

PLOS Science Wednesday: Hi Reddit! I'm David Frayer, here to talk about my PLOS ONE paper that found Neandertals created jewelry from eagle talons — Ask Me Anything!

PLOSScienceWednesday¹ and r/Science AMAs¹

¹Affiliation not available

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ABSTRACT

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Lewis Mumford has argued that in order to understand "civilised man", we should discard our perception that "civilised" equates "tool-using", and that we should pay more attention to early man's modes of expression, such as cave painting, ritual mutilation, and scarification. To what extent do you agree with that idea?

[vaticanhotline](#)

I agree. Tools date back to more than 2 million years, and lots of other animals use tools from crows to chimpanzees. I am not sure what Mumford by 'civilized man,' but Neandertals buried their dead (sometimes with grave offerings), made art objects (besides the ones we describe here), made complex tools, crossed open water, probably spoke and so on.

Hello! Thanks for this ama. How can you be confident that such objects were indeed jewelry and say currency or a dental cleaning tool or something used to repair their phone?

[elchuchu](#)

The talons are intact (except for one broken in the sediments). As for using talons to pick at something, these birds are rare in the wild, their talons difficult to acquire, and there were many things more readily available to them – like twigs, bone splinters, stone flakes, even their own fingernails. The talons show no wear on the sharp tips, other than what would have occurred in the lives of the eagles – based on duplication of talons, there were 3-4 different birds. There is some light polishing along the medial and lateral aspects of the talons and a few densely polished areas near where the talons were attached to the foot bones. None of these correspond to using the talons as tools. As we report in the paper, experimental research on shells, like those combined in a necklace at Blombos (S. Africa), showed polish where they likely rubbed together in the jewelry assemblage.

I doubt they were used as 'currency' – but they were all found in one level with the other foot bone showing many cut marks.

Thanks for doing the AMA! One thing I found particularly interesting about your article is that

you were analyzing a find from the 1800s! Are there other collections that you hope to look at in order to see if they too provide evidence for symbolic thought processes (jewelry & art)?

While it is hard to ever know what exactly such pieces are communicating, it is exciting to see the growing body of evidence that Neanderthals did have some capacity for symbolic thought processes. But I know this has been a hot debate in anthropology over the years with some still questioning things like purposeful burials. Do you think evidence like your eagle talons should settle the debate and combined such finds prove Neanderthals were capable of symbolic thought?

[firedrops](#)

The site was excavated from 1899-1905 – the sediments no longer exist. Gorjanović-Kramberger published a short paper on them in 1901, but missed the cut marks and other evidence of manipulations on them. While the finds is pretty incontrovertible and very spectacular -- there are only single talons found at European Neandertal sites in France and Italy, but in more recent time periods – this will not 'settle the debate' for some. Neanderthals as the 'other' is too much ingrained in the thought of many paleoanthropologists.

How did Neanderthals hunt eagles? How were the claws obtained?

[payik](#)

We do not know how the Neanderthals acquired the talons, but they come from 3-4 different birds based on duplicated claws. Eagles are rare in any environment, so it is difficult they collected them from naturally dead animals. I have talked to my birding friends from here and none have ever seen an eagle carcass. We suspect they hunted them, but have no evidence other than from ethnographic sources about modern eagle hunters. There was a lot of ceremony and bravery centered around the hunt.

Hello, Dr. Frayer. How do artistic trends like these in Neandertaler differ from those of contemporary Homo sapiens? Do you believe Neandertaler were capable of hunting eagles, or would they have had to scavenge carcasses?

[Ganzerli](#)

I answered this above. We do not know how they acquired the eagles, but they likely were not scavenged based on how rare they were in the landscape – but we do not know.

Hello. Could an assumption be made that the pieces where made for non-tool use? Possibly by absence of scratch marks you'd get from using the things to pry maybe?

[Madenmann](#)

There is no evidence these were used as tools. See response to Elchuchu above

Why are Neanderthals a different species if we could reproduce with them?

[boggleogle](#)

They weren't!

Welcome,

Fascinating discovery. Was there any evidence to indicate what the jewelry signified from a cultural standpoint?

[adenovato](#)

Based on ethnography of living people, eagles represent a powerful symbol. There is no reason to think Neandertals did not consider them the same way, but I suspect we will never know for sure. The only way we can make paleoanthropological inferences about behavior is to observe the present and infer to the past

Welcome Dr. Frayer and thank you for joining us!

Philosophy time: These arguments are so often framed as "People have long claimed that *fill-in-the-blank* feature makes humans special. New evidence shows we are not special."

When are people going to stop making this argument? Or does something make us qualitatively and empirically special?

[Jobediah](#)

From the beginning, Neandertals were considered somewhere between apes and humans and despite many discoveries, like burials, were not considered 'human.' Part of this is related to the argument, now rejected, that Neandertals lacked linguistic ability. As for when people's perceptions will change about Neandertals, who knows? But, it is important to emphasize discoveries that make them more like us and there is now a wealth of accumulated evidence, in addition to these talons.

Do you have any thoughts on why the Neandertals would want to make jewelry? Is it simply for ornamentation because it looks pretty or could there be a religious/spiritual/ritual reason for doing so?

[quickblur](#)

Eagle talons are powerful symbols in recent hunter-gatherers, a symbol of a strong predator. We cannot know why they collected the talons, but in any other 'modern' context they would be cited as evidence for symbolic/spiritual reasons.

More and more evidence suggests that multiple human species were living at the same time and that our family tree is particularly "bushy".

How many human species were alive in Europe contemporary with Neanderthal?

[MorsOmniaAequat](#)

Neandertals lived in Europe by themselves until moderns began moving in about 40,000? years ago. There was a brief period of 10,000 years? when they over-lapped and bred with moderns. This had a lasting effect on moderns, in that we all carry some Neandertal genes.

Have you read the Earth's Children series by Jean Auel, particularly the first book, Clan of the Cave Bear?

[iorgfeflkd](#)

Sure. Jean Auel's stuff is great, a fun read based on a lot solid paleoanthropological data. But, it is fiction.

Would this have been the first known instance of jewelry or other cosmetics?

[Slarti47](#)

In Europe it is, but there is evidence of shell beads in S Africa about the same time.

Thanks for your work and for doing this AMA.

Were these found close to the Neanderthal Krapina site featuring suggestions of cannibalism?

[homoanthropologus](#)

The talons came from the uppermost level at the site – level 8. The evidence for cannibalized bones from levels 4-5. There are a few Neandertal bones from level 8, but no evidence of cutting. All the bones and tools from Krapina are Neandertals.

I'm really curious about who would have worn these pieces of jewelry. Did all members of 'society' wear them, or only some? I'm guessing this is impossible to answer with what we know now, but maybe you had some theories?

[iamjerie](#)

Sorry, we have no idea who wore the jewelry or why it was lost or thrown away.

Hello! Amazing discovery! This would seem to indicate that they had aesthetic values. Has there been any evidence of musical instruments, such as a flute? Do we know for sure who did the cave paintings in Europe, homo sapiens or neanderthals?

[hopelesscaribou](#)

There is still a lot of debate about the flute. There have been some amazing new finds at Gibraltar, at Abri Fumane, etc. My guess is that sapiens made the van paintings, but there is evidence in Northern Spain that Neanderthals used paint

Can you describe what type of jewelry it was and where was it worn? How do we know it is a jewelry and not a tool?

[jonstew](#)

We have been unable to reconstruct the exact piece but we know it was strung, by the smoothing of the cut marks on the proximal margin. We also know that the talons rubbed together, producing sheen on the medial and lateral surfaces. There are some very densely polished areas, again on the proximal surfaces. So, we know that they formed part of an assemblage, either a necklace or a bracelet. There is no wear on any talon suggesting any were used as a tool.

Hi Dr. Frayer, thank you for doing this AMA.

What is your current thinking on the extinction of Neanderthals? Interbreeding with anatomically modern humans? Genocide? Failure to adapt to climate change? What do you think was the nature of their interactions with H. sapiens sapiens?

I was an anthropology major at KU and took your human osteology course in the '90s. I have a square job now and always have pangs of regret that I didn't pursue a career in paleoarchaeology.

[FelineNursery](#)

My guess is that Neanderthals were living in small populations and just were swamped out if existence. There is no evidence of increased violence at the time they shared Europe with moderns. Glad you are doing well

I had 23andMe analyze my DNA and they say I'm 3.3% Neanderthal 99 percentile. How accurate

is that? What contributions did the Neanderthal make to the modern human race?

[matt2001](#)

Congratulations. Why would you assume it is not accurate? There are a series of genes affecting brain size, sperm mobility, etc. Go to the original paper in Nature to see the list.

Is this finding indicative of a more advanced social structure than previously expected, and if so what does it tell us of our prior ancestors?

[flyingdtchman](#)

I am not sure about social structure, but if they caught them, it tells us something about their intelligence.

I haven't read your paper, so I'm not sure if you touch on this or not, but do you think your findings are proof of a high level of abstract thought being present in Neanderthals? It's an old question and an old debate about just how intelligent they were and how they compare to AMHSS, so I'd be interested in hearing your thoughts on the matter.

[Lunatox](#)

It is hard to argue that Neanderthals were not intelligent based on brain size, tools use, hunting ability, settlement, surviving in the cold, etc. A reporter asked me a few months ago if a Neanderthal came back to life, what would it want. I replied, "your computer" and I was not joking.

Is it simply an assumption that the jewellery was made by Neanderthals? How can we know it wasn't obtained through trade, gift, or simply found at a nearby site? Were they so isolated from other species that these alternatives are completely unreasonable?

[qmzpal1029](#)

there were no "related species" in Europe at 130,000 years ago, so if they traded for them, it was with another Neanderthal.

What's it like doing this kind of research in a place where your results could be controversial (i.e. Kansas or other southern states)?

I'm not talking about the University, just the state that it's in.

Have there been any incidents?

[jritenburgh](#)

none

on a scale of 1-10 how much does it anger you when people cannot pronounce neanderthals correctly?

[tacoqueen69](#)

a good question. I just correct them and often they are more angry at me than them. What is annoying is that word processor program keeps correcting Neanderthal to Neanderthals when I type it in on this reply form!

I've been low-level following the issue of Neanderthal behavior and cognition. It's cool that findings like yours and other findings of feathers and shells with ochre are changing the old,

traditional idea of Neandertals as boring dullards (I kinda wince when I still see people cite Diamond on the "Great Leap Forward"). However, with Neandertals we still don't find the kind of artistic and symbolic explosion that we do in Upper Paleolithic European or MSA African modern humans.

One idea that's been tossed around (by Boyd & Richerson and [others](#)) that I'm sympathetic to is that the difference is not due to Neandertals being dim but due to demography and cultural evolution; Neandertal population densities were very low, so new ideas were less likely to form (fewer people to come up with them) and more likely to be lost (innovations were more likely to die with their innovators than be passed on), resulting in fewer ideas and forms of expression than in later, denser human populations.

Do you have any thoughts on this? Is there more recent discussion on Neandertal/modern human cultural/behavioral differences that I'm missing out on?

I thought your paper was interesting, but it's also a single paper. Do you have any further recommended reading (from yourself or others) for people interested in your finding?

[tlacomixle](#)

I think Diamond's "magic twist" is definitely wrong. Language ability is older than the Neandertals. I agree with you paragraph 2.

Sure, it is a single paper, but the discovery is pretty spectacular and more things come out every week about Neandertal competence.

If you email me, frayer@ku.edu, I can send you some papers

Do you think we actively killed the Neanderthals to extinction?

[cakeofzerg](#)

No, like I said above, there is NO evidence of increased violence at the Neandertal/modern interface.

What the most fun part while researching this?

[iwinalot7](#)

It was an unbelievable find, just sitting there all these years until Davorka found the talons. My knees got weak when I first saw the cut marks, then we found all the other evidence of polishing, etc. Just an amazing find ... and there is more to come.

Hi David, I actually used a lot of this paper as a cornerstone for one of my papers last semester. Considering this find predates any know interaction between Neanderthals and Anatomically Modern Humans, and therefore could not be the cause of AMH influence on Neanderthal culture, would you care to venture that Neanderthals may have had influence on AMH culture during their interactions, and if so what kind? Has any talon jewelry been found in the surrounding area but has been attributed to Homo sapiens, although at a later date?

[StarlightFalcon](#)

Since modern knew how to make ornaments, I doubt they copied the idea from Neandertals. There are a few other European Mousterian sites where talons have been found, but only a single talons. My guess is that these were used a pendants.

Do the eagles have large talons?

[do7com](#)

yes, the white tailed eagle at Krapina was the largest raptor around then. The largest claws are bout 2 inches long, but not all talons are the same size.

Thank you for doing this AMA!

My question is: why was the notion that Neandertals disappeared due to inter-breeding with Cro-Magnons considered to be unlikely by many in the field until recent genetic studies showed that modern humans have significant genetic similarity to Neandertals?

In an introductory anthropology course I took in college, we read a book titled *Dance of the Tiger* by paleoanthropologist Björn Kurtén, which is based on the notion that there was interbreeding between Neandertals and Cro-Magnons. Kurtén's book was published in English in 1980, so I assume the theory was at least considered by some in the field even then. Yet in Jared Diamond's 1997 Pulitzer Prize-winning book, *Guns, Germs and Steel*, he confidently dismisses the idea as baseless.

Can you explain why the idea of inter-breeding has been so polarized?

[werebear](#)

Part of the reason for this is that Neandertals were first described as 'beasts,' and their image has never recovered. Another is that the first DNA from Neandertals was mitochondrial DNA and it showed no link to modern variation. We now know that mtDNA is not very sensitive to phylogenetic placement. The same researchers who isolated the mtDNA isolated the nuclear DNA and they were astounded to find links with moderns – that is DNA sequences in moderns that were only found in Neandertals. This led to the inescapable conclusion that Neandertals and modern interbred. As for Kurtén, *Dance of the Tiger* has always been one of my favorite piece of paleoscience fiction. Kurtén was a paleontologist who knew a lot about bones. I have never been impressed with Diamond's work, which for the most part have been discounted by specialists knowing something about the topics he writes about – see criticisms using Google.

Have you ever heard of/been to the place Erkrath/Neandertal?

[thedem](#)

no

Apropos of Neanderthals, what do you think about the alleged abstract art left by Neanderthals in Gibraltar? Do you think the conclusion reached by the paper - that this is some kind of an abstract art, is true, or does it warrant more investigation?

This is the paper - <http://www.pnas.org/content/111/37/13301>.

[Chrythes](#)

Yes, I know the paper, but haven't seen the actual art. It is pretty impressive. It is on the cave floor.

What is your opinion of the claim that Neanderthals occupied former settlements of modern human's ancestors in the Middle East? Is this a sign that Neanderthals were superior to humans at that time and place?

[adam_demamps_wingman](#)

The Levant is a mix of moderns and Neandertals and moderns. The Neandertals are different in many ways from their European counterparts - for example they are taller, their noses aren't so broad. It is complicated.

Why did *Homo sapiens* out number *Homo neanderthalensis* when they arrived in Europe by a factor of 10:1?

[Fevorkillzz](#)

good question. I have no idea your 10:1 ratio is correct, but they were definitely displaced over a 10000 year period. And it wasn't because of better hunting, bigger brains, smaller teeth, etc. The fact is that we are still a long way from explaining why they went extinct after being in Europe 2-3 times (or more) longer than moderns

Usually one thinks of Neanderthals in the context of the ice age, but this very early site should be from the (Eemian) warm period, shouldn't it? If yes, the climate would have been similar to the climate today, maybe even a little warmer. Can you say anything about the environment and the social organization of them at this time? What did they eat? Was the hunting good? You mention in the paper that there were many mammal species in the area, but it is not clear if you think that these mammals were hunted. Did anyone hunt the Neanderthals? (Lions?) Were they living in small family groups or maybe in slightly larger tribes?

[MarcelBdt](#)

Krapina was situated in an interglacial, so it was warmer in Europe than it is today. No glaciers and the preceding glacial an is Riss, not Eem.

Hi David! One thing that I've always wanted answered is the way that Neanderthals (and other branches of Sapiens) saw the world. I have always wondered if the ease at which we come up with abstract thought is recent, or whether it has always existed. So, did Neanderthals have any concept of maths? Did they have any words/understanding of emotions such as greed, lust or happiness? Did they have any routine in their lives?

[batbat168](#)

boy, who knows, but I think they were a lot more human than most paleoanthropologists have given them credit. So, they likely expressed these emotions.

Is the Willendorf Venus a depiction of a Neanderthal woman?

[repeatwad](#)

no

Some say that Neanderthal art was actually superior to sapient art at the time. What do you think of this and what is the cause?

[Fevorkillzz](#)

no, not true. Neanderthal art is very rare and rather simple compared to the art of the Upper Paleolithic. Maybe Neanderthals were making art that has not survived, but they were not sculpting things, making parietal art or doing all the interesting things by the Upper Paleolithic people.

With these recent discoveries does this mean that there could have been a hierarchy in the neanderthal community, such as; only the chiefs and the higher up neanderthals would wear the jewellery or would it be something that everyone in the community shared?

[Jxzyy](#)

no, we cannot make these interpretations without data. We do not know who wore the jewelry or if there was the kind of social structure you postulate.