How concepts and conventions structure the lexicon: Cross-linguistic evidence from polysemy

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Abstract

Words often have multiple distinct but related senses, a phenomenon called polysemy. For instance, in English, words like *chicken* and *lamb* can label animals and their meats while words like *glass* and *tin* can label materials and artifacts derived from those materials. In this paper, we ask why words have some senses but not others, and thus what constrains the structure of polysemy. Previous work has pointed to two different sources of constraints. First, polysemy could reflect conceptual structure: word senses could be derived based on how ideas are associated in the mind. Second, polysemy could reflect a set of arbitrary, language-specific conventions: word senses could be difficult to derive and might have to be memorized and stored. We used a large-scale cross-linguistic survey to elucidate the relative contributions of concepts and conventions to the structure of polysemy. We explored whether 27 distinct patterns of polysemy found in English are also present in 14 other languages. Consistent with the idea that polysemy is constrained by conceptual structure, we found that almost all surveyed patterns of polysemy (e.g., animal for meat, material for artifact) were present across languages. However, consistent with the idea that polysemy reflects language-specific conventions, we also found variation across languages in how patterns are instantiated in specific senses (e.g., the word for glass material is used to label different glass artifacts across languages). We argue that these results are best explained by a ''conventions-constrained-by-concepts'' model, in which the different senses of words are learned conventions, but conceptual structure makes some types of relations between senses easier to grasp than others, such that the same patterns of polysemy evolve across languages. This opens a new view of lexical structure, in which polysemy is a linguistic adaptation that makes it easier for children to learn word meanings and build a lexicon.
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1. Introduction

All natural languages include a repertoire of words to express a large set of basic ideas, from concrete concepts of animals, objects, and materials, to more abstract notions like events and beliefs. Interestingly, however, rather than labeling each idea with a unique word, languages systematically group sets of related ideas – or *senses* – under a single

word, a phenomenon called polysemy (Breál, 1897). Polysemy is important not only because it is ubiquitous, but also because it provides a source of linguistic creativity: to express new ideas, we needn't invent new words, but can instead extend existing words beyond their original meanings. In English, such creativity has yielded systematic patterns of senses: for instance, the same words are often used to label an animal or its meat (e.g., *chicken*, *lamb*, etc.), or a material and an artifact derived from that material (e.g., *glass*, *tin*, etc.).

Here, we explore what representations and processes might account for the structure of polysemy, i.e., for how word meanings are extended, and thus why senses are grouped together in particular ways. Previous work has suggested two potential sources of constraints on polysemy. One line of work has focused on the role of conceptual structure, and has suggested that the ways in which senses are grouped together reflect the relations we perceive between different ideas, given the situational context (e.g., Fauconnier, 1985; Nunberg, 1979, 1995; Papafragou, 1996; Wilson, 2003). Thus, *chicken* may have animal and meat senses because we find the relation between the animal and its meat particularly noteworthy or salient. A second line of work has focused on the role of conventions, and has suggested that because many word senses are related in seemingly arbitrary and opaque ways, they must each be learned and stored within the mental lexicon (e.g., Klein and Murphy, 2001; Lehrer, 1990; Murphy, 1997, 2007; Pinker, 2007). For example, the fact that the English word *glass* labels a glass drinking vessel – rather than a glass window or mirror – may be a relatively arbitrary fact that we have to learn.

The relative contributions of concepts and conventions to the structure of polysemy have important implications for the relationship between conceptual and lexical structure, but there is currently little consensus as to what those contributions are. The present paper aims to provide critical data to remedy the situation, by documenting cross-linguistic regularity and variation in polysemy. Broadly speaking, if polysemy is tightly constrained by conceptual structure, it should manifest quite similarly across languages, but if polysemy corresponds to arbitrary lexicalized conventions, it should be quite variable across languages. Based on our data, we will argue that polysemy is best explained by a model that incorporates both concepts and conventions, and in particular by a model in which the senses of polysemous words are learned conventions that are shaped by the cognitive biases of learners.

Below, we set out and discuss possible constraints on polysemy, and explain how they might influence variation in polysemy across languages. Then, we review findings from previous cross-linguistic studies of polysemy, and present our own large-scale cross-linguistic study.

1.1. Constraints on polysemy

Two important features characterize the structure of polysemy, at least in English. First, linguists have identified a number of systematic patterns of polysemy, wherein multiple words have sets of senses that are related in similar ways (see, e.g., Copestake and Briscoe, 1995; Lakoff and Johnson, 1980; Ostler and Atkins, 1992; Pustejovsky, 1995). Table 1 presents examples of some of these patterns. As can be seen, they often include sets of senses that cross different semantic categories, alternately labeling people, animals, objects, substances, actions, and more. Some of these patterns invoke metaphorical relations, such as when body part names are used to label parts of objects (e.g., "the chair's *arm* is broken"). These patterns sometimes also include sets of senses that cross lexical categories, as when words are used as nouns to label objects and substances, and used as verbs to label actions involving those objects (e.g., "He *buttered* the bread", "She *shoveled* the snow").[2]

The second important feature of polysemy is that these patterns vary in how freely they permit generalizations. In a number of cases, patterns can be easily extended to create new senses, with minimal supporting linguistic and extra-linguistic context. The animal for meat pattern provides a good example of this. We can easily extend this pattern to label the meat of animals that aren't typically thought of as edible. Thus, it sounds natural (though culinarily odd) to say "he ate some *seagull*." However, not every pattern is similarly generative. While *glass* and *tin* both describe materials and artifacts, it sounds distinctly odd to say "He bought a *plastic*," even though we know that plastic is a material out of which many artifacts are made. This use of *plastic* would seem to require significantly more contextual support to be felicitous (much like contextual innovations such as "ham sandwich", see footnote 2). These two types of patterns – generative and non-generative patterns – are typically referred to in the literature as *regular* and *irregular* polysemy, respectively (see e.g., Apresjan, 1974; Ostler and Atkins, 1992).

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[2] Importantly, these examples of polysemy require minimal linguistic context to be felicitous, and do not depend heavily on the extra-linguistic context or prior discourse for their meanings. As such, these examples are typically distinguished from *contextual innovations*, such as the creative use of "ham sandwich" to label a restaurant patron who ordered a ham sandwich (Nunberg, 1979). Contextual innovations have provided evidence that we can stretch word meanings quite dramatically, by reasoning pragmatically and drawing on the linguistic and extra-linguistic context. However, it is a matter of debate as to whether the mechanisms underlying our interpretation of contextual innovations like "ham sandwich" also support the relatively more context-independent examples of polysemy provided in Table 1, which will be our focus here.