Emergence of Linguistic Abilities
Emergence of Linguistic Abilities

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1. Introduction

Few would argue with the assertion of contemporary science that language is the most complex capacity evidenced by humans. In particular, the structure of language—phonology and syntax—has been considered as an epicenter of formulations regarding necessary and sufficient conditions for defining language in its modern complex form. Some recent perspectives have included lexical/semantic aspects of acquisition as necessary to understanding the nature of language capacities as well. One robust area of continuing scholarly inquiry on understanding this complex capacity has been consideration of how it is acquired by young humans. An auxiliary paradigm has centered in comparative study related to how non-humans who display some aspects of both linguistic competence and performance may help to illuminate and define the boundary values for human language capacities. These research topics have also been brought to bear on considerations of the deeper origins of the human language capacity; the question of language evolution.

The works in Emergence of Linguistic Abilities illustrate a number of contemporary paradigms for exploring language acquisition, comparative studies of primate communication modes, as well as extensions to consideration of language origins. As such, they offer varied potential avenues to deepening understanding of the complex phenomena of language capacities in a triangulation of scientific paradigms and perspectives across scholarly disciplines. Consensus based synthesis will relative to deep and contemporary roots of human language await legitimate integration of the philosophical foundations from which these diverse perspectives emerge. Agreement is positive in scientific inquiry into complex phenomena. However, differences in insight offered from these diverse paradigms and research cultures may be as important to more profound levels of scholarly insight as is the goal of achieving consensus. Distinct and differing views offer, as well, potential for more sophisticated
inclusive theories in their diverse tools and research cultures. The story of the blind man and the elephant comes to mind as these authors consider the implications of their disparate approaches to considering emergence of language capacities both contemporary and historical.

2. The Broader Context of Considerations on Language Capacities

The “nature” versus “nurture” debate forms a fundamental topic in the debate on the origins of complex knowledge and behavior relative to language capacities. Early work by the philosophers Descartes (1637) and Kant (1924) illuminated this dichotomy in philosophical orientation. The diversity represented in their views provides one axis of philosophical difference in epistemological study of the origins of knowledge and observable behavior in acquisition of complex systems. “Nature perspectives emphasize the inborn capacities of humans as being present at birth. In contrast, a “nurture” orientation implicates the importance of environmental input to instantiation of complex capacities, including language acquisition. This distinction is cogent to the topics covered in these chapters as well. With reference to language acquisition, two distinct perspectives emphasize “nature” and “nurture” respectively.

A recent article by Chomsky and colleagues (Chomsky, Hauser & Fitch, 2002) is illustrative of a strong “nature” or structuralist perspective on language faculties. In this account, the authors have proposed a narrow language faculty (FLN) and a broad sense faculty (FLB) to describe language knowledge. FLN indicates an abstract linguistic computational system unique to humans and available in advance of acquisition in human infants. It is based on abstract mentally stored linguistic structures. The broader faculty of language (FLB) includes both the abstract computational system and sensory-motor (i.e. phonetic) and conceptual (i.e. semantic and pragmatic) systems with which that system interacts. FLB does not define human language competence uniquely relative to non-human communicators but is an aspect of the broader scope of language capacities, according to this formulation.

In a contrasting emphasis on “nurture”, researchers operating from biological (Boë, 2007; Lindblöm, 2008) and social (Tomasello, 2003; Oller, 2000) functionalist perspectives on language and its conceptual foundations have proposed gradual accretion of linguistic capacities. In this view, language capacities are viewed as being emergent within functional interactions in the individual speaker’s communication
environment. These functionally oriented conceptualizations have proposed that the biology of human speakers and the functions of language in social context ultimately constrain the structure of human language capacities. This broader definition of language capacities in children and adult speakers implies that study of peripheral aspects of perception and production, and the social pressures on use of language are needed aspects of scientific inquiry necessary to full understanding of language capacities. Language function, as well as forms emergent from phylogenetic and ontogenetic processes, is viewed as interactive. In this sense, “interactive” relates to the general interactions of internal biological and external social forces in supporting creation of adaptive language behaviors. Functionalist conceptualizations are in strong contrast to the FLN perspective of Chomsky and colleagues, where abstract mental competence forms the essential boundary of language in humans and function is not required for language to emerge.

Common to both structuralist linguistic “nature” and functionalist emergence or “nurture” perspectives is an emphasis on language form as one critical defining feature of contemporary human language facilities. Differences in the two perspectives lay in the conceptualization of the boundaries required to define language. In the case of acquisition of language capacities in young speakers, are these capacities based on maturation of a priori structures merely “triggered” by experience during acquisition (“nature”)? Alternatively, are they emergent properties, based on multiple function-driven social interactions founded in biological mechanisms that constrain the boundaries of human language as implemented by production and perception mechanisms (“nurture”)? Which aspects of language are unique to humans relative to comparative studies of non-human primates? These large scale questions infuse studies of language acquisition in the implicit assumptions that researchers make about whether language is properly defined by abstract competence or must include considerations of the functioning of peripheral mechanisms and social capacities.

3. Divergent Research Perspectives on Language Capacities

At present, structuralist and functionalist accounts are not convergent in their differing perspectives on defining characteristics required for understanding language or on the nature of acquisition of language capacities. However, as Lindblöm (2008: 329) has recently noted;
There are no absolute explanations in science, only broader and deeper accounts. Every academic discipline chooses its own starting points and proceeds from there to investigate its chosen fragment of the universe. In this sense, any scientific explanation rests on a (set of) preliminary, and vulnerable, claim(s). Progress takes place when scientists succeed in broadening and deepening their understanding of reality.

The diverse topics addressed by volume authors in *Emergence of Linguistic Abilities* illustrate Lindblom’s broad conceptualization of the nature of scientific inquiry. As such, they offer some optimism for deepening understanding of the complex phenomena of language capacities via triangulation of scientific paradigms and perspectives across scholarly disciplines. Differences in insight offered from these diverse paradigms and research cultures may be as important to deeper understanding of human language in the broadest sense as the goal of achieving consensus. The story of the blind man and the elephant comes to mind as these authors consider the implications of their disparate approaches to considering language capacities.

In Chapter 1, Gontier critiques Haeschel’s classic “ontogeny recapitulates phylogeny” assertion. In her narrative, she reflects the “nature” perspective on language competence as she does not consider function as a factor underlying language acquisition. Applications of paradigms focused on prelinguistic development of vocal and gestural output capacities in understanding the nature of young human’s language acquisition are taken into account by Guidetti in Chapter 2 and in Chapter 5 authored by Ducey-Kaufmann and colleagues. Complimentary with consideration of earliest stages of prelinguistic output in human infants, understanding of language boundaries in comparative primate study of gesture use is the central focus of Vauclair and Meguerditchian in Chapter 3. Each of these three chapters is relatively more oriented toward a “nurture” or functionalist perspective. The authors consider the implications of their scientific questions and paradigms for questions of language evolution as well. Implicit to considerations of evolution from a Neo-Darwinian perspective is incorporation of function of language and/or communication systems for the organism.

Three chapters triangulate on consideration of structuralist “nature” and functionalist “nurture” accounts of language acquisition in young children. A structural analysis paradigm is pursued in Chapters 8 and 10. Reimers reviews evidence to support the assertion that CVC syllables are the initial state of the phonological grammar in Chapter 8. Prosodic and lexical analyses of fillers and determiners are described by Bassano and colleagues in Chapter 10 as an aspect of noun grammaticalization. In
contrast, functionalist paradigms based on emergence of speech motor control are found in Chapter 4. Lavallée and Vilain consider visual and auditory capacities as they intertwine with emergence of speech motor control. Insights offered from study of young children with communication disorders are found in Chapters 9 and 11. Study of communication disorders offers the opportunity to view the emergence of language in the young child when one of the building blocks of the process is not present. Building blocks include auditory and/or visual perceptual, motor, cognitive, and social capacities available to children who are constructing language knowledge and language performance (Davis & Bedore, 2008). In this genre, Schauwers and colleagues review the emergence of vocal output complexity in children with profound hearing impairment who have received cochlear implant instrumentation very early in the process of language acquisition in Chapter 9. This paradigm enables consideration of the functional consequences on language output of impoverishment of auditory perceptual input in earliest periods of language development. In a complementary study of acquisition of higher level language form, van Kampen centers on emergence of a broad spectrum of lexical, grammatical, and discourse variables in the context of early auditory deprivation in one hearing impaired child in Chapter 11.

Chapters 6, 12, 13 & 14 consider the role of input via psychological paradigms in emergence of varied aspects of prelinguistic vocalizations and emergence of early language structure. Noiray and colleagues emphasize the role of input in the linguistically relevant pattern of vocalic rounding in French children. Their chapter forms a compliment to considerations addressed by Röhr-Sendlmeyer and Dahmken on early ambient language vocal tract adjustments in German infants in Chapter 7. These authors analyze the nature of vocal tract modification in infants relative to language input factors in the period between 4 and 8 months in human infants.

Chapters 12 and 13 consider the role of input in a German language environment related to a variety of dimensions of children’s linguistic output patterning. Lintfert analyzes emergence of ambient language stress patterns relative to ambient language input in Chapter 12. Kieburg and Schulz, in a grammatically oriented account, center on German verb particles and the relative role of input in their emergence. Müller and Höhle expand beyond considerations of language form to include lexical development as a crucial aspect of early acquisition of linguistic capacities. Like the other chapters in this section, Müller and Höhle’s chapter is founded on input as a crucial and relevant processing factor in instantiation of essential aspects of language knowledge. In this case,
lexical knowledge lies outside of the FLN envisioned by Chomsky and colleagues (2002) as constituting the core property of human language.

4. Historical Origins of Human Language Capacities

The diverse chapters focusing on language acquisition are contextualized, in several instances throughout Emergence of Linguistic Abilities, within the larger question of how and whether understanding of language acquisition may potentially illuminate understanding of the deeper origins of language capacities in early speakers; the question of language evolution.

Emergence of evolution as a scientific question has a relatively long history. The ban on scientific consideration of language origins by the Société de Linguistique of Paris in the mid nineteenth century, followed shortly afterward by the London Philological Society put a dark and continuing cloud over intellectual discourse on this topic for more that 100 years. Beginning in the 1970's there were a few attempts to revive the issue. Since the early 1990's, evolution, in particular language evolution, has again begun to be recognized as worthy of scientific consideration. Without a fossil record for consideration of language origins, researchers from diverse scientific disciplines have investigated capacities of the peripheral production and perceptual systems, social and cognitive driving forces via anthropological study, neural structure and function and genetic underpinnings, to name a few topics addressed. A recent grant initiative of the European Science foundation (2002-2006) The Origin of Man, Language, and Languages (OMLL) sought grant submissions in “Language and Archaeology”, “Language and the Brain”, “Language and Genetics”, “Language Acquisition and Language Universals”, “Language and Animal Communication”, and “Language Evolution and Computer Modeling”. The application of scientific paradigms in these diverse disciplines within the European scientific community is illustrative of the proliferation of scholarly inquiry, paradigms, and cross disciplinary fertilization presently characteristic of study of the evolution of language. “Language Acquisition and Language Universals” and “Language and Animal Communication” are illustrated in this volume on Emergence of Linguistic Abilities.

Cogent to consideration of language evolution as a crucial aspect of fully understanding the emergence of linguistic abilities is a set of questions posed in 1952. In this period before study of language evolution gained momentum as a viable dimension of understanding language, Nobel laureate Nikko Tinbergen voiced these four far-reaching questions.
His goal was to enable comprehensive consideration of the nature and origins of communication systems in living organisms. His questions form a wide-ranging template to guide research across disciplines into the historical origins of contemporary language function. Few single disciplines presently have access to a diversity of powerful paradigms to address all four questions in any comprehensive way. The implication of need for diverse paradigms is borne out by the multidisciplinary nature of inquiry into evolutionary origins of language characteristic of the recent ESF grant initiative on the Origin of Man, Language, and Languages. Tinbergen’s four questions encompass “mechanistic”, “functional”, “ontogenetic”, and “phylogenetic” aspects of communication systems:

1. “How does it work?” What mechanisms (neural, physiological, psychological, etc.) underlie expression of language capacities?
2. “What does it do for the organism?” How do language capacities affect the organism’s functional capabilities—survival and reproduction?
3. “How does it get that way in development?” What ontogenetic (biological, social and cognitive) factors guide acquisition of language capacities?
4. “How did it get that way in evolution?” How does the phylogenetic (evolutionary) history of the species help understand contemporary language capacities in light of ancestral features?

These four questions imply a broad definition of language capacities inclusive of both FLN (abstract knowledge system enabling recursivity) and FLB (sensori-motor and conceptual-intentional system) as proposed by Chomsky and colleagues (2002). Importantly, Tinbergen’s questions also implicate consideration of the function of language as a necessary aspect of emergence of communication systems in ontogeny and in phylogeny in stark contrast to structuralist formulations. An auxiliary, but quite important, implication of these questions is inclusion of paradigms considering non-human communication systems. Comparative paradigms provide an avenue to understand the boundaries of human language in the context of the structure and function of diverse communication systems across the animal kingdom. This crucial question addressed by Hauser (1996) in his seminal volume Evolution of Communication.

The works from diverse disciplines that comprise the Emergence of Linguistic Abilities largely focus on three of Tinbergen’s four seminal questions. Tinbergen’s questions 1 (underlying mechanisms) and question 3 (acquisition or ontogeny) form the core consideration of the bulk of the chapters. Question 4 (evolution or phylogeny) is addressed directly within
Chapters 1-3 in the ontogeny/phylogeny sub-section. The diversity of paradigms and perspectives represented provide needed level of detail for consideration of the question of emergence of language in all its potential dimensions.

5. Summary

The challenge for contemporary study of the nature and boundary values for human language capacities is to continue multidisciplinary interactions in spite of the lack of coherence of present theoretical proposals and paradigms. With continued exposure, this diversity can begin to achieve a true scholarly level of cross-fertilization with the sophistication and comprehensiveness necessary to move toward coherent theoretical proposals for contemporary and historical understanding of human language capacities. Emergence of Linguistic Abilities contributes to that ongoing scientific dialogue as envisioned by Lindblöm.

References

PART I

ONTogeny / PHYlogenY
CHAPTER ONE

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

NATHALIE GONTIER

1. Introduction

Several scholars that work within the field of evolutionary linguistics (e.g. Bickerton, 1990:115; McNeillage & Davis, 2000; Givón, 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". 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” 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. 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 and thus are not present in earlier evolved species. Palingenetic processes, 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). 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