Evolutionary Precursors of Language in the Physiology of Ardipithecus Ramidus

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Abstract

Language needs cognitive, neural and biological basis to function. With such a complex constitution an extended period of evolutionary time is required for its development. Natural selection, which is a force without foresight, would summarily dismiss any random mutations with no immediate selective advantage. Therefore, language, being dependent on collaboration of all its constituent elements, can never evolve. That is one reason why language is not wide spread in the living world. This paper attempts to address the issue by suggesting that language evolution was the result of numerous exaptations rather than pure adaptations. Furthermore, an attempt has been made to allow maximum evolutionary time to the language phenomenon by establishing initial preadaptations leading to a later language readiness stage in Ardipithecus Ramidus that lived 4.4 million years ago. Such a contention would allow the homonin lineage to come to a linguistic threshold from where language could evolve naturally.

Keywords: Language evolution, Ardipithecus Ramidus, Preadaptations, Language Readiness, Bipedalism, Descended Larynx

1. Introduction

Homo sapiens are a very recent innovation in the context of mammalian and vertebrate evolution as per the evolutionary time scale. One unique characteristic that distinguishes them from the entire living world is their linguistic ability. Language being a complex mental as well as bio-physical phenomenon, should logically take an extended period of evolutionary development to come to existence. It is of course not likely in the short time of about fifty to a hundred thousand years that humans made their acquaintance with spoken language. Furthermore, of the two aspects of language i.e. mental and physical, the physical biology or the speech anatomy needs a particularly extended period of time as well as reason (selective advantage) to evolve. Thus it would be safe to suggest that the physical development of the speech paraphernalia might have started evolving regardless of the mental capability much before the cognitive aspects of language were in place. These evolutionary developments could have taken place just as plain exaptations or as resultant by-products of other evolutionary processes. The focus in this article is to establish a credible human ancestor that existed so down the evolutionary timeline that allowed sufficient evolutionary time for biological prerequisites of language to be in place by the time modern humans evolved.

It is reasonable to distinguish and define some evolutionary precursors of language before establishing a start point in the evolutionary history of mankind where some basic traits that triggered language related mutations came to existence. Such precursors must be only remotely related to language in the initial stages and might develop in the evolutionary process to a stage of "language readiness" where all the necessary paraphernalia is set and the language needs only to be tickled into its infancy later to be matured with time and usage. Thus keeping the intricacies of Darwinian evolution in mind, an investigation into the beginnings of language must consider that the shaping of the speech organs and the cognitive ability to use these for referential as well as communicative purposes started way back in the evolutionary history of mankind. Culmination of this process resulted in a stage where human beings were ready to experiment with language. This stage may conveniently be called the state of "Language Readiness". The idea is also supported by Hurford when he says "both the biological capacity and languages owe their shape to events far back in the past". (Hurford, 2003, p. 38) The state of language readiness is achieved through numerous evolutionary changes referred to as 'preadaptations for language' by Pinker and Bloom in their seminal work 'Natural Language and Natural Selection' (Pinker and Bloom 1990). James R Hurford (2003, p. 40) defines preadaptation as "a change in a species which is not itself adaptive (i.e. selectively neutral) but which paves the way for subsequent adaptive changes". To further illustrate his assertion he points toward bipedalism which triggered a sequence of evolutionary mutations resulting in the lowering of larynx and the subsequent birth of the human vocal tract regardless of the factors which originally brought the switch to bipedalism in the first place.

Aforesaid in mind the preadaptations leading to language readiness may be categorized as:

a. Cognitive
b. Biological

The cognitive preadaptations at the very beginning stages are not discernable as there cannot be any anthropological record of that, but, the biological changes, especially the ones involving bone structure can be documented and studied through the fossils discovered from time to time. Thus Ardipithecus Ramidus becomes an apt candidate for studies regarding the biological preconditions leading to origin of language.

2. Literature Review

The neural and cognitive preadaptations for language capacity are as rare in the animal world as they are hard to establish. Modern age animals have little or none of these and fossilization also does not help much either. On the contrary the biological preadaptations are abundantly found in the animal world. Predominantly these preadaptations are related to speech. These include various

aspects of acoustics, speech physiology and neuro-muscular coordination. The major preadaptations as pointed out by W. Tecumseh Fitch (2000) that aided human speech ability are:

a. Modification of vocal tract morphology
b. Appearance of vocal imitative capability

Considering the common grounds leads the researcher to the distinguishing traits which might have led the humans to being the only linguistically articulate species. Fitch (2000) distributes such discerning features into two broad categories:

a. Neural Mechanisms
b. Peripheral Mechanisms

The neural mechanisms leave no archeological record as these originate from groups of soft tissues and muscle groups which do not fossilize. The researcher is left with no choice but to examine the peripheral mechanisms only. These relate to vocal acoustics and anatomy. The wide spread presence of these peripheral mechanisms in other species also clearly points out that these evolved independently without any adoptive pressure due to language. Several species in the wild have successfully attained a peripheral ability to produce speech sounds without possessing any linguistic prowess. Hence, it may be conveniently concluded that evolution of peripheral speech mechanisms was independent of any linguistic or communicative advantage. The idea opens the area of research into speech acoustics and anatomy rather than linguistic sciences.

Considering the acoustic anatomy the one uniqueness that distinguishes humans from the other mammalian world and non-human primates is the peculiar structure and shape of their vocal tract. This peculiarity enables humans to produce a much richer variety of sounds. The major distinctive feature of human speech anatomy is the distinctly odd placement of the larynx. The human larynx is placed much lower than non-human primates and other mammals (Lieberman, Klatt, & Wilson 1969). Before discussing the permanent laryngeal descent which is a uniquely human trait, it is essential to have a necessary understanding of the speech anatomy, speech acoustics and bioacoustics. Vocal production in almost all animals is very similar, whether it be tetra pods, bipeds, amphibians, birds or even reptiles. It comprises of the following components:

a. Energy source
b. Voice source
c. Acoustic filtration sources.

The energy source is invariably provided by the respiratory system. In case of humans and many other species it is the lungs. The lungs pump out an airstream which becomes the energy source for later manipulation. The airstream produced by the lungs is a passive activity not involving use of excessive physiological

energy for normal vocal production. It is just the deflation of lungs in preparation for inhalation which is a vital body function. The airstream at the outset is mute. It is given a sound by tissue vibrations on its course. In case of humans this is achieved by the vibration of the vocal folds or vocal cords. The vocal fold vibration causes a certain frequency in the airstream called the fundamental frequency or phonation. The pitch of the sound is determined by this fundamental frequency. Speaking in evolutionary terms, phonation is a result of the evolution of a chamber called larynx provided with a protective valve composed of elastic tissue which is involuntarily set into a vibrating mode as the airstream passes through it. The involuntary vibrations cause high frequencies which would otherwise have not been possible if the vibration had been voluntarily controlled by the nervous system. The fundamental frequency thus produced is dependent upon the length, tension and density of the elastic tissue or the vocal cords in case of humans. The fundamental frequency is further manipulated at the third stage by a process of acoustic filtration through the vocal tract, which may involve the oral, pharyngeal or nasal cavities. Different filters in the vocal tract impart different frequencies to the fundamental frequency by interference. These are called formant frequencies. Inspiratory vocalization as in the case of braying of a donkey or crying and giggling of human babies is a reverse utilization of the same scheme but is hardly employed in vocalized human speech. Formant frequencies are produced by movement of or in the vocal tract. Normal speech vocalizations in humans consist of multiple formant frequencies independently manipulated by various vocal tract articulators present in the vocal tract. Another important factor is the length of the vocal tract starting from the larynx to the final production point of the formant. This arrangement provides for a vaster range of formant patterns. Formants being resonance patterns composed of peaks and valleys can be graphically represented. The phenomenon is “clearly illustrated by whispered speech, in which the larynx generates broadband noise (with no vibration), but vocal tract movements are normal” (Tartter & Braun, 1994). Whispered speech is discernable despite the lack of pitch. The instrumental music is another supporting example. It carries no acoustic clues but formant frequencies make it associable. The lowered larynx in case of humans is also evident from MRI results. In case of other mammals the larynx is significantly higher. In certain cases the larynx is adjacent to the nasal passages allowing the animals to breathe and swallow simultaneously (Negus, 1949). Interestingly the arrangement is present in human infants also; allowing the babies to suckle and breathe at the same time, but the larynx gradually lowers and adopts its lowered situation by three to four years of age.

> “The change in larynx position greatly expands our phonetic repertoire, because the human tongue can now move both vertically and horizontally within the vocal tract. By varying the area of the oral and pharyngeal tubes independently, we can create a wide variety of vocal tract shapes

and formant patterns. By contrast, a standard mammalian tongue rests flat in the long oral cavity, and cannot create vowels such as the /i/ in 'beet' or the /u:/ in 'boot'. Such vowels are highly distinctive, and have an important role in allowing rapid, efficient speech communication to take place". (Fitch 2000, p 260-261).

Thus it can be easily inferred that the decent of the larynx is a key preadaptation in the evolution of speech.

After establishing the importance of a permanently descended larynx it is only pertinent to link it to articulate vocalization. Speech is a complex phenomenon involving articulate vocalization. It is the universal mode of linguistic communication in human communities barring some exceptional situations where articulate vocalization is not possible. Sign languages are examples of such a situation. Written language being only a derivation of the spoken form may not represent multi-modality of language very convincingly. Thus articulate vocalization or speech being a primary player in linguistic communication becomes a good candidate for study when investigating the beginning of language. Fitch (2000) elucidates the necessity by enumerating the following aspects of speech:

a. Having relied heavily on speech modality the language faculty must have been influenced and to a great extent shaped by speech.

b. The elaborately evolved speech perception and production ability in humans is an important "missing ingredient" not available to other species to enablethem to evolve a language.

c. Speech is apparently the best bet for finding fossil evidence while researching language evolution. The evidence can be based on anatomical reconstructions of vocal tract as attempted by (Donald, 1991).

3. Ardipithecus Ramidus

The discovery of 3.2 million year old fossil "Lucy" in 1974 was reckoned as the find of the century by most paleoanthropologists. It revealed the fact that human ancestors walked upright instead of walking on their knuckles like the modern day chimpanzees before they evolved large brains. The discovery supported the 'out of Africa' or savannah hypothesis of language origin but leaves room for doubt for the anti-evolutionist school of thought who find the evolutionary time available for the requisite preconditions for evolution of language too cramped as per the evolutionary timescale. Furthermore, Lucy failed to take the spot of an intermediary Homonin form between the Homo and the later Australopithecines. A 'find' was needed where the human ancestor should be a dual citizen of the jungle world of trees along with the chimpanzees and the savannahs of wide and open grasslands as these evolved as a result of the great African divide caused by

the tectonic forces raising the mountains between east and west Africa to create a rain shadow in the east (Potts, 1998; Cane & Molnar, 2001). This anthropological miracle happened in 1994, twenty years after the discovery of Lucy, when a team of paleoanthropologists led by Tim D. White, Human Evolution Research Center and Department of Integrative Biology, University of California at Berkeley, discovered 4.4 million years old partial skeleton of Ardipithecus Ramidus at Aramis, in the Afar Rift region of northeastern Ethiopia. The find needed careful excavation and reconstruction before it could be documented and published which was finally possible in October 2009. Ardipithecus Ramidus was a female that stood 120 cms tall. A detailed analysis of the bone structure reveals that Ardipithecus Ramidus was a facultative biped which spent part of its time among the branches carefully treading on all fours using its opposable toe for grasping and part of its time on ground walking upright. Its foot was indeed primitive when compared to Lucy who was an adept biped. Ardipithecus Ramidus had a forefoot with a stiff design suitable to be used as a lever when walking. The upper pelvic bones were short and broad designed to lower the centre of gravity to augment balance in the upright posture. It also had a curved spine unlike the apes and chimpanzees which facilitated bipedality. Its hands were flexible unlike the stiff jointed forelimbs used for knuckle walking by the modern day chimpanzees. The cranial capacity was similar to that of contemporary primates which is slightly less than what Lucy had 2.2 million years later (Gibbons 2009).

Ardipithecus Ramidus appears to have little resemblance with the modern day primates such as the chimpanzees and gorillas, which clearly derails the efforts of guessing the evolutionary development of linguistic attributes based on experiments and observations in the context of such primates. Though Ardipithecus Ramidus seems to be a contemporary of the early hominins it bears few resemblances with the African apes and can easily be ruled out as a transitional stage between the two as suggested by Tim White who remarks, “We have seen the ancestor, and it is not a chimpanzee” (Gibbons 2009, p. 37). Ardipithecus Ramidus connects more with Lucy who was from genus Australopithecus. The female skeleton suggests that it had the physical stature of a chimpanzee with a matching cranial capacity but unlike the chimpanzees and some of the other primates it did not knuckle-walk and was not very prone to brachiation. Study of its foot anatomy reveals four toes to the front based firmly at an angle that would provide a supporting lever for walking along with an apelike opposable toe instead of the front big toe. The forward pointing toes seem to be rigid and lacking hand-like flexibility (Lovejoy, Latimer, Suwa, Asfaw, White 2009). Such a foot structure suggests that Ardipithecus Ramidus was bipedal, mostly walking upright, but owing to its opposable big toe it could conveniently negotiate trees and walk on all fours among the top branches as is suggested by the diet of nuts and ripe fruits. Palmigrady is further reinforced by the fact that Ardipithecus Ramidus had four bones in its wrist which made it

quite flexible as compared to the rigid wrists of apes used for knuckle walking and hanging from the trees (Lovejoy, Simpson, White, Asfaw, Suwa 2009). In short the facultative bipedality achieved by Ardipithecus Ramidus is the reason for Lucy and Australopithecus Afarensis to have near perfect bipedality (Neimark 2011, p. 48).

The early homonins in their revolutionary journey had changed but slightly from their cousin, Propliopithecus. The changes included increased dependence on upright walking or bipedal locomotion. Resultantly their foramen magnum, the gap at the base of the skull that accommodates the spinal column, shifted a little forward to assist the maintenance of balance. Similarly the pelvis underwent changes like shortening and broadening to facilitate bipedalism. The transformation was naturally accompanied by changes in muscle groups of the gluteal and hamstring regions. Other changes included an increase in the length of the legs specially femur in the genus homo. The feet also underwent transformation to enhance weight bearing capacity (Poirer & Mckee, 1999).

White, Asfaw, Beyene, Haile-Selassie, Lovejoy, Suwa & Woldegabriel (2009) see prospects in Ardipithecus Ramidus for being the root specie for Hominidae. It is neither a chimpanzee nor human. It did have a protruding lower face but neither to the extent as is the case with chimpanzees nor to the opposite extent as is the case with humans. It bears another significant trait regarding the placement of the spine beneath the cranium. The base is centrally supported for the purpose of balance as should be the case with upright walkers and not at the rear end as is the case with most quadruped primates. The dentures also bear striking differences as Ardipithecus Ramidus is missing the sharp piercing upper canines as possessed by chimpanzees. The overall anatomy of Ardipithecus Ramidus resembles the skull of Sahelanthropus tchadensis discovered in Chad by Brunet (White et al 2009) and believed to have been living between 6 and 7 million years ago. In conclusion Ardipithecus Ramidus is a member of a root homonin species of Australopithecus and might as well have branched off into two lines one leading to present day humans and the other to the Chimpanzees. Unlike the living apes, Ardipithecus Ramidus had lost its opposing toe by the time it evolved into Lucy's species, Australopithecus Afarensis, and had become an expert biped. The brain size had increased only marginally but had the ability to migrate into much diverse environments including savannas (Kimbel 2009). The 3.6 million years old footprints at Laetoli, Tanzania, validate the idea of homonins commitment to bipedalism (Tuttle 1991).

The discovery of Ardipithecus Ramidus also annuls the hypothesis that bipedalism emerged in the open grasslands and savannahs. Other fossils collected from the Afar Rift region indicate coexistence of monkeys, kudu antelopes, peafowls, parrots and doves among figs, hackberries and palms in the close proximity. All these plants and animals are not likely to be found in open grasslands but in woodlands.

Evolutionary Precursors of Language in the Physiology of Ardipithecus Ramidus

Biological Precursors for language readiness met by Ardipithecus Ramidus seem very relevant considering the evolutionary time available for the later homonins to further evolve them. The significant aspects may be:

- Lowered larynx.
- Disappearance of canines triggering the need for alternate means of sexual display.
- Broader molars suggesting change in dietary habits
- Arboreal existence gradually giving way to bipedalism and greater versatility on ground leading to greater need for group activity like hunting in savannahs.
- Readjustment of spine facilitating upright walking.
- Restructuring of pelvic bones to facilitate brisk walking and maintenance of balance.

Larynx, being composed of soft tissue that does not fossilize, in itself cannot be positively identified in Ardipithecus Ramidus. However, the likely causes of lowering of larynx can be investigated. Ardipithecus Ramidus seems to be a fit case in this regard as most of the hypotheses that seek to discover the causes of lowering of larynx can be applied on Ardipithecus Ramidus with the exception of one concerning the pre-existence of articulate speech. Pre-existence of speech 4.4 million years ago is easily ruled out due to anthropological reasons. Hence one may assume precedence of lowered larynx over articulate speech or language ability.

Going by the Darwinian principles a lowered larynx should be the result of a random mutation which would later be 'selected' because of the 'selective advantage' it gave to the particular species. This condition is not met by Ardipithecus Ramidus as the most obvious advantage of a lowered larynx is improved speech ability which is highly improbable without an habitual and frequent use of articulated speech. Furthermore, lowered larynx carries many potentially fatal disadvantages which would work against its 'selection'. Despite this obvious improbability, the case for Ardipithecus Ramidus can be developed on the basis that lowered larynx is not an 'adaptation' as per Darwinian definition but only an 'exaptation'. This implies that the lowering of larynx was a by-product of certain other adaptations selected for certain other selective advantages. This by-product later became an exaptation in the sense that it was employed to enhance and multiply the articulate speech ability which came into existence much later in the evolutionary process of the homonins.

The reasons for the lowered larynx can be many but following are a few significant hypotheses.

a. Resort to Bipedalism
b. Size exaggeration hypothesis
c. Increase in the length of the neck
d. Facial shortening
e. Disappearance of pronounced canines.

The significance and relevance of these hypotheses will be clear as other biological precursors for language readiness in Ardipithecus Ramidus' case are considered.

Bipedalism in humans is a unique attribute in the mammalian world. It has not been possible to give a single evolutionary explanation for its adoption as it tends to violate the basic principles for natural selection. Bipedalism compromises balance, rendering the bipeds prone to crashing to the ground and injuring themselves. It also forsakes speed and agility leaving the bipeds slow and clumsy when trying to evade predators (Johanson, 2006). On the contrary bipedalism embodies some advantages as well, which include enhanced manual dexterity by freeing the hands, better thermoregulation by reducing the surface area of the body exposed to the sun and better range of vision in savannahs. An important consequence of the resort to bipedalism was the reconfiguration of the physical structure which might have triggered the lowering of the larynx. The hypothesis is of primary interest to the linguist seeking the beginning of oral language. As per Johanson (2006), Martin (1994) and Spoor, Wood & Zonneveld (1994) the anatomical reconfiguration mainly involved:

a. Relocation of foramen magnum (spinal cord opening in the basicranium) towards the center
b. Restructuring of the jaw bones
c. Creation of the spinal curvature
d. Restructuring of the ribcage
e. Shortening and broadening of pelvis
f. Alteration of the lower limbs by angling the femur
g. Enlarged joint surfaces
h. Restructured foot
i. Restructured body musculature

In addition to the above yet another anatomical adaptation is an extensible knee joint unlike other primates that cannot fully stretch and straighten the leg while striding (Lewin 2005). These are numerous and highly significant physiological changes which are bound to have a revolutionary effect on the species' behavioral pattern. Whether the changes in behavioral pattern were the reason or the result of the significant anatomical transformation is debatable, but the point that language readiness was a likely byproduct waiting to be employed by Ardipithecus Ramidus' successors at some later stage as a grand exaptation is plausible enough.

Body size in the wild is an important consideration for survival, be it a defence against predators, a case of territorial dominance or sexual display. A descended larynx provides for a longer vocal tract enabling better sound manipulation as compared to the same sized species without the descended larynx. Furthermore, formant range and frequency varies with body size (Fitch 1997, Fitch & Giedd 1999, Riede & Fitch 1999) thus in case of a lowered larynx the increased vocal tract length enables the beholder to give a taller than himself impression. In short, a lowered larynx gives the adoptive advantage of exaggerated size impression through vocalization. The scenario is often referred to as the size exaggeration hypothesis for descent of larynx. The idea clearly includes laryngeal descent as a consequence of a need to produce sounds giving exaggerated size impressions and includes other species with permanently or temporarily lowered larynx, such as deer, and lions in the logic. Therefore, in the pretext of language ability a lowered larynx is an adaptation for the purpose of size exaggeration which may be further exapted for speech purposes. Thus, in other words, the descent of larynx though not triggered 'for' or 'by' speech is definitely a pre-condition met for speech. Similar logic may be employed in case of Ardipithecus Ramidus and assumed that it either had a lowered larynx or was due to get one soon thus meeting a vital pre-condition for language origin.

Shortening of the snout is also taken as a probable reason for lowering of the larynx. This process was first described by Victor Negus (1949):

> "… recession of the jaws; there is no prognathous snout…The [human] tongue however retains the size it had in Apes and more primitive types of Man, and in consequence it is curved, occupying a position partly in the mouth and partly in the pharynx. As the larynx is closely approximated to its hinder end, there is of necessity descent in the neck; briefly stated the tongue has pushed the larynx to a low position, opposite the fourth, fifth and sixth cervical vertebrae."

The idea is also propounded by Philip Lieberman who believed the tongue eased into the pharynx reshaping itself in the process from a totally flat existence in the mouth to a rounded posterior resting in the pharynx and the frontal part remaining in the limited space that remained in the mouth. The hypothesis gains further strength by the fact that the neck also gained an elongation (Mahajan & Bharucha, 1994) to accommodate the lowered larynx as larynx placed at or below the sternum or collarbone would fatally compromise swallowing of food (Lieberman et al., 2001).

Jaws and teeth are the most tough and enduring components of the skeleton, therefore, they have the best chances to fossilize. Furthermore, jaws and teeth, being the principal food processors for the possessor, yield useful information regarding its foraging habits. Human denture, for instance, when compared to that of chimpanzees has following peculiarities.

a. Shortening of the snout and flattening of the face resulted in tucking of the jaws under the basicranium which reduced the angle of the mandible (Lower jaw bone) to almost a right angle giving it an 'L' shape. This reconfiguration turned the mandible into a formidable grinding machine which might as well be a consequence of a dietary shift to a more vegetarian diet including nuts and seeds.

b. Pronounced canines especially in male chimpanzees is an example of sexual dimorphism and a source of sexual display. A reduction in size may result or be a consequence of the following:

   i. A need for alternate means of sexual display for which language could be an option

   ii. The pronounced incisors need diastemas in opposing jaws to be accommodated and bring the jaws to a locked position when shut prohibiting and sideways movement whereas reduced canines do not require any diastemas allowing sideways movements to the lower jaw even when shut thus assisting grinding of food. (Lewin 2005, p 116- 117)

Thus as a consequence of dental reconfiguration Ardipithecus Ramidus would need to bring some behavioral changes. Some obvious examples could be:

a. Reduced size of canines robbed Ardipithecus Ramidus of a major source of sexual display necessitating alternate means to attract females and ward off other suitors. One of these as already discussed could be the lowered larynx bringing into play the size exaggeration theory.

b. Pronounced canines made Ardipithecus Ramidus males territorial, jealously guarding their domain and keeping other males at bay. Disappearance of pronounced canines led to the elimination of the 'alpha male' resulting in more of a monogamous group structure where the male assisted in rearing of the young ones. (Suwa et al 2009)

c. Reduced canines and broadened molars also suggest a switch towards a more vegetarian diet including seeds and nuts which required cracking open and chewing.

d. Loss of a lethal weapon in the form of canine reduction would enhance group dependence for self defence and foraging.

All the above mentioned resultant changes are bound to encourage social bonding which would employ various forms of communication among the members creating a need for a language like system to evolve.

Having considered all the above probabilities regarding the lowered larynx no single hypothesis appears to justify the lowered larynx in totality, but the

combination of all possibilities in one species, Ardipithecus Ramidus, simultaneously leads to the obvious conclusion that Ardipithecus Ramidus already had a lowered larynx or was due to get one very soon. Consequent to a lowered larynx and bipedality Ardipithecus Ramidus direly needed to realign many attributes lost in the evolutionary process. Among the lost attributes reconfigured denture with reduced canines was very significant. Continuation of the species being the primary objective of nature Ardipithecus Ramidus had to substitute its sexual display methods for attracting females. Given the lowered or lowering larynx it had the obvious option of vocalizations and resort to monogamy as it no longer possessed the weapons to dispel other males and be the alpha male. In addition bipedality induced complications in childbirth and prolonged infant dependence further necessitated monogamy and better communication to cater for joint rearing of the offspring. Furthermore, the changed habitat from solely arboreal to largely terrestrial in open savannahs necessitated grouping for protection against predators and foraging. Thus, in short all compulsions started pointing towards the evolution of a good communication and reference system, which ultimately led to a defining moment in human evolutionary history where the stage was set for basic proto-language to appear. The neural preconditions must have gradually appeared alongside the physiological and social transformations, forced by various selective pressures according to Darwinian principles. Once the protolanguage was in place there was nothing to stop its further refinement owing to its unprecedented selective advantages.

3. Conclusion

Ardipithecus Ramidus preceded Lucy (Australopithecus Afarensis) by 2.2 million years providing additional evolutionary time to put the bio-acoustic apparatus in place to achieve language readiness before the neural and cognitive phenomenon could take over progress toward evolving a language like communication and referential system. The rudimentary exaptations leading to a permanently descended larynx, reconfigured dentition, switch from arboreal to more terrestrial existence, group foraging, monogamy and increased dependence on vegetarian diet seem very likely reasons for language to be born more than four million years later. Thus, Ardipithecus Ramidus replaces the find of the century, Lucy, due to the interest it generates in the paleoanthropologists and linguists alike; one searching the grand human ancestor and the other seeking a reasonable evolutionary time frame to allow language to originate.

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