# The hypothesis of Homo loquens

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## Abstract

This paper aims to demonstrate, with hopefully robust arguments, that a unique chain of geophysical events (starting 43,000 years ago) influenced the Homo sapiens brain, transforming its mental setup, which resulted in a language-ready brain. This transformation led to a new species, which is distinct from the original Homo sapiens. I have called this new species Homo loquens because of its unique mental abilities based on language.

This research may be relevant for Anthropology, Linguistics, and Social Neuroscience fields while envisaging the entire advent of civilization from a new perspective.

In my opinion, the language-ready brain, with its associated mental outcomes, are the only generators of the current civilization that turned out to be unrelated to any of the previous stone-age developments.

I have to mention that many of my papers uploaded on my site on academia.edu in the Social Neuroscience section, and the aspects presented here are interrelated. However, they provide plenty of details, argumentation, and references, which could not fit the current paper's format.

Humans became unique on this planet because of a language-ready brain and the further development of the language. The language-ready brain was the result of a complex transformation of the Homo neural networks. In the meantime, the information technology specialists showed that such language contains the textbook for generating all possible technologies.

The main factor that gradually changed the Homo brain was the repeated occurrence of geomagnetic events, which favored the penetration of the cosmogenic radiation's penetration through the atmosphere of the Earth, thus increasing by 20 to 80% the presence of the C 14 isotope in the atmospheric concentration.

The animal organisms assimilate C 14 Glucose when feeding on vegetables. In short, atmospheric C14 isotopes, as absorbed into C14 Glucose, stimulate oxygen species (ROS). And it regulates the production and inhibition of nitric oxides (NO), which both have interrelated roles in neurogenesis. This paper also aims to explain the differentiation in neurogenesis that occurred between Homo and other species.

The main study used in my investigation is *Low-dose or low-dose-rate ionizing radiation-induced bioeffects in animal models*, authored by Feng Ru Tang, Weng Keong Loke, and Boo Cheong Khoo of the University of Singapore. The paper was published in the Journal of Radiation Research (online 2016 December 27). (doi: 10.1093/jrr/rrw120). The authors said: "In this review paper, we aimed to update radiation researchers and radiologists on the current progress achieved in understanding the LDIR/LDRIR-induced bionegative and biopositive effects reported in the various animal models." The authors concluded: "*In summary, under certain circumstances, experimental animal data suggests that LDRIR/LDRRIR exposure may not only promote fertility and prolong the lifespan, but also induce immunological modification, give anti-tumor ability, slow progression of atherosclerosis, and ameliorate diabetic nephropathy. More data is needed to be generated to validate existing claims of biopositive/hormetic effects on humans*."

The high prehistoric concentration of atmospheric C-14 isotope, assimilated in C-14 Glucose, transformed the neural networks and its architecture by increasing the neurogenesis processes that became solely directed toward a higher cognition capability and brain plasticity. Such a complex process generated a type of intelligence vastly different from that of Homo sapiens.

## Introduction

When the animal's organism assimilates C14-Glucose, it inhibits nitric oxide production. The pharmaceutical experiments show that when a C14-Glucose is present, the small trace of C-14 isotopes stimulates oxygen species (ROS) production while locally decreasing nitric oxide (NO).

However, during experiments, the C-14 traces have been between 1 to 5mCi., thus entering the low hazard category. By comparison, the average concentration of atmospheric C-14 isotopes at sea level is estimated to be 2mCi per year.
During the atomic bomb atmospheric testing, such C-14 concentration rose to 3.6mCi (80% higher than usual) as it was investigated in 1963-65, and it diminished to 2.4mCi in 1990 (20% higher than average). Only in 2020, the concentration returned to the preexisting level (1955).

Thus, the atmospheric data mentioned above could be correlated with the dose used in pharmaceutical and medical experiments. The effects of today's experiments can be compared with past and present natural occurrence of C-14 isotopes.

Fundamental differences would be produced by the length of the exposure time. In prehistory, many generations were exposed to high C14 isotope concentrations one after another for hundreds and thousands of years. This process ended around 4,500 years ago; a slight resurgence occurred again 2,700-2,400 years ago.

The C-14 isotopes inside the human body, as part of C14 Glucose, would stimulate the production of oxygen species (ROS), which produce oxidative processes. Such oxygen species have specific reactions with nitric oxide, regulating its concentration in various tissues. NO is known to create a nitrite reduction pathway. Within the blood vessels, the oxygen produces vasoconstriction that causes hyperbaric tension within the vessels. High tension is found inside the cells, inflicting the level of permeability of the cellular membranes. It increases the amount of available oxygen in blood vessels and cells and interacts with local nitric oxide, regulating its production.

NO, and ROS can be generated by the same enzyme or by different ones through alternative reduction and oxidation processes.

Nitric oxide is involved in transporting and dispersing Glucose in the entire organism. Glucose also stimulates oxygen species that metabolize any unwanted excess of this substance. When nitric oxide (antioxidant) decreases in the brain and the nervous system, it is so because local oxygen species increases. The oxygen species reduce the nitric oxide (antioxidant) locally, causing a hyperbaric vascular tension by vascular constriction. By contrast, the same vascular tension affects the vascular peripheries distinctly, making the nitric oxide increase locally (vasodilation) while stimulating muscle fibers and skeletal developments.

It must be said that ROS species can activate signaling pathways with conflicting and sometimes negative consequences, like reducing antioxidant capabilities for cardiovascular, renal, and central nervous systems.

On the positive side, ROS regulates cellular differentiation, proliferation, apoptosis, cell cycle, and migration.

The above effects are a reasonable explanation for the role played by physical exercising: they strengthen the muscles, but they also better oxygenate the brain, thus helping the cognition and memory processes. It is there a ROS and NO interplay stimulated by the oxygen produced during the physical exercises.

## Method

I have researched Pub Med and other sources for English-language articles, mostly in peer-reviewed journals, to find the arguments needed to feed my hypothesis. I used the evidence provided by these sources.

I have to indicate that many similar or distinct sources have been subject to investigation in my previous articles on academia.edu.

Over time, my investigative research concluded on various issues I focused on, and the conclusions moved my analysis into new directions.

I started with the geomagnetic excursions; I analyzed their duration and radiative intensity. Unexpectedly, I found that the rate of occurrence for such excursions accelerated during the interval 43 ka-4.5 ka, while their radiative pulses intermittently covered a gap of 30,000 years.

The result of the mentioned radiative pulses led to a high atmospheric concentration of C14-isotopes. Then, I found that the experiments with the atomic bombs in the era 1955-1963 have produced the same type of C14 isotopes concentration as in our prehistory.

Searching medical literature, I analyzed the effects of various nuclear technology procedures and experimental health and pharmacological testing.
Of particular interest was a study made by a research group from the University of Singapore. This study (see reference) suggests that experimental animal data generates a host of biopositive effects; no humans have been tested yet in the same range of doses.

I found that medical procedures use a radiation exposure of 2-4mCi (millicuries) that produces a biological absorption of 0.4mGy/hr.

The same radiation exposure is recorded for average C14 concentration at sea level that is 2mCi/year. When the C14 concentration increased in prehistory and during the atomic bomb experiments, the atmospheric C14 concentration increased by 20-80% (2.4mCi to 3.6mCi).

These findings made me think that I could interpolate the data on radiative effects and analyze the human brain's biological results in the last 40,000 years of our evolution. Besides a lack of direct information in the literature caused by a general scientific disinterest in this topic, I could still argue my hypothesis using a comparative investigation.

## Materials

I like to mention here the study *Analysis of the atmospheric C14 record spanning the past 50,000 years derived from high-precision Th230, U234, U238, Pa 231, U 235, and C14 dates on fossil corals, authored by a team led by Tzu-Chien, Richard G. Fairbanks, Li Cao, and Richard A. Mortlock and published in Elsevier (Quarterly Science Review 26) on June 19, 2006.*

A second study I used on the same topic is *Atmospheric C14/C12 changes during the last glacial period from Hulu Cave (China)* authored by Hai Cheng, R. Lawrence Edwards, John Southon, Katsumi Matsumoto, and a long list of other colleges.

From the medical field, I used the study *Effects of Chronic Low-Dose Radiation on Human Neural Progenitor Cells* authored by a large group of Japanese and Chinese researchers led by Mari

Katsura, Hiromasa Cyou-Nakamine, Qin Zen, and Yang Zen and published in Scientific Reports (article number 20027-2016) on January 22, 2016.

I followed this study with another one: "*Low-dose of low-dose-rate ionizing radiation-induced bioeffects in animal models*," authored by a research team from Singapore University.

I have to mention the study *Reactive Oxygen Species in Metabolic and Inflammatory Signaling* authored by Steven J. Forrester, Daniel S. Kikuchi, Marina S. Hernandes, Qian Xu, and Kathy K. Griendling published PMC 2019 March 16.

## Results

The geophysical studies mentioned above indicate that the concentration of atmospheric C14 isotopes was from 54ka to 50 ka, 12% higher than the levels recorded before 1955. Between 50ka and 43ka it increased to 28%. From 43ka to 38ka, it was 60-80% higher. Here are 5,000-6,000 years of continual high C14 concentration with significant biological impact on the human brain.

From 38ka to 25ka, it was 60-40% higher. 20ka, it was 50% higher. From 23ka to 11ka, it was 50-60% higher.

From 10ka to 2.5ka, the value was 15% higher, but a peak was recorded 6ka as 30% higher.

In sum, during the last 30,000 years before the current era, the C14 concentration was 50-30% higher than before 1955.

This data, when it is interpolated, indicates that the atmospheric C14 isotopes concentration generated a radiation exposure higher than 3mCi that is 50% higher than an average recorded before 1955.

At its peak (1963-1965), the radiation in the atmosphere reached 3.6mCi that was identical with the geophysical records for the era 43-37ka.

The medical study mentioned above referred to experiments with three types of low-radiation-doses on human brain biology. The lowest dose used was 31mGy, representing a 4mCi radiation exposure that produces an absorption of 0.4mGy/hr. The effects of such 31mGy exposure were experimentally proved to have no statistical significance.

In the meantime, this last dose still produced an increase of 1.5-fold in the gene expression, affecting 6% of all gene loci.

The study found that "*low doses of radiation in the upper range of common diagnostic procedures, create mutations through inserted DNA even more efficient than the much larger doses*."

These experimental medical findings suggest that atmospheric high C14 concentrations of 50%-80% above normal could produce significant increases in gene expression and could trigger higher than regular rates of mutations. This was a situation that persisted for almost 30,000 years during our recent prehistory.

The other study mentioned above was about the experimental evidence obtained from animal models. During testing, they exposed animal models for a prolonged time, like several tens of generations (20-30 generations).

The mice were exposed in one test to a constant low-dose of 4.3mGy/day for three weeks. In another experiment, a mice colony was exposed for 21 generations to 28.8mGy dose at 1.2mGy/h.

Many biopositive effects were recorded in both cases, like an increase in litter size, more fertile than the control group, increased litter number, increased viability, and faster growth rate.

However, when the radiation doses were higher than 30mGy, the researchers started to observe the first, but mild, bionegative results.

## Discussion on the role of oxidative stress

A chemical reaction in cells caused by oxidation produces free radicals, which are the primary source of biophotons; this process occurs during the deexcitation of free-radicals.

All biological systems have a safety mechanism that rapidly intervenes to deexcite the most dangerous free-radicals.

As for brain plasticity and its connection to oxidative stress, I will first define plasticity. It refers to an undifferentiated cellular state, where the cells, not being differentiated, are open to all options. Consequently, they are available to adapt to needed changes.

Neurogenesis generates undifferentiated neuronal networks. When the entropy occasionally increases in the hippocampus's Dentate Gyrus, a neuronal generation will burst with higher than average plasticity (more undifferentiated neurons).

It is known that higher oxidative stress generates a higher entropy. Hence, an increase in cellular entropy is directly produced by the rise in oxidative stress.

It is well established that short pulses of augmented entropy/stress result from pulses of oxygenation (oxidative stress). The process produces short pulses of free-radicals, which are almost immediately annihilated by the deexcitation. The result is biophoton production.

Scientific literature estimates that biophotons would play a significant role in neuronal transmission and communication. A high biophoton neural production was part of the change in the Homo new intellect.

## Discussion on nitric oxide neurotransmitter functions

When the neurotransmitters are involved, a higher or lower amount of nitric oxide will diminish or favor communication between them and the neurons. The nitric oxide synthase plays a catalytic role that makes neurons resistant to toxic insults and neurodegenerative disorders.

The research shows that it is involved here in the neurotransmitter of the *cerebral vasodilator nerves*. In cases the nitric oxide synthase is produced in excess, it functions as a *neurotoxin* that causes neurodegenerative disorders.

The nitric oxide (NO) acts as a neurotransmitter, but it is synthesized only on demand. It diffuses with protein receptors of the adjacent cells. This is why NO is regarded as a signaling molecule and a secondary neural messenger.

Because it generates a reduction in the nitric oxide at the neural level, this effect of this process is vasoconstriction. As it is known, vasoconstriction produces an effect similar to the administration of hyperbaric oxygen.

Here, we can compare the hyperbaric oxygen treatment results with the effects produced by the prehistoric high atmospheric concentration of C-14 isotopes.

The oxygen species (ROS), being stimulated during neurogenesis from a hyperbaric effect, reduces the nitric oxide's neurotoxin outcome.

However, it seems that, when the nitric oxide is diminished in the brain, in compensation, it increases somewhere else, where it becomes a stimulant in metabolism, in skeletal and muscle contractility.

## Discussion on the shaping of the new brain: the combined oxidative vasoconstricting effects with nitric oxide vasodilatory effects

The combined effects of enhanced neurogenesis result from a stimulant C-14 Glucose and associated oxygen species production at the neuronal level. The compensatory effect would help a human significantly improve physical abilities by developing muscles and gaining stronger bones.
In the meantime, reducing the nitric oxide at the cellular level will increase the vasoconstriction effect, thus supplying more oxygen to the cellular functions. A diminished biological exposure of migrants to new pathogens and viruses encountered on the path out-of-Africa resulted from a sufficient cellular oxygenation increase.

All the aspects mentioned above indicate a sum of combined favorable features being developed on the path out-of-Africa. It would help the migrants improve their mental condition, associating it with better physical performance, in the tentative to overcome each local while novel challenge.

At the time the Laschamp excursion occurred 42kyr, Homo sapiens were leaving the tropical and subtropical zones of Eurasia, marching through the temperate areas. It corresponded too to a temporary warming up of the climate.

When the Last Glacial Maximum episode started 25 kyr, Homo sapiens were already on the way to gain a radically improved language. They achieved tremendously novel mental capacities and a more assertive physical posture. These features allowed Homo to vastly improve their ability (brain plasticity and cognition) to adapt to harsh and rapidly changing environmental challenges, like crossing high mountains and entering frigid zones. No such abilities had existed during Homo's existence in Africa.

I would say that the above-mentioned new abilities positively contributed to the success of out-of-Africa migration.

Thus, those changes occurred within Homo's mind by higher cognition and plasticity and acellular adaptation to novel Eurasian pathogens and viruses. Such changes that took place in Homo around 40-30 kyr were instrumental in propelling the migration further into the temperate, subarctic, and even Eurasia's arctic zones.

The LGM (Last Glacial Maximum) temporarily transformed many temperate and mountainous zone toward a frigid climate.

However, it took another 10,000 years until Homo was mentally prepared to understand how to build new stone tools (like the Gravetian/Magdalian types), earliest petroglyphs, earliest archery tools. But 30kyr+, the first rock art appeared in Europe and Borneo.

I would say that those 6,000-7,000 years of LGM determined the incipient novel capabilities to switch toward a cold adaptation as a temporary distraction.

The starting of deglaciation around 18 kyr corresponds with a boom in every possible approach: from evolved tools, like axes and bows, to first open-air temporary shelters, to animal and plant domestication. The social development induced a self-domestication that functioned as an intermediary for further social development.

Who was in charge there: Homo sapiens or Homo loquens?

In my opinion, Homo sapiens ceased to exist around 20 kyr.

Globally, all that remained was only one species: Homo loquens.

## Discussion on competing roles of oxygen and nitric oxide.

As observed during various experiments on plants and animals, a reduction in the released nitric oxide causes vasoconstriction.

As a team of researchers from Nanjing University (China) demonstrated in their paper "*Bidirectional Regulation of Neurogenesis by Neuronal Nitric Oxide Synthase Derived from Neurons and Neural Stem Cells*" (published in Stem Cells in 2010), "the neuronal nitric oxide synthase (nNOS) negatively regulates adult neurogenesis."

Another paper ("*Nitric oxide negatively regulates mammalian adult neurogenesis*") of a team of researchers from Cold Spring Harbor Laboratory, NY (published August 5, 2003, in PNAS), arrives at the same conclusion. The authors maintain that:

"Here, we report that nitric oxide (NO) acts as a negative regulator of cell proliferation in the adult mammalian brain."

The hyperbaric oxygen, through vasoconstriction, increases the tension inside the blood vessels (hyperbaric effect).

Two other papers ("*Long Course Hyperbaric Oxygen Stimulates Neurogenesis and Attenuates Inflammation after Ischemic Stroke*," written by a team of researchers from two Taiwan universities, and "*Hyperbaric oxygen therapy promotes neurogenesis*," written by a group of researchers from Loma Linda University, US, and Chongqing Medical University, China) demonstrate how hyperbaric procedures stimulate neurogenesis.

## Discussion on uniquely developed human neurogenesis.

As the literature indicates, humans present a different pattern of adult hippocampal neurogenesis than other mammalians. In humans, the vast majority (90%) of neurons in the dentate gyrus are subject to exchange, compared to 10-30% in other mammalians investigated. Humans show a less pronounced age-dependent decline during adulthood compared to mice and other mammalians.

A little addition of new neurons to the olfactory bulb (OB) after the perinatal period seems unique to humans. As various studies show, in other mammals, the neurons generated in the subventricular zone are integrated preponderantly in OB (olfactory bulb) during their entire life cycle. But in humans, after their birth, there is not such a process. It could be said that the rate of addition of new neurons to the Olfactory Bulb is meager if compared to the one to the hippocampus. It generates a fundamental difference in the human brain's plasticity, which differentiates humans

from animals.
It details how human neurogenesis takes a different direction from one of most mammals.

The contribution made by the neurogenesis to human cognition/plasticity determined our brains to switch from olfactory determination to context appreciation. Language gradually enriched all perceptions with a context. It led to correlative thinking based on contextuality.

The same increased plasticity produced a new mental foundation that allows the brain to operate with the symbols included in the words developed within the language. It generated that mechanism that defines the language-ready brain.

However, one of the most critical processes followed was the rapid switching from sign languages to verbal language utterance.
While the sign languages used the left hemisphere, most of the other features made our prehistoric brain display a right hemisphere preponderance and dominance.

Language development implied a switching of the correlates that moved the dominance to the left hemisphere.

## Discussion on Enantiodromia

Carl Jung introduced it as a feature about the emergence over time of an unconscious opposite. It is saying that any extreme is opposed by a tendency to restore balance within the natural world.

Recent studies found that atypical individuals who show unilateral language dominance in the right hemisphere can score high levels of complex thinking. Such an architecture can support exceptional instances of intuitive insight in any problem-solving.

Such scientific evidence is a strong indication of the previous dominant role of the right hemisphere. One could say that the old dominance was based on an extensive, unconscious information processing (uncertainty) that was dealing with much more information input than the brain currently operates. Such input was nonlinear, and it needed conscious conversion. That brain needed extensive neuronal circuits and a lot of energy consumption. It may also explain the large Paleolithic brains, which started to diminish in the last 12,000-10,000 years while reaching today 10% less volume.

It is proof that self-domestication (or the survival of the friendlier) results in smaller brains among mammals. This is true, especially in humans.

These arguments may lead to a hypothesis that the development of the left hemisphere, as the region that deals with language, occurred as the emergence of a natural counterposition to a too busy to coop the right hemisphere.

There is here a question on the switching of correlates: why does such a distinction arise? A simple answer would be: it was a natural way to balance brain activity.
A second answer would be that evolution is not linear despite our simple way of seeing it.

**Discussion of the role played by many species and subspecies of hominins**.
In the humans' case, we have to consider an entire range of species and subspecies originating in monkeys as our evolutionary connections. I would think of a nonlinear view, where the fundamental argument is related to neurogenesis.

As one could observe, the way neurogenesis evolved in mammals and primates points to a change, when a clear separation singled out the humans against the rest.
If one counts the subspecies and species that have evolved out of the Australopithecus in the last 4 million years, one can find many species and subspecies. I would say that archaeology probably could not find more than a few of all the species which had existed in this large family of so-called hominins.

Why has such a vast family of hominins developed? The first probability to consider refers to the high-sensibility of this hominin family to environmental changes. The second probability to the many varied or distinct species and subspecies from where it would be chosen natural optimality.

**Discussion on geophysical and radiative events producing biological causality**.

A specific causality that took advantage of an existing biological sensitivity within a nonlinear perspective should be considered. As mentioned, the humanoid neurogenesis was affected by a particular geomagnetic occurrence that is a geomagnetic excursion. Here is a list of the main geomagnetic excursions of the last 300,000 years:

-Calabrian Ridge 260 kyr

-Pringle Falls 211 kyr

-Iceland Basin 188 kyr

-Blake 120 kyr

-Norwegian-Greenland Sea 80-70kyr

-Laschamp 41kyr

-Mono Lake 33-31 kyr.

-Lake Mungo 29-26 kyr

The geomagnetic field was in excursional mode for the entire interval 31-23 kyr with the lowest magnetic intensity developed 37 kyr.

After deglaciation, the excursional mode continued with four-six more events. Geophysics recognized only four of them:

-Hilina Pali 18 kyr

-Gothenburg 13.5-12.5 kyr

-Solovki 7.5-4.5 kyr

-Sterno-Etrussia 2.8-2.2 kyr.

One can observe that the densest radiative events took place between 41 kyr and 4.5 kyr. The events were intermittent but lasted for hundreds to thousands of years on each occurrence.

This was the time when the Homo sapiens brain was subject to forced modeling, causing its fundamental transformation that generated the language-ready brain.

## Discussion on the biological clue of nitric oxide.

As it seems, the agent of such complex but somehow contradictory evolution is the nitric oxide (NO). It is a gaseous molecule synthesized by the enzyme nitric oxide synthase (NOS). It acts as a neurotransmitter. It is also a part of the signaling pathways that operate within the cerebral vessels, neurons, and glial cells.

NOS is known to exist in three isoforms: endothelial nitric oxide synthase (eNOS), neuronal nitric oxide synthase (nNOS), and inducible nitric oxide synthase (iNOS).

These isoforms influence the brain in distinct ways because they are active in different regions within the brain. The NO signaling pathways regulate the cerebral blood flow (CBF) during the rest and various stresses.

In the meantime, there is a growing body of evidence that NO plays a significant role in numerous biological processes. It is an essential mediator in the central nervous system, and it is supposed to be implicated in various neurological diseases.
For example, in the degenerative brain processes, which affect the CNS, the nNOS level rises rapidly. In some pathological conditions, as inflammations, the iNOS level is very high.

Overall, the nitric oxide seems to act as a "double-edge-sword." The role of nitric oxide could contribute to either cell survival or cell death. The ultimate answer is the untimely transfer of nitric oxide from one protein to another. There is evidence that NO transfer could lead to cellular suicide.

NO can act as a modulator of the inhibitory processes within the synaptic transmission. But also, it can modulate the activity of ion channels and regulate the ion exchanges.

The C14-Glucose, ingested through hominin and human feeding, is known to have, in general, an inhibitory role on nitric oxide.

## Discussion on the mental transformation of Homo sapiens into a novel species.

Now, I like to refer to Homo sapiens evolution. As it is known, it evolved from an "archaic type" (around 190ka) into an "incipient sapiens" (120ka).
Nevertheless, around 80ka-70ka, the first manifestation of art in South Africa appeared. It is true also that Neanderthals seem to enter a phase of high development during the same epoch.
But around 42ka, a chain of extreme geophysical events started to unfold. This chain generated a revolution in the primitive language of Homo sapiens. Still, it led to the extinction of Neanderthals and Denisovans, while the last surviving Homo erectus and other hominins also reached their extinction phase.
It is a critical point, where Homo sapiens, in a relatively short time, encountered fundamental changes, like the change in skull geometry toward rounding, the conjugates switched the brain lateralization, dual-use of the brain neural circuits (visual + verbal), some new neural circuits (for verbal use only), the changes in the neuronal processing speed (the speed diminishes).
Simultaneously, the entire body suffered a process of gracilization (as an extended form of neoteny).
The change in the skull geometry is seen as fundamental for a very distinct development of language. It had put the language-related sections in a central position, and by rounding, it diminishes some circuitry distances. A switching of correlates had paralleled the other developments in the brain while changing the pattern of lateralization.
As the archaeology indicates, the skull's rounding appeared some 30ka but was fully completed only during the Holocene optimum (cca. 8ka).

According to many specialists, consciousness itself settled in a form similar to the present only 4,500 years ago.

The language was generating anatomical changes because it was a technology that became embedded in our biology. It was a full biological response that needed to be developed by this new species: from genetic changes to new genetic expressions to anatomical reshaping.

One argument in favor of the language's mechanical role is switching the correlates from the right hemisphere to the left one, which changed the hemispheric dominance.

## Discussion on language as a technology that stimulates our imaginary approaches

The language was and is a technology in itself. It can infinitely produce other technologies by playing with its assembling/disassembling capacity.

Time and again, the language came with a set of features, where communication was one of them but not the most important. The other elements were planning, control, and socialization. Over time, the importance of each feature changed.
Planning implies creating careful coordination of actions. Hence, planning generates, among other things, all other languages, including those we call algorithms. We can infinitely create languages and algorithms.

Control confines us to a system of minimal variability that excludes the rest as unperceivable and unthinkable. Over time, we have learned how to deal a little bit better with variability. But even then, our progress was minimal.

Socialization seems to be one of the best-developed functions of the language.

## Discussion on the visual vs. the verbal brain

A recent study at the Psychology Department of Harvard Medical School, authored by Elinor Amit and Evelina Fedorenko (published on May 11, 2017, in The Harvard Gazette, and journal NeuroImage), has highlighted several necessary details of modern thinking.
The authors have demonstrated that people use inherited visual thinking about the things which are closer to them. On the other hand, people use inner speech as their new verbal ability when contemplating far-off things.
In short, people use visual thinking to deal with self, in-group, past, present, and near-present. By contrast, verbal thinking is used when dealing with somebody else, an outgroup, or the future. The researchers found out that the visual deals with the past and the present, while the verbal

agreements with the future. Here is a clear indication that verbal thinking development helped us define the concept of the future.

More importantly, it looks like language helped individuals deal with each other while ultimately defining and promoting each one.

It also helped the individual to become open to out of group relationships and contacts. A less talked about aspect is the relationship that started to develop with the environment. Such a new approach turned paramount in human evolution: it led to animals' and plants' domestication.

In short, domestication changed the type of social relationships, but this domestication has led to a change in diet and the kind of activity. Everything has been promoted thanks to the language.

In the meantime, the researchers found out that, at present, there is no pure visual or pure verbal thinking because both of them are mixed in every expression. Hence, the recently developed verbal mode is, by now, very well implemented in all of our brain circuits, contributing to a specific part of every expression.
Even so, one of these two modes of thinking still appears to be predominant in one expression or another.

As a negative outcome, experimentally, it is demonstrated that those people very good at verbal thinking score about average, or even low, on the object and spatial visualization tests.

Almost all the old visual circuits have been affected by the Interference with the newly developed verbal mode. This is an interesting mental approach because each of these two modes shows a very different speed of processing (it is estimated that the visual one is at least 10,000 times faster than the verbal one).

Overall, this Harvard study provides valuable information about how human thinking has radically changed since the advent of language, starting 30,000 years ago.

I see that the most significant result of verbal was the development of "*imaginary thinking*" accompanied by its "*factua*l" products. This "*imaginary*" mode exploited the verbal capabilities to a maximal extent that implies an "*infinity*" of mental manipulations, which generate "factual" products.

However, the language resulted from an intricate play of evolution that adapted the hominin and human biology to particular geophysical constraints.

## Discussion: was language an antidote to extinction or only offered a transition path for a change to another species?

Did language help us avoid extinction? It is known, all other hominins species disappeared at the same time when humans began to turn into a new species cca. 30ka. Hence, Homo sapiens disappeared too, because it was replaced by Homo loquens in no more than 2,000-5,000 years.

In support of my opinion, I would like to add a controversial idea that still makes sense. It refers to all cultural descriptions that picture our origin.

I would focus only on the Bible, where the symbolism is much clearer. The Bible says: "In the beginning was the *word*." Then, I am wondering: who spoke those *words*? The Bible makes no mentioning of any "primordial human" who would make stone tools and resembles Homo sapiens.

Thus, in my opinion, the Bible characterizes the first humans as speaking beings, and in doing so, it defines humans as a new species that is distinct while disconnected at the cerebral level from any other species inhabiting the Earth.

On the other hand, the biblical description, as it seems, pictures the "*word*" as an almighty feature or as the most critical human quality that helps "*tooling everything else*." But no other "tool" is mentioned there because the "*language is a tool generator in itself*."

## Conclusion

This paper aims to prove that the radiative event that contributed to the environmental presence of C-14 Glucose had a complex biological effect that stimulated a type of enhanced neurogenesis in Dentate Gyrus. As a process that proliferates and differentiates the migrating neural precursor cells, neurogenesis reflects neuronal intrinsic (genetic) and environmental influences (like C-14 isotopes).

The adult-born neurons in the Dentate Gyrus of the hippocampus exhibit critical periods of long-term plasticity during their maturation, contributing to the development of the mechanism of learning and memory. More importantly, new neurons expand the plasticity capacity while enhancing the pattern separation processes that enlighten the analysis/synthesis mechanism that copies the language's assembling/disassembling tool.

Language occurred due to a forcing geophysical factor that was cosmogenic in essence. The universe imposed a high-rank alternative that moved us into a higher hierarchy.

However, because of language, humans built everything imaginarily (in a symbolic manner) in contrast with the natural reality.

I would say that the transformation was a repeating process, intermittently stimulated, which gradually increased the overall effect.

Thus, while the transformation was rapid into a mental fundamental, it needed time to produce interrelated connections and inner neural network adaptations. The processes fed one another, making the new cognitive skills evolve gradually, accumulatively, and progressively.

## Acknowledgment

Because of this paper's limited length, I was forced to diminish the amount of cited and quoted sources to a restricted number. Thus, some of the information provided may appear superficially treated. In fact, it is based on a vast amount of scientific data. Those details are in my self-cited work uploaded on academia.edu

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