

Artificial Languages as a Tool For Studying Metaphorical Extension Across Modalities

Artificial language methodologies, such as iterated learning and communication games, can illuminate the cognitive factors behind language change (Roberts 2017). Here, we present several case studies demonstrating how these methodologies can be used to explore the role of metaphorical extension in different modalities.

Polysemy, the phenomenon in which a single word has multiple meanings, allows speakers to use a limited lexicon to express a wide range of concepts. For example, English *foot* can refer to a human or animal foot, the base of a mountain, or a unit of length or poetic meter. Rather than creating entirely new lexical items for every new concept, languages often rely on semantic extension and analogy, making communication more flexible and efficient. One important factor that drives such lexical-semantic change and creates polysemy is metaphorical extension; for example, the English *ardent* ‘passionate’ derives from the Latin *ardere* ‘to burn’ (Kay & Allan 2015), reflecting a fundamental ANGER IS FIRE metaphor (Lakoff et al. 1991). Artificial language studies provide a fruitful way to investigate the role of salient associations and metaphor in meaning extension, and how it is shaped by cultural and linguistic variation (Smith et al. 2025).

Here, we present several case studies that integrate methods from cognitive linguistics and experimental semiotics, and demonstrate how the development of metaphorical extension can be studied in different modalities. Specifically, we focus on the use of artificial language learning to investigate meaning extension. Study 1 (Pleyer et al., in press), investigates the emergence of metaphorical meanings in abstract visual symbols in an artificial language learning study. Participants are first taught novel visual “alien words” for physical concepts (such as “down”) and are then tested on whether they extend the meanings of these items to more abstract meanings (such as “sad”, making use of the SAD IS DOWN metaphor, Lakoff et al. 1991). Study 2 uses an experimental semiotics approach in which participants communicate without access to natural language. This allows the emergence of novel form–meaning mappings and tests whether participants spontaneously develop polysemous systems by extending meanings to semantically related referents. In Study 3, participants learn an artificial language in a controlled laboratory setting and are asked to extend word meanings to novel but related contexts. Eye-tracking measures capture real-time cognitive processing during meaning extension, allowing us to examine initial reactions of the participants to new items. Cross-cultural comparisons test whether participants from different cultural backgrounds differ in their semantic associations; for instance, English speakers typically associate the color white with weddings, while Chinese speakers may associate it with death or funerals. Therefore, Chinese participants may extend the artificial-language symbol for “white” to mean “funeral,” while English speakers may extend it to the meaning “wedding.”

These studies integrate cognitive and experimental methods to investigate the role of metaphor in language evolution. By examining how individuals learn, extend, and transmit meaning across cultural contexts, they show how metaphor can serve as a cognitive and cultural mechanism in different modalities that make human communication flexible, adaptive, and highly expressive.

References:

Kay, C., & Allan, K. (2015). *English historical semantics*. Edinburgh University Press.

Lakoff, G., Espenson, J., & Goldberg, A. (1991). Master Metaphor List.
<http://araw.mede.uic.edu/~alansz/metaphor/METAPHORLIST.pdf>

Pleyer, M., Zhang, E. Q., & Placiński, M. in press. Polysemy and Metaphorical Extension in an Artificial Language Learning Experiment. *Language and Cognition*.

Roberts, G. (2017). The linguist's Drosophila: Experiments in language change. *Linguistics Vanguard*, 3(1), 20160086. <https://doi.org/10.1515/lingvan-2016-0086>

Smith, K., Bowerman, J., Smith, A. (2025). Semantic extension in a novel communication system is facilitated by salient shared associations. *Cognition* 261, 106129,
<https://doi.org/10.1016/j.cognition.2025.106129>