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News

Are languages shaped by culture or cognition?

Linguists debate whether languages share universal grammatical features.

Philip Ball

Languages evolve in their own idiosyncratic ways, rather than being governed by universal rules set down in human brain patterns. That is the conclusion of a study that compares the grammar of several hundred languages by looking at their evolutionary trees.

Russell Gray, a psychologist at the University of Auckland in New Zealand, and his colleagues examined the relationships between traits such as the ordering of verbs and nouns in four linguistic families, and found no sign of any persistent, universal guiding principles (See '**Universal truths**'). Their work is published today by *Nature*¹.



New research disputes the idea that language is rooted in the basic way in which humans think.

Alamy

It is already proving controversial. "There is nothing in the paper that brings into question the views that they are arguing against," says Matthew Dryer, a linguist at the State University of New York at Buffalo.

Fixed patterns

There are thought to be around 7,000 languages in the world today, and they show tremendous diversity in structure. Some, such as Finnish, have complex ways of making composite words, whereas others, such as Mandarin Chinese, have simple, short and invariant words. Some put verbs first in a sentence, others in the middle and yet others at the end.

But many linguists suspect that there is some universal logic behind this bewildering variety — that common cognitive factors underpin grammatical structures. US linguists Noam Chomsky and Joseph Greenberg proposed two of the most prominent 'universalist' theories of language.

Chomsky tried to account for the astonishing rapidity with which children assimilate complicated and subtle grammatical rules by supposing that we are all born with an innate capacity for language, presumably housed in brain modules specialized for language. He suggested that this makes children able to generalize the grammatical principles of their native tongue from a small set of 'generative rules' that are hardwired into how they think.

Chomsky supposed that languages change and evolve when the parameters of these rules get reset throughout a culture. A single change should induce switches in several related traits in the language.

Greenberg took a more empirical approach, listing traits that he observed to be shared between languages. Many of these concerned word order. For example, in most languages a conditional clause normally precedes its conclusion: "if he's right, he'll be famous". Greenberg argued that such universals reflect fundamental linguistic biases, which probably reflect basic principles of human cognition.

"The Greenbergian word-order universals have the strongest claim to empirical validity of any universalist claim about language," says Michael Dunn, an evolutionary linguist at the Max Planck Institute for Psycholinguistics in Nijmegen, the Netherlands, and co-author of the paper in *Nature*.

Shifting standards

Both of the universalist ideas have implications for the family tree of language. In Chomsky's theory, as languages evolve, certain features should vary at the same time because they are products of the same underlying parameter. Greenberg's idea, by contrast, implies that there are co-dependencies between certain grammatical features of a language, but not others. For example, the word order for verb–subject pairs shouldn't depend on that for object–verb pairs.

To test these predictions, Gray and his colleagues used phylogenetic analysis, a technique developed in evolutionary biology, to reconstruct four family trees representative of more than 2,000 languages: Austronesian, Indo-European, Bantu and Uto-Aztecan.

For each family, they looked at eight word-order features and used statistical methods to calculate the chances that each pair of features had evolved independently or in a correlated way. This allowed them to deduce webs of co-dependence among the features and compare them to the predictions of Chomsky and Greenberg's theories.

They found that neither of the universalist models matched the evidence. Not only did the co-dependencies that they discovered differ from those predicted by Greenberg's word-order 'universals', but they were different for each family. In other words, the deep grammatical structure of every family is different from that of the others: each family has evolved its own rules, so there is no reason to suppose that they are governed by universal cognitive factors.

What's more, even when a particular co-dependency of traits was shared by two families, the researchers could show that it came about in different ways for each, so it was possible that the commonality was coincidental. They conclude that the languages — at least in their word-order grammar — have been shaped in culture-specific ways rather than by universals.

A question of lineage

Martin Haspelmath, a linguist at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, agrees with Gray's conclusions but says that "for specialists they are nothing new". "It has long been known that grammatical properties and dependencies are lineage-specific," he adds.

On the other hand, Dryer is not persuaded that the results make a convincing case. "There are over a hundred language families that the authors ignore but which provide strong support for the views they are arguing against," he says. There is no reason to expect a consistent pattern of word-order relationships within families, he adds, regardless of whether they are shaped by universal constraints.

Haspelmath says that it might be more valuable to look for what languages have in common than to measure how they (inevitably) differ. Even if cultural evolution is the primary factor in shaping them, he says, "it would be very hard to say that cognitive biases play no role at all".

"Comparative linguists have focused on the universals and cognitive explanations because they wanted to explain something," adds Haspelmath. "Saying that cultural evolution is at play basically means that we can't explain why languages are the way they are — which is largely true, but it's not the whole truth."

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References

1. Dunn, M., Greenhill, S. J., Levinson, S. C. & Gray, R. D. *Nature* [doi:10.1038/nature09923](https://doi.org/10.1038/nature09923) (2011).

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It's very interesting to consider the different evolutions of languages, especially when they have **#19856** evolved separately, much like Mandarin and German. Programmers have been pursuing [iPhone](#)

[development](#) tools that will translate languages in real time. Curiously, the problem they're having is not converting words but eliciting context. In this sense I think language is largely cultural because communication is so much more about what we say than how we say it.

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Posted by: **Diane Sumners** | 2011-04-14 07:45:18 AM

A "great green frog" is an unremarkable phrase. A "green great frog" would abrade a native English speaker. Why? **#19864**

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Posted by: **"Uncle Al" Schwartz** | 2011-04-14 02:15:24 PM

The article seems to take an either/or approach. What about the possibility that there are inherent qualities which are sometimes apparent but can be passed over in other cases? Then you could have a world where both sides might be correct, which seems to be what is occurring here. **#19865**

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