

Language heard while still in the womb found to impact brain development

November 24 2023, by Bob Yirka

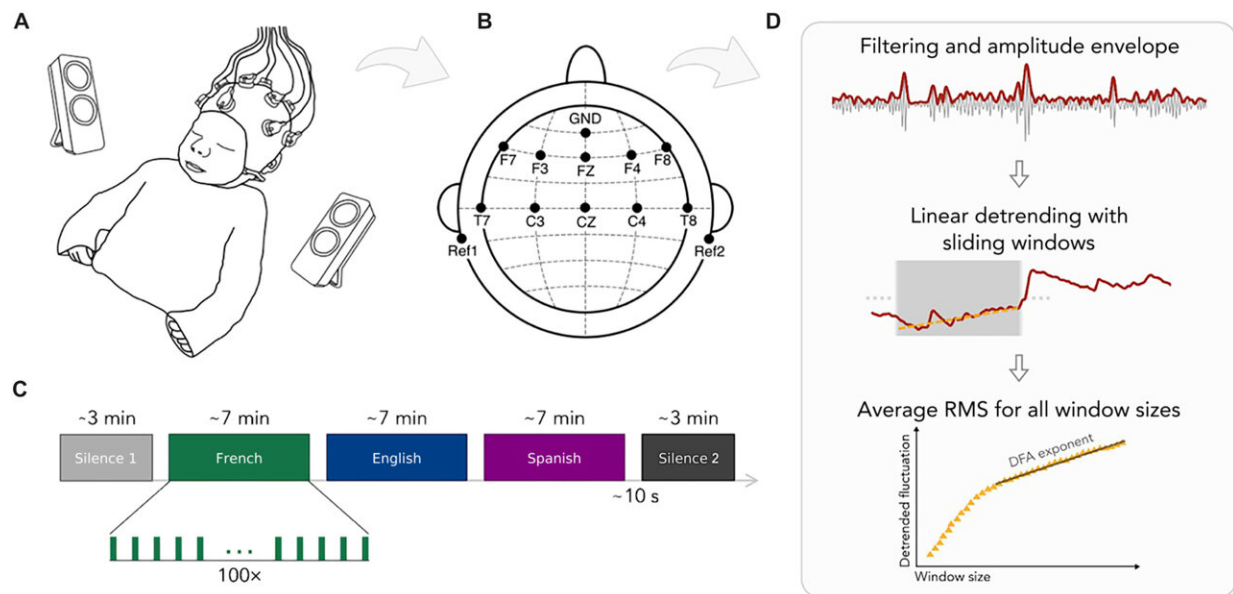


Illustration of the experimental paradigm and the analysis pipeline. (A) The experimental setup used in the study. (B) EEG channel locations. (C) The experimental design. (D) The detrended fluctuation analysis (DFA). Credit: *Science Advances* (2023). DOI: 10.1126/sciadv.adj3524

A team of neuroscientists at the University of Padua, in Italy, working with a colleague from CNRS and Université Paris Cité, has found evidence suggesting that neural development of babies still in the womb is impacted by the language they hear spoken by their mothers as they carry them.

In their paper [published](#) in the journal *Science Advances*, the group describes research they conducted with newborn babies fitted with EEG caps.

Prior research has shown that babies still in the womb (starting at about seven months) can hear when their mother speaks. They can also hear other sounds, such as other voices, music, and general noise. They can also recognize their mother's voice after birth and specific melodies related to her speech. Less well understood is what sort of impact hearing such things has on the neural development of the baby's [brain](#). To learn more, the research team in Italy conducted an experiment involving 33 newborns and their mothers—all of whom were native French speakers.

The experiments consisted of fitting all the newborn volunteers with caps that allowed for EEG monitoring in the days after birth. As the babies slept, the researchers played recordings of a person reading different language versions of the book, "Goldilocks, and the Three Bears." EEG recordings began during a period of silence before the book was played, continued through the reading and also during another moment of silence afterward.

In studying the EEG readouts, the research team found that the babies listening to the story in French showed an increase in long-range temporal correlations—all of a type that has previously been associated with speech perception and its processing. The researchers suggest this finding is evidence of the baby's brain being impacted in a unique way by exposure to a unique language while still in utero—in this case, French.

The researchers also conducted detrended fluctuation analysis on the EEG readings as a means of measuring the strength of the temporal correlations and found them to be strongest in the theta band, which

prior research has shown is associated with syllable-level speech units. This, the team suggests, shows that the infants' brains became attuned to the linguistic elements present in the language they had heard.

The research team also found that the baby's neural response was most strongly seen in the EEG readings when the book was being read in French, suggesting that prenatal exposure to a given language played a role in their brain neural development.

More information: Benedetta Mariani et al, Prenatal experience with language shapes the brain, *Science Advances* (2023). [DOI: 10.1126/sciadv.adj3524](https://doi.org/10.1126/sciadv.adj3524)

© 2023 Science X Network

Citation: Language heard while still in the womb found to impact brain development (2023, November 24) retrieved 14 May 2024 from <https://medicalxpress.com/news/2023-11-language-heard-womb-impact-brain.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.
