

Culture may explain why brains have become bigger

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A theory called the cultural brain hypothesis could explain extraordinary increases in brain size in humans and other animals over the last few million years, according to a study published in *PLOS Computational Biology* by Michael Muthukrishna of the London School of Economics and Political Science and Harvard University, and colleagues at the

University of British Columbia and Harvard University.

Humans have extraordinarily large brains, which have tripled in size in the last few million years. Other animals also experienced a significant, though smaller, increase in [brain size](#). These increases are puzzling, because brain tissue is energetically expensive: that is, a smaller brain is easier to maintain in terms of calories. Building on existing research on learning, Muthukrishna and colleagues analytically and computationally modeled the predictions of the cultural brain hypothesis and found that this theory not only explains these increases in brain size, but a variety of other relationships with [group size](#), learning strategies, knowledge and [life history](#).

The theory relies on the idea that brains expand to store and manage more information. Brains expand in response to the availability of information and calories. Information availability is affected by learning strategies, group size, mating structure, and the length of the juvenile period, which co-evolve with brain size. The model captures this co-evolution under different conditions and also describes the specific and narrow conditions that can lead to a take-off in brain size—a possible pathway that led to the extraordinary expansion in our own species. The authors called this set of predictions the cumulative cultural brain hypothesis. These theories were supported by tests using existing empirical data. Taken together, the findings may help explain the rapid expansion of human brains and other aspects of our species' life history and psychology.

"This is a brand-new theory to explain the evolution of the human [brain](#) as well as brains more generally. It shows how various characteristics of a species are actually intrinsically connected through a common evolutionary process," says Muthukrishna. "The limits to larger brains is our ability to birth them, but as this theory suggests, this process is ongoing—we're now expanding our juvenile period, hitting a new

biological limit in our ability to reproduce at an older age".

Next, the researchers plan to test the predictions made by the theory that relate to individual, rather than social, learning, as well as developing extensions to the [theory](#).

More information: Michael Muthukrishna et al. The Cultural Brain Hypothesis: How culture drives brain expansion, sociality, and life history, *PLOS Computational Biology* (2018). [DOI: 10.1371/journal.pcbi.1006504](#)

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