

# Researchers explain our perception of polysemous words

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Researchers from the HSE School of Linguistics and the Centre for Language and Brain carried out an experiment to find out how language speakers perceive the different meanings, or senses, of polysemous

words. They found that the proximity of figurative senses to the literal sense affects their perception as semantically different. In addition, they noticed that context affects one's ability to notice semantic distinctions—it is harder to perceive the differences between perceive meanings that differ only slightly when they are presented together with drastically different meanings. This is related to general cognitive mechanisms of attention: people pay attention to more salient stimuli, which diverts their attention away from subtle differences. The study was published in the *Frontiers in Psychology* journal.

Since the 1990s, psycholinguists have been researching the structure of lexical polysemy—multiple related senses in words—in the mental lexicon. There are various theories on the correlation between polysemy as reflected in dictionaries and the 'real' reflection of what happens in the [human brain](#) when it stores and processes polysemous words.

For example, the word "cold" has different senses in different contexts: cold air (air of low temperature), cold day (day when the air is cold), or cold person (an unfriendly person). Some psycholinguists, such as Steven Frisson and Martin J. Pickering, believe that the brain has one general 'underspecified' meaning for a polysemous word, which activates when it is perceived. By contrast, researchers such as Devorah E. Klein and Gregory L. Murphy claim that the brain stores each meaning of a polysemous word separately.

Finally, proponents of the "hybrid" approach to polysemy (such as Ekaterini Klepousniotou) argue that various types of senses are stored and processed differently depending on their proximity to the literal [sense](#). Particularly, metonymy-based senses (extension by contiguity) are stored together with the literal sense, since they are closer to it, while metaphor-based senses (extension by similarity) are stored separately as more distant ones.

In the example above, cold air—cold day is a metonymy-based extension, while [cold air](#)—cold person is a metaphor-based extension. This means that following a "hybrid" approach, the first pair of senses will be stored together, while the second pair will be stored separately. One argument for this approach is that metonymic senses are processed faster than metaphoric ones, as well as the fact that native speakers, when asked to separate the senses of a polysemous word, mix literal senses with metonymic ones much more often than with metaphorical ones.

However, it is still unknown how different types of metonymic extensions are stored and processed. Theoretical studies of polysemy say that there are different types of metonymies, some of which are closer to the literal sense, while others are more distant.

For example, there is a regular type of metonymy in adjectives, when a human emotional state or feature is extended to their appearance or actions: smart boy—smart eyes—smart behavior. In this type of extension, the only semantic shift is the idea of relation ("smart eyes" are the eyes of a smart person; "smart behavior" is the behavior of a smart person), so this metonymy is close to the literal sense.

On the other hand, there is "distal" metonymy, in which other important semantic components are added to the literal sense, such as temporality or causality: hungry person—hungry years (years when people were hungry), sad girl—sad news (news that causes sadness).

The researchers carried out an experiment in which they looked at how native speakers perceive the senses of polysemous words based on proximal metonymy, distal metonymy and metaphor. A total of 1,809 individuals aged 18 to 70 took part in the experiment. Their median age was 34.

The experiment considered four groups of senses:

1. Literal and two proximal metonymies (smart person—smart eyes—smart behavior)
2. Literal, a proximal metonymy and a distal metonymy (sad person—sad eyes—sad news)
3. Literal, a proximal metonymy and a metaphor (sweet candy—sweet smell—sweet smile)
4. Literal, a distal metonymy, and a metaphor (cheerful person—cheerful story—cheerful wind)

Each type of meaning was represented by two or more sentences.

The participants were asked to read sentences that illustrated different senses of polysemous adjectives, such as:

- He was an old, sad person in dark clothes (literal sense)
- The café owner was a bald, chubby man with sad eyes (proximal metonymy)
- It's a kind and sometimes sad story with a happy ending (distal metonymy)
- Our school principal is very strict (literal sense)
- Dima asked Tanya for an explanation in a strict voice (proximal metonymy)
- The judge demanded a strict interpretation of the law (metaphor)

The participants were then asked to assign the sentences to virtual "baskets" based on their understanding of which phrases contained the same sense of the word. The number of baskets was unlimited.

The baskets with literal senses also often contained proximal metonymy, less often distal metonymy, and extremely rarely metaphor. Metonymic senses were also mixed with each other. Two proximal metonymies were

most likely to get mixed (smart eyes and smart behavior), as well as a proximal and a distal metonymy (sad eyes and sad news), which were mixed with each other even more often than with the literal sense. Metaphors were rarely mixed with metonymies, but still more often than with the literal sense.

The authors believe that this signifies that the senses of a polysemous word in the mental lexicon are not arranged as discrete entities, but form a continuum. In this continuum, metonymy is generally closer to the literal sense and therefore overlaps with it to a greater extent, although different types of metonymy have an even larger degree of overlap. Although metaphors rarely overlap with other senses, they are confused with metonymies more than with the literal senses, which might indicate a general intuitive ability to distinguish between literal and figurative senses.

The researchers also demonstrated that in cases where distal metonymy was presented together with proximal metonymy, it was more easily perceived by the speakers as a distinct sense. In the second group, proximal metonymy was confused with the literal sense (cheerful person and cheerful look), but distal metonymy was frequently classified as a separate sense (cheerful song). In the fourth group, where distal metonymy was presented together with a metaphor, it was confused with the literal sense considerably more often (cheerful person and cheerful song), while metaphor (cheerful wind) was put in a separate "basket."

"It turns out that the perception of semantic differences is affected by general cognitive mechanisms of attention," commented Valentina Apresyan, Professor at the HSE School of Linguistics. "Our attention is focused on the most salient stimuli, and the degree of salience is relative. In the context of subtly differing stimuli, a stimulus of average distinctiveness will be perceived as separate, while in the presence of strongly differentiated stimuli, it will blend into the background. Subtle

differences sharpen our perception of semantic shades, while strong differences dampen it."

**More information:** Valentina Apresjan et al, Representation of Different Types of Adjectival Polysemy in the Mental Lexicon, *Frontiers in Psychology* (2021). [DOI: 10.3389/fpsyg.2021.742064](https://doi.org/10.3389/fpsyg.2021.742064)

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