

# Tokyo Lectures in Evolving Linguistics 2019

*Abstracts*



March 11

## **Generative grammar, cognitive linguistics, and language evolution**

**Koji Fujita & Kazumi Taniguchi**

This lecture is designed as an introduction to generative grammar and cognitive linguistics as theoretical backgrounds for our Evolving Linguistics project. We review basic concepts and ideas of these frameworks with a special focus on language evolution. As it stands, the strong opposition between GG and CL is often harmful to a better understanding of how human language first came into being in the species (biological evolution) and developed later in different societies (cultural evolution). We will clarify some advantages and disadvantages of each position and discuss some possible forms of unifying their good insights with other relevant fields to construct an integrative scenario of language evolution. (For the most part, this lecture is given in Japanese.)

## **Emergent constructive approach to evolving linguistics**

**Takashi Hashimoto**

The origin of language is characterized by the biological evolution of abilities related to language and communication, and the evolution of language by the structuralization and complexification of language knowledge as well as communication systems through cultural evolution. In this lecture, I will introduce emergent constructive approach to the origins and evolution of language. This approach is a methodology to analyze complex phenomena by constructing and operating the evolutionary and emergent processes of objective phenomena. Two idiosyncrasies of human linguistic communication will be the primary focus as Evolving Linguistics, namely, using hierarchically organized symbol sequences in language and sharing intentions in symbolic communication. The integration of these two characteristics is considered to make humans co-creative.

March 12

## **Biological pre-adaptations to language**

**Kazuo Okanoya**

Language divides humans from other animals. Yet, language is a property shaped by evolution. Language enables transmission and accumulation of knowledge and technology.

And these established the special niche of humans on the earth. We need to explain the discontinuity based on the continuity of evolution. In this lecture, I consider biological pre-adaptations that resulted in the emergence of language, and evolutionary driving forces that pushed the process of emergence. As pre-adaptations, I consider vocal plasticity, behavioral segmentation, and contextual segmentation. As driving forces, I discuss sexual selection and domestication. I will use examples from various animal behaviors, including bird song, mice song, gibbon song, rat spatial navigation, and proto-compositional use of calls in some monkeys and birds. I present possible scenarios that can explain the emergence of language based on these biological considerations.

### **When and why language emerged**

**Yasuo Ihara**

Language is perhaps the most conspicuous human trait that makes us consider ourselves different from all other animals. For a better understanding of the evolution of language, it is essential to narrow down possible timings for the emergence of the human language faculty, or its functional constituents, on the history of human evolution. Also of importance is to specify the ecological context within which each of these functional designs was favored by natural selection. As part of our Evolving Linguistics project, we have launched our endeavor to integrate knowledge from physical anthropology, archaeology, primatology, and evolutionary theory to explore the historical and ecological aspects of human language evolution. This lecture will outline our perspectives and recent developments.

### **Language learning, language use, and the evolution of linguistic structure**

**Kenny Smith**

When we look across the languages of the world, we see that they all share the same fundamental set of structural features that give language its open-ended expressive power. Those universal structural features of language presumably reflect properties of the way in which humans learn language, which may in turn be shaped by our genes. But language is not necessarily a direct reflection of properties of individual learners: languages persist in populations via a repeated cycle of learning and use, where learners learn a language by observing the communicative behaviour of other individuals who learnt their language in the same way. Languages evolve as a result of this cycle of learning and use, and are therefore the product of a potentially complex interplay between the biases of human language learners, the communicative functions which language serves, and the ways in which languages are transmitted in populations. In this talk I will present a series of

experiments, based around artificial language learning, dyadic interaction and iterated learning paradigms, which allow us to explore the relationship between learning and use in shaping linguistic structure; I will finish with an experimental study in non-human primates, which suggests that systematic structure may be an inevitable outcome of this cycle of learning and use, rather than a reflection of uniquely human learning capacities.

### **What use is half a sentence? Grammar caught in the act of natural/sexual selection**

**Ljiljana Progovac**

This lecture focuses on the evolution of grammar, advocating a gradual emergence of hierarchical structure and transitivity, as subject not only to cultural innovation, but also to natural/sexual selection forces. I present a precise linguistic reconstruction of the initial, proto-grammar stage, characterized as an intransitive, flat, two-slot mold, unable to distinguish subjects from objects. Even this crude grammar offers clear and substantial communicative benefits over no grammar at all, as well as reveals, through its limits, reasons and rationale for evolving more complex grammars. The particular uses to which this proto-grammar can be put even today (e.g. insult: cry-baby; naming: rattle-snake; proverbial wisdoms: Monkey see, monkey do; Like father, like son) reveals why this cultural invention (of coining binary combinations) would have been highly adaptive at the dawn of language. With the goal to shed concrete light on how biological evolution may have begun to shape the genetic make-up that supports human language, a specific sexual selection scenario will be considered. By identifying insult (verbal aggression) as relevant for early language evolution, this proposal also meaningfully interacts with the recent proposals regarding human self-domestication.

March 13

### **Social-pragmatic approach to language development**

**Harumi Kobayashi**

We cannot look at how humans acquired language for the first time on this planet, but we CAN look at how humans acquire language for the first time in life. Exploring language development provides us a precious opportunity to examine possible mechanisms that promoted emergence of language. In developmental psychology, several approaches have been presented to account for mechanisms of language development. In this lecture, I will discuss three major approaches, constraint/bias approach, statistical learning approach, and social-pragmatic approach. Social-pragmatic approach focuses on humans' ability to infer other people's intention and tries to explain language development as a process of

emerging skills of sharing intentionality. I will discuss the plausibility and advantages of the social-pragmatic approach from the viewpoint of Evolving linguistics.

### **Of speech and birdsong: Surprising similarities in brain circuits for vocal learning**

**Stephanie White**

Before they learn to sing, songbird nestlings, like human babies, cry for attention. Only through hours of practice during 'critical periods' do they develop a song suitable for courting mates. Language also blossoms during a critical period whose closure makes it difficult to speak a foreign tongue. Our research focuses on the FoxP2 transcription factor whose link to language is unprecedented: a single base mutation in the DNA-binding domain causes a human speech disorder with a Mendelian inheritance. What we learn about FoxP2 and other vocal-related molecules in birdsong may tell us how they affect speech. Remarkably, the act of morning singing reduces FoxP2 levels within song control cells of the avian striatum, along with coordinated changes in thousands of other genes. These changes occur in young and old birds. Changes unique to young birds may underlie critical period learning. We set out to identify how these gene co-expression patterns shift across the critical period boundary. In both young and old birds, we found patterns that were regulated by singing, >70% of which were subsequently found in human gene modules related to autism. We then found patterns that were tightly linked to learning in young birds but that were lost in old birds implicating them in critical period plasticity. Several of these learning-related genes are essential for language development. We capitalize on the robust brain-behavior relationships in songbirds to functionally test these relationships. Our work reinforces the convergent evolution of vocal learning systems in birds and humans.