**Headline:** A Compelling Theory to Explain a Key Trait of Modern Humans

By Marjorie Hecht

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**Source:** Independent Media Institute

**Credit Line:** *This article was produced by* [*Human Bridges*](https://observatory.wiki/Human_Bridges)*, a project of the Independent Media Institute.*

**Tags:** Social Science, Science, History, Art, War, Community, Tech, Immigration, Social Benefits, Food, Africa, Europe, Asia, Africa/South Africa, Opinion

**[Article Body:]**

Paleoanthropologist Curtis Marean has developed a comprehensive explanation based on a synthesis of research and archaeological evidence for what propelled *H. sapiens* to leave Africa about 70,000 years ago and colonize every part of the world, replacing other existing hominin populations.

Key to the process is “hyperprosociality,” by which Marean means the ability to cooperate with people who are not relatives. This in turn requires the use of symbolism in language and cultural communication, including art. Paradoxically, hyperprosociality produces cooperation among unrelated individuals at the same time that it fosters conflict to protect territory and food.

Since 2001, Marean has worked and taught at the Institute of Human Origins at Arizona State University in Tempe. He developed a new method for imaging, recording, and analyzing fossil bone, and his application of the new system “overturned… widely accepted idea[s]” about early humans, according to [his bio on ASU’s website](https://sustainability-innovation.asu.edu/person/curtis-marean/).

In recent years, pushed forward by genetic studies, a consensus developed among paleoanthropologists that modern humans evolved in Africa and spread from there across the globe, a view that overturned the previous Eurocentric theory. Marean believes that this occurred with genetic input from [“archaic and extinct lineages”](https://www.annualreviews.org/doi/10.1146/annurev-anthro-102313-025954) into the genome of modern humans.

There is still debate about whether the process was continent-wide in Africa or from a specific region, and Marean makes the case that conditions in the South African coastal area [were crucial](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2679288) for modern human dispersal.

As Marean wrote in the conclusion of [a 2015 paper](https://www.annualreviews.org/doi/10.1146/annurev-anthro-102313-025954): “All modern humans are descended from a lineage of *H. sapiens* that arose in Africa, probably in the latter third of the Pleistocene, during a long cold glacial phase. Although there were likely several lineages of *H. sapiens*, increasing evidence indicates that one gave rise to all modern humans. We do not know where this lineage resided, but several factors point to southern Africa as a strong candidate region.”

For example, Marean states that evidence from biological anthropology and archaeology of “proxies for advanced cognition, hyperprosociality, and a psychology for social learning were in place with the African lineage” between 200,000 and 150,000 years ago, while the Neanderthal lineage was still not substantially different from those of its primitive state.

**Why Hyperprosociality?**

For Marean, behavioral and cultural traits define human evolution; brain size, climate, and new technologies cannot explain the overall process.

Hyperprosociality, he says, provides a comprehensive explanation. *H. sapiens* is the only species that has high levels of cooperation with those who are not related. For example, early humans shared food, cared for those in the group who were ill, and cooperated with other unrelated groups for purposes of defense and finding mates.

While some of these traits exist among primate groups, humans brought them to a high state of development. These traits date back to the last part of the Middle Pleistocene, about 200,000 to 100,000 years ago, Marean suggests.

The on-the-ground evidence supports the emergence of hyperprosociality. The interaction of bands of people can be inferred from technologically advanced dating methods that can track the movements of an individual, group, or artifact from its place of origin to another location. Other techniques, such as chemical analysis of materials and tools in distant areas, suggest evidence of a network of groups that collaborated.

“The evidence in Eurasia for such structures and networks,” Marean writes, “is present only after [the dispersal](https://www.annualreviews.org/doi/10.1146/annurev-anthro-102313-025954) of modern humans.” The adaptive shift to hyperprosociality as a trait occurred in Africa as groups began making use of “dense and predictable resources,” Marean says. Along with this improved diet came the setting of territorial borders to secure the resources, and the consequent conflict with rivals for the food supply. The necessary cooperation with non-kinfolk for defense purposes led, in turn, to conditions that favored strong evolutionary “selection for hyperprosocial proclivities,” he writes. Cooperation between bands of people evolved into the first “ethnolinguistic” groups.

Marean emphasizes that a more dense and predictable food supply was accompanied by the need to protect one’s territory and engage in conflict with competitors. Marean proposes in [one of his suite of](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4920296/) papers on the topic “that the origin population for modern humans made this shift to dense and predictable resources, and thus was subject to high levels of territoriality and intergroup conflict, which provided the selection regime for high levels of cooperation with unrelated individuals within one’s group. The downstream effect was that all modern humans inherited these hyperprosocial proclivities that are unique to our species.”

**Significance of Coastal Resources**

Much of Marean’s work documents the importance of coastal resources and the systematic use of marine foods in the evolution of modern human traits. “Consistent use of marine resources often is associated with reduced mobility, larger group size, population packing, smaller territories, complex technologies, increased economic and social differentiation, and more intense and wide-ranging gifting and exchange,” [Marean argues](https://pubmed.ncbi.nlm.nih.gov/25498601/#:~:text=Consistent%20use%20of%20marine%20resources,wide%2Dranging%20gifting%20and%20exchange.) in a paper from this research series. This marked a shift from previous hominin lineages, which were mobile, low-density populations with little defense of their boundaries.

Marean builds much of his theory out of evidence his team and others discovered in several coastal sites in South Africa in the form of concentrations of [mollusk remains](https://www.sciencedirect.com/science/article/abs/pii/S0047248414002292?via%3Dihub) collected by people dated between 110,000 years ago to 40,000 years ago. He argues that the systematic exploitation of marine resources, as evidenced by the mollusk remains, probably required the coastal population to understand the lunar cycle and the tides to be at the right place for maximizing mollusk harvesting. This happens when the moon is full or new, and the tides are in what’s called a “[spring phase](https://moon.nasa.gov/moon-in-motion/earth-and-tides/tides/#:~:text=Spring%20tides%20always%20happen%20when,it%20perpendicular%20to%20the%20Sun.).” This process [required](https://www.sciencedirect.com/science/article/abs/pii/S0047248414002292?via%3Dihub) a “complex cognition that could make a novel connection between an astronomical observation, tidal character, and collection return rates.”

Although there is scientific consensus that “the use of marine resources and coastal adaptations are important topics in need of consideration” with regard to the story of how *Homo sapiens* colonized the planet, there’s little consensus about exactly what part coastal resources played in human origins, Marean [argues](https://www.sciencedirect.com/science/article/abs/pii/S0047248414002292?via%3Dihub). It’s not that these resources provided a higher-quality protein diet but rather that the systematic exploitation of coastal resources fostered hyperprosociality and its concomitant adaptations. Territorial defense is more successful with a cooperating community.

As he describes it, the benefits of these resources come with the cost of defending it, and [the benefit level](https://royalsocietypublishing.org/doi/10.1098/rstb.2015.0239) “can exceed the return-rate of hunting.”

**Hunters and Gatherers**

Over the course of his research, Marean argues how a lifestyle dependent on coastal resources [creates](https://royalsocietypublishing.org/doi/10.1098/rstb.2015.0239) the preconditions for a “more sedentary mobility strategy, reduced egalitarian ethos and more complex technologies, as predicted by the general hunter-gatherer adaptive system theory. Such hunter-gatherer societies are pre-adapted to food production and thus we might expect that the transition to food production may have sometimes occurred with them.”

On the basis of the archaeological evidence we have today, Marean [argues](https://royalsocietypublishing.org/doi/10.1098/rstb.2015.0239) the ancestors of modern humans and close relatives like the Neanderthals did have some cognitive and social learning capacity, but “that the hyperprosociality characteristic of modern humans was not in place and thus was the last key addition to the modern human suite of unique features.” The emerging modern humans were very complex hunter-gatherers, instead of noncomplex ones, [he writes](https://royalsocietypublishing.org/doi/10.1098/rstb.2015.0239).

Based on the interdependent triad that Marean elaborates in his writings**—**hyperprosociality accompanied by reliance on social learning, and advanced cognition capacity**—**modern humans developed in Africa and exported themselves and their adaptation of the triad traits to Europe and elsewhere, “[bringing about devastating consequences](https://www.annualreviews.org/doi/10.1146/annurev-anthro-102313-025954) for their competitors and prey.” The successful colonizers made use of projectile weapons, and as new technologies were continuously developed**—**starting with sticks and spears**—**these became more deadly.

Marean [summarizes](https://www.annualreviews.org/doi/10.1146/annurev-anthro-102313-025954) the effect: “The combination of the three adaptations allows for advanced technologies, particularly weapons, tied to extreme group cooperation in activities such as war.”

In a 2015 article for [Scientific American](https://www.scientificamerican.com/article/how-homo-sapiens-became-the-ultimate-invasive-species/), Marean reflects on the paradox of *H. sapiens* having the unique traits of cooperation and war. “Science has revealed the stimuli that trigger our hardwired proclivities to classify people as ‘other’ and treat them horrifically. But just because *H. sapiens* evolved to react to scarcity in this ruthless way does not mean we are locked into this response. Culture can override even the strongest biological instincts.”