

How we learn words and sentences at the same time

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There are two problems about language that young children have to solve. Credit: Lancaster University

How people work out the meanings of new words has been revealed by Lancaster University researchers, who say this is similar to the way in which young children learn language.

The research published in *Cognition* is by Professor Patrick Rebuschat and Professor Padraic Monaghan, who said, "Have you ever caught yourself saying long burbly streams of words to babies? A lot of what infants hear is "who's a lovely baby yes you are now where's teddy gone oh look here is teddy." How do babies begin to make sense of this burbling to figure out the [language](#)?"

There are two problems about language that young children have to solve:

1. they need to work out which sounds group together to form words and what these words mean
2. they need to understand how those words go together in sentences

These problems are interwoven, because to be able to acquire the meaning of words the child also needs to know what role they play in the sentence: is the word "teddy" about a thing, or what the thing is doing, or something else? And to figure out what a word's role is, the child needs to already know what it means.

Professor Rebuschat said, "This is a chicken-and-egg type of problem: Which comes first, the word or the sentence?"

To find out, the researchers tested how people learned new words and sentence by giving adults an artificial language to learn. They invented a language spoken by aliens and showed people sentences in alien language alongside scenes showing aliens carrying out different actions.

Over time, learners were able to acquire the words' meanings and their roles in the scenes—the names of the aliens, their colors, and the actions they were doing.

Learners do this by keeping track of all the associations between words and different aspects of the scenes across many learning trials before narrowing down to focus on those associations that are reliable.

The researchers said this method is similar to how young children learn.

Professor Rebuschat said, "So, when you say a [sentence](#) including "teddy", very often baby's teddy bear will be nearby and in view. When this occurs repeatedly over time, the child is able to figure out from "look at teddy" that "teddy" means that cuddly brown thing."

The only way to learn a new language is by keeping track of the words and grammar across hundreds of learning trials, a process called cross-situational statistical learning.

Professor Rebuschat said: "We knew children and adults can use this [learning process](#) to acquire individual words and very limited languages. But it was remarkable to witness that our participants could use this process to learn a highly complex language with considerable speed. It shows the power of humans' ability to keep track of all kinds of possible links between language and the world. This study shows us the way in which language can be learned in natural situations."

Professor Padraic Monaghan added: "We have discovered that the chicken-and-egg problem of learning language can be solved just by hearing lots of language and applying some very simple but very powerful learning to this. Our brains are clearly geared up to keep track of these links between words and the world. We know that infants already have the same power to their learning as adults, and we are

confident that young children acquire language using the same types of learning as the adults in our study."

More information: Patrick Rebuschat et al, Learning vocabulary and grammar from cross-situational statistics, *Cognition* (2020). [DOI: 10.1016/j.cognition.2020.104475](https://doi.org/10.1016/j.cognition.2020.104475)

Provided by Lancaster University

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