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WHAT IF... WE DISCOVER WE CAN SEE THE FUTURE?

HUMAN beings are adept mental time travellers. Our ability to envisage how things might be in the future, which seems unmatched by any other species, is arguably what has made us the cultured and civilised animals we are. But if visualising possible futures is a game-changer, being able to predict the future would be nothing short of revolutionary.

Debate has long raged about whether that is even possible. According to one school of scientific thought, known as determinism, it is. Given enough data about each atom in the universe, we can know tomorrow's football scores with as much certainty as yesterday's.

This mindset suffered a couple of blows during the 20th century. First, Heisenberg's notorious uncertainty principle said it was impossible to know everything about a quantum system such as an atom. Second, chaos theory taught us that the future behaviour of any physical system is extraordinarily sensitive to small changes – the flap of a butterfly's wings can set off a hurricane, as the saying goes.

But even if it's theoretically impossible, in practice we might get as close as makes no difference. Computers are already producing ever more accurate simulations of future reality, from tomorrow's weather to long-term climate trends to the eventual fate of our galaxy. Extrapolating from current number-crunching capabilities, near-perfect climate prediction, for example, should be possible within a century or so, says climate scientist Gavin Schmidt of NASA's Goddard Institute for Space Studies in New York City.

Such soothsaying ability might not play to our advantage, says Matteo Mameli, a philosopher at King's College London. Predictive software might ultimately deprive us of that evolutionarily hard-won ability to think creatively and improvise our way out of dangerous situations. Alternatively, unrestrained by any fear of failure, our hubris may accelerate our destruction of the world around us.

The outcome might depend on who has access to the predictive tools, says Timothy Pleskac, a psychologist at the Max Planck Institute for Human Development in Berlin, Germany. In the wrong hands, they might help prop up dictatorships or establish commercial monopolies. But more socially minded governments could use them to ready their citizens for challenges such as approaching environmental disasters.

Or, Pleskac thinks, our supremely adaptive minds might finally find themselves overwhelmed by such omniscience – and reject it in favour of a quiet life. "They might say, all that information is there, but I don't want to have access to it," says Pleskac. "It may be quite adaptive to be ignorant. People may just want to be left alone."

Gilead Amit

"BEING ABLE TO SEE THE FUTURE MIGHT NOT PLAY TO OUR ADVANTAGE"

3

WHAT IF... WE LEARN TO TALK TO ANIMALS?

LAST month, a New York court ruled that Hercules and Leo, two research chimps at Stony Brook University, had no right to legal personhood. But the fact that such a case made it through the courts at all shows our new willingness to consider the issue of personhood for other species. "Efforts to extend legal rights to chimpanzees... are understandable; some day they may even succeed," wrote judge Barbara Jaffe.

Steven Wise, a lawyer at the Florida-based Nonhuman Rights Project, which

brought the lawsuit, argues that if chimps are declared legal persons, they should be granted rights to protect their fundamental interests. "That would certainly include bodily liberty and likely bodily integrity as well," he says. We could no longer keep chimps in captivity, never mind subject them to intrusive experimental procedures.

If chimps were given rights, we might expect other intelligent species, such as killer whales and elephants, to follow. But why stop there? Our ideas about the inner lives of other animals – their capacity for suffering, autonomy and self-awareness – are based largely on analogy with ourselves: how would we like it in their place?

But what if those animals could tell us? What if a dog or dairy cow could let us know how it felt about its lot in life? The idea may not be as far-fetched as it seems. There are many examples of communication between apes and their human keepers. Researchers are busy decoding dolphin. And cognitive scientists are beginning to study emotional states in animals. It may only be a matter of time before more meaningful communication between species is possible.

Would we still eat meat once that happens? If we could converse with pigs, say, how could we justify slaughtering them by the billion, however humanely? And where should the line be redrawn? Would we still eat fish? Many of us might shun meat and animal products entirely.

Widespread legal rights for animals would affect environmental efforts too. Conservationists would have to put down the gun, says biologist Marc Bekoff, formerly of the University of Colorado in Boulder. Right now, most people take a utilitarian view, considering it acceptable to kill members of one species to save another or to safeguard an ecosystem. "But if we accept that these animals are sentient beings and ascribe greater value to each individual's life, you have to come up with alternative strategies," says Bekoff, a leading voice in the compassionate conservation movement. He insists that a "do no harm" approach is possible, although others argue it would make us too sentimental to do much good.

How would we weigh an animal's life against a human one? Research on animals leads to treatments that save human lives, making a blanket ban on animal testing unlikely. But asking scientists to limit the pain and suffering they inflict will no longer be enough, says Bekoff. Scientists would have to make the case that the benefits for humans outweigh the harm to the animal. At the very least, lots more species would get their day in court.

Daniel Cossins

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WHAT IF...

WE ARE NOT ALONE?

THANKS to the Kepler Space Telescope, we know the galaxy could hold as many as 30 billion planets similar to our own. The next generation of eyes in the sky, such as the James Webb Space Telescope, slated to launch in 2018, will search the atmospheres of such exoplanets for signs of life. Some think it's just a matter of time before we find out we're not alone. In April, NASA's chief scientist Ellen Stofan predicted we would have "strong indications of life" on other planets by 2025. If she is right, how will we deal with the news?

What we detect will make a big difference to how we react, says Steven J. Dick, a former NASA historian and current astrobiology chair at the US Library of Congress in Washington DC. Any discovery that is less obvious than little green men landing during the World Cup final is likely to be met by years of questions and examination. Sara Seager, a planetary scientist at the Massachusetts Institute of Technology who is searching for another Earth, agrees. It will probably take time to confirm any initial findings, she says. "There may not be an 'aha' moment."

A chemical imbalance in an exoplanet's atmosphere could be a sign of microbial activity. But an indirect result such as this will probably have only a short-term impact, says Dick. The apparent discovery of Martian nanofossils in meteorite ALH84001 in 1996 led to a media frenzy, and even US congressional hearings, before the furore died down in the face of increasing scepticism. Most now think that the meteorite does not hold the ›

CLOCKWISE FROM BOTTOM: REX SHUTTERSTOCK; ALESSANDRA SANGUINETTI / MAGNUM PHOTOS; SUPERSTOCK; JEAN-LUC CHAPIN /AGENCE VU / CAMERA PRESS