

Hunter-gatherers of words

Cedric Boeckx

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Cedric Boeckx is Research Professor at the Catalan Institute for Advanced Studies (ICREA). His current research focuses on developing new ways to shed light on the neurobiological foundations of the human language faculty.

Cedric writes: “A lot of attention has been paid to the combinatorial aspects of human language and how they may have evolved. Comparatively less attention has been devoted to the units of combination, the “words”. I’ll argue that asking evolutionary questions about “words” enables us to touch on broader questions about our cognitive make-up and, crucially, the communities in which language acquisition/use takes place. Examining the prerequisites that a rich symbolic culture imposes helps us probe further the nature of prosociality (and its limits) in our species.”

<https://www.youtube.com/watch?v=gjrfrn8WfQDo>

The Oxford Handbook of Human Symbolic Evolution

Camilla Power: Welcome, everybody. Thank you very much for coming out tonight, to everyone who’s come here live and got across the barriers and everybody joining on Zoom.

And we’ve just got, before we go to our main event, which is this really amazing talk we’re having from Cedric Boeckx, I’ve just invited Chris Sinner, who’s come here tonight, to talk about a new book that has just been put out.

Would you like to say something about this, Chris? And that we have an event shortly to book launch this book, which is the *Oxford Handbook of Human Symbolic Evolution*.

And that will be on March the 21st.

Anybody who’s interested in some free wine and nibbles, come along that evening, which is Thursday, March the 21st. 6 o’clock start, I think. And you can see actual physical copies of this extraordinary book.

Would you like to say something about it, Chris?

Chris Sinha: Sure. Thank you very much, Camilla. And actually, I have to thank you doubly, both for allowing me to say something about the book now, and also for actually helping organize the book launch on the 21st. So while you and Chris, but I think principal– and Jerome, and Jerome as well. So thank you to all of you.

So the Oxford Handbook of Human Symbolic Evolution has just been published, and we will do the official launch at this event on the 21st. It’s amongst the many

distinguished contributors to this book, there are actually four in the audience this evening, Camilla and Chris.

And please put your hands up, your others, the Prem Podar and Rukmini Bayanaye, who all, you know, every one of them will, I hope, say something at the book launch event.

What's the kind of unique selling point of this book, apart from the fact that it was almost 10 years in the making? Really, what is important about it is— I'm just going to highlight two things.

One is it's fundamentally interdisciplinary approach to what we can call a transdisciplinary topic. So we're not restricted to archaeologists anthropologists, paleontologists. We have psychologists, linguists, semioticians.

And secondly, when we talk about human symbolic evolution, there is a tendency to think of evolutionary processes as something that sort of belongs only to the deep past, right? And you know, and it kind of finished at a certain point, or at least our symbolic capacities, our linguistic capacities, our artistic capacities, our musical faculties, and so on, you know, they evolved, and then that was it, you know, then we just used them.

And, you know, this goes together with some sort of notion of a divide between a prehistoric and a historic or something like that.

So what we tried to do We, the editors— I'll say more about that next at the event.

I'm not going to introduce the editors now.

What we try to do is emphasize the fact that human symbolic evolution is a process which is both biological and— well, it is biological, social, cultural, and, of course, semiotic.

And the interweaving of these processes in a biocultural approach tells us that it has not come to an end.

So towards the end of the book, we actually explore more recent historical developments and even projections into the future and also even ideologies of the historicization of evolution.

So that's all I'm going to say. We will have copies of the book and flyers and everything when we all get together again on the 21st. So thank you very much. And I hope I haven't taken too much of your time.

Introduction to Cedric's Talk

Camilla Power: Thanks a lot, Chris.

We thought it was really worth highlighting because a lot of the audience here might be the audience that would be interested in coming to share a few wine and cheese nibbles and hear about the launch of the book.

Essentially, it's an extraordinarily interdisciplinary exercise.

And what we will have tonight with Cedric Brooks is also going to be an extraordinary interdisciplinary exercise.

Cedric is a research professor at the Catalan Institute for Advanced Studies.

He belongs to the University of Vaisalona Institute of Neuroscience, an Institute of Complex Systems, as well as belonging to their section of general linguistics.

Now, with all that interdisciplinary firepower, his current research has focused on developing new ways to shed light on the neurobiological foundations of the human language faculty.

Now, we here at Radical Anthropology became extremely excited when we read some of Cedric's and listened to some of Cedric's recent talks because he is steering these extraordinary, integrative, interdisciplinary projects.

Our very own Chris Knight, who's sitting over here, you can't quite see him, he'll talk later, I'm sure, was one of the founders of EvoLang, along with Jim Hereford.

EvoLang has become this giant conference on the evolution of language, which brings together this very interdisciplinary space.

And Cedric's been involved a lot as well with it.

But Chris has written greatly many times about; you can't have a theory of language origins without having a theory of everything.

But probably the person who really embodies trying to produce or aiming to produce such a theory is, in fact, Cedric.

So I'm going to invite Cedric to come and tell us about it.

Cedric's Introduction

Cedric Boeckx: Thank you, everyone, for coming in person, but also on Zoom. I'm pleased to see a full room.

It's a bit of a difficult talk for me to give because the purpose of the talk is, of course, not to fulfill the predictions of the introduction that was overly generous.

But rather, it's just to say thanks to Chris and Kamita because they have inspired some of the work that they've done in this area. And so the talk is largely a pretext to get the discussion going.

So you're not going to get the theory of everything today.

You won't get it tomorrow either.

But hopefully, you'll get material that will pique your interest and also generate discussion.

That's really why I'm here today.

So I've planned the talk more or less in two parts.

The first part where I'll just give you a few thoughts that might be of interest, and then the second part you're supposed to work.

You're supposed to ask questions, but above all, you're supposed to tell me things I don't know, things I haven't read, things I haven't understood perfectly. No one knows everything. I don't know everything.

And I still have a lot to learn from the many disciplines that are important and that bear directly on some of the issues that I'll discuss in the first part of the talk. So that's really why I'm here. So you have as big a role as I have today. And so I hope that the discussion would be interesting.

So apart from thanking Chris and Camilla, I also want to start by thanking people who have inspired research that I will present, especially Since I'm in London, but not only, Chris Stringer has been extremely influential in shaping my thinking.

Chris published in 2015–2016 this paper, *The Origin and Evolution of Homo Sapiens*, that I think is really required reading for anyone interested in this area, and you'll see very soon why that is.

But it's a paper that changes the way we have to approach the evolution of *Homo sapiens*.

And if there is one thing I'd like you to remember from the talk, is that whatever one thinks of the evolution of *Homo sapiens* should also be helpful in thinking about the evolution of human language, because these two things, *Homo sapiens* and language, are intimately related in exactly one way.

That's what everyone would like to know.

But there is a connection to explore.

And so when people like Chris Stringer tells us, well, the evolution of our species must be thought in more complex ways than we used to be.

That's also a thought that we should incorporate into the evolution of language literature.

So thanks, Chris, for this.

Charles Darwin

Let's start with Charles Darwin, because that's always a good place to start, right? The reason I think some of you are here, even if you're not a linguist, is because, perhaps not everyone, but certainly many people are interested in the origin of language, because we all have this intuition, I think, that this could be telling us something deep about how we came to be who we are, right? And Darwin already expressed this in this quote saying that there's a salient trait that we have in the way we associate sounds and ideas.

He could have said science and ideas.

And that seems to be quite different from the way closely related species or distantly related species do this.

So here is a trait that we might want to explain.

And that might actually help us shape our understanding of us as a species.

And Darwin also reminded us that whatever difference we identify– this one is just an example– as great as it is, it’s still just one of degree rather than kind.

And I think this is a lesson that we should not forget.

especially if you come from linguistics– I come from linguistics– it’s very tempting to see language as a defining barrier between us and the others, as it were.

There is a– I don’t know if it’s famous or infamous book by Berwick and Chomsky called *Why Only Us?* And the title already tells you that this is the wrong approach, because it’s not only us.

It’s us as a matter of degree, but not as a matter of kind.

And so I’ve put this to tell you that on the one hand, studying language is probably extremely important for understanding who we are.

But we shouldn’t try to reify this difference into, you know, a gap that’s unbridgeable. And you don’t have to be a linguist to appreciate that language is really at the heart of what makes us human.

Here is a quote from Mike Tomasello saying that “nothing says human uniqueness like language does”. This is a common quote, but, be careful about this word uniqueness, because there is a potential tension between this and the quote we just saw from Darwin. That’s a matter of degree, not of kind.

It certainly makes us a bit special, but let’s not make this too special, as it were. This is something you will see again in the talk.

So I want to make this perhaps a little bit clearer, taking a passage from a recent paper by a range of scholars, including Frans de Waal, who recently revisited Darwin’s *Descent of Man* and say, this will allow me to read this with you.

Increasingly, students of animal cognition agree with Darwin, that’s our previous slide, that human cognition is continuous with animal cognition, right? So that’s good.

New insights from neurobiology, genetics, and other fields only reinforce Darwin’s view that most of the differences are a matter of degree and not of kind, that we saw, right? Now comes the interesting bit, right? From non-linguists, by the way.

Only one widely recognized difference remains, which is the human language capacity.

Some aspects of language are found in the communication of other species, but some other aspects remain just for us, as it was.

And so what I think is interesting about this quote is that it gets everything right up to here.

And then it immediately says, oh, but there is one thing that still makes us extremely special, and that’s language.

And The goal of the talk and the work I do is to try to take down this last bit, to try to show that, yes, language has interesting properties, but it’s still just a matter of degree and not of kind.

And I think that the way to approach this successfully is not through the work of linguists, but it’s through the works of people from adjacent disciplines that you will see coming up in the slides.

Because I think that the evidence that we can gather from these different disciplines make the first bit even valid for the language domain.

So hopefully, this is a topic of interest.

So here's the way language evolution is usually approached these days.

They are basically two camps, unfortunately.

One camp, which is more or less here, says that a language emerged very recently.

Maybe here, don't ask me exactly when, 60,000 years, 100,000 years, doesn't matter too much, but it's very recent, and it was very subtle, basically.

It's like a flash, as it were.

Meaning that before that particular event, whatever happened is not super interesting.

But this point in time makes us quite special.

This is, for example, the story that's favored by Berwick, Chomsky, and many linguists.

There are other linguists and other scholars that take the opposite view, that says, no, this recent event was not as momentous as you thought.

Instead, language is actually much, much older.

So much so that language was already present, perhaps in the last common ancestor with the Neanderthals, the Denisovans.

So it's not here, but it's here, basically.

And what I think is interesting to see is that the arguments that were originally used in favor of this view are used also in favor of that view.

They're used because of one reason, essentially.

I don't think that the arguments were originally very good.

So to give maybe sort of a caricature, an argument, it was thought that the first cave paintings were basically a good proxy for the origin of language.

And when they were discovered, people thought, ah, it was at that point.

It was a very recent event.

And the idea was, well, how could these guys How could they have done this if they didn't have a modern language capacity? They must have had language, because without language, I cannot imagine how this could have taken place, this symbolic display on the cave.

Not a very compelling argument, by the way, because the argument was just that.

It was more like a poverty of imagination argument.

I cannot imagine how you could do this without language.

Therefore, language must have been present at that point.

With the other camp, so crucially, not a very compelling, like cognitively speaking, not a particularly compelling link between one thing and language, right? It was just plausible, right? Now, the other camp, has sort of taken advantage of the fact that we now know that things that we use to attribute to this particular event, specifically to modern humans or Homo sapiens, were actually things that other **** species engaged in.

So, for example, there are claims out there that some hominids in caves are you know, from Neanderthals, not modern humans, for example.

And so these arguments are used now saying, see, how could they have done this if they didn't have language? Therefore, language goes way back, because they also had languages.

The sad part of the story is, I think, that the bad argument is being used to draw a different conclusion, but it's still the very same bad argument, right? And what I would like people to try to do is have a more refined or complex view of the situation.

It's not this view that's, I think, clear, because I think there's no good evidence for this particular momentous event.

Biologically, it makes very little sense.

But precisely because the arguments that were used for this view were not very good, we shouldn't use them to argue for the other view as well.

We should try to essentially ask, are there more compelling arguments for populating this historical landscape, and try to see when aspects of language could have emerged, maybe here, maybe here, maybe here, right? And so this view, unfortunately, that sort of separates the two, I think, dominant perspectives on language evolution, should be replaced by a much more mosaic or complex view.

And you will see why right in this slide.

If you Unless you have lived under a rock for the past five, seven, eight, maybe even 10 years, you must know that every other week or so in the newspaper, you get in the science section to the extent that there is one, in the newspaper that you read, there's going to be a summary of a paper that has just come out saying, The thing that we thought was recent is actually much older.

The thing that we thought was simple is actually much more complex.

Every other week, there is a new study that makes the point that our species, the history of our species, is not just one that's very recent, boom, one event, and that was it, but it's actually a really complex mesh of events, a mosaic, that doesn't accept a single phylogeny.

This is here, this is here.

Instead, we must recognize, as Eli Sheri, Chris Stringer, and others have argued, I think, beautifully, that the story of our species doesn't go back just 200,000 years, 300,000 years.

But it goes way back.

And it's not the same story as that of other **** species that were also interesting in their own right.

But we shouldn't collapse all of you saying, if it's not recent, it's old and shared.

Instead, we should appreciate that there was really a long time for our species, even once it's split from the Neanderthals and the Denisovans, to explore different aspects of cognition that may be relevant for language, right? And so if these experts are telling us that the story of our species is much more complicated than we thought, it seemed

to me much more reasonable to admit that the story of our human language is also just as complex as this.

In other words, And whatever story we end up telling about language should be at least as complex as this, as what they are telling us, not much more simple.

So not what I was discussing in the previous slide.

So here's a much more complex phylogeny from Ellie Sherry's brilliant work, in my opinion.

So when we try to draw a cognitive phylogeny of language, the shape of that phylogeny should be much closer to this than whatever we have seen recently.

And I think this is at least one point that I want to come across.

And the other point that I want to come across draws from a different discipline, which is the discipline of developmental linguistics or language acquisition.

There is a point that's been well known for decades, but I think is very often forgotten, is that when we talk about language evolution, I think it helps to bear in mind the fact that it is a capacity that humans display, that's for sure.

But that capacity is sort of time-dependent in an interesting way.

And I think that you don't have to be a linguist to relate to what I'm saying.

Just looking here, I think it's OK not to offend anyone, but you're just as old as me, at least.

And so you know that if you're trying to learn a new language now, you're not going to do this very well.

Right? If I try to do this now, I'm pathetic.

And chances are that you are, too.

And this is quite different from what happened when you learned your first language. Whatever you think happened then is a very different thing.

It's a capacity that you have early in life.

And as Eric Lennenberg taught us many decades ago, it declines rapidly.

And by the time of puberty, it's pretty much gone.

It's something else.

It doesn't mean, of course, that you cannot acquire another language, but I think it does mean that you are drawing on cognitive resources that are different from those that you drew from early on.

And this explains why it feels so different to acquire language, and this is why it explains that the outcomes can be so different.

So first language— your first language sort of has a privileged status.

And I think it's worth insisting on this, because so many studies in so many different disciplines look at adult language data.

For example, many studies in neuro-linguistics that are really good Forget the fact that looking at the organization of language in the adult human brain, maybe, I think, in fact, is not looking at whatever is going on there when the capacity, as it were, is at its best.

And so I think that when we think of the phenotype, when we want to talk about language evolution, we should try to at least have a story for that early aspect of human life and not treat language as– or the language capacity, if you want– as something that doesn't change over the lifetime.

And in fact, the group that should be best studied as children.

And so if you want to, for example, have interesting claims about language in the human brain, the brain you should study is the brain of children, not of adults.

Because maybe you're picking a signal that's quite distinct from whatever we should be interested in.

Because the real difference is not so much what we do with language as adults, but as children.

And we'll see that paying attention to the early stages of brain development, I think, is particularly important in this respect.

It doesn't mean– and I want to insist on this because I don't want to make more enemies than necessary– it doesn't mean that work on The neuroscience of language that looks at adults is completely irrelevant.

That's not the claim.

But I think that there should be an extra step of asking whether the conclusions drawn from that work bear on this period.

And I'll try to illustrate this.

I think it's– yes.

Allow me for just a couple of minutes to illustrate this.

Again, in a cartoonish way, but I think not in a way that's untrue.

If you've looked at the literature on the evolution of language, one of the brain structures that's often discussed is the arcuate fasciculus.

It's this white matter tract that connects roughly– allow me the cartoon– Broca's area, the prefrontal area, and Wernicke's area, the temporal area, roughly this one, this one, these two areas.

It seems like an important tract that connects to areas that, in adults, are important for language and that are often almost invariably picked up by studies in neuro-linguistics, for example.

And the reason this tract has attracted a lot of attention is that it changed in evolution, as far as we can tell, in closely related living species like chimpanzees, but also less a little bit more distant than macaque, this tract has a very different shape, a very different density.

So here is the tract in an adult human, right? And he's in chimpanzee and in macaque, and you see that you know, it doesn't link the same areas, right? And so people have been drawn to this and say, ah, there's something special to be explained here, right? And this may be true.

This may be true.

But what's also true is that this particular tract that you see here, as I said, refers to the adult human brain.

It's not present in this density and shape in newborns and in early childhood.

In fact, here's a representation taken from Friederitz's work.

Here you see the connection in adults, fully formed, connecting the two areas.

But in newborns, some areas are not yet connected or not as well connected.

Right? It depends on who you ask in the literature.

They would say it's completely missing, or the density is quite different.

But I think it's important, because if you are telling an important story about the evolution of language on the basis of this track and on the basis of this representation, you should bear in mind that this representation is for the adult human brain.

But the interesting peak of our language acquisition capacity is here when this tract is not yet fully formed, suggesting, I think, that you don't want to put, well, your abstract money on this tract, right? Because you will be in trouble here, right? So we should ask, we should be sure, in other words, that if we pinpoint certain areas of the brain as crucial for a certain capacity, it should be there in the infant as well, because that's when the capacity manifests itself at its best, right? And I think this is a point that's often forgotten by the neuroscientists, by the linguists, but also, by the way, by the geneticists, because a lot of the genetic data we have come from adults, right? Right? Not from children.

There might be good reasons, good practical reasons why that's the case, but we should bear in mind that we are maybe committing an important mistake.

Because Lennerberg taught us, and I think he was right, that very early on this capacity is special.

In fact, it's more special here for this stage.

than at this stage, right? So let's ask, in other words, what's special about this brain and not so much what's special about that brain? Because so many things have happened to that brain that we may be looking at the wrong thing, as it were.

Is this clear a little bit? All right, here's another thing that I want you to bear in mind.

What I'm telling you now are, I think, elements of a better story.

They're in isolation.

They are not the full story, but they are important to bear in mind.

I think there is an aspect of language evolution that I think has been very well captured by the group of Simon Kirby and colleagues at Edinburgh that has shown that some properties of language naturally emerged in the context, in the act of communication and acquisition.

I don't know if there are some linguists in the audience.

Not all linguists appreciate the power of linguistic interactions in shaping the language phenotype.

Some think that It's already built in the individual, that studying the individual is enough.

This work, or this family of work, are showing that, in fact, we are missing a lot of the structuring power of communication in just studying one individual, or one individual's brain, as it were.

So what this is supposed to be an allusion to is that Simon Kirby and colleagues have shown that If you are trying to convey as many concepts as possible to your interlocutor, and the interlocutor is trying to remember as many of them as possible.

The natural tension, the natural way to resolve this tension is to have a language that's compositionally organized, that is, that has certain rules that essentially breaks down linguistic units into parts that are reusable, meaningful parts that are reusable, right? This is interesting because some linguists would like to claim that this ability to construct compositional meanings is part of a thing that they call— I don't know if I should use present or past tense— universal grammar.

So the thing that's supposed to be this innate knowledge of language that you have.

This kind of work shows that this is actually an unnecessary assumption, because this property will naturally emerge from biases that are not specifically linguistic, but they emerge in the act, in linguistic acts.

And this is true, notice that this is true of adults, but also of children, because learning a language is actually engaging in a social act.

You don't learn in isolation.

In fact, don't try that experiment.

Children learn by interacting with others, by teaching and learning from one another, right? And so this, and presumably other properties of language, are likely to emerge without requiring— now, see, we have to be careful.

It doesn't mean that there is absolutely no biology involved, right? What it means is that there is no language-specific bias involved, but there are other biases that might be based and presumably are based on cognitive and biological structures that are recruited in the act of linguistic exchange.

Right? And so if this is true— and I think it has a good chance of being true— if this is true, it's actually a good day for the biologists.

Because instead of searching for a unicorn that's called universal grammar, it can actually look for structures in the brain that are much more plausible, that can be recruited in the linguistic act.

And because they are not language-specific, they can be examined, possibly, in other species.

Now, remember that slide from Darwin? It's a matter of degree, not of kind.

This is one example where this is a plausible research agenda, basically.

It's one of the ways in which you make a language evolution more plausible, as it were.

Instead of asking too much of biology, you're asking what actually may look more plausible.

May look more plausible because the whole of biology is based on a comparative approach.

And the comparative approach requires you to look at a wide range of species.

And if you claim that it's just us, Forgive my friend, but you're screwed, right? All right.

So what this, I think, suggests is that looking for the, as it were, biological evolution of language is a bit like looking at the evolution of this figure.

And I want to take a moment to ask you if you all see this triangle.

Right? OK, that's good.

That's good.

But there is no triangle, people.

Right? As is well known, it's the configuration of these things that make you see the triangle.

But the mistake, I think, that linguists made, for example, with universal grammar, thinking that triangle really existed and was part of our biology.

That doesn't mean that there is no biological story to tell.

There is a biological story in trying to understand, basically, how these things became configured in such a way that they make this figure emerge, right? So the question for the biologists is not this, but this, right? But of course, as an adult, maybe the only thing you see is just this.

Right? And so that's why studying adult language is, I think, the wrong thing, because it ignores—there's a picture of various very famous buildings that at one point in their evolution or development look much uglier than we see them now because of the scaffoldings around.

And I think the scaffolding made these structures eventually possible, even if the scaffoldings were later removed.

And we should try to think of the evolution and development of the human brain as having this role of a scaffolding that maybe later on in his life is not so evident anymore, right? So what are the structures that may actually scaffold language acquisition is, I think, an interesting question in the context of language evolution.

And I'll try to give you some of these structures that I think scaffold language acquisition.

I'll start with some that are relatively well established, to the extent that anything is well established in language evolution, and then move to more controversial aspects that I've contributed to.

Here's one that's, I think, relatively well-established and also enjoys a lot of empirical support from a comparative perspective.

There's one thing that we seem to be particularly good at, and that is imitating sounds and signs from conspecifics, right? This is how we learn language, right? We have this capacity to basically pick up sounds and signs from the environment And we are now, fortunately not, the only species that has this capacity, but not all the species that we know of have this capacity.

In fact, at one point, this capacity was thought to be rare, was thought to be, well, found in us, in songbirds, in parrots, hummingbirds, elephants, whales, bats, and that was it, pretty much.

The past decade has shown that this is a vast underestimation of the distribution of this capacity.

And I think there is a lesson to be learned there.

But what's interesting is that whenever this capacity seems to show up in a species, it looks like it depends on a particular brain structure that sends a direct connection from the motor cortex onto your laryngeal muscle.

And it's the strength or the density of this connection that seems to be extremely important for you to develop this capacity.

Also, in case you ask, this capacity seems to develop also in young members of that species over a critical period of time, just like language, by the way.

And there's been really a lot of research showing not only that this brain structure is important, but understanding also the genetic basis of how this is established.

And as recently as last week, there's lots of changes in the genomes of species that display this capacity that seem to converge, species across species, in the establishment of this brain connection.

And I think that this is certainly a success story of comparative biology, showing you that you need a particular brain structure in order for you to eventually acquire this capacity that's so important, right? Incidentally, if anyone is interested in sign languages as opposed to spoken languages, you know that in order to sign, you have to have a big manual dexterity.

Alright? And what allows this manual dexterity seems to be very, very closely related to that ability that we have of a direct connection controlling the laryngeal muscles, not the laryngeal muscle, but this time the muscles of the hands.

In fact, there's lots of work showing that the very same as it were, not identically the same, but similar changes in the genomes are responsible for this enhanced dexterity that we have.

And I think this is interesting because it's not just true of different species, but it shows that across modalities, there are very similar changes that are responsible for an ability that we display.

right, both for spoken language or for sign language.

And I expect that we'll learn, of course, a lot more from different species, because I think that perhaps the best lesson is that a capacity that we thought was relatively rare across species is coming up in more and more species the more we look.

Couldn't this be telling us something about language in general? perhaps we underestimated the capacities of other species as well.

I'll skip this slide a little bit and show you another point of convergence that I think is interesting as well.

I'll tell you a little bit of a story of how we came to be.

So there is a very old idea, actually, that Darwin was attracted to that relates us as humans in our anatomy to domesticated species.

And you have this as a cartoon version of this, where changes that seem to be present in our anatomy are reminiscent of changes that distinguish domesticated species from their wild counterparts.

So this is an idea that has attracted, as I said, a lot of attention over the centuries.

thinking, perhaps, according to some, that we may have undergone a process in our evolution of so-called self-domestication.

I don't like the term too much, but I like the idea behind it.

And the idea behind it is perhaps not so much the anatomical parallels that one can draw, but I think there is one thing that domesticated species display relative to their wild counterparts, besides the anatomy that's this thing, and that perhaps you will be familiar with if you have a pet.

Domesticated species are tame.

What this means is that they have lost the fear of human.
in their evolution.

There's lots of experiments showing that one of the distinguishing factors of domesticated species relative to their wild counterparts is the fact that they have a dramatic reduction of reactive aggression, not aggression in general, but reactive aggression specifically, so that when they are threatened, they react less aggressively.

What this means is that they consider the threat less dangerous, as it were.

And what we have been involved in is trying to figure out, from looking at the genomes of domesticated species, their wild counterparts, but also our genomes, whether there are signs of this reduction of reactive aggression.

And I think we have found some—so you have some references if you're interested—showing that there are specific brain structures that are impacted by changes in our genomes, and also that we find in domesticates, that impact the so-called limbic system, which is the system of the brain that controls, among other things, reactive aggression.

So one of the things that we have, and that, for example, chimpanzees don't have, is that we remarkably, despite the fact that I'm talking for maybe too long, you remain remarkably calm.

Perhaps you want to attack me, but you don't, right? And this is happening in a relatively closed space.

In fact, this building is kind of closed, so it's really a very closed space, right? This is actually an instance of our behavior that's quite different from that of our closely related chimpanzee, for example, that couldn't possibly stand being in a room like this without competition emerging and a reactive aggression emerging, right? So we have basically—in this sense, we are and it's been claimed, we are a little bit like the bonobos.

We have really a low— a reduced reactive aggression.

And I think that there is evidence of the genome for this.

And I think this is, of course, quite different from what's happening at the level of speech or sign, but it dominates our temperament.

And I think it dominates our temperament in one important way.

If you are less fearful, that means you trust the other more.

That's just the flip side of this, right? The reason we are fearful is because we think of the other as an aggressor, as a threat.

As soon as we lower that threat, we trust the other more, right? And if there is anyone working on pragmatics, for example, or word meaning in this room, they know that language is crucially based not on truth, but on trust.

Words in language don't refer to anything other than what we decide for them.

That's quite different from the communication systems of other species.

We tend to basically collectively trust that each other will use non-referring terms in a reliable fashion.

Otherwise, communication disappears.

But it's all fiction.

If you don't believe me, try to think of the word money and its meaning, right? And you know that it doesn't refer to anything out there that doesn't depend on what we think of, if not try to exchange money at the airport, for example.

All right? And you will see that that meaning shifts, as it were.

So it's all based on trust, right? And I think that this aspect of language couldn't be present as part of our communication systems without this bit of our biology, without this decrease in reactive aggression that essentially gave us a dramatic boost in trust, right? And I think that in the future, people may want to look at the way domesticated species understand language use or communication with humans to understand, for example, how pragmatically interesting this is, because they also trust us when we point.

And so this could offer another area where the comparative approach that's so dear to the biologists may actually tell us something about some aspects of language.

I don't have, at least some people in this audience that I know the work of, I don't have to tell you how there is an interesting link here between this aspect of biology of trust and symbolic communication, because this is a symbol is nothing but a sign of trust.

There's nothing out there.

In fact, it's precisely the difference between, say, an index, an icon, and a symbol.

It's the fact that we essentially suspend our disbelief in order for us to communicate.

Suspending our disbelief is just what this picks out, I think.

It's seeing the other not as a threat, but being willing to suspend our disbelief, right? So I think that here is another aspect of language that may actually be rooted in a biological circuit that can be studied in other species.

And that scaffolds a language acquisition, because this trust is crucially— I'll skip some of this.

Yeah, distrust is crucially an aspect of a particular developmental stage in humans.

Children play a lot.

We all know this.

Play has no function other than basically engaging this symbolic world of trust, because it doesn't correspond to anything in reality.

In fact, it's fiction, right? But notice when it manifests itself.

When do we play the most? In the period of our life where we acquire language best, not afterwards.

It doesn't mean that we cannot play as adults.

Just like it doesn't mean that we cannot acquire a language as adults.

But the peak is in childhood.

And I think this is important.

And psychologists like Alison Gopnik has shown that children, unlike adults, are much more exploratory in their behavior.

And they boost the explorer side of a tension between exploration and exploitation.

As adults, we exploit much more of what we know than explore, right? And I think this crucial aspect of our childhood is crucially important for language acquisition as well, precisely because of this role of trust, right? And what I think is particularly interesting is that Gopnik and colleagues have shown that children under stress— that is, children that feel threatened— explore much less.

They mature faster, as it were.

They resolve the tension between explore and exploit very differently from children that are raised in a nurturing environment, as it were.

And what I find particularly interesting is that this early adversity is the telltale difference between the domesticated and the wild, between the threatened and unthreatened individual.

And so it may well be that what defines our childhood specifically is, I think, connected to this reduction in a reactive aggression.

And so when we play more, when we trust more, it turns out that we acquire language in a particularly efficient way, right? That's certainly not the full story of language acquisition.

There are many more aspects of the scaffolding that are at play, but I think it's an interesting one that picks out the same period of time that's so special for language acquisition.

That's the one when we trust, crucially.

Right? So there's a huge literature on this explore and exploit debate.

And the neurobiology of it is pointing at the limbic structure.

And I think I want to emphasize this.

at a structure of the brain that hasn't been much under the radar for language evolution.

I think everyone has paid attention to the cortex, because that's the thing that stands out the most visually.

But perhaps this was a mistake.

Perhaps structure underneath the cortex played a much more important role, not for adults, but for children.

And you know which structures develop fastest, mature fastest? Those structures, not the cortex.

So maybe that's why they are so crucial early on, and so helpful and efficient early on, because they are there from the start.

It's unlike the arcuate fasciculus that matures, as it were, too late for it to play such an important role for early language acquisition.

In another talk, I could tell you that other structures that develop relatively early in life, for example, the cerebellum, also play a crucial role in language acquisition.

So it turned out that these structures that are actually often said to be ancient structures, right, are sort of a driving, sort of have a driving role for early language acquisition.

Right.

Now, not everything is good because these structures, precisely because they are so embedded into our brain structures, they are hard to spot in certain techniques.

So there is a reason why they are not well studied, practical reasons.

But hopefully the future will tell us more about them, because I think that they might actually be much more central early on.

And then if you remember the triangle metaphor that I've used, it may be that their role decrease over time, right? Just like once you've seen the triangle, you no longer care about the things that made the triangle emerge, as it were.

And that might be true of our brain as well.

And so it could well be the things that make the adult brain special are not the things that make human language possible in the first place.

And if that would be true, that would be an interesting story.

And I think that on this point, I will end, take questions, reactions, and criticism.

Thank you for your attention.

Audience Questions

Chris Knight: So Cedric, knowing about one of your previous talks, I know that one of your favourite sayings is that for every complex problem, there's always a solution which is simple, clear, and wrong.

And just that— obviously, one of the simple, clear, and wrong things is that there's a universal grammar, obviously.

And they must, therefore, because, as Chomsky put it, of course, language is digital infinity, and therefore it can't really have evolved gradually.

And that seems to me that's quite an important point that Chomsky is making there.

You can't have a communicative channel whose formatting is nearly digital, sometimes digital, partly digital, if it's not, it's either analog or digital.

And surely Chomsky is at a point there that something is special about the formatting of language.

So what I suppose I want to ask as you answer that question, which is a little bit different from what Darwin says, of course, is how is it that your background, your decades-long specialism in minimalist Chomsky and syntax, how did that prepare you? How did that prepare, or has that prepared you for this so radically different and pluralist and, I don't know, exploratory exploration in dealing with the question of the origin of language of so many diverse topics which, from a Chomskian point of view, would have been completely out of order.

Cedric: Long question. There's a short answer and a long answer. The long answer is, of course, the more interesting one. The short answer is I don't think that it prepared me well for this story. But that doesn't mean that it didn't prepare me at all.

I think that one of the things that's clear from the history of modern linguistics is that there is a richness of structure at many different levels that is part of the grammars that we eventually acquire. And it would be a mistake to ignore that richness. So that we shouldn't forget.

What I think this doesn't do well is to ask, where does that richness come from? Is it domain-specific? Is it reducible to a simple rule that is able to characterize all that richness in just one way, right? So I think there— so the work of linguists sort of ends, if you allow me, in the sense that once that richness is characterized, the real work sort of starts.

And you have to ask, where does it come from, cognitively speaking, biologically speaking, what kind of role does the interaction play? Think of Kirby's work.

None of this is addressed by saying, look how rich that structure is.

remains true, as it were, but it doesn't even begin to address, I think, the cognitive questions and, ultimately, the biological questions.

And I think that the biological question is much harder to address if you don't take into account the role of interaction and structuring.

As linguists trained like me, we've been sort of led to think of the rich structures we identified as basically necessarily coming from something that can be characterized at the individual level.

I think that was the— I'm almost tempted to say the Cartesian blind spot because it turned out that richness can actually be, at least in part, the result of demands imposed specifically by interaction, not at the level of the individual, right? I said the Cartesian blind spot, although probably I'm committing a historical mistake.

Because if you go back to Descartes' work, He was very clear, at least in some quotes, that he didn't think that, for example, the ability to speak or something was the special thing, because he identified it in other species, for example, parrots.

But it was very clear that the key difference, if you allow me, was a matter of language use.

That's the creative aspect of language use kind of sentence.

So Descartes actually put a lot more emphasis on language use than he's given credit for, right? And so calling it the Cartesian blind spot is a little bit of a misnomer.

But nonetheless, it is, I think, an aspect that we have to wrestle with, and also an aspect that— so to go back to your question, the rich structures will be there.

But that's just the beginning of the task, not the end point.

It was too easy, in a certain sense, to attribute all that richness to something like universal grammar.

Chris Knight: Isn't the digital formatting something that's off the scale? And that's the question I was asking.

Cedric: The digital formatting, I think, in part, is not disconnected from the fact that the units that we use don't refer to anything out there. But the appeal to a notion of meaning that philosophers like to call sense as opposed to reference, right? And once you can solely rely on sense to establish an interesting dialogue based on trust, then a digital formatting may be a viable option.

That is not the case if your system is truth-based. So I think that it's not an answer, but there is a path to explore there.

Martin: Thank you, it was very interesting. It sounds super intriguing. My question is— of a fundamental nature, I suppose. But it will also allow me to phrase the sub-question that I'd actually like to ask. So it's composed of two parts.

The first part is, in your studies, in these studies overall, what is the definition of language? Because the definition can change from any interaction with your surroundings to very strict spoken languages.

And basically, what does it encapsulate? And this takes me to the second part, because whenever one studies and investigates the language capacity, language acquisition, obviously the definition of language itself will dictate that investigation.

And to give a concrete example, actually it was in one of your slides, the acquisition of second language, and how child brain and adult brain are different, and how the acquisition dynamics are different— very interesting question.

Depending on this definition, one may also start asking questions as follows.

OK, children may have a higher capacity to acquire a form of language, say, a new spoken language.

But then again, adults might be learning different aspects of a language, like the meta of language, such as sarcasm, humor, the depth of political correctness.

This sort of stuff.

That's why in order to decompose and understand these more, I want to understand what the language is.

Camilla Power: Can I just say that to the Zoom people in case they couldn't hear? You couldn't hear that.

Cedric: So you want me to repeat? Just repeat the basic question.

It is the basic.

I think I'll keep to the broad question, not the specific ones, because it's linked to the question.

What's the definition of language when we talk about, for example, the important stages for language acquisition or language use or anything that or in fact, evolution of language, right? Doesn't that depend on a particular definition of language? And I guess I don't remember if it was explicit.

You're asking me what's my definition of language, right? It's a good point.

On purpose, I avoid this question.

Because I don't think that there is a single good answer.

And the same way that I think So, the short answer is, I don't think, I don't certainly have one single answer.

I think that you need different elements to contribute to aspects of that answer.

So, for example, you need to look at the brain circuits involved.

You need to talk about ages and so different, depending on that, you may have different definitions or concepts of language that may distinguish, for example, a first language from a second language, things like that.

But I think it's no reason to despair because the same thing is what does it mean to be human? What's your definition of human? Likewise, what's your definition of, to go back to actually the paper by Chris Stringer that I started off.

What's the definition of Homo sapiens? When do you start drawing the line? When do we become Homo sapiens, right? Or, you know, often people still refer to the notion of anatomically modern human to characterize, for example, aspects of the fossil record, when, in fact, it's becoming clear that there's no single point where, ah, at this point, we are anatomically modern, but not before, right? I think that looking for precise definitions might be more of an obstacle.

So I don't have a good one for you.

And so you might feel disappointed.

But I don't think that I can do better at this stage than to say, yeah, we don't have, we have some differences that we can point to, but I don't think that there's one sentence that I could give you for a definition of language, in part because I think I think it's a mistake to think that just because the word language is singular, that it refers to a singular thing.

So there might not be a single definition, which is good, because that means people can have different opinions about it.

Rukmini: So I have many questions, and I'm valuable because I come from India.

So I guess I work in linguistic pragmatics, which you mentioned.

And I'd like to ask you two specific questions, one which has to do with Darwin and Leonenberg, and the second about language acquisition among children, which were two main themes in your paper.

So about Darwin, as you know, he knew very little about the brain, but he did write this big book called *The Expression of Emotions in Man and the Animals*.

And his hypothesis was indeed, as you stated, that there was commonality across cultures and also among species.

We have repeated Darwin's questionnaire.

among infants and mothers with a very large end, you know, so 500 mothers and children, since you can't ask a child, a very young infant, do you feel shame or do you feel shame? fear or something, we observed in a very, we believed in a very Darwinian fashion that mothers were 24/7 very good observers of their children.

They kept an eye on them and knew.

And what we found in our studies was that language acquisition, and so we gave the mothers very narrow bands like zero to three months, three to six months, all the way up to 10 years.

And they were mothers of children who were 10 or infants.

And so we asked them, when did you see this emotion in your child? What were the circumstances? What was allowed, et cetera.

What we found was very surprising, and I would like you to comment on it, that The children, that language acquisition and emotional acquisition, both, even though the mothers may have had children 10 years old, they said that it stopped at three and a half.

By three and a half or four, they were observing complex loving and emotions like shame and guilt in their children.

So I wanted to know, because we looked at the body and how children were communicating with whether you see that there is a link between emotional expression through the body and linguistics, the emergence of language, because they seem to stop at the same time as that we know from the studies.

The other question has to do with childhood.

So I would argue that the body is a durable grid, analogical grid, which children will use for metaphors and say, the years of the plane or the washing machine vomited or something like this.

The question I have about this is that when a mother points there and says, look, a bird, they call chiria or whatever it is, Does she? The child has a very complex cognitive task because the mother is just pointing and it's a general direction and there are thousands of things.

The child comes to put together all these bits of knowledge and understand what the mother meant after many tries, what are the neurological steps which are involved in this sort of proceeding? Sorry.

Cedric: No, no, no.

Two very, very complex questions, very difficult to answer.

So the first one is a link between a development of emotion and development of language.

So on the one hand, I'd like there to be an important link, because I think, in fact, it's also present in other species.

So for example, We know that the dogs develop specific facial muscles that are used for communications.

And so, you know, facial expressions and emotions are also part of the system that I think we must also use.

In fact, I think that the anatomical changes I was alluding to, for example, at the level of the face, were not unrelated to the fact that our facial emotions are particularly important in order to convey meaning.

So this is perhaps less salient in the case of spoken language, but in the case of sign languages, the shape of eyebrows, all the facial expressions are extremely meaningful in ways that I think these things emotions, meaning asking questions, and so on and so forth, must be deeply related, right? Having said this, I think that there is a potential confounding factor in the way these questions are often approached is because they're often asked, if I understand correctly, by use of a questionnaire.

No? Not in the case— OK, then in that case, ignore.

Because otherwise, using language to try to probe this is a potential confounding factor.

But if it's not used, then I think— I'd like to think that this particular period of time that I singled out as important for language is not disconnected from the rest of cognition, right? Often, the term critical period is thought of as something very domain-specific.

Like, it's for language and not something.

That's not the case, because, in fact, when I was alluding to Kopnik's work, it's more like, as it were, if you allow me, the personality of a child that makes it more exploratory.

That contributes to language, but that also contributes to other things, right? And so I'm not— I'm not I wouldn't be surprised if the same period of development is crucial for many aspects of human cognition.

In fact, I would predict that more than a domain specific aspect.

That's for your first question.

For the second question, I mean, complex.

I mean, I would need to think more.

Maybe, you know, in the question period or at the end, maybe we can talk more.

And I don't have anything brilliant to say right now about it, but I'd be happy to discuss it more.

Yi Ling: Hi, my name is Yi Ling. I'm a PhD student working at Linguistics. This is a very nice talk. Thank you so much.

I guess this is my first talk that I went to about language evolution. Maybe that's why I have this question. So I personally work on psycholinguistics and neurolinguistics. So I'm just wondering, I kind of got this idea from at least the first part of the talk that, you know, At least for language evolution, the brain of a child is perhaps a better example for us to study than the brain of an adult.

But I'm just wondering— I guess this overlaps with his question a little bit. So OK, the child has more potential to develop a language, absolutely, more than adults. But the language system is not full yet. It's not complete yet in the child. They have way smaller vocabulary, the grammar— they make a lot of mistakes in grammar.

In all aspects of language, I guess my question is just why, at least for language evolution, a brain where maybe there's more potential to develop a certain capacity is a better example than a brain, in this case, a nano brain, where maybe we've lost the potential to develop such a thing, but at least as a system, language is complete.

Cedric: Good question. I see the meaning behind the question. And you're not wrong in the sense that— so there is a famous slogan by Lissa Newport called “less is more in the case of a language acquisition”, that sometimes less mature is better for certain things. But it's important to remember it's not better for everything, right? It's better for some things.

The point that I was trying to make, so maybe it didn't come across well, so let me take this opportunity to correct this, is not the case that it's not important to look at adults or not helpful.

What I think is a mistake is to take the adult brain as the standard to understand, for example, to ask questions about brain evolution in the context of language evolution, right? Because the adult brain is basically sort of the endpoint of a very long process.

And in that process, specific stages, I think, make the brain of a child look quite different from that of the adult in some ways.

And not— so failing to look at those stages when the brain is more immature may not be a good idea if we want to understand how, at a particular point in our life history, so in development, we are extremely good at doing some things with language that later on seem to be at least much harder.

So not everything, right, but some things. So I'm not saying, for example, the *Diarchus fasciculus*, when it's fully developed, doesn't play a role. Not at all.

But I think that the mistake would be, ah, look, in the adults, it's so different, right, from other species, that that must be the key, because, in fact, It ignores some stages where it's not yet matured, and yet, important things about language development are happening.

So that was the corrective. But if you understood me as saying, let's not look at adults, just children, that was my mistake, if I gave you that impression.

Yi Ling: That wasn't my impression either, but I was just curious because— Yeah, I guess working in cycling this, I've always sort of considered language development as kind of like a separate thing from like actual use of language.

Say, if I want to study, say, how a brain processes irony, I wouldn't be looking for children if they don't have that yet.

Cedric: So the observation was that there are some things about the linguistic system, for example, the understanding of irony and things of that, so that are much more clearly manifested later on, and therefore, the earlier stages wouldn't be perhaps as helpful to understand them, and I think, while this is a fair point, I think that in

order to have at least a full picture, right, it would be important to take into account the fact that, you know, the system changes over time in ways that are perhaps important to understand.

Right? And if that's the take-home message, I'd be happy if that were the case.

You're right that for certain aspects of language, maybe looking at later stages might be important.

But for early aspects, I think it would be at least as helpful.

And I'll give you just one example.

So there are people, not me.

who are extremely good at learning languages even as adults, so much so that sometimes it's very hard to know which one is their first language or second language or something.

I think Ken Hale had the reputation of being like this, but perhaps others.

At least these individuals exist.

It's hard for me to believe, but I'm told that they exist, right? And some of these individuals have been put into a scanner to look at the organizations of the various languages and the circuits that they use.

So Ev Fedorenko, for example, has done good work on this.

And of course, it's all interesting because you see different things about the organization.

There is one take-home message for me from that study is that the first language can be singled out in the circuit, always.

Irrespective of how many languages are proficiently acquired later on, you can still see based on, for example, the brain activity that a first language, still holds an interesting place, neurally speaking, right? I bet it's because it was acquired at a particular interesting time in our life history, and that missing the dimension would be a mistake.

Yi Ling: Great, thank you.

I guess I appreciate that.

Camilla Power: Yeah, we need to go through, and there's people on Zoom, and I wanted to pick out a few points from Zoom.

One is Catherine Williams talking about, well, if we're going to have this focus on childhood and issues of play and issues of loss of fear and more trust occurring as a result of childhood, we are really talking about factors of childcare, and in particular issues like the cooperative childcare formulated by Sarah Herdy, providing that matrix for the emergence of that level of trust and that loss of fear.

And also Frederick Chavez was asked, I think it was Frederick Chavez here, was asking about What can we say about the differences between brains of babies and children today and brains of babies in the deep past, indeed, between the different species that we're looking at as potential linguistic species? Do we want to say anything in this?

Cedric: Good questions again.

So the first one, definitely an important topic that I would have liked to talk to, but there was no time.

The one thing that I'd like to say on this— and then I'll try to be brief to take questions also from the back— is that the kind of signal that we are picking, I think, from the genomes comparing domesticated species compared to their wild counterparts that I think is the basis for the trust-like system that I was mentioning.

seems to be perhaps not fully different, but nonetheless quite distinct from the signal that we would be trying to pick out if we were to look for pro-sociality in general.

And I'm going to say this because there's lots of cooperative breeding species out there.

And when we look at cooperative breeding species, for example, their changes in their genomes compared to their closest counterparts that are non-cooperative breeders, at least as far as I can tell from now— this is unpublished work we have done— it doesn't seem to be the same signal as the changes between domesticated and wild counterparts.

So this doesn't mean that it's irrelevant.

But we may be talking, for example, about different time frames.

And this, I think, we know happened.

That is, we became cooperative readers much earlier than whatever signal we are picking up.

And so the different processes— these processes shouldn't be collapsed.

They are family related.

So it's not irrelevant, but it's not identical to the thing that we seem to be picking up.

Camilla Power: They may be sequenced in some way.

Cedric: I think that they may be sequenced in interesting ways that I think the literature hasn't explored fully yet.

Chris Knight: I want to just point out that we're all trapped here.

So some people can't get out, and he can't get out.

Camilla Power: Well, Mark has gone to the door— if anyone needs to leave, Mark has gone to the door to let people through to the other side.

But we'll take some more questions if they're in the room.

Thank you very much.

And then Chris— yes, go ahead.

Martin: Thank you, by the way, Chris and Camilla, for organizing this wonderful talk.

Cedric, yes.

It was great to hear everything that you woke together about trust and interaction and childhood and the limbic system.

I wanted to know how that could relate to thinking about hunter-gatherers and how hunter-gatherers could also think back and turn.

Cedric: Yeah, good questions.

Camilla Power: We had a point on the Zoom, too, about the acquisition of hunting abilities correlating to the acquisition of Language ability.

I could add to.

Chris Knight: That, the fact that on your screen, you had a piece of ochre.

Camilla Power: Oh, yes.

What desire to do with it?

Cedric: Yeah, you're asking a very good question.

So this is where I don't know enough, and I would like to know more.

For example, about the temporal dimension of these activities that you were mentioning, for example, the hunting, I'm not sure, but this is just— my incomplete knowledge, that it matches the developmental stage that we are talking about, that we are talking for trust.

What I think is the case is that we can learn a lot about the specific aspect of human childhood and the care received.

and also the interactions among children, which I think is important, from the hunter-gatherers, from their activities.

Because I think that there is one aspect that I couldn't mention, which is very important, namely the fact that children don't necessarily learn just from the mothers and fathers, but also from their peers very early on.

And this social structure seemed to be extremely important.

for example, to accelerate some aspects of learning.

Because it turns out that if you're both a learner and a teacher, that is, if you are more egalitarian, that actually speeds up the learning process much more than if you have a hierarchical structure that depends on a teacher and learner.

Good point.

And this, I think, is a process that I'd like to understand the evolution of that.

is, I think, would be great to understand when they shifted, in other words, because it also makes the system much more reliable.

If you have a bunch of teachers and learners, then, if you allow me, one can disappear, but still the teaching and learning can take place.

But if you have just, like me talking and everyone listening, if I disappear, then the message breaks down.

So the social organization that made this possible, that is bringing different children that may be non-related, in fact, may actually be extremely important for other aspects of language.

So you're right to point this out.

This is an aspect that I couldn't bring up.

Martin: Well, you did say that fear regresses learning.

Cedric: Yeah, but I think this aspect of social organization, I think, is, I think, also very very important and quite special in the way that we organize ourselves.

And so, yeah, definitely.

Camilla Power: We should go to Chris Sinner, who's been patiently waiting.

And then– Thank you.

Chris Sinha: And thank you, Cedric, for a very interesting talk.

Camilla Power: I'll ask you, Munchego.

Chris Sinha: I completely agree with, especially the relationship between the evolution of infancy and childhood and the evolution of language and symbolic capacities. But of course, it's really boring to only talk about what we agree about.

So I just want to– what I want to pick up is this issue of your use of the notion of trust and the way in which you relate that to symbolization and simple usage.

Now, it seems to me that you have a very ultra-conventionalist version of symbolic– of symbol you said, you know? When you talk– I mean, and it is true that our capacity for civilization enables us to construct imaginaries of all kinds.

And yet, I mean, as I'm quite sure you know, there's this kind of– now quite well-entrenched notion in cognitive science and the problem of simple grounding.

That is the relationship of simple to the world and the worlding of our language.

So my point would be, we don't have to kind of choose, I think, between the formalist, truth-based theory of language, which is totally divorced from its human users and usage, and something which kind of neglects the way in which we relate our linguistic capacities to the world.

So let me just throw this one in.

OK.

What about these current artifacts, large language models, which are not grounded at all? They have no symbol grounding.

They are completely embedded in a textual universe, basically.

They learn language, or do they? And what is the relationship between the capacities of these artifacts and the processes which led to Allah? I mean, of course, it does raise exactly that question of what is language, or what are languages? Okay, I just...

Cedric: Thanks.

Again, very big question, very, very relevant, I think. Though...

Camilla Power: Zoom doesn't know the question.

Cedric: The question doesn't know.

The Zoom doesn't know the question.

The question is, at least in part, about the relevance of large language models, for example, for questions that we are interested in, in the context of language acquisition, language use.

So what's the relationship there? I think, unlike some linguists of a particular persuasion, I think those studies about large language models will be quite relevant for questions that have been asked in the context of language and cognition.

I think that it's still very early, but I've been paying attention to some of the aspects that these models are supposed to acquire, for example, things that were supposed to be impossible languages that the brain, you know, cannot handle.

Well, it turns out that those large language models perhaps also make relevant distinctions of this kind.

That is, they find some systems much harder to learn.

Right.

And so this may actually be telling us something.

What exactly we don't know yet, because it's still early days.

I think that One of the early differences that we're pointing out is, of course, we can acquire language actually within a relatively short amount of time without much data, right? That's the poverty of stimulus kind of reflections often.

And it turned out that the early language models were set to require a huge corpus.

But it turns out that studies that looked at the corpus, like how small a corpus do they need or can they use in order to acquire certainty, it turns out that there are interesting results in that area as well.

So I think for that one, it's still early days.

It may not tell us much about the specific biology of the brain, but it may tell us things.

It may give us ways of thinking of the acquisition problem in ways that eventually benefit the biologists, just like the Kirby experiment told us that, look, if you take into account interaction, you impose more realistic demands on your biology.

Right? And I think this is super interesting.

So perhaps those large language models, based on their configurations, will tell us that there are some demands that we are still tempted to make on the biology that are different and necessary.

We'll have to see. But I think it's a really important, I think, area to watch out for.

Manchego: In the West African jungles, you have communities of monkeys who all live in the same trees and move around with each other. It basically looks like the bar scene in Star Wars when you see them, there's so many of them, different kinds. And they will listen to each other's signals for danger.

How close is this to an actual language? And what is the, how is this, you establish trust in a group where there's so much, where everybody is another, basically?

Cedric: Good question. I don't know the specific example. I would need to just learn more. This is one aspect where just my knowledge ends, as it were.

But I think so the first question is, is the system learned, or does it relate to signals that seem to be fixed?

Manchego: Seemed to be fixed and the one species will have a signal amongst themselves. Like the ones who live in the top of the trees will have one that says, oh, there's a harpy eagle coming. And then there's one down at the bottom that has a snake coming. And everybody in the tree looks to where they're supposedly pointing at.

Cedric: I see. So like I said, I would need to study this more. But I think the reason I ask about the learning process is because that seems to be really quite important in

the fact that the ability to learn a system from an outgroup is an important property of our language.

The fact that— so in that period of time where we learn a language, we are not restricted to one language. We can actually learn as many as we can, given the environment, if the right circumstances are given.

And that, I think, is also an important insight into our social organization, the fact that we are not tied to one, but in fact open to many, is, I think, a fact that we should try to capture about our communication system.

The Ted K Archive

Cedric Boeckx
Hunter-gatherers of words
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Radical Anthropology. <www.youtube.com/watch?v=gjrfn8WfQDo>

www.thetedkarchive.com