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## **The End of the World? Crises, Responsibilities, Hopes. Session: Anthropocene and Anthropocentrism.**

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### **The Uniqueness of the Human Species: Imagination, Foresight, Capacity for Hope.**

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It is a true privilege to have been invited to speak to this distinguished audience, in this very special place, about how we human beings became endowed with our extraordinary gifts of imagination and hope, and with everything those gifts brought along with them.

Now, please let me start by emphasizing the strength of the evidence that our human species, *Homo sapiens*, is intimately nested within the Great Tree of Life that unites all living beings on our planet Earth.

That Tree is represented here in a circular form, but you can easily see how it reflects the common descent of all living things on Earth from a common ancestor that lived unimaginably long ago.

And within the living world we are intimately embedded among the mammals, as we see here.

But nonetheless, despite our place deep within the Tree of Life, it is nonetheless clear that there is something qualitatively unique about our species *Homo sapiens*.

Something that sets it apart from all other life forms on our planet.

Now of course, the same thing can in some way be said about every living species, since each species possesses some distinguishing feature by which we recognize it.

But there is nonetheless no question that we *Homo sapiens* are remarkable in a very unusual variety of ways.

For one thing, there is our very odd habit of walking on two legs with our trunk held upright, which has no parallels anywhere else in the natural world.

And the physical peculiarities that result from this strange way of getting around are not only bewilderingly numerous, but are also reflected throughout the structure of our bodies.

But nonetheless, I think that most of us would agree that even more striking than our physical peculiarities, is the very unusual, symbolic, way in which we process information in our minds.

Of course, many other creatures also exhibit remarkably sentient behaviors, sometimes very complex indeed.

But, as far as we can tell, in the entire living world it is only we human beings who reason symbolically.

Which is basically a shorthand for saying that we, and as far as we can tell we alone, deconstruct our interior and exterior worlds into a large vocabulary of discrete mental symbols.

And it is that atomization of our experience, via its representation by those arbitrary and discontinuous symbols, which gives us the capacity to describe the world in terms of its individualized components.

Components that we can then shuffle around, according to rules, to make statements not only about the world as it is, but as it *might* be.

And it is this unique ability of ours to mentally dissect the continuum of the natural world that allows us to make the complex mental associations that govern our daily cognitive experience.

This capacity makes a huge difference in how we are able both to perceive our place in Nature, and to live our lives within it.

Because even the smartest non-symbolic organisms are obliged to live in and to react to the world pretty much as Nature presents it to them.

Whereas we human beings are able, at least for most of the time, to live in the worlds that we each individually re-create in our minds.

This unique capacity fundamentally alters our ways of both understanding and relating to everything we experience.

And it is what underwrites the uniquely human qualities of imagination, and foresight, and hopefulness, to which this session is dedicated.

But all this notwithstanding, our place within the Tree of Life tells us unmistakably that, at some remove, we symbolic human beings *must* be descended from an ancestor that was *not* symbolic.

An ancestor that did *not* possess these remarkable cognitive qualities we pride ourselves on today.

And that, of course, invites the compelling question of just how, and when, members of our lineage acquired the unique and extraordinary cognitive abilities that their descendants display today.

Or, to put it another way, it begs us to ask just how and when, in human prehistory, the gulf between non-symbolic and symbolic reasoning was bridged.

Now, awkwardly in this context, cognitive states do not preserve directly in the fossil and archaeological records that we depend on for information about our remote past.

So, in attempting to answer this question of questions, we are obliged to look for indirect, proxy, evidence of symbolic behaviors that might preserve in the material record.

And that can be tricky, because not everyone agrees on what kinds of evidence might be acceptable as proxies of this kind.

Some scholars believe that, because of its undoubted complexity, modern human cognition must have very deep roots in time.

Which, if correct, would strongly imply not only that our cognitive style evolved gradually, but that it can therefore be incipiently recognized in some rather ancient hominin behaviors such as the manufacture of stone tools.

However, because behaviors like stone tool making are strictly functional, others, including me, prefer to look for more specifically symbolic evidence for the emergence of modern behaviors.

And if we do that, the picture changes significantly, suggesting it might be worthwhile to briefly revisit the archaeological record with the aim of seeing what we can most reasonably conclude about when, and how, we acquired our symbolic thought.

Now, the archaeological record, the material register of ancient human activities, was inaugurated some three million years ago by the invention of the first simple stone tools, such as this sharp-edged flake.

But for the sake of brevity, a useful point at which to begin the search for the origins of symbolism is with this species, *Homo heidelbergensis*, which first appeared much more recently, at a little over 600 thousand years ago.

At that point, our genus *Homo* already had a respectable history behind it, having first appeared around two million years ago in Africa. It was already tall and slender as we see here, but its members still had brains of modest size.

In contrast, the later *Homo heidelbergensis* was the first member of our genus to have been ubiquitous across the entire Old World.

And, although it remained primitive in various respects, it possessed a brain that was already well up toward modern human size, as I think you can see from this skull comparison here, with a modern human at left.

Now, *Homo heidelbergensis* was capable of very sophisticated craftsmanship.

Its members made beautiful stone artifacts by carefully preparing high-quality stone nuclei, like the one we see in the background here, until a final blow would detach a more or less finished tool with a cutting edge all around it.

Now, that is already a tour de force, but within the tenure of *heidelbergensis* many other important technological innovations were also introduced.

Among them was the hafting of stone implements into handles, greatly increasing their utility.

*Homo heidelbergensis* also constructed the first artificial shelters, like the one reconstituted here.

And it even made fitted lumber, like this piece of carpentry from Kalambo Falls in Zambia.

It gave us the first finely pointed wooden throwing spears, like this one from a German site.

And it was also during the tenure of *heidelbergensis* that controlled fires became a regular feature at campsites.

So in short, *Homo heidelbergensis* was an extremely clever hominin.

But what we *do not* find in the record left by this gifted precursor, is any unambiguously symbolic artifacts.

And because of this, what *Homo heidelbergensis* seems to be telling us that it is possible for a hominin to be resourceful, and smart, and behaviorally flexible, and technologically sophisticated, all *in the absence of* any convincing evidence for symbolic reasoning.

And what is more, we can say the very same thing for the later and more famous *Homo neanderthalensis*.

This European hominin species emerged, from indigenous predecessors, at about 200 kyr ago.

Its members had brains as big as ours, and they were wonderful craftsmen in stone, as you can see from these examples.

The Neanderthals flourished in an age of difficult climates; they hunted some fearsomely large animals like these woolly mammoths; and, at least occasionally, they buried their dead.

But they left little to suggest that symbolic behavior was a routine feature of their complex lives. At best, we just find the occasional isolated flash of creativity such as these eagle talons apparently notched for stringing.

So, once again, the Neanderthals seem to be telling us that there is more than one way in which to be a highly intelligent hominin.

Our way is not the only way.

And this is perhaps easy to understand in the case of a species that was anatomically very different from us.

But, more surprisingly, we can also say the very same thing about the earliest fossil representatives of our own species, *Homo sapiens*.

That's because, while the fossil record shows that by about 230 kyr ago, *Homo sapiens* like this one had evolved as an anatomically distinctive entity in Africa, it is not until around 100 kyr ago, also in Africa, that we start finding intimations of regular symbolic behaviors.

For example, objects like these small tick shells, pierced for stringing, hint that by around 100 kyr ago, in both southern Africa and along the Mediterranean, the plausibly symbolic practice of bodily decoration was beginning to be practiced.

And more explicit evidence of early symbolic behaviors soon follows in south Africa, where this 77 kyr-old ochre plaque from Blombos Cave is only one of several that were deliberately engraved with geometrical markings.

Those markings clearly encoded meaning, and pretty firmly indicate that members of our species had begun to process information in a symbolic manner, at a moment when the rate of technological innovation was also beginning to accelerate.

And very soon after that, as this map shows, populations descended from those first symbolic modern human beings exited Africa, and very rapidly took over the entire Old World, eliminating all of their hominin competitors in the process.

Those competitors included not only *Homo neanderthalensis* in western Eurasia, and *Homo erectus* in the far East, but *Homo floresiensis* in Indonesia and possibly also *Homo naledi* in Africa.

By around 40 kyr ago, the dazzling cave art of Europe was being produced; and we now have evidence of a comparable tradition of representational art in Indonesia as much as 10 kyr earlier, suggesting that both traditions had their roots yet earlier in Africa.

Clearly, then, in that short period between about 100 and 40 kyr ago, a fundamental behavioral transformation in *Homo sapiens* was sparking a revolution in the way in which hominins did business in the world.

So, what had happened?

Well, slow and gradual evolution by natural selection is obviously no answer in the case of a dramatically short-term innovation that clearly took place *within* the tenure of an existing biological species.

So in understanding what occurred here, it is necessary to recall that members of *Homo sapiens* could never have started to behave so differently, had they not already possessed the necessary neural underpinnings for doing so.

And the only event in which those biological underpinnings are in the least likely to have been acquired, is the radical developmental reorganization that had resulted long before in the highly distinctive skeletal anatomy of the new species *Homo sapiens*.

And we can see just how different we are, by comparing the modern skeleton on the right, with a Neanderthal on the left.

This comparison makes it clear that the genetic alterations involved in the emergence of the anatomically distinctive *Homo sapiens* had cascading developmental consequences that were expressed throughout the entire skeleton.

And, very plausibly, those changes extended beyond the bones that preserve in the archaeological record, to include crucial changes to the structure of the brain, which alas does not preserve.

By permitting more complex associations to be made within the brain, those biological alterations would ultimately underwrite the emergence of modern cognition.

But evidently, the new potential that was created by those neural innovations lay unexploited for an appreciable length of time.

Until *something* happened, at around 100 kyr ago, to stimulate the recruitment of the new behavioral potential

That recruitment would, by the way, have made this momentous happening a pretty routine evolutionary event.

For it would simply have been a matter of recruiting an existing feature to a new purpose in the common process we call “exaptation.”



This would have made it comparable, for example, to the serendipitous discovery by ancestral birds that the feathers they already possessed could be used for flying.

And it reminds us that evolution is much less to a process of relentless optimization over the eons, than a matter of simply getting by as well as possible, in an unpredictable world, with whatever advantages you happen to have at hand.

And further, because the biological innovations that underwrote the new way of thinking were necessarily in place already, it is clear that the stimulus to the change in cognitive function was a purely cultural one.

And by far the most plausible cultural candidate we have, is the spontaneous invention of spoken language.

Because language is of course the ultimate symbolic activity, depending as it does on a vocabulary of discrete spoken or signed symbols.

And significantly, it appears that the invention of language, by a creature that was already biologically predisposed to produce it, could quite easily have been just as sudden as the material record suggests it was.

For example, theoretical linguists have argued that the algorithmic basis of language is extremely simple, involving a single cognitive switch.

And field linguists have actually observed the appearance, both rapidly and spontaneously, of structured sign languages within communities of deaf children who had previously lacked the opportunity to express their urge to communicate.

Language and symbolic thought, in other words, were inextricably entwined in modern human emergence, having been acquired together, in a single short-term, event.

An event that involved an active feedback between the two, as the particularizations of language made it possible to form the symbolic mental associations that are central to modern thinking.

And it was an event that was not only both *recent*, and *emergent*, but also one that was sudden and *exaptive*, rather than gradual and *adaptive*.

Now, in the context of this workshop it is appropriate also to note that this event would have given rise, quite directly, to the now-universal human capacity for spiritual feeling.

Which is to say, to the ability to perceive that there is something greater out there than what we can directly observe.

And that we human beings are therefore not a pinnacle of Nature, but rather a small part of a much greater whole.

Of which, we are nevertheless a remarkable part.

And if there ever was a single event in which the unique human spirit was breathed into our species, it was surely in that recent and geologically instantaneous moment when human brains first began to make symbolic associations.

Associations that finally permitted the capacities for imagination, and foresight, and hope, to which this workshop is dedicated.

Now, we take these recently acquired capacities for granted today, as central elements of our human experience.

But it is humbling to imagine what the experience of those new insights must have been like for the early symbolic *Homo sapiens*, who had no intellectual context whatever to place them in.

For the change in our cognitive algorithm was surely the most radical alteration of any organism's mindset that ever occurred.

And that abrupt shift in gears compels us to see all subsequent human history as, most importantly, the story of how we symbolic human beings have, haltingly, learned to come to terms with our fundamentally new way of experiencing and interacting with the world, and each other.

Where that learning process will lead, we cannot know; all that is certain is that it is ongoing, and that, both as moral and as interacting entities, we human beings are still at most works in progress.

For, despite all our astonishing achievements in the arts and sciences, since the end of the last Ice Age both our stewardship of our planet, and the ways in which we have tended to treat each other, have been highly questionable at best.

Currently, the auguries for improvement appear far from bright. But there are nonetheless grounds for optimism.

Because our new gifts of imagination and foresight offer us at least the potential to reach a new and durable equilibrium with the world around us, and with each other.

And, despite our dubious history, we *still* have the option to exercise those gifts in a responsible manner.