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# Quantifying shared knowledge from individual free-association data

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## Abstract

Shared social environments shape minds across individuals, leading to similar perceptions, common interpretations, and convergent emotional responses. These shared internal representations constitute an implicit, structured, and generalizable understanding of the world, termed *shared knowledge*, that provides common ground for social interaction. Quantifying shared knowledge, however, remains challenging due to its high dimensionality, context sensitivity, and entanglement with individuals' private knowledge. Here, we introduce a method to extract shared knowledge from individuals' free-association responses to images. We show that shared knowledge can be dissociated from individuals' unique components and captured within a low-dimensional subspace embedded in a high-dimensional word-embedding space. Despite its low dimensionality, this shared knowledge predicts decisions in an independent coordination game involving the same images. The findings demonstrate a principled approach to quantifying shared knowledge from easy-to-obtain data and open new opportunities for quantitative investigation into how shared knowledge is formed, represented, and used in the human brain.