## Lost in Translation

*New cognitive research suggests that language profoundly influences the way people see the world; a different sense of blame in Japanese and Spanish*

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Do the languages we speak shape the way we think? Do they merely express thoughts, or do the structures in languages (without our knowledge or consent) shape the very thoughts we wish to express?

Take "Humpty Dumpty sat on a..." Even this snippet of a nursery rhyme reveals how much languages can differ from one another. In English, we have to mark the verb for tense; in this case, we say "sat" rather than "sit." In Indonesian you need not (in fact, you can't) change the verb to mark tense.

In Russian, you would have to mark tense and also gender, changing the verb if Mrs. Dumpty did the sitting. You would also have to decide if the sitting event was completed or not. If our ovoid hero sat on the wall for the entire time he was meant to, it would be a different form of the verb than if, say, he had a great fall.

In Turkish, you would have to include in the verb how you acquired this information. For example, if you saw the chubby fellow on the wall with your own eyes, you'd use one form of the verb, but if you had simply read or heard about it, you'd use a different form.

Do English, Indonesian, Russian and Turkish speakers end up attending to, understanding, and remembering their experiences differently simply because they speak different languages?

These questions touch on all the major controversies in the study of mind, with important implications for politics, law and religion. Yet very little empirical work had been done on these questions until recently. The idea that language might shape thought was for a long time considered untestable at best and more often simply crazy and wrong.

Now, a flurry of new cognitive science research is showing that in fact, language does profoundly influence how we see the world.

The question of whether languages shape the way we think goes back centuries; Charlemagne proclaimed that "to have a second language is to have a second soul." But the idea went out of favor with scientists when Noam Chomsky's theories of language gained popularity in the 1960s and '70s. Dr. Chomsky proposed that there is a universal grammar for all human languages—essentially, that languages don't really differ from one another in significant ways. And because languages didn't differ from one another, the theory went, it made no sense to ask whether linguistic differences led to differences in thinking.

The search for linguistic universals yielded interesting data on languages, but after decades of work, not a single proposed universal has withstood scrutiny. Instead, as linguists probed deeper into the world's languages (7,000 or so, only a fraction of them analyzed), innumerable unpredictable differences emerged.

Of course, just because people talk differently doesn't necessarily mean they think differently. In the past decade, cognitive scientists have begun to measure not just how people talk, but also how they think, asking whether our understanding of even such fundamental domains of experience as space, time and causality could be constructed by language.

For example, in Pormpuraaw, a remote Aboriginal community in Australia, the indigenous languages don't use terms like "left" and "right." Instead, everything is talked about in terms of absolute cardinal directions (north, south, east, west), which means you say things like, "There's an ant on your southwest leg." To say hello in Pormpuraaw, one asks, "Where are you going?", and an appropriate response might be, "A long way to the south-southwest. How about you?" If you don't know which way is which, you literally can't get past hello.

About a third of the world's languages (spoken in all kinds of physical environments) rely on absolute directions for space. As a result of this constant linguistic training, speakers of such languages are remarkably good at staying oriented and keeping track of where they are, even in unfamiliar landscapes. They perform navigational feats scientists once thought were beyond human capabilities. This is a big difference, a fundamentally different way of conceptualizing space, trained by language.

Differences in how people think about space don't end there. People rely on their spatial knowledge to build many other more complex or abstract representations including time, number, musical pitch, kinship relations, morality and emotions. So if Pormpuraawans think differently about space, do they also think differently about other things, like time?

To find out, my colleague Alice Gaby and I traveled to Australia and gave Pormpuraawans sets of pictures that showed temporal progressions (for example, pictures of a man at different ages, or a crocodile growing, or a banana being eaten). Their job was to arrange the shuffled photos on the ground to show the correct temporal order. We tested each person in two separate sittings, each time facing in a different cardinal direction. When asked to do this, English speakers arrange time from left to right. Hebrew speakers do it from right to left (because Hebrew is written from right to left).

Pormpuraawans, we found, arranged time from east to west. That is, seated facing south, time went left to right. When facing north, right to left. When facing east, toward the body, and so on. Of course, we never told any of our participants which direction they faced. The Pormpuraawans not only knew that already, but they also spontaneously used this spatial orientation to construct their representations of time. And many other ways to organize time exist in the world's languages. In Mandarin, the future can be below and the past above. In Aymara, spoken in South America, the future is behind and the past in front.

In addition to space and time, languages also shape how we understand causality. For example, English likes to describe events in terms of agents doing things. English speakers tend to say things like "John broke the vase" even for accidents. Speakers of Spanish or Japanese would be more likely to say "the vase broke itself." Such differences between languages have profound consequences for how their speakers understand events, construct notions of causality and agency, what they remember as eyewitnesses and how much they blame and punish others.

In studies conducted by Caitlin Fausey at Stanford, speakers of English, Spanish and Japanese watched videos of two people popping balloons, breaking eggs and spilling drinks either intentionally or accidentally. Later everyone got a surprise memory test: For each event, can you remember who did it? She discovered a striking cross-linguistic difference in eyewitness memory. Spanish and Japanese speakers did not remember the agents of accidental events as well as did English speakers. Mind you, they remembered the agents of intentional events (for which their language would mention the agent) just fine. But for accidental events, when one wouldn't normally mention the agent in Spanish or Japanese, they didn't encode or remember the agent as well.

In another study, English speakers watched the video of Janet Jackson's infamous "wardrobe malfunction" (a wonderful nonagentive coinage introduced into the English language by Justin Timberlake), accompanied by one of two written reports. The reports were identical except in the last sentence where one used the agentive phrase "ripped the costume" while the other said "the costume ripped." Even though everyone watched the same video and witnessed the ripping with their own eyes, language mattered. Not only did people who read "ripped the costume" blame Justin Timberlake more, they also levied a whopping 53% more in fines.

Beyond space, time and causality, patterns in language have been shown to shape many other domains of thought. Russian speakers, who make an extra distinction between light and dark blues in their language, are better able to visually discriminate shades of blue. The Piraha, a tribe in the Amazon in Brazil, whose language eschews number words in favor of terms like few and many, are not able to keep track of exact quantities. And Shakespeare, it turns out, was wrong about roses: Roses by many other names (as told to blindfolded subjects) do not smell as sweet.

Patterns in language offer a window on a culture's dispositions and priorities. For example, English sentence structures focus on agents, and in our criminal-justice system, justice has been done when we've found the transgressor and punished him or her accordingly (rather than finding the victims and restituting appropriately, an alternative approach to justice). So does the language shape cultural values, or does the influence go the other way, or both?

Languages, of course, are human creations, tools we invent and hone to suit our needs. Simply showing that speakers of different languages think differently doesn't tell us whether it's language that shapes thought or the other way around. To demonstrate the causal role of language, what's needed are studies that directly manipulate language and look for effects in cognition.

One of the key advances in recent years has been the demonstration of precisely this causal link. It turns out that if you change how people talk, that changes how they think. If people learn another language, they inadvertently also learn a new way of looking at the world. When bilingual people switch from one language to another, they start thinking differently, too. And if you take away people's ability to use language in what should be a simple nonlinguistic task, their performance can change dramatically, sometimes making them look no smarter than rats or infants. (For example, in recent studies, MIT students were shown dots on a screen and asked to say how many there were. If they were allowed to count normally, they did great. If they simultaneously did a nonlinguistic task—like banging out rhythms—they still did great. But if they did a verbal task when shown the dots—like repeating the words spoken in a news report—their counting fell apart. In other words, they needed their language skills to count.)

All this new research shows us that the languages we speak not only reflect or express our thoughts, but also shape the very thoughts we wish to express. The structures that exist in our languages profoundly shape how we construct reality, and help make us as smart and sophisticated as we are.

Language is a uniquely human gift. When we study language, we are uncovering in part what makes us human, getting a peek at the very nature of human nature. As we uncover how languages and their speakers differ from one another, we discover that human natures too can differ dramatically, depending on the languages we speak. The next steps are to understand the mechanisms through which languages help us construct the incredibly complex knowledge systems we have. Understanding how knowledge is built will allow us to create ideas that go beyond the currently thinkable. This research cuts right to the fundamental questions we all ask about ourselves. How do we come to be the way we are? Why do we think the way we do? An important part of the answer, it turns out, is in the languages we speak.