

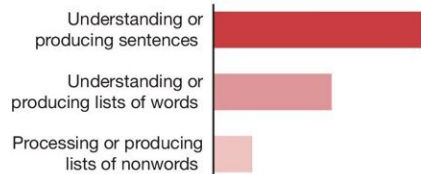
# What is language for? Researchers make the case that it's a tool for communication, not for thought

July 3 2024, by Jennifer Michalowski

## a Sample language networks in individual brains



Responses in the language areas



## Understanding language (by listening or reading)



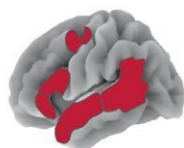
## Producing language (by speaking or writing)



Interpretation: sensitivity to sentence structure

Interpretation: sensitivity to word meanings

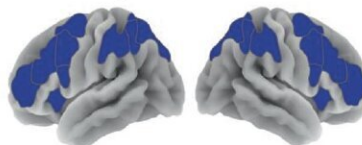
## b Language network



Supported functions:  
Language comprehension  
Language production

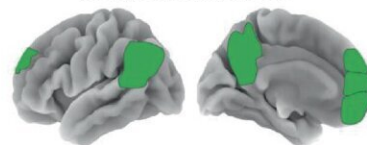
## Some networks that support thinking and reasoning

### Multiple demand network



Supported functions:  
Executive functions  
Novel problem solving  
Mathematics  
Some forms of reasoning

### Theory of mind network



Supported functions:  
Social reasoning  
Mentalizing

The language network and its relationship to other cognitive networks. Credit: *Nature* (2024). DOI: 10.1038/s41586-024-07522-w

Language is a defining feature of humanity, and for centuries,

philosophers and scientists have contemplated its true purpose. We use language to share information and exchange ideas—but is it more than that? Do we use language not just to communicate, but to think?

In the June 19 issue of the journal [Nature](#), McGovern Institute for Brain Research neuroscientist Evelina Fedorenko and colleagues argue that we do not. Language, they say, is primarily a tool for communication.

Fedorenko acknowledges that there is an intuitive link between language and thought. Many people experience an inner voice that seems to narrate their own thoughts. And it's not unreasonable to expect that well-spoken, articulate individuals are also clear thinkers. But as compelling as these associations can be, they are not evidence that we actually use language to think.

"I think there are a few strands of intuition and confusions that have led people to believe very strongly that language is the medium of thought," she says. "But when they are pulled apart thread by thread, they don't really hold up to empirical scrutiny."

## **Separating language and thought**

For centuries, language's potential role in facilitating thinking was nearly impossible to evaluate scientifically. But neuroscientists and [cognitive scientists](#) now have tools that enable a more rigorous consideration of the idea. Evidence from both fields, which Fedorenko, MIT brain and cognitive scientist and linguist Edward Gibson, and University of California at Berkeley cognitive scientist Steven Piantadosi review in their *Nature* Perspective, supports the idea that language is a tool for communication, not for thought.

"What we've learned by using methods that actually tell us about the engagement of the linguistic processing mechanisms is that those

mechanisms are not really engaged when we think," Fedorenko says. Also, she adds, "you can take those mechanisms away, and it seems that thinking can go on just fine."

Over the past 20 years, Fedorenko and other neuroscientists have advanced our understanding of what happens in the brain as it generates and understands language. Now, using functional MRI to find parts of the brain that are specifically engaged when someone reads or listens to sentences or passages, they can reliably identify an individual's language-processing network. Then they can monitor those [brain regions](#) while the person performs other tasks, from solving a sudoku puzzle to reasoning about other people's beliefs.

"Pretty much everything we've tested so far, we don't see any evidence of the engagement of the language mechanisms," Fedorenko says. "Your language system is basically silent when you do all sorts of thinking."

That's consistent with observations from people who have lost the ability to process language due to an injury or stroke. Severely affected patients can be completely unable to process words, yet this does not interfere with their ability to solve math problems, play chess, or plan for future events.

"They can do all the things that they could do before their injury. They just can't take those [mental representations](#) and convert them into a format which would allow them to talk about them with others," Fedorenko says. "If language gives us the core representations that we use for reasoning, then ... destroying the language system should lead to problems in thinking as well, and it really doesn't."

Conversely, intellectual impairments do not always associate with [language impairment](#); people with intellectual disability disorders or [neuropsychiatric disorders](#) that limit their ability to think and reason do

not necessarily have problems with basic linguistic functions. Just as language does not appear to be necessary for thought, Fedorenko and colleagues conclude that it is also not sufficient to produce clear thinking.

## **Language optimization**

In addition to arguing that language is unlikely to be used for thinking, the scientists considered its suitability as a communication tool, drawing on findings from linguistic analyses. Analyses across dozens of diverse languages, both spoken and signed, have found recurring features that make them easy to produce and understand.

"It turns out that pretty much any property you look at, you can find evidence that languages are optimized in a way that makes information transfer as efficient as possible," Fedorenko says.

That's not a new idea, but it has held up as linguists analyze larger corpora across more diverse sets of languages, which has become possible in recent years as the field has assembled corpora that are annotated for various linguistic features. Such studies find that across languages, sounds and words tend to be pieced together in ways that minimize effort for the language producer without muddling the message.

For example, commonly used words tend to be short, while words whose meanings depend on one another tend to cluster close together in sentences. Likewise, linguists have noted features that help languages convey meaning despite potential "signal distortions," whether due to attention lapses or ambient noise.

"All of these features seem to suggest that the forms of languages are optimized to make communication easier," Fedorenko says, pointing out

that such features would be irrelevant if language was primarily a tool for internal thought.

"Given that languages have all these properties, it's likely that we use language for communication," she says. She and her co-authors conclude that as a powerful tool for transmitting knowledge, language reflects the sophistication of human cognition—but does not give rise to it.

**More information:** Evelina Fedorenko et al, Language is primarily a tool for communication rather than thought, *Nature* (2024). [DOI: 10.1038/s41586-024-07522-w](https://doi.org/10.1038/s41586-024-07522-w)

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