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Review Article

How Speech Evolved: Some Historical Remarks

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The evolution of speech and language has been a returning topic in the language sciences since the so-called "cognitive revolution."

The evolution of speech and language has been a returning topic in the language sciences since the so-called "cognitive revolution." Eric Lenneberg's (1967) monograph, *The Biological Foundations of Language,* monumentally marks the beginning of this tradition. It presents an extensive treatment on the evolution and genetics of language. According to Lenneberg, our innate propensity to acquire language is rooted in "species-specific cognitive propensities" (p. 374). There is evidence, he argued,

> "that cognitive function is a more basic and primary process than language, and that the dependence relationship of language upon cognition is incomparably stronger than vice versa." (p. 374)

This species-specific propensity was called "universal grammar":

> "universal grammar is of a unique type, common to all men, and it is entirely the by-product of peculiar modes of cognition based upon the biological condition of the individual." (p. 377)

And:

> "all languages are so constructed as to conform to the stringent requirements imposed upon them by cerebral language data processing mechanisms." (p. 377)

This evolutionary priority of cognitive capacities, such as "modes of categorization, the capacity of extracting similarities," "the data processing machinery of the brain," its "time limitations on the rate of input," and "storage capacities" (p. 375), is precisely what, half a century later, is claimed by Christiansen and Chater (2016) in their important book *Creating Language*:

> "natural languages exist only because humans can produce, process and learn them. In order for languages to be passed on from generation to generation, they must adapt to the properties of the human learning and processing mechanisms." (p. 42)

And:

> "the pressures working on language to adapt to humans are significantly stronger than the selection pressures on humans to use language: a language can only survive if it is learnable and can be processed by humans." (p. 42)

Regrettably, the authors do not cite Lenneberg on this point, who had been the originator of this idea.

Christiansen and Charter's approach is to consider the processing, acquisition, and evolution of language, each operating on a different time scale, as closely intertwined. To begin understanding language,

> "we must look at its origins. That is, we must consider how language is created: moment by moment, in the generation and understanding of individual utterances; year by year, as new language learners acquire the skill of generating and understanding; and generation by generation, as languages change, split and fuse, through processes of cultural evolution, from what we imagine to be the rudimentary communicative systems of our far distant ancestors to the richness and diversity of natural languages today." (p. xi)

This is a laudable, innovative approach, but the authors show no awareness of the fact that this approach,

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which I have called the "genetic stance" (Levelt, 2016), was the dominant perspective of language scientists since the middle of the 18th and all over the 19th century of which Levelt (2014) presents an extensive overview. According to this perspective, language can only be understood from its origins, its genesis, and this genesis is three pronged: There is, first, the genesis of language/speech in the speaker's mind. I have called this the microgenesis of language (Levelt, 1989). There is, second, the ontogenesis of language, the emergence of speech and language during our first years of life. There is, third, the phylogenesis of language, the evolution of language in primordial *homo sapiens* and its further cultural evolution in the world's language families.

Here is, for instance, Wilhelm von Humboldt's (1827) formulation of the genetic stance. Language is not a product (Ergon), according to von Humboldt, but an activity (Energeia):

> "Hence, its true definition can only be a genetic one. It is namely the ever repeated labor of the mind, to enable the articulated sound to express the thought." (p. 192)

Language is what the speaker does, a process extending over time, the microgenesis of speech. This genetic stance invited two perspectives on the evolution of speech. The first one is to consider phylogenesis, that is, evolution, from the perspective of ontogenesis: What can the emergence of speech in the child tell us about the emergence of speech in our human species? The second one is to explain this emergence of speech from microgenetic processes in our primordial ancestors. What were they doing to express themselves? In the following, I will consider some highlights of these early ontogenetic and microgenetic perspectives on the evolution of speech.

The Ontogenetic Perspective—Charles de Brosses

Charles de Brosses (1765; 1709–1777), man of letters from Dyon and contributor to Diderot's enyclopedia, was the first to develop the ontogenetic perspective, in much detail, in his surprisingly well-conceived two-volume work on etymology in 1765.

It is never the case that a really new language appears, according to de Brosses. All languages are alterations of older, preceding languages. This is obvious in western languages that are all related to one another. The natural question to ask is: What language, spoken by the original "unique family," was the source of this branching family tree? Most regrettably, this "language primitive," the roots of all later words, cannot be reconstructed. All resemblance has been lost in the course of history. There is no proof, whatsoever, that any existing language, such as Hebrew, is the original one.

To discover the origins of language, we better focus on those who begin to speak, "ce sont les enfants." Ontogenesis reveals the origins of phylogenesis. The first causes of vocal expression in the child are internal feelings and sensations. These interjections are entirely mechanical products of our vocal organs, common to infants of all peoples. They are direct, nonmediated expressions of primary sentiments, such as pain, surprise, disgust, and aversion. Different sentiments excite different speech organs. Pain excites the "basses cordes," the base vocal cords; the interjection is glottal, aspired, and drawn out. Aversion is expressed by the front end of vocal apparatus, the lips. That is because it is not only expression of sentiment, but also of movement, action, and repulsion, as in *pouah!* and so on for the other primitive sentiments. de Brosses called this the "premier ordre" of vocal expressions in the child.

The "second order" is equally "mechanical"; it is the bilabial babbling of all infants. These meaningless syllables are the first roots in all languages. They are not imitations; they are not conventional. The bilabial babbles are followed by dental ones. de Brosses was the first to review the words for mommy and daddy in a large range of languages, showing that they are all based on these labial and dental babbles.

The third order contains a number of "almost necessary words." They are the names for our speech organs. They are derived from using these organs: bouche, dent, langue, and gorge. This often holds in other languages as well.

The fourth and quite extensive order is the words that paint. They are based on our universal, natural capacity of imitation. The child imitates "le bruit qui a frappé son orielle"; this is an onoma-topée, which is the original primitive form of composing names. This important source of name-giving in the primitive language is, again, a necessary "mechanical" outcome of the "physics of things," the sounds objects make, the functioning of our ear, and the natural capacity of vocal imitation:

> "Nothing is more common and more natural than names for objects coined after the sound they make to the ear." (de Brosses, 1765, Vol. I, p. 233)

In support of this thesis, de Brosses presents extensive tables of onomatopoeic words in various languages.

The closely related fifth order is what we now call sound symbolism. These words express certain modalities of entities, such as fixity. The expression of fixity makes use of the most fixed vocal organ, the teeth, preferably in words beginning with "st" as in *stella, stabilité*, and *structure*. There is the modality of fluidity as in *flambeau, flute*. And so on for other modalities. These are entirely natural causes of commonalities among languages, languages that may be entirely unrelated.

The sixth order of natural expression is called "accent" by de Brosses. It is closely related to the first order, the interjections. We can speak any words with a particular accent: "On peut dire qu'ils sont l'ame des mots" (de Brosse, 1765, Vol. I, pp. 254–255). They express the speaker's sincerity and the way the speaker is affected.

The seventh order, finally, provides the metaphorical extensions that guide further lexical derivations. They are all based on similarities. To call a flower "oeillet" is because of its resemblance to the eye. This metaphoric similarity works deep into our vocabularies and into the further conventionalization of a language. de Brosses uses this same

mechanism of metaphoric similarity to explain the coining of abstract, intellectual terms in cultivated languages.

In short, our children reveal the basic shape of our primordial language from which phylogeny proceeds. Ontogeny is our window on the roots of phylogeny. These roots are entirely "mechanical" in de Brosses' terminology. It is a "faculté naturelle" (de Brosses, 1765, Vol. I, p. 2), a God-given faculty.

de Brosses' insightful treatise was soon forgotten, but the ontogenetic perspective on the evolution of speech and language survived till the present day. The following three sections will consider some 19th-century developments in this respect.

The Ontogenetic Perspective—Steinthal and Schultze

The Berlin philosopher and linguist Heymann Steinthal (1823–1899) was deeply influenced by Wilhelm von Humboldt and his "genetic stance." In his first major work (Steinthal, 1855), he claimed that "the essence of language is identical to its origin."

> "In just the same way as any embryo builds this or that organ during a particular phase of development, at some definite point the mind necessarily builds language, today, as in primeval era." (Steinthal, 1855, p. 232)

Steinthal clearly expresses the ontogenetic perspective:

> "the laws that are still today operative in the child's acquisition of language, were also the driving forces in the invention of language." (p. 22)

But, as we will consider below, Steinthal especially elaborated von Humboldt's microgenetic perspective.

Fritz Schultze (1880; 1846–1908), philosopher and pedagogue in Dresden, was probably the first to develop the ontogenetic perspective for the evolution of our speech sound repertoire, in his 1880 paper entitled *Die Sprache des Kindes.* The paper opens with this rhetorical question:

> "… but doesn't the miracle of recruiting language confront us anew in any child? Couldn't one reconceive, in the developmental process of individual life, the fluid phenomena, which long since rushed by in the stream of universal development?" (p. 23)

Schultze then went into interesting detail. He proposed a "principle of minimal effort," which governs the order in which speech sounds are acquired in children and, by hypothesis, in the evolution of speech. He worked this out for both the acquisition of vowels and of consonants. Here is his treatment of consonant acquisition, which he summarized in Table 1:

First considering the vertical dimension, the place of articulation: According to Schultze, the physiological effort increases from lip- to tongue- to palate/guttural-speech sounds. And indeed, Schultze claims that is the order in which these speech sounds appear in the child.

Second, considering the horizontal dimension, the manner of articulation, for lips and tongue physiological effort, increases from left to right, that is, from plosives to trills.

Table 1. Schultze's (1880) table of consonants.

	Plosives	Resonants	Fricatives	Trills
Lips	*p, b*	*m*	*f, (v), w*	*r* (labial)
Tongue	*t, d*	*n*	*l, s, sch*	*r* (lingual)
Palate	*k, g*	*ng*	*ch, j*	*r* (palatal)

But for palatal speech sounds, effort increases in the opposite direction, from order of palatal *r* to plosives *k* and *g*.

And again, Schultze claims, these directions conform to the acquisition in the child. Schultze admits that far better data are needed than what he was able to collect from the limited number of sources available.

In discussing these orders of acquisition, Schultze makes occasional reference to the evolution of speech. His approach reflects the *Zeitgeist*. The world's peoples are in different stages of mental development, and so are their languages. Among the least developed ones are pacific "dialects," such as Rimatara. They have just a few consonants, the easy ones from the left side of the table. The *Naturvölker,* different from European peoples, also reduplicate as all children do, in mama, papa for instance. And when *Naturmenschen,* such as from Tahiti and the Maori, try to pronounce European words, they simplify them to fit their own mouth, just as our children do: *cook* becoming *otute, governor* becoming *kawana*.

The Ontogenetic Perspective—Haeckel's Biogenetic Law

Relating ontogenesis and phylogenesis got another twist just a few years before Schultze's (1880) paper. The occasion was Ernst Haeckel's (1874) book *Anthropogenie*. At the time, Haeckel (1834–1919) from Jena University was an already famous zoologist and naturalist. He had picked up Etienne Serre's idea of ontogeny recapitulating phylogeny. In fact, Haeckel had introduced both terms *ontogeny* and *phylogeny*. This recapitulation theory became known as Haeckel's "biogenetic law." An organism's development is like an accelerated film of the evolutionary states that had preceded the species. In his 1874 book, Haeckel generalized his law to mental development:

> "the mental development of every child is only a short recapitulation of that long phylogenetic process." (p. 706)

This was quickly picked up by child language researchers. Hippolyte Taine (1877), for instance, wrote in his *Mind* paper:

> "Speaking generally, the child presents in a passing state the mental characteristics that are found in a fixed state in primitive civilizations, very much as the human embryo presents in a passing state the physical

characteristics that are found in a fixed state in the classes of inferior animals." (p. 259)

With Taine, many students of language acquisition uncritically approved this tacit move from biological to cultural evolution. Like Schultze, developmentalists Perez, Preyer, Gutzman, Sully, and Ament all saw parallels between the child's predilection for easy speech sounds and the speech sound repertoire of so-called "primitive" languages. Like "natural peoples," children replace fricatives by plosives, they use click sounds (Gutzmann, 1897), they reduplicate, they have very limited vocabularies like the Iroquois whose language has just "a few words" (Chamberlain, 1893), and they only have concrete words, lacking general concepts, and so forth.

But others expressed doubts about this biogenetic law. Why would children repeat the stages of civilization? Why would these have become genetically endowed in the child? That sounds very Lamarckian, our acquired traits tending to become genetic. And indeed, Haeckel, who had met Charles Darwin and knew his work, remained a pronounced Lamarckian.

Darwin's brilliant young friend George Romanes (1889) made this a topic in his *Mental Evolution in Man*. Today's infant, Romanes argues, "is born into the medium of already spoken language." Let me cite him in full:

> "The infant, as a child of to-day, finds a grammar already made to its use, … But the infant, … in primeval time, was under the necessity of slowly elaborating his grammar … and this, …., he only could do by the aid of gesture and grimace. Therefore, while the acquisition of names and forms of speech by infantile man must have been thus in chief part dependent on gesture and grimace, the acquisition by the infantile child is now not only independent of gesture and grimace, but actively inimical to both…hence, so soon as a child of to-day begins to speak, gesture-signs begin at once to be starved out by grammatical forms." (pp. 329–330)

In other words, children have no reason to fully "recapitulate" the phylogeny of speech/language. They can practically skip the gestural precursor of speech, which took eras in the evolution of our progenitors, according to Romanes.

The subsequent stage, however, in language evolution, the development of the articulatory mode, still shows resemblances in ontogeny. Here, Romanes was much inspired by the ethnolinguist Horatio Hale (1886).

The Ontogenetic Perspective—Horatio Hale and the Child's Language Instinct

The American-Canadian anthropologist and linguist Horatio Hale (1817–1896) published, in 1886, an innovative paper on the causes of language diversity.

How come languages are so diverse? Hale rejects the untenable theory that all languages are rooted in the speech of one primordial community, with eras of dispersion causing the now prevailing diversity. But how come that there are no less than 12 and probably 30 distinct, totally unrelated language stocks in Oregon alone? (Note that "Oregon" then denoted northwestern America.) Or did these equally complex and fully developed languages arise independently and more or less simultaneously, as another theory proclaims? All this is most unlikely. Hale (1886) then proposed his own alternative:

> "briefly then, the plain conclusion to which all the observations point with irresistible force is, that the origin of linguistic stocks is to be found in what may be termed the language-making instinct of very young children." (p. 285)

Notice that this is exactly what de Brosses had proposed 120 years earlier, but that had meanwhile been lost on the linguistic community. However, Hale could support his theory with a new type of empirical argument. Hale cited various reports on what we now call *idioglossia*, the "home speech" sometimes developed by twins or other children growing up closely together and much left to themselves. Without much input from the environment, children start talking anyway; "they sometimes invent a complete language, sufficient for all purposes of mutual intercourse" (Hale, 1886, p. 285). But how can this have worked, children creating a new language in evolution? Here is a primordial tribe with a fully developed spoken language. How can their prelinguistic children get away and start for themselves in the next valley? Here, Hale comes with an ingenious solution:

> "If a single pair, man and wife, should wander off into an inhabited region, and there, after a few years, both perish, leaving a family of young children to grow up by themselves and frame their own speech, …this speech might, and probably would, be an entirely novel language….
> The natural disposition of the oldest child, indeed, would be to yield to the youngest in this regards…. The baby-talk, the "children's language," would become the mother-tongue of the new community." (p. 297)

The same mechanism may have worked for a single widow, left alone with her infants. Baby-talk would remain her only language (pp. 299–300).

Hale presents extensive examples of baby-talk, demonstrating its lack of inflections, parts of speech, function words, and its very limited vocabulary. All these features have to be created anew, based on the children's "language instinct." This, Hale argues, can work in rich climates, where such bands of children have a chance to survive. It explains the proliferation of language families in tropical regions. Here, then, is Hale's (1886) ontogenetic perspective in a nutshell:

> "Briefly then, the plain conclusion to which all the observations point with irresistible force is, that the origin of linguistic stocks is to be found in the language making instinct of very young children." (p. 285)

The Microgenetic Perspective—From von Humboldt to Steinthal

von Humboldt's microgenetic stance, cited above, was much elaborated by Heymann Steinthal (1871, 1881). If language is what the speaker does, the origins of language should be traced back to the mental processes underlying the first vocal activities of our primordial ancestors. This would need "eine entwickelte Psychologie," but not much of that was available in Steinthal's time. Steinthal adopted Johann Friedrich Herbart's (1816) theory of "mental mechanics," but also the "reflex theory" of Hermann Lotze (1852), Herbart's successor in Koenigsberg, who hated mental mechanics. Steinthal did not hesitate to bridge the gap in developing his microgenetic theory.

Herbart developed a clever mathematical theory of how ideas, *Vorstellungen* get in and out of consciousness, mutually associating or dispelling each other. Herbart provided the precise differential equations that govern this "mental mechanics." The basic idea is quite simple. Consciousness is like a stage. On the stage are one or a few actors; it cannot contain more. All other actors push to get onto the stage, using their associations to actors on the stage and dispelling other actors from the stage. Below consciousness are conglomerates of associated ideas. New ideas on the stage are easily drawn into existing conglomerates, for instance, by similarity. This process is called *apperception.* The conglomerate into which a new idea gets associated, Herbert calls the *apperceptive mass.*

Steinthal now argued that what we mostly have on the stage of our consciousness is *words,* inner speech. These inner words are associated to some apperceptive mass below the stage of consciousness. This unconscious conglomerate of ideas is in fact the word's meaning. We are never fully conscious of a word's meaning. What we are conscious of is the inner word sound and its connection to the underlying meaning conglomerate. Levelt (2015) showed that this is exactly what Jackendoff proposed in his 1987 book on consciousness.

How did this originally get set up? Here is our still speechless ancestor, who suddenly perceives something exciting, say a running chicken. Following Lotze's theory, this perceptual nervous excitement will "flow out" through the nervous system. It could, for instance, release a vocal sound reflex, such as *ah!* The image of the chicken and the image of the self-produced sound reflex are almost simultaneous, and they share the "excitement" affect. This affective similarity between the chicken image and the reflexive sound image suffices, given Herbart's theory of association, to associate the two images in consciousness. Next time, our ancestor perceives the sound *ah!,* self- or other-produced, it will activate the "sleeping" image of the chicken and the whole conglomerate in which it is embedded. In other words, *ah!* in consciousness relates to the chicken conglomerate as any spoken word relates to its underlying meaning. Linguistically speaking, *ah!* has become a primitive root word.

We will not further follow Steinthal in developing this theory in deriving new roots from existing roots or in sketching the evolution of the sentence, the first steps in relating a subject to a predicate. They were quite innovative moves in largely unexplored area.

The Microgenetic Perspective—Wilhelm Wundt

In the year 1900, Wilhelm Wundt, not only the father of experimental psychology but also the father of psycholinguistics, published his two-volume *Die Sprache*. The deep motivation for writing this work was to account for the genesis of language, micro-, onto-, and phylogenesis.

The culminating Chapter 9 reviews the gigantic literature on language origins. It rejects all existing theories, including Steinthal's, and instead proposes a strictly "gestural theory" of language origins. Wundt (1900) set out to explain the genesis of speech from the microgenesis of gesture, "spoken language originally developed with and from sign language" (Vol. II, p. 637). According to Wundt, gestural movements are directly expressive of affect, meaning, or thought. We still see this, according to Wundt, in the mimic and pantomimic gestures, which universally accompany the speech of children and of *Naturvölker*. Sign language is the universal, natural expressive means of *homo sapiens*. It arises spontaneously in any community, just because it is directly expressive of meaning. In contrast, speech sounds have no intrinsic meaning, whatsoever; even interjections are not depictive or iconic as gestures can be.

How then did initially meaningless, arbitrary vocal expressions take over from these gestures? Here is Wundt's microgenetic explanation: It often happens that the larger pantomimic gesture also flows over into the articulators (notice the Lotze/Steinthal influence here). They happen to produce sounds, initially totally meaningless sounds. For our gesturing primordial ancestors, however, the simultaneity of the meaningless sound and the meaningful gesture created the mental association between that sound and the gesture, and from there between the sound and the gesture's iconic meaning. This became the seed from which speech and spoken languages developed and still develop. That is, in a nutshell, Wundt's theory.

Could this have worked? Did the activity of spontaneous meaningful gesturing with some frequency "flow over" into the voicing apparatus of early prespeech *homo sapiens*? We will never know, but recent work by Stephen Levinson (personal communication, 2017) seems to support Wundt's idea. Levinson recorded and analyzed a lengthy communication by a Deaf person, "K," on Rossel Island in the South Pacific, which is inhabited by a small totally isolated community. K does not speak and does not master a conventional sign language. But K could communicate fairly effectively by using iconic, pointing, and other gestures, a variety of self-invented "home sign."

What Levinson observed is almost continuous vocalization accompanying K's oft-extensive gestures. It is almost miraculous how Wundt (1900) described this kind of behavior, which he most probably never observed himself:

> "more energetic gestures are accompanied by more violent speech gestures." (p. 608)

The speech gestures Levinson observed were indeed largely guttural/prosodic. They vary in pitch and loudness, indeed in energy and violence. But they are rarely articulatory, varying in place or manner. That may, however, be the Achilles heel of Wundt's theory. Being prosodic, it is unlikely that these voicings will attain fixed associations to specific meaningful gestures. If that would occur at all, it would not result in a natural spoken language. Wundt regrettably leaves us in the dark about possible mediating mechanisms.

The Precedence of Cognition in Language Evolution

Wundt's chapter on language origins brings us back to Lenneberg and to Christiansen and Chater. Language, first signed, then spoken, did not suddenly arise according to Wundt (1900), but gradually emerged from, and in interaction with cognition, or in the terminology of the day, "consciousness":

> "The development of human consciousness necessarily implies the development of expressive movements, gestures, language." (p. 635)

Both in Wundt's time and today, gradual, cognition-based theories dominate. But both then and now, more abrupt transitions to language have been proposed by respectable scholars. In Wundt's time, proponents of a genetically based sudden emergence of speech and language were Horatio Hale (1886), and Thomas Huxley, cited by Hale. According to them, the third frontal convolution, containing Broca's area, had suddenly been enlarged by a genetic change "of the minutest kind," making language possible. Recently, Berwick and Chomsky (2016, p. 79) claimed a sudden appearance of *Merge* on which our recursive language capacity is based due to a genetically caused "slight rewiring of the brain." Wundt disliked, even ridiculed, such theories, calling them "miracle theories" (see Levelt, 2018, for more detail). History keeps repeating itself, just like the evolution of speech and language.

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