Prolegomena: Why Now is the Time to do Phonetics/Phonology in Evolutionary Linguistics

Shin-ichi Tanaka

The New Caledonian crested gecko (Correlophus ciliatus) is a species of gecko, yamori in Japanese, which has a brown, orange, or yellow colored body of about 20 centimeters in length, with a relatively large, wedge-shaped head and two prominent crests that run from each eye to the tail. First described in 1866 by the French zoologist Alphone Guichenot, this species had long been considered extinct until its rediscovery in 1994. In other words, the crested gecko had been lost to history for about a century before its phoenix-like resurrection. Today, due to captive breeding in Europe and the United States, the population of the crested gecko in captivity is thriving all around the world.

Studies on the origins of language have suffered the same fate in the same period as the crested gecko. The field was banned as a pipe dream by la Société de Linguistique de Paris in 1866 and by the Philological Society of London in 1872, and it was abandoned for more than a century until its revival in the 1990s. But the Evolution of Language conference series (also known as EvoLang) was launched as an international and interdisciplinary attempt to examine language within the neo-Darwinian framework of modern evolutionary theory, with its augural meeting in Edinburgh in 1996. History seems to have come full circle when the second and third conferences were held in London and Paris respectively, the very same cities where the bans were announced more than a century before.

With regard to the potential difficulties involved in the field, which were the very reasons such studies were banned, Fujita, Tanaka, and Ike-uchi (to appear) argue that the challenges are threefold. First, although cross-species comparisons are an indispensable method in evolutionary biology, language across species appears to be uncomparable because language is uniquely human. Second, direct evidence for the origins or evolution of language seems unavailable because there are no fossils of language, and thus there is no way of comparing languages among Homo sapiens, due to the extinction of Neanderthals and Denisovans. Third, it might be difficult to trace back to language origins through the ‘descent with modifications’ or the assumption of gradualism in Darwinian evolutionary theory since according to linguistic theory, language is a whole system that is too rich and complicated to untangle or reduce to primitive functions. Unfortunately, this apparent complex and technical view towards language held by linguists tend to impede their opportunities to collaborate with researchers in ethology, sociobiology, cognitive sciences, and neurosciences. Of course, aside from these difficulties, there is always a problem with the definition of ‘language’: what specific mechanism is meant by ‘language’ in stating the difficulties.

However, beginning in the 1990s, the development and maturity of ethology, sociobiology, and linguistic theory has proven the fallacies of the premises stated earlier (underlined). First, it has been proven in the 20th century that some species such as primates, whales, songbirds, budgerigars, parrots, frogs, cicadas, crickets, bees, and even ants have a certain form of ‘language’ in the sense that they communicate with one another through the use of vocal, gestural, or chemical signals that form meaningful symbols. If language is not species-specific, then a comparative method is available for the study of language origins (again, putting aside the problem of what ‘language’ is). Second, the
availability of cross-species comparisons has made up for the lack of comparison within a species (e.g., among Homo sapiens sapiens, Homo sapiens neanderthalensis, and Homo sapiens ssp. Denisova). Thus, a scientific inquiry has become possible based on natural observations or laboratory experiments of extant humans and other species. In that sense, there are ‘living fossils’ of language in nature. Third, with the advent of generative grammar, or more specifically the Chomskian minimalist program in the 1990s, it has been proven that language is not a complicated monolithic whole but a minimally simplified function consisting of Merge, a recursive operation of combining two elements, with the interfaces of the Sensory-Motor (SM) system and the Conceptual-Intentional (CI) system. In this modular view of language, only Merge is a domain-specific and human-specific component of universal grammar, while SM and CI are employed in other behavioral and cognitive domains and are gradually evolved from those of other species. Despite its specificity in domain and species, Merge must also be a result of adaptation (for example, due to recursive Merge, high-level communication in quality and quantity may have become possible), and hence a comparative method holds for all of the three components (Merge, SM, and CI). In this sense, the descent of language can be retrieved, and evolutionary linguistics and Darwinian evolutionary theory are no longer conflicting. Also, the radical minimization of a domain-specific and species-specific component of human language (namely, the simplification of universal grammar) has enabled non-linguistic fields to access linguistic theory more easily and has encouraged potential interdisciplinary collaboration.

Importantly enough, comparative methods are not limited to the examination of the evolutionary development (phylogeny, i.e., biological evolution). They are also viable in investigating the advancement within a species (ontogeny, i.e., language acquisition) and within a set of cultural entities (glossogeny, i.e., language change and typology), as in the model proposed by Kirby (2002), Kirby and Hurford (2002), and Fitch (2010). These three types of studies can be characterized as macroevolution (language origin in phylogeny) or microevolution (language acquisition in ontogeny and language change and typology in glossogeny), depending on the time scale of the relevant evolutionary changes. From the viewpoint of phylogeny, language evolution can be said to have already completed about 60–80 thousand years ago. In this regard, studies on language evolution are likely to tend toward language origins. However, from the perspective of ontogeny and glossogeny, language evolution is still ongoing. Thus, a comprehensive and integrated study on language origins and evolution must take into consideration biological evolution, developmental evolution, and cultural evolution. Developmental and cultural evolution may well offer significant clues to biological evolution, as strongly evident in the fields of evolutionary developmental biology and sociobiology. The discussion of ‘evolution’ in the realm of ontogeny and glossogeny (such as acquisition, historical change, and typology of language) is not metaphorical in any sense.

To sum up, given recent developments in related fields, (1) illustrates the connection between language origins and evolution from the perspective of macroevolution and microevolution.

---

1) Macro-/Micro-Evolution of Language (adapted and modified from Fujita (2016a, b))
Here we assume an archaic and primitive form of language, called ‘proto-language’, which consisted of a proto-SM system for externalization or linearization, a proto-CI system for internalization or inner thought, and a proto-Lexicon for vocabulary or symbolic repertoire. These proto-modules as a whole, in turn, have evolved into human language as an emergent property by way of Merge. This captures the macroevolution or phylogeny of human language, and the origins of human language must not be singular but rather multilateral. When exposed to environmental and social factors (including primary linguistic data), the shared property of the three modules with Merge in human language then generates particular languages. The development of a particular language within an individual is ontogeny, while the diachronic change of a particular language or the typological distribution of particular languages is glossogeny. This is the microevolution of particular language.

In this way, research on the origins and evolution of language has revived in the name of ‘biolinguistics’ or ‘evolutionary linguistics’ in the 1990s. Henceforth, we will use the latter term, since the former is often interpreted narrowly as ‘the Chomskian school of evolutionary linguistics’. Present-day evolutionary linguistics not only departs from its precursor more than a century ago in its firm basis on empirically testable hypotheses, but also provides many in number and rich in phonetic content. Thus, one such hypothesis is the modular view of language mentioned above. The nine feature articles in this special issue put forward further hypotheses, which are tested empirically through various methodologies in their relevant disciplines.

From the perspective of animal vocal communication, KODA, OKANOYA, and SEKI probe into behavioral neuroscientific issues in macrowhile, based on observations of some forms of vocalizations including ‘calls’ and/or ‘songs’, by comparing specific species (e.g., primates, rodents, finches, and budgerigars) with a wide range of other relevant species including Homo sapiens. These works insightfully offer the blueprints of human language and prompt us to reconsider what ‘proto-language’ is like, regardless of whether its connection to human language is synapomorphy (homology) or homoplasy (analogy). Assuming that phylogeny is reflected in some way on ontogenetic development, TAKAHASHI considers vocal learning in other species including whales, oscines, bats, and marmosets by comparing it with preverbal vocalization in human infants. This study sheds fresh light on the features of ‘proto-language’ in its two (phylogenetic and ontogenetic) senses. On the linguistic side, MA-

ZUKA et al. also focus on the interaction between macroevolution and microevolution, in particular, issues in evolutionary developmental psychology, and draw significant implications for evolution from principles in phonology and experiments in infant-directed speech (i.e., motherese). SAMUELS et al. and SCHWARTZ’s concerns are with microevolution, but they both focus on glossogenetic variation or typology in phonetic/phonological forms and offer deep insights concerning biological evolution. Their findings are remarkable for their impact on, and their implication for, phonological theory. Finally, NASUKAWA and TANAKA refine a model of phonology in evolutionary linguistics through observations of the parallelism between syntax and phonology, which brings the origins of human language to light from a phylogenetic perspective. Although the aim of this special issue is not necessarily to discuss the emergence of Merge in (1), the two papers highlight it by considering its meaning in the evolutionary context.

Now one might wonder why this special issue reviews current trends of evolutionary linguistics in only phonetics/phonology. Actually, in the 1990s, “phonology was different” from syntax within the generative tradition (Bromberger and Halle (1989)). Phonology was thought of as a function of mapping morphophonemic forms in the underlying representation to phonetic forms in the surface representation. Thus, it was considered inseparable from phonetics in that mapping system or grammar. This meant that the system of computation and the system of its interface with sensory-motor organs were inextricably interwoven; in other words, unlike syntax, formalism and functionalism were inseverable. Such an assumption was true for both the rule-based framework before the 1990s and the constraint-based framework after 1990s. As primitives in grammar, both language-particular rules and language-universal constraints were rich in phonetic content. As a consequence, unlike syntax, grammar in phonology could not be reduced to a simple operation of recursive Merge with the interfaces of SM and CI, precisely because its operation or computation was itself inseparable from phonetic content. Ideally, universal grammar as a uniquely-human trait should only contain recursive Merge as in (1), but it would involve lots of universal constraints with phonetically-rich content in Optimality Theory, for example. That was also true for Government Phonology as a principles-and-parameters approach to phonology, whose universal principles are many in number and rich in phonetic content. Thus, these unfavorable assumptions in phonological theory deterred studies on language origins and evolution, still
more attempts to resolve Darwin’s problem.

But in the 2000s, a new stream in phonological theory emerged. ‘Substance-free phonology’, developed by Hale and Reiss (2000a, b, 2008), has treated phonology as a system of abstract symbolic computation, divorced from phonetic content. Based on this model, Samuels (2009, 2011) has further put forward an explicit framework and methodology for phonology in evolutionary linguistics. Blevins (2004) has complemented this line of linguistic research in biological evolution by focusing on historical change and typology in cultural evolution. Also, there was an exception to the 1990s’ situation in which phonology was different from syntax; namely, as another stream in phonological theory, Government Phonology has long assumed a parallelism between syntax and phonology since its early period and has a potential of updating with the maturity of the minimalist program in syntax. In fact, Cyran (2004) and Scheer (2004) have probed into ‘minimalism’ in this framework.

In this way, within an evolutionarily adequate model, we can do phonetics as issues of the SM system and do phonology as issues of Merge with the interfaces of the SM and CI systems.

Now phonological theory has become mature enough to pursue the issues of language origins and evolution. The next necessary step is to create and test specific hypotheses empirically and elaborate a valid model of evolutionary linguistics in phonetics/phonology. Such pursuits should be implemented by means of a well-balanced and multi-faceted project that takes biological, developmental, and cultural evolution into account. This is why our feature articles cover these lines of research under the unified theme and goal.

Acknowledgement

I would like to express my deepest appreciation to Kuniya Nasukawa and Miki Takahashi for their active and careful cooperation in organizing and reviewing the feature articles and to all of the authors for their unstinted original works for this special issue. I am also very grateful to Kazuo Okanoya for his valuable assistance in launching this joint project. Special thanks go to Yoshio Saito, editor-in-chief, who has kindly offered an occasion of the joint project and patiently helped the organizer with the publication of the issue. This project was supported by MEXT Grant-in-Aid for Scientific Research on Innovative Areas #4903 (Studies of Language Evolution for Co-creative Human Communication), 17H06379, under the specific branch of “Theoretical Frameworks for Studying the Origins and Evolution of Language”.

References