

'Where's the Phoneme Effect?' New Study Revisits Key Assumption in Language Neuroscience

PRAGUE, CZECH REPUBLIC, December 1, 2025 /EINPresswire.com/ -- A new [study](#) from [Charles University](#) and Czech Academy of Sciences revisits a long-standing idea in language science that speech sounds from one's native language elicit stronger brain responses than speech sounds from a foreign language. The research, published in the *Journal of Speech, Language, and Hearing Research*, suggests that this effect—while frequently reported—may be less consistent than previously assumed.

The study focused on the Mismatch Negativity (MMN), an automatic brain response that appears when the auditory system detects an unexpected sound. A seminal 1997 study proposed that the MMN is language-dependent: being stronger to speech sound differences that matter in a listener's native language (and can distinguish words) than to foreign speech sound differences – even if those are larger than the native ones.

“We wanted to test whether this classic pattern would hold for a new language pair and a perfectly counterbalanced design,” said Dr. Kateřina Chládková, co-author of the study. Lead author Martina Dvořáková and Dr. Chládková tested native Czech speakers and native Russian speakers learning Czech.

Participants heard two vowel contrasts:

- An acoustically small Czech contrast (transcribed as /i/-/ɨ/), which matters for the grammar of Czech
- An acoustically large Russian contrast (transcribed as /i/-/ɨ/), which matters for the grammar of Russian

If the classic theory held, Czech listeners should show a stronger MMN for the Czech contrast,



The study authors, Martina Dvořáková (left) and Kateřina Chládková (right), in their lab, happy about the study outcomes. Photo ©Vladimír Šigut, Charles University



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Martina Dvořáková

and Russian listeners for the Russian one. However, that pattern did not appear. Even across two types of MMN analyses, the researchers found no evidence that the MMN strength depended on whether a speech contrast was native or nonnative. Statistical tests provided strong support for the absence of a language-specific effect. All listeners showed clear neural discrimination of the native as well as the non-native sounds.

The results do not overturn decades of research, but they demonstrate that such effects are not guaranteed and may

depend on specific linguistic and methodological factors. "MMN is often used to assess language development or learning," said Dvořáková. "Our findings suggest that we should be cautious—if the classic phoneme effect doesn't consistently appear in healthy adults, it shouldn't be assumed as a universal benchmark."

The authors emphasize the need for broader replication across languages to better understand when MMN reflects a language's phonological grammar and when it does not.

Ina Palacká

Faculty of Arts, Charles University

ina.palacka@ff.cuni.cz

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