

Bantu language shows that processing of focused information may be universal

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EEG cap drying in the Mozambican sun. Credit: Jenneke van der Wal

Languages have different ways of highlighting relevant information.

Recent research shows that despite these differences, the consequences are the same: to trigger a brain response to process information more deeply. In an EEG study [published](#) in *PNAS*, led by the Max Planck Institute for Psycholinguistics (MPI) in Nijmegen, researchers investigated Makhuwa, a Bantu language that highlights relevant information in a different way than many Indo-European languages. Results reveal a universal pattern of processing relevant information.

In many languages across the world, speakers use intonation to focus on relevant information: "*Father* cooked the sauce." Speakers may also use a specific sentence structure to mark focus: "It was *father* who cooked the sauce." Listeners and readers process focused information in a deeper way than non-focused information.

For instance, EEG studies show an increased N400 response when words are focused. The N400 is a negative brain response that typically occurs 400 ms after encountering an unexpected word, in sentences such as "I eat *bottles*."

Makhuwa-Enahara, a Bantu [language](#) spoken in northern Mozambique, uniquely marks focus by changing the form of the verb. For instance, by changing the form of the verb "ate" (o-c-aalé vs. o-hoó-cá), speakers can put focus on the noun that follows, as in "the woman ate *rice*." If focused information is processed in the same way as in other languages, speakers of Makhuwa should show a more pronounced N400 effect when encountering focused words.

To test this hypothesis, the team recorded [electrical brain activity](#) in [speakers](#) of Makhuwa. To elicit brain responses to unexpected words, participants heard sentences such as "I eat *bottles*" vs. "I eat *rice*," with the crucial words in focus or non-focus position, depending on the verb form.

Results show that focused information generated a more negative N400 response than the same information in non-focus position. According to the authors, this demonstrates that regardless of how relevant information is marked, the consequences for processing of relevant information are the same.

According to senior researcher Peter Hagoort, director of the Donders Institute for Brain, Cognition and Behaviour, "Our findings point towards a universal pattern where focus marking results in an upregulation of focused information, irrespective of how it is linguistically marked. The universality of focus marking is hence not in its linguistic form, but in the processing consequences it has. This finding is significant for both linguistic theories and cognitive models of language processing, and contributes to the diversification of cognitive neuroscience research on language by including a non-WEIRD (Western, Educated, Industrialized, Rich, and Democratic) language."

More information: Rinus G. Verdonschot et al, Information structure in Makhuwa: Electrophysiological evidence for a universal processing account, *Proceedings of the National Academy of Sciences* (2024). [DOI: 10.1073/pnas.2315438121](https://doi.org/10.1073/pnas.2315438121)

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