LANGUAGE DEVELOPMENT AND COGNITIVE ONTOGENY: AN IMPORTANT LINK

OLGA VASILEVA[*1] and MICHAEL PLEYER[2]

[*]Corresponding Author: ovasileva@langara.ca
[1]Psychology Department, Langara College, Vancouver, Canada
[2]CLES, Nicolaus Copernicus University, Torun, Poland

The field of language of evolution is inherently interdisciplinary, attracting specialists from varied disciplines spanning from linguistics and psychology to computer science and biology. Although this interdisciplinary nature is incredibly productive and should be celebrated, it poses additional challenges to the field. Among such challenges is the existence of somewhat neglected topics that are crucial for understanding language evolution and yet are not sufficiently investigated, such as, for example, animal cognition (Fitch, 2020). Recent advancements in the field call for a more holistic approach to language by treating it first and foremost as a multi component system (Benítez-Burraco & Boeckx, 2014; Fitch, 2012; 2020) that is intimately related to human cognition. It is this tight link between organisms' communicative system and cognitive abilities that is unmatched in other species and makes human language particularly "stand out". Although the very idea of the role of language in the formation of human cognition is not novel (tracing back to Vygotsky (2012), it has received surprisingly little attention from the field of language evolution.

Language ontogeny is frequently invoked in language evolution discussions. At the same time, it is a research area that highlights the sharp contrast between two approaches focusing on the *communicative* and *"purely linguistic"* aspects of language. While the former investigate communicative aspects of language and other parameters that likely interact with the language system, such as social cognition (Tomasello at al., 2005), the latter focuses on the development of the linguistic system (e.g. syntax or vocabulary). It is thus possible to say that these approaches investigate either the formation of the linguistic system and its internal

“gear” (e.g. syntax) or language precursors or the external aspects of language (e.g. speech production), with insufficient interaction between the two. This situation in turn results in a quite fragmented (if not reductionist) approach where child development is studied not as a unified phenomenon, but rather specific aspects of it at a time point. An Evolutionary-Developmental Linguistics remains quite underdeveloped as a research field.

In our opinion, language development provides one of the most convincing types of evidence of the connection between language and cognition in humans. We briefly outline two lines of research demonstrating that in human children language development 1) corresponds with simultaneous and inter-dependent emergence of varied cognitive abilities and 2) results in qualitative changes in behavior. From the first line of research examples of language association with other domains include: object permanence (Gopnik & Meltzoff, 2021), categorization (Novack et al., 2021), and ToM (Tomasello et al., 2005). Research on the interaction of the motor domain and language suggests that developing linguistic system allows children to perform more complex hierarchical goal-oriented behaviors (Greenfield, 1991; Michel et al., 2013) as well as engage in complex play behavior (Pleyer, 2020).

Summarized results of decades long research programs with primates trained to communicate with language-like systems suggests that primates are overall capable of using symbolic communicative systems (Savage-Rumbaugh et al., 2018). Additionally, results of comparative studies demonstrate the presence of cognitive abilities in other animals remarkable both in their complexity and abundance (Andrews, 2020; Zentall, 2020). Animals can represent their environment mentally, operate abstract concepts and perform goal-oriented behavior (Godfrey-Smith, 2016). However, to this day, there is no convincing evidence the development of the communicative system has drastic effects on the development of cognitive abilities and qualitative changes in the behavior in other species (Novack & Waxman, 2020). While absence of evidence, by all means, cannot be equated with evidence of absence, this notion requires careful theoretical and empirical investigation. Underestimation of the importance of the link between human cognition and language in ontogeny in our opinion leads to limitations in developing language evolution research programs. We suggest that it is important not only to compare and contrast animal communication and communicative functions in human language but to explore differences in cognitive ontogeny as well as pose the question of why and how the tight link between language and cognition emerged in humans.

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