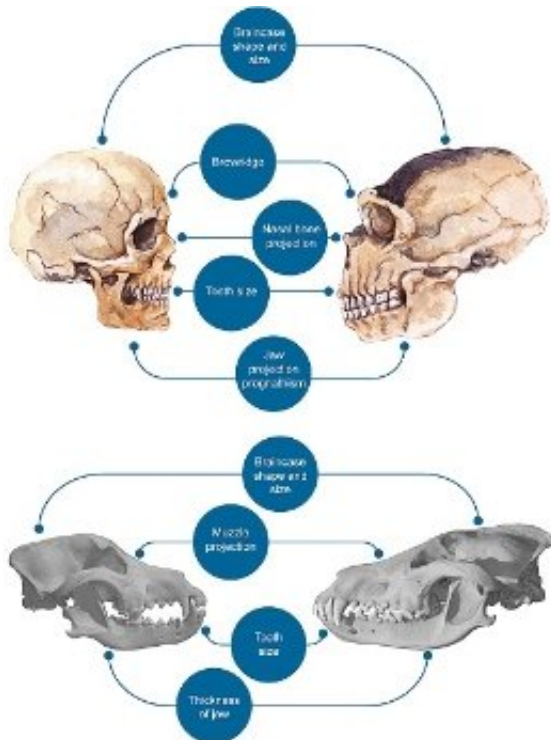


Did humans domesticate themselves?

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Craniofacial differences between modern humans and Neanderthals (top) and between dogs and wolves (bottom). Credit; PLOS ONE

Human self-domestication posits that among the driving forces of human evolution, humans selected their companions depending on who exhibited more pro-social behavior. Researchers from a team of the UB led by Cedric Boeckx, ICREA professor at the Department of Catalan Philology and General Linguistics and member of the Institute of Complex Systems of the University of Barcelona (UBICS), report new

genetic evidence for this evolutionary process.

The study, published in *PLOS ONE*, compared the genomes of [modern humans](#) to those of several domesticated species and their wild animal types in order to find overlapping [genes](#) associated with domestication traits, such as docility or a gracile physiognomy. The results showed a statistically significant number of genes associated with domestication, which overlapped between domestic animals and modern humans, but not with their wild equals, like Neanderthals.

According to the researchers, these results reinforce the [human](#) self-domestication hypothesis and "help to shed light on one aspect that makes us human, our social instinct."

A new type of evidence: the genomes of extinct human relatives

Self-domestication is proposed in species that display anatomical and behavioural features typical of the differences between [domestic animals](#) in comparison to their wild types. However, unlike the transition of wolves to dogs, self-domestication occurs without one species domesticating another. Several studies proposed the hypothesis, stating that humans (and other species such as bonobos) domesticated themselves. The aim of this study was to find biological evidence of this process by looking at the genomes of our extinct relatives, such as Neanderthals or Denisovans. This evidence was previously unavailable to biologists.

"One reason that scientists claim that humans are self-domesticated is our behavior: Modern humans are docile and tolerant, like domesticated species. Our cooperative abilities and pro-social behaviour are key features of modern cognition," says Cedric Boeckx. "The second reason

is that modern humans, when compared to Neanderthals, present a more gracile phenotype that resembles that seen in domesticates when compared to their wild-type cousins."

To identify signs of a self-domestication process in humans, the researchers made a list of genes associated with domestication features in humans, out of the comparison with the genome in Neanderthals and Denisovans, extinct human species. Then they compared this list to the genome from some domesticated animals and their wild relatives, for instance, dogs compared to wolves, and cattle compared to wisents.

Results showed that this overlap was only relevant between domesticated species and humans. "Those modern humans' selected genes under selection may prove central to a relevant process of domestication, given that these interactions may provide significant data on relevant phenotypic traits," said Cedric.

Intersection between modern humans and domesticated species

Researchers also employed other statistical measures, including control species, to certify these results. Their aim was to rule randomly overlapped genes between humans and [domesticated animals](#), so they compared the genomes among other great apes. "We found that chimpanzees, orangutans and gorillas do not show a significant overlap of genes under positive selection with domesticates. Therefore, it seems there is a 'special' intersection between humans and domesticated [species](#), and we take this to be evidence for self-domestication," Boeckx said.

Researchers note that more experimental work is required in order to determine the anatomical, cognitive and behavioural characteristics associated with these genes. "We suspect it will cover the anatomical,

cognitive, and behavioral characteristics that researchers used to motivate the idea of self-domestication. We think that the overlap could help us explain our special mode of cognition and why we are strikingly cooperative, but this remains to be put to the test. In a sense, what we did is narrow down the set of genes to examine experimentally," concluded Cedric Boeckx.

More information: Constantina Theofanopoulou et al. Self-domestication in *Homo sapiens*: Insights from comparative genomics, *PLOS ONE* (2017). [DOI: 10.1371/journal.pone.0185306](https://doi.org/10.1371/journal.pone.0185306)

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