

James Bridle and Tim Smit
In conversation with Andrew Kelly

Andrew Kelly: Hello, and welcome to Festival of Ideas and Bristol Ideas. I'm Andrew Kelly from the festival and I'm delighted to have James Bridle and Sir Tim Smit with us today. We're talking about James Bridle's new book, *Ways of Being: Beyond Human Intelligence*, bringing together science, art, ecology and culture to rethink the nature of intelligence for a new era of ethical and political cooperation with the natural world. It's an important book from an important thinker and artist, about solidarity with the more-than-human life forms on the planet, new forms of democracy, community and politics, and the role of new technologies in understanding the web of life on Earth.

James is author of the acclaimed *New Dark Age* about technology, knowledge and the end of the future. James wrote and presented the BBC Radio Four series *New Ways of Seeing*, about how technology is changing visual culture. Their writing on art, politics, culture and technology has appeared in magazines and newspapers, including the *Guardian*, *New Statesman*, *Frieze* and *Icon*, and James's artworks have been commissioned by galleries and institutions worldwide, and also featured on the internet. Tim Smit is Co-Founder of the Eden Project, Executive Vice Chair of Eden Project Limited and Executive Chairman of Eden Project International Limited. In 1987, he moved to Cornwall, where he and John Nelson together discovered and then restored the Lost Gardens of Heligan. Tim remains a director of the gardens. He's also Executive Chairman for Eden Project International, which aims to have an Eden Project on every habited continent by 2025. Thank you, James, and thank you, Tim, for joining us today.

James, could we start with the nature of intelligence, the definition of intelligence, how it's used and how you've extended it?

James Bridle: Yes, well, this was obviously one of the questions that I sort of had to figure out in trying to write my book. And it's an eternally vexed one, really. But I come from a background where for the last decade or so I've been studying the social and political implications of technology, so one of the reasons I started thinking about the subject in this way was because I've done a lot of studies and thinking about artificial intelligence. The book starts from the point of understanding what we mean by artificial intelligence historically and in the present and in our imaginations. If you look at the history of the way it's been defined, mostly by computer scientists, intelligence is really just what humans do. So for all the talk of non-human intelligence, there's always this kind of line, which is that something is only really considered intelligence, however you want to break it down into cognition and problem solving and various different aspects of it, if it's like what humans do.

That's what we've been trying to build with artificial intelligence for quite a long time now, and fairly ineffectively. There are two super interesting things about that. The first is that if you shift that definition slightly, if you take almost any other part of it, and you stop seeing intelligence purely defined at its centre by what humans do, all kinds of other intelligences start popping up all around you. And the second interesting thing is that definition is really falling apart even when it comes to artificial intelligence, that thing that we're creating ourselves, because we're realising that even while we've been trying to create something that's like human intelligence, we're actually creating something that's very different. We're creating a non-human intelligence. And again, the moment you admit to the possibility of a kind of intelligence that is not human intelligence, you suddenly start to realise that many, many different kinds of intelligence are possible and maybe they've been here around us all along.

Andrew: I think that's one of the significant things really, that it's not new – this form of intelligence, or intelligences, has been around for a long time. Talk us through the more-than-human side of this, and then I want to come to Tim to talk about the interconnectedness of things.

James: 'More than human' is a term that's used more and more these days, and it originated with an ecologist and philosopher called David Abram. And it's a challenge to several issues we have when thinking about the intelligence and the subjectivity and the very being of non-humans of all kinds, which is as soon as you use words like non-human, you draw the dividing line exactly like the one I was talking about, but you still somehow retain the human at the centre of things. And we do this in almost everything we do, and even environmentalists and ecologists are very guilty about [this], you know, when we talk about humans and the environment, we again put in this implicit separation between ourselves and that environment, and between ourselves and the rest of the world, with which, of course, we're inextricably entangled and soaked through and involved in in every possible way. And so the use of this term, 'more than human', is really to attempt to break that dichotomy to some extent, to remind us constantly that everything exists in the world in a greater form than us. We are part of it as well, we're not separate from it, and we must remain conscious of our place within it, which we can't escape – we are human, so everything we do is coloured by our incarnations as humans, but we are part of something far, far greater, and we're not at the centre of that. And that's why this term, 'more than human', is often quite useful.

Andrew: Now, Tim, the book hasn't been out very long, but we've both been fortunate to have read the work. Your own project, *Eden*, talks about the interconnectedness of all things. What was your reaction to the book?

Tim Smit: I would twice curse James Bridle for writing a book so darned good that the half a day I had apportioned to it to be able to write an endorsement turned into three and a half days of the most guilty pleasure of reading every darn word, and boring my son witless by reading out almost every other paragraph and saying, 'Wow, isn't this great? This is amazing.' More importantly, I would recommend to anybody who hasn't read the book to just give your brain a treat. It's like a clear mountain stream running through the old grey stuff. I think one of the things we were talking about while we were setting up was that around the world right now there is a ferment of people thinking about what it means to be an academic today. There was a really good book – I don't know whether you've read it, James – by Avi Loeb, called *Extraterrestrial*, which is all about space, and the piece of something of we know not what that came in across earth in October 2017. And Loeb asked these questions which are brilliant, absolutely excoriating, about what's happened in the academic world, where he says the great thing is all of the modern scientists I come across, they would say that believe in the brand Galileo, but I would throw down the gauntlet to say that far from being Galileo, most of the world of science has become so conservative that they've become like the administrators who would rather put Galileo on the fire.

And I think it's actually really interesting because what James is talking about now, with intelligence, I had never thought about it – and lots of people I have now talked to about it – had never thought about it in that way. James very cleverly talks about the difference between humans framing the questions to which they want a machine to find an answer, and a machine that just finds evidence to which you've not asked the question. But then it starts to suggest a completely new way of looking at the world. I'd love to hear James talk about that. But they start, brilliantly, talking about the origin of the modern computer and the A computer and then the Oracle computer, which I thought was really, really good. Can you talk about that, James?

James: Yes, absolutely, I'd be more than happy to. It was a really extraordinary realisation when I first started trying to think about it, because it was something I was aware of, the history of

computer science, which I'm interested in. But I really hadn't thought about the implications of it. And that is that in his very first papers, written in the 1930s and in the 1940s, when Alan Turing is first defining what will become all computers, essentially.

Almost 99.9999% of computers in use today are what we call Turing machines, based on Turing's mathematical definition of computation. We also call them the Turing Universal Machine, and Turing called it an automatic machine. He called it an automatic machine because essentially it only does what you tell it to do. You give it a set of instructions, and it steps through those instructions until the programme is finished. But in the very, very first paper he writes about this machine, he also says that there is another machine possible, what he calls a c-machine or choice machine.

In a later paper, he calls it by an even better name, which is the Oracle machine. And essentially, incredibly briefly, in only a couple of lines, he says that an automated machine can only do what you tell it to do but the Oracle machine will at some point during its programming wait for instructions from some unspecified thing that he calls the Oracle, i.e. it will look outside itself, look beyond the bounds of its programming in some way. And he also has a tiny footnote, where he just says whatever the Oracle machine is, it cannot be a machine. And that's it. He never comes back to the subject again, and Turing machines take over the world. And we all use Turing machines, we're all using Turing machines right now. We use them for pretty much everything. They've shaped our culture and our very cognition, our way of thinking, because the way that I think about it is that the tools we use, and particularly the complex tools like computers, shape how we understand the world and what we think is possible in the world.

So we've been shaped by this automatic machine, but right at the very beginning of computation, this really kind of revolutionary event in human thinking, Turing just opens up this tiny other door to another way of thinking and another way of building machines, not just of building machines, but thinking of the relationship between us, machines and the rest of the universe. And it's that that I've tried to pry open a little bit in the book, by working out whatever he could have meant by this Oracle and looking at some examples of machines and other strange devices that I think fulfil some of the qualities of the Oracle machine, and that we can learn from a little bit.

Andrew: One of the significant things for me in the book is about how you use the technology to create a better world, create better understanding and better knowledge. Can you talk us through just a little bit, though, about the kinds of intelligences you came across? I did summarise them in my own mind as first of all animals, secondly, trees and thirdly, plants.

James: Yes, that's pretty good, and I would extend that beyond that into fungi, into those micro-organisms that don't fit within our established categories. Because whenever you find some organism that doesn't fit within those established categories, of which there are many, there's always something interesting going on. But I would also extend it into rocks and ecosystems and oceans. Because when we're trying to understand what a non-human intelligence would look like or feel like or present as then it can become many different things.

For the last few years, I've been working with some scientists in Northern Greece who are growing some particularly interesting kinds of plants called hyperaccumulators, which are plants that are capable of growing in soils that are naturally very rich in metals and therefore are toxic to most other kinds of life. But these particular types of plants, several of which are endemic to very small areas – they only grow in those particular places, that's the only place they're found and that's where they've evolved – they've gained this ability to grow in that place, and what they do is they suck the metals up from the ground, and they store them in their stems and their leaves. What the scientists are doing is they're actually figuring out ways that we can harvest these plants and actually

extract the metal in a really beautiful circular process that also sequesters carbon in the ground and a bunch of other stuff.

The thing that I realised, by thinking about and being with these plants, is that they possess a very particular kind of knowledge, and the use of that knowledge, which is intelligence. And they've evolved that knowledge by their particular association with place and time, and we have something to learn from them. So that's one way in which intelligence might be figured.

It also might be figured in terms of a particular ability to problem solve, and so on and so forth. One of my favourite examples of this, but it's also one of the more obvious, is that there's a number of... I don't like to use that term 'higher', but apes – chimpanzees and bonobos in particular – who have this ability to recognise and recall really long sequences of numbers which they've only seen briefly, much more powerfully than humans are capable of. And it seems like a weird party trick, as so many of these things do, because they're the only bits of their intelligence that we can see. But even though it's a weird party trick, it's something that humans can't do. And all of our evolutionary ideas about intelligence revolve around these kinds of hierarchies of having humans at the top.

As soon as you start to see abilities that are elsewhere in the evolutionary line, that are not present in humans, then that whole idea completely collapses and falls apart, and you start to realise the things that are intelligent about other beings, even though they don't score on human IQ tests, are these forms of intelligence that we don't possess, but are different flowerings of it in various ways.

As soon as you start to see it that way, you start to recognise these abilities, incredibly complex abilities, that are possessed by all kinds of life forms as intelligences, then the way you think about them changes utterly, and it completely changes your thinking and awareness. And that's before we even get into intelligence really as, which I've come to think of it really, as something that isn't really an innate quality at all. In the book, I kind of move away from even talking about intelligence, because I found it to be not a terribly useful concept, because it's so individualising, and it's so focused on what's in the head, rather than what's in the world. And for me, what I really came to think of as intelligence is something that exists between beings, and between beings and the universe, rather than some innate quality that just gets performed by our brains.

Andrew: Tim, you deal a lot with plants and with trees and so on. What struck you about the book in these areas?

Tim: Well, I think James and I both been pretty wowed by the suggestions that have come from Suzanne Simard's work and, of course, the huge debt owed to Paul Stamets, who is also a great hero with his work on mycorrhizae. I think we're living in a genuinely very revolutionary period. And now when we look at the microbiome and the sheer variety of bacterial activity in that microbiome, and then you look at the fungal activity in the soil, and the length of distance that things are connected, and the information that seems to be being transacted...

One of the things that excited me about James' book is that when you look at those things you realise that so much of the information that we are giving to other people about the excitement of the 'wood wide web' and all that sort of stuff is to do with the simple fact that probably the biggest brake on it is our inability to comprehend what all of this is capable of doing. But let's be straight about it. We are living at a time which is predominantly, not exclusively, but predominantly, we're living in a secular age. And at a time that we're becoming more and more secular, there is a movement taking place all over the world which is questioning the nature of what it is to be a creature. It is also starting to really ask questions in a lot of places about what our relationship is with the natural world. And understanding that we are the stuff of... I was going to say 'stuff of

magic', which is bonkers thing to say, but we are all the stuff of mycorrhizae and the stuff of the microbes in our bodies – they kind of hint at a global creatureliness in all things, which is pretty darned marvellous. And it actually sends a shiver up your spine because you don't yet have the intelligence to know quite what you're saying, but it's something.... It's a je ne sais quoi. And I think it's just fantastically exciting.

And I think the other thing that James was talking about was that marvellous bit about the Internet of Animals. I've been regaling people with that for the last ten days, especially my favourite – the goats on Mount Etna who know hours before any seismic activity that it is in fact going to explode. I was going say to myself, 'Note to self: Get me some goats.' No, but it's brilliant, but it's suggesting stuff which makes your brain ache. I'm looking forward to your next book, James, when you say right, now this is the one for eight-year-olds to 12-year-olds coming up. Because the question... you're talking about intelligence almost becoming like a weather system, do you know what I mean? There's that marvellous bit where you're talking about conservation and the madness of using industrial revolution-based siloed thinking to create reserves, when every other part of your intelligence is telling you that animals like to migrate, or fish like to move and all the rest of it. It starts to make you realise how we've got to return to the understanding of ourselves biologically.

So I'd like to end by saying that somebody who I think would adore to have a cup of coffee with you is James Lovelock. Because I went to his 100th birthday bash at Exeter University a few years back, and I've known him a little while because he had roots into Cornwall, and I was just saying to him, I said, 'Are there any great natural laws that you think haven't yet been discovered? Because most scientists tell you that you're playing around on the fringes, or that we are playing around on the fringes.' And James paused for thought, then he said two things. Universities should never be regarded as anything more than playgrounds for active minds to get a little bit of honing. He said when they're taken too seriously, it rather moves you away from active thought, because everyone gets into group thinking. And the second thing he said was, 'The older I get, the more I have a sense that there is something so big and so extraordinary that it's in plain sight but because we've taught ourselves that there isn't anything to find, we don't know how to even start looking.' And I got a very strong sense of that reading your book, that you're going in that direction too.

James: It's lovely to hear that, and I'd certainly love to meet James Lovelock, who's a huge inspiration in many ways. You said earlier that you felt my excitement coming through the book, which I hope was true. And it's really true, because it was written as a process of learning for myself. And I was coming to understand a lot of these things for the first time, a lot of them through to the act of writing, which is how this stuff works – once you actually start to put them down and put them together, they take on the greater meaning that you find yourself arriving at. I feel, for me, that there's some stuff in the book that is that is pretty radical, and that I found to be quite extraordinary, that is spoken about very openly in scientific communities, but often within quite siloed disciplines and hasn't really impinged upon the public consciousness or even on the consciousness of scientists in adjacent disciplines.

A couple of those are things like the fact that the whole notion of species is really starting to stress and break in all kinds of ways and is really not necessarily a very useful way of thinking about the world – if it ever was.

The second one of those which you hinted at with the biome is really the growing rejection of the idea of the individual at all. That really we exist as these kinds of walking assemblages of various kinds of beings, of which the biome is quite a major part. There are one and a half to two kilos of other species walking around with us all the time. And they have a deeply profound effect on our health, but also on our cognition. It's been shown that changes in the gut biome change the way you

think in radical ways. And so very quickly becomes really impossible to think of ourselves as discrete individuals when we're completely unbounded in this way and constantly in relationship to other species in the very way our consciousness operates. And I don't get into consciousness, really, in the book, but it's what a lot of people go to as the fundamental essence of being, and yet that consciousness we're finding out all the time is mediated by and created in relationship to other beings.

And these are, for me, pretty big ideas that are, as you say, very difficult to wrap one's head around, very difficult to integrate into one's everyday life or one's conception of oneself or others. And yet it is increasingly clear that this is the case. The book is in large part a process of thinking through some of the consequences of that and, as you say, trying to lay as much of it out in non-academic language as possible, and trying to shape a new language for it. Because yes, as you said, it's quite hard. We often feel, even when talking about it that we don't really know what we're talking about. And that's really clear when you look into a lot of the scientific research. One thing I saw over and over again is that scientists were coming along with some of these extraordinary results and theories and one of the biggest problems was simply where to put them.

One of my favourite experiments and experimenters in the book is the work of Monica Gagliano, who's shown the ways in which plants have some really extraordinary abilities that we weren't really aware of. In particular, and most famously, the fact that plants remember previous experiences and act differently in the future. And this is a really radical finding because it really defies everything that we thought we knew about plants. And it disrupts a lot of the standard scientific interpretation of things like this, because we have no model for how it works. And science, and particularly botany, which really just likes to cut things up into tiny pieces and analyse them as machines, when there's no organ there doing this thing, it's very hard to hypothesise and test about it. And then it's also hard to write about it and publish it, because where does this information belong? Does it belong in botany? Or does it belong in psychology, right? The very foundations of our categories of knowledge start to be bent when these beings start to present themselves in their full diversity and ability. And it's those moments that I get incredibly excited about, and really try to think through not only the implications of those abilities, but our own ability to conceptualise them and integrate them into our lives, into our behaviours.

Andrew: I want to come on to the Internet of Animals soon, but James, talk us through the AI issues here. You talk about the need to use AI in more positive ways, in better ways, in making the world better. You've experimented a lot with this.

James: I'd be cautious about saying I want to use it to make the world better or use it in better ways, because I don't think that's how technology works, necessarily. There's a lot of work to be done before something like that even really becomes possible to suggest, I feel. But yes, as you say, I've worked with AI for quite a long time, really. I actually studied it 20 years ago...at the end of its last hype period, essentially, before it faded away and before its recent re-emergence as a big cultural and financial object. I've tinkered with it myself, building artificial intelligence systems in various ways. I know a lot of people who work with it. I'm particularly fascinated by its ongoing presence in culture even when it's rubbish – and to be clear, it is mostly rubbish.

What we have at present is really nothing even approaching artificial intelligence in any meaningful way. It's just very powerful computers. But it has this incredible cultural hold on us. And the main things I'm interested in, at least in the first part of the book, in thinking through are why the things that we call AI in the present are turning out to be such terrible things. By which I mean, you know, one of the huge growth areas for AI right now – and this is something that Microsoft and Google and Amazon and all the big tech companies do – is sell them for vast amounts of money to improve oil

and gas exploration. So all of these corporations are building infrastructures and AI-driven systems to help oil and gas companies more efficiently and profitably extract hydrocarbons to burn and destroy the atmosphere. And the immediate question is how is this intelligence? I guess, to me, it is quite clearly the opposite of intelligence.

And you look at the other ways that these things are being employed, like to encourage more car driving, or at the most basic level, the very way that a huge number of these systems are educated and trained is in beating humans at board games. There seems to be within this whole culture of artificial intelligence, something extractive and oppositional, things that are not really what I recognise as being intelligence, right? In an understanding of intelligence as something that is generative and regenerative and communicative and attuned to its surroundings and environment in ways that might enhance the survival of all.

And the conclusion I draw from that is that AI, considered almost as an organism, is currently something that is being nurtured within a very narrow ecological niche, which is the servers and boardrooms of very large rapacious corporations, unfortunately. And when an AI is built in the service of a large profit-making corporation, the intelligence that results is the intelligence of large corporations, which is more concerned about profits and shareholder value than it is about the survival of the planet or really the comfort of other humans in general. So most of the AI we see is this very, very narrow and fairly unpleasant kind of intelligence. And that's the first point, and why we need to rethink the ways in which we are creating AI.

The second bigish thought I have about AI is about its cultural importance in the present, because whatever forms of AI we have, as I say, we're getting, it's just fascinating to me what a huge hold that has on the cultural imagination. And that tied with the fact that the kinds of intelligence that we're building don't seem to be like human intelligence, and that's part of its fascination as well, right? It's the same fascination we have for aliens, really, that there might be other intelligences out there. And there's something about the fact that we're manifesting an ultimately non-human intelligence amongst us that might point towards the fact that other intelligences exist, as I said at the beginning. And that, to me, is a really, really key idea, that maybe the role of AI is not really to do any of the mostly awful things that businesses tell us AI is for, but it's simply to start to accommodate ourselves to being not the most important thing on the planet, even in our own imaginations, and actually part of the constellation of minds. And for some reason, humans always seem to need to build these kinds of toy versions of things ourselves before we start to recognise them in the world around us. And I feel that maybe AI is performing that role in the present, accustoming us to the idea of multiple minds, some of them capable of all kinds of things that we're not, so that we might start to change ourselves and our relationships to other beings to better reflect that.

Andrew: I suppose what I was trying to get at was what you come on to – the huge potential for AI to look at things differently, to hear things differently, to research things more thoroughly. At one point, you talk about the only constraints we have are our imagination and our intent. Tim, what's your view on that?

Tim: Well, because we've got very little time left, I'm going to completely hijack the question, which is the thing I would take away, if I was going to be shot in about 20 minutes and I had to convey something really interesting from James' book to someone else, it was unexpected. It was their rumination on the origins of democracy and what the importance was of randomness in terms of creating the instability necessary to make us better. I've been thinking about it ever since. Because what James is actually saying is we've got such vested interests in our... call it 'tribal', it's a clumsy phrase, but in our tribal desires to club together, to see advantage given to those who are like us and

all the rest of it. The rumination about the origins of the ideas behind democracy has actually really, completely stumped me, because I found it very attractive, very attractive. And also, building on something that James said, I've become really interested in the damaging nature of a profession that has colonised the world, called accountants. Accountants, because they can only deal in numbers, they actually feel that if you can't measure it and you can't add it up, then it's actually not worth knowing about. And that's how come we've ended up in a crisis of wanting to get into carbon sequestration. But what no one talks about honestly is because accountants could understand the numbers to do with carbon parts per million but actually they didn't realise that the question was never about carbon, it was always about how you have a cooler planet.

So actually what you've done is you've hijacked with a different form of thinking, and I think that's one of the things that James is talking about in here, which leads you to the thought that may be what we're all looking for is... it's a bit sort of quasi-religious, I guess, but it's a word which you use in the book, James, and we're using at Eden because we want to start an academy of that name, which is 'emergence'. And the notion of emergence in its simplest form is described to me as being if you looked at all of the molecules that make up a human being, now ask yourself the question, what the hell is life? Because none of the molecules give you any hint of what life might be.

And I think in terms of your book, if I was writing an epilogue of the epilogue, it might start to question that. Maybe that's the start of the new book! It's about: is the miracle that we're hoping to find, or the thing that we're hoping to control, a knowledge that is just out of touch? Which is, how can you put things all the talents together? We tell all sorts of stories about it and then we silo up our world. So how do you get those things together to create something so much more than the sum of its parts? And I think that's absolutely riveting. And that's what I would take away: democracy and emergence. But that would be only my top two out of a top ten that would be a greatest hits album.

Andrew: James, if you could talk a little bit more about how AI could help us understand other forms of intelligence, that would be helpful, I think.

James: Well, so, the places that I go to with this in the book is really looking at... as I say, my background is also largely in technology, and while I've written extensively in *New Dark Age*, my last book about all the problems that I see very clearly with our current uses of technology, I also see its capabilities to show us things that we were previously unaware of. There are a few examples of this in the book. I spent a lot of time while I was writing it doing time-lapse photography, which I think a lot of people have been quite wowed by in recent months by the latest BBC show about plants, which has lots of this footage in. And I really emphasise that this is something you could do quite easily at home, and it's even better when you do it yourself. This is a 150-year-old technology that reveals around us this incredible, bursting life that's not visible to the human eye. It shows us a view on the world that's mediated by a machine that totally changes our perspective of it. So technology really is capable, despite all the terrible things that we do with it in many ways, of giving us these kinds of years.

For me, visual satellites and Earth observation is another example. We loft these things up into space and most of them were used for spying and surveillance and warfare, but some of them grant us this really incredible view on the natural world and on the state of the planet at scales that were completely impossible before, and that do allow us to think new thoughts about it.

The final major example in the book is what we've mentioned a couple of times before, which is this thing that's coming to be called the 'Internet of Animals', which I must say I have deeply mixed thoughts about again but is quite wonderful. The basic premise of the Internet of Animals is that we've basically reached a point with animal observation through various systems, but primarily

things like GPS and satellite tags for knowing the position and location of animals, that we can build these huge sensor networks that once again allow us a perspective on the non-human, more-than-human world that we simply didn't have before.

But crucially, and this is what I try and do throughout the book, is knowledge is very far from enough. Just knowing about this stuff is clearly insufficient. It's really about what we choose to do with that knowledge and how we change ourselves as a result. Some of the animal tracking or Internet of Animals stuff is really key to this. I talk quite a lot about this huge project in the Northern US and Canada borders, where they've been tracking huge numbers of pronghorn antelope and a few other species, understanding their migration routes better in order that we can change the shape of human infrastructure, building bridges and tunnels across interstate highways, like changing the planning of settlements or even the land use for agriculture, changing the pattern of human settlements to better accommodate the lives and desires and needs of more-than-humans.

And that is politics. That is not just human politics, it's more-than-human politics, because we're including the needs, desires – expressed through their beings, through their movement, that we can now see – the including the more-than-human world into our politics and decision making. And that is something that is really in its infancy, and is highly contested, and is mostly opposed heavily, but there are these moments at which you can see the possibilities of the human, the human technological and the more-than-human, but all of them really together – and they shouldn't be as separate as I make them sound by saying that – working towards something that might at some point be more just and equal and survivable by all of us.

Andrew: One final question to you, James, and then a final question to both you. The term 'solidarity' you use, and the importance of solidarity – just talk us through that.

James: Solidarity is a term that I use, because I feel like a lot of our other political terms, and particularly the terms we use for more-than-humans, for the more-than-human world, are insufficient because they demand some kind of particular knowledge or empathy or understanding. So much contemporary human politics is based on empathy. And there's nothing wrong with empathy. But it's based on our being able to imagine ourselves in another's place. And that very quickly becomes impossible. It has limits. Particularly for me, solidarity is a form of politics that emphasises mutual aid and support and justice for all, which doesn't depend on our fully understanding or knowing those who we are supporting and in mutual aid with. It's possible for all of us to strive towards an environmental and global justice without having to imagine what it is to be like you, but simply to trust you as being a being who is deserving of rights and life and a survivable future. So solidarity for me is this really, really important term because it includes things like trust and care into a political calculus that is as broad and all-consuming as possible.

Andrew: A final question for both of you. I'll start with you, Tim. In the book, James talks about the central question of our age is how we mitigate against climate change. We've heard wonderful stories, and there are wonderful stories in this book about many, many animals, about intelligence, about the potential of AI. Do you think we've got the time to maximise all these great opportunities?

Tim: Crikey. History is very unkind to anybody who projects into the future. Yes, of course, I do. I think we do. I think the key to James' understanding of it lies in the other word that you use a lot – diversity. I very much enjoyed your defining of diversity to be so much wider than what is commonly described. And you may have forgotten how you used it, but you talked about it in terms of the assemblies in Ireland and Scotland and then in Holland where by actually trusting to diversity, far better decisions are made than are made by those who would seek to have the monopoly on good thinking. I think that is something which is going to grow vastly. And I'm hoping that the good side of

the internet, rather than that which you described in your previous work, may get us to a position where we can make some really smart collective decisions because we dare to use the right form of questioning. I've had such an exciting time meeting my new hero, which is rather odd bearing in mind I'm probably twice your age.

Andrew: James?

James: Thank you very, very much indeed. I mean, I don't have much to add to what Tim said apart from gratitude. The greatest tool we have in the fight against climate change, and all kinds of injustice, is education. And that envelops the diversity Tim says, because the only way we're going to get anywhere is by is by empowering more people and a more diverse range of people and giving them agency to address this. That doesn't just mean at that base level of like, these are the specific tools you need to fight this, because we don't know what the specific tools are. But we need education and empowerment of basically the widest, widest array of people as possible.

Andrew: Well, we're out of time. Thank you very much for watching. And I don't think I can encourage you to read this terrific book more than Tim has encouraged everyone to read this terrific book in his contributions today, so thank you for that strong endorsement. But I do urge you to read James' new book, and I do urge you to read James' other work as well. It's terrifically important work and we can all learn so much from this. Thank you very much for joining us, and thank you, James and Tim. Thank you.

This interview has been lightly edited for length and clarity. The full version of the interview is in the recording.