



Paleoanthropology of Consciousness, Culture and Oral Language

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Abstract

It is presented an updated version of my previous paleoanthropological interpretation of the available *utilitarian* and *non-utilitarian* Paleolithic finds (Messori 2016), aimed at establishing the earliest human developmental stages of consciousness, culture and oral language. The environmental transformations to which Earth has gone to meet from its formation to the Archean period of the Precambrian Era, during which the terrestrial proto-biological phenomenon develops, are briefly discussed. By following the quantum electrodynamic explanation of *biological water* it is assumed that the transition from organic to biological it would have happened during late Hadean with the formation of *colloid lyophilized bubbles*, *dissipative systems* embedded by *anticipatory systems*, at the phase boundary between chaotic and ordered (coherent) regimes, composed by perturbed prebiotic water maintained in a regime of *oscillatory super-coherence* by an endogenous electromagnetic field of suitable intensity and frequency, bounded by a selective electronic pump consisting of a semi-crystalline film of *reducing water*, and containing macromolecules such as proteins and amino acids, synthesized on an enantioselective basis. A brief recapitulation of the geological phases and biological events that characterized the ca. 1.5 billion years that stand between eukaryotic cells stabilization and genus Homo appearance is provided. By adopting a non-Darwinian approach, the biological phenomenon is described as an eco-systemic non-linear dissipative system embedded by super-complex anticipatory systems, at the phase boundary between chaotic and ordered (coherent) regimes, ruled by *thermodynamics of non-equilibrium* laws. By comparing *utilitarian* and *non-utilitarian* finds dating from Lower Paleolithic (ca. 2.7 - 2.4 mya to ca. 300 - 120 tya) with finds dating from Middle Paleolithic (ca. 300 - 120 to ca. 45 - 30 tya), it is assumed that the *inner life* (insight) of our distant ancestors underwent a slow process of *psycho-relational and psycho-biological individuation* (incubation and settling of a distinct and relatively autonomous *neuro-psychological identity*), that only recently (second half of Lower Paleolithic) led to the formation of the relatively autonomous

and independent psychic complex called *epigenetic function of the real*, or *consciousness*, the essential requirement for there to be a fully established *cultural production*. The slow process that went from a *musically established sound emission* (second half of Lower Paleolithic), to a fully syntactical and semantics codification of a suitably emitted and articulated range of sounds, that through time became *speech communication*, namely *oral language* (first half of Middle Paleolithic), is discussed. The slow process to which oral language has gone from acquiring the power to re-create the world by naming it—*semantic baptism*—as an act of legitimation of reality (Upper Paleolithic), to becoming an instrument of power in the hands of the male gender (Neolithic), which thanks to it tames Nature and subjugates the *generatrix power of women's uterus* (where the *pneuma* is transmuted into *offspring* by which the *progeny is re-created*) to the *generatrix power of oro-larynx* (where the *pneuma* is transmuted into *speech* by which the *World is re-created*), is also discussed.

Subject Areas

Anthropology

Keywords

Homo Dilectus, Epigenetic Function of the Real, Continuity vs Contiguity, Utilitarian and Non-Utilitarian Anthropogenic Finds, Imaginific Function, Sensing-Intuition, Thinking-Feeling, Symboling, Musically Established Sound Emission, Speech Communication, Semantic Baptism

1. Planet Earth: A Circumstellar Habitable Zone

Humans (Lineage: Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi; Mammalia; Eutheria; Euarchontoglires; Primates; Haplorrhini; Catarrhini; Hominidae; Homo) belong to the same taxonomic family as the great apes but this does not mean they evolved from monkeys.

Anonymous

The most ancient *fossil record* available dating back to about 13.5 billion years ago (bya), is the **cosmic microwave background radiation** [1].

The existence of a cosmic microwave background radiation at a temperature of 3 degrees Kelvin (−454.27 degrees Fahrenheit; −270.15 degrees Celsius) observed since 1965, provides an experimental clue concerning the possible state of the Universe at its earliest stage of formation, a mass-free energy state at very high density and very high temperature (calculable in 15 billion °K; 26,999,999,324°F; 14,999,999,727°C) which has undergone a slow and progressive process of cooling and perhaps also expansion [2] [3] [4].

For hundreds of thousands of years, energy in the form of electromagnetic

radiation was all there was. The elementary particles with masses such as electrons, neutrons and protons could be formed when the temperature reached 5 billion °K (8,999,999,468°F; 4,999,999,727°C). At a temperature of 300 million °K (539,999,536°F; 299,999,727°C), the first atomic nuclei could be formed by aggregation of particles, while at a level of 40 million °K (71,999,540°F; 39,999,727°C), more complex structures could be formed. Galaxies later formed perhaps by condensation of clouds are composed of radiation and particles, which after further condensation have determined the formation of single stars grouped in galaxies (it is estimated that in the Milky Way alone there are between 100 to 300 billion stars, and that the number of galaxies in the Universe is incalculable). Cooling progressively, galaxies have given origin to planets.

Our solar system and the planet we inhabit would have formed as a result of the aggregation process of a gaseous galactic cluster, over a period of time ranging from about 4.6 to 3.8 bya [5] (an almost exact dating of the birth of the Earth is obtained by calculating the rate of transformation of the radioactive elements in its rocks), a period of time called Hadean or pre-geological epoch, the first period of the Precambrian Era, which begun with the formation of the planet and ended ca. 570 - 540 million years ago (mya), when the Cambrian Period began (the Precambrian Era occupies 88% of the planet's history). During the pre-geological epoch (Hadean) the Earth was an incandescent mass whose surface resembled an ocean of magma, where floated a sort of semi-solid red-hot rafts. The lowering of the temperature below 1000°C led to the consolidation of the areas with lower temperatures that, becoming more stable, started the formation of the future earth crust. The further lowering of the temperature led to the establishment of a primitive earth crust of dark volcanic rock similar to basalt (the widespread consolidation of the earth's crust would have occurred approximately 3.8 to 3.6 bya). From the incandescent rocks and the primitive earth crust, a thick fog of gaseous substances such as ammonia, hydrogen, carbon dioxide, methane, water vapor and other elements emerged, mainly due to the volcanic activity, which, in a time frame of 100 million of years, gradually formed the Earth's primordial *reducing atmosphere* (that is free of oxygen in the gaseous state). The primitive Earth long remained shrouded in darkness, under a thick cloak of dense burning clouds formed by the water vapor continually poured into the atmosphere by volcanic exhalations.

When the temperature dropped sufficiently, the clouds began to melt in the rain, and the primordial atmosphere gave rise to storms of apocalyptic proportions. At first, crashing on the incandescent rocks the rain evaporated, but with the gradual cooling of the solid crust, the evaporation decreased until the water could condense in the most depressed areas of the Earth's surface, forming the first oceans, while from the rocky highlands took shape primordial continents [6].

Slowly our planet took on an aspect more familiar, with a fluid gaseous zone rich in clouds called (*reducing*) atmosphere, a fluid liquid zone with oceans (the formation of oceanic masses with a dislocation similar to the current is datable at around 3.2 bya), lakes and rivers, known as the hydrosphere, and a solid area

referred to as the lithosphere, with the first sketches of those that will become the future continents.

At the end of the pre-geological phase (ca. 3.8 bya) begins the Archean period of the Precambrian Era, and it is during this period that the terrestrial proto-biological phenomenon develops. From about this remote past forward, the planet Earth can be said to all means *habitable* (CHZ, Circumstellar Habitable Zone) and in fact inhabited by life forms that depend on the presence of water in a liquid state or, more exactly, by the presence of an atmospheric pressure able to keep the water on the surface of the planet in a liquid state. One planet among another 11 billion planets, in the Milky Way alone, considered, at least according to the data collected by the Kepler space mission (2009), habitable by life forms dependent on liquid water.

What happened on Earth in a remote past and what could have been the conditions (unique and unrepeatable?) that triggered the biological phenomenon, is a concept we can talk about, but we are dealing with events that we can not know by direct experience. Whatever hypotheses we make, we can not in principle verify it by direct comparison with what has happened. All we can do is elaborate a theoretical framework that allows us to advance a hypothesis that makes all the data in our possession coherently connected to each other, eliminating any apparent contradiction, without fear of having to retrace our steps, if the survey perspective adopted should prove to be wrong.

According to the current state of knowledge, the biological phenomenon began in the aquatic environment (which was incompatible with the survival of 99% of current life forms) between 4 to 3.8 bya, when the entire terrestrial habitat, so as the distribution of emerged land, it was completely different from the current one (the atmosphere was probably composed by 75% of nitrogen and 15% of carbon dioxide, the solar brightness was about 80% of the current level). The transition from organic to biological would have occurred between the end of Hadean and the beginning of Archean with the formation (out of clathrate hydrates cages?) of *colloid lyophilized bubbles, dissipative systems* [7] embedded by *anticipatory systems* [8] [9] [10], at the phase boundary between chaotic and ordered (coherent) regimes, ruled by *thermodynamics of non-equilibrium's* laws, composed by biotic water maintained in a regime of *oscillatory super-coherence* [11] by an endogenous electromagnetic field of suitable intensity and frequency, bounded by a selective electronic pump consisting of a semi-crystalline film of *reducing water*, and containing macromolecules such as proteins and amino acids, synthesized on an enantioselective¹ basis. Subjected to continuous and extremely destabilizing environmental perturbations, they would

¹Biological systems are *enantioselective*, i.e. they strictly select the *enantiomeric forms* of the molecular species of which they consist (biological reactions synthesize and use always and only one of the two enantiomeric forms of a given molecule). The enantioselectivity of biological systems is the reason for their *homochirality*; namely the presence of groups of molecules that have all the same enantiomeric configuration (e.g., the amino acids are all in the *levorotatory configuration*, while the ribose and deoxyribose of the nucleic acids have only *dextrorotatory configuration*). Enantioselectivity, homochirality and autopoiesis of biological phenomenon seem related to the phase transition of water from liquid state to *semi-crystalline* or *glassy and super-coherent state* of **biological water**.

have gone through a myriad of *points of crisis* or *bifurcations* leading towards new extremely organized stationary states, up to undergoing the phase transition that gave rise to the stable state of *prokaryotic cells* (unicellular autotrophic anaerobic photo, magneto and chemo-synthetic micro-organisms), which began to form ca. 3.8 - 3.6 bya.

The following constant, increasing, massive, over one billion years lasting O₂ (oxygen in the gaseous state) production, carried on by oceanic anaerobic photoautotrophic prokaryotes (cyanobacteria), primitive photosynthetic blue/green micro-algae living in chains-colonies, have increased and decreased the ocean's O₂ concentration several times before turning the existing *reducing atmosphere* into an *oxidizing atmosphere* [Figure 1], with catastrophic effects on the prokaryotic cells themselves, that are poisoned by the gaseous oxygen, and dramatic effects on the whole environmental (geochemical evidence of a new world-order for the carbon cycle), climatological (ice ages began) and geological conditions (most of the minerals found on Earth will be since formed as *hydrated* and *oxidized* forms due to *dynamic* and *crust* processes).

This process came to a no way back point ca. 2.3 bya, when the oceanic and atmospheric O₂ concentration rate reached irreversible levels incompatible with anaerobic cell's metabolism, giving way to the first and greatest mass extinction ever happened (also called the *Great Oxygenation Event*, GOE) [12].

Eventually, the mass extinction escaping prokaryotes, together with primitive anaerobic eukaryotes lacking *mitochondria* and *plastids*, who appeared out of different prokaryotic cells symbiosis less than 1 billion years after prokaryotic cells formation, took shelter deep in the ocean floor, far from the ocean's surface, or reduced themselves, via *encystment*, into a stripped-down, dormant form, or turned into *endospores*-like formations.

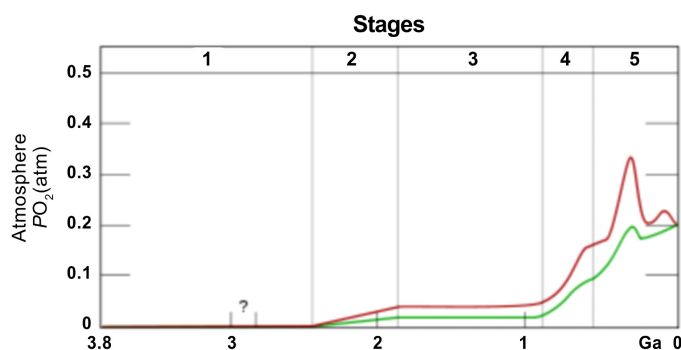


Figure 1. O₂ build-up in the Earth's atmosphere. Image source: Great Oxygenation Event https://ipfs.io/ipfs/QmXoyvizjW3WknFijnKLwHCnL72vedxjQkDDP1mXWo6uco/wiki/Great_oxygenation_event.html. Red and green lines represent the range of the estimates while time is measured in billions of years ago (Ga). Stage 1 (3.85 - 2.45 Ga): Practically no O₂ in the atmosphere. The oceans were also largely anoxic with the possible exception of O₂ gases in the shallow oceans. Stage 2 (2.45 - 1.85 Ga): O₂ produced, and rose to values of 0.02 and 0.04 atm, but absorbed in oceans and seabed rock. Stage 3 (1.85 - 0.85 Ga): O₂ starts to gas out of the oceans, but is absorbed by land surfaces. There was no significant change in terms of oxygen level. Stages 4 and 5 (0.85 - present): O₂ sinks filled and the gas accumulates.

Some of the prokaryotes and most of the primitive eukaryotes who escaped extinction underwent a ca. 600 million years lasted non-linear biological transmutation, which turned cell's metabolism from anaerobic to aerobic (oxidative metabolism, *photosynthesis*), and cell's composition from lacking in *organelles* (the membrane-bound compartments within a cell such as the *nucleus*, mitochondria, chloroplast), to be equipped with them (e.g. mitochondria derived from purple bacteria, the plastids from cyanobacteria, and the nucleocytoplasmic component from archaeobacteria), in particular with the *nucleus* (a-nucleated cells vs nucleated cells), where the heritable genetic material is located, to give way (ca. 1.9 - 1.7 bya) to a new, highly integrated and complex form of cell, the fully established *eukaryotic cell*.

Eukaryotic cells themselves underwent a ca. 700 million years lasted non-linear biological self-organization process that brought to the formation of the first multicellular organisms (the most ancient hybrids of multicellular organisms were metazoans, fungi and marine sponges, which formed ca. 1 bya).

About 650 mya, a second mass extinction took place, due to a global ice age (*Snowball Earth* hypothesis), which led to the disappearance of about 70% of pre-Cambrian marine micro-algae.

Approximately 570 mya, Precambrian Era is followed by the Cambrian Period [Figure 2] (from Cambria, the Latin name given to Wales, where the first rock

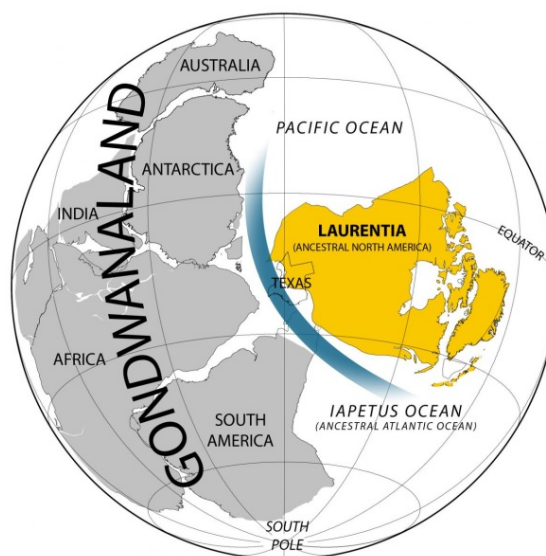


Figure 2. Image source:

<https://phys.org/news/2014-10-massive-geographic-triggered-explosion-animal.htm>.

Credit: Dalziel, I. W. D. (2014) The geologically abrupt appearance in the fossil record of almost all animal phyla is referred to as the Cambrian radiation or “explosion” of life on Earth. Also known as “Darwin’s dilemma,” because it seemingly posed a major problem for his theory of gradual evolution, it coincided with the initiation of the first of the two principal global marine transgressions of the Phanerozoic. A recent analysis [13] suggests a deep oceanic gateway, shown in blue, developed between the Pacific and Iapetus oceans immediately before the Cambrian sea level rise and explosion of life in the fossil record, isolating Laurentia from the supercontinent Gondwanaland.

dating back to this period, lasting from ca. 570 - 540 to 505 mya, was found), the first period of the Paleozoic Era [13]. Within a few tens of millions of years the biotic ecosystem, up to then composed by prokaryotic, eukaryotic and multicellular organisms hybrids, underwent, thanks to a widespread and unprecedented diversification of energy supply's strategies, a huge transformation that led to the appearance of fully established *multi-cellular eukaryotic organisms*, such as algae, arthropods, molluscs, jellyfishes, crustaceans (organisms with shells, predators, diggers of deep burrows, etc.).

Cambrian is followed by the Ordovician Period, marked by the appearance of the Agnated Vertebrates and by the Late-Ordovician, also called Ordovician-Silurian, mass extinction (ca. 443 mya, Gondwana Glaciation), when 49% - 60% of marine genera and nearly 85% of marine species went extinct. Ordovician is followed by the Silurian Period, during which the Pisces appear, followed by the Devonian Period, with the first samples of terrestrial flora and fauna and with the fourth mass extinction (ca. 374 mya, lasted for more than 20 million years about 70% of marine species went extinct), followed by the Carboniferous Period, characterized by a great development of the flora with large forests that covered all the continents, and finally by the Permian Period, the last period of the Paleozoic Era, with the appearance of the first exclusively terrestrial vertebrates, the Reptiles.

The Paleozoic Era it ended about 250 mya, followed by the Mesozoic Era. The first period of the Mesozoic Era is called Triassic, during which life is enriched by the appearance of the first organisms that instead of laying eggs give birth, the placental animals (precursors of the Mammals). Between the end of Permian and the beginning of Triassic, a fifth mass extinction took place (ca. 251 mya, Permian-Triassic mass extinction, a period of great volcanism in Siberia causing the release of large quantities of gas such as CO₂, CH₄ and H₂S into the atmosphere, the level of oxygen dropped from 30% to 12%, the level of carbon dioxide was about 2000 parts per million); it has been the worst post-Precambrian mass extinction, 90% of ocean life forms and 70% of terrestrial life forms (fauna and flora) went extinct, signs of a possible crater of meteoric origin, about 480 km wide, in the region of Wilkes Land in Antarctica, was found. A sixth global extinction event it occurred at the boundary between the Triassic and Jurassic periods (252 to 201 mya, Triassic-Jurassic mass extinction), that resulted in the demise of some 76% of all marine and terrestrial species and about 20% of all taxonomic families.

The Birds appear during the Jurassic Period, followed by the Cretaceous Period, when the Saurians are established and spread on the lands. The specialization of the great reptiles in the various ecological niches is from this period: fossils of Ichthyosaurs, Dinosaurs and Pterosaurs have been found, adapted to life in waters, on land and in air. The decline and total extinction of the various groups of Sauri it occurred between the end of Cretaceous and the beginning of the Paleocene Period (is the seventh mass extinction, dated ca. 60 to 65.5 mya, a

meteoric impact causes a 170 km wide crater in Chicxulub, Yucatan, Mexico, extinguishing 80% - 90% of marine species and 85% of terrestrial species, including dinosaurs).

Other forms of plant and animal life appear in the Tertiary Period, or Cenozoic Era, which begins about 65 mya (ending ca. 3 mya) and is divided into the Paleocene, Eocene, Oligocene, Miocene and Pliocene periods, characterized above all by the emergence of the Mammals.

The current Quaternary Period begins about 3 million years ago and is divided into two epochs, an initial epoch called Pleistocene (also known as the *Ice Age*), lasting from ca. 3 million to 12 thousand years ago (the eighth mass extinction took place 12.9 tya, the explosion of a comet on Canada causes the extinction of the American megafauna, including Mammut and Sabretooth Cat or Smilodon, as well as the end of the *Clovis culture*), and a following epoch, the current one, called Holocene. The lower and middle Pleistocene (geological scale) correspond to the period of the Lower Paleolithic (anthropological scale: *Homo habilis* and *Homo erectus*), while the upper Pleistocene to the Middle and Upper Paleolithic periods (*Homo neanderthalensis*, *Homo sapiens*) [Figure 3].

2. The pyramidal Model of Darwin's Theory of Evolution

Instead of hominid evolution following a simple, straightline transformation of one species into another, hominid evolution followed a series of complex adaptive radiations to produce a large number of species.

Primates and Human Origins²

The investigation and interpretation of reality can have several paradigmatic models of reference. The most studied and the most applied, also in the anthropological field, at least in Western countries, it is based on Descartes' dualism and classical Physics, the pillars on which it also rests Darwin's Theory of Evolution.

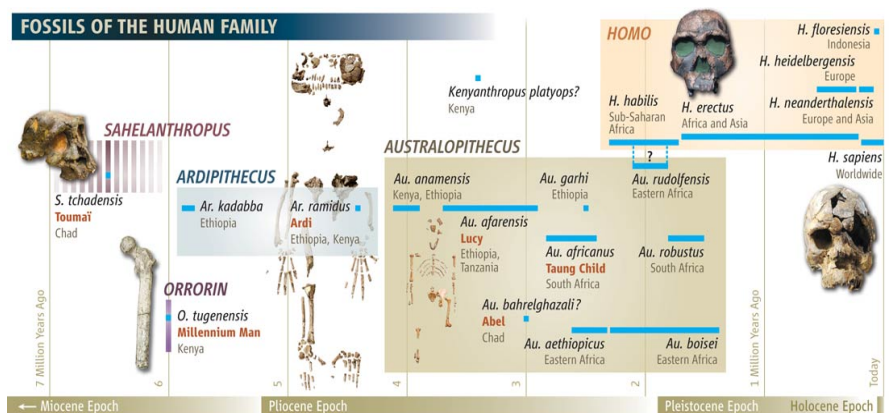


Figure 3. Human evolution timeline. Image source:

<http://berkeley.edu/news/media/releases/2009/10/images/ardi-timelineHR.jpg>.

²In: Primates and Human Origins

<https://1.cdn.edl.io/Yb6WcpQHURuNAVBS5lotmFsdpwSPrmDJFyF5uSISsgxveq9e.pdf>.

While setting itself in open contrast with the creationist position, still dominant during the nineteenth century Catholic and Protestant Old and New World, the Darwinian hypothesis of Evolution transfers at least two key concepts of Creationism into its theoretical framework: the idea that behind Evolution, as behind Manifestation, there is a *project* (divine for creationism, natural for Darwinism) moved by *intentionality* (ibid), and that the white-skinned male is the one who in the purposes of the project occupies the privileged position, the highest, with respect to all other creatures/life forms. If the Jewish people are beloved of Yahveh and Cristian people are beloved of God, the (British) bourgeoisie is beloved of Nature. In fact, according to the Darwinian hypothesis phylogeny would be driven by the **intention** to reach, through a progressive and growing series of evolutionary steps, the more complex and evolved life form, the improved evolutionary version of Homo Sapiens et Faber, that is **Homo dilectus**, the white, catholic, educated, well-off Britisharistocratic-bourgeois male. At each evolutionary step corresponds a certain random number of genetic combinations (karyotypes). Within each species, *natural selection* would have suppressed (→intraspecific speciation) individuals with less adaptive capacity (the most *unstable*, the Eugenics' "*unfit*"), to favor individuals with greater adaptive capacities (the more *stable*, the Eugenics' "*fit*").

The Darwinian model has no hypothesis on how the interspecific speciation has occurred (neo-Darwinism appeals to the genetic mutation, forgetting that genetic mutation is an adaptive possibility favorably exploited by unicellular organisms such as bacteria, while it is deleterious for multicellular organisms), that is how one passes from one species to another, but according to the intentional motive of evolution, it would seem that natural selection has chosen from time to time those genetic combinations (subdivided into orders and suborders of titular karyotypes and orders and suborders of gary cariotypes) that would progressively lead to the evolutionary step from which the Homo animal has taken off. Even today biological evolution is represented as a tree whose trunk would be the common ancestor and branches the descendants, according to a pyramidal scheme of phyletic relationships, compiled following a biological taxonomic criterion, made of evidence and clues, obtained from the collection of existing fossils, with *Homo dilectus* at the top (recently replaced by 4.0 version *Homo Artificialis*).

According to Darwin's Theory of Evolution, the *modus operandi* of evolution is made of tests and especially of *errors*. The only factor of order is *natural selection*. This transforms a improbability in a probability: it makes out of a *fortuitous event* (the appearance of a *random variation*) the beginning of a process that, considered in retrospect, seems addressed from the beginning along a certain direction, but only because any other paths have been cleared and what we see is the sole survivor, or the most visible among the survivors. Darwin showed that the same causes that produced conservation, stability and balance could produce instability, destruction and transformation. The serene, majestic, luxuriant look of Nature coexisted with its tragic aspect. Nature was both cruel and

beneficent, avaricious and prodigal.

But how are produced individual differences within a species, which are the building materials with which it operates *natural selection*? The starting point was the recognition of a *spontaneous variability* of the species in Nature, namely the fact that even in the same environment individuals of the same species differ all from each other, even if imperceptibly. This variability is called *spontaneous* because it is a constant of Nature, is present in all environments and in all conditions. Its causes are, according to Darwin, the most diverse (climate, food, lifestyle, weird effects of sexual reproduction, etc.), but the variation alone does not explain the evolution. In fact, not all the changes are of equal importance, not all can initiate an *evolutionary line*. Each may be more or less advantageous than others, depending on the circumstances: all must pass through the sieve of the environment, which has the final say. The decision is made at a higher level, no longer individual, but ecological, that of *natural selection*. The formation of new species is thus the result of two distinct processes: *the unpredictable and constant appearance of variations and the strict selection exerted by the environment*. The changes, according to Darwin, are not only spontaneous, but also *random*. This concept is crucial in his theory. Speaking of *random variations* Darwin does not mean that they *do not have a cause* (and a law that determines them), but that are due to *complex and unknown causes*: the term *random* is to indicate *our ignorance of the causes, not their absence*.

But the *random* term has also another meaning, logically distinct but inseparable from the first: *the variations are not oriented to favour the survival of the individual*. The single variation is not in itself the right answer to the needs arising from the environment; in other words, it is not born to adapt the organism to the environment, does not in itself guarantee the survival and reproductive success; indeed, in most cases the variations are unnecessary or indifferent, some even harmful: eliminated the latter by *natural selection*, the others remain, as we say today, *floating*, waiting for the *environment to give a ruling on their fate*. This, however, does not give instructions to the organisms on how to change, but is merely judging, so to speak, their spontaneous behavior. In Darwinian theory, the organism does not change to adapt: varied and just. The changes are produced in many directions, without correlation with the needs of survival. Whether and which of these changes are adaptive is determined by the complicated network of ecological relationships that makes up that particular environment: *the variation proposes, the selection disposes*.

Homo (dilectus) would be the goal, the final stage, of an evolutionary will that not only did not stop in front of the various mass extinctions, but that would even have used them to systematically eliminate errors and variables not suitable for achieving its purpose.

In this perspective, according to modern molecular biology phylogeny is a strong succession, logic and computational, of biochemical events orbiting around the *building blocks* of the biological phenomenon, the *nucleotide bases*,

the *alphabet of the language of life* (A, G, C, adenine, guanine, cytosine and T, thymine in DNA; A, G, C and U, uracil in RNA), from which combination and recombination would derive the *phyletic descent*. The causal network of Nature is however too complex for it to be reconstructed by the human mind; because of this all the physical knowledge can only be based on *probabilities* (approximations for lack of data).

The eighteenth-century biological determinism (biological superiority vs biological inferiority), resulted in the nineteenth-century social Darwinism, carried on to its logical extreme consequences by Eugenics and organicist practices (*fit* vs *unfit*), which began during the second half of the 19th century and went on until the second half of the 20th [14] (Hitler perfected his knowledge of Eugenics during the detention period in Landsberg prison, between April 1924 and May 1925, during which he wrote the *Mein Kampf* and read some racial hygiene treaties, such as “*The Passing of the Great Race*”, a 1916 book judged “*a torrid work of racial alarmism and pseudo-science that Adolf Hitler called ‘my bible’ in an admiring letter to Grant*” [15], written by American eugenicist, lawyer, and amateur anthropologist Madison Grant [16], member of the exclusive Boone and Crockett Club, the first and most authoritative American conservationist association, engaged in the field of Eugenics and immigration restrictions), to become part of the twentieth century genetic determinism (genetically superior vs genetically inferior) and of the current computational models of brain.

If evolutionism it has to continue to adhere blindly and unilaterally, to going to shatter phylogeny in a strong succession, logic and computational, of evolutionary events orbiting around the building blocks of the *alphabet of the language of life*, as it is claimed by genetic engineering that allows to obtain intraspecific whole chimeras by operating on embryonic stem cells, it is no big deal. The fact is that between the Agnated Vertebrates appearance and the genus *Homo* appearance there are not only more than 440 million years and an extraordinary multitude of biological bifurcations, but at least six great mass extinctions that interrupt, inexorably, any randomly logical descent, both biological and genetic, between the Ordovician vertebrates and the Quaternary vertebrates.

If we continue to extrapolate from the overall picture the chemical composition of the yellow color, to affirm that it is from there that the artist left to develop the picture, we will have obtained an art based on the chemical composition of colors.

A vision of art very interesting, but certainly short-sighted.

Charles Darwin, after all, it has been a man of science with very clear ideas about the future consequences of his observations, inferences and scientific deductions [17]:

At some future period, not very distant as measured by centuries, the civilised races of man will almost certainly exterminate and replace throughout the world the savage races. At the same time the anthropomorphous apes, as Professor Schaaffhausen has remarked, will no doubt be exterminated. The break will then

be rendered wider, for it will intervene between man in a more civilised state, as we may hope, than the Caucasian, and some ape as low as a baboon, instead of as at present between the negro or Australian and the gorilla.

Darwin's Theory of Evolution does not deny the creationist assumption according to which the Demiurge created Man in His own image and likeness³, placing him at the head of all creatures, but merely place the result of Creation in a historical perspective. In doing so, however, Darwin's Theory of Evolution breaks a spear in favour of the nineteenth-century positivist belief, contending to religion and mythology the monopoly on the explanation of how the forms of life living on the Planet originated. In any case, in adhering to the nineteenth-century scientific assumptions (Newtonian physics) and to the ideological dictates of the British colonial empire, the interpretation given by Darwin (on Lamarck's footprint) of the collected empirical data, leads to the enunciation of an evolutionary theory that lends itself to different and questionable applications, such as those that take shape in Eugenics.

Neologism *Eugenics* is coined in the early eighties of the 19th century by the English anthropologist, statist, psychologist, explorer Francis Galton⁴ (1822-1911), Charles Darwin's first cousin, and assigned to a system of thought which theorized, with scientific arguments extracted from the new born *Mendelian theory* (of the transmission mode of hereditary characters) and from the new born *Darwinian theory* (of the linear, progressive and ascending evolution of biological systems), the progressive improvement of *race* (*biological racism*⁵) and the supposed intellectual superiority of Europeans male, white, acculturated and well-off compared to the other *racial groups* (including lower-rated social groups, such as white adults of disadvantaged social groups and women, who were equated, for anatomical and mental characteristics, to the white children male of the cults considered superior, and presented in a Darwinian key as living specimens of primitive phases of the *linear, progressive and ascending evolution* of the latter) [14].

Concepts such as *evolution* and *adaptation* are used by Galton to legitimize the leadership of the rich bourgeoisie of industry and commerce, which had

³Darwin was aware that he had dealt a heavy blow to the creationist belief, but he always avoided getting involved in public attacks against religion and never denied God as the First Cause of Creation, he was rather concerned in giving to Science what was of Science and to God what was of God. Prudently, he closed the last paragraph of the second edition (January 1860) of his *On the Origin of Species* with this sentence (the bold in the text is mine): *There is grandeur in this view of life, with its several powers, **having been originally breathed by the Creator into a few forms or into one**, and that, whilst this planet has gone circling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved.*

⁴Francis Galton was a pioneer in scientific disciplines such as biometrics (he developed the basic techniques and principles for fingerprinting), meteorology (he discovered anticyclon), statistics (he made the first studies on multifactorial correlation) and experimental psychology (he developed the first mental tests).

⁵Biological racism was consolidated starting from the first half of the 18th century thanks to the first anthropological classification of races. Carl von Linné (1707-1778) and Georges-Louis Leclerc, Comte de Buffon (1707-1788) introduced Taxonomy and subdivided peoples according to the skin color, size and shape of the body, claiming that phenotypic similarities were in fact the *race*.

made the British nation great in the international scenario and in the cultural relations between races⁶. The very concept of *natural selection* (natural selection chooses among the possible emerging random variation between individuals of a species, the more favorable for survival, and therefore for the breeding in a particular environment, ensuring the survival of the only individuals best suited in the *struggle for life and death*) is used ideologically and conservatively as a criterion of distinction between *fit* and *unfit*, although it is already decided upon the criteria for identifying the *fit*, how to establish the distinctive features, in relation to whom or what.

Contemporary post-human subculture integrates Eugenics hope in the scientific and selective perfectibility of humanity, with the use of a very advanced technical and technological armament.

The computed-programmed-coded relationship (IT language → algorithmic feed back loops) that elapses between the conditioned (→software) and unconditional (→hardware) variables of the hybrid man-machine (cyborg) or of the robot (→*technological birth*), gives rise to behavioral dynamics largely (cyborg) or totally (robots) deterministic and reliable, namely controllable-predictable-reproducible-reversible.

For this reason, the man-machine hybrid, the anthropomorphic robot and the humanoid are clearly preferable (fit, superior, stronger, more suitable) to the unfit-natural-human being.

Eugenics and post-human subculture are intertwined by the equivalence ratio which lies between the progressive techno-scientism of the late 19th century (→Eugenics) and progressive techno-scientism of the late 20th century (→AI).

An equivalence ratio that can be expressed as follows: Eugenics is to *Mendelian theory* (theory of the transmission mode of hereditary characters, Johann Gregor Mendel, 1866) and *Darwinian theory* (the theory of the linear, progressive and ascending evolution of biological systems, Charles Darwin, 1859) as Artificial Intelligence is to 1) *chromosomal theory of heritability* (the genetic material is made up of DNA and not of proteins, Hershey-Chase, 1952), 2) the discovery of the *molecular structure of DNA* (J. Watson, F. Crick, M. Wilkins and R. Franklin, 1952), and 3) *Information Theory*, the theory born by convergence between *cybernetic theory*, or theory of communication and of control systems in artificial systems and in living beings (Norbert Wiener, 1948), and the *theory of information's transmission mode* (Claude Shannon, 1948).

A Non-Darwinian Approach to Phylogeny

An anticipatory system is a system containing a predictive

⁶Between the 16th and 17th century, the expansion of commercial routes to the Americas, Africa, the Indies and the Far East, and the consolidation of the British primacy on the seas, conquered at the expense of the naval fleets of France, Spain, Portugal and the Netherlands, and encouraged by progressive metallurgical improvements in the construction of cannons and the use of gunpowder, allowed the European aristocracies, and in particular English, to enrich themselves by importing large quantities of raw materials, precious metals and other merchandise (including slaves), exporting overseas, this yes, the *conquistadores'* ferocity, forced evangelization of unbelievers, alcohol, smallpox, gonorrhoea, plague and other calamities that flagged entire generations of *inferior races*.

*model of itself and/or its environment, which allows it to change state
at an instant in accord with the model's predictions
pertaining to a later instant.*

Robert Rosen

In the present work the Darwinian concept of “*evolution of species*” decays to give way to that of “*development of life*”, namely:

- the ongoing, non-linear (non-predictable, non-reversible, non-reproducible) process of diversification and integration to which undergoes the biological phenomenon from its origin, in relation to all the *transitions* (bifurcations), and to all the *dissipative/anticipatory* structures/systems solutions, induced by macroscopic (environmental, climatological, geological, planetary, cosmological) and/or microscopic (biophysical and biochemical) *state variations*, that have affected it, directly or indirectly, in space and time.

Phylogenetic bifurcations, transformations and differentiations, genotypical and phenotypical, structural and functional, are never to be understood as the product of a purposeful design or plan, neither natural nor otherwise intended. On the contrary:

- they are always the expression of solutions that thanks to an uninterrupted relationship of *continuity*, in time and space, are intertwined with all the solutions already adopted and with those adoptable (*anticipatory systems*), even when they are the result of a *phylogenetic bifurcation* (state transition);
- are always nonlinear and transient solutions (in relation to their evolution over phyletic times);
- are always stationary but unstable solutions (in relation to the mutability of the unconditioned and conditioned habitat variables);
- are always intermediate solutions between *adaptation* and *exaptation*⁷;
- are always solutions that for their becoming rely on the *poietic action* (which produces development and structure) exerted by the *self-organization* (Glansdorff and Prigogine) on the genesis and transformation of the forms of ma-

⁷The concept of *exaptation* was introduced by paleontologists Stephen Gould and Elisabeth Vrba in 1982, to indicate the possibility that in nature the relationship between organs and functions is potentially redundant, in order to allow that a tract developed for a certain adaptive reason, can be “co-opted” or converted to a function even completely independent from the previous one. This functional cooptation, which complements and does not replace the gradual action of implementation of natural selection, was named by Charles Darwin “*pre-adaptation*” and was renamed by Gould and Vrba with the neologism *exaptation*, means precisely that some innovations, appeared during the course of phylogeny, may not be the result of a process of selection toward that specific function, but the reuse for other purposes of an existing structure. An example is the origin of the *wing*, which originally worked as a structure for thermoregulation, to then be “*recycled*” for the *flight*. Another example are the organs and systems involved in the *phonation*. Phylogenetically the organs and apparatus involved in phonation are all born for other purposes than *vocalization* or *singing*. Over the course of phylogenetic diversification, the organs for the production of breath have been formed to supply lungs with air; the larynx appeared in Mammals as gate between the bellows and the external environment; the vocal channel is the first part of the alimentary canal; the organs for phonetics articulation have as a primary function that of chewing; the nasal resonance cavity correspond to the upper respiratory tract and the soft palate has the main task to prevent the back-flow of food. Several examples of functional cooptation have recently been found also at the molecular and cellular level, for example in relation to the role of *astrocytes* in *neurogenesis* (see footnote n° 16 for further explanation).

nifestation.

Continuity, transience, instability and non-linearity are properties that do not diminish but increase the possibilities of adaptation of biological systems to the continuity, transience, instability and non-linearity of the geo-environmental conditions, on a small and large-scale. Without them, for example, ecosystems would not have had, and would not have, any chance to re-invent and re-adapt themselves to the scenarios produced by the many variables, e.g., by glaciations and by the various mass extinctions, which have followed in phyletic times as a consequence of natural disasters.

A scenario, the one that emerges from the perspective of investigation adopted here, in contrasts with the supposed quasi-finalistic and quasi-linear consequentality of the phyletic lineage suggested by the Darwinian and neo-Darwinian *arboreal model* of phylogeny. Accordingly, *phylogeny* resembles less to a *tree with different branches* and more to a *basin of attraction⁸ of the chaotic type (riddled basin of attraction⁹) with different attractors and different dissipative/anticipatory structures/systems* [20].

Each element of reality, at any level of observation, is a micro system of relations, set in a macro system of relations. Nothing of what we observe exists in and by itself, neither at the level of our ordinary dimension, nor at that of quantum and relativistic dimension.

Every object or phenomenon of the quantum dimension is assimilable to a *vibrational system* (describable via a mathematical tool known as *wave function*), that vibrates with a certain *frequential configuration*, a certain *oscillatory* or *phase modality (rhythm of oscillation)* and a certain *intensity*, maintaining an uninterrupted local and non-local *relationship of interference* with other vibrational systems.

The phenomena of interference between the oscillatory modalities of the *energy flows* and *impulse* involved in the perturbation/excitation of the quan-

⁸Roughly speaking, an *attractor* of a *dynamical system* is a subset of the *state space* to which orbits originating from typical initial conditions tend as time increases. It is very common for dynamical systems to have more than one attractor. For each such attractor, its *basin of attraction* is the set of initial conditions leading to long-time behavior that approaches that attractor. Thus the qualitative behavior of the long-time motion of a given system can be fundamentally different depending on which basin of attraction the initial condition lies in (e.g., attractors can correspond to *periodic*, *quasi-periodic* or *chaotic* behaviors of different types). Regarding a basin of attraction as a region in the state space, it has been found that the basic topological structure of such regions can vary greatly from system to system. In what follows we give examples and discuss several qualitatively different kinds of basins of attraction and their practical implications [Credit: Edward Ott, Scholarpedia, 2006, http://www.scholarpedia.org/article/Basin_of_attraction].

⁹A type of basin topology that may occur in systems that, through a symmetry or some other constraint, have a smooth *invariant manifold*, i.e. there exists a smooth surface or hypersurface in the phase space, such that **any initial condition in the surface generates an orbit that remains in the surface** [18] [19].

¹⁰In physics *resonance* or coupling-phase is a condition under which an oscillating system responds to an alternative driving force with the maximum amplitude. Such condition may exist when the frequency of the driving force matches the natural (non-damped) oscillatory frequency of the system. Thus, in case of an imposed oscillating electromagnetic field, a biological system (e.g., a cell) will respond in a measurable manner only to those exogenous oscillations (i.e. alternative driving force) that match the natural (endogenous) EM oscillations of such system.

tum field give rise to *coupling-phase (oscillatory resonance)*¹⁰ able to trigger the *phase transitions* that lead, according to QED (Quantum Electrodynamics Field Theory), to the structuring of matter (*domains of oscillatory coherence* vs *domains of oscillatory incoherence*).

In particular, each localized (in space and/or in time) form of confinement, *i.e.* delimited by a boundary¹¹, is a *vibrational* micro-environment and corresponds to an *oscillator* or a *resonant cavity (cavity resonator)*, a *stationary* system organized around a particular tensorial/frequential configuration of perturbations (tensions/oscillations), existing thanks to the relationships of interference it has with the endogenous and exogenous tenso-vibrational environment¹² [21].

Biological systems are systems far from thermodynamic equilibrium (*thermodynamics of non-equilibrium*), *i.e.* are *non-linear dissipative systems* embedded by *super-complex anticipatory systems* [22], at the phase boundary between chaotic and ordered (coherent) regimes.

In the early seventies of the last century Glansdorff and Prigogine¹³ formulate a general hypothesis on the stability of stationary states far from equilibrium, saying that they can become unstable if conducted even more far from equilibrium: at that point can arise a *crisis* or *bifurcation point*, in which the system prefers to move away from the stationary state evolving into some other stable state. The novelty is that beyond the first point of crisis may suddenly occur extremely organized states. Far from equilibrium, the smallest fluctuations can lead to completely different behaviors on a macroscopic scale. A myriad of bifurcations can lead the system, in an apparently random way, to new stationary states. These not uniform states of structural organization, varying in time or space (or both), were called by Prigogine *dissipative structures*, and their spontaneous evolution, *self-organization* [23] [24].

Accordingly, under the thermodynamic-electrodynamic-autopoietic profile, the countless structural and functional solutions that characterize biological varieties, produced in the course of phylogenetic diversification in general, and of that

¹¹Every structuring process of a system of correlations endowed with a degree of subsistence (condition of resonance) such as to make it distinct and/or distinguishable (even when not observable) from the context of the relationships it forms part of; in general, a *confinement process* is equivalent to a phenomenon of *localization*.

¹²In this sense the terrestrial environment is to all effects a tenso-vibrational environment and every biological structure/system corresponds to an *oscillator/resonant cavity* tuned on the particular tenso-vibrational configuration of the environment to which it belongs.

¹³The thermodynamics of non-equilibrium pertains to systems for which the achievement of thermodynamic equilibrium (thermal death) is prevented by interactions with the outside, *i.e.* upon continuous exchange of matter and energy (open systems) with the surrounding environment. In any macroscopic mechanical process, at least a part of the energy involved in the process is dissipated as heat. When in 1850 the German physicist Rudolf Clausius first saw the possible implications of this simple observation, introduced the concept of *entropy*, that is an amount that is growing constantly as a result of this heat dissipation. The heat is given by the motion of the single particles that make up a system, so *entropy*, indicative of a thermodynamic potential, has been interpreted as the amount of disorder contained in the system. In 1945, Ilya Prigogine, a theoretical physicist and physical chemist at the University of Brussels, formulated the *theorem of minimum entropy production*, which states that the systems close to the thermodynamic equilibrium evolve towards a stationary state in which dissipation is minimal. Afterwards, with colleague Paul Glansdorff and other collaborators in Brussels, he began to explore more systems far from equilibrium, to see if the theorem could be extended to general criterion also valid for non-linear systems far from equilibrium.

following the Cambrian Period in particular, represent as many *dissipative systems* far from thermodynamic equilibrium, that rely on the availability of *anticipatory systems*, tuned on causes placed in the future (on *negative energy* for which time is inverted and flows from the future to the past [25], *i.e. converging waves*).

Despite the natural recycling of *organic matter*, life had remained energetically limited until the widespread availability of *gaseous oxygen*. This breakthrough in metabolic strategies greatly increased the *free energy* supply to living organisms, having a truly global environmental impact (*mitochondria* evolved much after the GOE). With more energy available from gaseous oxygen, organisms had the means for new, more complex morphologies. These new morphologies in turn helped drive biological diversification through interaction between organisms.

Life processes and light are inseparable and internally connected due to their electromagnetic nature. Light plays a significant energetic and regulatory role in living organisms and in the entire ecosystem, for instance in photosynthesis, in the process of seeing, in biological rhythms, etc. The establishment and maintenance of biological structures is based on the process of *photosynthesis* [26] [27], thanks to which the surplus of energy supplied by the photon to the electron in the electronic excitation is converted into binding energy. The inverse process is called *bioluminescence*. In this case there is a transfer of energy from a bond to an excited electron, with the consequent emission of a photon.

Changes in the intensity of photon emission are functionally connected with disturbances of homeostasis and their measurements specify the state of organism's vitality and the capacity for environmental adaptation. The *electromagnetic interface* and *photon exchange* is at the basis of all biological processes and it is thanks to it that a biological system, from the less to the most complex, interacts/interfere with each other and with the environment.

Because of this, the *electromagnetic interface* it represent, at the micro-, meso- and macroscopic level, the fundamental *sensory module* of any biological system [28] [29] [30] [31] [32], namely **EM sensory module** (a biological ability that several marine and few terrestrial animal species favored by developing **electro-reception**, used in *electrolocation*, *i.e.* detecting objects, and for *electric signaling*).

Until the Cambrian Period, biological dynamics revolved around the development of biochemical and biophysical strategies, aimed at fulfilling energy requirements. From the Cambrian onwards a new solution amongst energy requirements started to sketch a second way for the *development of life* on Planet Earth: adaptation by a huge diversification of *behavioural strategies*.

Diversification of behavioral strategies require *cell differentiation*, the process by which cells specialize, acquiring or enhancing their ability to perform a spe-
¹⁴All cells have the fundamental properties of living protoplasm, *i.e.* metabolic activity (synthesis, respiration), excitability, the conduction of excitation, the ability to receive stimuli from the environment and to respond by movement, secretion or other ways, plus the capacity to reproduce. When a cell specializes it loses none of these fundamental properties related to biological life, but it differs because it potentiates one of these properties. Generally speaking, when a cell specializes in a particular function, it also modifies its morphology.

cific function¹⁴. With *cell differentiation* the whole clusters of unicellular organisms that have colonized the planet until then, distributed over one or more areas and linked by a common adaptive and bio-energetic gain, found the way to come together (a process of information governed by the self-organization of specific associative patterns induced, in the short and long range, by resonance phenomena (via *Phase Conjugate Dynamics*, *Spin Coniugate Dynamics*, *Tension Coniugate Dynamics* [20] [21]), involving various kind of cellular and molecular species) to become *localized cells colonies*, specialized and joined by a common structural and functional link, defined and identified in the construction of *different tissues*, organs and systems of organs, that operate coherently and in synchrony for the survival and unity of the *multicellular system*. The *biological unit* (*cell*), from being a composed, integrated system delimiting (*membrane*) a multitude of sub-cellular structures and molecular units, became an *integrated specialized cellular ecosystem* (*multi-cellular organism*), consisting of differentiated cells, specialized according to the role and function they must play to be part of a choral unit¹⁵.

In multicellular organisms of the animal kingdom (from *Metazoa* to us), the distribution of the various functions among different and increasingly specialized tissues is integrated by a new tissue, the *Nervous Tissue* (NT), whose functional unit (in association with *glial cells*¹⁶) is the *nervous cell*, i.e.:

- a generator of *electromagnetic radiation* in ultrahigh range of frequencies with the wave length comparable with linear dimensions of the cell itself;
- *arrhythmogenic center* with exogenic modulated frequency;
- a *receptor unit* playing selective function on *state variations* (stimuli) and *functional interface* between innervated tissues;
- engaged in supporting and integrating the *energy-transfer* function exerted by the catalytic cellular core (CCC), formed by the Golgi apparatus, the centrosome (MTOC, Microtubule Organizing Center [38]) and microtubules (the structural units of the cell cytoskeleton, polymerized protein highly polarized).

In accordance to energy and geo-environmental constraints that have guided phylogeny in the process of diversification of biological functions and corres-

¹⁵In vertebrates, CNS functional and morphological organization follows exactly this pattern. At increasingly specialized and diversified behavioral strategies, pointing at species-specific CNS functions, also corresponds a distribution of different, morphologically and/or functionally specialized *neuron-glial colonies*, whole groups of cells belonging to species-specific Coherent Domains of the *CNS basin of attraction*, each of them in a **relation of continuity** with all the others, where the single behaviour is prescribed by the colony's choral interference network, and described by a unanimous and synchronised dynamic, based on self-organized biophysical processes occurring via *Phase Conjugate Dynamics*, *Spin Coniugate Dynamics*, *Tension Coniugate Dynamics* [20].

¹⁶Until a few years ago it was thought that the nerve cell was the only functional unit of the Nervous System (NS). It is now believed that this role should be partly shared with the glial cells [33] (e.g. they regulate the neuronal synaptic responses associated with learning and memory processes, and share with neurons the role of mediators in the genesis of brain functional skills [34] [35]). Glial cells, and in particular astroglial cells (astroglial lineage) [36], do not play only supportive and nurturing functions, the role commonly attributed to them, but occupy a prominent place in the evolution and architecture of the Central Nervous System (CNS), its *morphogenesis*, and in *neurogenesis*, the process of generating functional neurons from neural and glial precursors (→stem cells), very active in the pre-natal period (→development of the CNS) and relatively active in post-natal period (→neuronal repair processes) [37].

ponding structures/systems, the zoological neuro-dependent line adapts itself to the unconditioned variables imposed by the environmental pressure diversifying the biological scenario in a multitude of animal organisms, guided by the *genetic stabilization of specific sensory maps* (bearers of a specific ability to generate interference) and *specific neuronal maps* (bearers of specific anatomical and functional correlations), which assigns to species their own capacities, possibilities and tendencies, variously bound to *stereotypy* or open to overcome it.

Humans are the only animals phylogenetically endowed with the possibility to overcome the boundaries of stereotypy in a non-occasional, stable, functional and lasting way, a possibility that can only be realized when humans beings start perceiving themselves as **something else from their environment** (from a *relation of continuity* to a *relation of contiguity*), a splitting condition out of which the human being become a **subject** reflected by the mirror of oneself mind (*psychological birth*). *Conscious awareness* and therefore *consciousness* will be a measure of the ongoing psychic disposition given by the *process of nucleation* to which our splitting condition has been subjected since then. Consciousness reveals that being can be other to itself, *i.e.* the existence of consciousness implies that being is in some respect other to itself. Consciousness is always directed towards an object (which can include the conscious minded), and in order for the separation of subject and object to exist in the first place, there must be some form of division in being. There could not be a distancing of being from being, as implicit in consciousness, if being itself did not have a property or mode that allowed for such distancing.

Therefore, from an anthropo-neuro-psychological point of view the phenomenological definition of *consciousness*, *culture* and *oral language* would be, respectively:

- **Consciousness** is the neuropsychological warp on which is interwoven the weft of the ongoing faculty and ability to ideate, program and engage, not occasionally and not by domestication nor by artificial programming, an adaptive and supra-adaptive behavior not ruled by the phylogenetic prescription. Consciousness is not a substance, it is not an entity, it is the phylogenetic and epigenetic result of the *process of nucleation of human mental dynamics*: it is a relational possibility that distinguishes us as human beings.
- **Culture** is the ongoing overcoming of stereotyped behavioral patterns via intentional, circumstantiated, not occasional, epigenetic ideation, programming, organization and implementation (for adaptive and supra-adaptive purposes) of cognitive behavioral strategies. In the animal kingdom, all behavioral dynamics that do not satisfy, in whole or in part, the above criteria should be considered as interactive dynamics belonging to the relational module of a given neurological-minded organism, governed by the phylogenetic diktat and bound to stereotypy.
- **Oral language** is the ongoing overcoming of phylogenetically prescribed and sensing-intuitively tuned emission of sound signals via intentional, circumstantiated, not occasional, thinking-feelingly communication realized thanks to the

ideation, programming, organization and production of conventional, musically encoded (rhythm and timbre) and semantically codified phonetic sounds.

3. Lower and Middle Paleolithic Utilitarian and Non-Utilitarian Artifacts-Premises

For instance, all the “cultures” of the so-called Paleolithic period have been defined almost exclusively on the basis of subjective and untestable determinations of stone implement categories. Apart from the obvious fact that this taxonomy cannot be falsified, tools do not define cultures: we have no screwdriver, knife or spear cultures. Tools and artifact types can be and often are used across many cultures, hence they are not a primary variable defining cultures. In short, the “cultural sequence” archaeology has given us of the Pleistocene should not be expected to be a sequence of real cultures, or a taxonomy of peoples, tribes or ethnic entities.

R.G. Bednarik [39]

Similarly to early Earth’s pre-geological and geological times, what happened on Earth during Lower and Middle Paleolithic, and what may have been the conditions that triggered human *consciousness*, *culture* and *oral language*, is something we can speculate about, but are events that we can not know for direct experience [40] [41].

Any assumptions we may do on the behavioral life of human communities that inhabited and transmigrated on Earth during the Lower and Middle Paleolithic, it depends almost exclusively on the availability of hominid fossil record and *anthropogenic* lithic or non-lithic (e.g. bone, ivory, horn) finds, durable enough to remain intact for hundreds of thousands of years. Any other early efforts in other materials, such as wood or leather, would have disappeared long ago, but this is not a reason to doubt that the results of these efforts once existed.

Most of the available finds are *utilitarian artifacts*, *i.e. tools* [Figure 4], with

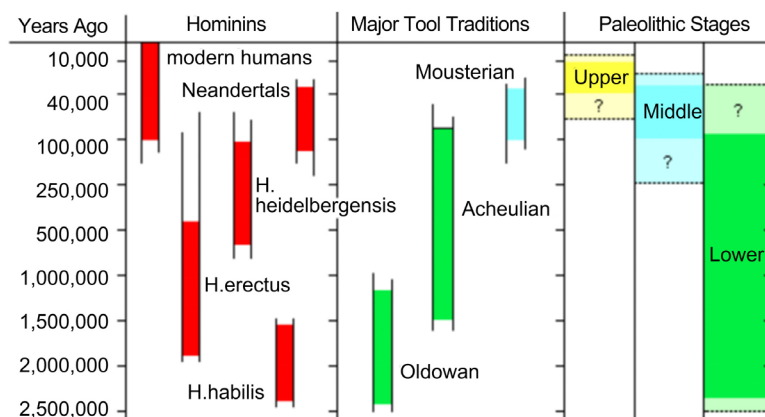


Figure 4. Major tool traditions. Image source:

http://anthro.palomar.edu/homo2/mod_homo_3.htm. The Paleolithic stages began earlier and/or persisted longer in different regions. Subsequently, the demarcations between stages was not sharp. The same is true of the transitions between hominin species.

some exceptions given by a kind of *non-utilitarian finds* [42] belonging to the so-called *paleo-art production*, the analysis and interpretation of which should establish whether their realization:

- 1) it has been possible thanks to the *intentional* application of time to time specific processing techniques, or
- 2) it has been possible thanks to the *put into practice* of phylogenetically inherited skills, or
- 3) thanks to a combination, with varying (geographically and temporally) proportions, of both 1 and 2.

In this regard, it must be noted that the line of interpretation adopted here excludes *a priori* as “illegitimate and spurious” the temptation to assume:

- the childhood as a comparative stage (a stage considered somehow cognitively primitive and scarcely developed as compared to the emancipated and highly developed adulthood of *Homo dilectus*) for the interpretation and explanation of the early stages of development of the human species (*recapitulation theory*¹⁷), *i.e.* it doesn't make any sense to compare the stages of cognitive development of the child with the (supposed) stages of cognitive development of the human species, nor to compare the behavior of the human infant to that of apes, as German anthropologist Emil Huschke (1797-1858) suggested (1854): *The Negro brain possesses a spinal cord of the type found in children and women, and beyond this, approaches the type of brain found in higher apes*;
- the volume of the skull as a comparative mark (it is puzzling that in the scientific field there is still who claim that cognitive functions increase with the increasing in brain volume or brain capacity);
- the modern scientific prejudice according to which the evolutionary degree of human being (*primitive vs emancipated*) is directly proportional to the amount and quality of artifacts that produces (lower is the degree of manufacture, lower is the evolutionary degree).

3.1. Lower and Middle Paleolithic Anthropogenic Finds—An Overview

(...) *humans became human not through natural processes that modified their skeletal structures, but by processes that enabled them to develop culture, cognition and technology on a scale removing humans far from all other primates in those areas.*

Robert G. Bednarik [39]

¹⁷According to this theory (Ernst Haeckel), the embryological development of higher forms of life summarizes, in the Darwinian sense, the phylogenetic evolutionary development: an individual organism's biological development, or ontogeny, parallels and summarises its species' evolutionary development, or phylogeny. In the nineteenth century, the *recapitulation* served as general theory of *biological determinism*, used to justify a hierarchical and linear ordering of human variation: groups judged inferior (in particular, black adults, whites of the disadvantaged classes and women) were equated, for anatomical and mental features, to the white males children of the groups considered superior, and presented as living examples of the primitive stages of linear, progressive and ascending evolution of the latter.

The paleo-archaeological record through which we groped to reconstruct, at least in general and with reasonable uncertainty, the essential features of the behavioral life of our distant ancestors lived during the Lower Paleolithic period (ca. 2.7 - 2.4 mya to ca. 300 - 120 tya), are (controversially) of few genres (variously classified) and are becoming increasingly scarce and fragmented as passing from the most recent finds, dating from the second half of the Lower Paleolithic (ca. 900 - 700 to ca. 300 - 120 tya), to the oldest anthropogenic finds dating from the first half of the Lower Paleolithic (ca. 2.7 - 2.4 mya to ca. 900 - 700 tya) [43], and even earlier [44].

The information we can glean from these anthropogenic finds vary according to their chronology and depend on the type and provenance of records that we have available, namely *utilitarian* and *non-utilitarian* anthropogenic finds.

Utilitarian finds are mainly *artifacts*, i.e. *tools*, dating back to the first half of the Lower Paleolithic like *simple pebble tools*, *quartzite pebble tools* and *flakes* (India), *chopping-tools* (Eastern Hemisphere), *handaxes* and *cleavers* (Middle East, Africa, western Europe), *bifacial-tools* and *flint tools* (western Europe, Jordan), all of them sharing a minimalist and essential shape, made according to a synthetic spatial perspective of a *mirror-symmetrical type* (double-sided) [45] [46] [47] [48] [49], a symmetry (*mirror symmetry*) which reflects a *two-dimensional spatial perspective* (bipolar) and a based guidance on the horizon, the line where, I argue, the two sides of the *sensing-intuition mental bipolar dimension* comes together [Figure 5].

Non-utilitarian artifacts, i.e. *palaeo-art finds*, from this period are [50] *beads* and *pendants* from the Acheulean of France (at Saint-Acheul); iron hematite (*ochre*) *fragments* (occurring together with Acheulean *bifaces* and exotic *quartz crystals*), the processing of which may have provided a pigment used for coloring objects, bodies or surfaces, from Wonderwork Cave, in the northern Cape

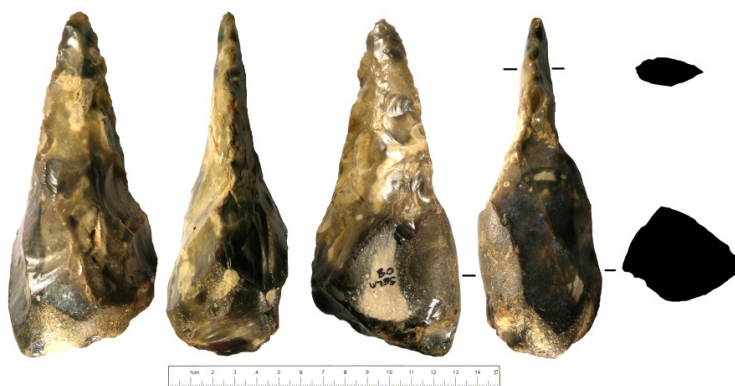


Figure 5. Palaeolithic acheulian handaxe. Credit: Laura Burnett, Sussex Archaeological Society. Image source: [https://commons.wikimedia.org/wiki/File:Lower-Middle_Paleolithic_ficron_handaxe_\(FindID_251959\).jpg](https://commons.wikimedia.org/wiki/File:Lower-Middle_Paleolithic_ficron_handaxe_(FindID_251959).jpg). Palaeolithic Acheulian handaxe of ficron type with a long tapering point and large, partially worked, butt. The point is formed with invasive shallow flaking and is pointed oval in cross section. County of findspot: East Sussex. Period: between 500,000 BC and 200,000 BC.

region of South Africa; numerous *manuports*, *i.e.* natural objects that were collected and carried by hominids because of some outstanding properties, such as *quartz crystals* from the Lower Acheulean of Singi Talav (India), Choukoutien (China) and Gudenus Cave in Austria; the *red jasperite cobble with distinctive natural markings* (that makes the cobble looking like an anthropomorphic shaped face with eyes and mouth) from Makapansgat Cave in South Africa [Figure 6], which was collected by a hominid about 2.5 - 3 mya; the *Erfoud manuport*, in the form of a fossilized fragment of a *cuttlefish* with natural phallic resemblance, from an archaeological site near the towns of Erfoud and Rissani in eastern Morocco [Figure 6(b)], which was collected by a hominid about 300 tya [51]; an *engraved bone fragment* from the Acheulean of Sainte Anne I, France, which bears *ten short cuts* along an edge.

Utilitarian finds from the second half of the Lower Paleolithic are artifacts that

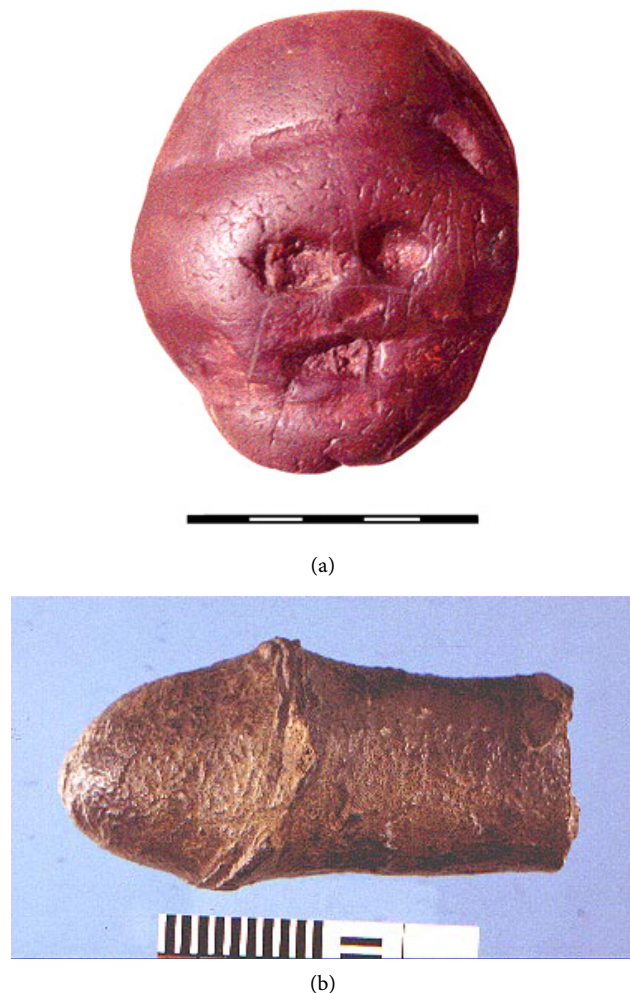


Figure 6. (a) The *red jasperite manuport* from Makapansgat Cave, South Africa, 2.5 - 3 million years, the oldest known palaeoart object in the world. Credit: R.G. Bednarik, IFRAO, 1998. Image source: <http://www.semioticon.com/virtuals/symbolicity/origins.html>; (b) The *Erfoud manuport*, from a Late Acheulian dwelling in Morocco. Credit: R.G. Bednarik, 2002. Image source: <http://www.semioticon.com/virtuals/symbolicity/origins.html>.

provide some likely clues on Paleolithic humans migration flows (a series of quartz stone axes, found in Crete and dated between 800 to 130 tya suggest that already from the second half of the Lower Paleolithic perhaps *Homo erectus* and certainly *Homo heidelbergensis* built rudimentary boats for sailing in the open sea) [52]; *stone tools (choppers, bifaces, scrapers, blades, handaxes and spikes)* [53] belonging to the so called *core-tool tradition*, developed and diversified in terms of their intended use [54], but also because of the location of their makers perspective, a fact of great importance in the *process of psycho-relational individuation* that has transformed the inner life and the relational approach of human communities, because it indicates that the human position, in the binocular perception of reality, is taken as the psycho-spatial coordinate that gives a sense of depth to the reality itself: the human actor's position, as psycho-spatial coordinate for the depth, is the dependent variable which orients the two-dimensional extension of the line and the one-dimensional point (dot) generating the *tridimensionality*¹⁸.

Non-utilitarian finds from this period are *stone carvings*, such as *cupules* [56] [57] (a shallow, non-functional cup-like depression, cut into the surface of a rock as an engraved dot) and *petroglyphs* found in Bhimbetka and Daraki-Chattan Caves, India (dated between 700 to 290 - 200 tya), lines and dots as engravings which add the size of the depth to the two-dimensional perspective, creating the suggestion of three-dimensionality; artifacts with *zoomorphic and anthropomorphic forms* realized according to a two-dimensional spatial perspective; specimens of *anthropomorphic statuettes* or figurines classified as *Venus* (*Venus of Tan Tan*, Morocco, dated between 500 to 300 tya; *Venus of Be-rekhat Ram*, Israel, dated between 500 to 230 tya) [42]; *iconic figures* in the graphic art of eastern Europe and Asia such as some of the paintings in Kapova Cave and Ignatiev Cave and two mammoth engravings, one each from Mal'ta and Bereliokh, Siberia, and perhaps one figure from Hayonim Cave; *geometric or non-iconic marks* such as the numerous *geometric signs on portable objects* from Russia, Ukraine, Siberia and India, best exemplified at Eliseevichi, Mezin, Kirillovskaya and Mezherich (but also occurring, less pronounced or in smaller numbers, at Patne, Mal'ta, Afontova, Kavkaz, Balinkosh, Klinets, Timonovka, Suponevo, Novgorod-Severskaya, Avdeevov and Gagarino), in the first Palaeolithic art discovered in China, in several *engraved objects* from the Levant (especially the Urkan e-Rub II plaque and an Upper Besor 6 *ostrich eggshell fragment*) and in Blombos Cave, southern Africa.

¹⁸With respect to the 3-dimensional sense Wynn observes [55]: *Perhaps the most critical new spatial concept is the understanding and coordination of multiple points of view. The intentionally straight edges and parallels on some of the Isimila bifaces require attention to a stable point of view, which is a projective notion. More complex still are the regular cross sections of many of these bifaces... Unlike the spatial concepts used for earlier tools, these projective notions allow the internal frame of the artifact to be controlled by the external relation of perspective. A second spatial concept to appear by 300,000 years ago is that of a "Euclidean" space, that is, a space definable by a three-dimensional coordinate grid... The acquisition of this constellation appears to have hinged on a single breakthrough in spatial thinking, the invention or discovery of perspective... The evolution of these concepts of space reflects, I think, the development of a very distinct concept of self as an actor in an independently existing world. Such an awareness is at the heart of human understanding.*

The finds from the Middle Paleolithic (in Europe) or Middle Stone Age (Africa) [58] or “later Early Paleolithic” (LEP) in the Chinese chronological scheme [59], ca. 300 - 120 to ca. 45 - 30 tya, include *pictographs*, *petroglyphs*, *survival flukes* (rock paintings in deep caves), *proto-sculptures* or figurines, iron hematite (*ochre*) *fragments* such as those found in an archeological site near Twin Rivers, in Zambia, South Central Africa, dated ca. 270 tya, abundant and varied types of tools and other hand processed stone artifacts belonging to the so called *flake-tool tradition* [60], some of them showing a clear propitiatory-magical significance, as well as some evidences on the evolution of fire control. Their processing and typological variety are in favour of a substantial refinement of the skills used in the manufacture of materials such as stone, bone [Figure 7] and wood showing that in humans’ psyche was taking place a mature process of elaboration and structuring of the objectives pursued with their production, an evidence of the settling of the three-dimensional perspective orientation assumed by humans in their relation with the surrounding.

From now on it develops an anthropocentric orientation which entails a progressive detachment from the *relationship of continuity* or *phylogenetic (quasi) unconditioned identification* with the natural habitat, determining a drift towards a problematic epigenetics *relationship of contiguity*, or *epigenetic-conditioned identification* with the surrounding, which, in overcoming the relationship of continuity, re-creates the world in the form of *internal representation (first symbolic and later on also semantic) of external reality*.

In this regenerative and representative psychophysical process, the *undivided unity composed by the individual and its natural habitat* is cleaved into a territory and its mapping. In the tension, fraught with uncertainties, created by this splitting, the (quasi)absence of intentional supra-adaptive purposes¹⁹ in early



Figure 7. Bone fragment with two sets of sub-parallel lines engraved with stone tools, from the Oldisleben 1 site, Germany, of the Micoquian, and possibly in the order of 120,000 years old. Credit: R.G. Bednarik, 2006. Image source: <http://www.ifrao.com/wp-content/uploads/2014/06/yev.pdf>.

¹⁹It should be stressed that it is not possible to conceive the ongoing transformation process of human cognition, as if it has been composed and divided by *jumps*. All forms of behavior observed at a certain period of time within a given species, are always somehow prefigured, among that same species, in earlier behavioral forms. That is to say that any behavior undergoes over time a more or less observable process of diversification, going from a phase in which its effectiveness it is not fully established, to a phase in which it is. In human species it has never been a behavior completely free of intentionality! However, the behavioral intentionality (stricto sensu) it has been for a long time overshadowed by the prescriptive action (eminently unconscious) exerted by the *sensing-intuition mental function*. For this reason, its impact on the behavior adopted by the human communities in the course of Lower Paleolithic, does not seem compatible with the establishment of a fully cultural and linguistic production.

humans is facing and integrates with the rising humans' *state of consciousness*, and from its anthropo-centric orientation flows the fully supra-adaptive behavioral which we call, to all intents and purposes, *cultural production*.

3.2. Lower and Middle Paleolithic Anthropogenic Finds' Interpretation

The interpretation of the finds described as *paleo-art* or *paleo-non-utilitarian traditions*, e.g. *rock carvings* (petroglyphs), *cupules*, *engraved pebbles*, *beads*, iron hematite's *pigment*, *manuports* and the like, dated from the Lower Paleolithic, is controversial: given that "*the body of very early paleoart, and any other 'non-utilitarian' evidence may provide clues to early hominid cognition*" [61], are they to be considered evidences of an established cultural system, which assume *cultural relevance* only in a complex social system of *symboling*²⁰ (*symbol creation*) and of *value concepts*? The answer to this question depends on what we mean by complex social system of *symboling*, cultural system and cultural production. If the answer were to be affirmative, it would be in favor of the hypothesis according to which as early as from the first half of the Lower Paleolithic human communities were producing *culture* and were organized in a *complex social system* which could rely on the use of *symboling* and of *value concepts* [62] [63].

Bednarik, e.g., is in favour of this hypothesis. In speaking of culture Bednarik writes [39]: "*Culture', defined scientifically, is the passing on of practice by non-genetic means (Handwerker 1989), therefore many animal species possess culture*", and elsewhere he writes [61] "*In the case of humans, 'culture' defines the collective customs, beliefs and arts of a group of people who are usually bound together by it, and these are passed on from generation to generation*".

About symboling, he writes [61]: "*One could further speculate that symboling by re-enactment is likely to have originated from neuronal pathways facilitating deceptive behaviour, which has been observed in chimps. Once again we see that symbol use is based on neuronal circuits that may well have their antecedents in those of earlier primates. It is therefore inappropriate to expect finding a specific development or event that would mark the beginning of symboling. Rather, this must be assumed to be an incremental process, with its origins deep in unconnected neuronal structures that existed even before humans appeared (...). It was apparently during the Lower Palaeolithic that, in a sequence of developmental events that still need to be identified, various strands or fragments of behavioural traits came together in such a way that what we call 'consciousness' became possible.*"

Speaking of cultural production, and therefore of the necessary cognitive and behavioral requirements and the necessary motivations, outside human boundaries (*many animal species possess culture: chimpanzees produce culture?*), is a thesis very debatable, to which I do not adhere.

Dating the onset of "making culture" and of "being endowed with conscious-

²⁰A term coined (1949) by American anthropologist Leslie White (1900-1975).

ness” to the Lower Paleolithic is also a very debatable hypothesis, to which I oppose the following one:

- the findings dated from the first half of Lower Paleolithic lies on the plane of *pre-symbolling*, which belongs to the *imaginific function*, the territory of the “archaic remnants” or “archetypes”²¹ or “primordial images”²², the *mental-basins of attraction* rooted in the phylogenetic bifurcations that led first to the formation of vertebrates and then to that of humans, in which they develop the tendency to form *symbols* and therefore *magic images or motifs*;
- the findings dating from the second half of Lower Paleolithic lies on the plane of *proto-symbolling*, *i.e.* on the plane of what *exceeds the signified because it does not contemplate a signified as such, i.e. as concept* (one of the three factors that together with the signifier and the referent compose the semiotic triangle) and, with it, exceeds the *abstract way of thinking* (therefore it exceeds also the plane of *concept, i.e. of abstract idea or mental image which corresponds to some distinct entity or class of entities, or to its essential features, or determines the application of a term—especially a predicate—and thus plays a part in the use of reason or language*²³).

This latter hypothesis provides a scenario of *cognitive hominid evolution* that does not exclude *a priori* the possibility that *paleo-artistic production* can be meaningful, even without being the expression of a complex cultural and social system, which must include a variable but significant amount of abstract thinking and conceptualization. That is to say that hundred of thousands of humans generations for hundred of thousands of years have lived and transmigrated on this planet just relying on the *ground of the imaginific function*²⁴ and *sensing-intuition mental bipolar dimension*, the *phylogenetic basin of attraction*

²¹As pointed out by Laughlin [64] quoting Jung: *Archetypal structures underlie all recurrent, “typical” (panhumanly typical, not culturally or personally typical) ideas, images, categories, situations, and events that arise in experience. They contain no inherent content, but exist “at first only as forms without content, representing merely the possibility of a certain type of perception and action”. Archetypes may manifest as “a priori, inborn forms of intuition”. And as the instincts impel us to act in a distinctly human way, so do the archetypes impel us to perceive and understand the events we instinctively respond to in a distinctly human way.*

²²Quoting C.G. Jung [65]: *My views about the “archaic remnants”, which I call “archetypes” or “primordial images,” have been constantly criticized by people who lack a sufficient knowledge of the psychology of dreams and of mythology. The term “archetype” is often misunderstood as meaning certain definite mythological images or motifs, but these are nothing more than conscious representations. Such variable representations can not be inherited. The archetype is a tendency to form such representations of a motif—representations that can vary a great deal in detail without losing their basic pattern.*

²³Credit: Oxford Dictionaries, Language matters www.oxforddictionaries.com/definition/concept.

²⁴In etymological terms, I link the word *image* to the Greek *idol (spectrum)* and to the Latin *imaginem*, but also *imitaginem* (Porphyrius), hence *mimagine* (from the root of the Greek *mimos*), *to imitate, by similarity*. Following this meaning, *image* is given as *a principle of similarity*, and by extension as the minimum permissible spectrum, undifferentiated, indeterministic and totipotent of dynamic correlations **potentially** able to generate interference (*frequency-phase coupling* on quantum level; *phase-tension coupling* on quantum-relativistic level; *tension-tension coupling* on relativistic level): in its absence, there can be neither association nor memory or the coupling. On an associative level, I link it to the Greek *eidelopoios* or *idolopeo*, *that which generates spectrum, shadows, images*, which Anton Maria Salvini (1653-1729) translated as *imaginific*. Following this meaning, *image* is given as *adynamical principle*.

where are embedded the essential and *ready to use* humans' pre-cultural behavioral strategies, without getting bogged down in the maze of abstract thinking, concepts, cultural production, speech communication and the like.

Sensing is one of the four poles of mental functions introduced by C.G. Jung in his *Psychological Types* [66], where he introduces a hierarchy of mental functions in two mental bipolar dimensions (dichotomies). These are *sensing* (*attentiveness* by means of the sense organs) coupled to *intuition* (*awareness* in unconscious way or *being aware* of unconscious contents) and *thinking* (function of intellectual cognition; the forming of logical conclusions) coupled to *feeling* (function of subjective estimation). When one of the poles of the two dichotomies predominates over the rest of the poles, it defines the dominant function of a person or a community of persons.

The *sensing-intuition* dichotomy represents the way in which an individual receives information. According to Jung *sensing* and *intuition* are called *irrational functions*. *Sensing* refers to the means by which an individual knows something exists, derived by his/her neuropsychological-sensory system.

Intuition is knowing about something without conscious understanding of where that knowledge comes from. The *irrational function*, according to Jung, is typical for mental and perceptual activity that predominantly (and, for the most part, unconsciously) operates with opportunities, *i.e.* various possible outcomes and sensations result from some premises and sensations, mostly driven by unconscious processes. In humans, all the forms of behaviour, including *cognitive behaviour*, and communication, including *oral language*, are rooted on the psycho-physical plane of *sensing-intuition*.

The *thinking-feeling* dichotomy refers to how an individual processes the information. The function *thinking* allows a person to understand the meanings of things. The function *feeling* is the method by which a person qualifies the value of conscious activity. This process relies on logic and careful mental activity. According to Jung *thinking* and *feeling* are called *rational function*, because it typical for mental activity that consciously operates with, judges or analyzes received information.

When the *human's state of mind, endowed by the relational dynamics ruled by sensing-intuition, which give rise to the specific anatomical and functional organization of the human's neuro-psychological-sensory system*, is integrated by the *thinking-feeling mental bipolar dimension*, the phylogenetic scenario change dramatically, as the human-animal and his/her environment from being an *interconnected/interacting/interfering unit* becomes subject-object of a relationship conditioned by an *internal representation of the external reality* conceived, initially via *symboling* (from the second half of Lower Paleolithic) and then also via *semantics* abilities (from late Middle Paleolithic onwards), in the settling process of the psychological complex relatively autonomous and independent that we call *epigenetic function of the real* or (*self*-)consciousness.

Perceiving oneself as entity subjectively distinct from the environment, is, I claim, the precondition for there to be *cultural production*. Our pre-cultural and

pre-verbal humanity perceived the world via *imaginific function and sensing-intuition mental bipolar dimension*, as a system of vibrating fields, each with a particular sound and rhythm, and this is the reason why early non-utilitarian traditions have devoted much of their physical and mental energy in the caves and rock shelters' stone processing, because caves and caverns are places whose sound structure makes them natural and primordial resonant telluric crates, where sounds resonate, echoes, rumble, reverberate, places in which it may be found the highest environmental acoustic effects, where not seeing for the dark requires to sharpen the listening above and beyond the sensing, where the sound is an alive tension of vibrations shrouded into the silence [67] [68] [69] [70] [71].

The cave as the cavern is the *lithic throat* (Vishuddha, the fifth *chakra* of Vedic Tradition) whose breath generates the sound, the *telluric uterus* (Muladhara, the first *chakra*) where the echo of the sound creates the mystery of births and deaths, of appearing and disappearing, of day and night, the primordial abyss, the space of the unknown thing, the spell. With the magnificence of its silences, its forms, shadows, transparencies, the cavern is the place where all the resonances can rejoin the primal resonance and hence re-born to a new sound. The rich and widespread production of *cupules* is a tangible sign of the deep, visceral bond that unites cavern and rock, as guardians of the primordial sound, to the human being, who digs and carves into it and over it her/his sound, resonance, her/his sounding board, her/his uterus-throat concavity, her/his receptacle of the sound, the *cupula* [Figure 8].

That is. In the absence of an *I/Me* that distinguishes itself from an *Other than I/Me* (which is the psychological condition that has ruled, remaining essentially unchanged, humans behavior for at least *fifty of the sixty minutes* that mark *humans' hour timeline*), human psyche did not contemplate a submerged territory, namely *unconscious psychic material*, on which floats an emerged territory, namely *conscious psychic material*, and did not even contemplate an unconscious psyche characterized by two well distinguishable layers, one *personal* and one *collective* (C.G. Jung). Almost all there was during these *fifty minutes* it was *phylogenetic psychic material*, the territory of the *essentially unknown*, embedded with the *innate predispositions* which have assigned to humankind all the

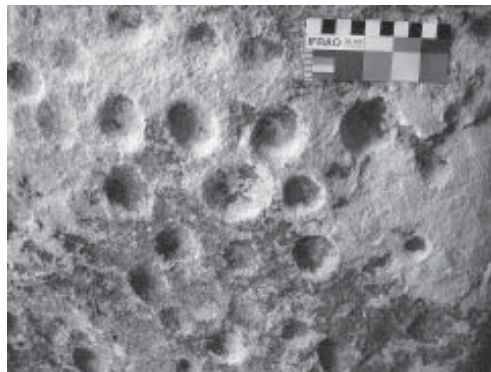


Figure 8. Cupules. Some of the more than 500 Paleolithic cupules in Daraki-Chattan, India, thought to be of the Acheulian or Middle Paleolithic. Credit: Robert G. Bednarik.

ready to use strategies and skills necessary to fulfill its adaptive needs. This is why from the beginning of Lower Paleolithic until the end of the first half of Middle Paleolithic, there have not been huge variations in the type of products realized by human's hand, even though the variations that there have been, however slight, are nonetheless an evidence of the fact that human psyche was undergoing the slow psychological *process of individuation* and *nucleation* which would be led to the settling of a *state of consciousness*, with all the consequences that we observe in the findings dated from the second half of the Middle Paleolithic onwards.

A clue that can help us understand these variations is given by taking into account the paleo-art works according to their perspectives, namely the one-dimensional, two-dimensional and three-dimensional perspective.

On the subject Bednarik writes [61]:

If we separate art works into three-dimensional figurative, two-dimensional figurative and non-figurative genres, we see that the first is the least complex and the last the most complex. This is because in the first art genre, referent (the object depicted, the signified) and referrer (the art motif) are cognitively relatable by direct visual resemblance of certain characteristics. In graphic figurative art, the referent is related to the art motif through the projection of certain of its characteristics onto a two-dimensional plane, so the perception of its relationship to the referrer involves a decoding process requiring certain cognitive faculties. In entirely non-figurative arts as well as those that use highly "stylized" versions of iconicity it is impossible to know the referrer, unless one has direct access to the cultural conventions in question.

The meaning to be assigned to the *geometric or non-iconic marks or non-figurative genre*, from the earliest parallel sets of straight lines (vertical or oblique) and sets of convergent lines and dots (*cupules*), to the increasingly complex geometric arrangements, such as multiple arcs, zigzags, circles and radiate patterns and the likes, it remains an outstanding question²⁵.

²⁵In this regard, Bednarik has advanced the hypothesis, named *phosphene theory* (Bednarik 1984 et passim), according to which *phosphenes* may have a role in the earliest engravings. This hypothesis does not explain how *phosphenes* are connected to paleoart origins, but merely points out that all known pre-figurative engravings appears to resemble *phosphene* motifs. In Bednarik's words [57]: *Phosphenes are most easily described as a kind of test pattern of the visual system. They are an autogeneous and involuntary phenomenon of the mammalian visual system whose form constants cannot be influenced by cultural conditioning and which seem to be ontogenically stable. This phenomenon can be produced by many factors, such as electrical stimulation (frequency dependent), pressure on the eyeball, blows to the head ("seeing stars"), certain hallucinogens and many others. Phosphene forms are the fifteen known standard form constants of phosphenes, and most of these are found in the earliest engravings and petroglyphs. It is beyond doubt that phosphenes are intrinsic phenomena of the visual system, or entoptic phenomena, and that they reflect inherent structures of the visual system rather than any external factor or information. Since the earliest graphic production of the modern infant and the earliest production of hominins both consist entirely of compositions resembling phosphene forms, I consider it likely that these art forms are in some way related to specific basic neural processes of the visual system. Therefore the idea that these earliest engravings "resonate" with the neuron structures of the brain seems to be confirmed by the phosphene theory, according to which the entoptic stimulation recorded by the visual centre resembles inherent structures, such as perhaps that of the striate cortex.*

I suggest that the three above-mentioned forms of art genres belongs to three different levels of expression which lie on three different logical planes. They should be seen as correlated to the three main marking steps of the psychological process of individuation which would be led to the settling of a *state of consciousness*:

- the *non-figurative genre (geometric or non-iconic)* marks the starting phase (first half of Lower Paleolithic) of this process, with a pre-symbolic (*imaginific function*) and consciousness-free way of expressing the insight (a *relationship of continuity* in which no space or time elaboration is involved, just *totipotent sensing-intuition images*);
- the *two-dimensional figurative genre* marks the transition phase (second half of Lower Paleolithic) towards a *relationship of contiguity*, with *sensations* turning into *feeling-emotions*, with a way of expressing the insight contaminated by the psychologic tension that arise in differentiating, *i.e.* orienting, the undifferentiated space-time of the non-figurative genre;
- the *three-dimensional figurative genre* (dating from late Middle Paleolithic onward [72] [73]) marks the ending phase of the process, with a way of expressing the insight ruled by a *state of consciousness*, pre-rational (stricto sensu), with a fully established competitive relationship between *continuity* and *contiguity*, where out of *sensing-intuition* endowed by *feeling-emotions* are settled the two mental bipolar dimensions of *sensing-intuition* and *thinking-feeling* that still characterize our mind territory.

Given that *technique* is the daughter of the *process of abstraction* and that it has been driven by social and cultural production that require instruments, and that *technology* is the know-how meant as intentional ideation, production and application of manuals and/or instrumental *techniques* (procedures) aimed at the satisfaction of anthropic purposes, and given that there is well over than a million years stasis with very little trend in the overarching lithic manu-facturing system, I claim that the hypothesis according to which as early as from the first half of the Lower Paleolithic human communities were producing *culture* and were organized in a *complex social system* which could rely on the use of *symboling* and of *value concepts*, it appears inconsistent with the fact that until late Middle Paleolithic humans communities:

- must have had very little interest and/or needs (that would have justify the request) for *technique* and for *technology*, or at least for *technique* and *technology* aimed at stone and bone manufacturing, and/or
- have not developed any particularly promising and/or useful kind of *technique* and *technology* (aimed at stone/bone manu-facturing), which means that for hundreds of thousands of years *handaxes* variously worked was about everything they had need (we could also argue that their capacities, possibilities and tendencies were insufficient or inadequate to trigger a progressive trend in the overarching lithic manu-facturing system, but this would mean to measure their priorities on the basis of our priorities, and I do not think that this is our aim, for sure is not mine).

Acheulean *handaxes*' one million years production stasis is supporting this hypothesis.

Around 1.5 mya a new kind of artifacts developed from simple Oldowan broken (flaked) rock tools. These artifacts, known as the *Acheulean*, is typified by one type of tool, perhaps the most successful tool ever used: the *biface handaxe*, a basic, essential and functional tool produced and utilized for subsistence and adaptation's needs. *Homo ergaster* and/or *erectus* made this tool for over a million years as did later members of the *Homo* genus. *Homo erectus* made handaxes everywhere they could find the appropriate kind of rocks, with little stylistic variation, all of them having the same almond- or *teardrop-shape* from any angle. Why?

According to what stated so far, the reason for which the style and form of handaxes (like that of other anthropogenic finds from Lower Paleolithic) were consistent for a very long time over a wide geographic range, from the Middle East to Europe and Africa [74], it could be because the ability to shape a stone in the form of handaxe was *hardwired* in the *sensing-intuition interactive dynamics phylogenetically inscribed into the neuropsychological relational module* of early *Homo*, much like the ability to make a particular kind of nest is *hardwired* in the *sensing interactive dynamics phylogenetically inscribed into the neurological relational module* of birds, the ability to make a particular kind of cobweb is *hardwired* in the *sensing interactive dynamics phylogenetically inscribed into the neurological relational module* of spiders, the ability to make a particular kind of hive is *hardwired* in the *sensing interactive dynamics phylogenetically inscribed into the neurological relational module* of hymenopters, etc.

This is to say that early humans did not have to *invent or conceive* handaxes and the techniques to manufacture them, all they had to do was to follow phylogenetic skill-prescriptions based on *sensing-intuition mental function*: almost all the anthropogenic production dating back to the Lower Paleolithic has been possible thanks to the mental action exerted by the *irrational function sensing-intuition*, typical for mental and perceptual activity that predominantly (and, for the most part, unconsciously) operates with opportunities, *i.e.* various possible outcomes and sensations result from some premises and sensations, mostly driven by unconscious processes [19].

It is therefore conceivable that a fully established *culture* production, among human communities organized in *complex social systems*, which could rely on the use of *symboling* and of *value concepts*, it appears consistent with the available utilitarian and non-utilitarian finds only from Middle Paleolithic onwards.

In conclusion:

- The human *sensing-intuition* dichotomy has to be considered as the mental bipolar dimension, phylogenetically inherited, that has dominated unchallenged the relational life of human communities throughout the Lower Paleolithic, while the *thinking-feeling* mental bipolar dimension is a consequence of the gradual psychological process of nucleation-individuation to

which the *sensing-intuition* dichotomy has undergone over nearly two million years. Because of this, I argue that among the distinguishing features of the human species the *sensing-intuition* dichotomy should be considered as the primary distinctiveness.

4. From Animal's Sound Production to Human's Oral Language Codification

*This is a feature peculiar to the archaic ontologies:
animals and plants begin really to exist from the
moment when they are given names.*

Mircea Eliade [75]

This is the *human relational scenario* that from the end of Lower Paleolithic (late Acheulean) will lead to the fully syntactical and semantics codification (from the second half of Middle Paleolithic onwards) of a suitably emitted and articulated range of sounds, which marks the transition from a *musically established sound emission*, i.e. an intermediate communication system that was more like music than language [76] [77], to a fully established *speech communication*, namely *oral language* [78]-[83].

The circumstantiated emission of complex and coherent sounds, characterized by their own rhythm and timbre (*signal*), by animals considered in their natural habitat it establishes, via sound-consonances and dissonances, an *interferential* adaptive relationship between each others and with the acoustic qualities of the vibrational environment of belonging [84] [85].

Besides having a fully upright bipedal gait and a full-time terrestrial bipedality²⁶, which permanently free the upper limbs from antigravity functions, with the consequent possibility of their fully use for manipulative functions, the *human animal* can rely on a particular adaptive and supra-adaptive aptitude in perceiving, imitate²⁷ and reproduce (not only and not so much by vocal or instrumental sound, but above all through the adaptive and supra-adaptive trans generational tuning of human's behavior and relationship in the environment and with it) the *rhythmical matrices* that enliven the environment in which he/she lives, which I call *human acoustic-musical faculty* [90] [91], the peculiar and ready to use in-

²⁶It has been suggested that bipedal walking was already used by hominids around 3.7 MYA [86] [87] [88].

²⁷Imitation is a widespread behavior among mammals, a behavioral attitude that has been associated with the so-called *Mirror System* [Rizzolatti & Arbib, 1998]. Arbib however recognizes that the hypothesis of the *Mirror System* has precise objective limits both in connection with the aptitude for imitation as for those related to oral language. He writes [89]: *It is important to be quite clear as to what the mirror system hypothesis does not say. 1) It does not say that having a mirror system is equivalent to having language. Monkeys have mirror systems but do not have language, and I expect that many species have mirror systems for varied socially relevant behaviors. 2) Having a mirror system for grasping is not in itself sufficient for the copying of actions. It is one thing to recognize an action using the mirror system, it is another thing to use that representation as a basis for repeating the action. Hence, further evolution of the brain was required for the mirror system for grasping to become an imitation system for grasping. 3) It does not say that language evolution can be studied in isolation from cognitive evolution more generally.*

nate (phylogenetically prescribed) faculty that makes the human being a polyphonic and polyrhythmic animal [92].

That is: the human individuality, long before showing a competence for a codified language, calculated in an ABC or in music theory, embodies a polyphonic and polyrhythmic being able to relate adaptively and supra-adaptively with the environment by making use of an attitude strongly and effectively able to fertilize (via *imaginific function*) the relationship of (quasi-)continuity entertained with the environment, an attitude essentially intuitive and imitative, pre-symbolic, pre-rational and pre-verbal, which it takes place on the human cognitive plane of *sensing-intuition mental function*, i.e. the acoustic-musical plane, the mental dimension of an uninterrupted *hic et nunc* (unrelated to mental categories of space and time), able to express, through the height, depth, amplitude, movement and harmony of the *rhythmical sound*, all the qualitative, intensive and extensive properties of the phenomena, without resorting to speculative thought.

The neonatal vocalization and babbling exercise, like the early extrauterine motricity, rely on too redundant and ready to use phylogenetic requirements and facilities not to respond to essential adaptive needs. Early extrauterine motricity it organizes the acquisition of a full competence for motor-based functions, e.g. antigravity function, exploration and manipulation of the surrounding, eye-hand coordination, etc. Neonatal vocalization and babbling exercise it organizes the acquisition of a full competence for interference-based functions related to sound hearing and production, which is the main way, but not the only one (in the first weeks of life prevails a slightly differentiated CNS operation's modes, which organizes itself in massive responses to even minimal stimuli, and the better functioning sensory analyzers are the *proximal*, i.e. tactile, thermal, dolorific, vibratory and proprioceptive sensitivity, smell and taste, while hearing and seeing, especially the latter, are not yet able to deploy all their discriminative potential, suggesting that at this age and all life long the *proximal* sensory analyzers are themselves *interference organizers*), through which is acquired and expressed the interferential function belonging to the sensing-intuition mental function and associated to human's acoustic-musical faculty.

The wide range of sounds reproducible by the human voice, is the result of an amazing network of anatomical and functional correlations between abdominal cavity, diaphragm, chest, larynx, pharynx, nose, palate, dental arches, tongue, cheeks, lips. All of it chaired by a refined neuropsychological competence for vocalization, modulation of ventilation, articulation of sounds, phonation, intonation, melodic progression, acoustics quality, sound scanning, rhythm and timbre of the sound emitted, its extension, the emphasis, and so on.

Modern and relatively modern humans, such as *Neanderthals* or perhaps *H. heidelbergensis* (and *Homo erectus?*), are the only primates known to have their hyoid bone high in the neck. While this helps us produce a far wider range of vocal sounds, it also allows us to more readily choke on food and suffocate because it allows the entrances to both the trachea and the esophagus to be open at the same time. The fact that phylogenetic diversification has come to this poten-

tially disadvantageous trait, suggests that vocal-sound production plays a central role in the human relational attitude.

The luck of the human larynx as an organ of phonation and singing is because of being in the bottom of a resonance tube, of variable length, shape and volume: the first part of the alimentary canal. The lips, indeed, without a resonator suitable to modulate the sounds, can only produce raspberries. With the transition from quadrupedism to the upright position the voice channel is bent at right angles, dividing into two broad resonance cavities: the mouth and the throat. If the operations of the lips and tongue implemented by the baby to suck, are performed during the emission of the voice, the resonance cavities are modified and the sounds that cross them undergo so pronounced modulations that can be used as sound signals. When to this ability of the voice channel is added the larynx attitude to produce notes in at least two octaves, the human being has located in his throat, ready to use, the musical instrument most flexible and expressive than what his technique will ever be able to produce.

If this natural predisposition to reproduce a wide range of sounds possessed by the human vocal system, it holds, as I argue, a primary adaptive and supra-adaptive significance, then it is reasonable to assume that imitation and reproduction of sounds it must have been everything that human communities of Lower Paleolithic needed for a long time before moving to the codification and articulation of this attitude in *oral language* (when resonance becomes word), intended as:

- the ongoing overcoming of phylogenetically prescribed and sensing-intuitively tuned emission of sound signals *via* intentional, circumstantiated, not occasional, thinking-feelingly communication²⁸ realized thanks to the ideation, programming, organization and production of conventional, musically encoded (rhythm and timbre) and semantically codified phonetic sounds.

5. From Speech Communication to the World Generated by Naming It

For Palaeolithic sites which accumulate in natural sediments, archaeological “levels” are often thick palimpsests, and their formation was usually complex; cultural “layers” are often arbitrary creations of the excavator and artefacts may be mobile between these.

In such cases, what do “outliers” actually mean?

(...) Demonstrating that priors are not corrupt is therefore a particularly pronounced problem in Palaeolithic archaeology, and if this

²⁸*Man is the only organism known to use both the analogic and the digital modes of communication. The significance of this is still very inadequately understood, but can hardly be overrated. On the one hand there can be no doubt that man communicates digitally. In fact, most, if not all, of his civilized achievement would be unthinkable without his having evolved digital language. This is particularly important for the sharing of information about objects and for the time-binding function of the transmission of knowledge. And yet there exists a vast area where we rely almost exclusively on analogic communication, often with very little change from the analogic inheritance handed down to us from our mammalian ancestors. This is the area of relationship. Based on Tinbergen (1953) and Lorenz (1952), as well as his own research, Bateson (1955) has shown that vocalizations, intention movements, and mood signs of animals are analogic communications by which they define the nature of their relationships, rather than making denotative statements about objects. [93]*

*cannot be done, then the garbage going in becomes the garbage coming out.
 (...) Based on the principle of "garbage in, garbage out" we must surely
 treat even the simplest of models as speculative, and therefore subject to scrutiny.*

P. B. Pettitt and J. Zilhao [94]

With the established psychic nucleation of the relatively autonomous and independent neuropsychological complex called *epigenetic function of the real* or *state of consciousness*, the world ceases to be just lived to be also interpreted. Psychologically, the ability to interpret the world means having to get out of a relationship of continuity with the external and internal (insight) environment to project oneself out in a *somewhere else*, in a time and space measurement made by the interpretation of the world and of oneself. In making an *I-Me* distinct from an *Other than I/Me* the world is split into a subject *I-Me* observing, and an object *Other-than-I* observed, in a thesis and antithesis.

The *subject-object dichotomy* is the primal source of the antinomies, or pairs of opposites that refer to a polar relation (psychological tension) between a thesis (what I can sense) and an antithesis (what I cannot sense). Since humans began to think and feel the world in terms of subject and object, distinguishing themselves from Nature and ceasing to identify with it, the human communities also developed the ability to *create culture*. Bearing in himself/herself the ability to choose which space and time to follow, the exercise of the *epigenetic function of the real* fertilizes the world giving birth to new worlds, and fertilizes individuals giving rise to new individuals. In fact, to act in the face of Nature as distinct from it is to be born a second time, that is to be *re-born*. The leitmotif of the re-birth permeates all human cultures and feeds, systematizing it, the nascent (300 tya?) *oral language production* (initially, and for a long time, strongly focused on ritual purposes and supported by *magicians* and/or *shamans syllabic singing*) and the newborn *phonemic-thinking* (pre-verbal).

With Homo Sapiens et Faber, through the Breath-Sound-Speech, through its magical and mysterious power, through its ordering function, its power to give form (Logos-Consciousness) to the formless (Chaos-Unconsciousness) and the power to give voice (logos-life) to silence (chaos-death), the World ceases to be merely lived to also become interpreted. With this troubling re-birth in the womb of Breath-Sound-Speech humanity thereby sees itself forced to look at itself in its not being the World, but only part of it, forced to give some sense to the painful and never completely resolved detachment from the Great Mother Earth's *womb*. And it is here, in the excruciating attempt to sew together the wound resulting from the estrangement from the Maternal Breath, that the human being finds refuge in the archetypal triad which forms the basis of all internal representations of external reality, whether pre-rational and pre-verbal, or rational and verbal: from this point on, humans' place in the World would be between Earth and Sky (→fully upright bipedal gait), an elective agent of connection (medium) between their own image reflected by the mirror of the *Earth's animus-breath-sound-pneuma* and their own image reflected by the mirror of the

Sky's anima-breath-sound-pneuma ... each with their own quota of *consciousness*.

Our pre-verbal humanity, perceived the world as a system of vibrating fields, each with a particular sound and rhythm.

Homo Sapiens et Faber gives a name to the World! Very different way of being. In this reflective relationship (its own image reflected by the mirror of mind) is summarized the identity of *human psychological birth*, its giving of itself as a presupposition of possibility, a possibility that makes it inevitable to leave the *relationship of continuity* with the World, a relationship which, as is true for every other animal, maintains the human being in a dimension of *ante-rem-in-fusion* with Nature-Great Mother Earth's womb, to enter the dimension of detachment from it, in a *relationship of contiguity* brimming with unknowns and hence tragic.

Between the end of Paleolithic and early Neolithic (between 40,000 to 10,000 tya, transition from *totemic cultures* to *megalithic cultures* [92]) [Figure 9] the maturity gained by the epigenetic function of the real (rooted into the magical-symbolic thinking developed by the competitive relationship that has arisen between the sensing-intuition and the thinking-feeling mental functions) and by the *phonemic thinking* in the social organization and cultural production of human communities, gives a turning point in the evolution of later cultural productions and social organizations. During this period of time we are witnessing on the one hand to a radicalization of the detachment of the communities from the primordial identification to Nature, in favor of an increasingly effective competition with the *forces of Nature*, aimed at their domestication, and, on the other hand, we see a progressive refinement of the strategies and techniques applied for the supply of food and for subsistence. The spread of cereal cultivation and cattle breeding it triggers a process of diversification of the social organization and reinterpretation of the roles within the communities. Because of an epoch-making collective *transference neurosis*, which marks the transition from an anthropic world that does not base its energy supply on Nature domestication, to a world that it does, the *mouth of the son* who sucks the milk from the mother's breast takes upon itself the weight of human's tragic re-birth in the womb of consciousness, *i.e.* the consequences of the fatal estrangement from the

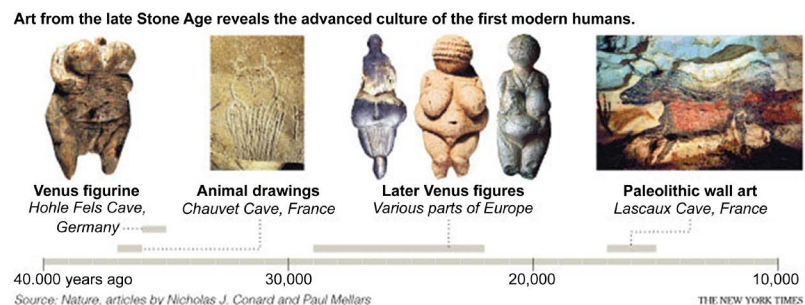


Figure 9. When it resonates within the female uterus, the primordial vibration (sound) makes her pregnant of the human offspring. When it resonates within the telluric womb of Great Mother Earth (the cave), it generates all beings living between Earth and Sky [92]. ©, The New York Times Company.

unconditioned union with the Great Mother Earth, moving into the incest taboo, into the *penis of the son* who wants to join (mate) with the mother's womb (Great Mother Earth).

It will be from Upper Paleolithic onwards, that the *mouth of the son*, namely the male gender, is self-proclaimed depositary by divine right of the power assumed by oral language within the community, projecting on himself the power to create the World through his mouth, by naming it (*semantic baptism*).

The late Paleolithic *rebirth motif* is contextualized in the womb of consciousness, by introducing a semantic hierarchy of the real according to which: Nature generates but it is only through the *semantic baptism* that the generated is recognized as real.

The generatrix power of *Resonance turning into Word* (*Ruah, pneuma, breath, anima/animus, prana, C'hi*), enters so fully fledged in open competition with the generatrix power of Nature, to which the natural generatrix power of women is associated²⁹, subjecting it, still today in much of the world, to a radical and systematic operation of domestication and subjugation.

For thousands of years, the incest taboo is accomplished through the speech uttered by the Lord of the Word (Logos), the Male, which fertilizes the Female-mother by penetrating her through the ear, possessing and submitting her both from within [Figure 10] and from outside [Figure 11]. That's how and why since Upper Paleolithic the male gender subdues the *women's uterus* to the *male's oro-larynx power*.

From the fully established ability for *speech communication*, the *word* that gives life to the *world* by naming it undergoes a process of systematization that, at least in some areas of the planet, first it combines and then slowly subverts the *magical word* (intended to establish an interference relationship between different vibrational/rhythmic planes of reality) with the *sacred word*, then with the *written word*, expendable for commercial communities' needs, then with the *philosophical word*, then with the *political word*, expendable for social, worldly and governmental needs, and finally with the *techno-scientific word*, always rigorously declined to the masculine.

The dawn of the third millennium marks the spread on a global scale of very performing computing devices for home, medical, scientific, military, industrial use, that thanks to sophisticated voice recognition and production systems make them able to entertain, actively and in real time, an exchange of verbal information (although virtual, because you are anyway talking to a computing platform masquerade as human interlocutor), computationally itemized and statistically endowed with meaning. A fact equipped with enormous evocative implications (fascination).

²⁹An association that also translates into the propitiatory recall to female fertility carried by the abundant findings of female statuettes dating from Upper Paleolithic, such as: the Venus of Hohle Fels ca. 40 - 35 tya; the bone Venus of Kostenky ca. 30 tya; the Venus of Montpazier ca. 30 tya; the Venus of Dolni Vestonice ca. 26 to 24 tya; the Venus of Willendorf ca. 28 - 25 tya; the Venus of Savignano ca. 25 tya; the Venus of Moravany ca. 24 - 22 tya; the limestone Venus of Kostenky ca. 23 - 21 tya; the Venus of Laussel ca. 23 - 20 tya; the Venus of Brassempouy ca. 23 tya; the Venus of Lespugue ca. 23 tya; the Venus of Garagino ca. 22 tya; the Venus of Malta ca. 21 tya.

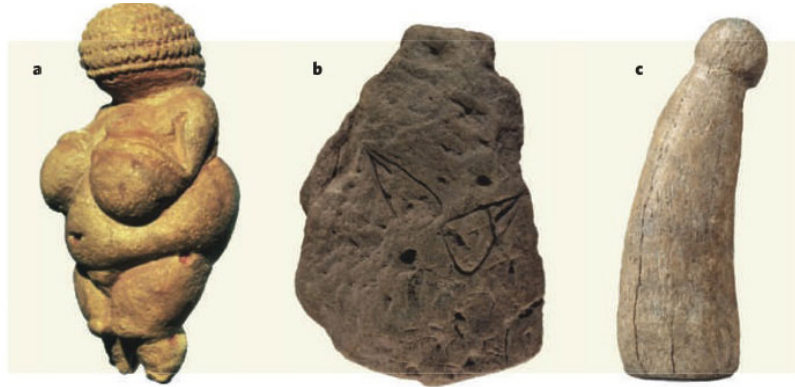


Figure 10. Credit: A. Bridgeman Art Library; B. P. Jugie/MNP, Les Eyzies, Distr. RMN; C. RMN. Image source: <https://www.nytimes.com/2009/05/14/science/14venus.html>. Sexual images in early Homo sapiens European art: A. A “Venus” figurine from Willendorf, Austria, 105 millimeters in height, dated about 28,000 years ago; B. Female “vulvar” symbols carved on a limestone block from the La Ferrassie rock shelter, southwest France, dated about 35,000 years ago; C. A phallus, carved from the horn core of a bison, from the Blanchard rock shelter, southwest France; the carving is about 36,000 years old and is 250 millimeters long.

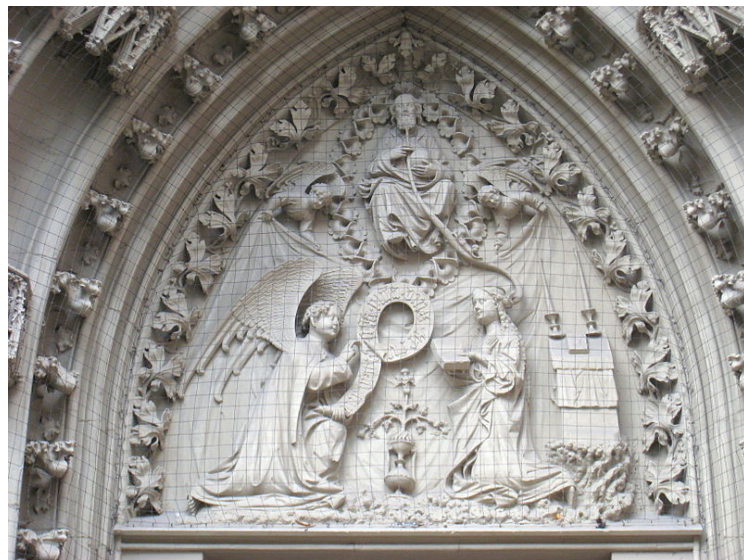


Figure 11. *Late-Gothic Annunciation.* Würzburg Marienkappelle Nordportal tympanum. The Breath or Word of God the Father (above) is running down through a bent pipe or tube to the left ear of vergin Mary (below) sitting and reading in front of angel Gabriel’s Annunciation. At the ear of Mary, the tube forms a dove (a pre-Christian *image* for fertility acquired by Christianity as *image* of the Holy Spirit) with the child Jesus, the incarnation of the Word of the Father, gliding down outside the tube. The Cistercian abbot Bernard de Clairvaux (1090-1153) explains it by saying that the angel Gabriel was sent by God in order to penetrate the Word in the womb of the Virgin through the ear.

In *giving voice* to a machine, re-emerges the magic power assigned to the *word-sound* by the mid and late Paleolithic human communities, subsequently merged in the post-Neolithic metaphysical and philosophical concept of *psyche*, *pneuma*, *breath*, *ruah*, *prana*, *anima/animus*, and finally in that of *Energy* (*energ-*

heia), i.e. the ability attributed to the *acoustic vibration* to animate, to give life to the inanimate.

The scientist who gives voice to a machine is like the shaman who gives voice to the spirits: the spirits speak through the shaman's intercession, machines speak through scientist intercession. The task of the Neolithic shaman (and after him of any other person appointed to act as an intermediary, *medium*, with the otherness) was to curry favor with the spirits, so that they could influence the forces of Nature, for the good (or for bad, black magic *vs* white magic) of the community. The task of the contemporary shaman-scientist is much more ambitious: he wants literally subdue and even replace the forces of Nature. Meanwhile he succeeded, thanks to artificial insemination *in vitro*, to pull out from the female uterus (and not just thanks to the *speech monopoly*, but in deeds, artificially) the natural power of generating life belonging to woman.

6. Conclusions

In providing a definition of *consciousness*, *culture* and *oral language*, the present work argues that they begin to take shape as distinctive features of the human being only from the second half of Lower Paleolithic. Literature offers different hypotheses about their genesis. Excluding the various theories and beliefs, still widespread throughout the world, which attribute their origin to divine and/or mythological (and extraterrestrial too!) causes, almost all of the remaining hypotheses are formulated according to the Darwinist pyramidal model, claiming that phylogeny is the *historical succession* of causes and effects governed by a driving mechanism known as *natural selection*, whose *natural mandate* is to act already in the primordial epoch on the evolutionarily lower forms of life (prokaryotes), in order to reach, through a *sequence of evolutionary milestones* (supported by appropriate *genetic mutations*), ever more and more evolutionarily advanced forms of life, until the realization of the form of life endowed with the highest evolutionary value: the modern *Homo (Artificialis)*.

That is: In formulating his historical interpretation of the terrestrial biological phenomenon, the scientist Darwin has as its reference point the scientific model of his time, the Newtonian, while the Darwin of the wealthy British society follows the ideological model dear to the British colonial Empire. It is enough to lead him to embrace the Malthusian *economy of nature* (selecting from chance variants so that every part of newly acquired structure is fully practical and perfected), which brings him naming his theory *natural selection*, in analogy with what he termed as *artificial selection* of selective breeding. Garbage in, garbage out. To Earth's biological phenomenon it is assigned a *evolutionary purpose* that justifies the drafting of a *scale of evolutionary values*, where the highest step, the dominant anthropocentric position, is firmly occupied by the not-anymore-animal *Homo (dilectus)*, with his highest consciousness, culture and oral language.

Features, the latter, that have been taken as a *yardstick* to "measure", for example, the behavior of animals considered close to him, e.g. living primates. No

surprise if such assumption may rise some non-trivial outstanding questions, like the one highlighted by Velina Slavova in drawing conclusions on the mental mechanisms that may underlie the development of oral language [95]: *There are reasons to believe that the mental mechanisms discussed here arose in pre-human evolutionary development and exist to some extent in nonhuman primates. So there are no reasons for nonhuman primates to not develop such an elaborated language as humans. But they did not.*

If we reject the idea of **comparing different species** by resorting to a *hierarchy of traits endowed with evolutionary value*, the answer to the posing question “*why nonhuman primates did not (and will not) develop oral language as humans, although they possess (do they?) the mental mechanisms useful for the purpose*”, can be provided without resorting to neuroanatomical or neurophysiological arguments: they don’t because their own distinctiveness, and therefore also their abilities, possibilities and tendencies, are different from, and can safely do without, those of humans.

As Emiliano Bruner points out in presenting two of his recent papers [96] [97]:

“Living species can provide information on the product of evolution, while fossils are necessary to provide information on the process. In the former case (extant species) we can rely on more comprehensive biological analyses, but results concern the final result of the process, not the process itself. In the latter case (extinct species) we can investigate directly the process, but samples are generally not representative neither at biological nor at statistical level. This dual framework is often not properly acknowledged, confounding taxonomy (the product) with phylogeny (the process). When samples and information are analyzed without these cautions in mind, conclusions can generate misleading hybrid perspectives. From the one hand, living species (monkeys and apes in anthropology and evolutionary neuroscience) are still frequently misinterpreted as primitive human ancestors. At the same time, scattered and descriptive information on individual and fragmented fossils are generalized to propose broad and inclusive theories. Both aspects are, scientifically speaking, crucial weaknesses, generating instability and unreliability within the field.”³⁰

“Thus, strictly speaking, there is no consistent evidence on language evolution when you deal with fossil anatomy. Ralph Holloway already stressed this point before, but it seems that most books and articles introducing this topic simply keep on stating the opposite, following a mantra (usually void of citations) according to which fossils must clearly reveal the cerebral (usually frontal) changes behind language evolution. The lack of scientific evidence in this context does not mean that there is no association between language and brain evolutionary changes in hominids, but just that fossils can provide only a very incomplete (and insufficient) view of this process. Firm statements, scientifically speaking, should be avoided, and relegated to storytelling and science marketing.”³¹

³⁰Bruner, E. (2019) Shaping cortical evolution, at:

<https://paleoneurology.wordpress.com/2019/01/02/shaping-cortical-evolution/>.

³¹Bruner, E. (2017) Language and fossils, at:

<https://paleoneurology.wordpress.com/2017/07/01/language-and-fossils/>.

*“Another issue concerns the Homo-centric perspective that still contaminates evolutionary neuroanatomy and evolutionary anthropology. Apart from generating a deformed evolutionary scenario, anthropocentric views demote attention towards the other primates. Apes are generally used to “shed light on human evolution”. But living apes are not ancestral to humans. They could be bad models to understand our evolution, as we humans are probably bad models to understand their own one. They have their own specialized traits, which merit attention. In fact, apes are themselves an exceptional zoological case study. Anthropology is interesting, but **apeology** is interesting too. In cognitive terms, for example, apes could have capacities that we have never evolved. Finally, it can be also worth noting that, charmed in searching for “what makes us humans”, we are neglecting “what makes us primates”. Because these latter features are associated with instincts, emotions, and cognitive constraints, they seriously deserve attention. Mostly when recognizing that they often deal with our social aspects, and with their consequences.”³²*

That is, we should keep in mind that our mental categories map the territory, but they are not the territory. If this is true when our mental categories do not fit the observed facts, as is the case of the Bumblebee’s flight (*The wing structure of the Bumblebee, in relation to its weight, it is not airworthy, but he doesn’t know it and flies anyway*), it is also true, and even more so, when they are supposed to fit with facts of which we have no direct evidence and to which we can trace only through vague and partial fossil records, as is the case of our very distant ancestors’ skills and behaviour: if, according to our *yardstick*, their cognitive structure in relation to their *awareness*³³, is to be considered unfavorable or favorable for the fulfillment of their needs, it changes the way we relate our abilities, possibilities and tendencies with theirs (supposed), but it does not change the fact that they lived anyway, for one million years or so, eventually long before consciousness, culture and oral language took place as established distinctive features of the human beings.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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³²Bruners, E. (2019) Shaping cortical evolution, at:

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³³Namely: “(...) *an enduring entity (i.e. the feeling that we are the same person across time) to which certain mental events and actions are ascribed (i.e. the feeling that we are the authors of our thoughts and actions) and which is distinct from the environment*” [98].

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