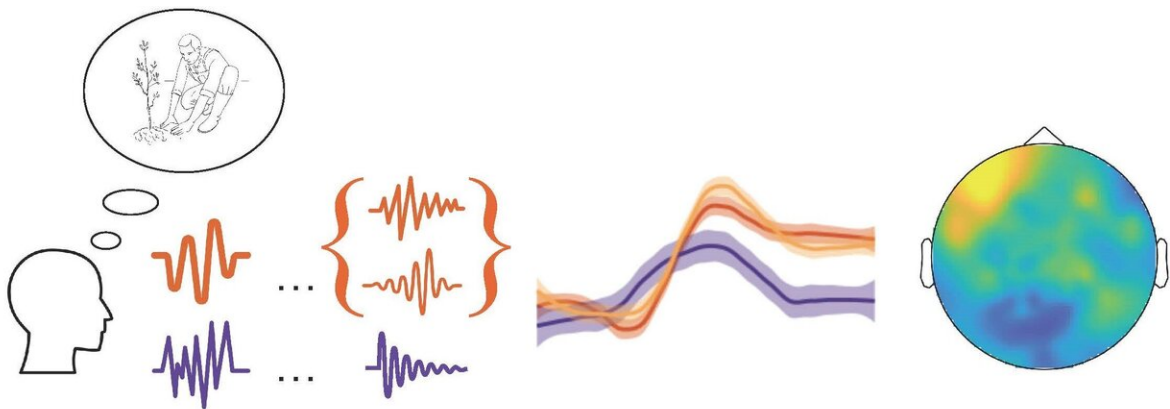


# Study shows that brain activity during speaking varies between simple and complex grammatical forms

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Credit: NCCR Evolving Language (National Centre of Competence in Research)

Speaking is something that comes across as an effortless process, almost working by itself. Our brain, however, has a lot of work to do when we construct a sentence. "In addition, languages differ in myriad ways and this also means that there are differences in how we plan what we want to say in different languages," says Balthasar Bickel, senior author of the study and a professor at the University of Zurich.

And if some languages seem easier, it is because they make fewer distinctions in their grammar. While English always uses the (e.g., in

"The tree is tall" and "Snow covers the tree"), German makes a distinction between der (subject) and den (object) (e.g., in "Der Baum ist groß" and "Schnee bedeckt den Baum").

## Analyzing the brain just before speech

In order to do this, researchers at the University of Zurich, in collaboration with international colleagues, measured the [brain](#) activity of Hindi speakers while they described different images. This is the first time that the brain processes during the planning of sentences before speaking have been studied with high temporal resolution. "Until now, similar methods have only been used for planning single words, but not for complete sentences," explains Sebastian Sauppe, lead author of the study.

## An ending with many possibilities

Researchers have discovered that although a language may seem 'easier' to us at first glance, it actually requires more work from our neurons. They found that having fewer grammatical distinctions makes planning particularly demanding for the brain and requires more neural activity. The likely reason for this is that having fewer distinctions means keeping more choices open for speakers for how to continue a [sentence](#).

"This has, however, a crucial advantage for speakers: languages with fewer distinctions allow speakers to commit to the whole sentence only late in the planning process", adds Sebastian Sauppe. This finding contributes to explaining why languages with fewer distinctions in their grammar are found more often among the world's languages, which had been shown by an earlier study of the same research group.

The research is part of the NCCR Evolving Language, a new national

research center which has set itself the goal of unraveling the biological underpinnings of [language](#), its evolutionary past and the challenges imposed by novel technologies.

**More information:** Sebastian Sauppe et al, Neural signatures of syntactic variation in speech planning, *PLOS Biology* (2021). [DOI: 10.1371/journal.pbio.3001038](https://doi.org/10.1371/journal.pbio.3001038)

Provided by NCCR Evolving Language (National Centre of Competence in Research)

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