

Residuals of Intelligent Design in Contemporary Theories about Language Nature and Origins

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ABSTRACT

Some contemporary theories about the origin and the nature of language resort to concepts with no bearing on Darwinian evolutionary hypothesis or evo-devo perspective which are both based on the reconstruction of species morphological structure transformation. These theories, which evoke qualitative leap, cultural evolution, structure/function coevolution as explicative principles for human evolution, in our opinion, result compatible in some points with the most recent Intelligent Design (ID) accounts. Attempting to substantiate itself as a scientific theory, the contemporary ID is ready to give up (or suspend) creationist explanation just to impeding Darwin's fundamental idea according to which it's possible to explain evolution only through a gradual material modification of structures. For comprehending a complex phenomenon as human language – according to ID – it's necessary appealing to a second substance, whatever it is. This idea seems to be at the bottom of all those theories which have rejected monistic structural explanation (modification of physiological structures) for embracing functional, psychological or cultural accounts. We consider these kinds of explanation real unresolved residuals of ID, residuals nested in the heart of the most accredited scientific theories.

Keywords: co-evolution, cultural evolution, dualism, intelligent design, language origins, language nature.

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1. The dangers of Intelligent Design 2.0¹

In a useful book edited a few years ago, Barbara Forrest and Paul Gross (2004) introduced in the cultural debate the idea that not only the public education but also the scientific research could be unconsciously infected by real *Trojan Horses* of creationism. The *wedge of Intelligent Design* introduces a narrow but gradual division between the unrefined biblical-theological tradition and the more sophisticated and dangerous “theistic science” tradition. The research of a scientific acceptance – never obtained yet – has indeed induced the ID supporters to spread a vehicle of philosophical infection, an insidious vehicle because it seems reasonable and moderate: the idea that it is not obligatory to suppose a creator agent in order to state the intrinsic rationality of a biological project, but it is just enough to exclude the possibility that the latter can be only explained through resorting to complete transformations of the matter.

The ID’s current and general criticism – not only to evolutionism but also to biological science – is not that complex phenomena can’t be explained without the participation of a creator God, but rather that they can’t be entirely solved inside a radically monistic theory. In other words, they can’t be exposed to a naturalistic reduction, for example conceiving that «mental functions are by-products of physical activity in the brain, and as such are rigidly predetermined by natural law» (Bowler, 2007, p. 123). Phenomena could be also explained without the clear participation of a designer, but they can never be reduced only to structures’ transformations. To explain any (complex) phenomenon it is necessary to resort to an external substance, to the action of a *second substance*, whatever it is.

Natural selection is the actual target of this second generation creationism. That is «the interplay of undirected natural forces» (Menuge, 2007, p. 32), «a chain of black boxes; as one is opened, another is revealed» (Behe, 1996, p. 6), a theory of naturalistic evolution, which means that it absolutely rules out any miraculous or supernatural intervention at any point. Everything is conclusively presumed to have happened through purely material mechanisms that are in principle accessible to scientific investigation, whether they have yet been discovered or not (Johnson, 2001 p. 61; see Craig-Moreland, 2000). To pursue this polemic aim the new residual creationism would be also inclined to

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pay a heavy price: admitting, for example, that the evolution can reveal itself as a sequence of related species, but never as a casual variation of structures that come in succession across a selective ecological modelling.

But what explanation can a creationistic paradigm without God (“the first thing that has to be done is to get the Bible out of the discussion” – as the vigorous Philip Johnson exhorts in an editorial on a catholic ultra conservative paper i.e. “Touchstone: A Journal of Mere Christianity” August 1999) imagine or admit? If nothing is ascribable to structural transformations generated by natural selection, but neither comes out already equipped by a demiurge’s mind, how the hell we can explain the ID foundational phenomena, or the irreducible and specific complexity in range of a carefully regulated universe? (Behe, 1996; Dembski, 2004; Dembski & Well, 2008; Poole, 2012).

No one of these new gladiators – today almost all are grouped around the *Discovery Institute’s Center for the Renewal of Science and Culture* in Seattle – has got clear ideas about this point. It prevails the currently deconstructive approach of Darwinism, more than the attempt of affirming a new universal vitalism (that could include, if necessary, also the Christian God but, to avoid a prior exclusion from scientific parameters, admits every entity that is different from the structures that it has to explain). From this unexpected pseudo-laic tension, however, it has arisen a debate about all the weak points of the new evolutionistic synthesis that can be considered an alarming attack less against the political-cultural dimension and more against the scientific one, attack that many observers have noticed (Forrest-Gross, 2004; Foster et al., 2008; Pennock, 2001; Shanks, 2004; Young-Edis, 2004; Pievani, 2006).

This attack is particularly insidious especially to some area of the actual evolutionary research since it welds to the difficult suture between social-humanistic culture and the scientific one in the field of privileged contrast of ID theorists: the complexity of human phenomena. Here some positions are arising, configuring themselves as real ID residuals in the inner of the scientific-philosophical community, even in a more advanced naturalism like that of cognitive science.

We will return in detail on these cases in the second part of the paper. At the moment it is interesting to notice how the person who can be probably considered the most qualified among the new ID exponents – the philosopher William Dembski – has taken advantage of difficulties of some areas of the new evolutionistic synthesis in giving completely naturalistic explanations, exactly

in order to hit the theories about language and human intellect that represent the weakest link in Darwinian tradition. His argument comes from the fact that, in this field, the evolutionists look at fossil evidences, at genetic proximities, at the dimension of the brain to substantiate the animal evolution not only of similar physical structures (bones, cranial capacities, DNA sequences, etc.) but also of similar cognitive-behavioural functions (Dembski & Well, 2008). Following synchronization between structures and functions it rests soon, however, the possibility to maintain untouched a strictly naturalistic methodology. Crucial points, in Dembski's opinion, seem to be two, that we can call: 1) the question of the language adaptiveness; 2) the question of the evolutionary pathways mismatch that brings to language.

The first question, well known but sometimes unexplainably refused by philosophers, linguists and biologists that deal with language origins, is that it exists an irreparable friction between the earlier state of the function taken by peripheral and central structures of language, and the ones derived by social-cultural diachronically gradual behaviours, that are inserted in the same structures. It seems that Dembski wants to keep stuck evolutionism in the Darwin's founding idea, still inalienable for biology, according to which all the intelligent processes are oriented to survival and reproduction, when considered as a product of natural selection. The secondary representational function of language, on the contrary, can't be considered an immediate advantage for survival and reproduction:

The evolutionary process, as Darwin conceived it, places no premium on accurately representing reality. The process by which our minds evolved, according to Darwin, places a premium solely on survival and reproduction. Since misrepresentations of reality could facilitate survival and reproduction better than accurate representations, there is no reason to think that our minds are adapted to know the actual state of the world. Indeed, our minds are, on standard evolutionary principles, more likely to operate at the expense of truth, preferring expedience and gratification (Dembski & Well, 2008, p. 16).

From this point of view two decisive points of evolutionary analysis are brought into question: the first one is that the origin of language has to be obligatorily connected to functions directly linked to reproductive advantage; the second one is that, from the point of view of adaptive selection, the functional components acquired with language development might not be

considered, or revealed, as an evolutionary advantage (on the contrary, they even could show themselves as counter-evolutionary features).

This second point raised up by Dembski seems to challenge the central mechanism of evolutionary reconstructions. According to Darwinian dictate, indeed, also the most complex organism derives from “numerous, successive, and slight mutations” of their own morphologic structures. The pure reconstruction of these transformations and the internal laws that rule them, is called by ID supporters a «direct Darwinian pathway» (Dembski & Well, 2008, p. 151).

This is a pathway that, for example, inspires the evo-devo, a contemporary version of evolutionary biology that adds to natural selection one factor: the limited variation possibilities of structures in relation to their own genetic restrictions (onto-genetics and phylo-genetics) and to the regulation of their expression. In evo-devo, however, the place for functions’ autonomy is minimised. The evo-devo motto might be: “tell me how structures change and I’ll tell you why the development of some functions will be impossible”. Analogously a rigorous application of natural selection’s principles doesn’t determine the functional issue of structural transformations before these are completed. We can recall a story, even intense and complicated, of morphologic changes without seeing any new function. Even though there are some hypotheses – we will talk about them soon – today we aren’t able to formulate a universal law that explains when a structural transformation (or even a series of very complex structural transformations) may cause a functional change: furthermore it is possible that we won’t ever know *ante quem*. The lack of a predictive value doesn’t prevent us from formulating advanced *post-hoc* hypothesis on complex specific phenomena. In human language, for example, a “direct Darwinian pathway” can be rebuilt taking into account the original structural constraint story (peripheral and central structures of hearing-vocal system) and the interaction between ecologic and environmental constraint (bio-geographic, for example) and social structure constraints, produced in turn by morphogenetic and cognitive constraints (from human female’s hidden ovulation, to the “sentence” of semantic and syntactic categorization caused by vocal articulation). In short an intersection between different restrictions, but all “inside” a natural perspective.

There is another practicable pathway, though, faster but, precisely, fraught with traps, shortcuts and “trojan horses” of possible intelligent designs not perceptible at first glance. In fact, one of the Dembski’s satisfaction motifs is

the lack of naturalistic patience in which a piece of contemporary evolutionism would fall down. It is obvious, for example, that «to explain irreducible complexity, Darwinists in the end always fall back on indirect Darwinian pathways» (Dembski & Well, 2008, p. 151), or reconstructions in which “not only does a structure evolve but so does its associated function”. In language theories, many examples of this kind exist: new-chomskian discontinuist hypothesis (Fitch, 2010), neo-culturalist (Tomasello, 2014), cognitive ethology (Hauser et al., 2014) or evolutionary psychology hypotheses and, especially, the infinite shapes of co-evolutionary hypothesis: «the only way for Darwinism to explain irreducible complexity – concludes Dembski – is by means of an indirect Darwinian pathway in which structures and functions co-evolve» (Dembski & Well, 2008, p. 151).

“Co-evolution” has a primary meaning – derived by classical paradigm – that shows a parallel evolutionary process of different species in a same territory that interact to each other to a point that makes a selective advantage so important as to finish with influencing one another. The generalisation of this meaning, however, has brought to the meaning given by Dembski: «a form of evolution in which biological structures and functions both change so that as structures evolve they acquire new functions» (Dembski & Well, 2008, p. 310). This is exactly the meaning of many hypotheses that would be scientific on language origin and operation, and that gave up the artful separation between natural evolution and cultural evolution in order to explain appearing mismatches between the slow going forward of the structural changing and the dramatically fast appearance of ideas and language usage.

Back to Lamarck? A compromise between human-social sciences and life one? We don't think so. We quite think that these hypotheses drag themselves on unconscious residual of dualistic hypothesis compatible with *Intelligent Design*. On the other hand all the candidate hypotheses linked to the “right way” of the direct Darwinian pathway are just considered aberrant to ID that hasn't the problem of evolutionary biology to respect a totally naturalistic epistemology. The language already arises as a programmed accessory, for ID supporters, of human supremacy upon the rest of the universe and, consequently, it doesn't endeavour to understand how times and kind of action of both structures and functions are synchronized, the value has to be attributed both to a creator God and a ordering function of technologic evolution and/or cultural life. On the contrary, who wants to remain in the naturalistic field never resort to any of these pseudo-creationistic shortcuts.

For example, it always has to account for a reconstruction of the way in which morphologic changes resolve themselves in a function originally linked to primary movements of natural selection; it should avoid to assign explanatory values to so-called “cultural evolution”; it should exclude the recourse to ambiguous hypothesis as discontinuity, “co-evolution”, etc, penalty the encapsulation of ID unsolved residuals inside theories that want to call themselves scientific. In general, who wants to avoid this risk must be disposed to accept what ID stigmatizes as a “*downgrade*” of language and human intelligence (Dembski & Well, 2008, p. 15) but which should be more correctly to define as the ultimate abandonment of any anthropocentric perspective, in terms of a new naturalistic ethics of scientific research.

2. Hidden residuals in linguistic theories

It is undeniable the fact that until recently many explicative models, born in the field of cognitive sciences, have unconsciously adopted this dangerous dualism surreptitiously brought by ID in their attempt to explain complexity in human language without using the “right way”: an evolutionary explanation linked only to the progressive variation of morphologic structures. The first and clamorous case is Chomsky’s case in which he suddenly got rid of the question deleting all at once both the evolutionary hypothesis and the theme of morphologic correlates of language, claiming that the species-specificity of these last ones consists in an unusual, *sui generis* cognitive form: «a unique type of intellectual organization that cannot be attributed to peripheral organs or related to general intelligence» (Chomsky, 1966, pp. 4-5).

Chomskyan position, essentially unchanged for the last 50 years and confirmed in his last contribution with a meaningful title, *The mystery of language evolution* (Hauser et al., 2014), seems to be engulfed by tons of criticisms deriving from linguistics, philosophers, psychologists and biologists. However, his thesis seems to have actually success also among his own judges, under the side of language disembodiment – essential to Darwinism. Giving up to the challenge that the complexity can be explained through structural transformations alone, for example, the idea of “double evolution” (the biological and the cultural one) has spread.

Michael Tomasello, who declared to be obsessed for some time by this «ongoing dialectic between evolutionary and cultural-historical processes»

(Tomasello, 2008, p. 10) has been obliged on several occasions to change the “second substance” that could explain language complexity and human primate specificity: shared social learning, capacity of reading other’s intentionality, social cooperation (Tomasello, 1999, 2014). Because he is a compared experimental psychologist his exceptional works have demonstrated, in a Darwinian way, how difficult is not to accept the continuity between human primates and non-human primates: a good example, in this regard, his last book, in which, with a huge intellectual honesty, he admits that, over his previous works, last experiments don’t support anymore that non-human primates don’t perceive the others as intentional agents like themselves. However, moving on philosophical positions, Tomasello ends up with sacrificing Chomsky on the altar of symbolic and social faculty, the abandonment of what should be the principal aim of evolutionary “right way”: explaining the gradual transformation of acoustic-vocal and cerebral structures, and arriving to the thesis of signal-manual origin of language, already supported by other scientists (Paget, 1930; Hewes, 1973; Corballis, 2002).

Essentially, just so as not to pursue the “direct Darwinian pathway”, that should only observe and describe how sapiens talk trying to understand how auditory-vocal structures and cerebral circuits that control their articulations developed, they arrive to imagine approximately hypothetic derivation of vocal signs from manual ones. However, it must be observed that the hypotheses, even if they were true, wouldn’t solve the question given by the constitutive vocalization of actual human language. It should have been also a moment during the hominid evolutionary chain in which gestures become articulated phonic production: in that moment vocal structure of language had also to shift this passage. Then, it had to be ready to use. Here we are at the starting point. Manual gesture, or any other corporeal practice suitable to an information exchange, could be certainly used to strengthen the social cooperation (with many other natural factors), however the specific form of a body technology of language, that is today the relationship between auditory-vocal system and cerebral mapping of its usage, must record a start date, whatever it is. Unless it disclaims that actual humans talk through a developed auditory-vocal canal that is precisely and finely controlled by neuro-cerebral system and that, through this species-specific canal, they develop a cognitive form well defined. That is accepting, with Cartesian Chomsky, that human cognition is a “second substance” independent from the physiologic structure that produces it, or as

an horrified ID representative said, that «mental functions are by-products of physical activity in the brain, and as such are rigidly predetermined by natural law» (Bowler, 2007, p. 123).

The Trojan horse that allows the surreptitious spreading of the dualistic prospective – paradoxical according to whoever pursues naturalistic perspectives – is the substitution of the evolutionary reconstruction of structures with the functions, substitution that, significantly, goes collateral to dualism between natural evolution and cultural evolution. It's not by chance that these positions are especially expressed in evolutionary and compared psychology and in philosophy of mind. It is indicative the case of the thesis about co-evolution – a general trend until few years ago (see Sperber & Wilson, 1986; Origgi & Sperber, 2000). In almost all these theses talking about co-evolution between brain and language always this means co-evolution of cerebral function and language function, no one of these has anything to share with the only real object of naturalistic Darwinian perspective: the evolution of structures. Here two naturalistically insurmountable obstacles arise. The first one is that functions' evolution can become object of biological studies only when structures' transformation has passed through a whole speciation cycle. Otherwise, it's just an alteration of environmental or cultural variations certainly pertinent to sociology, cultural anthropology or any other culturalist subject, but not to natural science. The second one is that the feedback of functions on structures, a merely Lamarckian residual, becomes incompatible with phylogenesis times. There is no feedback effect of language on human brain that is, to date, structurally similar to the first *sapiens'* brain. In the infinite and continuously mutable possibilities of usage of mental processes that the story of social mutations shows us, they eventually change psychological phenomena linked to categorization, to perceptive-inferential processes, to reasoning logics, etc. Of course, as famous sociologists and mediologists claim, the use of Internet or new medial devices will change our “way of thinking”, as writing, printing and any other human cultural activity has done at the breathtaking rhythm of one every hundred years or less, but this never produce any new speciation.

3. From the evolution of linguistic function to the evolution of body technology of language

The temptation to adopt a dualistic perspective to understand the language development is much present not only among philosophers and psychologists but also between people who make the natural observation their own job. Language, indeed, has always been a “burden” that many scientists, also some cognitive ones, have tried to sacrifice (see the question of “linguistic negationism” in Pennisi & Falzone, 2010). However, this position has often driven to a deceitful dualism between functional and structural aspects of language.

If we analyze most of the theoretical hypotheses on language origin, indeed, the first starting point seems to be the defence of linguistic function adaptivity: scholars committed to do this job try to fight against one of the harder positions in this field (Chomskyan discontinuity) showing that language functions (or better the functions of each language component, from grammar to pragmatics) have a clear adaptive value (i.e. they are used to improve communicative aspects for *sapiens*) and therefore they have been selected by natural selection. This debate is very vigorous and calls into question compared psychologists and cognitive ethologists as well as illustrious linguists and famous philosophers infected by irresistible temptation of abolishing every kind of “speciality” from linguistic function.

To obtain this aim, however, they paradoxically don't search for the evolutionary structural antecedents of language, but for its functional precursors: they essentially try to behold what kind of core knowledge is collocated at the basis of cognition in general and language in particular, by tracing the presence in species phylogenetically close to *sapiens*.

In this way, they are missing two central aspects of “direct Darwinian pathway”: on one hand they don't consider how linguistic function is realized today (i.e. the use and the function of the sum of central and peripheral vocal structures that allow to produce speech); on the other hand it is not valued the effective usage of the function in natural and species-specific contests. Essentially most of the scholars who study evolution of language don't ask themselves “how speech has evolved” (or better “how vocal articulatory propriety has evolved”), but “is language an adaptation?” (or better “of what use is language?”).

Answering to the latter question allows on one hand to bypass morphological and ecological (usage in natural context of a certain capacity) differences present among different animal species and on the other hand to reduce language to a simple instrument of communication between members of the same group. Answering to the former question implies, indeed, to underline all the changes that have allowed the continuous production of articulated voice (ability found in *sapiens* only) under a morphological point of view and to consider language as a complex function in which a “set” of anatomical changes allows the rooting of functional “innovations” that differentiate us from non-human primates.

It is maybe the fear of falling into supposed anthropocentric traps that drives theorists of language evolution to a functional analysis of evolution that loses sight of the only evolutionarily valuable aspect: forms’ evolution and functional possibilities that these forms admit. However, it remains an irreducible data, accepted by all the scientists of language evolution, to take into account: if *sapiens* hadn’t had an articulatory morphology and a neuro-cerebral system to finely control it, it wouldn’t have been possible for him to produce articulated speech. Human language is constrained by a highly specialized body structure without which it wouldn’t be practicable.

Now, we start from this assumption, in our opinion the only one that is not getting involved in the quarrel between who thinks that language is a trivial by-product of structure and who believes that it is the result of a “more complex” readjustment of a series of basilar cognitive capacities: *language is a body technology, as a coordinate collection of morphological constraints that allow to learn, produce and understand speech* (Pennisi, 2013).

The concept of morphological constraint, adopted from evo-devo perspective, assumes a decisive role for language evolutionary hypothesis: indeed, in evo-devo perspective the connection between structure and function is not problematic. Morphology, also the complex one, is driven by inner expression laws and mutual influence of genes (Breuker et al., 2006; Klingenberg, 2010; Albertson et al., 2005). Several studies have explored how genetic bases of different morphological traits, that often join the *Bauplan* development of different species, influence the functional meaning of these structures in a decisive way (Dalziel et al., 2009; Barrett & Hoekstra, 2011). Evo-Devo approach tries not to complicate the relationship between morphology and function: there is more interest to understand how a structure has evolved rather than to explain how it is possible that a function is adaptive.

Functions show themselves because they are essentially constrained by the possibilities offered by structures (Irschick et al., in press).

From this assumption, we support here the idea that, at least for language evolution, to explain the merely transformation of functional aspects not only doesn't describe the real nature of language but can even result epistemologically misleading (it means that it can give residual dualistic explanations and not a naturalistic ones). This is the reason why we propose a theory of language evolution that aims to explain not what language has allowed us to do, but how structures that permit language have evolved.

4. A denied natural history: the evolution of voice's forms

One of the risk that occurs when one tries to value adaptivity of the single components of a cognitive function is to offer adaptationist explanations: evolutionary psychology has often been accused of adaptationism, that is the tendency to consider every single aspect of a specific behaviour or a certain cognitive capacity as adapt to survival (see Cosmides & Tooby, 2013). From this point of view, the whole human cognition is constituted by a series of functional adaptation stretched to obtain more reproductive success. Then every actual cognitive capacity should be the result of selection – happened in an “ancestral environment” during Pleistocene – of more advantageous behaviours, as if natural selection worked to optimize our cognition. The paradox to which adaptationism leads is to explain, under the evolution lens, those behaviours that are counter-adaptive and that are realized by *sapiens* (for example the choice of not having children or the homosexual marriages, see Boyd & Richerson, 2004; Pennisi, 2014) or to use “embarrassing evolutionary explanation” (Pievani, 2014) to account for those behaviours that are not directed by natural selection certainly, as the mainly masculine inclination to political activities or the feminine one to establish sentimental relationship.

On the other hand, it's just the exaggerate use of adaptive explanation that has reduced many methodologically careful scientists to give up, if not to the entire evolutionary explanation (Chomsky, 1972), at least to the identification of causal relationships between structure and function (Hauser et al., 2014) or to the use of the term “adaptation”: even Fitch (2012) declares himself

sceptical against the applicability of the concept of adaptation to language evolution in the name of the “scientific respect” for this term!

Actually, from an evolutionary point of view, there are more plausible explanations that try to integrate various language components in a single evolutionary scenario. For example Miyagawa et al. (2013) have proposed an *Integration Hypothesis* of human language evolution according to which there are two principal components of language, the expressive (prosodic-vocal) one and the lexical (referential) one, both present separately in other species, but present in an integrated way uniquely in *Homo sapiens* (Miyagawa et al. 2014).

According to our hypothesis, this evolutionary scenario is that in which central and peripheral anatomical structures of language have been selected not necessarily for linguistic purposes. Obviously this rooting is determined by microscopical genetic variations which have produced new relationships in DNA (see Carrol, 2005). From those variations, a kind of morphological conformation is arisen and this conformation has offered a modality of vocal articulated production for the first time accessible in a constant way. Natural history of voice is a story of mediation among microscopic, macroscopic, functional, environmental and ecological levels.

In this respect, it really seems contradictory that many hypotheses about language origin that have supported the politically correct cause of evolutionary continuity of linguistic function didn't polarize their own research to that anatomic-functional element which most characterizes human language: the vocal production. For decades vocal production has been considered by linguists as the fortress of human language uniqueness. At the same time, paleo-anthropological studies (see Lieberman, 2007) and comparative studies (Goodall, 1986; Pollick & de Waal, 2007) have converged on a data: non-human primates don't have that autonomy on vocal tract as to allow them to use voice for communication, except for referential signals, linked to the context (Seyfarth & Cheney, 1980) or for concrete needs (food and reproduction, Hauser, 1996). This convergence has advanced the false idea that primate world has to be considered just a mute world (see Falk, 2009). Maybe because of this prejudice, scientists of language origin didn't search for the evolutionary precedents of linguistic function in primate vocalization. Because of this supposed impossibility, for non-human primates, to produce similar-linguistic vocal sounds, and the epistemological necessity of tracing a “precursor system” for linguistic function, many scientists have identified in gestural communication the evolutionary continuity between animal and

human communication. Indeed, a similar connection is not understandable apart from the perspective of dualistic residuals which we have discussed above.

As seen in section 2, even if we admit the truthfulness of this hypothesis, it doesn't solve at all the question of explaining the origin of constitutive vocality of actual human language. To not recognize to primates the capacity of using manual signs in a "symbolic" way seems to be quite questionable (Tomasello, 2014). What we cannot ignore in any way – because it would entirely deny an essential part of natural history that has conduced to *sapiens* and it would establish the "direct Darwinian pathway" for language evolution – is that many non-human primates use voice to communicate not only when they want to express concrete needs, but also to recognize conspecifics, to identify the social role (Geissman, 1993), to connote the membership to a specific group and the dominance (Goodall, 1986), to delimit and to defend their own territory, to recall the partner for sexual purposes and even to communicate with individuals of other species (Gamba et al., 2012). If we look nearer, going back to darwinian evolutionary coral, it is possible to see how lots of species among fishes, amphibians, birds and mammals use sounds, vocalizations and even singings that are functional in their ecological-social contest (Bass & Chagnaud, 2012). This implies that the vocal communication system is used by many animal species to communicate both with conspecifics (mating, territory defence, social roles: see Catchpole & Slater, 1955) and with other animal species (predation/defence, cooperation: see Zahavi, 2003).

Furthermore, different recent studies have underlined that this vast use of vocal communication in animal kingdom depends on the presence of neural patterns of vocal-acoustical signalling that mediate social behaviours among all the vertebrates. The phylogenetic presence of a vocal compartment that presents a shared specific organization in the motor nuclei, then, could suggest that there has been a common development that is conserved and evolved among genetic pathways, including combination that brings to the expression of the omeotic gene Hox in mesoderm, and naturally through the development of romboencephalon and spinal cord. Studies have underlined similarity with mammals and primates, highlighting that they have also the same structure designed for the control of sounds production. Bass et al. (2008) suggested, in other words, that the premotor circuits that has given the start to acoustic behavior have been originated in fishes. No a "jump" anymore!

The identification of this functional evolutionary continuity is not yet linked by the exam of morphological possibilities: animal species that use sounds to communicate are characterized by the presence, in the central and peripheral level, of morphology adapt to vocal production and decoding. It is undeniable, indeed, that to succeed to show an adaptive behaviour as vocal communication it is necessary that species present a vocal form adequate to sound production.

Supporting an evolutionary hypothesis of language that considers the structural aspects that allow the production of language as constraints to its exhibition permits to determinate an evolutionary continuity with previous species and to delete any form of “speciality” bounden to the idea of language as abstract producer of symbols. Unlike the hypotheses that assign to gestural communication the role of guarantee of evolutionary continuity, that aren't able to give an unproblematic explanation of the passage from primate gesture to human voice (Corballis, 2002), the analysis of “voice forms”, i.e. of morphological structures that constitute the constraints to vocal production possibility, seems to constitute both the most direct and Darwinian approach and the less anthropocentric one.

If there is a positive aspect that this kind of analysis is, indeed, just to delete every possible residual of anthropocentrism: every animal species produce more or less complex vocal communicative forms, using their own species-specific structures (for example, just remember Indri singings: Gamba et al., 2011; or gibbons complex vocal duet: Geissmann et al., 2006). The approach we propose, indeed, considers central and peripheral morphology that allows language as an anatomical constraint, with components that can be separately observed also in other animal species, not always philogenetically close to *Homo sapiens*. Just think, for example, to the case of supra-laryngeal vocal tract, that for decades was considered the emblem of speciality of human language production. Thanks to comparative studies (Fitch, 2000), we know that vocal tract conformation used by *Homo sapiens* – in which the horizontal portion of oral cavity has similar dimension to the vertical one of larynx cavity – it is reached by many animal species at least starting from crocodiles, thanks to muscular efforts of larynx lowering (Fitch, 2010).

Fitch thinks that the forced lowering of the larynx muscular is present in many animal species because it permits to pretend to have bigger corporal dimensions than the effective ones, producing lower and more defined sounds: this is a characteristic of members with a bigger size, that result more appetizing for reproduction. In *Homo sapiens*, permanent lowered larynx

should be selected because it would offer the possibility to operate this pretence without the continuous muscular effort that the other animal species are obliged to do. The immediate advantage associated to larynx lowering has not, then, directly to do with language, but with a fitness increasing. Language should be installed later (exaptation) and only when the human brain has also become “speech-ready”, i.e. ready to organize voluntary articulator movements. Elsewhere, we have defined “auditory-vocal technology applied to symbolic needs” the group of all the articulator-auditory possibilities in which our individual and social cognition is “condemned” to reach the fulfilment of the own purposes (see Pennisi & Falzone, 2010). This auditory-vocal technology – with defined morphological (peripheral-central) and social (as body forms bind social organization) correlates (Pennisi, 2014) is evolved during a very long time among a huge quantity of mutations that have acted directly or not in the formation of structures, that became suitable to articulated speech at a certain point of their development. The two criteria (direct and indirect) aren’t dissociable and today we can study the effect of these direct mutations through experimentation in cognitive science and reconstructive indirect explanation in evolutionism.

Direct Darwinian pathway goes through the analysis of body morphology: organisms narrate an evolutionary story made by phylogenetic heredity and species-specific changes. The functions that every organism show depend by constraints given by its body shape and by the interaction with the habitat he lives. Human language, as any cognitive function, showed itself only when *sapiens* morphology reached a “usable minimum threshold”, a discreet ergonomic target and a system of neural control that make possible compositional segmentation (Wray, 2002) and constant articulation of vocal sounds. In this way, it is possible to explain the presence of a communicative and representative complex function as human language without “intelligent” residuals, without necessarily using an external substance, and without spasmodically researching the adaptivity of every linguistic component to demonstrate evolutionary continuity.

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