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Abstract: Recurrent lexicalization patterns across widely different cultural contexts can provide a window onto common conceptualizations. The cross-linguistic data support the idea that sweet, salt, sour, and bitter are basic tastes. In addition, umami and fatty are likely basic tastes, as well.

Is the mapping of language onto the world arbitrary? Erickson takes the position in his article that language tells us nothing about the underlying nature of things. Words are uninformative, or worse, misleading for theories of taste. We disagree. Language can be a valuable tool for uncovering human conceptualization - when approached in the right way. We suggest here how we can use the language of taste to inform our scientific theories. But, first, some clarifications are in order.

Erickson's position is a realist one. He states that things - tastes - exist independently of our naming them. He contrasts this with the alternative nominalist position, that it is the words *sweet*, *sour*, *salty*, *bitter* that create the taste categories "sweet," "sour," "salty," and "bitter." He thinks nominalism cannot be true because experience is continuous, but words in language force arbitrary boundaries in service of communication needs, which can vary as a function of culture, experience, and availability of foodstuffs. More importantly, his realist position leads him to assert that there is no evidence for basic tastes because the linguistic categories that exist are just a matter of language usage not psychophysiology.

If we take single examples for individual languages, arbitrariness abounds. Keeping to gastronomy, in Japanese there is a word *pakupaku* which means 'to eat in big mouthfuls or take quick bites,' while in Hawaiian *muka* means 'a smacking sound with the lips, indicating that the food is tasty,' and in G!ui, a central Khoisan language spoken in Botswana the verb *kVore* means 'to have a good taste common to eggs, a certain caterpillar, or other specific food.' Why should Japanese, Hawaiian, and G!ui have precisely these words, and English none of these? Surely this demonstrates that language merely reflects cultural preoccupations and nothing more.

We agree that individual words by themselves cannot tell us anything deep about underlying cognition. But when different languages make the same distinctions again and again - despite variation in culture and ecology - there is something more to explain. Language discriminations have to be supported by the psychophysics, and recurrent patterns suggest uneven psychophysical continua, or salient prototypes (cf the color domain, where language data have always been taken seriously; see Berlin & Kay 1969; Regier et al. 2005; 2007). Conversely, psychological foci for basic tastes are made plausible by their common lexicalization across languages. In the case of taste, language discriminations do not just reflect one great cultural tradition - they reflect 8,000 traditions, many quite unconnected to one another, and with different staples, cuisines, and so forth. If languages demonstrate recurrent taste categories, despite these differences, it suggests there are psychologically salient taste concepts being mapped onto language. So, what are the linguistic facts?

Sweet, sour, salty, and bitter are commonly labeled by distinct words in the many independent languages, as Erickson notes in his article, too. Moreover, some languages make lexical confluences across taste qualities, providing further tantalizing clues as to how taste qualities are conceptualized. Over 100 years ago, Myers (1904) devised a cross-linguistic questionnaire, which he sent to missionaries and European residents abroad, to investigate the taste words of people from different cultures. The results of that study show that sweet and salt are commonly conflated together, as are sour and bitter. Two other common confluences include salt, sour, and bitter together and sweet, salt, and

Language does provide support for basic tastes

doi: 10.1017/S0140525X08003476

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sour together. These facts combined suggest that sweet and bitter are psychologically the most dissimilar and distinct tastes. Also, that sweet and salt are more similar to one another than to the other tastes, and that sour and bitter are likewise more similar to one another than to the others.

According to Erickson, these conflation are just arbitrary facts about particular languages. If that is so, it is hard to explain how these cross-linguistic tendencies also mirror naming behavior within single languages. English speakers naming different chemical solutions, for example, often make identification errors. Most commonly they confuse bitter and sour, but they also confuse sour and salt, and even occasionally salt and bitter. They do not, however, mistake bitter and sweet (e.g., O'Mahony et al. 1979). This parallelism between the English data and the cross-linguistic naming supports the idea that there are common psychological concepts underlying the linguistic systems of different languages.

Examining lexicalization patterns across a range of languages opens up the possibility of finding additional conceptualizations that just happen to be missing from a single language. The natural variation in languages means that there can be accidental lexical gaps. But large-scale cross-linguistic investigations can help us discover additional systematicities. Proof of how fruitful language data can be in informing scientific theory is the "discovery" of umami as a basic taste (Ikeda 1909/2002; Lindemann et al. 2002). Examination of the literature shows potential additional basics. These include astringent, mint, pungent, rancid, spicy, and fatty. Although many of these terms do not appear to encode pure taste sensations (as elicited by epithelial taste receptor cells, rather than olfactory or trigeminal stimulation), there is evidence that the set of basic tastes is larger than once thought. Work from our own lab suggests that fatty is a term that appears in the vocabularies of quite distinct cultural traditions, including Tzeltal speakers in Mexico and Ye'ŋ Dnye speakers of Rossel Island, Papua New Guinea, as well as in many of the Algonkian languages of North America (Chamberlain 1903). And just as we find conflation of sweet, salt, and such, there are other languages that show conflation of sweet and fatty, including the Toaripi in Papua New Guinea and Bau dialect speakers from Fiji (Myers 1904). Recent physiological evidence gives further substance to this idea. At least part of the gustatory experience of fat appears to be through activation of taste receptor cells (Gilbertson 1998). In support of this, "super-tasters" who are sensitive to the bitter taste of 6-n-propylthiouracil (PROP) are also sensitive to the difference in fat content between a 10% fat salad dressing and 40% fat salad dressing, whereas "non-tasters" of PROP are not (Tepper & Nurse 1997). A likely mechanism for this is the number of taste buds that tasters have and hence the number of fatty acid sensitive taste cells (Gilbertson 1998).

In sum, language patterning is part of the data that a good theory of taste perception is answerable for, and attention to it may yield insights into psychophysical processes.