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## DETERMINANTS OF HUMAN DEVELOPMENT<sup>2</sup>

### Abstract

This article attempts to identify the main characteristics that underpinned the survival of *Homo sapiens sapiens*, as opposed to other primitive species of human.

**Keywords:** human development, determinants of development

Modern humans (*Homo sapiens sapiens*) belong to the family called hominids (Hominidae), which had its cradle in Africa, and to the genus *Homo*. Over the past three million years, a number of *Homo* species spread across Eurasia. The only extant species today is *Homo sapiens sapiens*, also referred to as the anatomically modern human (AMH). It emerged from a small population in Africa around 200,000 years ago, and it is genetically exceptionally homogenous, carrying only small admixtures of genes from the Neanderthal, Denisovan, and perhaps other *Homo* species.

Anatomically modern humans are characterized by a brain whose functional capacities have no match in nature, not even among the anthropoids, our closest extant relatives. Our brains allow us to be cognizant of the reality around us, much like the brains of other mammals, but we can also use words and abstract notions to describe that reality.

The human brain is the best adaptation to life in real time, and it simultaneously allows for abstract thinking and enables us to take past experiences into account in our life strategies as well as to try to anticipate the future. Therefore the brain was, and still is, a key determinant of human development.

Speech and the ability to make predictions, facilitated by the development of the brain, allowed *Homo sapiens* to develop adaptive behaviors in organized structures such as families, tribes, and societies. These social determinants of development, in turn, have also been crucial for the success of humankind in historical times.

In their book<sup>3</sup> exploring the origins of our species, Konrad Fijałkowski and Tadeusz Bielicki argued that the increasing volume of the hominid brain could be

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<sup>3</sup> K. Fijałkowski, T. Bielicki, *Homo przypadkiem sapiens*, Warsaw 2008, Wydawnictwo Naukowe PWN, p. 302.

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the result of stamina-based hunting, which means chasing the hunted animal until it suffered a heat stroke. The larger the brain of the hunters became, the better it was at acting as a “thermal buffer.” In other words, they suggest that the hominid brain developed for reasons other than speech or abstract thinking – in other words, its development was a matter of “preadaptation”. A notion advanced in the first half of the 20th century by Lucien Cuénot, preadaptation refers to the emergence of new organizational and functional traits that currently do not have positive adaptive importance, yet lay the groundwork for a future adaptation to a different environment. This book on *Homo sapiens* is largely a summary of Fijałkowski’s numerous publications since 1978. The hypothesis put forward in it is one that can neither be proved nor refuted – as indeed is true for all hypotheses that refer to the idea of preadaptation. I do agree, though, with the first sentence of the book, which posits that “the emergence of humans was an extremely unlikely scenario.” There are arguments that appear to offer reliable and compelling justification for this statement.

Over the past decade (2008–2017), we have witnessed significant advancements in the study of the history of humans (*Homo sapiens sapiens*) and their close relatives: the Neanderthals and the Denisovans. These advancements have resulted from the rapid development of archeogenomics.<sup>4</sup> It was back in 1856 that a skull and long bones were found in a valley called Neanderthal outside Düsseldorf, Germany. They belonged to a man who had lived in the distant past and was anatomically different from modern humans. From that year onwards until the early 21st century, our knowledge about anthropogenesis was largely based on comparative analyses of fossil remnants and implements made by hominids for utilitarian and artistic purposes. Nowadays, however, fundamental progress has been made in this field thanks to the technique of obtaining nuclear and mitochondrial DNA from the bones of individuals that lived even in a very distant past.

Comparing DNA sequences makes it possible to analyze with a high degree of accuracy and precision how extinct organisms were related over time to one another and to modern organisms. Based on such findings, we can establish with certainty whether remnants found at different sites belonged to individuals of the same species or of different species. With access to the fossil record, archeogenomics even makes it possible to read evolutionary trends.

Based on the excavations discovered so far and the archeogenomic techniques used to analyze them, we know that within the past 200,000 years the Earth has been inhabited by genetically varied hominid populations. This included species that were anatomically heterogeneous, such as the burly *Homo erectus* and the miniature *Homo floresiensis*. Evolutionarily more advanced than these two species were *Homo heidelbergensis*, as well as three varieties of *Homo sapiens*: modern humans (*Homo sapiens sapiens*), the Neanderthals (*Homo sapiens neanderthalensis*), and Denisovans (*Homo sapiens denisovanensis*) – anatomically

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<sup>4</sup> I. Stolarek, M. Figlerowicz, “Homo sapiens w Europie – historia zapisana w DNA,” *Nauka*, no. 3, 2016, pp. 7–25.

different varieties of the same species. The Neanderthals inhabited Europe and West Asia, the Denisovans lived in Southeast Asia, and anatomically modern humans came from Africa to Eurasia in at least two migrations. Individuals from these three varieties of *Homo sapiens* interbred sporadically, the traces of which can still be found in the genomes of modern humans.

Of these species, evolutionary success would only be achieved by *Homo sapiens sapiens*, chiefly as a result of the second migration, which took place around 45,000 years ago. The remaining two varieties of the *Homo sapiens* species became extinct. Evidence of the presence of the last known Neanderthals, found in Gibraltar, dates back to around 30,000 years ago. We have, as yet, no concrete knowledge of the direct causes of the extinction of the Denisovans and Neanderthals. However, Neanderthals lived in the regions in Europe and Asia that were inhabited by anatomically modern humans during their migrations from Africa. It is difficult to tie their extinction to climate change (glaciation) – *Homo sapiens sapiens* survived in those very same harsh conditions.

All the three varieties of *Homo sapiens* were hunter-gatherers and led a nomadic lifestyle. Neanderthals had larger brains and were sturdier than anatomically modern humans. Judging by the products of their material culture, we can conclude that they were no worse in this respect than anatomically modern humans. The evolutionary success of our ancestors must have been ascribable to other, additional factors.

These probably included the migratory urge and the scale of migrations. In certain periods, migrations were the result of climate change and occurred in all the varieties of *Homo sapiens*. However, the migrations of anatomically modern humans were global in scale, coming to encompass all the continents save for Antarctica, and often spontaneous. Also, the success of anatomically modern humans must have been determined by individual and social characteristics. I addressed this problem a few years ago, at the “Poland 2000 Plus” Foresight Committee’s conference on “Challenges of the Future: Opportunities and Threats.” My considerations were included in the Committee’s publication,<sup>5</sup> and their main idea can be summarized as follows:

“Humans – *Homo sapiens sapiens* – have achieved remarkable evolutionary success and become the dominant species across the globe, while other species of the *Homo* genus became extinct. That success has been determined by brain development and the urge to form organized social structures, which led to the emergence of human civilization. The author agrees with Charles Pasternak, who sees cognition as the essence of humanity. It is cognition, along with the creative potential contributed by science and technological advancements, that guarantees humanity’s continued success.”<sup>6</sup>

<sup>5</sup> L. Kuźnicki, “Przyszłość intelektualnej ewolucji człowieka,” in *Wyzwania przyszłości – szanse i zagrożenia*, eds. J. Kleer et al., Warsaw 2010, PAN Komitet Prognoz 2000 Plus, pp. 392–397.

<sup>6</sup> *Ibid.*, p. 392.

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The Neolithic Revolution, linked to the emergence of agriculture and the first stable human settlements, took place some 8,000-12,000 years ago. The development of the first civilizations in the Nile River Valley and between the Tigris and Euphrates began just 5,000 years ago. From the perspective of the history of *Homo sapiens sapiens*, the emergence of the first civilizations can already be considered modern history. Since that time, the biology of humans and their brains cannot have changed, because natural selection no longer applies among contemporary societies, and even if it did, its effects would not be manifest in view of the short time span.

From the biological perspective, we are hunter-gatherers who have created favorable urban and agricultural environments for ourselves and settled there. Our exceptional brains have allowed us to quickly adapt to these new conditions. In many cases, however, we still behave much like our nomadic ancestors. For example, many people feel anxiety when they see harmless spiders or fast-moving but non-menacing animals such as slowworms (a kind of legless lizard, resembling a snake) or cockroaches. The word innate can be used to describe not only such traits and individual behaviors, but also mutual relations between members of societies that emerged in hunter-gatherer populations.

Humans can be taught both empathy and aggression, especially when such education starts in childhood. There is evidence that reciprocity was a universal principle of moral agency. In the tribal societies in which *Homo sapiens sapiens* evolved, sharing of feelings among individuals from the same group was always a beneficial adaptive reaction, especially in terms of survival and reproduction, which means the maximization of fitness (increasing an individual's reproductive success).

Depending on the local conditions in which hunter-gatherers lived, the populations became diversified, forming different material cultures. The durability of those communities was determined by advancements in hunting techniques as well as organization and collaboration within populations.

There is ample evidence to support the argument that the maintenance of distinctiveness in tribal communities must have oftentimes been coupled with discrimination against outgroups and entire groups regarded as rivals. The evolutionary success of *Homo sapiens sapiens* has been determined, therefore, to equal extents by the ability to collaborate with others of "our own kind" and by aggression towards strangers. The emergence of societies lent special significance to collaboration and conflicts both within groups and between different communities.

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