

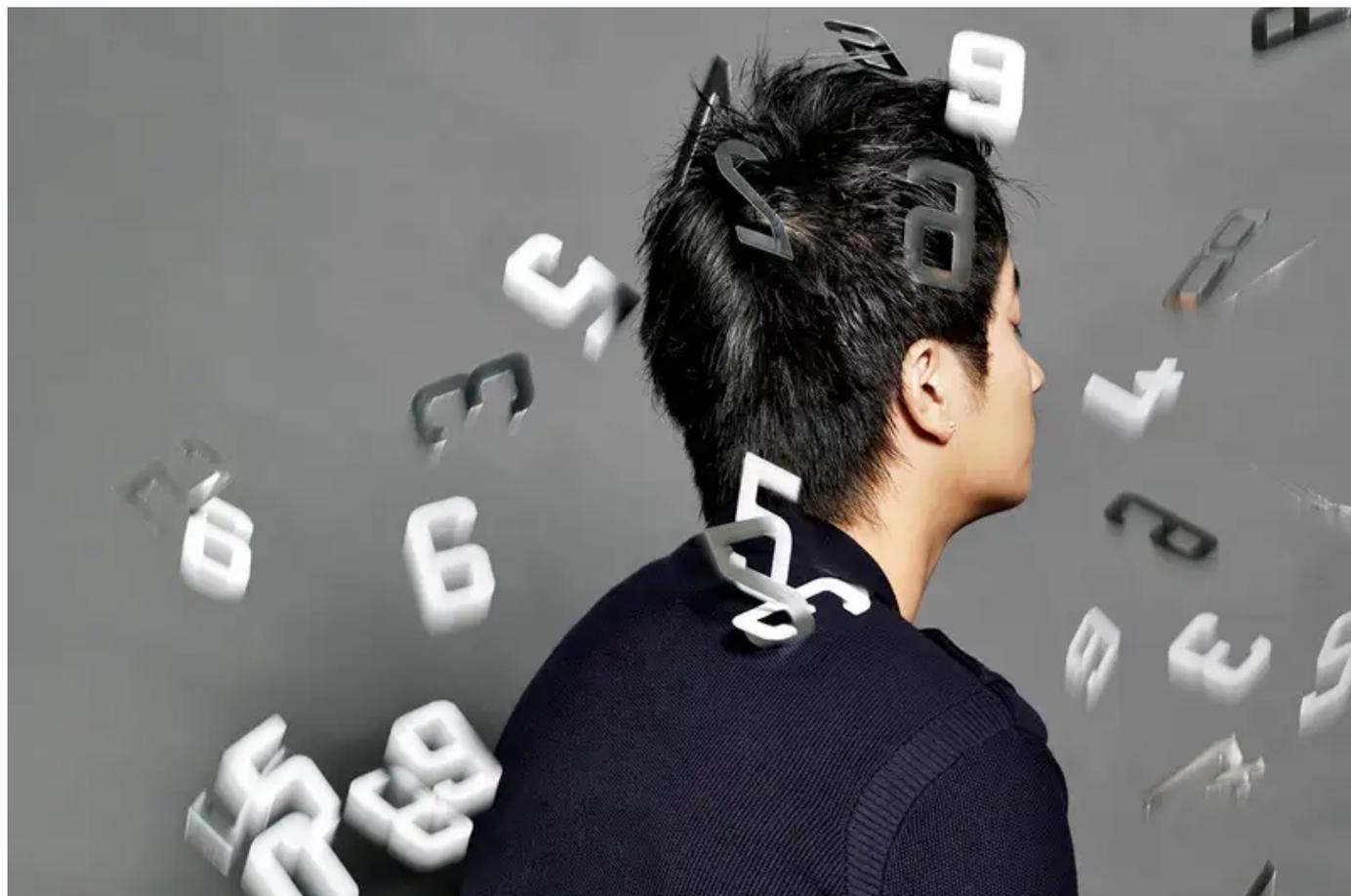
How number words may have changed us from zeroes to heroes

In his exemplary new book *Numbers and the Making of Us*, Caleb Everett dissects the role that culture and language play in giving us our numerical smarts



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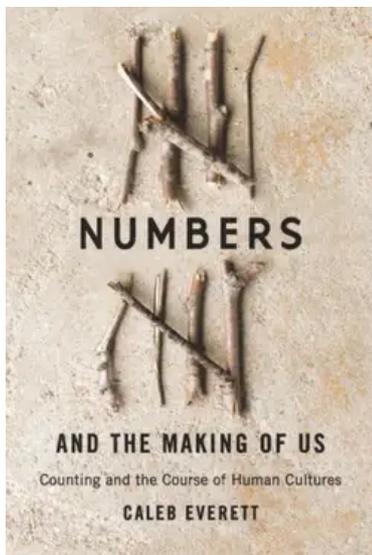


Do we think differently if our language has number words?

Emmanuel Pierrot/Agence VU/Camera Press

IMAGINE a world without numbers. Time and space would lose their meaning: telling time and counting the passing days, months and years would become impossible. Our ability to use numbers is essential for functioning in our quotidian here and now, from scheduling meetings to reading timetables and paying for groceries at the supermarket.

But in a fascinating new book, *Numbers and the Making of Us*, linguistic anthropologist Caleb Everett argues that number is a recent cultural invention, deeply tied to our linguistic smarts. Moreover, he likens it to a “flint stone that ignited the human timeline”. Not only does number make it possible to perceive quantities in the world, it has, he claims, “led to the advent of agriculture and writing, and indirectly to the technologies that flowed from the latter two”.



English is by no means unusual, with other languages making more sophisticated grammatical distinctions. In the Austronesian language Moluccan, for example, there is a grammatical tier intermediate between one and more than one: a so-called “trial” category denoting exactly three items.

But there are enough languages that lack number. These range from unrelated spoken languages, such as Pirahã and Mundurukú – both indigenous to different remote parts of Amazonia – to non-spoken languages, such as Nicaraguan Sign Language.

“According to Everett, quantity is not something you can perceive without the help of language”

Users of these languages, it turns out, cannot reliably count more than three items. According to Everett, quantity is not something that you or I can reliably perceive without the help of language: having number words makes it possible to see a world of number.

Moreover, this startling claim has been experimentally verified. For instance, when asked to show how many dots are printed on a card by counting the same number of fingers, Mundurukú speakers cannot go beyond three. This, Everett argues, has nothing to do with any cognitive deficit or the fact that they belong to a pre-industrial society. The decisive factor appears to be the absence of number words.

Recent research reveals that the human brain has, broadly, two number systems. The first is an approximate sense: human infants are born able to distinguish between, for instance, 8 and 16. This enables only fuzzy maths, in which we can determine that one group is larger than the other, rather than the numbers of entities in each. The other system is an exact number sense, but one that only works up to 3. We can distinguish between 1, 2 and 3, precisely.

Unifying abilities

So how do we manage to identify larger quantities? Everett’s answer is: verbal number. Numerate cultures can count and perceive quantities precisely because number words – language – unite these two innate mathematical abilities. His evidence is indigenous such as the Pirahã: anumeric cultures lack “the means of unifying these two genetically endowed capacities”.

The invention of the linguistic means to convey number, a cultural tool, makes it possible to bootstrap our genetic endowment, enhancing and changing how we perceive our world. While anumeric peoples struggle to differentiate quantities greater than three, with the advent of verbal number, we can parcel up space and time in far greater detail.

The central claim of the book is that far from our being born with the ability to precisely identify quantities, number is a cultural achievement; it is facilitated by language rather than being innate. Here Everett raises the spectre of the classic distinction between nature and nurture, although the welter of evidence relating to anumeric peoples strongly supports the cultural-developmental, anti-nativist view.

Nevertheless, there are drawbacks to Everett's arguments. A nativist sceptic may still argue that correlation is not causation. Everett describes ingenious behavioural experiments with anumeric groups, but they only show that an anumeric language correlates with counting problems. Crucially, this doesn't establish that the absence of verbal number causes the counting deficit. To do that, we will have to go beyond clever field-based tasks to examine what's going on in the brain.

Second, the significance of number is perhaps over-egged in terms of human cultural and cognitive development – a tempting thing to do, perhaps, when this is the focus of an entire book. Everett's claim is that how we perceive time and space is, in part, made possible because of the existence of number.

Inevitably, things are more complex. Space and time are the foundational domains of human experience. And time, at the level of neurological processing, is arguably the cognitive glue that makes perception possible in the first place. For example, both being able to perceive a sequence of events and recognising iterations of events are fundamentally temporal abilities.

In short, temporal abilities underpin number sequences and the ability to add up, which are fundamental to number. This suggests that it may in fact be our temporal smarts that make number systems possible, rather than vice versa.

Finally, Everett invokes divergent quantification abilities across anumeric versus numerate cultures as evidence for linguistic relativity: grammatical differences across languages cause their speakers to perceive the world differently.

This principle suggests that language can lead to cognitive restructuring in the minds of their speakers. To demonstrate this, however, we need to show that different number systems in different languages lead to divergent cognitive behaviour.

While Everett makes a powerful case for the cognitive restructuring of numerate versus anumeric minds, the jury is still out on the effects of number systems across all languages.

But these are minor quibbles. The breadth of research Everett covers is impressive, and allows him to develop a narrative that is both global and compelling. He is as much at home describing the niceties of experimental work in cognitive science as he is discussing arcane tribal rituals and the technical details of grammar.

“Everett makes a powerful case for the cognitive restructuring of numerate versus anumeric minds”

The book is an exemplar of the best kind of academic writing: well researched, while written in a sufficiently engaging way to appeal to many educated lay readers. It is often poignant, and makes a virtue of the author's experiences with some of the indigenous peoples he describes, based on a childhood following his missionary parents – in particular his famous father, Daniel Everett – into the Amazon jungle.

In many ways, *Numbers* is eye-opening, even eye-popping. And it makes a powerful case for language, as a cultural invention, being central to the making of us.

Numbers and the Making of Us: Counting and the course of human cultures

Caleb Everett

Harvard University Press

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