Science AMA Series: I'm Thomas Suddendorf, Professor of Psychology at the University of Queensland, Australia. I'm here to answer questions about what makes humans unique. AMA!

Thomas$_S$*uddendorf*[1]*andr*/*ScienceAMAs*[1]

[1]Affiliation not available

April 17, 2023

Abstract

Hi reddit! I am investigating the mental capacities in young children and in animals to answer fundamental questions about the nature and evolution of the human mind. What sets us apart from other animals – and why is there such an apparent gap between us? In 2013, I published my first book, The Gap: The Science of What Separates Us From Other Animals, which explores this topic in detail. This short video provides a brief introduction to my work and here is a link to a relevant TEDx talk. You can see my latest academic publications on my UQ web page. I'll be talking about the uniqueness of humans with Professor Helen Christensen and Claudia Hammond at BBC Future's World Changing Ideas Summit on 15 November in Sydney. The talk will be recorded for BBC Radio 4's All in the Mind and will be available to listen to afterwards. I will be here to answer questions at 18:00pm EST, 23:00pm GMT. Ask me anything!

the WINNOWER

REDDIT

Science AMA Series: I'm Thomas Suddendorf, Professor of Psychology at the University of Queensland, Australia. I'm here to answer questions about what makes humans unique. AMA!

THOMAS_SUDDENDORF R/SCIENCE

Hi reddit!
I am investigating the mental capacities in young children and in animals to answer fundamental questions about the nature and evolution of the human mind. What sets us apart from other animals – and why is there such an apparent gap between us?
In 2013, I published my first book, The Gap: The Science of What Separates Us From Other Animals, which explores this topic in detail. This short video provides a brief introduction to my work and here is a link to a relevant TEDx talk.
You can see my latest academic publications on my UQ web page.
I'll be talking about the uniqueness of humans with Professor Helen Christensen and Claudia Hammond at BBC Future's World Changing Ideas Summit on 15 November in Sydney. The talk will be recorded for BBC Radio 4's All in the Mind and will be available to listen to afterwards. **I will be here to answer questions at 18:00pm EST, 23:00pm GMT. Ask me anything!**

CORRESPONDENCE:

DATE RECEIVED:
November 11, 2016

DOI:
10.15200/winn.147878.85865

ARCHIVED:
November 10, 2016

CITATION:
Thomas_Suddendorf , r/Science , Science AMA Series: I'm Thomas Suddendorf, Professor of Psychology at the University of Queensland, Australia. I'm here to answer questions about what makes humans unique. AMA!, *The Winnower* 3:e147878.85865 , 2016 , DOI: 10.15200/winn.147878.85865

Hi professor Suddendorf! What is your opinion on animal models for mental disorders? Are mental disorders uniquely related to human capacities?

I can perhaps imagine anxiety as an attitude towards an abstract future, or psychosis as crucially involving some form of disruption of language, etc. I don't know much about it, so I would be interested in knowing your take on the subject!

Kakofoni

Good question. I think it is likely that certain disorders or aspects of disorders are shared with other species and others are distinctly human. For instance, captive animals, at times show behavior typical of human disorders, such as stereotypies, self-mutilation, and withdrawal. Animals may experience some forms of anxiety (and you may have heard about research on learned helplessness) but, as you say, there may well be a distinctly human component to this that has to do with being able to self-generate thoughts about remote future events and the threats that they may bring. (There is a new special issue on the role of foresight in clinical disorders where we discuss anxiety http://onlinelibrary.wiley.com/doi/10.1111/bjc.2016.55.issue-1/issuetoc) There is considerable research being conducted on rodents and other animals in an effort to understand human mental disorders, but this only makes sense when these animals have at least some rudiments of the human trait. After all, for characteristics that turn out to be unique, the use of animal models would seem to be profoundly misguided. This is one reason why it is important to make systematic progress on the question of what exactly is unique. It can save laboratory animals' lives and help researchers avoid many a garden path.

Hi Dr. Suddendorf, thanks for being here!

I bet your research leads you to some interesting perspectives on childhood development. It seems like there are so many illusions that we have developed socially that get dispelled when human childhood development is compared to that of other animals. Any interesting anecdotes on this?

Also, I was wondering, if humans were to mysteriously disappear tomorrow (not a Trump reference haha) which animal(s) do you imagine would end up being the first to develop sophisticated language and technology? What might that world look like?

Thanks!

discofreak

Yes there are plenty of interesting perspectives though I am not sure what anecdote I ought to relate here. Perhaps this one is of interest: We recently found that the long-held belief that newborn humans imitate facial gestures of adults, is actually not supported by the evidence. http://www.cell.com/current-biology/abstract/S0960-9822(16)30257-3

As for the thoughts about our replacement if we were to disappear, I could speculate about many options, but the first thing to note is that evolution is not directional. So there is no reason to assume that our niche would be instantly filled by another creature that evolves language and technology. If this hypothetical extinction is a bit further into the future, I would suspect that our own creations in terms of artificial intelligence and biological engineering would be the most likely candidates. …

Hi Dr Suddendorf!

Really looking forward to this AMA - first time poster. In terms of the mental development of children, how much is genetic, how much is environmental/cultural? Or in plain terms, nature vs nurture in child mental development - how much of each one is it?

Thanks in advance, Algaean

Algaean

Hi Algaean – Both nature and nurture interact and are indispensable, so the question about their relative contribution led Donald Hebb to the following response: “Which contributes more to the area of a rectangle, its length or its width?”

Having said that, if by mental development you mean universal traits such as being able to learn a language, then that is likely under tight genetic control, and behavioral genetics (e.g. by comparing monozygotic and dizygotic twins) is trying to quantify its relative contribution to individual differences on many traits related to mental development. So the answer depends on what aspect of mental development you are interested in.

Hello, thanks for doing this AMA. Do you find that domesticated animals like dogs have more human characteristics than wild animals? Or does our proximity to our pets make us feel like they exhibit behaviors that aren't really there?

kaleidoscopic_prism

Hi – many of us probably have a tendency to treat our pets as if they were little people in furry suits, especially if we relate to them as part of our family. And domestication has had a profound effect on

animals. There has been some fascinating work contrasting the capacities of dogs and wolfs that illuminates some of these effects (e.g. see studies by Brian Hare)

Hi Dr. Suddendorf,

A fundamental challenge of identifying what separates humans from other animals is conceptualizing mental qualities that afford equitable comparison. At its face, studying the psychology of other species does not seem simple, and inferring internal mechanisms from external behavior certainly presents a number of barriers. What are your thoughts on the challenges of quantifying and operationalizing things like empathy, intelligence, &c in animals?

Thanks!

Beake

You are right - It is not simple and there is a lot of debate about methodology in the field. I devote a whole chapter to this ground work in the book. Minds need to be inferred from behavior and to establish a trait we need clever, replicable tests. We also need to carefully rule out alternative interpretations (e.g. you may have heard about the Clever Hans phenomenon). To establish the absence of an ability is even more difficult – we can only give animals opportunities to demonstrate capacities.

I often use tests that were developed to examine preverbal human infants. These can sometimes be quite easily adapted to examining other primates and are useful if one is interested in questions related to human abilities. But animals that have very different sensory or nervous systems (such as bats, octopus, or spiders) often cannot be examined in the same manner and a human-centric perspective may not be appropriate. Quantitative comparisons across species are for this, and various other reasons, often problematic.

Despite all the differences, humans and many animals have adapted means of interspecies communication (my dog is good at communicating to me when he wants to play, I am good at communicating to my dog when I need him to sit still, or walk at my side). So, in addition to divergent cognition, it seems like there have been selective pressures towards convergent communication, if not cognition. Does your work explore these apparent similarities in addition to the differences?

p1percub

Alarm calls are one example of common interspecies cooperation and communication, and it would indeed make sense to expect some convergence in cognition between species in such domains. My work has focused primarily on homologies (traits shared because of common decent, rather than on convergent evolution) because I am trying to find out how we have become the peculiar creatures that we are

From your studies, have any animals shown any sense of morality the way humans do?

Skullify

In my book, the chapter on morality draws on DeWaal's distinction of 3 levels of morality. (1) the basic building blocks of empathy and reciprocity; (2) the social norms and group pressures that keep individuals in line; and (3) the capacity for self-reflective moral reasoning and judgment.

The current evidence looks like this: At level 1 there is now reasonably good evidence that other

animals may have something like compassion (e.g. chimpanzees console others who were hurt in a fight), and there are examples of reciprocal cooperation between unrelated individuals. At level 2, there are some signs that primates exert pressures that support cooperative group living, but there is no compelling case for animals moralizing explicit norms or third parties punishing moral violations or rewarding virtuous acts. At level 3, there is as yet no evidence that nonhuman animals engage in self-reflective moral reasoning.

Hello Dr. Suddendorf!

I was wondering if you've studied the science behind play much. Playing is hardly unique to the human species and is typically used as a teaching method for young, but much of western society frowns upon play into adulthood. How is play valuable to brain development? What happens without it?

bfdana

Hi – I think play is tremendously important (but maybe I am biased because I love playing myself so much- especially soccer). Most mammalian youngsters engage in play. There is even some evidence that our closest animal relatives engage in pretend play like a human toddler.

Children subsequently spend a considerable amount of their waking life in fantasy play. Thinking, in a fundamental way, is imagining actions and perceptions, and in play children learn to test hypotheses, consider probabilities, and make causal inferences. Play provides opportunity to practice and to build up expectations. Children take on roles and act out narratives of what happens in various situations, and thereby gradually learn to deliberately imagine scenarios and their consequences without having to act them out. (in other words, they learn to simulate mentally - to think).

In some sense we keep playing all our lives, not only in terms of board games and sports, but in that we all pretend certain things together. If you think about it we invent social roles and symbols, and collectively imbue them with powers. Consider presidents, referees, police officers, and national flags – they serve important functions and are critical our webs of cooperation. But their powers, reputations, and responsibilities only exist because we collectively agree upon them. Animals cannot perceive them. We pretend them together and act as if they are real - and so, for us, they are.

Hi prof. I've a question. Is Schizophrenia only unique to humans?

gg1998

There is research on the neurophysiology of schizophrenia (e.g. on the effect of prenatal vitamin D) that uses animal models. As noted in an earlier answer, though, there may well be aspects of schizophrenia and other mental disorders that have no parallels in other animals (e.g., hearing voices; speculating about the intentions and scheming of other people).

Out of curiosity, what is the separation between parrots like African Grey's and humans like? I know greys are very smart birds, and I've heard they have problem solving skills, but how does that compare to humans?

kerovon

African Grey parrots are famous in part because of Irene Pepperberg's work with the parrot Alex. He managed to learn about 150 words (50 objects, counting to 6), and appropriately used contrasting concepts such as bigger/smaller or same/different. Like the ape language projects, though, there was no story-telling or the open-endedness of human communication. Alex has unfortunately passed away

and I am waiting to see if other grey parrots can pick up where he left off

Hello! How does one quantify various aspects of "mental capacity"? I believe that long ago it was incorrectly done with things like brain size (which also doesn't match across different species) but are there tests that can be performed which help with that quantification or is it broader than that?

themeaningofhaste

Hi - even simple brain size comparisons, as you rightly point out, are problematic. For instance, it has turned out that the number of neurons in the brains scale differently in rodents, insectivores, and primates (A gram of monkey brain contain a lot more neurons than a gram of rat brain). Note that human brains are simply linearly scaled-up primate brains in terms of cell numbers. For mental capacities, it is very difficult to find traits that are easily quantifiable across species (see one of the earlier answers above). Most of my work has more to do with existence proof (can species X do Y), rather than with quantification (how much better is species X than Y).

Im curious of what you think of the executive control network and its contribution to this gap.

Redditagonist

Executive control is very important indeed. After all, for our key cognitive capacities (e.g. I find that our capacity for nested scenario building is critical – for instance in enabling us to compare future possibilities) to influence action in a prudent way they often need to compete with more immediate urges. Consider “anticipated regret” - it stops us from pursuing things we would really like to do right now because we think in the future we would have to pay a price (e.g. we do not eat in a fancy restaurant if we know we can’t pay the bill). Individual differences in inhibiting temptations (Mischel’s famous marshmallow task) in young children predict many different variables even decades later in life. There is some interesting work on inhibition and intertemporal choice in other animals. Chimpanzees can delay gratification for minutes and there is even some evidence to suggest that they may distract themselves to do so. Humans are of course even able to forgo rewards from weeks, years and lifetimes.

Dr. Suddenorf, thank you for doing this AMA! I'm often a proponent of the idea that humans are not as different, i.e. special, from many other species on a social level. For example, the social infrastructure behind an ant or bee colony is incredibly complex for a species with such a small brain.

But I often counter myself, to some extent, when I think about human's remarkable capacity for self-awareness. In my view, self-awareness, and its downstream/indirect influences, is what makes humans particularly 'special' relative to other animals. What is your take on this idea? More specifically, what biology grounds this difference when we compare ourselves to other species, from an ant to a dolphin? Is there a specific stage in development (child -> adult) where aspects of the activational phase takes hold and grants us a stronger ability to question our environment?

Lastly, do you think this poses any major problems in the field of animal research, particularly rodents. Do you think there any major problems that should be addressed when investigating psychopathology with animals models... specifically outside of pharmacotherapy and more related to memory and conditioning.

Thank you so much for doing this AMA!

Mehofjack

Thanks for the interesting questions. I agree that there are many aspects of the human condition that are very much continuous with that of other animals. And I agree that there is something special about our self-awareness. While great apes and humans share a capacity for mirror self-recognition (and this suggests in turn that this trait evolved between 14 and 18 million years ago), we can reflect on our past and future in ways that may be unique to us. At the end of the preschool years, children begin to conceive of the remote future (and are confronted with the most unwelcome of all realisations – one's own inevitable mortality). Foresight gives us tremendous flexibility, allowing us to prepare for distant opportunities and threats, to shape the future to our design; and even to shape our own future selves (e.g. acquiring skills and knowledge through deliberate practice and study). The development of these capacities is one of the major topics in my research.

As for the issue of animal models, please see my earlier replies.

Why do I have an inability to think and a blank mind? What can I do about it?

This_is_itmyusername

I am drawing a blank as to how to answer this...You are clearly able to think up a tricky question. There are individual differences in imagination, but I am afraid I am not an expert on interventions

In one of your videos you mentioned that human ancestors were likely responsible for the demise and extinction of our hominid cousins. Given our penchant for violence towards out-group members, is it safe to assume the human mind is adapted to be overly aware of in-group vs. out-group dynamics - for instance, that we have little empathy for those not in our tribe?

Psilodelic

Yes, I am afraid that our social psychology probably does reflect that. It is also the case, though, that we have become increasingly more inclusive and our circle of concern has largely been expanding. After the Holocaust, humans of all nations eventually agreed on the Universal Declaration of Human Rights and the first article reads: "All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood." This declaration is an appeal to extend our morality to all humanity, to stop slavery and prejudice, to give everyone equal rights: to treat all humans like relatives. We can reason about how we should behave in light of the consequences it has now and into the remote future - and so we can set deliberate goals to combat our own evolved leanings towards violence and prejudice

Hi Dr. Suddendorf, and thank you for doing this AMA. I found this blurb from your book to be quite interesting:

[Suddendorf] finds that two traits account for most of the ways in which our minds appear so distinct: Namely, our openended ability to imagine and reflect on scenarios, and our insatiable drive to link our minds together. These two traits explain how our species was able to amplify qualities that we inherited in parallel with our animal counterparts; transforming animal communication into language, memory into mental time travel, sociality into mind reading, problem solving into abstract reasoning, traditions into culture, and empathy into morality.

I was hoping you could reflect a little on how these traits may have been selected for in early humans - namely, what conditions favored evolution of these complex behaviors in early humans but not in other contemporaneous non-human primates.

Also, I am would be curious to hear your thoughts on what distinguishes communication from language and tradition from culture in non-human primates. How do you think about the rare examples of primates learning sign language (such as Koko) or seeming to take an interest in arts (painting)? Thanks!

SirT6

wow – these are great questions and there is a lot to say in response, so I am tempted to suggest reading the book (sorry). Chapter 11 goes in detail into the archeological record and what it can tell us about the evolution of distinctly human traits. I can only point to a couple of points here. One major condition was that our ancestors faced radical climate change as the forests to which they were adapted turned into savannah in east Africa. This transition confronted them with challenges (e.g. predators such as saber tooth cats) that exerted strong new selective pressures. Cooperation and accurate throwing of objects may have been a couple of traits that were selected early on as critical means of defense. I will have to stop myself here, and try to quickly respond to your other queries.

As for culture: there is some excellent recent work on socially maintained traditions in other animals (e.g. see Andy Whiten and colleagues). There is now good evidence that chimpanzees maintain dozens of traits through social learning. The most exciting is perhaps the use of stones to crack nuts – and one site in the Ivory Coast suggests that chimps have been doing this for several thousands of years (Chimpanzee stone age! - tough note they do not make stone tool, they just use them). Still, human transmission of such traits is more efficient (involving deliberate teaching and “over-imitation”) and this allows us to accumulate cultural knowledge rapidly (see Michael Tomasello’s work).

As for language: the key difference to other animal communication systems appears to be the open-endedness of human language (usually attributed to recursion). The ape language projects are amazing and demonstrate that they can learn hundreds of words. (check out the documentary Project Nom, by the way). However, there has been a long debate about whether they get syntax, and the open-endedness it enables. Another main issue is that the apes mostly utter commands (e.g. chase me), and have not really used their “language” for the more exciting aspects of human conversation: to tell us stories, share their reflections or ask questions. They seem to lack the urge to link their minds. Finally, the chimpanzees I work with sometimes seem to enjoy painting and the products may look like abstract art, but there is no evidence to suggest that they represent anything.

When you talk about animals not reflecting on and imagining hypothetical situations - does it seem as though they don't do this *at all*, or just not in the same way?

As an example if a bear smells berries over the next hill, does it visualize those berries and itself eating them in any sense or does it just thinking like "berries hungry go that way" or something? What would a bear in that situation be thinking, if we can know? And if we can know, can you point toward or give an explanation of the experimental method involved in finding out?

Thanks!

Chaiimowen

Great question. The mammalian hippocampus contains something like a cognitive map that enables navigation. Recent work on the sequential firing of so-called place cells in the hippocampus suggest that when in a well-known maze, rats can cognitively sweep ahead, considering one path and then the other, before making a decision about where to go. Such place-cell sequences have even been recorded during sleep and rest, suggesting a neural basis for the learning of the maze layout and its options. Moreover, great apes have been shown to think about hidden movements, and solve some problems through mental rather than physical computation, and show signs of pretense in play and deception. This suggests that they have a basic capacity to imagine alternative mental scenarios of the

world. In many ways their abilities are comparable to those of eighteen- to twenty-four-month-old human children. There is little to suggest, though, that they reflect on these imagings (so called meta-representation) and embed them into larger narratives. As a methodological example on how one might assess such capacities, have a look at a recent work by Jon Redshaw and I, in which we gave apes and children the opportunity to prepare for two mutually exclusive future situations. http://www.cell.com/current-biology/abstract/S0960-9822(16)30416-X Thanks

Is prejudice in any way hereditary? For example, if you took a child born into the Westboro Baptist Church and raised it in an average, non-prejudice family; would it still have prejudices towards homosexuality?

notdollydot

This is not my area of expertise, but there is some behavioral genetics work on this. Some people in my school have been working on this (e.g. see Barlow, F. K., Sherlock, J. M., & Zietsch, B. P. (in press). Is prejudice heritable? Evidence from twin studies. Eds. Sibley, C. G. & Barlow, F. K. Cambridge Handbook of the Psychology of Prejudice. Cambridge University Press, Cambridge, UK.)