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Analogical Reasoning about THINGS

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Analogical reasoning is a cornerstone of cognition [1], but how analogies are solved by human subjects is incompletely understood. Here, we present experiments using a new test set of common-sense analogies between concrete object categories drawn from the THINGS dataset [2], which can be presented verbally and pictorially, along with a set of parametrically generated analogies between abstract shapes. N=50 subjects completed these analogies with high accuracy, and performance was correlated across semantic and abstract tasks. We quantified semantic distance and parallelity of our analogies and find that these measures are significantly related to experimental results; in particular, analogies for which the geometry in semantic space is closer to a parallelogram are solved faster and more accurately. Our findings thus relate human and machine understanding of abstract and concrete analogies.

[1] Hofstadter, D. R., et al. (2001). Analogy as the core of cognition. *The analogical mind: Perspectives from cognitive science*, 499–538.

[2] Hebart, M. N., et al. (2023). Things-data, a multimodal collection of large-scale datasets for investigating object representations in human brain and behavior. *Elife*, 12, e82580.