

EEG and lemur calls give insight to how infants link language and cognition

June 18 2021, by Stephanie Kulke



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New research from Northwestern University provides the first evidence of underlying neural mechanisms that support infants' acquisition of the unique language-cognition link in humans.

Even before infants can roll over in their cribs, research has shown that listening to language boosts their cognition. For infants as young as three months, listening to [human speech](#) supports their ability to form categories of objects (like "dog" or "bottle").

In these first months, it is not just [human language](#) that can do this—listening to vocalizations of non-human primates like lemur calls also supports infant cognition. But by six months, infants' responses to lemur calls fade out, and only listening to human [speech](#) continues to offer this cognitive advantage.

Cognitive psychologist Sandra Waxman, research specialist Kali Woodruff Carr and their colleagues identified developmental changes in four- and six-month-old infants' neural responses to human speech and lemur calls, providing new insight into how the link to cognition becomes so rapidly attuned to human speech.

Woodruff Carr is a research specialist in the Institute for Policy Research (IPR). Waxman holds the Louis W. Menk Chair in psychology, is a professor of cognitive psychology and an IPR fellow.

"Measuring [neural activity](#) can reveal unique insights into the rapidly developing [cognitive processes](#) that are difficult to assess in preverbal infants," said Woodruff Carr, the article's first author. "These findings give us a glimpse into what goes on in the infant brain as babies begin to learn what sounds are for them and how language refers to the world around them."

To learn about infants' neural responses to language and lemur calls, Waxman, Woodruff Carr, and their co-authors used EEG (electroencephalography) to measure infants' neural responses as they listened to human speech and lemur calls.

The researchers discovered emerging differences in infants' neural activity. Human speech and calls from lemurs, who are some of humans' closest evolutionary relatives, each engage early neural components of infants' attention, but by the time they are 6 months old, they do so in distinct ways. Between four and six months, infants' neural attention while listening to speech is enhanced, but their attention while listening to [lemur](#) calls is suppressed.

These results offer novel insights into how listening to language supports early cognition. They also illuminate the rapid organization of cortical networks in the infant brain for processing speech and language.

"This new evidence is exciting because it permits us to look 'under the hood,' to discover how the infant brain is modulated by listening to language," Waxman explained. "Without non-invasive neural measures like EEG, we would not have been able to discover how infants so rapidly form the language-cognition link."

"Developmental changes in auditory-evoked neural activity underlie infants' links between [language](#) and cognition" was published online June 1 in the *Developmental Science* journal.

More information: Kali Woodruff Carr et al, Developmental changes in auditory-evoked neural activity underlie infants' links between language and cognition, *Developmental Science* (2021). [DOI: 10.1111/desc.13121](https://doi.org/10.1111/desc.13121)

Provided by Northwestern University

Citation: EEG and lemur calls give insight to how infants link language and cognition (2021, June 18) retrieved 9 April 2023 from

<https://medicalxpress.com/news/2021-06-eeg-lemur-insight-infants-link.html>

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