What are the levels and mechanisms/processes of language evolution?

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ABSTRACT

Modern evolutionary biology is currently characterized by epistemological divergence because, beyond organisms and genes, scholars nowadays investigate a plurality of units of evolution, they recognize multilevel selection, and especially from within the Extended Synthesis, scholars have identified a plurality of evolutionary mechanisms that besides natural selection can explain how the evolution of anatomical form and functional behavior occur. Evolutionary linguists have also implicated a multitude of units, levels and mechanisms involved in (aspects of) language evolution, which has also brought forth epistemological divergence on how language possibly evolved. Here, we examine how a general evolutionary methodology can become abstracted from how biologists study evolution, and how this methodology can become implemented into the field of Evolutionary Linguistics. Applied Evolutionary Epistemology (AEE) involves a systematic search and analysis of the *units* (that what evolves), *levels* (loci where evolution takes place), and *mechanisms* (means whereby evolution occurs) of language evolution, allocating them into *ontological hierarchies*, and distinguishing them from other *kinds of evolution*. In this paper in particular, we give an in-depth analysis of how AEE enables an identification, examination, and evaluation of levels and mechanisms of language evolution, and we hone in on how hierarchies and mechanisms of language (evolution) can and have been defined differently. For an in-depth analysis of *units* of language evolution, we refer the reader to Gontier (2017) for which this paper functions as a follow-up. Thus, rather than present a specific theory of how language evolved, we present a methodology that enables us to unite existing research programs as well as to develop theories on the subject at hand.

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1. Introduction

The evolution of language is studied from within different disciplines, and all have identified a multitude of what can be called *units* (elements that evolve), *levels* (loci where these elements evolve), and *mechanisms* (conditions or processes according to which these elements evolve at certain loci) of language evolution. This multitude necessitates a *pluralistic* stance on both the nature of language and how language evolves. And here, Evolutionary Linguistics can learn from evolutionary biology and evolutionary epistemology, where scholars nowadays also investigate a plurality of units of evolution, they recognize multilevel selection, and especially from within the Extended Synthesis, scholars are identifying a plurality of evolutionary mechanisms that besides natural selection can explain how evolution occurs.

In this paper, under (**2**), we analyze how scholars active in traditional evolutionary epistemology and Universal Darwinian have reformulated natural selection theory in order for the latter to not only account for the evolution of biological form but also for the evolution of cognition, behavior, language and sociocultural phenomena. This research has led to the identification of new *units* and *levels* of evolution. The recognition of *unit* and *level pluralism*, in turn, has resulted in a questioning of the boundaries that a previous generation of researchers assumed there existed between the inorganic (physical and chemical), organic (biological), and superorganic (sociocultural). And this requires us to build *new hierarchical views* of how the biological and sociocultural relate to one another.

In part (**3**), we hone in on how the Extended Synthesis has made us recognize that evolution can occur by a multiplicity of mechanisms and processes. This recognition of *mechanism pluralism* adds to the complexity of how we study language evolution, because on the one hand, we often cannot straightforwardly link a specific biological evolutionary mechanism to the trait of which we want to study how it evolved, and on the other, there also exist mechanisms specific to cognitive, social, cultural and linguistic evolution (Zywiczynski et al., 2017). Applied Evolutionary Epistemology (AEE) is a methodology that enables us to cope with this unit, level and mechanism pluralism, and we detail how the methodology can become implemented into Evolutionary Linguistics.

In part (**4**), we examine how existing research programs in (evolutionary) linguistics have already tackled the problem of identifying the units, levels and mechanisms of language (evolution), and how they have conceptualized the ontological hierarchies relevant for language (evolution). We provide a tentative ordering of the existing data, and demonstrate how AEE enables unification of the ongoing research endeavors.

Under (**5**), we demonstrate how AEE not only enables an ordering of existing data. It also provides a research methodology in the form of three heuristics that enable an identification, examination and evaluation of *units*, *levels* and *mechanisms* of language evolution, how they can be allocated into *ontological hierarchies*, and how language evolution can be differentiated from other *kinds of evolution*.

Finally, in parts (**6**) and (**7**), we give an in-depth analysis on how we can in particular identify and analyze the various *levels* or loci where language evolves, and, the various *mechanisms* and processes whereby language evolves. For an in-depth analysis of the unit-heuristic, we refer the reader to Gontier (2017), for which this paper functions as a follow-up.

Thus rather than present a theory of language evolution, in this paper we present a methodology that enables us to unify existing research programs as well as to develop theories on when and how language evolved.

2. Traditional evolutionary epistemology (EE) and Universal Darwinism

Natural selection theory is a theory that first developed in the biological sciences with the primary objective to explain the evolution of biological species, in particular their shared anatomical form, common descent, and diversity (speciation and extinction). Traditional EE (Bradie, 1986; Campbell, 1960, 1974a) initiated from early attempts to apply natural selection theory to phenomena originally studied outside the field of biology, including cognition (originally studied from within psychology), behavior (ethology), language (linguistics) and sociocultural phenomena (sociology and anthropology). In order to apply natural selection theory to cognitive, behavioral, linguistic and sociocultural phenomena, scholars have "universalized" natural selection theory by examining how it can operate on units other than genes or organisms. That is why this approach has also been called Universal Darwinism (Dawkins, 1983) and Universal Selectionism (Cziko, 1995).

How then did these scholars "universalize" natural selection?

For one, scholars have investigated under what *conditions* the *mechanism* of natural selection operates, and these conditions have either been formulated in terms of heuristics such as "blind variation and selective retention" (Campbell, 1960, 1974a) or logical skeletons of natural selection, that focus on the three Darwinian principles of "differential variation, inheritance and differential fitness" (Lewontin, 1970).

Secondly, such research has brought forth the units (Lewontin, 1970) and levels (Brandon, 1982) of selection debate. Beyond genes and organisms, which have long been considered the only *units* of natural selection, scholars have introduced concepts such as replicators and memes (Dawkins, 1982), interactors (Hull, 1981), culturgens (Boyd and Richerson, 1985), linguemes (Croft, 2000), and reproducers (Griesemer, 2000) to investigate what kind of entities can evolve by means of natural selection.

Thirdly, scholars have recognized that such units can become selected at *multiple levels of an evolutionary hierarchy* (Hull, 1981; Okasha, 2005, 2006). A gene, for example, can be the target of selection at the level of the organism, group, or species, and the latter three are entities that together form a genealogical hierarchy that is based upon common descent (Eldredge and Salthe, 1984; Tëmkin and Eldredge, 2015). And a lingueme (Croft, 2000), for example, underlies an individual's idiolect, but the lingueme is also altered by dialects and sociolects in cultural ecology (Mufwene, 2001).

In sum, classic EE brought forth research on the units of selection, the levels where selection occurs, and how these units and levels combine into the classic evolutionary hierarchy of genes, organisms and species (Hull, 1980, 1981).

3. The Applied Evolutionary Epistemological approach (AEE)

Applied Evolutionary Epistemology (Gontier, 2010a, 2010b, 2012, 2013, 2017) is a scientific and philosophical methodology used to conduct evolutionary research. It builds on the research methodologies associated with classic evolutionary