Chapter 26

Comparing Lexicons Cross-Linguistically

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Abstract

The lexicon is central to the concerns of disparate disciplines and has correspondingly elicited conflicting proposals about some of its foundational properties. Some suppose that word meanings and their associated concepts are largely universal, while others note local cultural interests infiltrate every category in the lexicon. This chapter reviews research in two different semantic domains – perception and the body – in order to illustrate cross-linguistic similarities and differences in semantic fields. Data is considered from a wide array of languages, especially those from small-scale indigenous communities which are often over-looked. In every lexical field we find considerable variation across cultures, raising the question of where this variation comes from. Is it the result of different ecological or environmental niches, cultural practice, or accidents of historical pasts? Current evidence suggests diverse pressures differentially shape lexical fields.

Keywords: *lexicon, words, concepts, categories, semantic domain, semantic field, lexical field, cross-linguistic, cross-cultural*

Introduction

The study of how meaning is packaged into words is simultaneously the most fascinating and vexing of topics. Best-selling books such as *The meaning of Tingo and other extraordinary words from around the world* (de Boinod, 2006) and *They have a word for it: A lighthearted lexicon of untranslatable words* (Rheingold, 1988) are testament to the interest the public have for learning about the curiosities in other languages. But this same popular interest can result in scholars viewing cross-linguistic meaning as merely that – a charming curiosity not worthy of serious attention. It turns out, however, that the lexicon is central to many broad questions that occupy psychologists, linguists, and anthropologists, such as: *Where does meaning come from? How similar are the meanings of words across communities? How are language and thought connected?*

Some suppose that the stock of concepts expressed in the lexicon is universal and innate. This is based (partly) on the "venerable view" (Gleitman & Papafragou, 2005, p.634) that you must be able to entertain the concept in the first place to be able to acquire it, thus creating a conundrum for theories postulating that concepts are learned. In favour of the nativist view is the impressive body of work examining infant conceptual development (Spelke, 1994), which shows there is a rich repertoire of knowledge we hold prior to any kind of linguistic experience. On this view, we might expect that lexicons across languages would be largely similar. As Chomsky (2000, p.120) argues: "The linkage of concept and sound can be acquired on minimal evidence... the possible sounds are narrowly constrained, and the concepts may be virtually fixed."

A very different view holds that the words and concepts in a language vary widely, since they are moulded to fit local preoccupations. Evidence of well-fittedness is abundant. Many pastoralist societies of East Africa, for example, have impressively large lexicons referring to cattle (Evans-Pritchard, 1934; Turton, 1980); sea-faring people reflect their cultural preoccupation in terminology for geographical features (Boas, 1934; Burenhult & Levinson, 2008); and, indeed, lexical elaboration can be seen in response to all matters of ecological and environmental interests. But the relationship between lexicon and culture is not so straightforward so as to imagine all cultural interests are directly elaborated in lexicon, nor that lexical elaboration tokens heightened cultural significance. As Hymes (1964) points out, although the Yana Indians from California may be said to have heightened interest in baskets and acorns as reflected in their many terms for these objects, it is unclear what to make of the fact that there is also considerable elaboration of terms to do with the eyes and vision. This, he says, "would not have been predicted and does not depend on the environment. The Yana are not reported to have had more eyes or kinds of eyes, than other people." (p. 167).

Items in the lexicon are composed of three things: form, the associated syntactic properties of that form, and the meaning. It is this last aspect that is the focus of this chapter. Words, such as *dog*, *blue*, *run*, are typically considered the unit relevant to the lexicon but there both smaller and larger chunks that are important to consider. The smallest meaningful unit is the morpheme, such as *un-* and *cover* in *uncover*. Some morphemes, like *cover*, can be used

on their own as words; others, like *un-*, are affixes – they are "bound" and cannot occur independently. When comparing lexicons sometimes meanings that appear in independent words in one language will appear in a morpheme in another. Likewise there can be phrases whose meanings are not predictable from the combination of words or morphemes that appear in them. Consider *chew the fat* which means 'to discuss a matter'. The meaning of the phrase is not literal; it cannot be derived from simply combining meanings of *chew*, *the* and *fat*. Rather it is likely that the whole phrase is stored in the mental lexicon as a chunk. So, when comparing lexicons cross-linguistically it might be that we have to compare words in one language with morphemes or phrases in another. Every term in a language is connected to a rich internal, mental representation that is correspondingly activated upon producing or comprehending a word. This internal representation, or concept, is multiplex, and there are many points of debate regarding some of the basic aspects of this representation.

One way to think about how word meanings are stored is to consider them something like the entries in a mental dictionary, with ancillary information stored separately in a mental encyclopaedia (Clark & Clark, 1977). Depending on the viewpoint entries in the mental dictionary could be formulated in an amodal, propositional system (e.g., Jackendoff, 1983; Wierzbicka, 1992), in sensori-motor primitives (e.g., Barsalou, 1999; Prinz, 2002), or maybe even represented in an entirely atomistic fashion (Fodor, 1981, 1998). The mental dictionary analogy can be helpful but not everyone subscribes to a strong distinction between the mental lexicon and encyclopaedia (e.g., Hagoort, Hald, Bastiaansen, & Petersson, 2004; Murphy, 2004); instead word meaning is taken by some to be richer including many aspects of what we know about things in the real world. Regardless of which theory one subscribes to, however, the content of this internal representation must be such that it fixes the range of things that words refer to, otherwise language could not be used to talk about things in the world.

Words in the mental lexicon are not isolated entities but are related to each other through relations of hyponymy (e.g., *poodle* to *dog*; *burgundy* to *red*; *slice* to *cut*), synonymy (e.g., *fiddle* and *violin*; *monarch* and *sovereign*; *settee* and *sofa*), antonymy (e.g., *long* vs. *short*; *black* vs. *white*; *married* vs. *single*), and so forth. These are the paradigmatic relations between terms. At the same time, words can combine with other words only in certain ways and this collocational information can also tell us something about the meaning of words, so while *the big square* is an acceptable sequence *the circular square* is not. The possibilities for terms to appear in certain contexts or collocations are the syntagmatic relations between units. According to structuralism, the meaning of a term is a function of its relationship to other terms within the same system (Saussure, 1916). This notion was developed further in the theory of semantic fields by scholars such as Jost Trier, such that terms which stand in systematic paradigmatic or syntagmatic relations with other terms all belong to a semantic or lexical field:

> Fields are living realities intermediate between individual words and the totality of the vocabulary; as parts of the whole they share with words the property of being integrated in a larger structure (sich ergliedern) and with the vocabulary the property of being structured in terms of smaller units (sich ausgliedern) (Trier, as quoted in Lyons, 1977, p. 253).

In Trier's original formulation, lexical fields are internally well-structured and coherent, they cover one semantic field, and are clearly separated from other semantic fields. All terms fall into one, and only one semantic field, and no word is left floating on its own. Decades of studies suggest a different picture, with much overlap, criss-crossing, and lexical gaps in many fields, as will be illustrated in the sections below. The idea that the mental lexicon can be subdivided into subsets based on shared meaning has played a critical role in the comparison of lexicons cross-linguistically. However, there is no real consensus on what constitutes a semantic field or domain, nor how it can be identified. Here we witness another set of conflicting views: should we compare lexicons by beginning with an analysis of the language-internal structures, or should we instead use a neutral non-linguistic space and then see how individual languages "carve-up" that conceptual domain? Different disciplines have ended up with different sets of semantic fields or domains, based on different weightings of these criteria. Within the tradition of linguistic anthropology, scholars have studied domains such as kinship, numerals and color; linguists identify domains such as space, time and cause; whereas neuropsychologists and neuroscientists tend to identify domains such as animals, plants and tools. There is also the question of the granularity of a semantic field – should it be identified at the level of color, smell and taste, or should it instead be broader, perhaps identified with "perception". One possibility is to think of lexical fields themselves as in a set of relations to one another so that it is possible to zoom-in or -out of a field depending on the particulars at hand.

Certain aspects of meaning are preferentially expressed in the lexicon rather than through grammar or prosody. So, while tense, aspect, and mood *can* be expressed lexically cross-linguistically, they rather lend themselves to grammatical expression. However, the domains of color, smell, temperature, texture and weight only appear to be expressed in the lexicon (Allan, 1977; Evans, 2011; Goldin-Meadow, 2007), which makes these domains particularly attractive for further study. For those domains where meaning distinctions appear in lexicon and grammar – which aside from tense, aspect and mood include things such as bodyparts, shape, emotions – one particularly pertinent question becomes what is the division of labour between the two. For example, in Purépecha, an indigenous language of Mexico, bodyparts are coded in a set of independent nouns, as they are in English, but there is also another system of distinctions made in a closed set of (spatial) suffixes. Although some suffixes appear to refer to the same part as those coded by independent nouns (e.g., the word *jak'i* for 'hand' appears to denote the same part as the suffix *-k'u* 'hand') other suffixes make different distinctions (e.g. *–rhu* refers to nose *and* forehead). The bodypart suffixes can be used to determine the precise location of the ground object, for example, *Mikua kapa-**rhu**-ku-s-ti mesa-rhu* (lit. cover

container+upside down-**nose.forehead**-intr-perf-asser.3 table-loc 'The lid is upside-down **on the edge** of the table' (Mendoza, 2007). In general, the meanings of these bodypart suffixes are more schematic than those of body part nouns, as grammatical forms are wont to be. So, the term *-rhu* 'nose, forehead', for example, also refers to point, tip, projection, end of object, edge, fruit, flow, seed, etc.

In the remainder of the chapter, we look more closely at two broad domains, namely "perception" and "the body", in order to illustrate some of the points of debate briefly introduced above.

Perception

Perhaps it is in the domain of perception that semantic distinctions seem most straightforward: Our eyes deliver information about form, motion, and colour; our ears pick out the loudness and pitch of sounds; our tongues distil the qualities of sweet, sour and bitter, etc. According to John Locke (1690) "If a child were kept in a place where he never saw any other (colour) but black and white til he were a man, he would have no more ideas of scarlet or green, than he that from his childhood never tasted an oyster or a pineapple has of those particular relishes". Our perceptual organs and the environment to which they are sensitive are for the most part similar from person to person and presumably, therefore, the resulting categories are too. But there is considerable variation in how languages carve up these sensory experiences for the purposes of language. Even the semantic categories coding the simple sensations of the tongue show substantial variation across languages. Leaving aside the combined sensation of "flavor" which integrates smell, texture and pain signals with "taste" proper; and focusing only on the qualities experienced by taste receptors, i.e. 'sweet', 'sour', 'salty' and 'bitter', variation abounds. Speakers of some languages conflate 'sweet' and 'salty' with a single word, while grouping 'bitter' and 'sour' together under a different label (e.g. in Aulua, an Austronesian language spoken in Vanuatu).[1] In other languages, however, 'salty' is conflated with 'sour' or it is conflated with 'bitter'; while in yet others all three 'salty', 'sour' and 'bitter' are conflated together (apparently common in New Guinea, the New Hebrides, and most of Polynesia; see Chamberlain, 1903 and Myers, 1904). So, even these discriminable, basic sensations do not straightforwardly call out for distinct words in all languages.

This notionally simple domain also illustrates some of the problems with identifying semantic domains for cross-linguistic comparison. For example, the British psychologist Myers in his study of taste vocabulary started with a non-linguistically defined space of the four taste qualities 'sweet', 'salty', 'sour', and 'bitter' and then examined how

[1] If one were to paraphrase the relevant distinction, the words appear to refer to pleasant tastes vs. unpleasant tastes, though . crucial data is missing for us to be entirely sure that this is the underlying semantics. Salt is only pleasant in low concentrations, for example, so if participants would still use the same term for sweet and high concentration salt, the gloss 'pleasant taste' seems less felicitous.

speakers of different languages referred to these qualities. In contrast, the North American anthropologist Chamberlain took as his starting point the lexical field of taste in Algonkian languages and came to a rather different set of qualities that characterized the semantic field. Including the distinctions covered by Myers, there seemed to be additional terms covering the qualities of 'astringent', 'peppermint', 'pungent', and 'rancid'. In both cases considerable variation across languages was found, but it is clear that the mapping of lexical fields to semantic fields is a thorny matter.

Variation abounds in other perceptual domains too. Some languages elaborate on tactile expressions, with words labelling very many texture distinctions. Siwu (a language of eastern Ghana) is one such language, where there are many specific words for haptic sensations: for example, *kpɔlɔkpɔlɔ* 'unpleasantly slippery (e.g. muddy road, mudfish)', *dɛkpɛrɛɛ* 'fine-grained (e.g. flour)', *safaraa* 'coarse-grained (e.g. sand)', etc. (Dingemanse, 2011; Dingemanse & Majid, 2012). In Yukatek (spoken in Mexico) there is a productive derivational morphology that allows speakers to concisely express tactile sensations in single words such as *k'ixlemak* 'stinging (e.g. having a small piece of wood in the eye' vs. *k'ixinak* 'stinging (e.g. rubbing the fur of wild boar)' (Le Guen, 2011).[2] Other languages elaborate on smell qualities. The Aslian languages spoken in the Malay Peninsula shine here (Burenhult & Majid, 2011; Tufvesson, 2011; Wnuk & Majid, 2012). For example, in Jahai around a dozen or so stative verbs categorize smell qualities with the connoisseurship eluding ordinary speakers of Indo-European languages. Sound qualities – such as loudness or pitch, for example – are also treated differently cross-linguistically (Eitan & Timmers, 2010): while English, and other Germanic languages make use of a vertical spatial metaphor to talk about variation in pitch (*high* vs. *low*), languages like Farsi, Turkish and Zapotec use a horizontal spatial metaphor instead (*thick* vs. *thin*; Dolscheid, Shayan, Majid, & Casasanto, in press; Shayan, Ozturk, & Sicoli, 2011). "Sounds" can also form the basis of words. In a number of languages many names for animals, such as birds, frogs and insects, are derived from the sound typically made by that animal. The animal's call is translated into the phonological repertoire of the language, and this onomatopoeic form becomes conventionalized as that creature's name (Berlin & O'Neil, 1981).

As with other sensory modalities, visual experiences can be "carved up" in different ways too (Saunders & Brakel, 2002; Wierzbicka, 2005). Beneath the rampant variation, recurring patterns can nevertheless be detected. In the domain of colour, for example, Berlin & Kay (1969) compared the colour lexicons of nearly 100 languages and concluded that there was a total universal inventory of exactly 11 basic colour categories, and that all languages drew from this basic stock. The variation between languages was in how many color words they had; but languages with the same number of terms had the same referential range, consistent with the tenets of semantic field theory. Moreover, they argued, there was systematicity to how colour lexicons grew. According to their analysis, all languages have terms

[2] Formed from the root *k'ix* 'thorn'.

for ‘white’ and ‘black’; if there is to be a third colour word in a lexicon it will be ‘red’; next comes either ‘green’ or ‘yellow’, and so on.

Berlin and Kay focused on the denotational or referential aspect of colours terms (i.e. their extensions). They presented speakers with a colour array, i.e., over 300 standardised colour chips, and asked speakers to indicate the boundaries and best examples of colour words from their native language. Of course, speakers are able to express colours using a wide-range of strategies: they can use dedicated, abstract terms, such as *red, green* and *blue*; conventionalised source-based descriptions, such as *lilac* or *turquoise*, or even ad-hoc phrasal expressions like *shark invested water blue* or *white if it had a wine spill on itself and let it dry for a few days and then tried to wash it but it just left it that awful color*.[3] This fact alone might suggest substantial cross-linguistic variation in the expressibility of colour, since if source-objects vary cross-culturally (as they surely do), then descriptions will vary too. Rather than compare all possible strategies speakers might use to talk about colours, Berlin and Kay focused on “core” or “basic” vocabulary. Since even this restriction can result in an unwieldy number of terms, Berlin and Kay identified a number of criteria which allowed them to identify core colour vocabulary, or in their parlance “basic colour terms”. Basic colour terms are monolexemic (that is, compounds or modified terms are excluded), psychologically salient, without unusual distributional behaviour; they are not source-descriptors (such as gold, aubergine, etc.), nor are they restricted to a narrow class of objects, or foreign words; and, finally, their extension is not included in that of any other colour term. By using these criteria, Berlin and Kay were able to extrapolate the regularities in colour lexicon development described above.

There have been a number of revisions to the original theory (see Biggam, 2012, for a summary of these changes) in response to various criticisms (e.g., Levinson, 2000; Lucy, 1997; Wierzbicka, 2008). One point of critique has been the use of English glosses. Glossing words as ‘black’ and ‘white’, for example, is misleading, argues Wierzbicka because this suggests two terms taken from different lexicons have exactly the same meaning. This is especially problematic when we consider that the extension of a term glossed as ‘black’ in a language with only 3 color terms will be vastly larger than a term glossed as ‘black’ in a language with 11 terms. Generally, the boundaries of color terms shift as a function of the number of color words within a lexicon.

A number of scholars have questioned whether color is a coherent semantic domain cross-linguistically: many terms that appear on the surface to encode color in small-scale languages are in essence multi-modal, including in their semantics information about texture and succulence (e.g., Conklin, 1955; Roberson, 2005). Likewise, syntagmatic and paradigmatic relations for color words suggest that it might not cohere as a lexical field, either. Even in English, the

[3] Actual colour descriptions from an on-line colour naming survey http://blog.xkcd.com/2010/05/03/color-survey-results/

distributional properties of color words differ – so while we can *blacken*, *whiten* and *redden*, we cannot **yellow-en*, **green-en* or **blue-en*. These findings, amongst others, prompted many to worry whether color was a coherent domain at all; and whether by limiting the field to the three dimension of hue, saturation and lightness, Berlin and Kay were ruling out the very facts that challenged their universalist claims. Other worries included the language sample (which was biased towards languages with large populations of literate speakers) and speaker sample (bilingual speakers resident in the US).

In response to these latter criticisms, the "World Colour Survey" was launched (Kay, Berlin, Maffi, Merrifield, & Cook, 2009). This is the largest database of referential meaning ever collated. Within it is naming data for 330 different colour chips from 2616 speakers of 110 small-scale non-literate communities, as well as judgments of the best examples of colours from each language. By applying various statistical models, Kay and Regier have confirmed that the distribution of categories is not random (Kay & Regier, 2003), but represent optimal partitions of colour space (Regier, Kay, & Khetarpal, 2007). Moreover, best examples of colour categories cluster in colour space (Regier, Kay, & Cook, 2005). This finding is interesting because it suggests that although boundaries between categories are influenced by which other colour words are present within a language, focal points are not, which in turn supports the hypothesis that focal colours may form the bedrock from which colour categories are formed (Kay & McDaniel, 1978).

However, the story turns out not to be quite so straightforward. First, if focal colours are universally available and the basis for color categories, then speakers of 'grue' languages (languages with a single word to cover both green and blue) should indicate the best exemplar for their 'grue' word is either focal green or focal blue (or both) (Regier & Kay, 2004). However, around a third of speakers of a 'grue' language choose a point mid-way between the two, which is inconsistent with a universal focal colours proposal, but consistent with a proposal by Roberson and colleagues that people calculate focal points on the basis of the particular language's category boundaries (Roberson, Davies, & Davidoff, 2000). Another line of thought also questions universal focal points but from a different perspective. Lindsey & Brown (2002) noticed that the distribution of languages around the world with a grue category is not patterned randomly: there are many more languages with a grue category near the equator. Speakers living nearer to the equator are exposed to higher levels of sunlight with lots of ultraviolet-B which, according to Lindsey & Brown, leads to changes to the lens of the eye. So, according to their account, (at least some) people speaking a grue language simply do not see 'blue' in the same way as speakers of a language that differentiate 'blue' and 'green'. If enough people within a community suffer from "lens brunescence", then this might bias speakers of the whole community to not differentiate blue and green in words since the distinction would not be successfully communicated to all. The Lindsey and Brown hypothesis also predicts that speakers of grue languages do not choose focal blue or green as best examples, but according to their account this would be because speakers have warped perceptual fields. Other evidence is also consistent with the idea that visual experience can warp perceptual space. A recent study testing Norwegians born

above the Arctic circle found that individuals were less sensitive to the yellow-green-blue spectrum and more sensitive to variation in the purple range than those born below the Arctic, which Laeng and colleagues (2007) ascribe to differences in light exposure. Although this study does not directly assess colour names, considered together with Lindsey and Brown's analyses, it is suggestive of the experiential shaping of colour categories; a topic that is still relatively under-explored.

Which brings us back to the blind man in Locke's example at the beginning of this section, with blindness as an extreme form of variation in experience. Although missing the crucial qualia, does a blind person really have "no ideas" about colour? A study by Shepard and Cooper (1992) is enlightening in this respect. They presented speakers with normal vision, different kinds of colour-blindness, or complete absence of vision since birth with actual colour chips or colour names (corresponding to those chips), and asked participants to sort each set according to their similarity. For participants with normal vision, sortings of colour chips revealed Newton's colour circle (see Figure 1), and their sortings of names paralleled this same circular structure. Shepard and Cooper take this as evidence that internal representations mirror external structure, or in this case that the organisation of the colour lexicon is isomorphic to colour perception. Even more intriguing are the results from colour-blind individuals. Those with "red-green" colour-blindness (deutans and protans in Figure 1) sorted colour chips consonant with their colour deficiency – the colour circle was collapsed so that red and green appear much closer together than for normally sighted people. But – and this is the fascinating part – when it came to sorting the names of colours, colour-blind individuals sorted more like the normally sighted individuals than their own perceptual colour space. There are two interesting things about this: first, color-blind individuals know a considerable amount about the colour lexicon, presumably through their exposure to collocational information in language. Second, the lexical fields for colour are substantially similar across groups (although not identical), demonstrating the potent ability of language to coordinate mental representations across individuals and thus bring them into alignment.

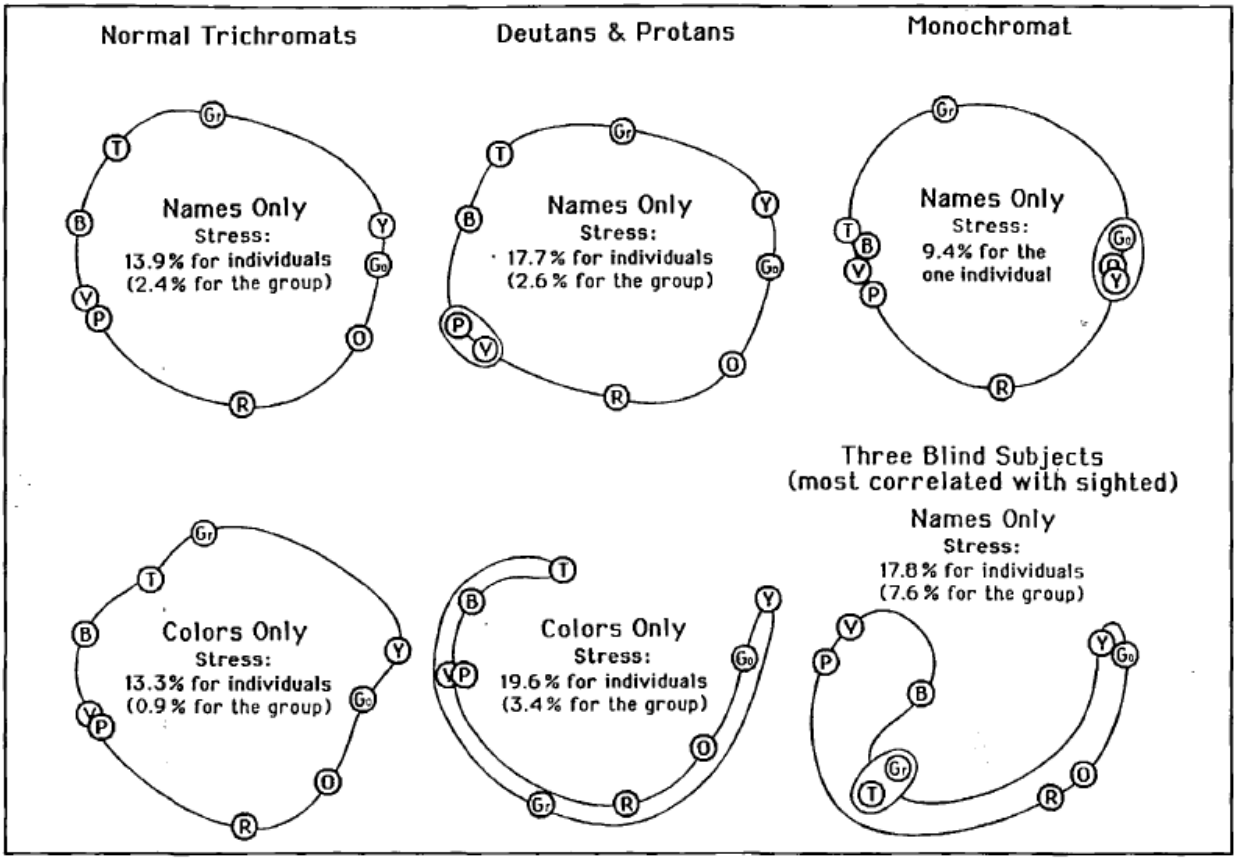

Figure 1: Taken from Shepard & Cooper (1992, p. 100). Multidimensional scaling solutions for similarity data for colors and color names collected from normally sighted, color-blind and completely blind individuals. Gr = green, Y = yellow, Go = gold, O = orange, R = red, P = purple, V = violet, B = blue, T = turquoise.

Perceptual vocabularies across cultures illustrates the dual-shaping of meaning in the lexicon. On the one hand, words have to map onto the structure of the environment as perceived by our perceptual organs. Shepard and Cooper's study illustrates this point very nicely: color word similarity mirrors perceived color similarity in normally-sighted people. This parallelism of lexicon and perceptual psychophysics appears across sensory modalities (Dingemanse & Majid, 2012; Wnuk & Majid, 2012). On the other hand, words also reflect varying cultural forces. Languages vary in their size of colour, smell, or taste lexicons, and in the distinctions made therein, despite the fact that there are potentially universal environmental and physiological influences. Different cultural factors may account for this variation depending on the affordances of the domain – dyeing technology is perhaps at the root of variation in color terminologies (Berlin & Kay, 1969; Conklin, 1973); subsistence patterns may explain the existence of smell lexicons (Hombert, 1992); while culinary traditions could shape taste lexicons (Enfield, 2011). Or perhaps the differences are better accounted for by variation in the environments, such as varying light conditions across the globe (Laeng et al., 2007; Lindsey & Brown, 2002); or historical circumstance such as contact with other linguistic groups (Malt, Sloman, Gennari, Shi, & Wang, 1999).

The body

The notion that the body is made up of parts – hands, arms, legs and feet – seems obvious. puts it thus:

> A psychologically natural part, while not bounded, will nonetheless move as an internally connected region. Hence fingers are natural parts and so are toes, but it is profoundly unnatural to think of the ring finger and the kneecap as a single body part (a fingerknee) because fingers and knees are unconnected. But connectedness isn't enough. A one-inch wide ribbon of skin running from the left hand, up the arm, over the shoulder, and ending at the middle of the lower back is connected (and also conforms to the principles of solidity and continuity), but it is not naturally seen as a body part… Something more is required. Bloom (2000: 109) (Bloom 2000: 109)

The something more could come from vision, as Hoffman and Richards (1984, p.82) suggest. According to their account, parts can be discovered using general geometric principles, and they note that "It is probably no accident that the parts defined by minima [their procedure for determining parts] are often easily assigned verbal labels".

The idea that some sorts of parts are more "natural", and therefore likely to be labelled in language, is wide-spread (e.g., Andersen, 1978; Brown, 1976), and various algorithms have been proposed to determine parts (Biederman, 1987; Hoffman & Richards, 1984; Marr, 1982). It is often claimed that the body and some of its parts (such as face and back), universally serve as source domains for the conceptualisation and expression of other aspects of the world, including spatial location (Heine, 1997; Svorou, 1994). So do these prelinguistically defined parts hold up to cross-linguistic scrutiny? One way to answer this question is to take an approach similar to that used for color categories, namely to examine the extension of words used to refer to the body and to then examine to how much cross-linguistic correspondence there is (Majid, 2010; Majid, Enfield, & van Staden, 2006).

As with the colour domain, we first have to consider which terms should be compared across languages. I mentioned in the introduction that an independent word in one language may correspond to a bound morpheme in other. And as with the colour vocabularies we considered earlier, it is always possible to coin a new expression to refer to a specific bit of the body – *the back of the knee, the inside of the elbow, between the shoulderblades, the tip of my pinky*. Noone would expect these sorts of ad-hoc expressions to necessarily fit non-linguistic segmentation principles. The claims about the how parts are labelled in language only applies to "basic" body part terms so we will restrict our attention to those.

Even when we restrict ourselves to this smaller set, however, it is clear that there is much more variation in this domain than might be expected. For example, in Jahai (mentioned earlier for its many smell words) there is no word

that corresponds exactly to 'head' (Burenhult, 2006). The closest term is *kuy* which refers only to that part of the head that is covered in hair (i.e., 'scalp'). This is made more surprising when discovering that there is also no word for 'face'. Jahai speakers appear instead to rely on many fine-grained distinctions when talking about the face and body (see Figure 2). For example, the word *cŋcɨ̃ŋ* is used for the area around the eyes and picks out a spectacle-shaped region; *wɛs* refers to a prominent vertical ridge on the side of the forehead; *knh ɨr* to the root of the nose/the wrinkles between the eyebrows, and *carək nus* (literally 'upper lip streambed') refers to the indent between the upper lip and nose (i.e., philtrum). Similarly detailed distinctions are evident when Jahai speakers talk about 'arms' and 'legs' too – in fact, there are no such general terms. Instead, speakers refer to *klapəh* 'deltoid part of the shoulder', *bliŋ* 'the upper arm', *prbɛr* 'lower arm', *cyas* 'hand', *bl ɨʔ* 'upper leg', *gor* 'lower leg' and *can* 'foot'. [4]

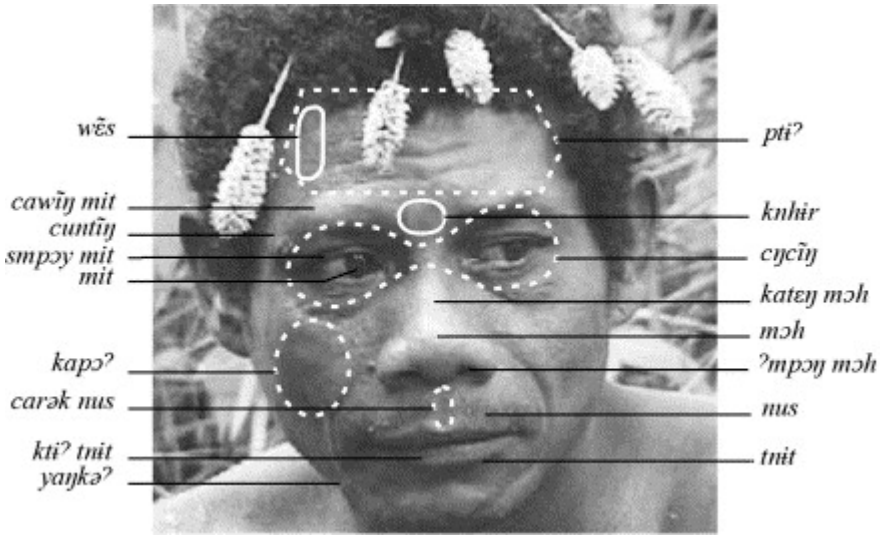

Figure 2: This figure depicts the main words (and their extensions) used by Jahai speakers to refer to parts of the face. Reproduced from Burenhult (2006).

These fine-grained categories do not necessarily deviate from general visual parsing principles. The surprise here is more in the fact that the default way to refer to body parts is more refined than in English or other Standard

[4] It's unclear whether in English *arm* and *leg* include in their reference 'hand' and 'foot'. When asked to color in the *arm* or *leg* around half of participants include/exclude the 'hand'/'foot', just as Dutch speakers do (Majid, 2010). Linguistic tests suggest a similar ambiguity. *He lost his arm in an accident* entails that he lost a hand too, but *She has a tattoo on her arm* does not entail she has it on her hand as well. Whether this really suggests two distinct meanings of *arm* or whether a secondary meaning is only inferred in context is not clear (Cruse, 1979).

Average European languages.[5] However it turns out that there are also body part terms that are more challenging to the proposal that body parts can be identified by general non-linguistic constraints. For example, Jahai *nus* 'upper lip' also includes the fleshy part between the mouth and the nose where a moustache might be located; *tnɨt* 'lower lip' includes the fleshy part between the mouth and chin. Note, there is no coverall term 'mouth'. Here, the salient boundaries of the lip, including protuberance and colour, are discarded and the linguistic partitioning uses a different logic.

Jahai is not alone in having terms that violate general visual parsing principles. In Tidore, a Papuan language of North Moluccas, the term of leg, *yohu*, begins at the foot but finishes not at the hip but three-quarters of the way up the leg where there is no salient perceptual boundary (van Staden, 2006). In Swedish, *nak* refers to the neck but also includes the back of the head (also Danish *nakke*), so a 'head rest' is actually a *nackstöd* (literally, 'neck support').[6] These examples also demonstrate how extensional meanings reveal the same meaning components as linguistic examples relying on collocational evidence – both sorts of data project from the same representation, and should be viewed as complementary evidence revealing the underlying concept.

As Bloom suggested above, a "natural" part should "move as an internally connected region"; Swanson and Witkowski (1977) put it slightly stronger: "Discontinuous categorising of body parts, for example, does not occur" (exempting the same term being used for the left and right sides). More specific statements of this general constraint can be found in two classic papers on the typology of body parts, according to which legs and arms should always receive distinct terms, as should hands and feet (Andersen, 1978; Brown, 1976). Here we also find counter-examples. In Lavukaleve, a Papuan language of the Solomon Islands, the term *tau* covers both legs and arms (Terrill, 2006), while in Mawng, an Australian language, hand and foot are subsumed under a single term *yurnu* 'limb extremity' (reported in Evans, 2011).

Some find this hard to credit. Wierzbicka (2007, p. 28), for example, states: "human hands mediate to a very large extent, between the world and the human mind. The fact that 'hands' are fundamental in human thinking is reflected in the relative semantic simplicity of this concept: it appears that of all the body-part concepts this is the only one which can be explicated directly in universal semantic primes, and without any reference, direct or indirect, to any other parts of the body. 'Arms', 'legs' and arguably, 'head' require in their explications a reference to shape, and 'eyes', 'ears', 'nose' and 'mouth' appear to require a reference to 'head', but an explication of 'hands' can be couched exclusively in primes, without any use of shape concepts which are inherently semantically complex.".

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[5] Standard Average European is used to refer to the Indo-European languages of Europe. These languages share a number of traits which are quite different from other languages of the world.

[6] Thanks to Carsten Levisen for pointing this out to me.

Wierzbicka offers a semantics of body parts not based on visual discontinuities, but in terms of paraphrase into "semantic primes" such as I, YOU, GOOD, BAD, PART, ONE, TWO, and LIKE. Wierzbicka argues that "Since the most reliable evidence for the presence of such a concept is the presence of a word, the question of whether all languages have a word for 'hand' is of great importance to both cognitive anthropology and cognitive science." (p.29), but according to her it is not necessary that there is a separate word that only encodes the concept of 'hand'. What is critical, instead, is that there is a distinct "word meaning" expressible in every language. That word meaning (given below in a-g) could be expressed polysemously by one term. This is the analysis she proposes for Polish *ręce* which extensionally covers the arm and hand. Wierzbicka claims that there are two distinct word meanings covered by *ręce*: *ręce*$_1$ has the meaning outlined in a-g (i.e., hand) but *ręce*$_2$ has a meaning closer to English arm (with some subtle differences).

hands

a. two parts of someone's body

b. they are on two sides of the body

c. these two parts of someone's body can move as this someone wants

d. these two parts of someone's body have many parts

e. if this someone wants it, all the parts on one side of one of these two parts can touch all the parts on one side of the other at the same time

f. because people's bodies have these two parts, people can do many things with many things as they want

g. because people's bodies have these two parts, people can touch many things as they want

Of around 600 languages sampled by Brown (2008), over one third (including Russian, Marathi spoken in India, Hausa from West Africa, and Seri from Mexico) do not distinguish between hand and arm with separate words, so Wierzbicka's arguments regarding Polish *ręce* has important implications for how we are to understand variation in the lexical field of body parts. According to Wierzbicka, there are two main arguments in favour of a polysemous analysis. First, she argues that the hand is a fundamental element in understanding many other concepts, including physical actions like *clap, slap, tear*, object concepts such as *gloves* and *handle*, and attributes like *hard, soft, long* and *flat.* Because it is so fundamental, all speakers must have a distinct concept for hand. Second, she suggests that whereas other body parts have shape as an important component in their definition, hand does not rely on the notion of shape and therefore this lends further credence to the distinctness (and priority) of hand as a concept.

There are some problems with these arguments. First, Wierzbicka conflates concept and word meaning. It may well be that every speaker has a distinct non-linguistic concept of 'hand', but not all concepts are reflected directly in the lexicon. Murphy (2004, p. 389) gives as examples "ELBONICS: n. The actions of two people maneuvering for one armrest in a movie theatre or airplane seat" and "PUPKUS: n. The moist residue left on a window after a dog presses its nose to it.". It is a postulate of NSM that a concept which is to be used in the meaning exposition of another term should have formal expression, but the postulation alone is not a reason to accept this. Second, the argument for polysemy is inconsistently applied. So, while Wierzbicka analyses *ręce* as polysemous, the equivalent term *nogi*, which covers legs and feet, is analysed as being monosemous and it is not entirely clear why the two could not be analysed in a similar way, apart from for theory-internal constraints (cf. Riemer, 2006). The critical empirical data either collocational or extensional is conspicuously absent from her account.

Finally, a brief word on the organisation of the lexical field of the body across lexicons. It has been suggested by Andersen (1978) and Brown (1976) that the body is organised into a hierarchical partonomy with no more than 6 hierarchical levels, and rarely more than 5 levels. The hierarchy is constructed by establishing whether native speakers accept the relationship of 'part of' between terms, e.g. *the arm is part of the body*. This was the approach followed by Stark (1969) in order to produce the hierarchy of the body in Quechua reproduced in Figure 3. There are some strange elements in this figure: *maki* appears on three different levels as a simple term (and another two times in complex expressions), each time with a different gloss – 'arm', 'finger-to-elbow' and then 'hand'. These glosses Stark derives from their relation to other terms at the same level of the hierarchy: *maki* 'arm' stands in relation to 'leg' at level 3 in the hierarchy but *maki* 'hand' stands in relation to 'foot' at level 5. But are these different senses really distinct representations in the minds of Quechua speakers? And do Quechua speakers really accept that a *maki* is a part of the *maki* which in turn is part of *maki*? It seems unlikely. One cannot help but sympathise with the sentiment of Swanson and Witkowski (1977, p. 324): "It seems possible that some writers in the literature have been too eager in placing the anatomical domain into near, cut and dried structures with the appropriate (and perhaps culturally and universally obvious) branching and nicely labelled levels."

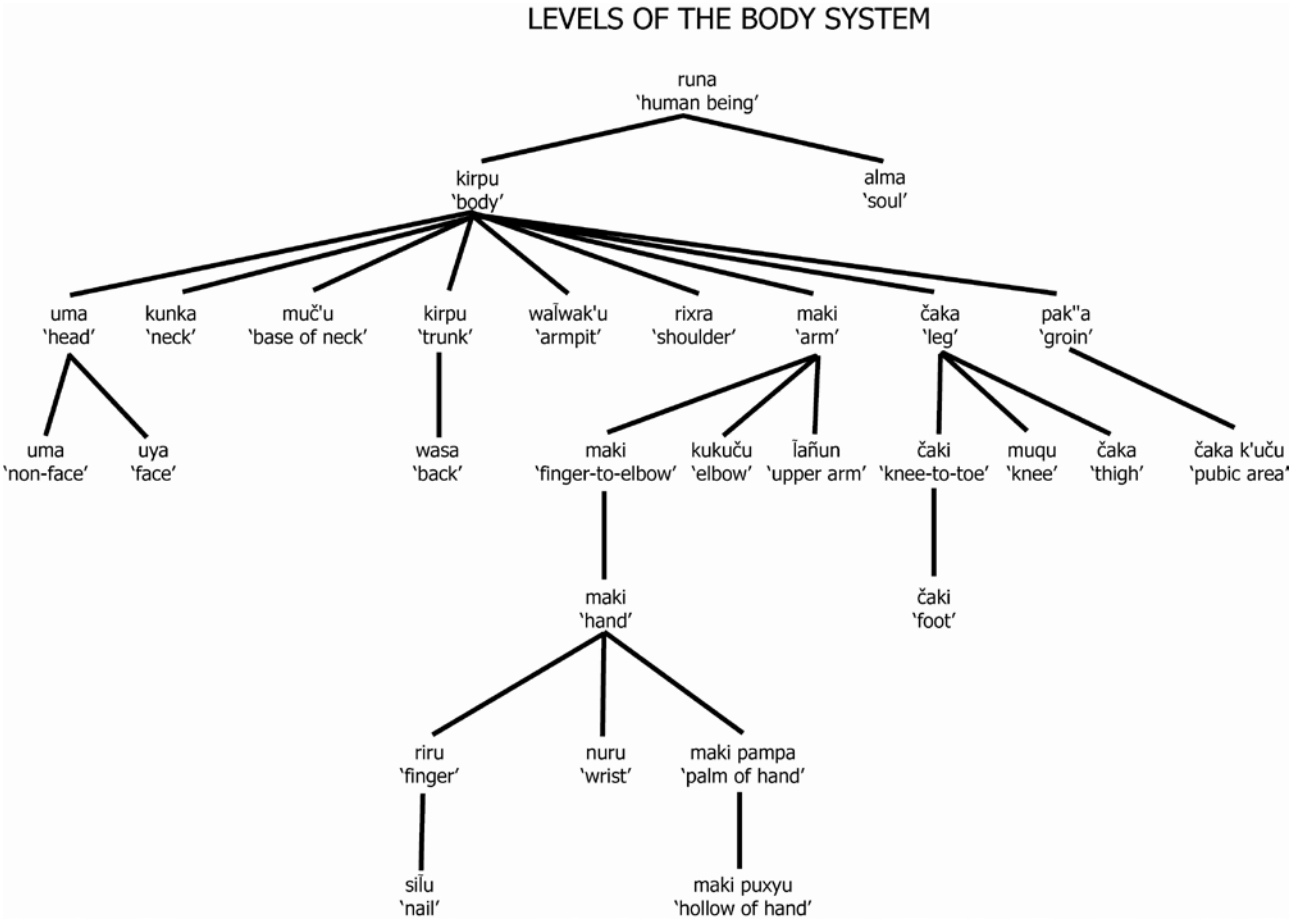

Figure 3: The hierarchy of the body in Quechua, adapted from Stark (1969)Stark (1969).

Cross-linguistically, the 'part of' relation is not always available as the necessary relation between body part terms: in some languages the most natural relation is one of 'possession', e.g. *the face has eyes* (e.g., Swanson & Witkowski, 1977; van Staden, 2006) or spatial connectedness, e.g. *the fingernails are on the fingers* (e.g., Majid, 2006; Palmer & Nicodemus, 1985). In a recent collection of papers exploring the lexical field of the body across a wide array of languages, only half the languages evidenced any kind of partonomy. In the remaining languages, the partonomy that was discovered was not exhaustive or deep. Furthermore, it is not clear to what extent these relations are really entailed or to what extent speakers merely derive these from non-linguistic spatial schema of the body when questioned. Further careful analysis and argumentation is required in this area.

To summarise, the lexical field of the body shows considerable variation across languages. Witness the default granularity of naming parts in Jahai in comparison to English. It is harder to motivate why we find the variation we do in this domain, as we saw earlier in the quote from Hymes: bodies are the same across the globe. But perhaps there are other factors at play that might explain some of the variation here. Brown (2008; Witkowski & Brown, 1985), for example, has suggested that differences in climate might lead to different dress conventions which may in turn lead to

the hand being made more salient as a distinct part. Specifically, Brown argues that wearing gloves and long sleeves that end at the wrist in cold climates makes the hand prominent, resulting in a distinct name for it, and there is some correlational evidence in favour of this proposal with more languages showing a distinction between hand and arm the further we move from the equator. However, this relationship may be a spurious result of the sampling of the languages (Majid & Dunn, in prep), leaving it unclear why languages vary in the way that they do in this domain.

Conclusions

Despite the problems and controversies which plague this area of research, researchers in recent decades have nonetheless discovered a number of fascinating generalisations and important facts about the lexicon across languages. In order to make further progress additional in-depth studies of multiple languages using the same methods are required. Both fine-grained comparison of two or three languages and large-scale studies involving dozens of languages will provide crucial data regarding the similarities and differences in lexical fields. In addition, systematic investigations are required to explore whether the attested cross-linguistic variation can be explained by differences in environment, cultural practices, language history, or some other factors. As we saw earlier, it is possible that variations in the environment (temperature) affect body part lexicons, while variation in culinary traditions affect taste words. There are many such plausible accounts for different lexical fields but little or only weak demonstrable empirical support. Future studies are important for understanding the lexicon cross-linguistically and thus settling some of those fundamental questions at the heart of the cognitive and linguistic sciences.

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