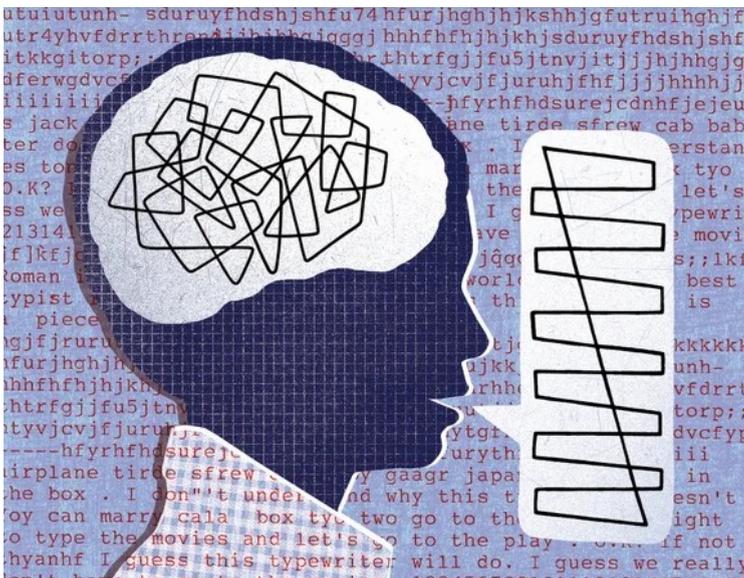


A unique biological trait enabling human complex language usage

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The development of language can be considered the second major innovation of humankind after the use of fire. It significantly improves communication efficiency and enables abstract conceptual thinking among humans. Although human language is learned through socially mediated interactions [1,2], humans might not be capable of complex language usage without biological evolutions.



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A group of researchers, led by Takeshi Nishimura (Kyoto University), have discovered that the capability of producing complex language among humans might attribute to a unique trait that cannot be found in other primates: the loss of vocal membrane in the larynx [3]. Employing magnetic resonance imaging (MRI) and computerized tomography (CT) scans, the researchers found that all 43 different studied primate species had a membrane that

does not exist among humans [4]. The loss of vocal membranes in the larynx – often referred to as the voice box – allows humans to produce stable, harmonic-rich phonation, which mouths and tongues can manipulate to generate complex sounds that are the foundation of language.

The finding published in *Science* is fascinating from the evolutionary biology perspective as it helps explain one of the humans' major evolutions. It is also no less interesting when viewing the finding from the information-processing perspective [5,6].

The mindsponge theory assumes that an individual is an information-processing system, and communication can be deemed an information-exchanging process among two or many systems [7]. Such systems do not only have to obtain the necessary receptors (e.g., auditory and cognitive systems) to absorb the information (e.g., sounds) but also need to acquire the information generation capability (e.g., cognitive and voice generation systems) for a 'complete' information-exchanging process. Following this way of thinking, the voice generation system and the auditory system might also need to adapt and evolve for more complex information (e.g., language) to be exchanged.

Although the above assumption is speculative, it might be a useful suggestion for studying the rising complexity of language and communication methods [8].

References

[1] Meltzoff AN, et al. (2009). Foundations for a new science of learning. *Science*, 325(5938), 284–288. <https://www.science.org/doi/10.1126/science.1175626>

[2] Li P & Jeong H. (2020). The social brain of language: grounding second language learning in social interaction. *npj Science of Learning*, 5, 8. <https://www.nature.com/articles/s41539-020-0068-7>

[3] Nishimura T, et al. (2022). Evolutionary loss of complexity in human vocal anatomy as an adaptation for speech. *Science*, 377(6607), 760-763. <https://www.science.org/doi/10.1126/science.abm1574>

[4] Stahl A. (2022). Why humans have more voice control than any other primates. *ScienceNews*. Available at: <https://www.sciencenews.org/article/humans-primates-voice->

[control-cords-larynx-membrane](#)

[5] Vuong QH, Nguyen MH, La VP. (2022). *The mindsponge and BMF analytics for innovative thinking in social sciences and humanities*. De Gruyter. <https://books.google.com/books/about?id=EGeEEAAAQBAJ>

[6] Nguyen MH, et al. (2022). Introduction to Bayesian Mindsponge Framework analytics: An innovative method for social and psychological research. *MethodsX*, 9, 101808. <https://www.sciencedirect.com/science/article/pii/S2215016122001881>

[7] Vuong QH. (2022). *Mindsponge Theory*. AISDL. <https://books.google.com/books?id=OSiGEAAAQBAJ>

[8] Mufwene SS. (2013). The emergence of complexity in language: An evolutionary perspective. In MB Àngels & BB Albert (ed) *Complexity perspectives on language, communication and society* (pp. 197–218). Springer. https://link.springer.com/chapter/10.1007/978-3-642-32817-6_13

