

Discovering Components of Meaning in English and Chinese with Machine Learning

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Here I introduce a methodology for identifying the aspects of meaning that are stored in the semantics of a verb itself, as opposed to in the syntax. I explore this problem with respect to the causative-anticausative alternation. Some intransitives form causatives (*The ship sank* → *The submarine sank the ship*), whereas other intransitives do not (*The flowers blossomed* → *The gardener blossomed the flowers*). Of key interest is how the meanings of these two kinds of intransitive verbs differ. I propose that intransitives that appear in the transitive syntax have components of meaning associated with transitivity, making them inherently dyadic predicates (see Alexiadou et al., 2005; Levin & Rappaport-Hovav, 1995). Here I describe how the components of meaning of intransitive verbs can be determined using a recently developed machine learning model called BERT (Devlin, 2018). I demonstrate that the model is sensitive to a verb's argument structure, as reflected in its acceptability in different syntactic frames. I further describe a set of methods I developed for extracting components of meaning from the model, which, interestingly, closely reflect the components of meaning often discussed in the lexical semantics literature (e.g., CAUSE, CONTACT, MAKE, and CHANGE), but also components that have not been discussed (e.g., PLACE, FORM, PRESSURE, and EXPERIENCE). The results provide clear evidence that the meaning of intransitives that participate in the causative alternation include components of meaning associated with transitivity, such as CAUSE. Lastly, I demonstrate how the results from English are largely mirrored by findings from Chinese, suggesting that the components of meaning may reflect not only critical features of each language, but also fundamental features of the broader conceptual system.