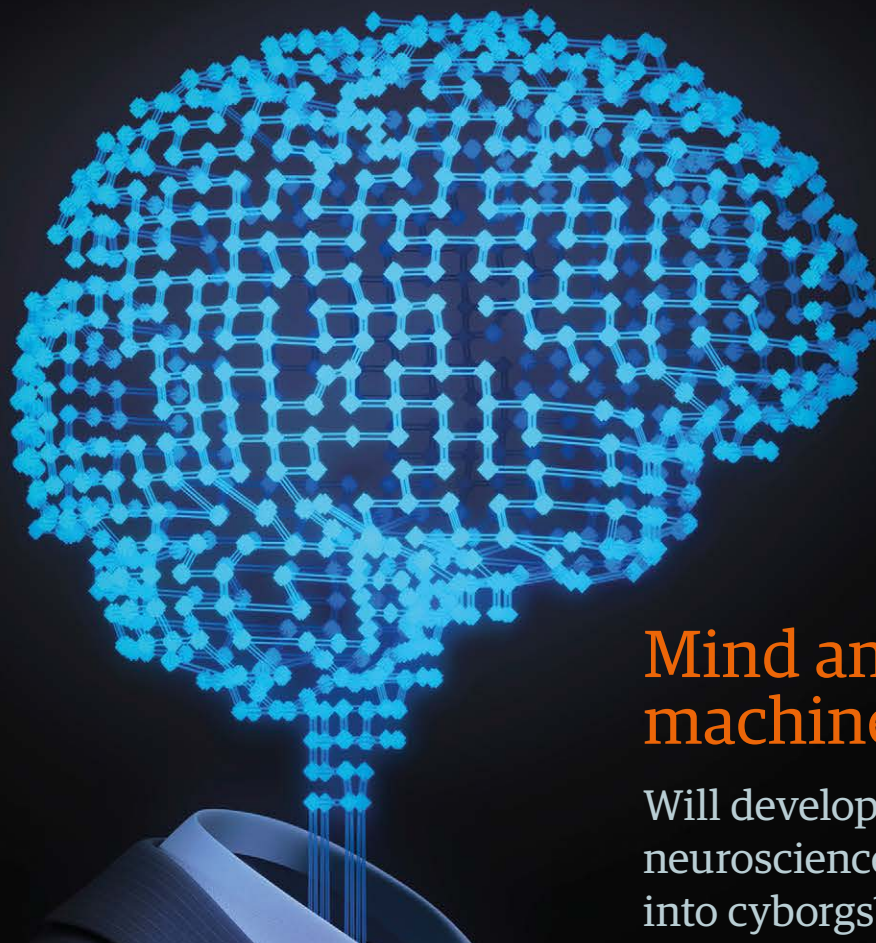


Vision Review

Edition 16



Mind and machine

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neuroscience turn us
into cyborgs?

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waist to
waste?

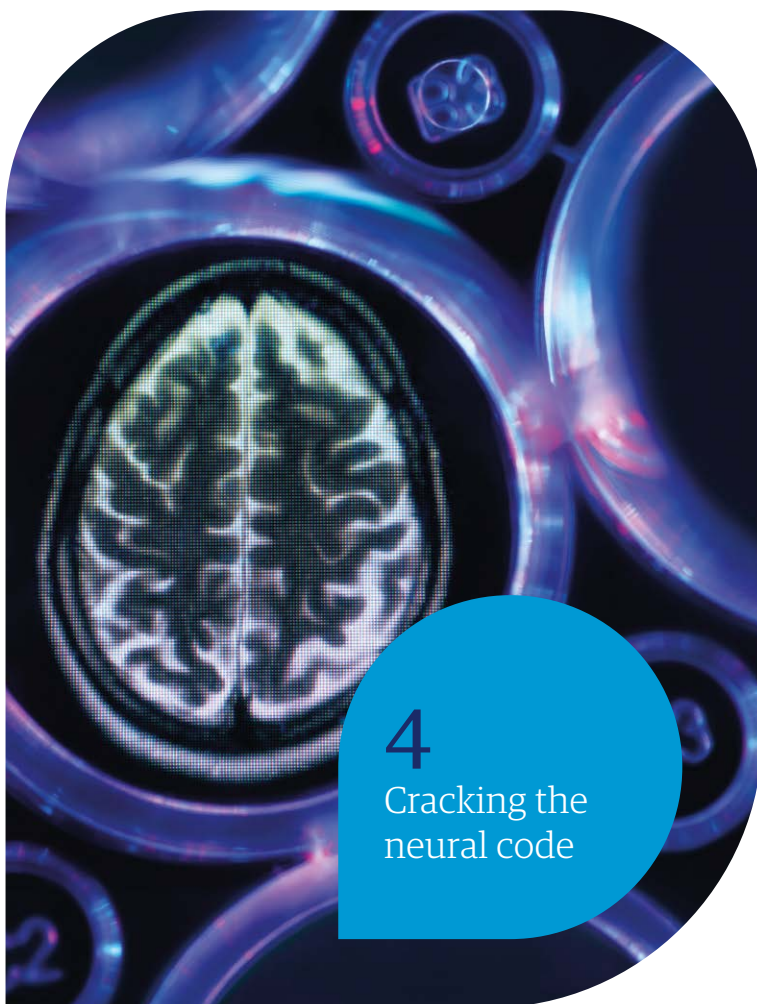


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Flower
power**Editor**Jenifer Hall
*Network Support
Manager*

If you have any comments on this publication or suggestions for topics that you would like to see discussed in the future, please let me know.

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Welcome to the winter edition of *Vision Review*



Amid the radical innovation that has come to define the fourth industrial revolution, the centuries-old quest to understand how our minds work appears to be entering a new phase. Advances in neuroscience are producing remarkable breakthroughs in the treatment of mental and physical conditions, as illustrated by the recent story of a paralysed man who is learning to walk again with the help of a 'brain-computer interface'.

So are we really within touching distance of what has been called science's final frontier? And, if we are, what might await us beyond it? With efforts to map the mind increasingly linked with the rise of artificial intelligence (AI), are we moving inexorably towards the melding of human and machine? Does our only hope of keeping pace with AI lie in somehow making it a part of us? In this edition of *Vision Review* we consider the past, present and likely future of attempts to grasp the workings – and the potential – of the brain.

Having explored the secrets of the nervous system, we also examine the puzzles of the immune system. Allergies were regarded as medical curiosities throughout much of history, but today they represent a significant and growing problem. We look at the likely causes of the modern-day explosion in allergic reactions – and the possible cures.

Other topics in this edition include the sustainability-inspired rebellion against 'fast fashion', the tech phenomenon that is blockchain and the changing nature and impact of political correctness. We also discuss the economics of racehorse breeding, the emergence of laboratory-grown diamonds, the financial benefits of marriage and civil partnerships and the drive to protect our bio-heritage.

Finally and hot off the press, I am delighted to announce that Vision recently attended the prestigious Financial Innovation Awards ceremony in London, where we were victorious in the Customer Service/Service Team of the Year category. This is a fantastic endorsement of our wonderful head office team. I thank you for your loyalty and support, as always.

I hope you enjoy the magazine – and please remember that we always value your feedback.

Paul Sweatton*Chief Executive of Vision*

Mind and machine

Cutting-edge efforts to map the human mind are opening up extraordinary possibilities, including novel ways of tackling disease, interacting with machines and even enhancing our intelligence. How did we get to this stage? Where might we go from here? And should we be excited or worried – or both?

Simon Dewar

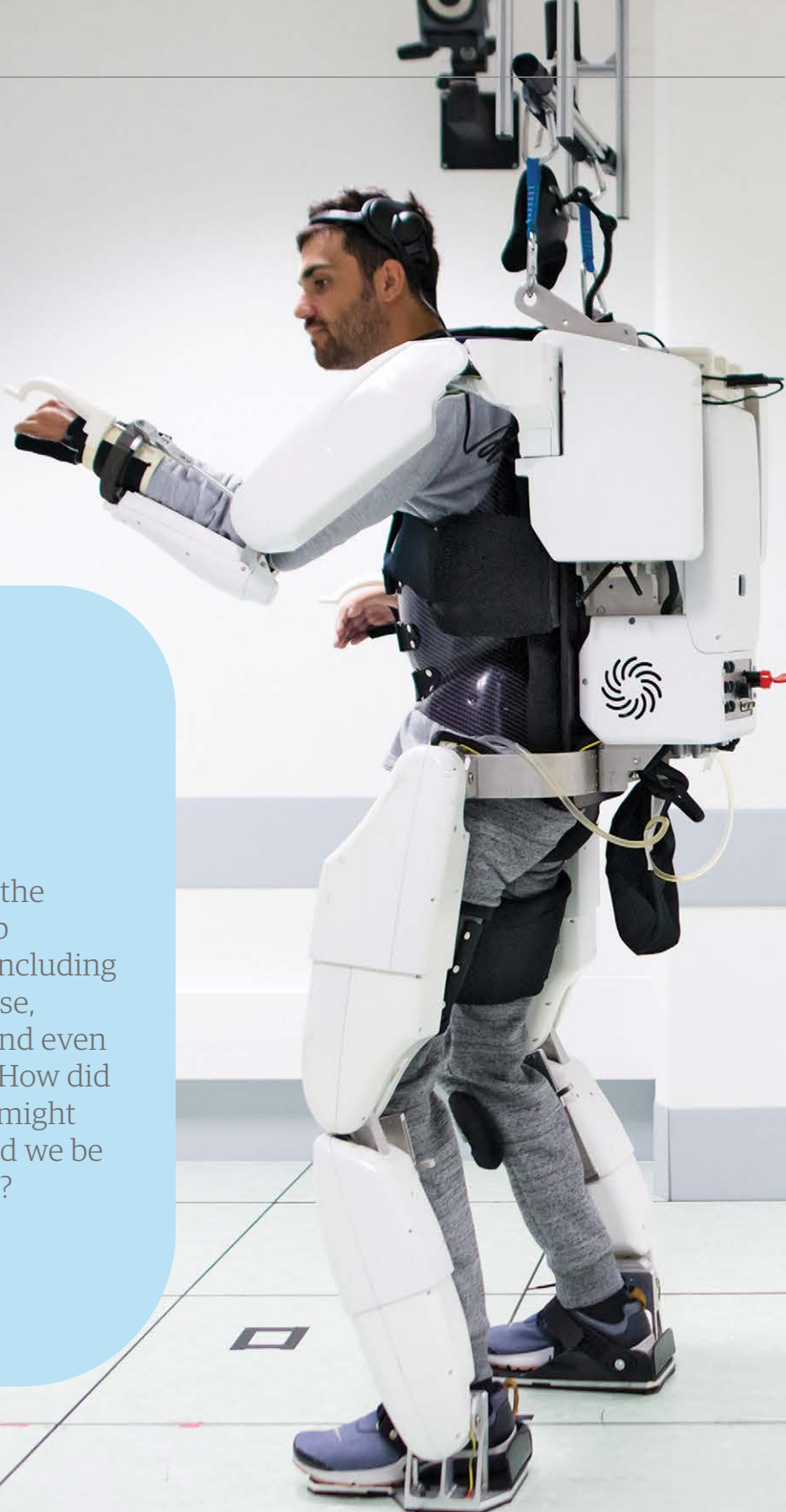




Image: CEA/Climatec/Juliette Treillet

This mind-controlled exoskeleton suit has enabled a paralysed 30-year-old Frenchman — named only as Thibault — to walk again, regaining control of all four of his limbs. Thibault said of his initial steps: "It was like being the first man on the Moon."

Great thinkers have wrestled with the complexities of the human mind for thousands of years. From Socrates to Descartes, from Darwin to Crick, philosophers and scientists alike have tried to unravel its workings and fathom its relationship with the body and beyond. What has changed over time is that the focus has steadily shifted away from its evolution and towards questions around how it actually functions and is structured.

The answers lie in neurons. These are the basic units of our nervous systems and the fundamental building blocks of intelligence. An adult brain contains more than 85 billion of them, each with around 10,000 connections to other such cells.

Sensory neurons react to stimuli such as sound, light and touch, sending signals to the brain or the spinal cord. Motor neurons receive these signals, controlling our every movement – from muscle contractions to glandular output. Trillions of minute junctions, known as synapses, allow the signals to pass from one neuron to another in a process that is partly chemical and partly electrical.

The latter attribute has attracted scientific attention ever since Luigi Galvani, an 18th-century physicist and biologist, found that the legs of dead frogs twitched when struck by a spark. Galvani posited that this was due to an electrical fluid carried to the muscles by the nerves. His discovery gave us ‘galvanism’, which in turn gave us ‘galvanise’ – meaning to shock or excite something into action.

The second half of the 20th century saw attempts to understand neurons become ever more precise, diverse and molecular. Today scientists are getting closer not just to decoding the electrochemical signals in the brain but to composing and delivering them. This opens doors to some incredible



Researchers at Ulster University are mapping the mind to measure brain activity and support research on better treatment of brain tumours and epilepsy.

“As our comprehension of the nervous system flourishes, cutting-edge thinking is encompassing not just how the mind operates but how it might be repaired or even enhanced.”

treatments and advances in human capabilities. Some would say it also opens a Pandora’s Box.

Innovations and interfaces

The quest to map the mind has always drawn on achievements in other fields, among them anatomy, physiology, mathematical modelling and, more recently, optogenetics, cognitive psychology and computing. Many of these arenas have witnessed substantive

advances, not least since the turn of the millennium, propelling neuroscience into an age in which what once seemed inconceivable might soon be within grasp.

Crucially, as our comprehension of the nervous system flourishes, cutting-edge thinking is encompassing not just how the mind operates but why it sometimes fails – and, by extension, how it might be repaired or even enhanced. As a result, the treatment of numerous medical conditions increasingly looks set to involve interaction between the human brain and machines.

This has actually already been happening for longer than most of us might guess – as evidenced by cochlear implants, which for decades have helped tackle hearing problems by converting sounds into electrical signals that are then sent to the brain. Although there is no direct interaction with neural tissue, such apparatus might be regarded as a primitive example of what has come to be termed a brain-computer interface (BCI).

Similarly, one of the most common forms of surgery for Parkinson’s disease,

deep-brain stimulation (DBS), was first approved in 1997. Extremely fine wires tipped with electrodes are implanted in the brain via extensions tunnelled under the skin behind the ear; they are then linked to a pulse generator to deliver high-frequency stimulation that alters some of the signals that cause the condition's movement-related symptoms. Although not a cure, this approach is more effective than medication in many cases.

At Brown University, Rhode Island, researchers developed BrainGate, a BCI that uses a small array of electrodes implanted in the brain's motor cortex. These detect the neurons that signal planned motion in the hands or arms: the signals are communicated through wires poking out of the skull, and a computer decodes them and translates them into movements.

Since 2004 BrainGate has assisted more than a dozen people with paralysis. Thanks to her newfound ability to communicate with a robotic

"Thanks to her newfound ability to communicate with a robotic arm, one woman was able to take her first-ever sip of coffee without aid from a caregiver."

arm, one woman was able to take her first sip of coffee without aid from a caregiver since the stroke that had paralysed her 15 years earlier.

Maybe most famously, Matthew Nagle, the first person to receive an implant, was in effect able to play bat-and-ball computer game *Pong* with his mind after mastering the required moves in just four days. "If your brain can do it,"

A paralysed woman is filmed taking a sip of coffee with the help of a robotic arm. She is sending signals with her mind using a brain-computer interface.

Brown professor of neuroscience John Donoghue said in 2006, "we can tap into it."

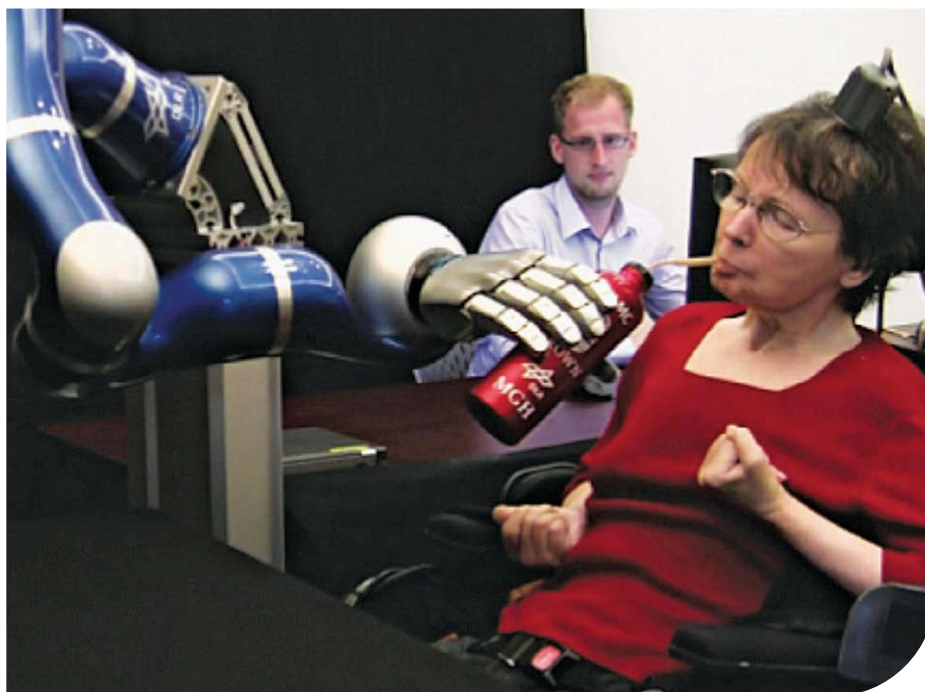
Beyond BCIs

The phrase 'brain-computer interface' originally surfaced in the academic literature in the 1970s, when the University of California, Los Angeles, carried out a study partially funded by the US government's Defense Advanced Research Projects Agency (DARPA). Today the notion of a BCI is becoming an ever more sophisticated reality, with household-name tech giants responsible for some of the most significant breakthroughs.

Microsoft is among those at the forefront. In 2018 it launched its AI for Accessibility initiative, a five-year programme intended to accelerate the creation of artificial intelligence solutions that could benefit more than a billion people with disabilities. Around \$25 million in funding is at present being made available to universities, non-governmental organisations and inventors, with larger investments promised for the scaling up of would-be game-changing innovations.

And then there is Elon Musk, of Tesla fame, whose Neuralink Corporation is pioneering a new kind of BCI that aims to embed flexible "threads" in the brain and use them to transmit information to a wireless receiver worn as an earpiece. The threads would be thinner than a human hair; they would also be implanted by a robot. One goal, as with BrainGate, is to enable people with paralysis to communicate with electronic devices at a higher level.

During a presentation in July 2019, teasing the supposedly top-secret project's results to date, Musk reportedly surprised even his own colleagues when he announced: "A monkey has been able to control a computer with its brain."



Images: Niall Carson/PA Archive/PA Images, dpa picture alliance archive/Alamy

Despite insisting that his speech was not a vehicle for hype, he elicited further and more widespread astonishment when he declared: “We hope to have this in a human patient by the end of next year.”

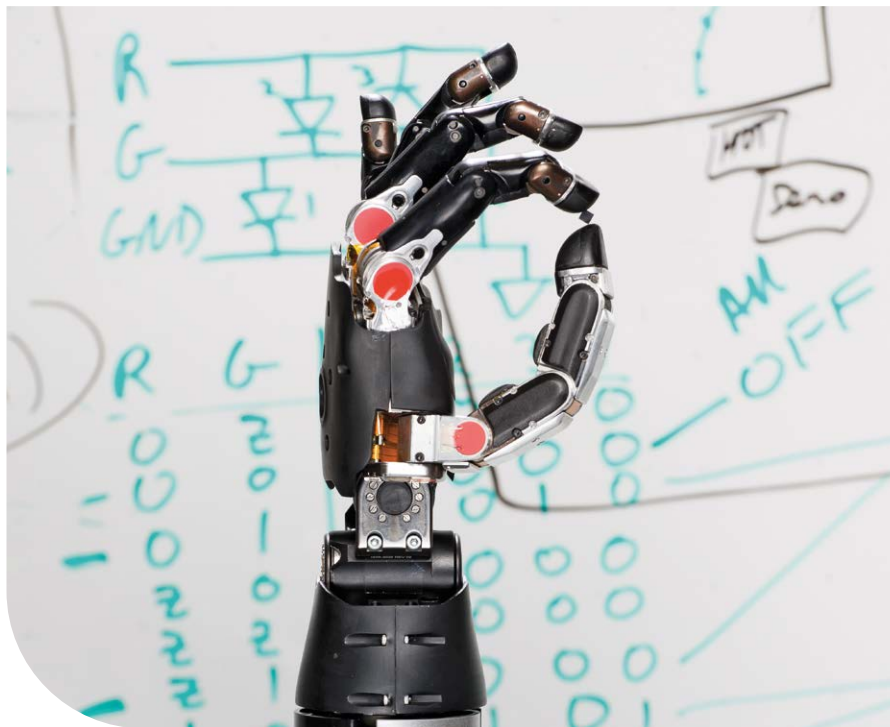
Musk himself subsequently stressed that Neuralink would not work towards “taking over people’s brains”. Rather, he said, the principal objective would be to “achieve a symbiosis with artificial intelligence”.

Yet this is where the line between ‘progress’ and ‘dystopia’ tends to become blurred. Perhaps few people would object to BCIs being used to ameliorate medical conditions or cure diseases; but if this should lead to the ever-greater fusion of human and machine, as critics fear and some experts fully expect, then what might the future hold?

Things to come?

Two years ago, appearing before the World Government Summit in Dubai, Musk warned that humans could be rendered useless in an era of ubiquitous AI. Machines would be making perfect sense of data at a rate of more than a trillion bits per second, he said, while the flesh-and-bones stragglers of *Homo sapiens* would still be laboriously tapping messages into their smartphones. The best course of action, he asserted, would be to merge the two.

“We’re already cyborgs,” Musk said. “Your phone and your computer are extensions of you. But the interface is through finger movements or speech, which are very slow.” He ventured that a “high-bandwidth interface to the brain” might “solve the control problem and the usefulness problem”. If we do not accept as much, he claimed, the proliferation of an AI “smarter than the smartest human on Earth” could end life as we know it.



Much of the research on brain-computer interfaces and hi-tech prosthetics has been funded by the military – to help restore the lives of combat casualties. But it may one day be used to enhance the capabilities of soldiers in the battlefield.

“If this should lead to the ever-greater fusion of human and machine, as critics fear and some experts fully expect, then what might the future hold?”

This manner of vision is by no means novel. Irving John Good, a contemporary of fellow codebreaker and computer scientist Alan Turing at Bletchley Park during the Second World War, wrote in 1965: “The first ultra-intelligent machine is the last invention that man need ever make, provided that the machine is docile enough to tell us how to keep it under control.”

Futurist Ray Kurzweil coined the term ‘the singularity’ to describe the moment when machines become infinitely more intelligent than humans. The World Economic Forum has officially recognised “the singularity” as one of the most pressing issues around AI.

Kurzweil has predicted that we will necessarily meld with computers and that our thoughts, like so much data today, will be stored in the cloud. This raises a host of questions and concerns. Will our perceptions, emotions, decisions and memories remain our own in those

“Is the next logical – or even inevitable – step really to be able to download the sum total of humanity’s knowledge into our brains?”

circumstances? Might they be ‘hackable’ or serve as minuscule components of one monolithic, shared system?

Information can go both ways. We already access the sum total of humanity’s knowledge via our phones, tablets and laptops, so is the next logical – or even inevitable – step really to be able to download it all into our brains? Is this our sole hope of keeping pace with machines? Would we not then become machines ourselves?

“It’s going to be all mixed up,” says Kurzweil. “There’s not going to be a clear distinction between a human and a machine.”

There is also a military dimension to this. DARPA, the organisation that

Are we already cyborgs?

A technology that advances the mind-machine relationship but falls short of brain-computer interfaces is biohacking. In Sweden, where it has been available since 2015, around 3,000 people have undergone the necessary procedure – usually a simple injection of a microchip into the hand.

Supporters enjoy the convenience that biohacking can bring. For instance, they can use the data contained on a chip to open doors, register train tickets or make payments.

Yet problems around security persist. As well as concerns over who should be allowed to share personal information stored in this way, there is the grisly prospect of hands being sliced open – or off – to obtain a potentially valuable source of data. There are also fears that such implants could lead to infections or to reactions in an individual’s immune system.

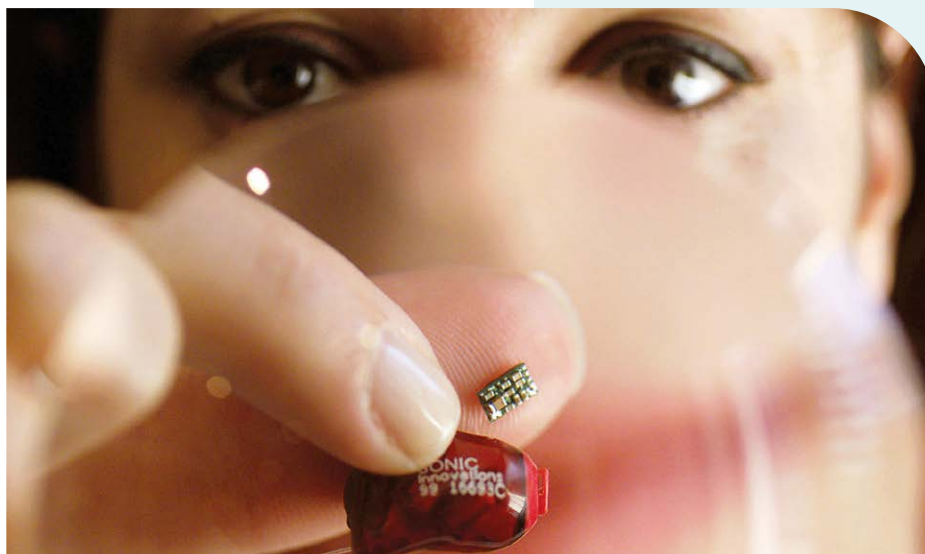
helped finance the 1970s research on brain-computer interfaces, remains at the forefront of neuroscience research. The organisation was created in response to the Soviets’ launch of Sputnik 1 in 1957. Its aim is to prevent the US receiving technological surprises ever again – and to create some of its own.

Former DARPA director Arati Prabhakar has always been enthusiastic about the potential of this branch of science but readily and repeatedly addressed the ethical challenges throughout her time in post.

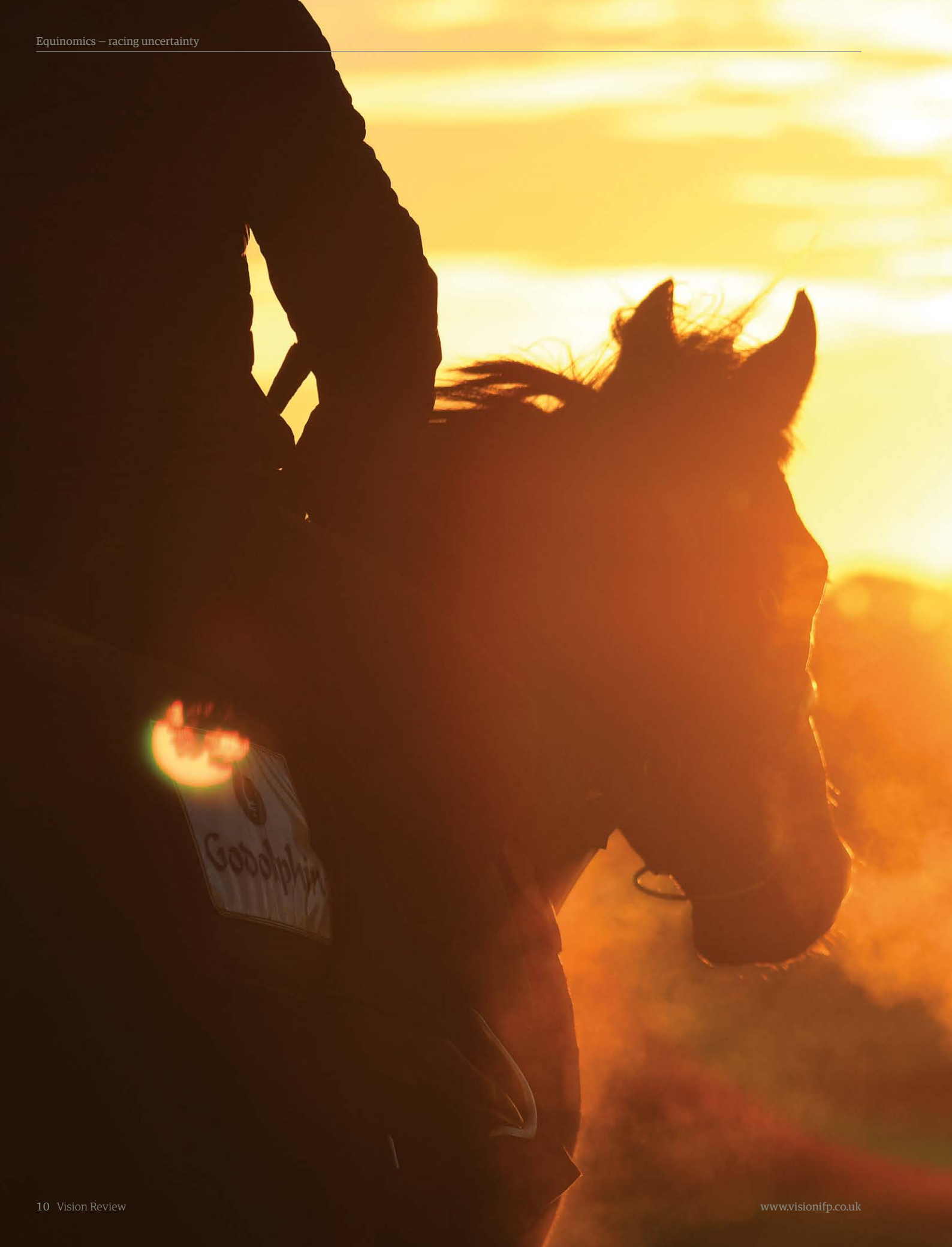
“In a possible future,” she says, “neural technology will enable a soldier to focus under fire by turning his heart rate down, or to sense an odourless biological threat, or to directly and intuitively direct a whole bevy of military systems that could keep an adversary at bay. In that future will the military ban neural enhancement, the way we ban performance-enhancing steroids today? Or, conversely, will neural enhancement become a condition of military service?”

“Neural technologies could enable people across society to overcome depression, to boost our physical health, to learn complex tasks in a flash... In that future will society think about neurotechnology the way we think about braces or even laser eye surgery? Or is there a time when we can begin to imagine a disturbing gap between the neural enhancement haves and have-nots?”

We have not yet completely cracked the neural code, which very probably does represent science’s final frontier. As we get closer, though, Prabhakar’s words will come to have greater significance. She says: “With these big possibilities come some big choices. In the choices we make we will reveal who we are and who we will become as human beings.”



Images: John Hopkins Uni/DARPA, David Gray/Reuters



Equinomics – racing uncertainty

Horseracing is worth billions of pounds to the British economy – and is particularly important to rural communities. But this is a high-cost sport that is facing many hurdles. As the going gets tougher, can the industry around it survive?

Jonathan Hill

During an unbeaten career, the racehorse Frankel won almost £3 million in prize money – a great return for his owners, whose initial outlay on him was several hundred thousand euros. But the earnings do not stop when a great horse leaves the winners' enclosure for the last time. Millions more can be earned in stud fees.

Frankel's father, Galileo, was himself a champion thoroughbred. He is rumoured to command stud fees in the region of €600,000. Frankel eclipsed his father's racing records and is off to a promising start as a stud. During their debut season in 2016, his progeny achieved a strike rate of 40% in terms of winners relative to runners. Scarcely surprising, then, that his owners already charge stud fees of £175,000. Frankel covered almost 200 mares in 2017. This horse is a cash cow!

Stable economy

Numbers like this would suggest that the racing industry is hugely profitable. It is certainly important to our economy. A report for The Thoroughbred Breeders' Association by accountants PwC in September 2018 estimated that horseracing contributes over £3.5 billion annually to the UK economy and supports over 85,000 jobs.

The prestigious Godolphin stable, whose UK base is near Newmarket, was founded by the Ruler of Dubai. It has produced hundreds of winners. Here one of its thoroughbreds takes part in a training session.

Image: Vince Caligiuri/Stringer/GettyImages

This, however, is an expensive sport. The average annual cost of owning and running a flat racehorse is close to £23,000. Around three-quarters of this is spent on training fees and much of the rest on racing costs (such as entry prices, travel expenditure and jockey fees).

The Balding family are one of Britain's most successful racehorse trainers. Emma Balding says: "This is a labour-intensive industry, and no amount of technology will change that – computers can't muck out horses!"

Few can afford to participate seriously. The Queen is Britain's best-known racehorse owner. Perhaps the next most famous is Sheikh Mohammed bin Rashid Al Maktoum, Ruler of Dubai, who founded the Godolphin thoroughbred operation and whose European headquarters are near Newmarket. His horses have won 5,000 races; last year alone they won 30 Grade I events – the highest level of thoroughbred and standardbred stakes races – including the Epsom Derby and the Melbourne Cup.

But a growing number of the 'ordinarily wealthy' are dabbling in the sport for fun – often in syndicates, whose members share ownership of a horse. For many of them the sport is a hobby rather than a business. Balding, whose son, Andrew, trains as many as 190 horses at any one time at their stables at Kingsclere, near Newbury, says: "If you rolled back 50 years you would find most owners were wealthy landowners. Breeding and racing horses was their leisure and pleasure. Today there are more syndicates within the breeding industry and owning side of it. These enable many more people to participate in the sport and to get more out of it."

Higher hurdles

As with owners, it is tough for trainers and breeders to make a profit. And it is getting tougher. A new law introduced in April limited the maximum stake on fixed-odds betting terminals in betting shops from £100 to £2. The move,



Race numbers



3,318
breeders
in the UK



£12,000
estimated loss
made on an
average filly
sold at sales



66%
of breeding
operators
unprofitable



24%
of the world's
top 100 races
are hosted in
Britain

Source: Report for The Thoroughbred Breeders' Association by PwC, September 2018

brought in to help tackle gambling addiction, has meant a big drop in bookmaker earnings. William Hill has already announced it is to close around 700 of its licensed betting shops.

Bad results have also hit bookmakers' profits this year. This feeds through to the racing industry, which receives a levy on those profits. It is expected to receive £17 million less than in 2018. And this is before the effect of the new gambling restrictions has fed through to profits.

This is already leading to cuts in prize money and creating a vicious circle. The average 'cost per run' is approximately £3,000 for a flat racehorse and £3,500 for a jumps horse. With prize money in some races falling below £3,000, owners are questioning whether it is worth running their horses. It means field sizes are dropping, which makes races less exciting to watch.

All this is happening against a backdrop of already-falling attendances. A recent in-depth study by a team at Liverpool University (which offers an MBA in Thoroughbred Horseracing Industries) shows that, though numbers for events like the Cheltenham Festival and Royal



Ascot held up, attendances at many jumps meetings were more than 25% lower in 2018 compared to 2002. In part this is because of ubiquitous coverage of race events on specialist TV channels.

Heavy going

Two-thirds of breeding operators were unprofitable in 2018. The average return on capital in the industry is just 1-3%. It is perhaps not surprising that nearly one in 10 breeders has left the industry in the past five years.

Balding, who also runs a stud farm, says: "It's very tough. If you're not having any success, it's impossible. One good sale on our stud can bankroll the business for a couple of years, but one good sale might come along every five years. So in between you have to be canny. The thing that's a killer is when you're left with a horse that doesn't make a sale because it isn't conventionally good-looking in the ring. You have to train it for another year to prove its merits, and that adds £30,000 to the bill."

Brexit, too, could prove a major hurdle. There are over 26,000 free movements of horses for racing, breeding and sales

Above left: A bay filly is paraded during a sale at Tattersalls, the leading auctioneer of racehorses in Britain and Ireland. The Newmarket-based company sold a record 331 million guineas' worth of bloodstock in 2017.

Above right: Tom Queally rides Frankel to victory in the Queen Elizabeth II Stakes at Ascot in 2011. Frankel won more than £3 million in prize money during an unbeaten career that spanned 14 races.

"Two-thirds of breeding operators were unprofitable in 2018. The average return on capital in the industry is just 1-3%."

purposes between the UK, Ireland and France, and these may face additional checks. In addition, nearly half of British stud farms employ at least one EEA member of staff (11% of the UK breeding workforce), who often hold specialist skills that cannot be easily replaced.

Animal rights

Added to all this is another threat – from animal rights campaigners. Animal Aid

claims that around 200 horses die on racecourses each year. Its members want an end to all commercial racing. Its criticisms are hitting home, and there is a growing drive within the industry to tackle welfare issues.

Dr Madeleine Campbell, from the Royal Veterinary College, told delegates at this year's Horseracing Industry Conference in Liverpool that ignoring critical public opinion could ultimately lead to the sport's abolition. She said more could be done to improve horseracing's image – including banning the use of whips to encourage the horse to run faster. But she said: "Although racing does involve some harm to animals, it is outweighed by the benefits of racing – not only to humans but to animals."

Balding says: "The vast majority of us care desperately for our horses, and the horses love the action. They are as competitive as the humans on them. I've seen some really quite average horses win races because they want to. They are athletes and they train like athletes. You can say a horse doesn't have a choice about this, but if a horse doesn't want to race you really can't make it."

Balding is a trustee of Retraining of Racehorses, a charity that promotes the welfare of racehorses when they retire from the track. She says: "Many of them don't enjoy retirement – they miss the buzz of the track, so they often go on to eventing, polo, dressage and endurance riding. They can make a fantastic buy for an experienced horse lover, but you have to learn to look after a thoroughbred. They do everything a bit quicker than your plodding pony."

Horseracing has never faced so many challenges, but it remains the second most attended sport in the UK after football. The odds are not stacked against it, but its future is uncertain. One thing is clear, though – for those drawn to racehorse ownership by the dream of unearthing a new Frankel, a stable investment is sometimes not found in a stable.

The fast fashion rebellion

Clothes retailers have a vested interest in us regularly buying new clothing to stay in tune with a fashion cycle that they spin ever quicker. But it seems that a growing number of us are rebelling.

Kate Elliot





American model Lauren Hutton once said: “Fashion is what you’re offered four times a year by designers. Style is what you choose.” For many years now, new fashions have been offered to us on an almost weekly basis.

Spanish store Zara pioneered ‘fast fashion’ – it can design, produce and display a garment in its stores worldwide in just 15 days. The fact that those garments may be on the rack for only a couple of weeks pressures consumers to buy before stock disappears.

Other discount brands and online retailers, such as Primark and boohoo, have also accelerated supply and production processes, driving down prices to the point where dresses can be marketed for as little as £5.

From waist to waste

Faster production, cheaper pricing and smart social media marketing mean that fashions fade faster than ever, making many garments single-use items – and often not even that. UK adults have been estimated to spend on average £733 a year on clothes that remain unworn in their wardrobes. We are buying five times as many outfits as we did in the 1980s. The environmental impact is sobering.

It can take up to 2,700 litres of water to produce a cotton T-shirt. The majority of this water footprint is linked to cotton farming – a problem exacerbated by the fact that much of the world’s cotton production is concentrated in water-scarce regions. Meanwhile, textile dyeing is the second-largest polluter of clean water in the world.

The total amount of greenhouse gas emissions from textiles production – 1.2 billion tonnes annually – exceeds that of international flights and maritime shipping combined. If the fashion industry does not adapt, some estimate that it will use up a quarter of the world’s annual carbon budget by 2050.

Synthetic materials such as polyester and acrylic come with their own problems

and have been linked to global plastic pollution. For example, a single wash can release 700,000 microfibrils, many of which end up in the sea, turning our oceans into what one marine scientist refers to as “a big plastic soup”.

Disposal is largely inefficient. Around 50 trucks’ worth of used clothing ends up in landfill every day in the UK, with environmental charity WRAP estimating that we dispose of £140 million of clothes in this way each year. Historically less than 1% of disposed clothing has been converted into new products, as most common recycling methodologies struggle to separate blended materials like polyester and cotton.

“If fashion brands do not change their ways by 2030 then the decline in earnings could reduce overall industry profits by some \$52 billion.”

In February 2019 the UK’s Environmental Audit Committee published a report condemning unsustainable practices in the fashion industry. The government rejected its recommendations to ban incineration or landfilling of unsold stock that could be reused or recycled.

Smart fashion

It is increasingly clear that we need to introduce ‘circular economy’ principles, where waste is designed out from the start, to fashion. The journey of a Rapanui T-shirt exemplifies this approach.

Sourcing organically produced Indian cotton, the company produces shirts in a factory powered by renewable energy. The shirts are dyed with recirculated water and designs are printed on shirts only once orders have been made to avoid overproduction. After use, the shirts can be returned for store credit and, being made from 100% cotton printed with ink that is easier to remove, can easily be recycled into another garment.

As one might expect, these shirts are more expensive than those from discount brands. And there lies the challenge. Affordability remains a priority for many consumers, forcing them to choose between their consciences and their wallets.

The solution may lie in widespread adoption of better technology. Worn Again Technologies argues that there are so many non-reusable textiles and plastic bottles ‘above ground’ that we do not need more “new” raw materials: we need instead to be better at turning the old into the new.

Worn Again’s patented polymer recycling technology separates contaminants, dyes and blended materials from clothing and returns them to raw material state for future re-use. Its research is being backed by investors like fast fashion giant H&M.

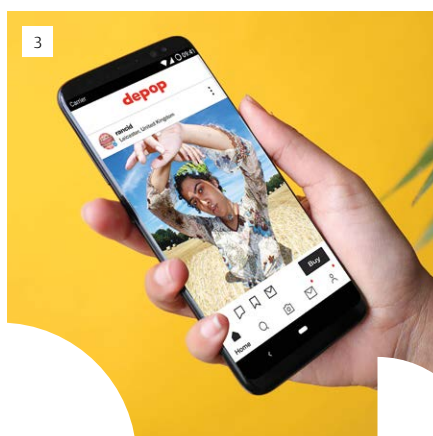
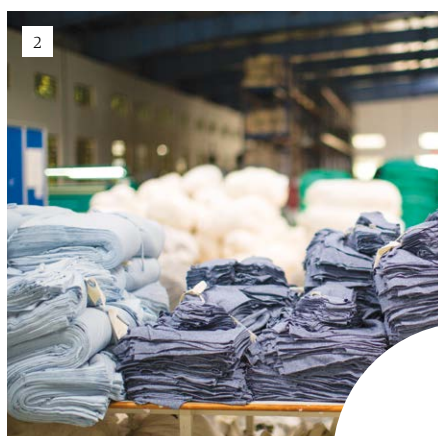
And H&M is not the only fashion retailer recalibrating its business to promote greater sustainability. Zara has recently pledged that by 2025 it will use only organic, sustainable or recycled cotton, linen and polyester. Outdoor clothing company Patagonia was the first to produce a polyester fleece from recycled plastic bottles. And for a number of years Kering has published environmental profit and loss accounts in parallel with its financial ones.

There is a business imperative, with future profitability at risk. A 2017 report, *Pulse of the Fashion Industry*, projected that if fashion brands do not change their ways by 2030 then the decline in earnings could reduce overall industry profits by some \$52 billion.

Is “off trend” on trend?

New technologies and circular economy innovations are in their infancy, however, and some consumers are reviving more old-fashioned methods to make a more immediate contribution to sustainability.

Oxfam recently publicised the issue of fast fashion through its #SecondhandSeptember campaign,



asking shoppers to say no to new clothes for 30 days. Online US thrift store thredUp's annual report predicts that second-hand clothes will make up a third of closets by 2033, comfortably overtaking fast fashion. A recent poll of 1,500 people in the UK showed that 45% would buy pre-owned clothes.

Depop, a social media/second-hand shop hybrid, is a mobile platform for users to sell their unwanted or vintage fashion items and accessories. Selfridges is hosting Depop sellers on a monthly basis to highlight changing attitudes within fashion. Similarly, Asda is hosting a 'Re-Loved' charity clothing pop-up shop to improve the environmental impact of its George clothing brand operations.

1: This 18,500 sq ft Oxfam superstore in Oxford is staffed by 150 volunteers and has a drive-through option for people to drop off donations. 2: Clothes

manufactured in India with organic sustainable cotton. 3: More than 13 million people use the Depop app to buy and sell vintage clothing and other items.

"The total amount of greenhouse gas emissions from textiles production – 1.2 billion tonnes annually – exceeds that of international flights and maritime shipping combined."

Vintage and second-hand clothing is finding a new lease of life among the younger generation. This trend is supported by the proliferation of online platforms, the ubiquity of charity shops and the emergence of popular vintage fashion shops in many cities.

Emily Stott, a 20-year-old Exeter University student, is one of a growing number of younger consumers committed to buying as much as possible second-hand. "The environmental benefits are important," she says, "but second-hand clothes are also cheaper, the materials are often better, and I will probably be the only one wearing an item, which I like."

The idea of sustainable fashion is not just a millennial trend. Financial journalist Simoney Kyriakou says: "I recently realised that I had reached the age of 42 having never thrown any of my clothes in the bin. People need to learn to use a needle and thread!

"If I find jeans with tears then I patch them with other reclaimed bits of fabric. If my old clothes are in too poor condition to be donated then I use them as cloths or rags. There's a use for everything."

Kyriakou's message will resonate with older generations brought up to waste not, want not. And it seems that others are recognising the benefits of a "make do and mend" mindset.

Rachelle Strauss, founder of an annual awareness campaign, Zero Waste Week, says knitting and sewing classes are starting across the country as younger generations seek to rediscover the lost skills of repairing clothes. "Our grandmothers wouldn't think twice about sewing on a button, repairing a hem or darning socks," she says. "It was normal and expected."

Fast fashion may not yet be hanging by a needle and thread, but consumers are increasingly demanding a style that is more sustainable – and the industry is under pressure to respond.

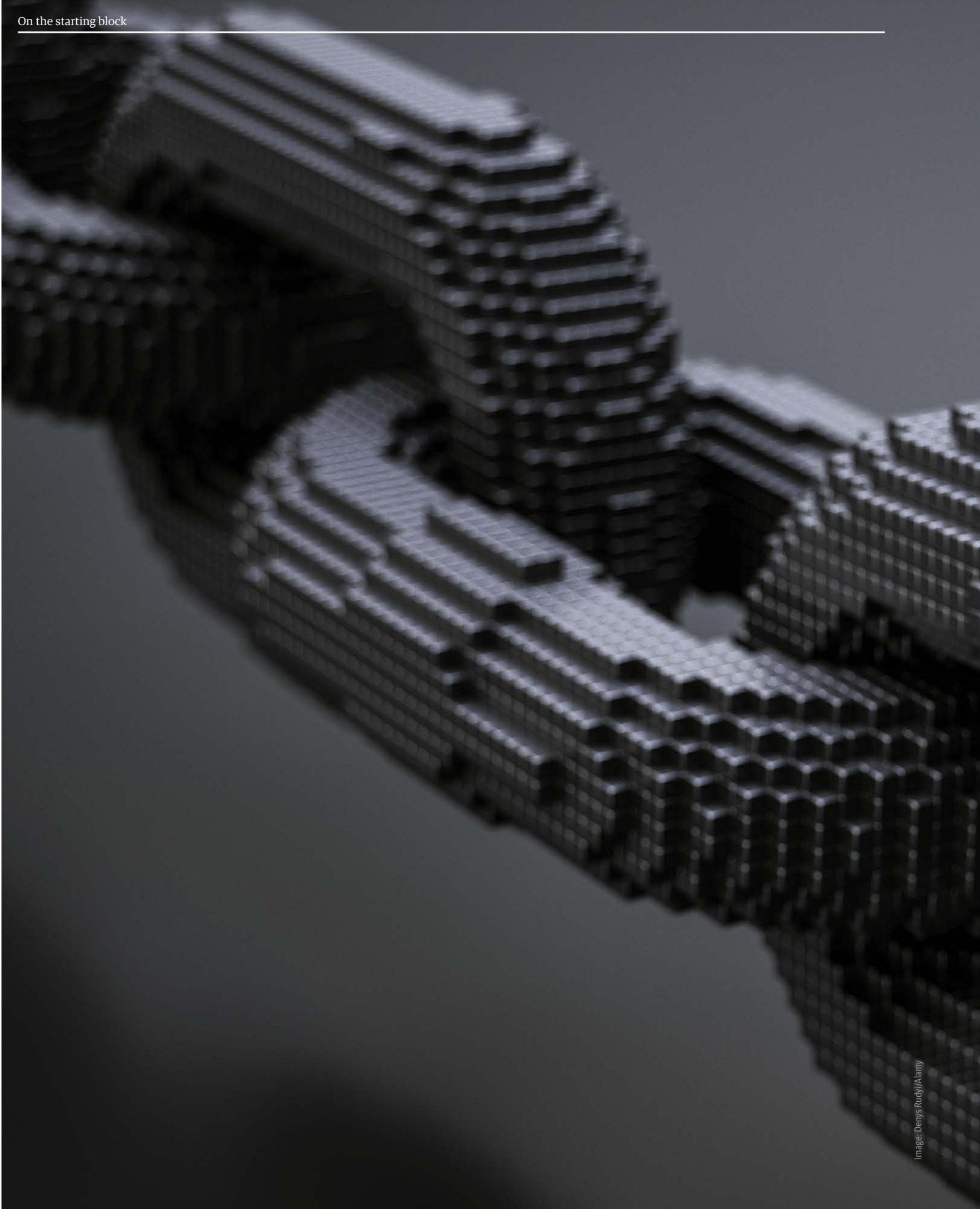


Image: Denys Rudyj/Alamy

On the starting block

Blockchain technology could one day transform our lives, so it is remarkable how little most of us understand it. Even the experts struggle to make it clear. Our blockchain primer may help you begin to understand what the fuss is about.

Steven Haines

Blockchain is being touted as a radical and cost-effective means of transforming myriad transactions and processes. What is it and is it going to be as revolutionary as some people claim?

What is blockchain?

Blockchain was introduced to the world in 2009. It served as the methodology underpinning cryptocurrency bitcoin.

Key to any transaction is trust. Often this arises from the involvement of third parties, such as a banker, a solicitor or an estate agent. Blockchain is a clever way of storing and sharing a trusted network of data. It could eliminate the need for these intermediaries, making a whole host of transactions cheaper and quicker.

The technology works by storing multiple copies of all the transactions of a deal as it progresses. This is called distributed ledger technology (DLT). Information in the blockchain is protected using cryptography, so it cannot be hacked and changed.

Blockchain has tremendous potential to disrupt existing ways of working across facets of life, from registering land in remote parts of the world to speeding up insurance claims.

How does blockchain actually work?

The easiest way to illustrate how blockchain works is to look at bitcoin. The illustration opposite compares how a traditional electronic transaction works with a payment via cryptocurrency.

What is a block?

The blocks in a blockchain are made up of pieces of digital information in three parts:

1. Blocks store information about transactions such as date, time and value.
2. Blocks store information about who is participating in transactions, using a unique, anonymised digital signature.
3. Blocks store a unique code, called a hash, which ensures that every block in the chain looks different.

How does a block get into the chain?

When a block stores new data it is added to the blockchain; this is how the chain of blocks is created. Before the new block can be added to the chain four things need to happen:

1. A transaction must occur.
2. The transaction must be verified. Instead of using humans, with blockchain this is done by a network of computers (up to five million in the case of bitcoin).
3. The transaction information (date, time, various digital signatures) is stored in a block.

How cryptocurrencies work

Buying a cup of coffee with a traditional credit card or with a cryptocurrency underpinned by blockchain technology



With a traditional credit card

1. Give your credit card details to the barista
2. Café asks the bank if you have the money in your account (authorisation)
3. Bank checks its records (ledger)
4. If the answer is yes then the bank tells the café
5. Bank updates its records (ledger) to show the movement of the money from your account to the café's
6. The bank collects a fee
7. You get your coffee



With bitcoin

1. Give your bitcoin wallet details to the barista
2. Café asks all the computers in the bitcoin blockchain (known as ledgers) if you have the money in your account
3. They check their records
4. If the answer is yes then they all tell the café
5. All the ledgers update their records to show the movement of the money from your account to the café's
6. The first computer to validate the transaction receives a small fee in cryptocurrency
7. You get your coffee

4. When everything in the block is verified, it is allocated its unique hash identifier. This also defines it as the most recent block added to the chain.

The information in the blockchain then becomes publicly available. For instance, you can go to blockchain.com and look at all the bitcoin transactions.

Is blockchain secure?

Anyone can view the contents of a blockchain, but you can also connect an individual computer to it. After this the computer is automatically updated each time there is a new transaction and a new block added. This means that thousands (or, in the case of bitcoin, millions) of computers have a copy of the same blockchain. Each copy of the blockchain is identical. Because there are so many, it is difficult for hackers to manipulate them all. A single block will fail the verification stage if it does not match itself in the other computers.

The transactions in the blockchain are anonymised (the only identifying feature is the secret digital signature) to protect privacy.

How do you avoid human error?

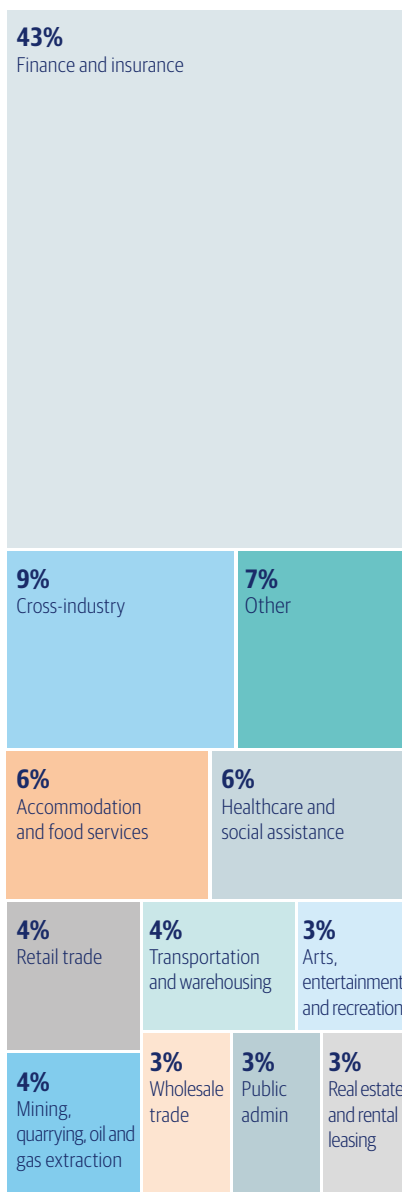
Human error could mean that one computer's copy of the blockchain differs from the rest. This is overcome using a process called consensus. If there are multiple, differing copies of a blockchain, the longest chain available becomes the master copy. The blockchain with the most users will grow fastest, and the blockchain with the most users will be the blockchain that is most trusted. Since technology cannot know if a block does not match due to human error or malicious activity, the same approach to policing works for both.

What are the uses of blockchain?

Cryptocurrencies are only the start of the potential applications for blockchain.

Where is blockchain gaining traction?

The latest *Global Enterprise Blockchain Benchmarking Study*, published by the University of Cambridge's Centre for Alternative Finance, highlights blockchain's use across a variety of industries. The financial services sector remains dominant in applying this still-emerging technology.



Source: Cambridge Centre for Alternative Finance: *Global Enterprise Blockchain Benchmarking Study*, 2019; data collected from more than 160 entities across 49 countries [shortfall accounted for by rounding]

Experts say blockchain is already being used in financial processes such as settlement, clearing and cross-border payments.

However, our digital infrastructure extends well beyond financial services. Blockchain technology could, for example, be used to manage food and drug supply chains to guarantee authenticity and prevent adulteration. It could be used to create land registries in places like Africa and protect farmland from being stolen, or to ensure royalty payments to musicians when their music is played over the internet. It may enable online democratic elections. And it could make buying and registering a vehicle simpler.

Why hasn't bitcoin taken over the world?

Blockchain and cryptocurrencies suffer from being new, so cryptocurrencies are difficult to spend and volatile. This is not the fault of blockchain. However, the computing power needed to create the unique hash for each bitcoin blockchain block would power an average US household for eight days. This makes a large-scale blockchain such as bitcoin environmentally unfriendly and very expensive.

The issue could be addressed by the development of super-fast quantum computers, but this might cause another problem. Blockchains could become hackable because the computer power will exist to reprogram all the hashes in a blockchain, rendering them insecure.

Another issue is 'garbage in – garbage out'. Most people have suffered from inaccurate data in a computer at some point, and blockchain is not immune to this problem.

So is blockchain going to be as revolutionary as some people say? Almost certainly yes – there are so many applications where it could prove useful. But not yet.

Allergic to life

Allergies are on the rise, with every generation seeming to suffer more than the previous one. Are we becoming more sensitive to the world around us?

Ian Dembinski

In 1827 *The Times* reported that the Duke of Devonshire was “afflicted with what is vulgarly called the Hay-fever”. A few years earlier his condition did not even have a name. A doctor, John Bostock, first described the symptoms to the Medical and Chirurgical Society in 1819. The public soon caught on to the idea that these symptoms were caused by the effluvium – smell – of new hay.

Bostock, who had suffered every June since the age of eight, had tried to alleviate his misery with bleeding, cold baths and even opium. He eventually found relief by moving to the coast for the summer. By the end of the 19th century hay fever was known as the aristocrats’ disease and seaside resorts advertised themselves as places to escape its effects.

Food allergies have a longer recorded history. Two thousand years ago the Chinese issued edicts warning pregnant women against foods like shrimp, and Hippocrates (460–377 BC) referred to ‘hostile humours’ that made men ‘suffer badly’ after eating cheese. But food allergies only began to be studied methodically in the 1920s.

It is clear that for most of history the incidence of allergies was so low they were seen merely as medical curiosities. In the past three decades,

“Around 30% of UK pensioners suffer allergies, but that number rises to 50% for their grandchildren.”



Clutching at strawberries

Richard III is best known for killing the princes in the Tower of London and being buried under a car park in Leicester. Less well known is the fact that he would break out in hives if he ate strawberries. Legend has it that he once furtively consumed “a messe of strauberies” and then blamed his reaction on witchcraft orchestrated by a political opponent. His rival was summarily beheaded.

however, successive generations across Europe, the USA and developing countries have reported sharp increases in the numbers affected.

Serious health implications

Around 30% of UK pensioners suffer allergies, but that number rises to 50% for their grandchildren. The UK has the highest rate of asthma in the world – there are 50,000 asthma-related hospital admissions each year – and allergic rhinitis (sneezing and a runny nose) affects almost one in four of us.

All allergies are rising and food allergies in particular. There was a five-fold increase in peanut allergies between 1995 and 2016. With this comes an increasing risk of food-induced anaphylaxis, which has risen by 41% in six years.

Overreacting

An allergy happens when your body encounters a normally harmless foreign substance called an allergen and overreacts.

It produces an antibody called immunoglobulin E (IgE). Antibodies are normally a good thing – they circulate in the bloodstream and help remove harmful bacteria or viruses. There are many kinds of IgE – one for each allergy.

Notices

ALLERGY WARNING

This facility
processes food with
the following
ingredients:

eggs
fish
cream
milk
corn
shellfish
peanuts
tree nuts
Soy
garlic
onions (red)
tomatoes
beef
pork
cheese
salt
chicken
celery
pepper
beans
mushrooms
seeds
chocolate
cilantro
grapes
vegetables
cumin
chile
Onions (white)
Vinegar
cinnamon

“There is clear evidence that children exposed to dirt are less likely to develop allergies.”

When the antibody is inhaled, swallowed, touched or injected (through an insect bite, for instance) the IgE rush to the body's defence. They release a cocktail of chemicals that latch on to nerve cells, triggering itchiness and coughing or other familiar symptoms.

Why we get allergies is less well understood. Natural selection would have favoured individuals with an immune system that could fight off pathogens. How is overreacting to harmless ones of benefit?

Finding the causes

One theory blames tiny parasitic worms. More than 20% of the Earth's population has a parasitic worm infection. Before modern health systems our ancestors faced a lifelong struggle against them. The theory suggests our body learnt to recognise the proteins on the worm's surface and evolved IgE antibodies in response. The antibodies ensured that immune system cells quickly repelled any parasite trying to get in. “You need to react within an hour to reduce the chance of these parasites surviving,” says David Dunne, a parasitologist at the University of Cambridge.

The worm theory states that proteins on parasitic worms are similar in shape to other molecules we now regularly encounter in our lives. If our body detects them it mounts a pointless defence to violently eject them. “Allergy is just an unfortunate side effect of defence against parasitic worms,” says Dunne.

Given the rise in allergies, this would

Most common food allergies in children



Cow's milk



Fish and shellfish



Hen's eggs



Peanuts



Soy



Wheat



Kiwi fruit

Source: NICE

suggest we are coming into contact with far more of these molecules than historically. The body is mistaking them for parasites.

Another theory is that we are increasingly lacking vitamin D, which is known to have antioxidant properties that may be good for us. American scientists have established a link between children with asthma and low vitamin D levels. Doctors say 80% of it should come from the sun, but on average we spend only 10% of available daylight hours outside.

Changing diets could also be to blame. Stephen Till, a professor of allergy at King's College London, says: “The commonest new onset severe food allergy I see is to prawns. The type of food we eat has changed a lot in recent decades due to changes in the food industry.”

The growth of heavily processed food is considered another factor. The way some foods are processed – modern bread grains, for example – may increase the allergenicity of food.

One of the most popular arguments is that we are too clean. There is clear evidence that children exposed to dirt are less likely to develop allergies including asthma. Amish children, for instance, have half as many allergies as their city-dwelling counterparts. Some products we use to avoid germs, such as antibacterial soaps, may prevent the healthy development of a child's immune system.

All children go through a phase of putting everything in their mouths. And all parents know the lengths we go to in order to prevent this. But that could cause an increase in allergies. If the body does not have to fight parasitic worms, might the immune system turn against harmless substances? No single



"The only way to prevent an allergy is to avoid the allergens that cause you problems. We have not yet found a way to cure them."

answer seems completely satisfactory, and the research continues.

Searching for cures

The only way to prevent an allergy is to avoid the allergens that cause you problems. We have not yet found a way to cure them, though a temporary reprieve is possible. Where an allergy is especially severe the sufferer may undergo immunotherapy, using an injection, drops or tablets, but this is not a permanent cure.

Early consumption of trigger foods has been shown to prevent an allergy developing by exploiting the gut's immune system and enabling it to create a more resilient biome (the bacteria in your stomach). A US study has suggested that eating allergenic foods when you are pregnant and breast feeding can reduce the level of allergy in your child.

And we keep returning to those worms. Curiously, the lowest incidence of autoimmune diseases, such as multiple sclerosis, occurs where the level of infection by parasitic worms is highest.

Allergy or intolerance?

A true food **allergy** causes an immune system reaction that affects numerous organs in the body. In some cases an allergic food reaction can be life-threatening. In contrast, food **intolerance** symptoms are generally less serious, take a while to develop and arise when you eat a substantial amount of the food.

From 2021 businesses will have to clearly label all ingredients and allergens on products. The new law was introduced after campaigning by the parents of 15-year-old Natasha Ednan-Laperouse, who died in 2016 after eating a Pret a Manger sandwich that contained sesame.

That these foreign bodies manage to survive, even though the IgE antibody has evolved to eradicate them, has set scientists investigating how they hide from our immune system.

They have found that the parasites secrete a chemical that suppresses our immune response. This chemical also reduces other autoimmune responses such as those that cause Crohn's disease. When human hookworms (which grow to about 8mm) are introduced into the guts of sufferers their symptoms are reduced. The worms cause side effects, so the focus is on synthesising a drug with the same chemical properties. Investigators are exploring if the therapy could be used to treat asthma, an allergy with similar characteristics.

The 'old friends' allergy hypothesis states that the immune system becomes fully effective only if stimulated by exposure to the microorganisms and parasites that have coexisted with us throughout evolution. If they can cure our allergies they will not just be our oldest friends but also some of our best ones.

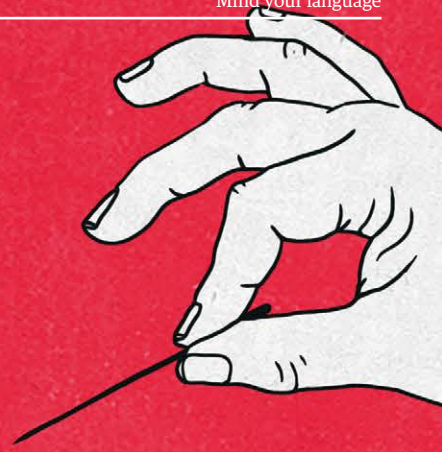


Image: Sergio Ingravalle/Ikon Images

Mind your language

'Political correctness' has become a catchphrase for any attempt to control and shape the language we use. Has it made us more tolerant and respectful or undermined our rights? And what influence has it had on Brexit and Donald Trump's rise to power?

Elliot Bancroft



In 1997 council staff in Birmingham needed to create a marketing campaign that covered a series of events in the city centre over 41 days. These included BBC Children in Need, the switching on of the Christmas lights, a German Christmas market, an outdoor ice-rink, Diwali, an extensive arts programme and a huge New Year's Eve party.

To market everything individually would have been expensive and time-consuming. They needed a generic banner to capture all the various activities and attract a sponsor. They came up with a portmanteau – Winterval, a combination of 'winter' and 'festival'.

To their astonishment, they suddenly found themselves in the eye of a media storm. "Council bans Christmas!" screamed headlines. "Political correctness gone mad!" cried the critics.

The accusations would not have gained momentum if people had not intuitively suspected that there existed those in authority who might genuinely wish to erode their cultural traditions and shape their behaviour through language. In a sense, as we shall see, they were right.

History

The first recorded use of the term 'politically correct' was in 1793, in an American Supreme Court judgment. It was only in the 20th century that the phrase began to gain traction, initially among left-wing activists. It was used ironically – a term of gentle mockery for political bedfellows who were being self-righteous and dogmatic.

By the 1980s Thatcherites had appropriated the term to berate the 'loony left' and the antics of 'Red Ken' Livingstone at the Greater London Council.

Back in America, in 1991, President George Bush Senior identified political



Alf Garnett was the central character in *Till Death Us Do Part*, a popular BBC sitcom that ran from 1965 to 1975. Played by Warren Mitchell, he was famous for his racist, sexist, xenophobic and anti-socialist views. The intention was that the audience would find him a figure of ridicule, but research found that many viewers instead agreed with him.

"When we change the language we use we're often helping to correct power imbalances."

correctness as a major danger. He said: "The notion of political correctness has ignited controversy across the land...In their own Orwellian way, crusades that demand correct behaviour crush diversity in the name of diversity."

The reference to George Orwell was deliberate. In his book, *1984*, Orwell's infamous 'thought police' tried to control people through language. Hazel Price, a linguistics lecturer at the University of Huddersfield and editorial assistant at language magazine *Babel*, says: "At the time Orwell was writing there was a belief – the Sapir-Whorf hypothesis – that language determines thought. Experiments have disproved the theory, but there's empirical support for a softer

notion that language does influence the way we think."

Laurie Cohen, a professor of work and organisation at Nottingham University Business School, agrees and points to how the creation of the term "sexual harassment" in the 1970s gave women who for years had been the subject of bottom pinching and lewd comments a language to explain how they felt. It helped to ensure that offences were recognised and taken seriously and ultimately improved behaviour at work. "Language is often about power," she says. "When we change the language we use we're often helping to correct power imbalances, which is what's happening when, for example, gay people reclaim a derogatory word like 'queer' and make it a badge of honour."

Modern attacks

Even during the bitter political conflicts of the Thatcher era, when the *Sun* newspaper regularly ran stories about puritanical Labour councils to illustrate acts of "political correctness gone mad", the tone was mockery.

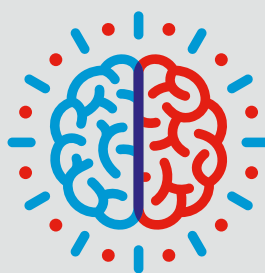
Then came Trump, who during the 2016 election regularly raised the spectre of a conspiracy to suppress opportunities for ordinary working Americans through political correctness. When a TV presenter accused him of calling “women you don’t like ‘fat pigs, dogs, slobs and disgusting animals’”, Trump returned to a familiar defence. “The big problem in this country is being politically correct,” he said, to whoops and applause from the studio audience.

This sentiment is echoed by right-wing commentators like William Lind, the director of the Center for Cultural Conservatism. He says: “For the first time in our history, Americans have to be fearful of what they say, of what they write and of what they think. They have to be afraid of using the wrong word, a word denounced as offensive or insensitive, or racist, sexist or homophobic... It is the great disease of our century, the disease that has left tens of millions of people dead in Europe, in Russia, in China... It is the disease of ideology.”

What interests Cohen is that this rhetoric resonates with so many Americans. She says: “American sociologist Arlie Russell Hochschild spent a lot of time researching Trump voters. She found millions of ordinary people who have been sold the American Dream and fed the line that if they work hard enough they’ll get to that glittering place on the top of the hill. They worked hard but got no closer, and they’re mad about it. Trump has capitalised on this. Political correctness has become an ideological scapegoat – he tells them that women, black people, Mexicans and Muslims have all been allowed to jump the queue ahead of them. We saw echoes of that in the Brexit debate, too.”

Cohen argues that social media has allowed this blame culture to take root and spread. “The anonymity and distance of social media make this aggressive and inflammatory language

“The key thing to remember is that political correctness starts from a good place – it’s about being sensitive to people’s identity and beliefs.”



Not always political

Mental health charity Mind was accused of policing language after it encouraged people not to use terms such as ‘mentally ill’ and ‘sufferers’. One commentator lampooned “snuffling, pointy-nosed witch finders”. The charity’s director of communications at the time, Ruth Richards, argued that it was simply responding to feedback from members who did not want to be defined by their illness. She said: “Language is powerful. It can shape how we see the world. Shifts in language can drive and reflect a change in public attitudes.”

even more possible, with very scary consequences,” she says.

Social media can exacerbate the problem in other ways. Critics of political correctness say the vitriol that can be heaped on those who ‘say the wrong thing’ suppresses healthy discourse.

Writing in the *Spectator* magazine, associate editor Douglas Murray highlighted the case of an 18-year-old Utah schoolgirl who posted online a picture of herself in a traditional Chinese dress on prom night. She was globally berated for casual racism and cultural appropriation. Murray listed several other incidents of people daring to speak their minds and falling victim to ‘volunteer scolds’. He said: “Today nearly all real public discussion has become impossible. Which is why nearly all public thinking has become impossible. Which is why the thinking has gone bad on nearly every major issue now facing us.”

Price is fascinated by the emotional reaction that political correctness evokes. She believes that some of it is down to discomfort with change. “Society’s norms change,” she says. “Look at our attitudes to homosexuality, which was taboo in the 1950s and is much more widely accepted now. Language evolves to accommodate that. But adjusting attitudes is hard for some people. The key thing to remember is that political correctness starts from a good place – it’s about being sensitive to people’s identity and beliefs.”

Maybe we should all try to bear that final sentiment in mind as the debate rumbles on. And maybe we should also recall what Orwell said in another of his masterpieces, *Politics and the English Language*: “If thought can corrupt language, language can also corrupt thought.”

The road to Tokyo – part II

A year ago we reported on Team GB kayaker Jess Walker and her bid to achieve the ultimate sporting success – an Olympic gold medal. Here we bring the story up to date as Jess continues her quest for a place at the 2020 Games in Japan.

Roger Edwards

The late Vince Lombardi is among the most celebrated figures in the history of American football. He is best known for coaching the Green Bay Packers during their trophy-laden glory years of the 1960s, which included two Super Bowl triumphs and five NFL titles. He is also fondly remembered for his observations about sport in general.

One of his most famous remarks encapsulates the harsh reality that even successful athletes very seldom experience nothing but victory. The truth is that everyone suffers setbacks – and only those who find it within themselves to recover go on to greatness. “It’s not whether you get knocked down,” Lombardi said. “It’s whether you get up.”

Jess Walker appreciates the sentiment. The kayaker’s dream of securing a place at the 2020 Olympic Games in Tokyo remains in the balance, and she will need to demonstrate her ability to bounce back from disappointment in the months to come.

“The road to Tokyo was never going to be completely straightforward,” says Jess, already a three-time Olympian, who had hoped to qualify via the 2019 World Championships. “But I still have more chances to earn my spot, and I’m excited by the challenges that lie ahead.”

Jess is acutely familiar with the ups and downs of a sporting life. In 2008 she became the youngest-ever Olympic kayaker when she represented Great Britain in Beijing. In 2012, in London, she came seventh in the 200-metre single kayak class and was also part of the crew that placed fifth in the four-person 500-metre race. She was gutted to miss out on a medal in Rio in 2016.



Jess training at a warm-weather camp in Australia.

“I really appreciate all the backing, which is essential to my hopes of bringing home a medal”

Since then she has been steadily improving her speed and technique in what is now her chosen discipline, the 200-metre sprint. Demanding supreme power and precision, this is an event in which tiny fractions of a second routinely separate the medal winners from the rest.

So it proved at the World Championships, which were held in Szeged, Hungary, in August. Jess narrowly missed out on a top-three spot in her semi-final, meaning she had to contest what is known as a B final – which determines the standings from 10th to 19th. Only an overall top-five finish would have guaranteed her participation in Japan.

Now she must turn her attention to Team GB’s national selection race, scheduled for the end of March, which she will need to win to progress to a second Olympic qualification round. If all goes well then she could face further crunch events in the Czech Republic and Germany next spring.

Before then, as ever, it will be a matter of maintaining her rigorous training

regime – beginning with a warm-weather camp in Australia. “It’s very cold at home, and I also have to train on my own there,” says Jess. “That’s why I took an opportunity to train with the Australian women’s team. I can make the most of excellent conditions and work with good athletes who can really push me.”

Jess will spend some time back in the UK, further building her strength in the gym, before returning to Australia for another seven weeks. “All the travelling also provides a chance to monitor how I respond to jet lag,” she says. “It should help us understand my ideal preparation, especially in terms of recovery time, with Tokyo in mind.”

Many elite athletes who compete in sports that might not be widely regarded as “glamorous” rely on external support, which can make an enormous difference to their ability to reach their full potential. Jess is no exception, and Vision is proud to sponsor her latest Olympic quest – as are two of our long serving advisers, Michael Captieux and Paul Duval, and Rathbones plc.

“I really appreciate all the backing, which is essential to my hopes of bringing home a medal,” says Jess. “And that’s how I view this whole journey – everything I do is part of what it means to race for an Olympic medal. The ups and the downs, the times when you have to regroup and press on – you’ve got to take it all in your stride and stay focused on the ultimate goal.”

Vince Lombardi probably put it most succinctly. “Winners never quit,” he said, “and quitters never win.” On behalf of everyone at Vision, we wish Jess the very best for the crucial months ahead.

For love and money

There are estimated to be 3.4 million unmarried couples cohabiting in the UK. At present only same-sex couples can enter into a civil partnership, but this rule is expected to change soon. Might many heterosexual couples then be tempted to make their relationships legal in the eyes of the law?

Clare Archer

In 2005, with the introduction of civil partnerships, same-sex couples won a campaign to allow their relationships to be recognised in law. For many it was not enough – the informality of simply signing a legal document did not have the same status as the ceremony of making public marriage vows. It was not equality. The campaign continued until 2014, when David Cameron's government introduced a law permitting same-sex marriages in England, Scotland and Wales.

Ironically, there are many heterosexual couples that might like the legal status conferred by a civil partnership but do not want the ceremony of marriage. Unfortunately for them, promised laws to extend civil partnerships to all couples have become bogged down in the quagmire that has surrounded a lot of new legislation in the wake of Brexit rows. For the time being it means that same-sex couples across Great Britain currently have more options than their heterosexual peers.

“There are many heterosexual couples that might like the legal status conferred by a civil partnership but do not want the ceremony of marriage.”

Most experts are confident the change will happen – and perhaps fairly soon. When it does it might encourage many couples currently cohabiting to reconsider their position. From a financial perspective it could be in their interests.

When things go wrong

On the breakdown of a civil partnership or marriage the parties have similar rights. They may apply to the courts for financial provision orders. The court may order that one party pays maintenance payments and makes financial provision for children. It can adjudicate on the



sharing of assets. London is regarded as 'the divorce capital of the world', primarily because of the relatively high levels of maintenance awarded for relatively long terms in comparison to jurisdictions such as Scotland.

The rights of couples that are cohabiting and not in a marriage or civil partnership are very different. Many people still believe that a 'common-law marriage' arises when a cohabiting couple live together for a certain amount of time.

This is not true in England and Wales. When a period of cohabitation ends and the cohabitants do not have children, the only claims one party may bring against the other are in respect of property that one or both may own. Neither partner has a right to claim maintenance. If they have children, one partner may make claims against the other for the benefit of the children. Where there are no children, the limited rights of cohabitants may leave the financially weaker party in a very vulnerable position, particularly when the relationship is a long one and one party has become dependent on the other.

Cohabitants, particularly the financially weaker one, may be advised to encourage their partner to enter into a cohabitation agreement when moving in together or when circumstances change – for instance, with the arrival of children. This allows couples to agree what happens to their assets if they split or one partner dies and what arrangements should be in place for the care of any children and even for pets. It can cover how they pay bills and next of kin rights.

Tax benefits

Many of the key financial benefits of a marriage or civil partnership may come on death. When one partner dies everything can pass to the other without inheritance tax (IHT) being charged. When the second partner dies, both sets of IHT exemptions are applied to the estate – potentially reducing the amount of IHT paid. The tax-efficient benefits of

any savings in ISA wrappers also pass to a spouse or civil partner on death. Neither is the case for cohabitants. So on the death of their partner a grieving cohabitee may find their inheritance severely diminished by tax. It may even result in them being forced to move out of their family home.

There are additional rights that spouses and civil partners have on receiving or inheriting agricultural or business assets, both of which are relieved from IHT, or being gifted assets with a large capital gain by their partner. They are deemed to stand in the shoes of the deceased when determining the length of ownership or occupation – a privilege unmarried couples do not enjoy. So, again, cohabitants may find themselves penalised with IHT or capital gains tax (CGT) on a partner's death.

Where there's a will

All couples should consider having a will. In England and Wales a will governs how an estate is left and the same rules apply irrespective of marital status. However, the position is very different where no will exists, at which point so-called 'intestacy provisions' apply. These benefit the remaining partner in a marriage or civil partnership – irrespective of whether a couple actually live together – but not cohabitants.

An unmarried couple may have been together for many years, but on the first death the survivor will have no automatic entitlement to inherit assets held in the deceased's sole name or in which the deceased had a discernible share. In such cases the deceased's assets, which could include the family home and its contents, could be left to distant and even estranged relatives, leaving the cohabiting surviving partner facing a legal contest. The Inheritance (Provision for Family and Dependents) Act 1975 allows a surviving cohabitee to make a claim on an estate on the basis that they do not have reasonable financial provision. This is not a struggle anyone wants to go through when they are grieving.

In Scotland the position is rather different, as spouses, civil partners, the deceased's children and issue have certain legal rights – regardless of whether the deceased left a will or the estate is intestate. While cohabitants in Scotland have no legal rights, they may make an application for a share of the deceased's net intestate estate if the nature of the cohabitation falls within a prescribed statutory definition.

Benefits in life

Beyond the gloom of separation and death, there are some financial perks to be enjoyed by couples happily married or in a civil partnership. The biggest may be the ability to pass assets between each other without triggering a CGT bill. Some pension benefits may only accrue to married couples or civil partners, too.

There may be good reasons for cohabiting but not deciding eventually to marry or enter a civil partnership. In the case of older couples considering a second marriage it might, for instance, invalidate widowed pension benefits. So this can be complex.

It may not be romantic, but if this article has encouraged you to reconsider your position – or your family members to reconsider theirs – then it is worth discussing the matter with financial and legal advisers before you start looking for reception venues and honeymoon destinations.



Clare Archer
Partner & Head
of Private Client,
Penningtons
Manches Cooper
LLP

Clare leads the firm's 60-strong private client and tax team. Her focus is on relationships with landed and business families. She advises on generational planning and governance.



How to grow carats

Their rarity and beauty make diamonds precious, but what would happen if we could grow them in a laboratory rather than mine them? Would consumers be interested?

Joanna Pennington-Jones

Lab-grown diamonds are increasingly disrupting the high-end jewellery market. The stones above were produced by Diamond Foundry, the world's first certified carbon-neutral diamond producer, which uses solar technology and renewable energy at its California and Washington State facilities.

Image: Diamond Foundry

In 1948 a young copywriter named Mary Frances Gerety coined what would become one of the most successful advertising slogans in history. The New York ad agency where she worked had been approached by diamond producer De Beers. Sales were at an historically low level, and De Beers was desperate to kick-start demand.

Gerety came up with “a diamond is forever”. It was a perfect marketing strapline for something so beautiful, formed underground over billions of years, laboriously mined, skilfully cut and intended as a symbol of eternal love. A diamond engagement ring became an indispensable part of courtship. Rising sales made the diamond jewellery business an \$82 billion industry.

Today that industry is facing a far bigger threat than 1940s consumer indifference. A new source of stones is changing public perceptions – the laboratory.

Diamond culture

Mined diamonds are formed when carbon is subjected to immense pressure and heat – most often through eruptions

shooting upward from the Earth's mantle, a hundred miles below ground, or the collision of tectonic plates.

Early attempts at growing diamonds sought to replicate these environments. Two 19th-century chemists, James Ballantyne Hannay and Ferdinand Frédéric Henri Moissan, both claimed to have successfully made diamonds on separate occasions by heating charcoal to 3,500 degrees Celsius inside a furnace.

Modern tests have shown their claims to be misguided or unfounded, but today several producers have found successful ways to mimic the environment in which natural diamonds were created – and have succeeded in growing new diamonds.

Most methods involve taking a tiny fragment of diamond – a carbon seed – placing it in a carbon-heavy gas such as methane and exposing it to intense pressure and laser-strength heat for six to 10 weeks. Another technique sees the diamond built layer upon layer by chemical vapour deposition inside a reactor alongside a cocktail of hydrocarbon gases. Setting up the facilities to pursue either approach commercially can cost around £50 million.

Entrepreneur Joanna Park-Tonks is launching ChelseaRocks.net – a collection of jewellery made exclusively from lab-grown diamonds. She says: “The time is ripe to disrupt the traditional diamond industry. The Federal Trade Commission in the US has published advice stating that lab diamonds ‘possess the same optical, physical and chemical properties as a mined diamond’.

“At a molecular level and visually, they are practically indiscernible from their mined counterparts – sharing all their fire and brilliance,” adds Park-Tonks. “The only key differences are price and provenance. Since lab-grown diamonds typically cost 20-30% less, consumers can enjoy a larger, better-quality stone for less. And they are naturally conflict-free.”

Losing their shine

Mined diamonds have developed a less than sparkling reputation. The public has grown increasingly aware of conflict diamonds – also known as blood diamonds – and the use of child labour in mining them. While a United Nations agreement called the Kimberley Process has gone some way to cleaning up the industry, it is still thought that one in 13 diamonds on the international market is of conflict origin.

There are also environmental concerns. Diamond mining is a leading cause of deforestation, soil erosion and pollution. Empty pits often fill with stagnant water, providing prime breeding places for malaria and dengue-carrying mosquitos.

Park-Tonks says: “The environmental and human costs of mined diamonds

“Diamonds that have remarkable provenance or are the most exceptional, flawless specimens will undoubtedly remain valuable.”



A diamond in the rough

\$17.5 billion

Size of the rough diamond market

\$420 million

Size of the lab-grown diamond market

Source: Robb Report

are unacceptable in today's society. Laboratory-grown diamonds allow us to have these beautiful stones without any of the negative associations – and at much more attainable price points.”

Critics point out that there is still an environmental cost to producing diamonds in a laboratory – the manufacturing process involves huge amounts of energy, though this can come from renewable sources.

Hard competition?

Those who place a premium on price, ethics or sustainability are already beginning to turn towards lab-grown. Even De Beers, which accounts for a third of world diamond mining, has resigned itself to the disruptive growth of the market. In the same way that many tobacco manufacturers are investing in e-cigarettes and oil companies in renewable energy, it is spending £85 million over four years to develop its own diamond-growing laboratories.

It is hoping to create a clear distinction between the two products – lab-grown diamonds for ‘fashion jewellery’, traditional diamonds for ‘fine jewellery’.

Diamonds that have remarkable provenance or are the most exceptional, flawless specimens will undoubtedly remain valuable. But these make up just a tiny fraction of the 164 million carats that are unearthed every year. The question many industry experts are asking is whether lab-grown diamonds could become the core market.

There have always been cheaper or more ethically and environmentally friendly alternatives, yet people have continued to buy mined diamonds. If the traditional diamond-mining industry is to survive it will be because lab-grown diamonds fail to capture the romance still associated with natural ones. And for that we have an advertising copywriter to thank.

Q&A with Kevin Morrison

In 2017 *Vision Review* interviewed Kevin Morrison, founder of 20 Twenty Wealth Management, about his new business and his decision to join the Vision Network. Here Vision Network Support Manager Jenifer Hall revisits him to discuss the changing landscape of financial services.



Kevin Morrison

Born: Tooting, Southwest London

Lives: Epsom, Surrey

Professionally Qualified Independent Financial Adviser

Hobbies: holidays, supporting Liverpool FC, learning to play golf (which is proving quite a challenge!)

Married to Sheryl; three children – Emma, Jessica and Joshua

Jenifer: You're about to celebrate your third anniversary with the Vision network. How would you sum up these first three years?

Kevin: Amazing! It's been an incredible period, with so many different emotions.

After the initial excitement of deciding to go it alone, especially



having worked for a big corporate for so long, I felt the fear kick in. This was swiftly followed by a realisation that there was a lot of hard work ahead! But things soon settled down, and I began to really enjoy the experience.

Now I can now honestly say I love what I do. I'm very fortunate to have great clients, many of whom I regard as friends. I've been able to surround myself with people I know and trust and who have helped me enormously. And I feel very proud to have built up my business to where it is today.

Jenifer: Could you quickly remind us of your background?

Kevin: I joined HSBC Bank in 1997 and spent the first 20 years of my career there. I initially provided financial advice to clients looking to arrange mortgage lending, and then I started providing advice around retirement and savings needs.

I also spent some time working alongside commercial clients, and then in 2010 I began looking after high net worth individuals and their financial planning needs. In my final year I was named "Role Model Wealth Manager, Europe", which was a nice bit of recognition.

Jenifer: So why did you decide to move on?

Kevin: I had a great time working for HSBC, but in the end I wanted to be able to do more for my clients. At times I felt restricted in what I could offer and in the solutions available to me. That's why I made the decision to become an Independent Financial Adviser.

"I've been able to surround myself with people I know and trust and who have helped me enormously. And I feel very proud to have built up my business to where it is today."

I set up my own business, 20 Twenty Wealth Management, which I named in light of having spent 20 years with my previous employer and in the hope that this move would mark the next 20 years of my career. I also became an appointed representative of Vision Independent Financial Planning, which I saw as the perfect fit to provide the support and compliance functions needed when providing financial advice.

Jenifer: In 2017, when you were first interviewed for *Vision Review*, you said you hoped advisers would earn more trust and would no longer be thought of merely as salespeople. Has this happened?

Kevin: From what I see, yes. I think there's been a move away from advisers being thought of purely as salespeople, and that's a very encouraging trend.

Sadly, there are always going to be instances where the industry is rocked by bad practices, which can undo some of the trust that has been built up. The recent negative headlines around Neil Woodford offer an obvious example.

But incidents like that remind us all of the importance of undertaking ongoing

due diligence on any products or services we recommend. They serve as a wake-up call and keep us focused on providing the very best for our clients at all times. We always have to remember that trust is hard to earn and easy to lose.

Jenifer: Given the recent and ongoing challenges of the macro environment, do you feel sound financial advice has become even more important since your previous interview?

Kevin: I think there's more of an understanding of how important advice is. In the UK there's so much choice, so many different investment houses and pension providers, and it's important that individuals are given sound guidance in making sure they use their money wisely.

It feels like we're living in a strange world right now. We can't be sure what might lie ahead for the UK, we can't be sure what Donald Trump might do next... Yes, it's challenging, and most investment houses I speak with feel it may be harder to achieve good returns amid such uncertainty.

But it's in circumstances like these that good advice can really make a significant difference. Outperformance is key when returns may be lower, and I believe this can be achieved through good active management of client portfolios. We need investment houses to be investing in strong businesses and avoiding the likes of Thomas Cook!

Jenifer: What do you make of the current focus in the financial press on costs and fees being applied to financial advice?

“There are always going to be instances where the industry is rocked by bad practices... We always have to remember that trust is hard to earn and easy to lose.”

Woodcote Park golf course, set in beautiful surroundings of the Epsom Downs.

Kevin: I always ensure I explain to clients upfront and on an ongoing basis what their costs are. It's imperative that the costs applied are fair and right, and my view is that they should reflect three things.

- **Service** – how much work is involved
- **Value** – the value a client receives for the advice provided
- **Liability** – they should reflect the liability the adviser takes for providing advice

I do feel too much focus on costs could cause problems in the future. It's important to try to reduce costs, of course, but it's also important never to compromise service and performance.

Jenifer: Technological advances are rapidly reshaping the financial services industry as a whole. What are your thoughts about the rise of robo-advisers?

Kevin: I think robo-advice will have a place, because technology helps provide people with choice in any



sphere of business. Financial services clients will have the choice to continue to do face-to-face business with advisers or to look at robo-advice as a new alternative.

I also welcome it because it forces advisers to up their game. My feeling is that I always have to provide more value and a better service than a robot can. In that sense it serves as a powerful motivator.

But I also think the industry has to ensure that robo-advice is genuinely for the benefit of the clients who receive it rather than for the benefit of the businesses that provide it. I'm very uncomfortable with the idea of any clients being left behind by an inflexible focus on tech.

If you think about the use of touch-screen tablets in McDonald's restaurants, for example, that's a great idea for tech-savvy teenagers. But it might not be ideal for some members of older generations, who may be used to a very different way of doing things.

So robo-advice is definitely an interesting space, and I'm sure it will work well for many people. But we shouldn't forget the question of accessibility.

Jenifer: What motivates you?

Kevin: I always find this question really difficult to answer. I want to be the best I can be for myself, my family and my clients, and I want to have a positive impact on the people I meet... I really enjoy both my home life and my work life, so I guess my main motivation is for this to always be the case!



"I want to be the best I can be for myself, my family and my clients, and I want to have a positive impact on the people I meet."

Jenifer: Your firm is called 20 Twenty Wealth Management, and we're about to enter 2020. Do you sense this could be a special year?

Kevin: It could be a special year for lots of reasons, not least for sports fans. We'll have Euro 2020, and it'll be an Olympic year as well – and I might even learn how to hit a golf ball properly! Jokes aside, though, let's hope it's a great year for everybody.

Customer-facing technology can be highly effective – but only if businesses fully understand their clients' needs and preferences.



Jenifer Hall
Network Support
Manager, Vision

Having joined Vision five years ago, Jenifer has progressed to become the Network Support Manager. She is passionate about providing a personal service to all of Vision's Appointed Representatives.



Seeds of our protection

One in five plant species is estimated to be threatened with extinction worldwide. Around the world scientists and plant enthusiasts are working to preserve our bio-heritage. But why does it matter so much?

Susan Gordon

The temperatures are as low as minus 20 degrees. Scientists wear extreme weather clothing as they carry out their daily checks. But this is not the end of the Earth; this is not an Antarctic research station. It is a concrete underground bunker in the heart of West Sussex.

The Millennium Seed Bank, run by Kew Gardens, has the finest collection of seeds in the world. In 2009 Britain became the first country to preserve its botanical heritage. Seeds of practically every UK-native plant are held dormant in the icy vaults of this unusual bank. Only a handful are missing – those whose seeds are particularly difficult to store. Now the team members have set themselves a bolder ambition: they want to safeguard 20% of the world's flora here, providing a safety net for species at risk of extinction.

“With changing climate and food scarcity becoming more serious, some of the plant seeds we have here may one day hold the key to providing sustenance for millions of people.”

Director Richard Barley says the priority is to preserve the seeds of important food crops, like rice, maize and wheat, and those plants most vulnerable to climate change and at risk of extinction. He says: “Some plant ecosystems are very fragile. They become prone to pest infestations with just a degree of change in the temperature. Insects can come in and ravage a whole species on an island.”

Barley is passionate about the need to safeguard the world's biodiversity. He says: “With changing climate and food scarcity becoming more serious, some of the plant seeds we have here may one day hold the key to providing sustenance for millions of people. We cannot afford to lose our options. In the future, if required, these seeds can be germinated and reintroduced to the wild or used in scientific research.”

Kew is collaborating with nearly a hundred other seed banks around the world to ensure that plants in the collection are stored in several locations. As the world's climate changes, crops that are dying in some regions may flourish elsewhere. Kew researchers are also running projects in Africa and Madagascar to help farmers – among 55 million people around the world – whose livelihoods are dependent upon the production of coffee. Barley says:

Working in icy conditions, staff at Kew's Millennium Seed Bank safely store seeds from around the world to protect the planet's biodiversity. They have created a resource that scientists might one day use to develop disease-resistant crops that are better adapted to our changing climate.

Image: RBG/Kew

“We are introducing them to more resilient ways to grow their crops and different varieties that are better suited to hotter and drier conditions.”

Several other organisations in Britain have a similar focus on preserving plant heritage. One of the most interesting is the Heritage Seed Library. It was established by horticulturalist Lawrence Hills in the mid-1970s as new European seed regulations were being introduced. These required seed merchants to register varieties to prevent the sale of poor, unreliable seed. It can cost around £1,000 to register a seed variety commercially. Fifty years ago there were hundreds of seed merchants in the UK, selling a huge variety of seeds. To list them all commercially would have been ruinous, and so their catalogues began to shrink.

At the same time, as post-war industrial-scale agriculture became widespread, modern F1 hybrid seeds – the F stands for ‘filial’ – began to become established. These tend to be better suited to large-scale commercial production, delivering vigorous crops that are more uniform and that ripen at the same time, which reduces harvesting costs. Their seed cannot be kept, because it will not “come true” year on year. They may not even germinate at all in the second year.

Thousands of traditional open-pollinated plants – those whose pollen is spread from one plant to another by insects or by the wind – and which breed true to type

for generation after generation were being abandoned and lost. Perhaps as many as 90% of vegetable cultivars have been lost in the UK and US in the past hundred years. Scientists worry that some could have thrived in our changing modern climate and played an important part in adapting and enhancing crop productivity. They are anxious not to lose any more.

The Heritage Seed Library now has over 800 heirloom seeds in its collection. Most are varieties you cannot find anywhere else. It wants these plants to be grown but is not allowed to sell the seeds, so it has an ingenious solution. Each year it offers Garden Organic members who pay £18 to join the Heritage Seed Library a choice of six packets of seeds from its collection ‘for free’. It throws in a seventh ‘lucky dip’.

Each seed has a story. The oldest is the Martock broad bean, which originated in the village of Martock in Somerset and is first referenced in manorial rolls in 1293. Then there is the Cherokee Trail of Tears, a climbing French bean that was a treasured possession carried by the Cherokee nation when marched off their land by American settlers in 1838. Another is the Carlin pea, which dates back to Elizabethan times and in the North East is traditionally soaked in brine overnight and then boiled and eaten with salt and vinegar on Carlin Sunday – the Sunday before Palm Sunday.

Catrina Fenton, Head of the Heritage Seed Library, relies on dozens of volunteer gardeners – ‘seed guardians’ – who grow the crops and save the seeds to be shared. The organisation also has its own garden at Ryton, near Coventry, where it uses polytunnels to raise those vegetables that will not grow true if pollinated with different varieties.

“Without Lawrence Hills’ forethought,” says Fenton, “many of the varieties our members enjoy each year wouldn’t exist. We’re not just preserving the past and something unique. These are a genetic resource that is important to us. Some of these heritage varieties may have certain resistance to drought and pests and diseases. We believe the best way to protect them is for people to grow them again.”



Preserving garden heritage

The National Fruit Collection at Brogdale Farm near Faversham, Kent, has a collection of 2,200 varieties of apple tree, 550 pears, 285 cherries and 337 plums.

Plant Heritage is another organisation that works to preserve biodiversity. Its focus is on garden plants. It helps gardeners to trace and share rare plants that were at risk of quietly vanishing forever. It has helped establish 600 national plant collections around the country – gardens where individuals or organisations grow a comprehensive collection of one group of plants in trust for the future.



Lawrence Hills, founder of the Heritage Seed Library.

Learn more:

Plant Heritage
nccpg.com

Kew
kew.org

Heritage Seed Library
gardenorganic.org.uk

Brogdale
brogdalecollections.org



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