bringing separate worlds together. The phrase

> "The impact of digital media on this body of literature, in fact, goes beyond this description into other uses and references. Contemporary narratives of migration by African authors have articulated the complex relations between the rupture produced by migration, and the role and limits of new communication technologies in bringing separate worlds together."

'new-media-driven narratives' has been used to describe how novels such as *Americanah* and NoViolet Bulawayo's *We Need New Names* (2013) address 'issues of affect and access, which the influence of expanding virtual networks on social relations is making increasingly visible' (Isaacs, 2016, p. 174). US critic Caren Irr theorises a new subgenre that she labels the 'digital migrant novel' – in which she includes the 'African migration fiction' of Teju Cole's *Open City* (2011), Chris Abani's *Virgin of Flames* (2007) and Dinaw Mengestu's *The Beautiful Things that Heaven Bears* (2007) – where digital media provide a representational template and spatial sensibility that enable the move 'from the discrete geography of nations to the overlapping and virtual spaces of communication technologies' (Irr, 2014, p. 26).

But digital media are not only the playground of African literary stars who use them as narrative devices or to enhance their visibility. What Shola Adenekan calls 'the internetting' of African literature dates back 'to the mid to late 1990s, when many young African writers, wanting to escape the politics of book publishing, began to publish poetry, short stories, and essays on African listservs, personal blogs and creating writing websites' (Adenekan, 2016, p. 3). Today, 'there are dozens of poetry and creative writing communities online.' They testify both to the possibilities opened up by digital media for hybridising written and oral forms of expression and to their complex imbrication with the offline world:

> ...poetry posted on Facebook may be performed for members of the public in the real space of Lagos and Nairobi, and the recording of those performances may be posted on YouTube and Facebook for consumption by the online public. Young poets such as David Ishaya Osu (Nigeria), Dami Ajayi (Nigeria), and Redscar McOdindo K'Oyuga (Kenya) publish poems almost every week on Facebook, many of which later form part of print collections. These works may also appear as part of a collection of a creative book project. These processes arguably involve reshaping the text for different formats, and through this process the creative piece is unfixed and susceptible to changes. (Adenekan, 2016, p.3)

Digital media have offered a platform for the production, circulation and reception of diverse texts and performances through modes of delivery that make them travel outside of the literary establishment and move away from canonical literary forms.

In June 2019, the number of African online users was 'already larger than in Latin America (448 million) and at current growth rates could eclipse Europe (719 million) as internet penetration on the continent grows.' Still, a note of caution about the scale and reach of these developments is in order. In June 2019, less than 40% of Africa's population used the internet, contrasting with more than 60% of the population in the rest of the world (*Business Insider*, 2019). Although internet penetration and mobile telephony are growing exponentially in Africa, giving many access to digital and social media platforms, the digital divide remains a reality linked to class, age, gender, geographical location and language. The majority of internet sites are only available in English or in other former colonial languages. Smartphones and data are still too expensive for the continent's poor and working class people. In South Africa, for instance, only 32 of over 58 million citizens have internet access, while the cost of data is more expensive than in higher income countries such as Australia (see Mutsvairo and Ragnedda, 2019).

African digital literary networks are largely middle-class and elite spaces. As Adenekan underscores, the 'poets, novelists, critics, and consumers of [African literary] works [that circulate online] are people with the language capability to enjoy them. They can afford fast and reliable internet, are often based in metropolitan centres of Africa, Europe, and America, and some even spend much of their time in these

places.' The listservs Adenekan surveys, such as ConcernedKenyanwriters, Krazitivity, USA-Africa Dialogue and Ederi, do not exceed a few thousand active users (Adenekan, 2016, p. 3).

There is no disputing the digital divide on the African continent, where a minority of people have access to digital technologies – to devices, software, data, effective connection and digital literacy skills (i.e., computer and other proficiencies). Where people only have access to the cheapest type of devices – 'dumb' or 'feature' cell phones – they are more likely to be using them for oral communication than for enjoying the other affordances of digital media. It is not just a matter of access, but of meaningful and effective access, unimpeded by the cost of data and lack of digital literacy.

Even so, despite unequal access to digital technologies, and despite the current constraints on digital connectedness in Africa, digital media can and do play a significant role in promoting reading practices and cultures across the African continent, in a multiplicity of African languages. Examples of this can be found in work promoting children's literacies – critical to developing lifelong readerships – by African Storybook. Now in its fifth year, African Storybook uses traditional and digital publishing processes to create and distribute print and digital materials that support multimodal reading engagement.

The African Storybook initiative 'aims to address the shortage of contextually appropriate books for early reading in the languages of Africa.' Its goal is 'for all young African children to have enough enjoyable books to read in a familiar language to practise their reading skills and learn to love reading'.1 Central to African Storybook is a website that is a repository of openly licensed digital storybooks written by African educators, and available in a multiplicity of languages ranging from Acholi (Uganda), Afaan Oromo and Amharic (Ethiopia), Akwapem Twi and Asante Twi (Ghana), to isiXhosa (South Africa), Yoruba (Nigeria) and Zarma (Niger).

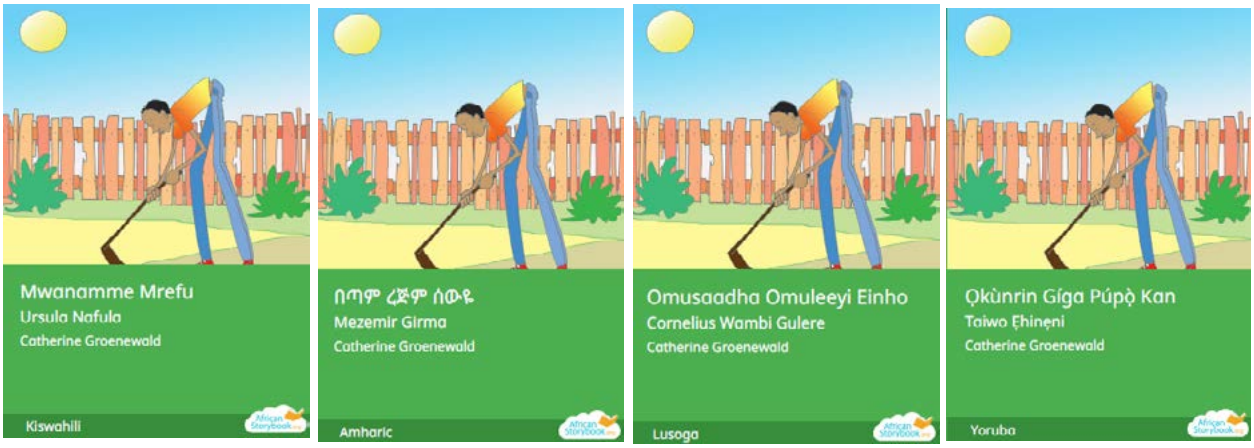
Storybooks are freely available for reading online, and for downloading as PDFs (print-ready or for projection) and EPub files. At the time of writing, a total of 5851 digital storybooks had been published on the website, in 183 languages – mostly indigenous African languages, but also in English, French and Portuguese. Some of the languages represented previously had little or no reading material published specifically for children. The total number of storybooks available on the website consists of those classified as original, plus the number of translated or adapted versions of the original storybooks.

There are two main categories of original storybooks on the African Storybook website: those that are created and published by independent users of the website, and those that are created and published with African Storybook resources (which have gone through a basic editorial process and are illustrated by artists commissioned by African Storybook). Publishing tools for making storybooks are available both on the website and offline, and in a storybook maker app. While the quality of independently-produced materials may vary, this represents an important shift from publishing being the preserve of expert professional publishers to publishing being accessible to anyone with a computer and access to online publishing tools (and the ability to use them).

The story manuscripts illustrated and published by African Storybook have been developed and written mostly in workshops with teachers, librarians and education students in Uganda, Kenya, South Africa, Lesotho, Ethiopia, Ghana, Nigeria and Rwanda. In other words, the majority of storybooks are authored by African educators who create the storybooks for their particular contexts of use. Contributors of stories are asked to write in their preferred language, and to submit two final texts – the story in an indigenous African language and another version usually in English (either the writer or someone else translates as necessary). The English storybooks are seen as the 'seed texts,' which can be accessed and translated or adapted by translators with proficiency in that language. This means that one illustrated storybook in one language can potentially be used by many different readers because it is possible to replace the written text on the digital pages and publish new translations and adaptations of any storybook. This can be achieved with the website publishing tools by any registered user.

The economy of scale in (re)publishing storybooks on the African Storybook website is enabled by the open license publishing model. All storybooks are

1 See www.africanstorybook.org. African Storybook is an initiative of Saide, https://www.saide.org.za.



A very tall man

published under a Creative Commons CC BY license, which means that anyone is 'free to download, copy translate or adapt this story and use the illustrations,' as long as they include the attribution on the back of the storybooks they produce. Thus, the core collection of approximately 400 original illustrated picture storybooks published by the African Storybook initiative is available to anyone to translate or adapt online or offline and then upload in any language that has a written form (and, ideally, that has a keyboard).

For example, a storybook written by Cornelius Wambi Gulere in Lusoga and English, 'Omusaadha Omuleeyi Einho' – 'A Very Tall Man,' has been translated into over 45 African languages, as well as into multiple non-African languages (via Global Storybooks). This storybook – and others with similar high numbers of translations and adaptions – is a good example of the affordances of open license digital publishing for multilingual cultural production.[2]

We are reminded here of another digital publishing project by *Jalada Africa*, an online journal out of Nairobi that published a short story originally written in an African language and subsequently translated into 30 other African languages. Titled 'Ituĩka Rĩa M r ngar : Kana Kĩrĩa Gĩt maga And Mathiĩ Mar ngiĩ,' and authored by Ng gĩ wa Thiong'o, the story was published in March 2016 in Gĩk y and translated into English as 'The Upright Revolution: Or why Humans Walk Upright.' According to M koma wa Ng gĩ, this is 'the most translated African language story' and the translation initiative is an important contribution to 'decolonization' (Mutsvairo and Ragnedda, 2019, p. 13-26).

The examples of 'internetting' of African literature, as well as of African Storybook and the *Jalada Africa*'s translation initiative illustrate some of the possibilities at the interface of digital media, literacy, literature, storytelling and African cultural production. They also underscore the complexity of theorising reading practices and creative expression in contexts where linguistic diversity and plurality are the norm, thereby inviting us to question what, in African contexts, constitutes the value of constructs such as 'literacy,' 'literature' and even 'language.' ■

A longer version of this article will appear in *African Philosophical and Literary Possibilities: Re-reading the Canon*. Ed. Aretha Phiri. Lanham, MD: Lexington Books.

2 For a link to 'Omusaadha Omuleeyi Einho' – 'A very Tall Man,' see www.africanstorybook.org/reader.php?id=918&d=0&a=1. Global Storybooks (https://globalstorybooks.net/) and Storyweaver (https://storyweaver.org.in) also offer open license storybooks in multiple languages

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WIKIPEDIA AND ARCHIVAL PROBLEMS:

A Derridean impression

"Do these new archival machines change anything?"

Jacques Derrida, *Archive Fever* (1996: 4)

By Dominic Pretorius

As much as *Archive Fever: A Freudian Impression* is Jacques Derrida's meditation on the notion of archives as it relates to Sigmund Freud, the person and the psychoanalytic tradition, many of his insights can be applied to theories of the archive in general. Moreover, he is particularly concerned with the meaning of archives at a moment of rapid technological development. Derrida (1996: 17) writes, "[At] an unprecedented rhythm, in quasi-instantaneous fashion, this instrumental possibility of production, of printing, of conservation, and of destruction of the archive must inevitably be accompanied by juridical and thus political transformations." These 'transformations', in 1996, were the hopes that as computers and the internet became more sophisticated and accessible, they would issue in a new era of knowledge production, storage, and reproduction, that is, a democratic archive. Derrida did not know, but may have vaguely sensed, that he was writing shortly before the advent of Wikipedia in 2001 which, as its cofounder Jimmy Wales says, "Imagine[d] a world in which every single person on the planet is given free access to the sum of all human knowledge" (cited in Gallert, Mushiba, and Winschiers-Theophilus, 2016: 1). Although Wikipedia has arguably seen success, it has also failed to transcend many of the constraints, relating to privilege and power, that Derrida expressed regarding the archive. In this article, I will apply Derridean impressions onto contemporary debates regarding Wikipedia's exclusion, through policy and practice, of various people, languages, and knowledge systems.

The word 'archive' stores its political function in its etymological roots. It means the place of the archons, the rulers in Ancient Athens who had the authority to make and represent the law. Derrida (1996: 4) writes, "There is no political power without control of the archive, if not of memory." In the contemporary moment, there is not a singular place where knowledge and power coalesce as simply as in Ancient Greece. There are, of course, many archives – parliaments where legislation is formulated, the various courts where justice is distributed, universities where knowledge hierarchies are established. However, these archival places share two features: firstly, they have material substrates, for example, infrastructure, documents, and capital; secondly, they have officials who are invested with exclusive power over them (Derrida, p. 2). Over time, nation states have seen a general shift from monarchies' absolute political power towards various forms of democracy with increased suffrage. Concomitantly, these archival places are expected to be increasingly accessible and transparent, and ultimately to be *by and for the people*, the founding ideal of democracy. Derrida (p. 4) writes, "Effective democratization can always be measured by this essential criterion: the participation in and the access to the archive, its constitution, and its interpretation."

It is within this political trajectory that the internet, in its infancy, was celebrated as the next step towards a democratic archive. In a utopic imaginary, Wikipedia would be the ultimate archive *by and for the people*: an easily, freely, and universally accessible repository of the vast and deep knowledge that has been accumulated throughout human history, where everyone could inscribe their own contribution in its ever-growing store. Notably, these technological possibilities were announcing themselves at the same time that post-colonial societies were committing themselves in new ways to the process of decolonisation. For example, *The Empire Writes Back*, a seminal account of post-colonial critiques of Western notions of language and literature, was published in 1989.[1] Those who had for so long been oppressed by, and excluded from, the centres of power and knowledge were finally able to respond to those ideological systems and to speak on their own terms. For Achal Prabhala, an activist who served on the advisory board of Wikimedia Foundation from 2006 to 2018, Wikipedia came at a time, with dropping telecom prices and cheap smart phones, when equality seemed to be near. Prabhala (2018) writes:

Let's face it: we will never catch up with the accumulated mass of formal knowledge produced

"Although Wikipedia has arguably seen success, it has also failed to transcend many of the constraints, relating to privilege and power, that Derrida expressed regarding the archive. In this article, I will apply Derridean impressions onto contemporary debates regarding Wikipedia's exclusion, through policy and practice, of various people, languages, and knowledge systems."

by Europe and the US. Not going to happen. But in the digital world? I did think it was the one place where we could have a kind of equality; new rules for a new world.

And yet, in reality, the internet and Wikipedia did not become the laudable knowledge commons that many prophesised. In fact, the internet very quickly became subject to the 'tragedy of the commons', a communal resource compromised by a few people acting in their own self-interest (Hardin, 1968: 1244). As the internet became increasingly commodified, a minefield full of click-bait and advertising, Wikipedia remained staunch in its belief that it would be an oasis for freedom. In 2005, cofounder Jimmy Wales assured the public, "We help the Internet not suck" (cited in Prabhala, 2018). But in a different sense, Wikipedia was under threat from a 'tragedy of the commons' in which its openness apparently allowed for people to exploit and abuse it. Many were sceptical about the reliability of its user-generated content. Malicious people could lead misinformation campaigns, thereby ruining the resource for everybody else. As Garrett Hardin (p. 1243) the economic theorist behind 'The Tragedy of the Commons' writes, "Freedom in a commons brings ruin to all." Many of us who attended school in the 21st century will remember a teacher forbidding the use of Wikipedia because it was not considered a reliable source. Consequently, there was increasing pressure for Wikipedia to assert more control over the production of its content. The issue caused major controversy when a hoax article was published on Wikipedia, accusing a prominent American journalist of being a suspect in the assassination of former US President John F. Kennedy (Wikipedia contributors, 2019, 'Wikipedia Seigenthaler biography incident'). The fallout from this article caused the site to apply, amongst other things, more stringent policies on referencing information and on who gets to publish and edit articles (Giles, 2013).

"In fact, 90% of all Wikipedia editors are male, which would not surprise Derrida (1996: 3), who noted that archiving has always been a patriarchal act. The site has been criticised for "reflecting a Western, male-dominated mindset similar to the perspective behind the encyclopaedias it has replaced".

The only apparent way to guard against the 'tragedy of the commons' was for the site to become more regulated even if that meant foregoing its founding democratic values. Hardin (1968: 1247) writes as a justification for this conservative turn - that is, the privatisation of the commons - "[i]njustice is preferable to total ruin." Consequently, Wikipedia became increasingly constrained by two related things, text-based sources and a relatively small community of volunteer editors who are predominantly white, educated men living in the Europe or North America (Giles, 2013). In fact, 90% of all Wikipedia editors are male, which would not surprise Derrida (1996: 3), who noted that archiving has always been a patriarchal act. The site has been criticised for "reflecting a Western, male-dominated mindset similar to the perspective behind the encyclopaedias it has replaced" (Cohen, 2011). It is necessary to pause here and reflect that these two things – citation and verification – represent the Derridean physical substrate and authority that determine political power. And so, as Derrida (p. 37) writes, "The question of the archive remains the same: What comes first? Even better: Who comes first? And second?"

It is easy to lose sight of the underpinnings of Wikipedia content, because it is on the internet, which is still a strange virtual world, and cannot be thought simply as a place in which an archive is stored and protected. But, remember, there are very real materials needed for Wikipedia to function: the servers, the physical and digital texts it requires for sources, the telecommunication infrastructure, the personal computers and phones, and the volunteer labourers, who need homes, spare time, money, and education. These factors all contribute to what Derrida (1996: 3) called the "privileged topology" of the archive which, although the internet may seem to exist everywhere and nowhere at once, has decidedly geographical implications. Firstly, the archive excludes information about places and people that are on its periphery, because of the conscious and unconscious biases of its keepers. According to Jim Giles (2013), quoting research done at the University of Oxford, "...many African nations have fewer articles than the fictional realm of Middle Earth. These regions... are 'virtual terra

incognita'." Secondly, the knowledge produced on those peripheries is considered suspect, even if it conforms to the text-based (that is, not oral) sources required by Wikipedia. Prabhala (2018) notes an example in which articles about Makmende, a Kenyan superhero character, were blocked from Wikipedia, despite their references to well-known Kenyan newspapers. The article on Makmende was only permitted to enter the archive when the subject received a mention in the *The New York Times*. Prabhala (2018) concludes with not a little exasperation, "...nothing really happens unless it happens in a journal published out of Cambridge or a newspaper in Manhattan. And Wikipedia is passionately committed to this warped, outmoded, colonial view of the world." Furthermore, Paul Gallert et al (2016: 2), who have promoted the integration of indigenous knowledges into Wikipedia, note that even the design of technology excludes certain groups of people because it replicates "cultural logics and literacies."

Derrida (1996: 40) explains that "there could be no archiving without... archontic principles of legitimization... without criteria of classification and hierarchization." Importantly, here, Derrida expresses the archive's two-pronged concern regarding knowledge, that is, what constitutes knowledge and, moreover, what knowledge is notable or a matter of consequence. Consequently, the many undocumented knowledges, many of which are archived in oral and embodied traditions, cannot enter Wikipedia, which remains humankind's most extensive archive. In *Archive Fever*, Derrida (p. 34) draws attention to the "archival problems" of, for example, oral traditions and transgenerational heritage, ways of knowing that cannot be reduced to scientific inscription. On the other hand, those in the so-called developing world lack access to text, whether it be in printed or electronic form. And even if the knowledge has found a place in text, one of Wikipedia's 1,300 administrators, a position earned through the self-affirming and myopic community of Wikipedians, has the power to delete any article *he* determines to be inconsequential or frivolous. There is the story of Anasuya Sengupta, an activist from Bangalore, who demonstrated this point at a 2010 conference for African Wikipedians. She wrote a Wikipedia article on Bisi Adeleye-Fayemi, a prominent

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women's rights activist in Nigeria, during the conference proceedings. Her entry was "marked for speedy deletion... [it was] judged to be trifling" (Chafkin and Kessenides, 2016). This editorial decision is telling when a meme regarding Chuck Norris has had its own Wikipedia page since 2006 (Giles, 2013).

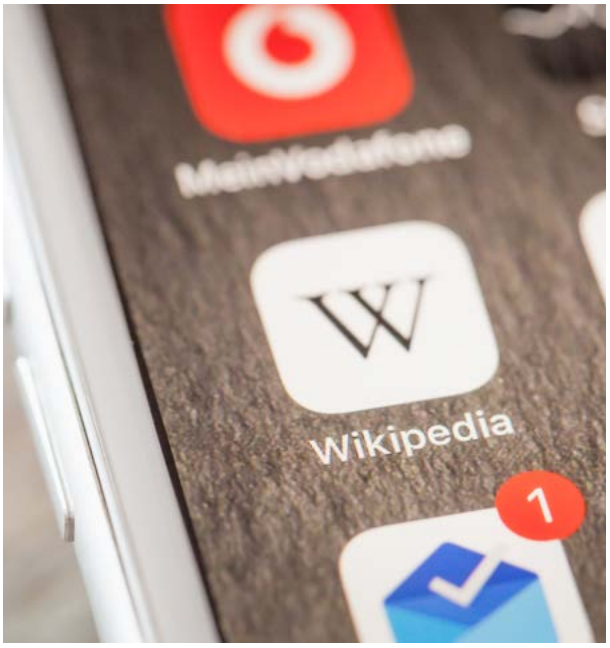
Wikipedia's archive, by limiting what constitutes valuable knowledge, in turn asserts what constitutes being human. The archive is stored in an 'ark', which we must think of in its two connotations: a chest and Noah's Ark. A chest is for files, but is also your body's chest, where your heart is, where your life and love are stored. In the story of Noah's Ark, after making a covenant with the lord, Noah constructs an archive of life on earth in case the world is wiped clean and human society must start again. Analogously, Wikipedia can be seen as the archive for everything 'we/they' know. And, contrary to common sense, the archive is not just about the past that it stores. Future writing is based on the repository of knowledge and also on its footnotes - that small archive at the bottom of each of these pages, those works that have become accepted in the archive, and thus the archive produces the future as much as it stores the past. As the story of Noah shows, the Ark is about reconstituting the future. It is based on a constant anxiety about the fragility of the present moving into the future, a future that will be defined by its archive and those who control it. Derrida (1996: 36) notes accordingly: "It is a question of the future, the question of the future itself." There may never be a biblical flood, but there is a constant dying, a piecemeal annihilation of human beings and their languages and culture. Or as Public Enemy would say: "Apocalypse bin in effect" (cited in Eshun, 2003: 299). We live at a moment of knowledge

death, as globalisation assimilates and obliterates certain people, languages and cultures, - all of which are carriers of knowledge, but knowledges that will transform or disappear in this process. It is the archived knowledge, stored in legible, exterior mediums, that will survive, thereby ensuring the survival of its officials', and their descendants', political power. Instead of producing an infinite and diverse store of knowledge, archives "aim to coordinate a single corpus, in a system or a synchrony in which all the elements articulate the unity of an ideal configuration" (Derrida, p. 3). And, for Wikipedia, that 'ideal configuration' is decidedly Western and male. With its proliferation becoming ubiquitous, it imposes a 'We' on an 'Other' in what Derrida (p. 42) calls "the violence of [a] *communal* dissymmetry." In this violent relation, the 'We' – the custodians of knowledge – becomes the overseers of the 'Other' who cannot resist becoming subservient to the dictates of the archive, because of the uneven power dynamics present in that address.

Wikipedia's concern as an archive with the future can also be read in terms of what Mark Fisher calls 'SF capital' – science fiction capital – which creates a "positive feedback between future-orientated media and capital" (Eshun, 2003: 290). Most simply, global capital flows towards the likes of Elon Musk and Mark Zuckerberg, and technologies like cryptocurrency, because they are believed to be producing the future. Similarly, Wikipedia can attract USD 104.5 million during the 2017/2018 financial year because it is believed to be the future's archive (Wikipedia contributors, 2019, 'Wikipedia: Fundraiser statistics'). The foundation's leverage is its promise to produce "reliable, neutral information" and to ensure "access to knowledge for everyone, everywhere" (Wikipedia contributors, 2018, '2016-2017 Fundraising report'). But, as I have argued, that funding is going towards producing a particular kind of knowledge for a particular kind of person, all of which will produce a particular kind of power structure in the future. Importantly, Kodwo Eshun, as an Afrofuturist, has theorised that black culture in Africa and its diaspora was denied a history during the colonial period in order to subjugate black people. Thereafter, Eshun argues that there is a risk that black intellectual culture is, and will be, overdetermined by its concern with revising that historical archive, thereby leaving the future open to colonisation by former colonial powers. Eshun (p. 288) writes, "the vigilance that is necessary to indict imperial modernity must be extended into the field of the future." Therefore it becomes of utmost importance that people work towards, and fight for, a future archive that is inherently democratic, because there is always the risk of history repeating itself.

> "This archive and the internet in general are, therefore, like many archives before it, a nexus point for acquiring significant political power in determining what constitutes valuable knowledge and, moreover, what constitutes being human."

To try to rectify the archive, activists like Prabhala have valiantly tried to change Wikipedia, its culture and its citizens. In 2010, Prabhala produced a film entitled *People are Knowledge*, which documented his attempt to integrate knowledge from rural communities in India and South Africa into Wikipedia (Prabhala, 2010). The documentary seeks to expose what Derrida (1996: 4) calls the "limits *declared* to be insurmountable" by the keepers of the archive. In Limpopo, a northern province of South Africa, he interviewed Sepedi people regarding Mokgope, a drink made from fermenting Marula fruit, and then facilitated the writing of a Sepedi-language Wikipedia article about it, while using the recorded audio files as the sources. Although the article is active, it remains untranslated by other Wikipedians because it is in a minor language and because of the audio references (Prabhala, 2018). This stands in contrast to an entry on a French drink called Pastis, which has been translated into 22 different languages. This is another example of how Wikipedia's archival limits restricts the spread of some knowledges compared to others. Although Prabhala had minor victories, ultimately, he quit trying to fundamentally change the structure and make-up of the site, because partially due to harassment from seasoned Wikipedians. Under perceived threat, they have become increasingly protective over their property. Prabhala (2018)



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concludes: "[Don't] be fooled: it's merely the old system of power, wrapped in a dazzling gauze of technological emancipation and repackaged with a benevolent liberal bow."

In summary, I have tried to show how Wikipedia, which for a time may have seemed to offer a significant opportunity to shift the power dynamics in the global production of knowledge, has fallen foul to the oft-hidden constraints of the archive. Reading Wikipedia seems a common, natural, and politically neutral research method. However, applying Derrida's insights onto contemporary debates regarding Wikipedia's policies and practices shows that, in fact, there are physical substrates and archons to this archive. This archive and the internet in general are, therefore, like many archives before it, a nexus point for acquiring significant political power in determining what constitutes valuable knowledge and, moreover, what constitutes being human. In the collective human body, the heart, in its archival chest, refuses to love large proportions of humankind, and this will inevitably have an impact on the future of this body, and how it constitutes and remembers itself. I think of Koleka Putuma's 'Storytelling[1]', the opening poem in *Collective Amnesia* (2017), a body of work that writes back to the archive of Western patriarchy, highlighting the voices that the archive keeps silencing. The poem's title sits at the top of the page, but the page remains blank, not empty but full of whiteness; the title is footnoted though, directing your eyes to the bottom of the page in order to read below the footnote separator line because that's where the power lies: "1) How my people remember. How my people archive. How we inherit the world" (Putuma, 2017: 11).

Finally, one might want to consider or support initiatives that promote internet accessibility and literacy, which may lead to a more democratic Wikipedia or an entirely different future archive. For example, the University of the Western Cape in South Africa has worked with residents in Mankosi, Eastern Cape, since 2012 to set up Zenzeleni (translated as 'Do it yourself'), the country's first cooperative-owned Internet Service Provider network (Tucker, 2017). This is a South African instantiation of a movement to close the internet connectivity gaps that exists globally, particularly on the African continent, through community networks that democratise the digital. ■

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1 *The Empire Writes Back* was first published by Routledge in London. It is, of course, ironic that the seminal work regarding the literary opposition to the empire was originally published by Western academics within the empire.

TECHNOLOGY AND THE LAW:

The problem with opaque AI

"I would rather discover one true cause than be the king of Persia"

– Democritus.

By Asher Austen Fainman

Opacity

The ability to uncover, evaluate and predict causality is fundamental in disciplines of inquiry, such as law. Effective adoption of Artificial Intelligence (AI) applications in domains in which legally significant consequences result will depend heavily on the user's ability to provide explanations and contest decisions. While doing so is needed to effectively meet the requirements of legal tests for causation and intent (which assess reasonable foreseeability and decision making) in order to establish legal liability, this is complicated by that fact that AI applications can be opaque in their decision-making processes.

This problem cannot simply be ignored, as an increasing number of AI applications can currently match or outperform (Stumpe and Peng, 2017) humans in a variety of tasks – both low-wage, low-skilled jobs and those that require higher levels of education (Muro et al, 2019). Jobs that typically involve some collection of rule-based routines and automatable tasks (Frontier Economics, 2018) are even more likely to become automated in the future. For instance, the performance of convolutional neural networks in detecting abnormalities in radiographs has led some, such as prominent AI researcher Geoffrey Hinton, to declare that medical schools "should stop training radiologists now" (Snow, 2018). Although this statement is likely somewhat hyperbolic (European Society of Radiology, 2018), the encroachment of AI in professional disciplines remains likely.

In the past, knowledge-based AI such as "expert systems" failed to gain substantial traction in professions due to their rigidity in decision-making (Yanase and Triantaphyllou, 2019). These applications often relied on hard-coded "static" rules for inferential reasoning and evaluation. For example, in computer chess games, machine learning (ML) algorithms could allow modern AI programs to be given rules to learn from so that it could find optimal patterns that could be generalised to play against real players (Goodfellow et al, 2016). Today, however, AI has been developed to the point that it might be trained on something more complex, such as historical stock market price data (Flach, 2012).

For this article, I will be principally discussing AI applications that use algorithms from the subfield of ML in some configuration. In supervised learning, a "training" dataset of images created by experts is processed by ML algorithms, and the model that is created can then be tested to see if it is generalisable (Flach, 2012) and thus used on live data (Burrell, 2016). However, the issue is that, in such processes, opacity can develop in different ways and to different degrees, with some ML approaches such as Bayesian networks and decision tree learning having greater transparency than deep neural networks1 and support vector machines (SVM).2 In this article, opaque AI (OAI) refers to applications that exhibit any degree of opacity.

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Interpretability

Some legal scholars (Selbst and Powles, 2017) have pointed to a "right to explanation" in the General Data Protection Regulation (GDPR) as a principle safeguard to protect rights in automated decision-making. However, the right to explanation is not currently legally binding (Wachter et al, 2017). The safeguards that do exist may together constitute a non-binding right that could apply in certain, very limited, circumstances (Bensoussan, 2017), where a decision that was fully automated had legally significant effects (Edwards and Veale, 2017). However, where it does apply, this right only seems to extend to an explanation of the general system as it functioned before the decision was

1 In deep neural networks, multiple layered networks of interconnected neurons (nodes) alongside a backpropagation algorithm progressively find relational connections between data points. These layers learn 'patterns of patterns' (Schmidhauber, 2014) from each other hierarchically, learning to model a complex function. No single neuron encodes for one part of the decision-making process; instead, many layers converge on a decision. Thus, the network learns from experience in a process akin to intuition, so it cannot be reduced to a set of instructions (Goodfellow, 2016). The large number (sometimes hundreds of thousands) of interconnected neurons performing individually simple computations can together produce sophisticated outcomes through what is known as "connectionism".

2 SVMs find geometric patterns between variables. The SVM will find an optimal solution by maximising the margin (distance) between each category that is classified and a dividing line. This line (in a two-dimensional example) is generally the most generalisable and predictive. With three variables, the dividing line becomes a plane, and with more variables, the human mind cannot visualise the line because it cannot process high dimensionality. This is especially true with non-linear (curved) divisions (Flach, 2012). Therefore, with large numbers, it becomes impossible to visualise how the model distinguishes between variables, which results in opacity (Deng and Yu, 2013).

made, rather than an explanation of the localised internal logic, or even a loose ranking of variables of an individual decision after that decision (Wachter et al, 2018).

The benefit that can accrue from explaining the internal logic of OAI has thus led to the emergence of subfield explainable AI (XAI). Interpretability methods have been created that attempt to approximate algorithms to determine how a model came to a specific output.3 There are problems regarding generalisability, however, as most interpretability methods are designed on an ad hoc basis for detecting embedded bias or debugging a specific algorithm in a domain by an expert (Guidotti, 2018). Furthermore, researchers typically delineate their own definitions of what constitutes an explanation (Guidotti, 2018), and there are no standardised criteria for evaluating these explanations (Lipton, 2017).

There is also often some trade-off between interpretability (describing the system's internal logic using understandable and meaningful language) and completeness (describing the system's operation accurately to allow its behaviour to be fully anticipated) (Gilpin, 2019). There are various methods that exist, located somewhere between these two poles. These models are local – a simplified model approximating a decision about a few data points in an individual instance – or global – a proximate model for all possible data points (Mittelstadt et al, 2018). However, these methods are problematic.4

Moreover, it is precisely their complexity and dimensionality that make OIA so accurate – and which interpretability methods assume away. When explanations do not reflect these complex interrelationships, small input changes to the model have wide effects on the explanation output. For instance, in deep learning, "each input… [is] represented by many features" and each feature in combination represents "many possible inputs" creating a "distributed representation" structure (Goodfellow, 2016: 16). This diffusion across the network means no single node encodes for a specific part of the output; input features may be represented by interconnected layers or clusters. Information is "encoded in the strength of multiple connections" rather than at "specific locations, as in a conventional database" (Castelvecchi, 2016: 4), making it difficult to identify the contribution of a specific input feature to an output. Instead, the importance of a feature depends on the existence, absence or relative influence of other features. The precise combination of all of these interconnected features and their relative weights in concert produce a particular output in a particular instance.

Adding to these complex interrelationships is the manipulation of dimensionality, such as through the "kernel trick" in SVMs, which improves performance but also means that the relationship between a feature and a dimension is not simply one-to-one (Burrell, 2016), making it very difficult to establish direct relationships between inputs and outputs. Other drawbacks also prevent interpretability methods from meeting the standards required for legal tests. Firstly, because of the iterative nature of OAI, it is difficult to reproduce results in research from a particular instance. There are not standardised best practices (source control) for recording changes, and changes to GPU drivers and updates to frameworks that models depend on all vastly effect accuracy. Moreover, their respective frameworks need to balance between numeric determinism and performance, which can vary outputs when reproduced. Furthermore, the expansion or changes to the dataset the model learns from, whether continuously or in periodic update stages, will affect the model's predictions, meaning it is not static. As such, we would need a snapshot of the "whole system" (Warden, 2018) to accurately reproduce the exact state of the

3 It is important to note, however, that this attempt to towards transparency is constrained by the desire not to allow manipulation of the decision-making process, violation of other's rights to privacy or the disclosure of proprietary information (Ananny and Crawford, 2016).

4 An example of a method that trades off completeness for interpretability is saliency mapping. However, saliency maps ignore non-salient background features, which are unstable aspects of an image, in favour of more stable salient aspects of the given input. Often these background "artefacts" will not be uniformly relevant across inputs, but the salient aspects are. These artefacts are thus not captured in an explanation, even though they contribute to individual output decisions (Alvarez-Melis, 2018).
Another popular method is LIME (Ribeiro et al, 2016), a linear proxy model that develops a local linear model as a simplified proxy for a local decision. These models assume linearity across the model, to approximate local, non-linear behaviour in the original model. Often, however, this does not scale to accurately reflect the non-linearity at a global level of the model (Hulstaert, 2018). Others have shown that in LIME (and other proxy models), the perturbations with little to no effect on the global model's predictions can have outsized effects on local explanations (Alvarez-Melis, 2018).
A third method is counterfactual models, which were specifically designed to exceed the GDPR requirements. These models aim to show how input changes may impact the decision outcome (Wachter, 2018). This approach has been adopted by Google as a tool in their TensorFlow ML framework (Wexler, 2018). However, counterfactual approaches assume that "variables are independent of one another" (Wachter 2018: 860). By ignoring interdependencies, the method sometimes relies on artefacts generated by a classifier rather than a labelled "ground truth" data point, creating explanations that do not reflect actual features. Also, counterfactuals neglect non-linearity and unstable aspects (Laugel et al, 2019).
All three of these methods thus lack explanatory robustness, which is indicative of a wider problem where methods frequently rank the relative importance of features with wide variability, even in simple scenarios (Lakkaraju et al, 2017).

model for a given instance, which would require immense storage and management. Even Article 5(e) of GDPR requires keeping data that has been processed for "no longer than is necessary for the purposes". As such, such, storing such "snapshots" is not standard practice for many applications, and often individual input data about a particular decision will be deleted to optimise data storage and protect privacy rights (Doshi-Velez et al, 2018).

In sum, owing to the assumptions these methods make and their lack of robustness, at best they provide a general overview of the factors considered in a decision and at worst they provide unreliable and misleading reassurance about the internal logic of an OAI.

Intent

Humans are also black boxes to some extent. We cannot always predict others' decisions, or their reasoning. Currently, intent and causation tests scrutinise decision-making and attempt to externally validate claims through fact-finding. For instance, cross-examination or following documentation trails may help to proximate reasonable foreseeability, causal relations and expectations, or to infer what someone likely knew. In contrast, OAI does not provide qualitative causal explanations for the purposes of external validation. Interpretability methods thus often would not satisfy the burden of proof required by these tests. Moreover, OAI application do not possess intent in any meaningful sense. Their developers or users do. With non-OAI, we might scrutinise design to approximate intent – for instance, a program designed to break into another system was likely intended for the "purpose of" (Copyright and Related Rights Regulations, 2003) unlawful conduct. With OAI, we can discern an overarching goal or "objective function"; however, OAI makes decisions within these parameters in ways developers may not understand or be able to reasonably foresee. Without hard-coded instructions to infer intent, these tests may not be satisfiable.

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For example, an OAI may be designed to develop a profitable trading strategy. It would be given historical and real-time stock price data for a range of securities and access to business newsfeeds and a twitter account (Azar, 2016). After validation and then live testing, the OAI would begin consistently profiting. The OAI would rapidly place and withdraw orders, and occasionally re-tweet news articles before and after trades. The developers would not be able discern a clear strategy from its behaviour, only that it remained profitable. If, however, the OAI takes a short position on a security it often trades and profit, some investors may then bring a lawsuit alleging market manipulation through "phantom orders" and making misleading statements (re-tweets) before placing orders.

The developers might defend that access to the twitter account was given but not designed to retweet information or place phantom orders; they had no intent to manipulate prices and were surprised by the OAI's actions. The developers could demonstrate that they only provided the lawful objective of profit maximisation (Bathaee, 2018) – the OAI independently developed a strategy involving a prohibited practice. Indeed, the OAI may only be able to interpret market impact, not inaccurate information, and so may re-tweet a misleading article with this effect. Because intent is usually required for fraud, it cannot in this case be proven. Interpretability methods might determine the importance OAI placed on these misleading tweets but would not be able to uncover the overall strategy, nor the impact of a single tweet on the decision.

Intent tests also examine the basis for conduct. Without knowing the OAI's strategy, we cannot determine if it was engaging in illegal "spoofing" (rapidly placing then withdrawing trades, causing the desired movement) – we could also assume that it may have found in past data that placing/withdrawing bets was correlated with price rises. Whilst the developers could have prevented this conduct, failing to do so could be negligence, not a design decision, therefore falling short of criminal causes of action. Currently, it is extremely difficult

to prove intent in algorithmic trading. United States v Corsica was the first prosecutions for spoofing using High-Speed Trading (HFT) systems. HFT systems exploit market inefficiencies, trading them away before others can, using algorithms faster than humans. Proving manipulation here relied on conduct being wilful (Bathaee, 2018). The developers foresaw the effects of the system on the market, and as such were likely to have designed the system for an unlawful purpose (Yadav, 2016). The proof of wrongful intent in this case relied on the developer's testimony regarding the unlawful purpose for which he was instructed to design the system. Intent tests use this burden to prevent legitimate transactions resulting in liability, but this can also insulate defendants who can point to program unpredictability due to speed or opacity to defend that there was no criminal intended consequence. OAI compounds this problem because there may be no explicit instructions for spoofing or an illegal strategy – the OAI might have intuitively do so.

In other cases, intent serves to limit the scope of possible claims. For instance, a judge could use an OAI, which is given access to data about past sentencing, types of crime committed and personal attributes of the previous defendant, to output a sentence reflective of the likelihood of recidivism. A Wisconsin supreme court ruled a program that used actuarial data to predict recidivism did not violate due process rights (State v Loomis, 2016), suggesting that a warning to judges about methodological dangers was a sufficient safeguard against discrimination. However, of course, this does not inform the judge about how much to discount the assessment (Ibid). Furthermore, if the sentencing training data contained latent bias against a particular group, the OAI may, unbeknownst to its developers or users, propagate discriminatory decisions. For instance, even unprotected features such as postal code may correlate significantly with race and may in some circumstances be outcome-determinative in the OAI's decision. Indeed, some studies have demonstrated that several unprotected factors can act as proxies for protected characteristics in existing COMPAS recidivism prediction systems used in the US (Angwin, 2016). Opacity may exacerbate this effect.

To contest judicial decisions, individuals would have to appeal the decision itself (Equality and Human Rights Commission, 2015), requiring a demonstration that the judge took an irrelevant factor (such as race) – or relied on an OAI that did – into account during sentencing. Even if interpretability methods could show that postal code ranked highly, this could be seen as indicative of economic inequality rather than discriminatory intent. Furthermore, merely pointing to the OAI's history of sentencing would not be sufficient: because the OAI may reason in a non-linear way, a parameter that is highly weighted for one individual may not be for another with a different combination of characteristics. The burden of proof can be reversed once a prima facie case for indirect discrimination is established (Equality Act, 2010), requiring decision-makers to prove the practice's legitimacy. However, without knowledge of the internal logic of that particular output, arguing for overall accuracy may sometimes be sufficient (Grimmelmann and Westreich, 2017). Indeed, there is only minimal case law suggesting that the inability to disclose the underlying factors are necessarily construed against decision-makers (Meister v Speech Design, 2012).

“These sorts of intent tests serve to limit arbitrary appeal cases but, where the internal logic of an OAI is inscrutable, it may be impossible to prove discriminatory intent, shielding users of OAI and leading to fewer appeals and making it less likely for an expert to uncover bias.”

These sorts of intent tests serve to limit arbitrary appeal cases but, where the internal logic of an OAI is inscrutable, it may be impossible to prove discriminatory intent, shielding users of OAI and leading to fewer appeals and making it less likely for an expert to uncover bias. Because developers cannot reliably foresee outcomes of OAIs to achieve decisions and we cannot deduce intent from explanations, OAI can create both ex-ante and ex-post barriers to proving that an illegal outcome was intended.

Causation

Causation tests balance the scope of causes of action with the administrative burden of

enforcement. These tests seek to ensure harm was indeed caused by another's actions. Tests for reasonable foreseeability can thus help identify the form of liability through examining whether outcomes were foreseeable consequences for a reasonable person, with higher burdens for professionals. Reliance tests require the injured to prove they relied on another's unlawful conduct, manifesting as misrepresentation, for example, causing them harm (Robinson, 2010).

Causation is often highly dependent on context. In medicine, for instance, an analysis (Caruana et al, 2015) of an ML research project sought to predict the likelihood of death from pneumonia and thus to establish a system for admitting high-risk patients whilst treating low-risk patients as outpatients. In one of the datasets, the model found the counterintuitive rule that individuals with a history of asthma were at lower risk than the general population of developing pneumonia. The dataset reflected the fact that patients with asthma, presenting with pneumonia to hospital, were usually admitted to the ICU and this intensive treatment lowered their risk of dying compared to the general public. Because their prognosis improved so much, models trained on the data found the rule that asthma lowers risk, when in fact the opposite is true (providing they are not hospitalised). As such, the models incorrectly classified these patients in the validation data set. Both a neural network and a rule-based logistic regression approach were used and came to the same conclusion. Importantly, the researchers favoured the logistic regression approach, despite it having lower accuracy, because it was transparent and so they were able to identify the problematic rule and adjust individual weights to correct for it (which, as described in section 3, cannot be done with OAI) (Burrell, 2016).

Indeed, the risk of using OIA are apparent. For instance, an OAI model may be applied for the same purpose but with live data input to predict both risk and appropriate treatment. If incorrect information was entered, which could be a predictor for a serious complication for pneumonia, was reported in a patient's medical record fed to the OAI, the system would incorrectly identify them as requiring immediate and specialist treatment. Eventually, the mistake would be identified by medical staff but only after further testing or treatment, incurring considerable expenses to the hospital.

The opposite may also occur, resulting in accusations of negligence. An evidentiary burden then exists to prove the model relied on this particular input, such that, without the reliance on OAI, they would have "acted differently" (Customs & Excise Commissioners v Barclays Bank, 2006). This may be an impossible burden. Unlike with a transparent logistic regression model, an expert cannot simply adjust the weight of the feature in question to establish that, ceteris paribus, the same outcome would occur or not. One might contend that, because the input was given to the model, this is evidence of at least some reliance. However, this fact does not demonstrate that the information was weighted by the model, in that particular decision, to be outcome-determinative. Indeed, even if we could obtain a snapshot of the model as it existed at the time, interpretability methods would provide loose rankings of importance, but the outcome depended on the confluence of them all in that particular instance (Goodfellow, 2016), making it difficult to establish reliance.

The outcomes OAI arrive at may not be reasonably foreseeable in individual instances because they also may uncover latent patterns correlating with counter-intuitive recommendations, thus presenting difficulties in establishing causation when relied upon by doctors. In a 2018 study (Peng et al, 2018), researchers used convolutional neural networks trained on retinal fundus images to accurately predict sex, with an impressive AUC of 0.97 (alongside age, blood pressure, smoking status, and major cardiac events), on an independent validation dataset. Whilst admittedly there are better ways to determine sex, this illustrates an important point. ML has been widely used in classification tasks before; however, these generally involved "feature engineering", or the

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computation of explicit features that experts have specified. However, the model used in the 2018 study could "learn the appropriate predictive features based on examples rather than requiring features to be hand-engineered" (Peng et al, 2018). This allowed the OAI to find latent predictive features that the ophthalmologists were not aware existed. The researchers used saliency maps of anatomical regions important to the model in predicting gender. Ophthalmologists reviewed these maps, categorising the highlighted sections. They noted these sometimes focused on vessels and optic disks, but also "non-specific features" in 50% of the sample, but no discernible pattern or mechanism could be identified (Ruyu Qi, 2018). This finding is significant because, in some instances, specialists can infer causal relationships from existing medical knowledge about, for instance, predictors for cardiac events.

Similar associations could also develop in live clinical data with an OAI, with further risks. For instance, using the example of an application predicting pneumonia survival rates, the model could uncover a counterintuitive indication, highly correlating some set of patient characteristics with a treatment considered last resort, because it is generally considered unnecessarily high-risk at an early stage of disease progression. Nevertheless, the OAI could recommend the treatment. A doctor could then decide against intervening and the patient improves anyway. This process would repeat until, eventually, one patient is harmed from unusual complications, which then could result in an action alleging that the doctor's decision not to follows to application's recommendation was negligent.

In cases of medical negligence, individuals must usually establish a duty of care, a breach, and a causal link to the harm (Laurie et al, 2016). The "Bolam test" is often used, which states that the "standard of care" is that of the "ordinary skilled doctor". Where multiple options exist, a doctor does not act negligently if the intervention accords with a practice accepted as proper by a responsible body of medical specialists in that field (Bolam Hospital Management Committee v Friern, 1957). The common law also provides more flexibility for innovation, allowing reasonable risk-taking, providing a practice is endorsed by at least one sub-specialty of a responsible medical body (De Freitas v O-Brien and Connolly, 1997) and is not considered unreasonable under the circumstances (Bolitho v City and Hackney Health Authority, 1998). This provides an allowance for innovative techniques but is limited by the particular circumstances (Cooper v Royal United Hospital Bath NHS Trust, 2004). The standard of care develops dynamically through common practice, professional guidelines, legislation, and case law.

However, because the standard of care for OAI is effectively non-existent, the transition period to wider adoption presents uncertainty. Non-OAI decision aides in medicine are generally considered to "augment the physician's existing knowledge by providing further information" (Miller and Miller, 2007: 433). As such, the software is seen only to provide clinical information, while the treatment decision is always made independently by the doctor. However, with OAI, because neither the doctor nor the developer knows the exact process underlying the recommendations made, the doctor cannot verify the recommendation against their body of expertise (Price, 2017); they can only accept or reject the recommendation. As such, if an OAI that has been appropriately approved (Schonberger, 2019) recommends changing the dosage of a drug, in contrast to medical knowledge, and the doctor proceeds, the problem is how this approach might be clinically validated, particularly when specialists cannot identify a causal mechanism of this decision through interpretability methods. Where an OAI application's status regarding the standard of care is unclear, the same decisions are equally risky and may be left for a court to decide whether harm eventuates (Cooper v Royal United Hospital Bath NHS Trust, 2004).

To mitigate risk, some have suggested that doctors may have to validate OAI and its recommendations based on their relative risk, looking at analytical validity, clinical validity and clinical utility (Price, 2018) of the OAI. Price suggests that validation could be conducted through clinical trial models, where algorithmic support might be randomised through computational validation involving procedural safeguards for data quality or tracking outcomes in clinical settings to retrospectively confirm algorithm quality and thus both validate and enable updates (Price, 2017). However, the effectiveness of these approaches

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may still depend on a static OAI model, which is not updating dynamically based on patient data and still presents a difficult risk calculus for doctors on an individual basis. The exact parameters for balancing intervention risk or evidence in the recommendation are still unclear (Ibid) but likely will be, again, highly domain-specific.

When a developer or user of the OAI cannot predict the extent or nature of the decisions in a particular instance and cannot probe the OAI after the output to determine if its recommendation was based on unorthodox but sound medical reasoning or an error, the scope of liability does not seem reflective of the precautionary risk calculus of the reasonable person, making the test arbitrary. Causation tests are equally unequipped to recognise the difficulty in establishing unavoidable harm, where a recommendation falls outside established medical knowledge and cannot be scrutinised by doctors, who must decide whether to intervene.

This issue is further complicated because, in an increasingly wide variety of prediction and classification tasks, OAI have lower error rates than specialists, sometimes substantially (Topol, 2019). One may thus suggest we should always favour OAI in such cases because, on aggregate – and in the long run – they produce better outcomes. However, this argument misses a great deal of nuance. In a pragmatic sense, a doctor may subjectively evaluate the size of the deviation between outcome and expectation to assess the likelihood of errors. However, doctors often underestimate the likelihood of false positives (Gigerenzer et al, 2007). This problem may be addressed by using a confidence score alongside a decision. Similarly, doctors may request retaking the decision to reduce the likelihood of false positives/negatives. However, because the model dynamically adjusts, there may be a different outcome – which is not necessarily false – between decisions if periodic “batched” updates or continuous learning is used. Furthermore, there may often be multiple valid outcomes if different treatment options exist, which may complicate the foreseeability of errors. Relatedly, when creating “ground truth” data to train models on, researchers often find significant subjective variance amongst practitioners, for instance when using diagnostic grading scales for disease progression (Krause et al, 2018). Further exacerbating this problem are adversarial examples, where ambiguity in an image, for instance, may lead to an incorrect classification by both a model and humans (Wexler, 2017).5

To address this issue, researchers may have specialists deliberate over ambiguous outliers and aggregate decisions to ensure that the benchmark for testing is the best approximation of medical knowledge (Krause et al, 2018). Many technical issues may arise in training, but these are resolved insofar as the model will only be used if it performs with the same or lower error rate than humans. However, when applied to live data, issues with “overfitting” the model so that it does not generalise effectively may emerge. For instance, as in the example of judicial sentencing above, there is a possibility of algorithmic discrimination.

If the underlying datasets contain biases against minorities or other groups, algorithms will often reproduce these in their outputs (Romei and Ruggieri, 2014). There are many techniques to address this to improve fairness, but more subtle encodings may be hard to remove without impacting accuracy. There is naturally (in the west) proportionally less training data about minorities (Hardt, 2014), and this sample size disparity will often increase error rates for those groups (Zou and Schiebinger, 2018), especially when data sources do not reflect true epidemiology (Neighbors, 1989) or where broader socio-economic factors may exclude minorities from health services and clinical studies (Schonberger, 2019). However, an influential study argued that “relevant attributes”, such as

5 Adversarial networks can be used to make models more robust against outliers, but they can also be used to deliberately disrupt the functionality of OAI models. Inputs can be designed to induce mistakes in other networks through imperceptible changes to images, causing misclassification. These attacks can be conducted with or without access to the policy network of the OAI (Goodfellow, 2017). Researchers have suggested embedded applications in medicine may hold technical vulnerabilities making them susceptible, especially when there are broader economic incentives for attacks in the healthcare system (Finlayson et al, 2017). For cases where system security is compromised, established case law exists (Kingston, 2018) for establishing liability in non-OAI software, but this is not the case in OAI software.

targeting individuals susceptible to addiction, are meaningfully shaped by "sensitive attributes", such as growing up in a poorer neighbourhood, correlated with a particular ethnicity (Barocas and Selbst, 2016). Therefore, removing correlations of sensitive attributes, or proxies, significantly impacts accuracy (Calder and Verwer, 2010), ultimately harming identification and treatment of those at higher risk. As such, some trade-off between fairness and utility may be unavoidable. Nevertheless, if the error rates can be shown to be disproportionately distributed (Homer v Chief Constable of West Yorkshire Police, 2010), this

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may still present litigation risks through indirect discrimination or data protection legislation (Art. 9 and 22(4) GDPR), where special protections when processing sensitive data is required. Although this may improve with the digitisation of underrepresented group's medical records, these uncertainties may impede developers. Moreover, whilst algorithmic discrimination can reinforce discrimination, insofar as OAI is reflecting existing discrimination in the data, developers may be uniquely placed to detect this on aggregate if not individually (Savulescu and Maslen, 2015) and subsequently correct for this through automated decision-making.

Regulations

The problems arising from OAI may well resolve themselves if interpretability methods reach a level of detail to satisfy legal requirements in all contexts. Indeed, approaches in reinforcement learning and models involving causal "do-calculus" yield promising results (Lavin, 2019). However, they also rely on sometimes substantial assumptions about causal relationships. Moving away from this associational, a-theoretical and opaque model of decision-making is central to the debate about the theoretical basis of AI and there may be inherent limitations to the ability of many current approaches (Pearl, 2018) to produce "explainability". Creating such models without reducing accuracy seems a significant hurdle, and in the meanwhile, it may be that the fractious domain-specific landscape of interpretability methods may continue, and we must concede Box's aphorism that "All models are wrong but some are useful".

Regulatory approaches have been equally problematic (Guihot, 2017). It may be appropriate to hold AI to the same standards as humans in some circumstances, focusing on the kind of explanations required by the law in individual contexts (Doshi-Velez et al, 2017) and weighting the need for clarity against the relative domain risks whilst refining interpretability methods (Reed, 2018). Some have suggested using standards-based regulation to mitigate risks arising from opacity and have argued that algorithms should be held to even higher standards than humans, where explainability is also required (Tutt, 2017). The European Commission (EC) has also been evaluating the product liability framework to deal with AI concerns around their self-learning

capabilities in particular (European Commission, 2018), while the House of Lords has concluded that it is simply not acceptable to deploy any AI that has a substantial impact unless it can provide a "full and satisfactory explanation" (House of Lords, 2018).

Attempts have been made in this regard, but they remain incomplete. For instance, the EC expert group on AI (European Commission, 2018) has broadly addressed the need for interpretability mechanisms for explanations and to detect bias but does not provide a substantive regulatory framework. The FDA seems to have the most comprehensive regulatory framework for its approval of a few dozen AI applications in medicine. It provides standards-based regulation for pre-market and post-market approval and review, such as protocols for handling algorithmic changes by developers that may change the output and requiring clear expectations of how the model might change over time (FDA, 2018). However, it does not provide any requirements for transparency in particular decisions or provide an explicit framework for the degree of autonomy or oversight in decision making.

Ostensibly it may seem appropriate to favour standards-based regulation, similar to schemes in finance that are intended to provide transparency through disclosure and strict registration requirements (Manne, 2007). However, it is not clear that, as black box AI becomes more complex with the increasing availability of quality data, it would necessarily become more auditable – indeed, increasing complexity may result in the opposite. As such, placing minimum transparency standards may restrict any market entrants or require design trade-offs, where developers are forced to use a shallower architecture with reduced performance. Equally, a complex regulatory standards system may impose great costs for market entrants with regard to meeting compliance requirements, thus further increasing the monopolisation of AI (Coates, 2015). Standards-based regulations that set impossible thresholds for explainability is counterproductive and stifles innovation.

Strict liability regimes are another favoured approach with, for instance, the European Parliament debating the possibility of a "Turing registry", where AI application providers conduct "risk pooling" from which to pay out damages

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under a strict liability scheme (European Parliament, 2017). Others have proposed doctrines such as res ipsa loquitur – or "facts speak for themselves" – where negligence is inferred against the defendant who must then rebut the prima facie case against them (Cassidy v Ministry of Health, 1957). This approach is generally applied where complicated machinery is involved of which the claimant has little knowledge and an explanation is not given by the defendant (Laurie et al, 2016). However, courts have been reluctant to apply the doctrine because it is very difficult to establish that a failure to prevent damage was caused by a negligent or non-negligent act (Ratcliffe v Plymouth & Torbay Health Authority, 1998). The Automated and Electric Vehicles Act 2018 imposes a strict liability regime for accidents involving autonomous vehicles, allowing injured parties to bring claims against insurers and, whilst acknowledging in Section 3(2) the possibility of contributory negligence, it circumvents decision-making and oversight questions. Relatedly, often the no-fault strict liability for products – in, for instance, the Consumer Protection Act 1987 and similar international legislation (Wagner, 2018) – may be used for claims. Here, a "defect" in a "product" would deviate from a standard of safety an individual is entitled to expect. However, this may only include embedded software (Schonberger, 2019) and the question of what a defect precisely entails concerning OAI remains to be determined.

Often predictive programming necessarily involves some degree of unpredictable error (Yadav, 2017) and as such may lead to widespread breaches when regulating algorithms. OAI exacerbates this characteristic. Strict liability is only useful when developers can predict harmful effects for which they might be liable and adjust for them and obtain sufficient insurance. They also do not have the same level of control as a product designer about

> “In essence, the broader problem is that duties of care, intent and causation tests are based on our understanding of human decision-making and ability to verify human behaviour. This evidentiary calculus breaks down when we are presented with a decision-maker that reasons in a fundamentally different way to both humans and hard-coded “static” programs.”

known defects. The unpredictability of high-cost liability stemming from this scheme would create significant barriers to entry and stifle innovation (Schwartz, 1992), thus this approach should be reserved for the most inherently dangerous applications, if any. Yet this regulatory scheme relies on aggregate performance, as regulators assume that, if developers can predict the error rate of the model on aggregate, they can infer from this how the model will act in an individual instance. This is misguided. Indeed, during an FTC hearing, the CEO of the first approved OAI for autonomous retinal scanning, when asked how they defined an accurate or transparent result, stated “Simply correlating AI output to current standard of care output does not take into account the underlying reasoning and therefore risks” (FTC, 2018). The law does not exclusively examine a doctor’s track record to determine potential negligence in an individual case; it examines the reasonableness of the specific decision in question.

The issue with blanket regulatory approaches is that they do not acknowledge the variance of interpretability methods, nor do they account for the degree of supervision and transparency that seem central in balancing domain-specific risks. It seems reasonable to ensure OAI is not applied in areas where there is an excessive risk; however, it may also be undesirable to limit OAI to areas we already understand well. When an OAI is supervised but has some opacity, an assessment may focus on whether the user or creator was justified in how they used it, coupled with any relevant insight into the OAI itself. This approach might rely on the harm being a foreseeable consequence of deployment rather than action. A regulatory taxonomy of OAI applications may be required, which, based on expert insight in a particular domain, acknowledges the level of risk stemming from the consequences of decisions, the degree of interpretability possible with current methods and the amount of oversight (Price, 2017) required depending on the foreseeability of error.

There are several difficult balances to properly align incentives here. Providing too much information about internal logic may expose proprietary content, while oversight without clear boundaries may lead to frivolous litigation, and too little of both may disenfranchise individuals. Indeed, the lack of direct supervision and independence of workers resulting from previous industrial revolutions brought difficulties for agency law, which led to an expansion of its use (Carlson, 2001). A similar expansion to encompass OAI may be useful here, specifically the principal-supervision rule for less dangerous scenarios and vicarious liability for more dangerous scenarios (Bathaee, 2018).

In essence, the broader problem is that duties of care, intent and causation tests are based on our understanding of human decision-making and ability to verify human behaviour. This evidentiary calculus breaks down when we are presented with a decision-maker that reasons in a fundamentally different way to both humans and hard-coded “static” programs. Therefore, a re-evaluation of these doctrines seems necessary to account for the degree of interpretability, domain-specific risks and the level of oversight. ■

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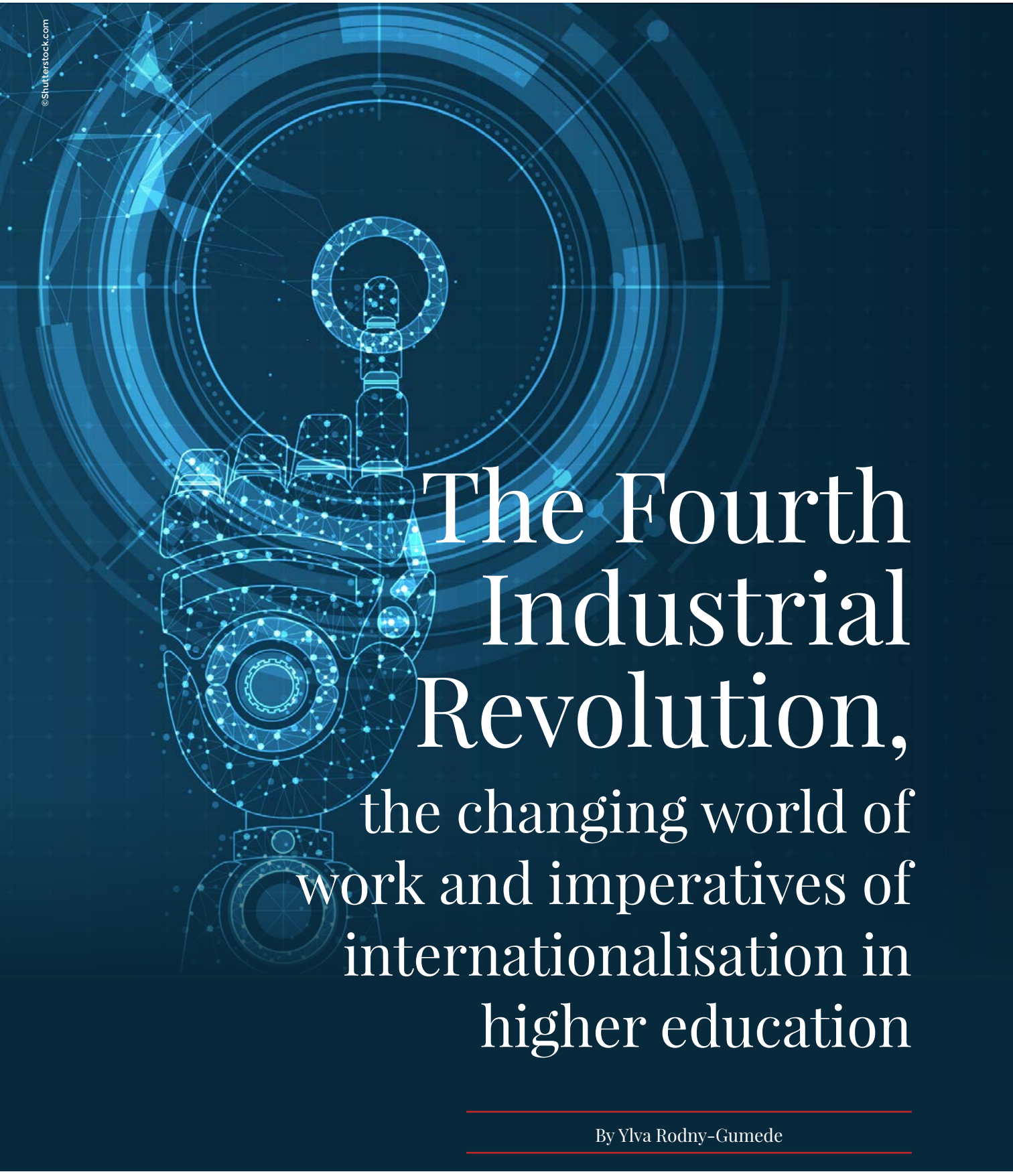

The Fourth Industrial Revolution,

the changing world of work and imperatives of internationalisation in higher education

By Ylva Rodny-Gumede

We are seeing major disruptions to higher education, and the education system as a whole, not only at home but globally. One of the major contributors to such disruptions is the paradigmatic shift brought about by the Fourth Industrial Revolution (4IR), with massive implications for the world of work, and by extension in higher education through the learner of the future. On an overall level and aligned to paradigmatic shifts established through the third industrial revolution (or the digital revolution as it has become known) is the shift away from an economy premised on labour and resource intensive industries towards a knowledge based economy. The skill sets and capabilities needed have shifted from being role or industry specific to transferable skills and capabilities centred on the four C's: critical thinking, collaboration, communication and creativity (Harari, 2018). These can be further broken down so as to encapsulate a range of capabilities such as problem solving skills, financial literacy, digital literacy, teamwork, marketing and presentation skills, and a range of other skills and capabilities that all talk to the importance of adaptability.

If we look at the South African economy, it has been premised on a very different labour market. This is not only reflected in low-skilled sectors of the job market, but due to the history and politics of isolation and exclusion in South Africa, diversity, flexibility and creativity in the job market, workforce, business or education has not been a feature of economic or societal organisation. More flexible research and development based economies have a huge advantage and so often their education systems are already attuned to such an economy and the societal changes that drives it. Thus an essential part of changing the South African economy relies on fostering new skills and capabilities. Here, the higher education system has a massive role to play - in particular how quickly it can respond to the changes needed. In this regard, internationalisation (in its widest meaning possible) has a huge role to play.

What then is meant by internationalisation in higher education? Knight (2003: 2) has defined internationalisation as "the process of integrating an international, intercultural or global dimension into the purpose, functions or delivery of post-secondary education". There are numerous

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variants to this definition and it is safe to say is that it means different things to different people in different contexts[1]. However, the definition set out by Knight (ibid) has the advantage of being general enough to capture the essence of what internationalisation means within the context of higher education. The specific tasks of the internationalisation project then can be aligned to this primary definition, provided it is grounded in the realities of the context it is supposed to serve.

Research into the internationalization of higher education needs to be regarded as a relatively new field of study, and one that has only really emerged as a field in its own right in the last two decades (Kehm & Teichler, 2007: 269). It is largely eurocentric and focused on intra-European internationalisation and mobility. With regards to published research in the field, African research is virtually non-existent and the major research journals in the field are dominated by research from, as well as centred on, the Global North (cf. Bedenlier & Kondakci & Zawacki-Richter, 2018). In the context of South Africa, research into the internationalisation of higher education and its benefits and impact on students, staff, curricula, institutions of higher education as well as broader societal developments is still in its infancy. However, with the continuous growth in the number of international students seeking access to South African higher education institutions in the past two decades and the concomitant need for management of the internationalisation process at higher education institutions in the country (cf. Rouhani, 2007), internationalisation has become a priority of government, as well as many institutions of higher education in South Africa. This has occurred within a context in which South Africa is thought of, and touted as, the leader of internationalisation projects in the region (South

African Department of Higher Education, 2017).

Recognising that the end of apartheid, coupled with the reacceptance and return of South Africa to the international community, has triggered a growth in internationalisation projects at South African institutions of higher education, internationalisation has been made a priority area by the Department of Higher Education (Department of Higher Education, 2017: 16-17). Equally, the National Development Plan (2012) sets out a number of goals and targets for the internationalisation of higher education, including the encouragement and development of international exchange partnerships; increase support for postgraduate study at overseas universities; increased opportunities for researcher collaboration and for international partnerships between universities and industry (ibid: 16).

While the draft policy does not explicitly comment on 4IR or link internationalisation to the broader global shift created by 4IR, it is clear that many of the recommendations need to be interpreted and seen in this light. Among other things, the Draft Policy Framework explicitly calls for internationalisation strategies to: improve international communication, cross-cultural learning and global citizenship; improve peace and cooperation, and finding solutions to global challenges such as sustainable development, security, renewable energy and HIV/AIDS; and contribute to an increase in knowledge production, intellectual property and innovation in South Africa (Department of Higher Education, 2017: 16-17). It is difficult to see how such recommendations could be fulfilled if not aligned to broader societal and technological shifts triggered by 4IR. Hence, it falls upon higher education institutions in South Africa to make sure that their strategic planning around 4IR is aligned to their internationalisation strategies as they are dependent on each other. In particular, and this is also emphasised by the draft policy, internationalisation provides opportunities to take local and indigenous knowledges to the international community (Department of Higher Education, 2017: 16-17). Thus, mutuality and complementarity in knowledge transfer is encouraged (ibid: 21). This is where South Africa and the global South have the chance to be innovative and truly influence discussions around knowledge hierarchies, and continuous legacies of Western hegemonic knowledge systems and the transfer of knowledge. It is not only international mobility and the exchange of students and faculty that is encouraged, but also the incorporation of international and intercultural knowledges and abilities that prepare students professionally, socially and emotionally in an international and multicultural context (ibid: 18). The idea of preparing students for a world of work that is international and multicultural directly links to 4IR, through ideas of flexibility and the ability to work collaboratively. Multiculturalism and multicultural environments and contexts are also linked to increased creativity (cf. Tadmor et. al., 2012; Steven et. al., 2008), including increased creativity among students exposed to studying abroad programmes (cf. Lee et. al., 2012).

> “This is where South Africa and the global South have the chance to be innovative and truly influence discussions around knowledge hierarchies, and continuous legacies of Western hegemonic knowledge systems and the transfer of knowledge.”

How then can IR4 and internationalisation be linked and concretised within higher education?

4IR and internationalisation as interlinked processes

Fostering creative talent

Higher education within 4IR is dependent on, as Xing and Marwala (2017: 13) point out, the ability to cultivate innovative talent. In this regard and as emphasised earlier, South Africa has not had an education system that has fostered innovative and creative thinkers. As

Xing and Marwala (ibid) argue “Most developing or under-developed countries lack innovative talent” and as such higher education “…should not only focus on training knowledge-based skilled person, but have a good look at cultivating innovative talent, especially high-level scientists and technologists. These scientists must be trained in an interdisciplinary environment where technologists should understand humanities

and social science and vice versa." This is highly dependent on the creation of flexibility in degree structures and offerings within higher education. While processes are in motion, at least at some institutions such as my own at the University of Johannesburg, to address this and to develop more flexibility in offerings (including breaking down some of the boundaries between disciplines), this is far from the case at many educational institutions in South Africa.

To achieve this, it will be important to forge partnerships and linkages both domestically and internationally to offer more flexible and versatile degree programmes and professional qualifications (Xing and Marwala 2017: 15). These can come in a range of forms, and can entail anything from student exchanges and the completion of degrees abroad to the sharing of degree offerings where student become graduates of a joint institution (ibid). Whatever the arrangements going forward, much of our university teaching will rely on the usage of technology to deliver high quality education and, as Xing and Marwala (ibid) propose, there is also scope for blended degree offerings where local and foreign education providers deliver programmes through e-learning, online learning and/or on-site learning.

Creativity in the disciplines and degrees

In addition we need to look at international degrees and how overseas institutions have developed degrees better suited to meet the demands of 4IR and the changing world of work. The question we need to ask ourselves in relation to higher education, and maybe more specifically in relation to academic disciplines, is: 'how creative is my discipline?', 'what is the scope for innovation?' and 'does it open up for, and is it open to, interdisciplinary discussions, collaborations and epistemologies?'.

"Equally, flexibility in degree structures and opportunities for breaking with, as well as expanding disciplinary boundaries that have for long divided the supposed 'hard' and 'soft' sciences, need to be encouraged. Xing and Marwala (2017:10) argue that the convergence between person and machine "...will reduce the subject distance between humanities and social sciences as well as science and technology."

Equally, flexibility in degree structures and opportunities for breaking with, as well as expanding disciplinary boundaries that have for long divided the supposed 'hard' and 'soft' sciences, need to be encouraged. Xing and Marwala (2017:10) argue that the convergence between person and machine "...will reduce the subject distance between humanities and social sciences as well as science and technology. This will necessarily require much more interdisciplinary teaching, research and innovation" and "scientists must be trained in an inter-disciplinary environment where technologists should understand humanities and social science and vice versa" (ibid: 13).

Invest in Research and Development

Encouraging innovation and fostering innovative talent is directly linked to research and development. Xing and Marwala (2017: 14) emphasise that investments in new technological advancements are often ranked as the most important driving force. This will require resources and to achieve this, international business collaborations and partnerships will play a crucial role. While much of the focus of internationalisation projects has been centred on research collaboratons between academic institutions across the globe, this will need to be expanded into the private sector. Universities, with regards to 4IR, will need to undertake projects aimed at international collaboration between higher education institutions and the private sector, through shared research and development, projects aimed at fostering and developing innovation and entrepreneurship, and the hosting of student projects and internships for example in the private sector.

International cooperation around harnessing the potential and opportunities that 4IR opens up for innovative and collaborative research are endless and necessary in terms of addressing the problems of our times and to work towards finding common solutions. Global problems around poverty, health and the environment can be researched in the context of internationalisation and 4IR. Internationalisation here therefore means equality in partnerships and in the ways in which solutions are sought that are of true mutuality and global relevance.

Guard against overreliance of technology

In such efforts we must also, however, as Yang and Cheng (2018: 58) argue, guard against an overreliance on strong technocratic or technophilic discourses emanating from elite industrial and academic voices, being directed primarily at the policymakers and the elites. Instead we must centre "the 'on the ground' experiences and subjectivities of the more disadvantaged and marginalized". If we take internationalisation to mean the advancement and fostering of diversity, multiculturalism and global citizenship, diversity in the broadest sense must be our focus. In the context of South Africa, we must be mindful of working in the interest of human development and to ensure ethics and accountability.

Ensure local and regional beneficiary outcomes

Equally, we must not forget the regional dimensions to the internationalization of higher education. Imperatives that strengthen African scholarship and the need to counter "Euro-American economic and epistemic hegemonies" (Zeleza, 2012:20) are crucial. As Zeleza (ibid) reminds us: "The position of Africa as an object of study and as a centre of knowledge production remains precarious in the international division of intellectual labour". And with research expenditures and productivity across Africa below world standards (bar centres such as Egypt, South Africa and Nigeria who together are responsible for about 80% of all African research outputs) internationalisation must also mean regionalisation or making sure that our internationalisation efforts truly benefit our own society and that of sub-Saharan Africa in the first place (see Dzvimbo and Moloi, 2013). In this regard, collaborations and partnership with institutions and organisations such as the EU, AU, BRICS and SADC are going to be crucial, along with private partnerships.

In conclusion, as much as the university of the future relies on a higher degree of internationalisation in higher education, the opposite also applies and 4IR opens up for increased opportunities for international collaboration. In light of South Africa's history of exclusionary and isolationist politics, the imperatives of restructuring higher education to meet the demands of 4IR are closely linked to the internationalisation project, where both are central to broader transformation agendas within higher education and useful for addressing inequities. ■

> "Global problems around poverty, health and the environment can be researched in the context of internationalisation and 4IR. Internationalisation here therefore means equality in partnerships and in the ways in which solutions are sought that are of true mutuality and global relevance."

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1 For a good outline of differing meanings and efforts related to the internationalisation project in higher education see Knight (2004).

AFRICAN FUTURES:

Why most African states may be at war with each other in 2063

By Francis Onditi and Shadrack Mulei Kithiia

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The Agenda 2063

The year 2063 is important to the AU and the African people. Aside from the fact that, by then, many African states will be celebrating 100 years' independence, this is also the year that the goals listed in the Agenda 2063 should have been achieved. The Agenda 2063, which was created in 2015, groups its objectives into four broad categories: inclusive growth; integration; governance; security; cultural identity; women and youth; and partnership. However, the Agenda does not consider the influence of war and conflict. The failure to anticipate and put in place measures for mitigating the impacts of such events means that the goals of the Agenda 2063 are less likely to be achieved.

In this paper, we argue that investigating war and conflict, and its triggers and effects, is necessary, especially in Africa, where armed conflict costs the continent US $18 billion per annum (IANSA, Oxfam and Saferworld, 2007). In 2017, Africa experienced 50 non-state conflicts compared to 24 in 2011 (Peace Research Institute Oslo, 2018). During the same year, the continent experienced 18 conflicts in 13 countries – an increase from the 12 conflicts in 10 countries seen 10 years ago. In total, since the

1970s, the continent has seen more than 30 wars (Mengisteab, 2003), which have resulted in more than half of all war-related deaths world-wide and more than 9.5 million refugees (Mengisteab, 2003). These figures show the importance of identifying the factors that might cause or trigger war or other types of conflict. As such, the planners of the Agenda 2063 should have considered the conditions that foment war and conflict; the likelihood that, in 2063, the majority (98%) of African states might be at war with each other; and what should be done to avert this possibility. In addition, the AU planners ought to have critically examined whether or not the trend of increasing conflict on the continent demonstrates a definite build-up of tensions that will erupt into full-blown war in a few decades from now.

In order to try to fill these gaps in the Agenda, we examine three processes: 1) demographic trends, 2) environmental forces and 3) polemogical factors. It will be shown that an analysis of these factors demonstrates why it is necessary that the AU reconsiders its Agenda 2063 and takes into account the likelihood of wide-spread and numerous wars by 2063.

Changes that influence the way we perceive war

The first factor that will shape 2063 is the demographics of Africa. According to Statistica (2018), Africa's average life expectancy is 61 years for males and 64 years for females. In some areas, such as middle Africa, the rate is much lower: 57 years for males and 60 years for females (United Nations Statistics Division, 2019). Using these figures, we have utilized two types of probability models to forecast the life expectancy in African by 2063.

Statistics indicate that the global life expectancy is higher than that in Africa (71 years and 74 years for males and females, respectively) (The Border Project, 2018). This means that 52% and 57% of Africans born in the 1960s and 1970s respectively will be alive in 2063. Those born in 1990s have a 40% chance of living to see 2063. Those born in 2000 will be 63 years old, with females having a higher chances of surviving (58%) than males (56%). Those born after 1990 have a 60% chance of being alive in 2063. This scenario is, however, dependent on a number of internal and external forces, such as the impact of civil wars, higher emotional and physical stress levels, diminishing water and food, and increasing levels of carcinogenic agents in the atmosphere. Furthermore, human ecological studies have unveiled evidence linking climate change to conflicts. This relationship is particularly evident in regions dependent on agriculture for livelihood, countries with politically excluded populations and states with ineffective institutions (Koubi, 2018).

The second factor is environmental change. Like the rest of the world, Africa is experiencing the effects of human, physical, economic, and environmental processes. With the population growth rate in excess of 2% per annum, it is possible that the number of people in Africa will reach the 2.4 billion mark in 2050, up from the current 1.2 billion (World Population Review, 2019). Presently, 60% of Africans are under the age of 25. A youthful population experiencing high unemployment rates is associated with increased war and conflict, which is the case in Ethiopia, Mali, the Central African Republic, the Democratic Republic of Congo, Kenya, Burundi, Nigeria, Tunisia, and Egypt. In our estimation, high rates of unemployment are likely to remain for several decades, and perhaps will result in large-scale conflict before 2063.

Moreover, research predicts that, by 2020, 30%–40% of the world will experience water scarcity (Al Jazeera, 2016). By 2025, an estimated 1.8 billion people will live in water-scarce areas (Holloway,

1 Unconditional probability: If we select a child at random (by simple random sampling), then each child has the same probability (equal chance) of being selected, and the probability is 1/N, where N = population size. Thus, the probability that any child is selected is 1/5,290 = 0.0002. The following formula can be used to compute the probability of selecting an individual with specific attributes or characteristics: P(characteristic) = # persons with characteristic / N. Conditional probability: Each of the probabilities computed in the previous section (e.g., P(boy), P(7 years of age)) is an unconditional probability, because the denominator for each is the total population size (N = 5,290), reflecting the fact that everyone in the entire population is eligible to be selected.

2 A probability is a number that reflects the chance or likelihood that a particular event will occur.

3 Those born in 1960: current age as of 2019 = 59; age by 2063 = 103; chance of survival = 59/103 = 0.57 or 57%.

4 Those born in the 1970s: current age as of 2019 = 49; age by 2063 = 93; chance of survival = 49/93 = 0.52 or 52%.

5 Those born in 1990: current age as of 2019 = 29; age by 2063 = 73; chance of survival = 29/73 = 0.397 ~ 0.40 or 40%. Chances of survival is therefore 60%.

6 Chances of a woman reaching 2063, using 60 years as the life expectancy as of 2019 and 104 at 2063: Chance of survival = 60/104 = 0.577 ~ 0.58 or 58%.

7 Chances of a man reaching 2063, using 57 years as the life expectancy as of 2019 and 101 at 2063: Chance of survival = 57/101 = 0.564 ~ 0.56 or 56%.

2019). and five times as much land is likely to be under extreme drought conditions by 2050. The UN predicts that 30 nations will be water-scarce in 2025, up from 20 in 1990s, and that the number will rise to 41 by 2063. This problem is exacerbated by population growth. It is estimated that there will be 1 billion more people to feed in 2025, which means that global agriculture will require an extra 1 trillion cubic meters of water per year (equal to the annual flow of 20 Nile or 100 Colorado rivers). By 2050, the estimated 9 billion people residing on Earth will require a 60% increase in agricultural production and a 15% increase in water supply. Total water demand is projected to grow 55% by 2050 (The Christian Science Monitor, 2019). Moreover, by 2035, the world's energy consumption will increase by 35% (The Christian Science Monitor, 2019). Climate change will thus likely cause major famines and death.

On the account of these demographic and environmental changes, tensions among nations will have escalated in the 2050s and 2060s. War and conflict seem inevitable, especially considering the apparent inability of nations to put strategies in place to decrease risks and effects of war.

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What is war?

Society is mostly geared towards peace and progressive development, not for large-scale war. From this perspective, it makes sense that the AU Agenda 2063 failed to take into account the possibly of war in 2063. To remedy this lack, we propose four approaches to assessing the likelihood and presence of war. The first is the psychological school of thought, based on the competitive nature of human beings and, by extension, entire countries. The second is rational strategy. Political leaders making decisions on war must be aware of three issues: 1) there are hidden costs associated with war; 2) war weakens the fabric of society; and 3) conflict can lead to self-destruction. These issues encourage a rational-strategic approach to war. The third approach is the geopolitics of things. In 1904, British geopolitician Sir Halford Mackinder put forward the idea of the 'heartland' as the key geographical factor that determines power structures amongst nations (Mackinder, 1994). He defined geopolitics as 'the geographical pivot of history'. Although Mackinder's visualisation of power through the prism of geopolitics was designed to explain the global power structure, his methodological classification can be applied to the study of power dynamics within and between nations. For instance, one could leverage psychological weakness (island) of the opponent by maneuvering the enemy into precarious positions through inducing feelings of frustration and confusion.

> "We examine three processes: 1) demographic trends, 2) environmental forces and 3) polemogical factors. It will be shown that an analysis of these factors demonstrates why it is necessary that the AU reconsiders its Agenda 2063 and takes into account the likelihood of wide-spread and numerous wars by 2063."

Why African states may fight each other in 2063

In Africa, each state has either 'sleeping' or

> “Research predicts that, by 2020, 30%–40% of the world will experience water scarcity (Al Jazeera, 2016). By 2025, an estimated 1.8 billion people will live in water-scarce areas (Holloway, 2019). and five times as much land is likely to be under extreme drought conditions by 2050.”

‘active’ unresolved border disputes. These inimical relationships form what we term a web-like map of hostilities among states. As such, a country can have a border dispute with more than one neighbour. For instance, Sudan has disputes with Egypt, Ethiopia, Chad, the CAR and, more recently, the Republic of South Sudan. These disputes are over territories that are rich in resources or are strategic locations. There are similar disputes in the Bakassi peninsula between Nigeria and Cameroon (Okoi, 2016) and in the Corisco Bay between Equatorial Guinea and Gabon. There is also tension between Kenya and Somalia over the Indian Ocean’s Exclusive Economic Zone, which is around 42,000 square kilometres (Okoi, 2016). Kenya’s objection to the court’s jurisdiction over, and the admissibility of, the case has drawn out the dispute. Finally, the rich deposits of phosphates in the Western Sahara are at the centre of tensions between the territory and Morocco. To complicate the situation, Morocco has benefited from strong political, economic, and military support from its Western (United States) and Arab (Gulf Monarchies) allies (Zoubir, 2010). It is therefore imperative for African leaders to foresee these tensions as potentially escalating into future wars.

Other likely sources of conflict are found further north in Tunisia and Egypt, where the effects of the ‘Arab Spring’ remain. Even though the revolution was intended to champion democratic governance in the Middle East and North Africa, analysts also fear that the civil war in Libya and the ongoing crises in Yemen and Syria are prolonging the conflicts in North African states (Joffé, 2011). The neo-patrimonial political system in Tunisia and the worsening socio-economic conditions in Egypt may intensify before 2063. Egypt also maintains diplomatic ties with the West (mainly the US and Britain), which is a factor that may see the West continue to destabilise Libya and other North African states through ‘proxy warfare’.

Further issues can result from unstable neighbours. For instance, the CAR is surrounded by some of the most unstable states on the continent: Chad, Cameroon, Congo Republic, DRC, South Sudan and Sudan. Other external forces with significant influence include France, as well as Libya, Uganda and Benin (Kam Kah, 2014). The involvement of South African troops in defending South African mining interests in the country led to standoff between these forces and the Séléka insurgents during their march to the capital city of Bangui. This regional web-like effect was occurred when Benin hosted rebel leaders who caused havoc in the CAR. In the meantime, France and, for instance, Russia continue to pursue their interests to the detriment of political stability in the country.

In neighbouring DRC, the history of protracted conflict is related to a culture of insurgency. In the wake of the anti-Kabila revolt in 1998, President Paul Kagame of Rwanda captured the capital city, Kinshasa, and launched a spectacular transcontinental attack from the eastern town of Goma to the western military base of Kitona, located 1600 kilometres away (Kisangani, 2003). Kabila was aided by Angola and Zimbabwe as part of a military alliance within the SADC. Increasingly, the DRC conflicts have drawn both official military personnel and insurgents from Angola, Zimbabwe, Burundi, Rwanda, and Uganda. There has been no change in the political regimes in these countries, thus the leaders or their heirs are likely to continue to deploy the same tactics. By 2063, these tactics may have resulted in full-blown wars.

On the Horn of Africa, the relationship between Ethiopia, Eritrea, Djibouti and Somalia is not amicable. The Badme border between Ethiopia and Eritrea is contested owing to the fact that Tigrayans from both sides use this area as grazing land and to search for alluvial gold. This border point remains controversial even after the de facto independence of Eritrea in May 1991. Eritrea has contended that the unilateral Italian map of 1934 should serve as the basis of the demarcation, but this seems to be contrary to the various treaties and to international law, which Ethiopia is using to contest this position. To the south of the Horn of Africa, the border between Tanzania and Malawi over Lake Nyasa has been subject to dispute

active since May 1967 (Mayall, 1973). Although the government in Dar es Salaam initially accepted that no part of the Lake fell within its juris, a recent change of position suggests the possibly of future conflict.

There are also tensions between Uganda and Rwanda. The relationship between these countries depends on a number of factors, including population growth in Rwanda. In the north, the oil-rich Abyei has been claimed by both Sudan and South Sudan (Johnson, 2012). The pending decision by the Juba government on whether its oil should be exported through the Kenyan Coast of Lamu or through Khartoum also brings further risks and may create another 'war triangle' as soon as South Sudan begins exporting oil on a large scale. In 2019, Kenya also joined the oil exporting countries, which may result in tensions with other EAC partner states.

In southern Africa, while Mozambique does not have active border disputes with its neighbours, the country's position is complicated by internal strife between Frelimo and Renamo. Tanzania and Malawi have sent in armed units to assist Frelimo (Morgan, 1990). A quadrigal relationship between South Africa, Botswana, Swaziland and Lesotho is then described by Valentine Belfiglio (Belfiglio, 1980), who asserts that ties between these countries are loose. The main point of tension here is the fact that South Africa is perceived to dominate the 1969 Customs Agreement. Meanwhile, in South Africa, the problem of xenophobia continues, while the inefficiency of the post-Apartheid regime to implement the September 1991 National Peace Accord is a further cause of dissatisfaction among South Africans. Unfortunately, this violent behaviour against people of African descent is a further reason for war between South Africa and other African states.

War will surely be prevalent in 2063 if nothing is done today

In conclusion, it is necessary to develop a methodological approach to anticipating and planning for war. Doing so might call for a rejection of some of the assumptions made within the Agenda 2063. However, this should not lead to a complete renouncement of the goals embedded within the Agenda. Pragmatic solutions are thus needed that take into account the reality of possible changes in Africa. There needs to be strong advocacy towards more inclusive governing structures in many of the African states to avoid the feeling of exclusion, which ultimately triggers conflicts and wars. Resource exploitation, sharing of revenue, and protection of environmental resources should be taken seriously by African states to avert wars associated with environmental stress. There is also a need for investment in genetic engineering technologies focusing on food production to increase agricultural production to feed the ever-increasing population in the continent. ■

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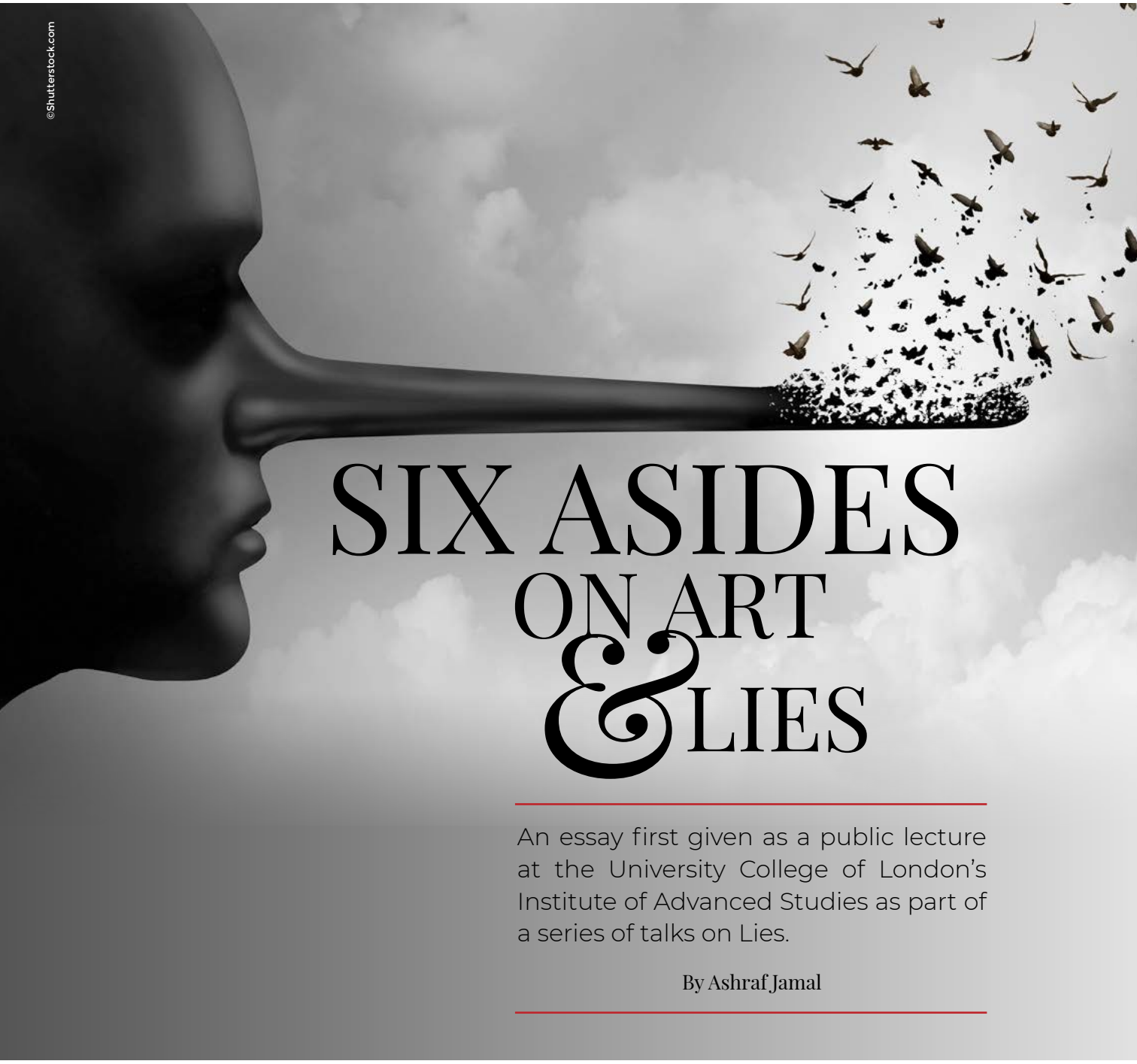

SIX ASIDES ON ART & LIES

An essay first given as a public lecture at the University College of London's Institute of Advanced Studies as part of a series of talks on Lies.

By Ashraf Jamal

1: BLUE ALOE

It was a brisk afternoon in a valley in Yorkshire in the north of England when my art teacher, Mr Waddington, standing beside me seated at my easel, first introduced me to Charles Darwin's phrase, 'cryptic colouration' – an organism's ability to blend into its surroundings. The phrase has stuck with me, spurring a long-standing interest in mimicry – the relationship between survival and calculated obscurity. The National Geographic channel provides countless examples of this ability to blend in and dissimulate a given context. Human beings are no different. We devote the bulk of our lives to disappearing acts. However, 'cryptic' is a curious word to attach to this disposition, for It suggests something mysterious and elusive, and

not an act of survival, or one of damnation, which, after all, is what it also means to dis-appear.

Against the endless disappearing acts we consciously or unconsciously perform, it is surely startling to encounter a creature who refuses to do so. Joseph Conrad's bling harlequin-figure in *Heart of Darkness* springs to mind, but so does a rather strange looking African Aloe, created by Rowan Smith, which I encountered in an art gallery in Cape Town with the alluring moniker, WhatIfTheWorld. While a compelling facsimile, Smith's aloe was painted a jarring and unearthly swimming pool blue. Fixed to a stainless steel stem and bolted to an achingly white, fluorescent-lit, wall, this pale blue plant stood anomalous. Part of an austere installation which centred on mimicry-dissimulation-camouflage – and the impertinence of this orientation – this chlorinated blue aloe suggested an Africa sterile and antiseptic. For there was doubtless something unhealthily pallid in the artist's colour scheme.

In 2015, Wired Magazine introduced me to another term – 'plastiglomerate' – the aggregation of starkly dissimilar yet integrally related synthetic and organic matter, which more compellingly reminded me of the unnatural conditions in which we live. Smith's blue aloe epitomised this unnatural state. For ours, today, is no longer Darwin's cryptically coloured world. Ours is a world which has shifted from acts of imposture to acts that are aberrant. And it is in this particular regard that Rowan Smith's blue aloe proves an apt prelude to our conversation – Art and Lies.

2: WITCHES' ORACLE

As a verb the word – lie – intrigues me most. In its past tense we know it as lay, or lain, as some condition, something, which, according to the OED, assumes 'a horizontal position on a supporting surface … undisturbed or undiscussed'. It is this sense which prompted Virginia Woolf, in *The Waves*, to ask: 'what is the thing that lies beneath the semblance of the thing'? The supposition, here, the query, is often asked, for we commonly suppose that meaning, or truth, is something concealed, hidden from view, difficult to ascertain. Truth is supposed to exist beneath the lie, and it is truth – said to exist 'beneath the semblance of the thing' – which we hanker for and enshrine. It is truth's remoteness that compels us, its rarity, its preciousness, which we believe best informs and defines us – all the more so in this post-religious and morally bankrupted moment in which we find ourselves.

"For no one can fail to recognise – in this era dubbed 'post-truth' – that which keenly concerns us most is truth's absence. Ours is a realm of veils in which truth possesses no traction and no worth. In our world – a world of copies – we no longer possess the capacity to issue forth truth. A lie has become our staple."

For no one can fail to recognise – in this era dubbed 'post-truth' – that which keenly concerns us most is truth's absence. Ours is a realm of veils in which truth possesses no traction and no worth. In our world – a world of copies – we no longer possess the capacity to issue forth truth. A lie has become our staple. It defines our culture. It is the 'new normal'. The very condition for life itself. It is therefore not the scarcity of truth that matters, but the ubiquity of lies. We live because we lie, we exist the way we do because we cannot imagine a world which is not infused and shaped by deception. Lies, therefore, are constitutive. They are the ground – now groundless – which makes it possible to wake up and complete the tasks – riddled with 'little lies' – which, we pretend, enable us to continue.

Lies are the acts and conditions which we must learn to accept, for not to do so would make living unbearable. And yet we gnash and groan in the face of lies. When someone blithely demurs that there are all kinds of truth – 'alternative facts' – we protest in the name of some inviolable essence which we insist in believing exists beneath the surface of this post-essential and post-religious moment. However, if there remains a justice in demanding the existence of a condition pure and inviolable, this is not because it is the purity of truth that we seek, but the purity of a better, if contaminated, lie. Dissimulation is inescapable. The inauthentic defines who and what we are, especially those who traffic in the arts, in fiction, which Plato sought to rout out and condemn as liars.

Lies – the staple of fiction, of art – are integral to the creation of imagined worlds. Lies are wagers,

ventures, leaps of faith, willed conditions. They are not intrinsically or essentially bad for us. However, because they are deceptive, they can also be treacherous. We know this well. Act 1, Scene 1 of Shakespeare's *Macbeth* sets the stage for this treachery. That it stems from the mouths of three witches – and women we are reminded, again and again, are the ciphers of treachery, as is the black man – should alert us to the fact that the 'lies' they supposedly tell are not lies at all, but veiled truths.

Shot through 'fog and filthy air', through a veil contaminated, unclear, in which 'Fair is foul, and foul is fair', the witches present to us their oracular insight which Macbeth chooses to read to his own advantage. The moral of the drama is that we cannot presume to know, in absolute truth, the meaning of a statement, we can only infer, at our own peril, its true import. For what the witches' oracle reminds of is that we can never fully disinter truth from falsity. This difficulty stems not merely from the failure of morality, or the collapse of our cognitive faculties, it stems from a fair deeper problem which Friedrich Nietzsche in particular has scrupulously tackled.

In his essay 'On Truth and Lies in a Nonmoral Sense', Nietzsche reminds us that 'the art of dissimulation reaches its peak in man. Deception, flattering, lying, deluding, talking behind the back, putting up a false front, living in borrowed splendour, wearing a mask, hiding behind convention, playing a role for others and for oneself – in short, a continuous fluttering around the solitary flame of vanity – is so much the rule and the law among men that there is almost nothing which is less comprehensible than how an honest and pure drive for truth could have arisen among them'. The barb is lethal. We cannot ignore Nietzsche's assertion that it is truth that is rare, dissimulation – the culture and rule of lies – which is normative.

> "Truth is mediated at every turn, holographic at best. In the secular realm – a realm relative, speculative – it cannot be satisfactorily regulative. Which is why Nietzsche reminds us that it is not the fraudulence of meaning-making which is the problem, but its damaging consequence when it is abused."

The witches in *Macbeth* understood this founding condition, for it is not only Macbeth's craven ambition which they ensnare, but his vanity. Nietzsche returns, repeatedly, to this 'pitiless, greedy, insatiable, and murderous' indifferent and ignorant desire for the realm of lies. 'The liar', he says, 'is a person who uses the valid designations, the words, in order to make something which is unreal appear to be real'. For Nietzsche, this dissimulation is not intrinsically wrong, it is inevitable. What concerns him far more is the consequence of this sleight of hand – 'being harmed by means of fraud'. What troubles us, he says, is 'not deception itself, but rather the unpleasant, hated consequences of certain sorts of deception'. It is this incarnation of lies – as something profoundly harmful and destructive in its fraudulence – which troubles us most.

Tautology – fair foul, foul fair – is not a falsity but a complexity wired into a linguistically driven cognitive faculty. Words are forked, meaning volatile. This is because 'we possess nothing but metaphors for things – metaphors which correspond in no way to the original entities'. And concepts – which are the ideational means through which we make sense of things – arise, always, from the equating of the unequal, through acts of transference. Macbeth imputes his triumphal fate. It is not that the witches deliberately seek to lead him astray. Rather, the act of straying, intrinsic to the confection of meaning, is tragically amplified and guided by Macbeth's overweening vanity and hunger for power. He will find the meaning which he chooses to find in the witches' oracle. For it is not that they are lying – they speak the truth – but not necessarily the truth Macbeth seeks. By placing himself centre-stage, as the rightful ruler, which he is not, Macbeth, after Nietzsche, mistakenly misreads the witches' oracle as the particular sum of a 'regulative an imperative world'.

However, this imperative is one of many, for words designate multiple outcomes. What something appears to be is not necessarily what it is. The very essence of a thing can only be understood as a complex of possibilities. What words provide is the appearance of meaning, not meaning in-and-for itself. For as Nietzsche reminds us, 'it is not true that the essence of things "appears" in the empirical world'. Truth is mediated at every turn, holographic at best. In the secular realm – a realm relative,

speculative – it cannot be satisfactorily regulative. Which is why Nietzsche reminds us that it is not the fraudulence of meaning-making which is the problem, but its damaging consequence when it is abused. Echoing Macbeth, the philosopher reminds us that 'man has an invincible inclination to allow himself to be deceived and is, as it were, enchanted with happiness when the rhapsodist tells him epic fables as if they were true, or when the actor in the theatre acts more royally than any real king. So long as it is able to deceive without injuring, the master of deception, the intellect, is free'.

Deception, therefore, is inescapable, even bountiful. But it is also potentially lethal. And one would do well to keep this in mind as we venture into the realm of lies, our natural but also our debased habitat. As for truth? For Nietzsche the desire for it remains a mystery. At best, 'Truths are illusions which we have forgotten are illusions'. However, it is not this paradox which exercises me most, but the far more pervasive, necessary, and dangerous realm of lies with which we cloak our lives. More particularly, it is this realm of lies and its operation within a specific world – the world of contemporary South African art – which compels me the more. How do lies work effectively in art? When does the lie become dangerous and damaging?

3: PATHOLOGICAL ATTACHMENTS

In 'The Jerusalem Prize Acceptance Speech' – an essay to which I've returned more persistently than any other – J.M. Coetzee considers the difficulty of telling the truth. Penned in 1987, in the very heart of a cruelly divisive time in South Africa's history, Coetzee notes that therein 'there is … too much truth for art to hold, truth by the bucketful, truth that overwhelms and swamps every act of the imagination'. By 'truth', here, the Nobel Laureate is speaking of 'The crudity of life in South Africa, the naked force of its appeals, not only at the physical level but at the moral level too, its callousness and its brutalities, its hungers and its rages, its greed and its lies', which, in hindsight, have never been resolved. And if this crudity persists – a crudity which makes it impossible to imagine my beleaguered country differently – it is because we have been unable to, or have refused 'to quit a world of pathological attachments and abstract forces, of anger and violence', and, subsequently, remain unable to 'take up residence in a world where a living play of feelings and ideas is possible, a world where we truly have an occupation'.

Our very idea of the world and what it must become is defined by a pathological morality – a need both just and obsessive which has made it impossible to shirk a constitutive abomination – racial inequality, poverty, the psychic horror of centuries of abuse. As a consequence, our art cannot be sustained through enabling appearances – a 'living play of feelings and ideas' – and, therefore, finds itself mired in nakedly cruel and violent forces.

And yet, if we hold fast to Nietzsche's conclusion that truth is chimerical, then what are we to make of Coetzee's yearning to be rid of 'pathological attachments'? Surely, if art is to 'truly have an occupation' it cannot ignore the inescapability of an abusive and cruel world? Surely what matters is not art's capacity to overcome this horror, but its capacity to think and feel through it which remains sustainable? This I think has been Coetzee's project all along – he does not seek some vainglorious and beneficent world, he seeks, rather, to engage with the very gravity of the world in which we exist, a world ground down by naked appeals, hunger, rage, greed and lies – a world intestate and unresolved.

This world – shaped and honed through pain – is not one which we must refuse to imagine, but which we must learn to imagine differently. In so doing, we must not only recognise the difficulty of expressing it truthfully – whether this is possible is disputable – we must also reconsider the unscrupulousness of the fictions we live by – the fiction of liberty, self-possession, and self-determination. The lie of greatest concern is one in which we accept that we have been defrauded, a lie that champions salvation when there is none, that imagines a world in which, finally, we are one. In South Africa no such parity exists. Ours remains a society mutilated and ugly, founded on the illusion of supremacy and the shackles of bondage. Ubuntu, the Southern African credo in which we are whom we are because of others, has withered. It is a sentiment, a 'truth', which has been replaced by a pathological culture shaped by hate, fear, confusion, greed, desperation, violence, which, if Nietzsche is correct, must be endured.

Reflecting on the 'rawness' of life in South Africa, 'the evils that were practiced here', the novelist and essayist, Mike Nicol, in *The Waiting Country*, goes on to examine the inevitability of dissimulation – 'how we lie to one another'. 'We lie to accommodate', he says. 'We lie because we believe it does not matter. We lie because we think that in the face of so many years of misery, a lie that is for the good is not a lie at all. And we lie because we have no self-respect. We lie because we are victims. We lie because we cannot imagine ourselves in any other way'. But it is not only the instrumentality of lying which is the problem here, but the extent of the fraud perpetrated because it – the psychic cost of lies.

For Coetzee the root of the problem stems from the falsity of 'fraternity', 'The vain and essentially sentimental yearning that expresses itself in the reform movement' which he sees as disingenuous and corrupt in its 'yearning to have fraternity without paying for it'. The destructive consequence of this illusion – the illusion of fraternity – remains with us today. But the problem goes deeper, for what concerns me is not the confection of equality, but the root problem which founds its impossibility. What we are dealing with, when seeking to right a wrong, is not so much truth's impossibility, but its metaphoricity – for truths, says Nietzsche, are illusions both necessary and duplicitous. They come in the way of the greater problem presented to us in-and-through the culture of lies.

To better understand just how the South African art world operates, therefore, requires not merely the quest for a truth, but the greater quest to understand just how lies have operated, how they sustain us, and how, at their best, they can begin to help us reconfigure our condition and position in this world. This is because we need lies that operate as enabling metaphors.

4: AGE OF ANGER

An artist who compellingly engages with the duplicitousness of the South African experience is Ed Young. In his word-works, in particular, one confronts the delusory nature of fraternity and the psychic discordance which wracks the country's body politic. BLACK IN FIVE MINUTES is but one of many ironic barbs directed at the canned notion of transformation and the ruse of some instantaneous shift. Young understands the desire for change,

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but far more critically he asks us to reflect upon the conditions which makes this change seemingly possible – South Africa's phantom democracy. His aim is not merely to spoof hope, but to understand the yearning which triggers it – a yearning for a different world in a fundamentally indifferent time. Because of course at the very moment – historic and global – in which we hunger for connectedness, we also find ourselves confronted with what Pankaj Mishra terms the 'widening abyss of race, class and education'.

This abyss is by no means peculiar to South Africa. What Mishra addresses is a global 'Age of Anger', an age crude, barbarous, divisive, which no moral logic can countenance, and in which 'Well-worn pairs of opposites, often corresponding to the bitter divisions in our societies, have once again been put to work: progressive vs. reactionary, open vs. closed, liberalism vs. fascism, rational vs. irrational'. However, while this antithetical realm assumes dominance, it also refuses any reconciliation. Indeed, says Mishra, 'our search for rational political explanations for the current disorder is doomed'. This stark conclusion, made in 2017, is chastening. For today one cannot, rationally, resolve an escalating conflict. Indeed, the parsing of categories – open/closed, true/false – has become all the more difficult. This is because we can no longer suppose it possible to make distinctions. Instead we find ourselves caught in what Frantz Fanon and Achille Mbembe have termed a 'zone of indistinction' – foggy, filthy – in which it is difficult to disinter being from non-being.

Fanon's and Mbembe's insight deserve greater attention on our part, for what concerns the Martiniquan psychoanalyst and Cameroonian philosopher is the notion that blackness – the black body and psyche – has been so thoroughly obliterated, so wholly denied its self-presence, that it cannot return itself to itself. Objectified,

humiliated, rendered in-existent, it is a body, an agency, which, even today, remains at the margin of being. It is not surprising, therefore, that it is the clamour for being, for breath, for life, which has driven a humancentric will for selfhood. This drive, this yearning, is agonistically evident in a protest placard which reads – I AM SOMEBODY. For it is the very denial of the human that lies at the heart on an on-going struggle for dignity.

My point. however, is not to champion this justifiable right. What interests me, rather, is the voided being, the in-existent limit, the abyssal horror which we choose to flee from, or like Macbeth, tragically misconstrue. For as we are inescapably caught up in lies, if deception is the very ground upon which we live, then, surely, the recovery of some solvent agency, some beneficent model for a better life, comes at quite another cost. For one cannot only replace absence with presence, nothingness with something substantive, one must also reflect upon that which is worthwhile which lies within the void – the ability to exploit the veils that cloud us, the mystery that subsists in an afflicted and recessive condition. For to merely rename the black oppressed body positively, to bequeath it with a reason which, for centuries, it was denied, is to merely invert a pathology, replace a lack with a seeming clarity. In so doing, we come to foster a vision of black experience and black art as merely a reactive decree, and, thereby, deny it its richer complexity. For surely the black body and experience, and its artistic expression, should also be allowed its incommensurability, its perversity?

If, for Mishra, reason is doomed and no longer a useful tool, if reason is on the verge of bankruptcy as a mechanism for mediation, then why should it now assume a dominant role in black expression? As Edmund Burke, the eighteenth century English theorist of the sublime and compatriot of Schiller reminded us, 'The nature of man is intricate; the objects of society are of the greatest possible complexity; and therefore no simple disposition or direction of power can be suitable either to man's nature, or to the quality of his affairs'. Reason, as a mechanism in-and-through which to attain a human right, is broken. Which is precisely why we find ourselves caught up in an era of hyperbolic excess, hysteria, and, along with it, a mounting violence. It is because 'Reason has been reduced to a bloodlessly instrumental mode of rationality, which does no more than calculate its own advantage', that we must now reconsider not only its uses but its abuses. For as the Marxist cultural analyst, Terry Eagleton, resumes, 'Nature has been drained of its inner vitality and reduced to so much dead matter for human manipulation. What holds sway over human lives is utility, for which nothing can be precious in itself'.

The art world – indeed, the world at large – has fallen victim to this cynically energised and limited application. Reactive rather than active, declamatory rather than invocatory, this disposition, while necessary, is also enfeebled, for it blunts and contains a given struggle in scare quotes. Divisive, oppositional, monomaniacal, and hysterical, it is a mechanism which cannot save us. Hovering as we do in fog and filthy air, it is understandable that we might seek some clarity, but that clarity, as Eagleton rightly notes, comes at the expense of complexity. If reason is doomed, if we find ourselves today in a realm in which distinctions are collapsing all about us, in a state increasingly liquid – 'fluid' – this state, the state of our time, need not be lamentable. Truth after all was never the other of falsity. As Nietzsche argues, ours has always been a culture informed in-and-through dissimulation. It is the ideal of truth, an imposition upon an inherently unscrupulous world, which is the strange attractor – a quality and a category which remains inherently remote. Which is why I've chosen to emphasise the importance of lying as a generative rather than a degenerative agency.

What makes Ed Young's word-works compelling is not that they seek to speak truth to power, but that they implicate us in a founding hypocrisy. ALL SO FUCKING AFRICAN – displayed at Frieze-New York in 2016 – is precisely that, a word-work which challenges the fetishization of Africa as a continent, an idea, a principle. The tone of Young's work is exasperated, exhausted, numbed not only by the hype but the banalisation of a continent which for the past 500 years has operated as Europe's inverted and perverted Other. That there has been a concerted attempt to rewire this prevailing prejudicial perception has in no way stifled its prevalence. Instead, what we get is a disjunctive state in which a constitutive pathology is transmogrified. And yet, if we concur with Coetzee's view, then it is those very pathological attachments which, despite all attempts to the

contrary, will prevail.

For Coetzee it is this very pathological attachment to a dark truth which cannot be vaulted which makes South Africa 'as irresistible as it is unlovable'. While I share Coetzee's conviction, indeed his morbid neurosis, I nevertheless have also asked that we flip the prognosis and, thereby, resist this reading and learn to love the aggrieved and brutalised body of a country and a continent, and its people. For it is only through resistance and love – a resistance and a love which is not prescriptive – that we will begin to understand the complexity of the problem.

Art's job, if it can be said to possess one, is not to solve a problem but to inhabit it in an engaging way. And I think that Young does just this – he occupies a dilemma and makes it his vocation. In this regard, however, he also goes against the grain – the grain of resistance art which, dominant in the 70s and 80s, muted in the 90s, has resurfaced. For today, we find ourselves thoroughly caught up in Mishra's polarised and doomed logic, precisely because we mistakenly believe that we can think and paint ourselves out of a corner. Paradox, however, cannot be so easily overcome, which is precisely why Young has chosen to operate inside a contradiction, and, in so doing, foreground the lies which willingly, or unwillingly, we choose to spin.

I SEE BLACK PEOPLE – a word-work exhibited at the Johannesburg Art Fair in 2015 – expresses an observation. One might assume the first person pronoun – I – to be the subjective perspective of a white male artist. This could be true, but it is also not. The statement does not read, I, Ed Young, a white South African born in Welkom in the Free State, see black people. But because we know the artist to be white, male, and notorious, we tend to fix upon what could be a supremacist and racist abstraction of others. The generic conflation – 'black people' – is now not read as an objective sighting of a cluster, but a derogatory diminishing of a corpus of singularities into a blurred group. And yet, given the context for the exhibition of this statement, a forum whose very culture is exclusionary and predominantly frequented by a white middle class elite, surely this sighting is inaccurate? Surely what Young is telling us is that he does not see black people? That black people are markedly absent from a forum – the Johannesburg Art Fair, one of Africa's leading trading centres – and, therefore, that it is their absence which is all the more palpable?

5: THE SLEEP OF REASON

The black body in pain is not the oracle of truth, and yet it is precisely the fixation on abjection which, with a morbid excrescence, has assumed dominance. It is against this impassioned but also pragmatic deployment of the black body – of blackness – which Achille Mbembe has chosen to think. His *Critique of Black Reason*, typically dismissed by those who use blackness as a categorical imperative, is an inspiring attempt to think inside the difficulty of a contentious category. 'Though some names can flatter, the name "Black" was from the beginning a mechanism for objectification and degradation', Mbembe notes. 'It drew its strength from its capacity to suffocate and strangle, to amputate and emasculate. The name was like death'. To be black, he more starkly adds, is 'the prototype of a poisoned, burnt subject … a being whose life is made of ashes'.

Departing from this most defiled of categories, Mbembe seeks to explore just how a category like blackness – typically perceived as debased or threatening and violent – could operate both as 'the clinical manifestation of a "sickness" of a political nature as it was a practice of the transformation of symbols'. It is only in this doubled sense – as a category pathological and transfiguring – that we can begin to grasp the complexity of the being it frames. The relevance of this approach is that it defies easy polarisation and allows one to inhabit a realm that is indistinct, in which one is no longer captive to the rights of an oppressed body or glibly insouciant in relation to its messianic destiny.

It is in this regard that Lungiswa Gqunta emerges as a particularly canny young artist, for she not only recognises a history of pain and injustice but seeks, through a series of visceral and conceptual installations, to foreground the complexity of the oppressed being. Clinical, exacting, daring in its execution, Gqunta's works point to the zone of indistinction, the constitutive void, which defines black experience in contemporary South Africa.

One work in particular stands out as an instance of this complexity. We see a bedframe, shaped in a precise square, the bed coils starkly a-glimmer, the bed's frame tracked all about by a cold white light. Above the coiled square the artist has fixed a clear

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sheet of Perspex. This is the structure's surface – transparent, vertiginous, devoid of any consoling support, for there is no mattress. There is only the frame that we see, the idea of a bed, shorn of any comfort, any fabric which one would reasonably suppose necessary for rest, for sleep. For in this lean sculptural work, spot-lit, stark, it is precisely rest, sleep, which is denied. In the place of a mattress, we find a thin bilious film of petrol. Greenly iridescent, it is beautiful and it is chilling, for what Lungiswa Gqunta is telling us is that this is not a time of sleep but one of violent discord. Francisco Goya's etching, as ruthlessly precise as Lungiswa Gqunta's skeletal stage, is called 'The Sleep of Reason Produces Monsters', and it returns us to the implacability of this unrest. For ours is a time in which reason has failed us, in which we have become traumatised, besieged, and panic-stricken. And if we cannot escape the monstrousness of ours blasted lives, it is because we are ruinously inconsolable.

The brilliance of Gqunta's installation – the bed is accompanied by a video work in which we see the artist's calves and feet swaying backwards and forwards, clasped in makeshift sandals made of scrubbing brushes, the bristles replaced with matchsticks – lies in its latent force. For the installation is incendiary. It speaks to a burning world – 'a being whose life is made of ashes' – in which there is no privacy, no peace, in which the home is a battleground. As the matchstick points of the brushes sweep across a bed of coals, we imagine that all, in an instant, could be engulfed in flames – a sensation which all the more forcefully ignites itself within us as we see the shimmer of petrol and the delicate impress it has made on the Perspex sheet.

Here we return to my initial reflection on the lie as something shallow, undisturbed and undiscussed, assuming a horizontal position on a supporting surface. But I am also reminded of K Sello Duiker's superb novel, *The Quiet Violence of Dreams*, published in 2001, in which the wracked state of the black imagination assumes its stark presence. For Duiker, like Gqunta, well knew that reason, dispensed as an antidote to horror, is not only generic but a venomous fake. 'We're not all God's children', Duiker writes. 'In here God doesn't exist. I am the forgotten who lies rotting in a barrel of fermenting apples. God never heard my cries. I never saw the light or touched on something sacred in myself. We're not all mystics who can extract beauty from our pain. Some of us are just born with too much corruption to ever survive it'. That Duiker's novel proved the inspiration for a group show jointly curated by Blank Projects and the Stevenson gallery in 2016, should further impress upon us the crippling extent of South Africa's damaged psyche. Today we are very far removed indeed from Ed Young's only optimistic work, a sculpture of Desmond Tutu in flight, holding fast to a lurching candelabra. Made in 2010, it is a sculpture to which I repeatedly returned with my daughters'. The words which accompanied the grinning airborne Desmond Tutu, now, in hindsight, are an arid mockery – BE PATIENT – the declaration reads – WE ONLY HAVE A FEW THINGS TO FIX.

At the exhausted limit of reason, In the midst of an agonistic and inconsolable fact of abuse, disregard, debasement, Duiker, like Gqunta and Young, seek to create art that infects us with its ruinous difficulty. Duiker would kill himself in 2004, but not before he bequeathed us a bare-boned body of work which defied the hypocrisy that still seeks to contain and nullify black experience. 'I don't care for people who want to prescribe what it means and doesn't mean to be African', he writes. 'People say things just for the hell of it, to hear their own voices blowing out vacuous breath. I know who I am'. It is this vacuity which we find spoken all about, a vacuity which shapes and informs so much talk of African art today. It is a vacuity that subsists in a dangerous and fraudulent lie.

At the root of the problem is perception: what we choose to see and why? Given that lies are built into perception, the problem is not that we lie – this is unavoidable – rather, what should be concerning are the lies which come in the way of a deeper understanding. If Ed Young's provocation or Luniswa Gqunta's insinuation are compelling, it is

Sleeping Pools – Lungiswa Gqunta

because they appeal to this greater understanding – they understand and manipulate the illusory power of art, and, in so doing, tap into the structures of feeling – a structure of anger and dissent – in which it subsists. Neither artist is reactive – though Young's art appears to be so – rather, both actively engage with the difficulty of perception, the one by challenging the complacent exploitation of entitlement, the other, more demandingly, by foregrounding a besieged psyche and body.

I have written on these matters at great length, and in variant and conflicting iterations, in my book *In the World*. For the purposes of this conversation, however, I seek only to address the ubiquitous nature of the misperception of African art. There is, for example, the gauche view that the spiking interest in African art signals a 'second scramble', yet another occupation and deterritorialization of Africa's agency and value. To bluntly state, as does Matthew Partridge, that 'in South Africa the art world is a white world, trading in blacks', is a view that is as convincing as it is offensive and disturbing. But my point, here, is not to bemoan this state of affairs, let alone right it. Rather, what interests me far more is the value of a calculated dissonance and an enabling lie. For just as I cannot stomach the exploitation of the black body and its expressions, neither can I wholly endorse the jingoistic assumption that it is an invariable force for good.

Piety in the understanding of black experience must be routed out. As Steve Bantu Biko noted in *I write what I like*, 'The first step … is to make the black man come to himself, to pump back life into his empty shell; to infuse him with pride and dignity, to remind him of his complicity in the crime of allowing himself to be misused and therefore letting evil reign supreme in the country of his birth. This is what we mean by an inward-looking process. This is the definition of "Black Consciousness"'. The 'Black man', therefore, is complicit in the engineering of his own dissolution and co-optation in an enterprise which, fundamentally, refuses him a greater probity. And if the art world has allowed this to happen it is precisely because it has favoured the iconic and spectacular at the expense of what Edmund Burke termed 'the greatest possible complexity'.

Tragically still perceived as a curiosity, the black being and its works have rarely been permitted to move beyond an assigned representational economy. There is, of course, an urgent move to override this tendency, the decision by an institution – which will not be named – to exchange its white male blue chip art with works by women and blacks being a typical and rather sinister instance of this new-fangled political correctness. Ironically, it is the overweening desire to 'do good' and right an imbalance which further compromises an already compromised art world. After Nietzsche, it is this political correctness which has emerged as a symptom which has forgotten it is a dangerous illusion. We see this misstep in operation in curatorial projects and tertiary curricula everywhere. The widely touted

"Tragically still perceived as a curiosity, the black being and its works have rarely been permitted to move beyond an assigned representational economy. There is, of course, an urgent move to override this tendency."

Candice – Daniel Stompie Selibe

decolonising project is a glaring instance of this misstep. As a rational project – a project driven by a good reason – it fails to address the more complex matter of human complexity, a matter, a factor, refused at its outset by colonialism, which, as Terry Eagleton has rightly pointed out, is 'at root a political and economic reality, not (as some postcolonial theory imagines) a cultural one'.

The greater appeal – expressed by Achille Mbembe, and which has been troublingly disregarded and disabused today – is to engage in 'the project of a world that is coming, a world before us, one whose destination is universal, a world freed from the burden of race, from resentment, and from the desire for vengeance that all racism calls into being'. Consigned to the dumpster for being utopian, it is a view which nevertheless connects rather than divides us. It is, in other words, a better and more engendering lie, precisely because it holds fast to a beneficent will in a time which is fast becoming irredeemably balkanised. For as James Baldwin has reminded us – a reminder which the ideologues amongst us wilfully suppress – 'The rage of the disesteemed', while 'absolutely inevitable' is also 'personally fruitless'.

Art cannot construct solutions to our ills, it can only implicate us in the difficulty of addressing them. As Jeannette Winterson notes in *Art Objects: Essays on Ecstasy and Effrontery*, 'The true artist is interested in the art object as an art process, the thing in being, the being of the thing, the struggle, the excitement, the energy, that have found expression in a particular way. The true artist is after the problem. The false artist wants it solved (by somebody else)'. While I do not support Winterson's distinction between the 'true artist' and the 'false artist', claiming rather that we lie for better or for worse, I nevertheless cannot shirk her conclusion that prescriptive art is also unduly conscriptive – it asks us to complete its meaning, to be its foil. That this incorporating and inclusive view has become increasingly commonplace – the viewer democratically championed as art's extension and arbiter – reveals the degree to which populism has infected the art world, indeed, the world at large. In this troubling regard, however, we should remember Biko's caution and be wary of being complicit in the 'crime' of allowing ourselves to be so 'misused'.

This caution – qualified variously by Mbembe, Biko, and Winterson – is brilliantly heeded and overridden by Daniel Stompie Selibe, who, to my mind, best exemplifies an art in which blackness – as a trope for subjection or victimhood – is exhausted and reconceptualised. In his works – part collage, part febrile mark-making – it is 'the being of the thing, the struggle, the excitement, the energy' which compels us.

Simon Schama's description of the paintings by Soutine as 'observed phenomena' that 'dissolve completely in a pottage of paint – the paint flung on with abandon, wet into wet, forming ropes, snakes, flat ribbons of sharp colour, while the whole surging surface is sometimes slashed over with welt-raising strokes of black', cannily mirrors the abyssal vortex which distinguishes Selibe's world. His is an art refined by oblivion, which stands as a remarkable testimony to the enraging hopelessness which consumes us. For as James Baldwin reminded us, 'People are trapped in history, and history is trapped in them'.

The prevailing lie – mired in political correctness,

“Through a digital process – too complex for me to grasp and explain here – the artist had reconfigured the idea of objecthood and personhood. She was asking us to rethink how we see people – the ideological-political-cultural-faux scientific methods we use to appropriate others and consign them to a preordained and imposed set of categories.”

and thus, after Winterson, a lie that generates a ‘false’ art – is that this oblivion must, perforce, be overcome. Daniel Stompie Selibe, I’d wager, has refused this stifling and crippling imperative. Rather, his is an art – closest in spirit to K Sello Duiker’s *Quiet Violence of Dreams* – which has chosen to inhabit an enraging hopelessness. It is an art poised at the tipping point in the experience of being human at this moment in the twenty-first century. For it is not only the art of a black South African consciousness but a consciousness that is engulfing the entirety of the world; a consciousness distressed, panic-stricken, fearful, which, nevertheless, must forge a path, no matter how inarticulate and graspingly futile.

6: A DIFFERENT POLITICAL POTENTIAL

If ‘[T]ruths are illusions which we have forgotten are illusions’, if they are but ‘metaphors that have become worn out and have been drained of sensuous force, coins which have lost their embossing and are now considered as metal and no longer as coins’, it is because they have lost or mistaken their currency. This, however, has not stopped a failed currency from being minted anew.

In South Africa, I have witnessed this counterfeit played out in the quest for free education in which neither freedom nor education has been fundamentally addressed. But it is not this acutely complex matter with which I wish to conclude this conversation, but its antidote, for above and beneath this rhetoric for change there exists an art which can overcome it – an art which refuses to sustain the fictions which we inevitably embrace, but which, despite this refusal, can nevertheless help us to live better, if difficult, lives.

One such fiction, one such lie, for JM Coetzee, is that ‘After we die we wake up in another, better world’. Another is Achille Mbembe’s, ‘of a world that is coming … a world freed from … resentment.’ If damned for being fraudulent, they nevertheless hold fast to their currency. And what connects these beliefs, these fantasies, is their fortitude and their fundamental inconclusiveness. For while we cannot shirk the indisputable fact of ‘a widening abyss of race, class, and education’, while our ‘intellectual industry’ has become increasingly polarised, what persists and cannot be overridden, despite innumerable efforts to do so, is our capacity for some starkly austere critical wonder. In the midst of our flawed and aggrieved state, we have the ability to access our better selves. And it is in this particular regard, finally, that I want to share with you the work of a remarkable young artist – Alana Blignaut.

A Master’s graduate from the University of Witswaterand in Johannesburg – I was her external examiner in 2018 – Blignaut introduced me to a room blackened, but for one light projection which revealed a series of looped portraits. My first impression was that I was looking at fine pencil drawings, or drawings scored with acute delicacy in some grey ink. Photographs were not what I thought I was seeing. This incorrect, yet reasonable impression, made sense when I realised that what Blignaut was in fact doing was not taking photographs but digitally morphing a grouping of photographs of men and women respectively, and reconstructing them according to received ideas of caste-phenotype-race. The images were taken from an apartheid prison archive, the subjects deemed a threat to the state.

Through a digital process – too complex for me to grasp and explain here – the artist had reconfigured the idea of objecthood and personhood. She was asking us to rethink how we see people – the ideological-political-cultural-faux scientific methods we use to appropriate others and consign them to a preordained and imposed set of categories. The reasoning behind it all was especially compelling, for what I thought primarily interested Blignaut was not only the system of closed meanings which confined the subject-as-object according to gender and race, but the slippage that occurred in the attempt to do so. The categories were intrinsically aberrant, it seemed, for they also inadvertently announced the a-categorical.

This insight I thought then, as I do now, is critical, particularly today, in a culture both local and

Female average Male average
– Alana Blignaut

global which seeks to imprison and herd human beings. That Blignaut chose the faces of purported 'criminals' or perceived 'threats' to the apartheid system as her focus and terrain, in no way belied the fact that she was also addressing the darkly current reinvestment in the objectification of human beings according to race and gender. However, her critique was even more far reaching, for what interested the artist was the impertinence and obscenity which undergirds the naming and framing of people. What spurred her on was the vexed impossibility of any strategy of containment. In short, the artist had deftly drawn my attention to the visceral and cognitive fact that no human being can, finally, be reduced to a type.

Blignaut's endeavour was not only a brilliant deconstruction of types, but also a deconstruction of the imagined essence mistakenly believed to subsist in types. For through an exploration of 'Facial Averaging', in which a cluster of men and women were morphed to create a single image, we learnt not only of the universality of faces – that we belong to one species – but, far more importantly, that no face can truly contain its singularity, and that faces – the aggregation thereof – resulted in two impossibilities – the impossibility of the singular and the impossibility of the universal.

What, one wonders, is achieved in renouncing or suspending these absolutes? For Blignaut, I think it opened up a far more fluid comprehension of the viscosity, rather than the density, of being. That the artist is currently undergoing an alteration in gender – thereby challenging the imperative of polarity and the ruse of essences – has surely informed this astoundingly potent work. For as Blignaut's co-supervisor and long-standing collaborator, Kathryn Smith, more pointedly noted, the artist's innovation displayed 'an active perversion of a historically discriminatory and repressive technology and method', and, in so doing, invoked 'something both beautiful and unsettling, that asserts a different political potential'.

I have chosen to conclude this conversation with Blignaut because she has reminded us that the lie that is art, the lie that is perception, is one that harbours great riches – a different political potential. In foregoing certainty, in embracing the infinity that is difference, we arrive at the enabling lie which makes life and art conditions in which we can survive. After all, a 'regulative and imperative world' is one that kills, no matter how necessary that regulation and imperative may seem to be. ■

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