CHAPTER ONE

ON THE DIFFERENT APPLICATIONS OF HAECKEL'S BIOGENETIC LAW IN LANGUAGE ORIGIN AND EVOLUTION STUDIES

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1. Introduction

Several scholars that work within the field of evolutionary linguistics (e.g. Bickerton, 1990:115; McNeilage & Davis, 2000; Givòn, 2002), argue that the ontology of language recapitulates the phylogenetic emergence of language. The idea that ontogeny recapitulates phylogeny is also known as Haeckel's biogenetic law. In this paper, several implementations of this law are critically reviewed. First, it is examined what Haeckel himself intended to capture with his biogenetic law that states that ontogeny recapitulates phylogeny. Secondly, it is investigated how Haeckel's biogenetic law is applied within language origin and evolution studies. Three such implementations are discussed: the interspecific, intraspecific and linguistic one. Interspecifically, Haeckel's law is applied to draw conclusions on the evolution of language based on evidence of current primate behaviour. Intraspecifically, it is sometimes argued that child language recapitulates adult human language. And linguistically, Pidgin and Creole languages (not the speakers of these languages) are regarded as simpler forms of language that resemble a proto-language.

2. Haeckel's biogenetic law

Haeckel's fundamental law of biogeny (the "science of the genesis of life in the widest sense") states that ontogeny (the development of the individual) recapitulates phylogeny (the evolution of species) (Haeckel, 1912: 1). More specifically:

> "The series of forms through which the individual organism passes during its development from the ovum to the complete bodily structure is a brief, condensed repetition of the long series of forms which the animal ancestors of the said organism, or the ancestral forms of the species, have passed through from the earliest period of organic life down to the present day. The causal character of the relation which connects embryology with stem-history is due to the action of heredity and adaptation. […] Phylogenesis is the mechanical cause of ontogenesis". (Haeckel, 1912: 2-3).

What does this mean? Haeckel (1912: 32-35) was a fearsome proponent of Darwin's theory of evolution by means of natural selection. He regarded natural selection to be the sole answer to the then prevailing dualistic or teleological views wherein internal life forces (e.g. élan vital) were introduced to explain the origin of behaviour. According to Haeckel (1912: 35), Darwin gave a monistic, mechanical account on how species, including humans, evolved. Haeckel called this monistic approach to human evolution "monistic anthropogeny"[1]. According to Haeckel, the theory of natural selection was an inductive law. Contrary to the deductive method, the inductive method is characterized by the endorsement that empirical observations must precede theoretical generalizations. Because Darwin came to his conclusions on natural selection by inductive reasoning (for instance he observed artificial selection of plant and animal breeders and from thereon generalized about natural selection).

If one follows an inductive method, the primary task of every adherent of evolution is to develop disciplines that provide the necessary empirical data from whereon we can then develop and generalize our theories. According to Haeckel, inferences, or "synthetic truths" as he called them, could be drawn from:

> "… comparative anatomy, embryology, palaeontology, dysteleology [the study of useless or harmful traits], chorology [the science of distribution, migration], and classification [taxonomy]."

Thus, embryology and more specifically, ontogeny (which used to be synonymous to embryology, while it now refers to the development of an organism from conception until death) provide a "window"[2] on phylogeny.

Haeckel reasons as follows: in an evolutionary view, everything that exists today is somehow the result of evolution. Therefore, ontogeny too must be the result of phylogeny, because of the processes of heredity and adaptation. Therefore, one can say that phylogeny - quite literally - *causes* ontogeny[3]. Embryology thus becomes a method, a tool to literally observe the evolution of the species. In the best case scenario then, one would only need to study the development of the embryo to literally *see* the evolution of the species. However, especially for man, no such scenario is possible because of cenogenetic processes.

In Haeckel's (1912, 4) theory, cenogenetic processes or embryonic variations are distinguished from palingenetic processes or embryonic recapitulations. Cenogenetic processes explain the origin of traits of the embryo that have newly evolved ans that thus are not present in earlier evolved species. Palingenetic processis, on the contrary, explain the emergence of traits in the embryo that are shared with ancestral species. Haeckel (1912: 5):

> "The evolution of the foetus (or ontogenesis) is a condensed and abbreviated recapitulation of the evolution of the stem (or phylogenesis); and this recapitulation is the more complete in proportion as the original development (or palingenesis) is preserved by a constant heredity; on the other hand, it becomes less complete in proportion as a varying adaptation to new conditions increases the disturbing factors in the development (or cenogenesis)."

In Haeckel's account, heredity enables the faithful transmission of existing traits. Adaptation towards an external (embryonic) environment, on the other hand, causes the embryos to vary and evolve new traits (basically form their ontogenetic unfolding pattern[4]). While palingenesis could possibly provide us with a portrait gallery of all our common ancestors, cenogenetic processes blur the picture because certain forms or traits are deleted during the course of history while other forms are inserted (see also Gontier, in press b, Richardson & Kneuck, 2002).

Although forms can be deleted and inserted during the course of evolution, Haeckel (1912: 3) understands evolution to be predominantly a gradual and linear process. New traits are mostly added onto an existing developmental process by *terminal addition*. There where "direct embryological observation" can not fill in the gap that results from ontogenesis, "comparative anatomy" mostly can.

Although Haeckel's theory has been overthrown, his goal was noble and the means he gave to study evolution are at the very least intriguing. It would make things much less complicated if we were somehow able to study the evolution of species by studying currently developing embryos. It would indeed be the closest we could come to direct observational evidence of evolution. However, we cannot draw inferences on evolution from embryology and ontogeny because of heterochronic and heterotrophic processes. Heterochrony and heterotrophy refer to the different time and place of activation of certain genes in relation to the internal and external environment (Richardson & Kneuck, 2002: 503-5). The development of an individual is not a linear process. Rather, different feedback loops between genes, the internal organismal and external environment result in different non-linear developmental patterns that cannot be compared directly with developmental patterns of other species (see also Slobin, 2005, and Langer, 2004). All of this makes the idea of terminal addition of new traits at the end of an ancestral series, and thus of evolution proceeding from the simple to the complex, everything but evident.

3. The different applications of Haeckel's law in language origin studies

Biological scholars around the world today reject Haeckel's biogenetic law as a fundamental evolutionary law, but discussion remains as to whether the principle can to a certain extend be applied to certain aspects of biological evolution. It is however especially within extra-biological disciplines, such as evolutionary linguistics, that one can find a renewed interest in the principle (Bickerton, 1990, Givón, 2002).

In language origin and evolution studies, Haeckel's biogenetic law is implemented in three different ways (Table 1-1):

1. It is applied at an interspecific level (between species) when it is argued that hominin development recapitulates non-human primate evolution;
2. It is applied at an intraspecific level (within the same species) when the language acquisition of a child or a second language learner is compared with adult human language;
3. And linguistically, the creolization od Pidgins is argued to resemble the transition from a protolanguage to a grammatical language.

Type of application	Type of window		Specific type of evolution
Interspecifically	Hominin cognitive, communicative development	Recapitulate(s)	Non-human primate evolution
Intraspecifically	L1 and L2 Acquisition		human language evolution
Linguistically	Pidgin and Creole languages		Child language acquisition and/or the transition from a protolanguage to fully syntactic language

Table 1-1. The different applications of Haeckel's Biogenetic Law

The windows (hominid cognitive development, L1 and L2 acquisition and Pidgin and Creole languages) are sometimes regarded as linguistic fossils that resemble a protolanguage (Bickerton, 1990, 2002).

The interspecific application of Haeckel's law

How ape-like can we make humans (Gontier, 2007)? A similar question is also raised by Vauclair (2003) in a book chapter entitled: *Would humans without language be apes?* This title captures best what is implied when one compares different species with each other.

In order to be able to compare modern humans with hominins, apes or monkeys, we need to assume that evolution is linear, continuous and gradual. Evolution needs to be *linear*, in the sense that humans evolved out of hominins, apes and monkeys. And this evolution needs to be *continuous*, because if it were discontinuous, no viable comparisons could be drawn between newly evolved structures and old ones. Hence, evolution must also be *gradual*, only small random mutations are postulated to lead to the emergence of new traits and eventually species.

Returning to Vauclair's (2003) question: Would humans without language be apes, basically two questions are asked by the author: (1) is language the result of continuous evolution, and thus, can we find rudimentary linguistic elements amongst our cousins, or is language discontinuous; and (2) Are there differences between humans and apes in non-verbal behaviours, and if so, are these of a continuous or discontinuous kind?

Vauclair (2003) answers the first question by showing that human language differs in structure and function from ape communication systems, and therefore he subscribes to the view that language is discontinuous. Although Vauclair assesses that some human non-verbal cognitive capacities (such as the cognitive mapping of the physical world) are shared with other primates (a point also made by Tomasello & Call, 1997, 27-185), he answers the second question by showing that human uniqueness is not limited to the language capacity, because non-linguistic behaviours such as the handling of tools and the use of complex spatial frameworks also appears to be humanspecific.

Continuity is important if one wants to apply Haeckel's biogenetic law to assert that human evolution recapitulates (to a greater of lesser extend) hominin, ape, or monkey evolution. This is the case because in Haeckel's view, new traits are added onto an already existing sequence. That is, evolutionary novelty is introduced by means of terminal additions. Terminal addition implies (1) that a new trait is introduced without affecting or rearranging earlier structures, and thus that (2) a completely new structure is added onto an evolutionary sequence. An old structure is thus not transformed or altered into something new (so pre-adaptations or exaptations (Gould &Vrba, 1998), where an old structure that already had a function gets a new function, are impossible within this view)[5].

In this way, terminal addition does not a priori exclude that evolution is of a discontinuous nature, in that sense that the new, added structure could work fully autonomously, thus without affecting earlier structures. This operation can lead to qualitative differences. A hypothetical example would be the emergence of a language faculty, that forms an independent module in the brain that causes humans to be linguistic. Note that this would imply that the language module is domain-specific and that it neither cooperates nor affects other possible modules. Thus, silent conceptualisation processes for example would be different in kind from the linguistic categorisation systems and no interaction between the two systems would occur.

This discontinuous language element could thus hypothetically be added terminally, meaning that humans without language would possibly be apes.

That is why it is interesting to look for non-linguistic discontinuous behaviour as well. If one is able to find such behaviour, like Vauclair has done, it shows that humans without language would still differ from apes. This shows that *only* terminal addition of new structures (modular or otherwise) in non-human primate evolution is not enough to explain the evolution of humans (and their unique traits) and thus that Haeckel's law cannot be applied interspecifically.

The intraspecific application of Haeckel's law

Intraspecifically, it is sometimes argued that language acquisition or the acquisition of a second language recapitulates human language evolution (Bickerton, 1990: 110-115; Givón 2002: 151-161). In this view, language acquisition thus provides a window on the evolutionary origin of language. This claim differs from the interspecific claim that child language can be compared with the rudimentary communicative competence of human encultured apes[6]. Nonetheless, it is often argued by the afore mentioned authors that child language, the language of trained apes, and the acquisition of a second language all share similarities, and that these similarities in turn hint at the possible structure of a proto-language from whereon it is presumed that human language developed.

Adhering to the idea that current language development or current second language acquisition recapitulates human language evolution would mean that one needs to assert that each time we develop or learn a new language, the same acquisition structure or mechanism is applied, otherwise there would be no recapitulation. Posed differently, it would mean that one needs to assume that the way in which (a first or second) language is learned, is the way our human ancestors learned it. The *mechanism* of language acquisition would necessarily be the same for all humans (children, adults, L2, L3, Lx learners or the first language-lacking humans). Or it would imply that some unchanging, linguistic *structure* (for instance an LAD) would be present at the onset of the human species that is uniformly shared by all human beings. This structure would have to become activated every time a child learns its mother tongue, or when a human being learns a second language. Furthermore, this structure must already have been in place when our human ancestors, that did not have language yet, developed or acquired a language.

In order to test these assumptions, two questions need to be asked: (1) Is the manner in which a child learns a first language not only comparable to, but also similar to the way an adult learns a second, or third,… language and (2) is this similar to the evolutionary emergence of language *tout court*?

Regarding the first question: numerous studies have shown that there is a critical period in which human language must be acquired and is acquired most rapidly. This critical period shows that there are some language acquiring mechanisms available to the child that are not (equally) available to the adult. So even if there is an LAD that is shared by all human beings, it is not equally accessible and applicable by all human beings at all stages during their ontogeny. Furthermore, it is assumed that there is a difference between L2 acquisition from birth onwards on the one hand, and L2 acquisition during later stages in ontogeny, on the other hand. So here too, it is assumed that, at one point during ontogeny, some language acquisition devices shut down and are thus not equally accessible to all human beings at all times during ontogeny (for a discussion see Mondt, 2005, 77-152). Both points make us conclude that a mere recapitulation scenario regarding the mechanism or structure of language acquisition is not possible.

We now turn to the second question: can L1 or L2 acquisition, or adult language competence and use provide us with a window on the evolutionary emergence of language? A positive answer is problematic in more than one way. The case of Nicaraguan Sign Language teaches us that "… the age at which learners are first exposed to a language determines their eventual linguistic abilities, with those who start younger achieving greater efficiency…" (Senghas, Senghas & Pyers, 2005, 296). More specifically, during the evolution of NSL (Senghas, Senghas & Pyers, 2005, 303), two different processes can be distinguished. On the one hand, adult members have the ability to construct linguistic communities and are able to intentionally influence the way in which their language evolves further. This is achieved through the development of new words and grammatical structures as well as by controlling what is being thought to children (a process that is referred to by the authors as "niche construction"). At the same time, these older members are less and less able to (re)construct their own language competence. Children on the other hand, are able to learn and automate the newly arisen grammatical structures much faster, thereby boosting the language to a next level (Senghas, Senghas & Purey, 2005: 298-304).

> "With each passing year, individual proficiency at language learning declined, decreasing each learner's potential. At the same time, with each passing year, the ambient language became progressively richer, increasing each learner's potential. These simultaneous, opposing forces make it tricky … to differentiate the effects of the language on its learners from the effects of learners on their language." (Senghas, Senghas, Pyers, 2005: 297).

The care of NSL makes us conclude that the emergence of new languages cannot univocally provide us with a window on the evolutionary origin of language, because the current linguistic niche or ecology as Mufwene (2002, 2005) would call it, differs from the niche that was occupied by our hominin ancestors. The input available to current language learners is richer than the input that our human ancestors had that were lacking full-blown language (a point also made by Slobin, 2005). That is, how homesigns develop into a full-fledged language could provide us with an example of how a lexicon-based protolanguage develops into full-blown language, were it not that the deaf signers were already exposed to full-fledged (spoken) language (for example by learning to write). Their hearing family and educational caretakers had a fully developed language. So the linguistic environment of our human ancestors and our current (deaf or hearing) children or grownups differs.

Furthermore, children are not so much the innovators of new linguistic structures (as Bickerton's bio-program suggests), as that they are the ones that retain and automate existing structures they learn. The role of retention therefore is important:

> "The concept of natural selection as applied to linguistic behaviours is especially relevant, because it is not only the appearance of novel linguistic forms that is of concern, but also their retention (i.e. selection for regular continued use) that marks true historical change." Senghas, Senghas, Pyers, 2005, 302).

In conclusion, all of this means that the environment in which language is learned changes constantly. A rigid recapitulation process of the linguistic niche or the idea that new structures are simply added upon old, unchanging structures becomes quite impossible, because the linguistic niche is profoundly changed by the elder members of society. This process enables to give the new generation quite different parameters to begin with, so the idea of terminal addition at an intraspecific level is hereby overthrown[7]. The latter however does not exclude the possibility that the development of NSL can lend an insight into the evolutionary mechanisms that underlie language evolution. All that is being argued here is that it demonstrates that Haeckel's idea of terminal addition applied to characterize language ontology or phylogeny.

The linguistic application of Haeckel's law

Linguistically, it is sometimes argued that Pidgin and Creole languages recapitulate the evolution from protolanguage to language (Bickerton, 1990, 2003).

This account postulates the existence of a "protolanguage", a lexical-driven ungrammatical language that necessarily precedes the evolution of a fully evolved grammatical language. Child language, early hominin language, the signing of encultured apes and pidgin and creole languages are argued to be similar to this primordial protolanguage because they too lack grammar.

> "They [the symbolic and the structural] are actually dissociated in several forms of development that can still be observed in the world around us: in early-stage pidgins, in early stage second-language learning, and in the production of trained apes and other animals." (Bickerton, 2003: 81)

In Bickerton's account, the lexicon has primacy over syntax. This is the case because Bickerton emphasizes the referential side of language (Gontier, 2007): i.e. the primary function of language is that it enables one to refer to the outer world. Hence, he adheres to the view that the lexicon (this proto-language) arose first. Syntax, and thus full fledged language, emerged when the lexicon grew too big. In other words, in his view there is a linear order from the lexicon to syntax. It might be interesting to investigate whether the other way around: syntax first and the lexicon later, could not be evolutionary possible as well, for this assumption has not yet been challenged[8].

Specifically regarding Pidgins and Creoles, Mufwene (2002) has argued convincingly that the Pidgin-to-Creole process that is postulated by Bickerton's innate bio-program cannot be correct for one following reason: geographically, Pidgins are located in the Atlantic coast of the African mainland and the Pacific Islands, while Creoles are located in the Atlantic and Indian Ocean islands and the Atlantic coasts of America. Pidgin can thus not have evolved out of creoles. The differences between Pidgins and Creoles are, according to Mufwene (2002), the result of the different socio-economic histories of the territories involved: Pidgins mainly evolved in trade colonies where contact was very limited and unintended, while Creoles arose mostly in plantation settlements where communication was mainly intentional.

But regardless of their origin, are Pidgins and Creoles grammarless and thus simpler than full-fledged languages? Evidence of Haitian Creole morphology, put forward by DeGraff (2001, 54-68, 2003), claims the contrary. That is, this Creole is far from grammarless and the grammaticalization that can be studied in this language is not always inspired by the source-language either.

Instead of subscribing to a linear order where Pidgin or Creole languages advance from a simple (ungrammatical) to a complex (grammatical) state, Mufwene (2002) argues that the evolution of this language follows an inverse direction. That is, Pidgins and Creoles show a "break-down" as he calls it, and what survives the break-down, according to Mufwene, lends an insight into the most basic properties of language.

If the latter is true, than again a linear recapitulation scenario that moves from the simple to the complex, and where new elements are added upon an earlier existent structure is impossible. And this claim is strengthened once more, if we again take the linguistic environments into account where these languages emerge: the input that is available when Pidgin and Creole languages developed is much richer than the output (Slobin, 2005). Our non-linguistic human ancestors, on the contrary, must have had a period with no linguistic input available to them and yet developed linguistic (lexical or otherwise) output.

Most important, however, is that in the linguistic application of Haeckel's biogenetic law, no longer individuals belonging to one species or individuals belonging to separate species are the topic of investigation. That is, in the inter- and intraspecific applications, language or non-human primate communication is understood as a species(-specific) property. In the Pidgin and Creole application, "different languages" are argued to recapitulate a proto-language. Nobody is saying that current Pidgin or Creole speakers are less complex human beings that lack the human specific capacity for language, rather, it is argued, from a mere linguistic point of view that these languages are underdeveloped. (Although as Mufwene argues (2002) linguists rarely adhere to the view that languages can be divided into less and more complex kinds).This application of Haeckel's biogenetic law makes us raise the question of wether languages are comparable to biological species or organisms. This question is the topic of investigation in the remainder of the article.

4. Are languages analogous to species or individual organisms[9]?

In the 19th century, a temporal cross-fertilization occurred between linguists and evolutionary biologists. Charles Darwin, Ernst Haeckel and August Schleicher all inspired one another (Richards, 2002). The methods and terminology used by genetic linguists and evolutionary biologists still coincides today because of this cross-fertilization. Terms like variation, competition, gradual evolution, extinction, genus, family and so on, are concepts that were introduced in the 19th century. Also *Stammbäumtheorie*, family tree models, were introduced, first by Schleicher and later on by Haeckel (who was one of the first evolutionary taxonomists) to show common descent between languages and species respectively (Hull, 2002, 19, Mufwene, 2005). Schleicher (Richards, 2002) assumed that languages are similar to individual organisms, because both emerge, compete, die or evolve further. Evolution could be progressive, simple structures evolve into complex ones, but also regressive, complex structures deteriorates into simple ones[10]: for example ancient Greek and Latin were understood as more complex languages than current Germanic languages.

Scientists from both disciplines used each others theories to reinforce their own as well. It was assumed (wrongly) that the human species could be divided into "races" and that some "races" were more "primitive" – or stated differently "less evolved" – than other more "advanced races". Linguists demonstrated that the languages spoken by these different "ethniés" could be related to each other, because they share same basic structures, but also historically, different languages share a common descent and thus a common origin. In other words, it was assumed that "modern" languages could be traced back to one or more common ancestors: the Ursprächen as Schleicher called them, and that all languages evolved through speciation from that common stock. Research into the historical relation between languages therefore provided a perspective from wherein we could investigate the origin of humans on the one hand, and on the other, the evolution of man provided evidence for the evolution of languages. Furthermore, it was not only assumed that both fields could supply the necessary evidence for each others theories, it was subscribed to that similar evolutionary mechanisms lie at the basis of the evolution of language and the evolution of life in general, including humans. For instance Darwin (cited in Hull, 2002, 19) states that: "… the formation of different languages and of distinct species, and the proofs that they both have been developed through a gradual process, are curiously the same". In Darwin's account, different languages share homolog structures because they share a common descent. The evolution of languages is furthermore analogical to the evolution of species because both languages and species are argued to evolve according to the same evolutionary mechanisms (Hull, 2002, 19).

With the introduction of Saussurian linguistics, however, synchronic language research was favoured diachronic research, and nowadays every linguist adheres to the principle of uniformitarity: it is general knowledge that all languages are equally complex and that all share a common descent. Furthermore, language variation or evolution does not show a preferred direction towards greater or less complexity (Newmayer, 2003: 64).

Nonetheless the reasoning based upon analogy between language evolution and/or variation and the evolution of life in general however is still practiced by some scholars today. Mufwene (2005) for instance states that languages, although they cannot be compared with individual organisms, as Schleicher thought, can be compared with species. And Croft (2000, 2002) argues that an evolutionary model based upon the hybridization of plant species and natural selection can be applied to understand language change and variation.

Asking whether languages are best regarded as analogical species or as organisms is asking an evolutionary epistemological question (Gontier, 2006).

The language-as-species metaphor introduced by Mufwene (2005: 30) states that languages resemble species more than individuals because "individual communicative acts" together make up a language just as individual organisms make up a species. That is, according to Mufwene (2005: 33) a language is a population of idiolects "… the distinct ways in which individuals, as opposed to groups, speak their language, each one with his/her own peculiarities".

Mufwene's species concept is an unarticulated nominalistic one, which is also the species concept that Darwin adhered to in his later writings. That is: a species is a species only in name, and that name is given by humans that use arbitrary classification systems. A language, according to Mufwene (2005: 33), is "… as abstract as species, which are mere categories projected from structural or ontogenetic properties shared by classes of individuals or organisms." These species categories are therefore "… naturally fuzzy an operationally arbitrary…" and idiolects can be classified by means of their family resemblance only.

This *nominalistic* species concept differs from the *biological* species concept that states that species are distinguishable from one another when individuals of the opposite sex cannot produce fertile offspring. No argumentation whatsoever is given by Mufwene as to why the first species concept should be preferred over the latter (i.e. why e.g. different idiolects would not be able to interact further).

Furthermore, this discussion relates to the units and levels of selection debate (Gontier, 2007). More specifically, it asks whether it is justifiable to regard species as mere agglomerations of individuals or whether species as a whole can be regarded as an entity.

By adhering to a nominalistic species concept Mufwene is arguing that biological species, or languages that are analogous to the latter, neither have any causal impact on their members or idiolects respectively, nor can they display behaviour that is not reducible to the members or idiolects that make up the species or language.

Certainly in biology this position has been called into question several times, and it would be interesting to open the discussion regarding languages-as-species as well.

What Mufwene is unarticulatedly implying is that language cannot either emerge or evolve or die, because what a language is can only be defined *post factum* by humans that use arbitrary measures. More specifically, in Mufwene's view it are the idiolects that do the evolving, emerging or dying, while languages are merely human constructs that are given to some phenomena.

Stated differently, In Mufwene's view, idiolects are the *units* of selection, and these are selected at the *level* of the linguistic, ecological environment where different individuals (with their different idiolects) interact.

This scenario does not differ much from Hull's (1980, 1981) replication-variation-environmental interaction scenario that Croft (2000, 2002) uses to develop his evolutionary based theory of language change. In Croft's view, not idiolects but linguemes (grammatical structures that are replicated in the utterances of people) are the unit of selection. These vary, because utterances show phonological and semantic differences and this variation can be the target of selection within the population of utterances (analogical to the gene pool).

However, the case of Nicaraguan Sign Language shows us that there are not one but different *levels* of language evolution. At minimum three different levels can be distinguished: the level of the individual organism (where critical periods during ontogenetic development cause the acquisition of language to be differential); the level of the linguistic community (where not only selection but also retention of traits occur); and the level of interaction between the organisms and the linguistic environment (where a process of co-evolution must occur). A mere replication-variation-environmental interaction process will thus not suffice, because the *replicator* is regarded as a unit (and not a level of selection), *variation* is something that occurs between replicators, and selection is argued to exclusively occur at the level of the environment.

The different levels of selection also make it susceptible that there are different units of language evolution distinguishable, not all of them being analogous to replicators such as linguemes. But that is a different discussion altogether that goes beyond the scope of the present article.

Suffice to say that the nominalistic species concept excludes the possibility to regard languages or species as entities that can have some bearing upon the idiolects or individuals that make them up. And it also excludes the possibility that languages as a whole are either the unit of selection (this being the idiolects), or the level of selection (this being the population level where different idiolects interact).

Whether or not the latter is the case should be the topic of investigation, instead of merely advancing this thesis.

5. Conclusion

The application of Haeckel's biogenetic law seems interspecifically, intraspecifically and linguistically untenable.

Interspecifically, language is not merely added onto the cognitive abilities of apes, rather, several linguistic and non-linguistic differences can be pointed out between the two species that lead to qualitative differences.

Intraspecifically, child language acquisition differs from L2 acquisition with regard to equal accessibility to a shared language structure and/or acquisition mechanisms because of the presence of critical periods during development.

Linguistically, the Pidgin-to-Creole scenario, according to language is assumed to evolve from an ungrammatical to the grammatical state is also the subject of scholarly debate. Not only have Pidgins and Creoles evolved in different geographical regions, which makes a possible correlation between the two highly problematic, it has been shown that these languages do have grammar.

Finally, especially the linguistic application raises the evolutionary epistemological question of whether languages are either comparable to species or individuals. Mufwene, who defends that language needs to be regarded as a species, unarticulatedly adheres to a nominalistic species concept. This excludes the possibility that language is an entity on its own that can have causal bearing on its internal elements that make-up the language, and it also excludes the possibility that language as an entity, evolved. The evolution that occurs, occurs because idiolects change, and vary. But "a language" is non-existent.

The current discussion has helped clarify some conceptual issues that need to be taken into account when it is argued that ontogeny recapitulates phylogeny in language evolution and has therefore provided us with some new paths that are in need of further investigation. The interspecific, intraspecific and linguistic application of Haeckel's law is untenable in many respects.

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