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LINGUISTICS

Sound and meaning in the world's languages

The sounds of words that represent particular meanings are usually thought to vary arbitrarily across languages. However, a large-scale study of languages finds that some associations between sound and meaning are widespread.

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Plato's dialogue *Cratylus* begins with a debate. Socrates is asked whether the sounds of words are simply arbitrary conventions, as Hermogenes suggests, or if sounds are reflective in some way of their meaning, as Cratylus proposes. Socrates argues for the latter option, holding that although many words have arbitrary relations to their meanings, 'good' words are distinguished by a correspondence between sense and sound — their sound somehow suits their meaning. However, most researchers today accept the linguist Ferdinand de Saussure's updated version[1] of Hermogenes' viewpoint that the connection between sound and meaning in language is essentially arbitrary, with a few minor exceptions.

Writing in *Proceedings of the National Academy of Sciences*, Blasi *et al.*[2] address this old debate by exploring an unprecedented number of languages for indications of associations between sound and meaning, uncovering substantial data that support Socrates' viewpoint. The authors find that, although most words vary arbitrarily, certain associations between speech sounds and the meanings of the words that contain them surface time and again among populations spread across the globe.

There are many categories of sound–meaning correspondence. The most easily recognizable form is termed onomatopoeia, in which the sound of a word corresponds to the sound made by an animal or object. For example, bird names such as cuckoo or chickadee represent phonetic attempts to imitate the characteristic sounds made by these birds. However, even here a certain amount of arbitrariness is present. The crowing of a cock is 'cock-a-doodle-doo' in English but 'kikeriki' in German.

Overlapping somewhat with onomatopoeia are what are known as ideophones. The sound of the entire word of an ideophone has a role in conveying an iconic meaning that can go beyond simply imitating sounds. Such ideophones are uncommon in English, but one example is the comic-book word 'kapow'. Yet in many other languages, including Korean, Japanese and the African language Ewe, there are large numbers of ideophones, which are frequently used in expressive speech — for example, the Japanese term 'doki doki' expresses the thumping heartbeat of excitement.

Finally, the most pervasive form of sound–meaning correspondence is termed sound symbolism, referring to the situation in which some part of a word or words has a non-arbitrary association between sound and meaning, but other components are arbitrary. A well-known example is the use of different vowels to represent size: the /i/ vowel sound (pronounced 'ee') in the word 'teeny' or 'weeny' symbolizes small size, whereas the /u/ vowel sound (pronounced 'oo') in 'huge' or 'gargantuan' indicates large size. Similarly, in the famous *bouba–kiki* shape–sound effect[3], words for sharp, angular objects tend to have consonant sounds such as 'k', whereas smooth, rounded objects are associated with consonants such as 'r' and 'b' (Fig. 1). Both of these phenomena have been extensively studied experimentally and seem to be robust across cultures and age groups[4–6].

Other potential examples in English include systematic sound similarities in words possessing related meanings. For example, the sound 'gl-' often indicates shiny visual phenomena (such as glitter or gleam), whereas 'sl-' occurs frequently in words with negative connotations (like slime, sludge, slum or slander).The non-arbitrary sound–meaning associations studied by Blasi *et al.* belong in the category of sound symbolism.

Most previous studies of sound symbolism have explored less than 100 languages. Blasi and colleagues started by assembling phonetically transcribed word lists from an enormous variety of languages. They prepared more than 6,000 lists of about 30 basic words and their meanings, as well as conducting a detailed examination of 328 word lists containing 100 items. There is no clear dividing line between a 'dialect' and a 'language' — linguists often quip that a language is a dialect with an army and a navy. Nonetheless, these lists cover roughly 60% of the world's languages and 85% of family groups of related languages (such as the Romance language-family grouping that includes Italian, French and Spanish). Although the lists are short, they encompass much of the basic vocabulary in each language and represent the most common nouns and verbs.

Blasi *et al.* then searched these lists for systematic biases in the probability of particular sound–meaning associations (controlling for the biases expected as a result of the overall occurrence of the sounds). They aimed to find robust, widespread sound-symbolic phenomena, and screened out associations found in only one or a few languages. They also aimed to take into account such factors as language relatedness, word length or language-specific constraints.

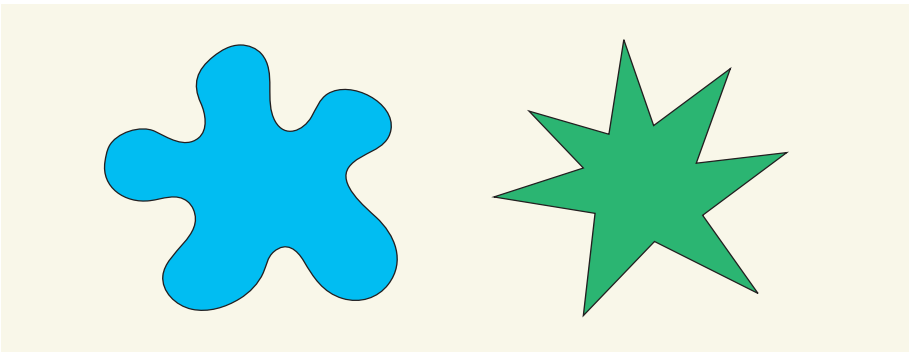

Figure 1 | The *bouba–kiki* phenomenon. When asked which of the shapes shown are probably named '*bouba*' or '*kiki*' in an unfamiliar foreign language, people consistently choose the rounded shape (blue) for *bouba* and associate the sharp-edged shape (green) with *kiki*[3] (*bouba* and *kiki* are invented words). This link between the consonants 'b' and 'k' and round and sharp shapes, respectively, is consistently found in speakers of different languages, and occurs when other invented words are tested[5]: for example, 'baluma' is also associated with the rounded shape. Blasi *et al.*[2] find that such relationships between the sound and meaning of words are more common and widespread than previously suspected.

The result was a surprisingly long list of robust, widespread sound–meaning associations. Reassuringly, Blasi and colleagues found that the vowel /i/ is widely associated with small size, and 'r' with roundness, as noted by previous researchers[4–6]. Other positive associations found by the authors also seem intuitive, such as 'n' for nose, 'l' for tongue (as in 'lingual') and 'm' in words for mother or breasts. Negative associations uncovered included the observation that the sounds 'b' and 'm' are unlikely to be present in the word for teeth. However, some of the associations identified are particularly hard to fathom, such as 's' for dog (such as *canis* in Latin) or 'a' for fish (like *pescado* in Spanish).

Where does this leave the debate between the views of Socrates and de Saussure? As de Saussure argued, most of the sounds in words remain arbitrary, but these data from Blasi and colleagues indicate that matches of sound to sense might be more widespread and pervasive than has been discovered by previous smaller-scale approaches.

The underlying processes driving these biases between sound and meaning remain a topic for future research. It seems possible that some of these connections reflect the shared sensory and cognitive biology of our species, which over time filters out 'bad' words that don't sound right, and favours words that have a good fit between sense and sound. Over many generations, this filtering will result in selection of variant words and pronunciations, leading to a process of cultural evolution in which words obeying Socrates' dictum — that good words have sounds that suit their meaning — will have a higher probability of persisting. This hypothesis can be easily tested in laboratory experiments exploring cultural evolution[7–9], adding new fuel to the ancient arguments in *Cratylus*. ■

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