Language and thought

How is language related to thought? Do people who speak different languages think differently? According to one theory, language offers the concepts and mechanisms for representing and making sense of our experience, thereby radically shaping the way we think. This strong view, famously associated with the writings of Benjamin Whorf (Whorf, 1956), is certainly wrong. First, people possess many concepts which their language does not directly encode. For instance, the Mundurukú, an Amazonian indigene group, can recognize squares and trapezoids even though their language has no rich geometric terms (Dehaene, Izard, Pica & Spelke, 2006). Similarly, members of the Pirahã community in Brazil whose language lacks number words can nevertheless perform numerical computations involving large sets (even though they have trouble retaining this information in memory; Frank, Everett, Fedorenko & Gibson, 2008). Second, there are often broad similarities in the ways different languages carve up domains of experience. For instance, crucial properties of color vocabularies across languages appear to be shaped by universal perceptual constraints (Regier, Kay & Khetarpal, 2007). To take another example, many languages seem to label basic tastes by distinct words (e.g., sweet, salt, sour and bitter; Majid & Levinson, 2008). The presence of constraints on cross-linguistic variation suggests that language categories are shaped by cognitive biases which are shared across humans.

A weaker version of the Whorfian view maintains that, even though language does not completely determine thought, it still affects people's habitual thought patterns by promoting the salience of some categories and downgrading others. One line of studies set out to examine how speakers of English and Japanese draw the conceptual distinction between objects and substances. English distinguishes between count nouns (*a pyramid*) and mass nouns (*cork*), while Japanese does not (all nouns behave like mass nouns). When taught names for novel simple exemplars (e.g., a cork pyramid), which could in principle be considered either as objects or as substances, English speakers predominantly took the name to refer to the object ('pyramid') but Japanese speakers were at chance between the object or the substance ('cork') construal (Imai & Gentner, 1997). These findings have been interpreted as evidence that the linguistic count/mass distinction affects how people draw the conceptual object/substance distinction (at least for indeterminate cases).

A second set of studies has focused on speakers of Tseltal Mayan living in Mexico whose language lacks *left/right* terms for giving directions and locating things in the environment. Tseltal speakers cannot say things such as *The cup is to my left;* instead they use absolute co-ordinates (e.g., North or South) to encode space. In a series of experiments, Tseltal speakers were shown to remember spatial scenes in terms of absolute co-ordinates rather than body-centered (left/right*)* spatial concepts; speakers of Dutch, a language which (like English) possesses *left/right* terms, showed the opposite preference (Levinson, 2003).

At present, the precise interpretation of these findings is greatly debated. To begin with, studies such as the above simply show that linguistic behavior and cognitive preferences can co-vary, not that language *causes* cognition to differ across various linguistic populations. Furthermore, some of the reported cognitive differences may have been due to ambiguities in the way instructions to study participants were phrased. When speakers of Japanese and English were asked to rate on a scale from 1 to 7 how likely they were to classify a novel specimen as a kind of object or a kind of substance, their

ratings converged (Li, Dunham & Carey, in press). Similarly, when speakers of Tseltal were given implicit cues about how to solve spatial tasks, they were able to use left/right reasoning; in fact, on some tasks, they were more accurate when using left/right concepts compared to absolute co-ordinates – contrary to what one might expect on the basis of how Tseltal encodes space (Li, Abarbanell & Papafragou, 2005). These data show that human cognitive mechanisms are flexible rather than being streamlined by linguistic terminology.

Other studies have confirmed the conclusion that cross-linguistic differences do not necessarily lead to cognitive differences. For instance, memory and categorization of motion events such as an airplane flying over a house seem to be independent of the way languages encode motion (Papafragou, Massey & Gleitman, 2002). Relatedly, similarity judgments for containers such as jars, bottles and cups converge in speakers of different languages despite the fact that words for such containers vary cross-linguistically (Malt, Sloman, Gennari, Shi & Wang, 1999). In a striking recent demonstration using eye tracking methods, speakers of English and Greek were found to attend to different parts of an event while they were getting ready to describe the event verbally; however, when preparing to memorize the event for a later memory task, speakers of the two languages performed identically in terms of how they allocated attention – presumably because they relied on processes of event perception that are independent of language (Papafragou, Hulbert & Trueswell, 2008).

This research suggests that language can be usefully thought of as an additional route for encoding experience. Rather than permanently reshaping the processes supporting perception and cognitive processing, language offers an alternative, often optionally recruited system of encoding, organizing and tracking experience. The precise interplay between linguistic and cognitive functions will continue to be the topic of intense experimentation and theorizing for the years to come.

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