

Model suggests Neanderthal extinction occurred due to human cultural superiority

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A Neanderthal skeleton, left, compared with a modern human skeleton. Credit: American Museum of Natural History

(Phys.org)—A trio of researchers, two with Stanford University in the U.S. and the third with Meiji University in Japan has created a model that showed that it might be possible that the Neanderthal extinction that occurred in the years after early humans arrived in Europe, was due to the cultural superiority of humans. In their paper published in

Proceedings of the National Academy of Sciences, William Gilpin, Marcus Feldman and Kenichi Aoki describe the factors they used to create their model and why they believe it was possible that cultural differences might have been enough to drive the Neanderthal to extinction.

Prior research has shown that populations of Neanderthal were living unfettered in Europe for hundreds of thousands of years, but then, approximately 45 thousand years ago, [modern humans](#) arrived in the area after migrating out of Africa—five thousand years later, the Neanderthal were gone. Scientists have offered a variety of ideas regarding what happened—modern humans carried with them diseases that were deadly to Neanderthal, our early ancestors simply killed all the Neanderthals, or Neanderthals were not able to adapt to a changing climate, are the leading explanations that have been offered. In this new effort, the researchers report that a model they built suggests it was possible that Neanderthals went extinct because human cultural advantages were so great that it made survival for the less culturally advanced group impossible.

The researchers used a computer model that had already been built by others to mimic interspecies competition—they added elements that allowed for taking into consideration cultural and technical abilities. The result, they claim, is evidence that a culture that was more culturally advanced could displace one that was less so—even if the less culturally advanced group was initially much larger. The [model](#) also showed that such cultural advantages could lead to a feed-back loop—the more advanced one group became the more dominant they became, and the more dominant they became the more their cultural advantage grew. The researchers suggest that cultural advancement goes hand-in-hand with technological innovation which would have allowed early humans to outcompete Neanderthal for natural resources.

What is not clear is why the Neanderthal would not have simply copied the advanced culture or technology developed by [early humans](#) once it became clear there was an advantage.

More information: William Gilpin et al. An ecocultural model predicts Neanderthal extinction through competition with modern humans, *Proceedings of the National Academy of Sciences* (2016). [DOI: 10.1073/pnas.1524861113](https://doi.org/10.1073/pnas.1524861113)

Abstract

Archaeologists argue that the replacement of Neanderthals by modern humans was driven by interspecific competition due to a difference in culture level. To assess the cogency of this argument, we construct and analyze an interspecific cultural competition model based on the Lotka–Volterra model, which is widely used in ecology, but which incorporates the culture level of a species as a variable interacting with population size. We investigate the conditions under which a difference in culture level between cognitively equivalent species, or alternatively a difference in underlying learning ability, may produce competitive exclusion of a comparatively (although not absolutely) large local Neanderthal population by an initially smaller modern human population. We find, in particular, that this competitive exclusion is more likely to occur when population growth occurs on a shorter timescale than cultural change, or when the competition coefficients of the Lotka–Volterra model depend on the difference in the culture levels of the interacting species.

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