The influence of expertise and individual differences on psychological embeddings

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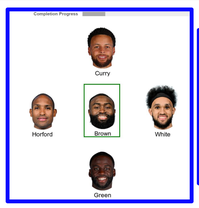
NSERC CRSNG

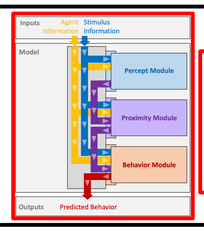
POSTER

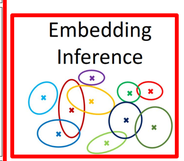
BACKGROUND

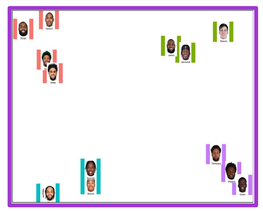
PsiZ (Roads & Mozer, 2019): A **novel technique** for inferring ***psychological embeddings*** (rich multidimensional similarity spaces) from **behavioral similarity judgements**



"Choose which one of the surrounding reference images is most similar to the central query image"





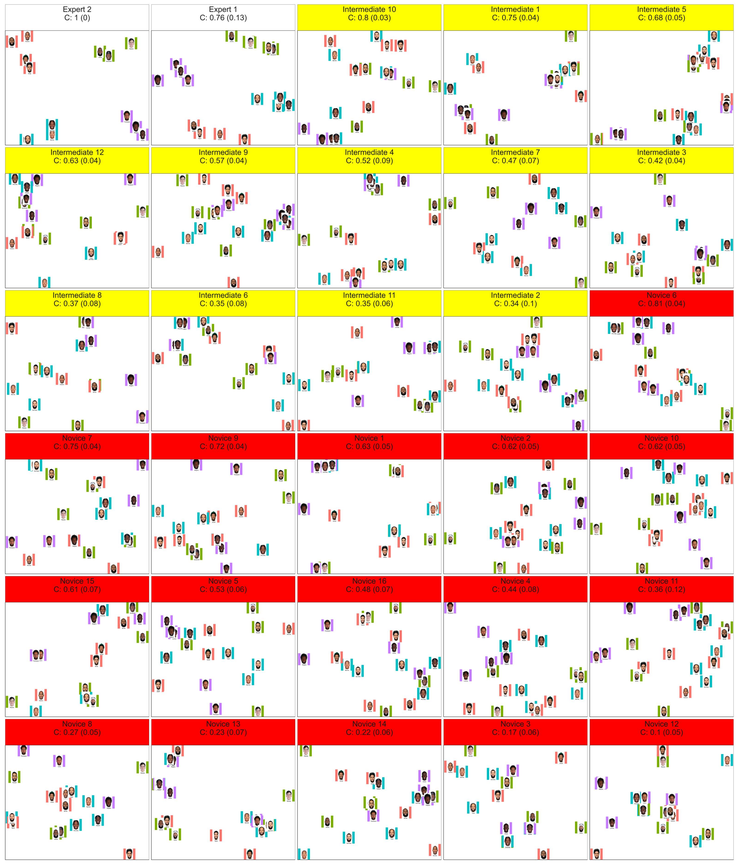


Can we measure the effects of individual differences (particularly expertise) on perception, categorization, and psychological embeddings using PsiZ?

Judgments of NBA players by experts, fans & novices

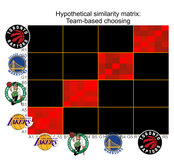

Curry


James

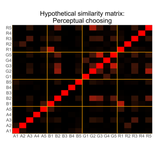


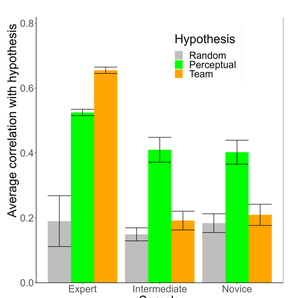
Team: Celtics, Lakers, Raptors, Warriors

1. 2 experts, 12 'intermediate' fans, 16 'novice' non-basketball watchers complete **200 "4-choose-1" trials of 20 NBA players from 4 well-known teams**
2. Obtain **embeddings for participants**
3. Compute ***implied pairwise similarity matrix*** from embeddings
4. **Correlate matrices** with **hypothetical *conceptual* matrix** and **hypothetical *perceptual* matrix** (based on VGG-16 of images)



vs.

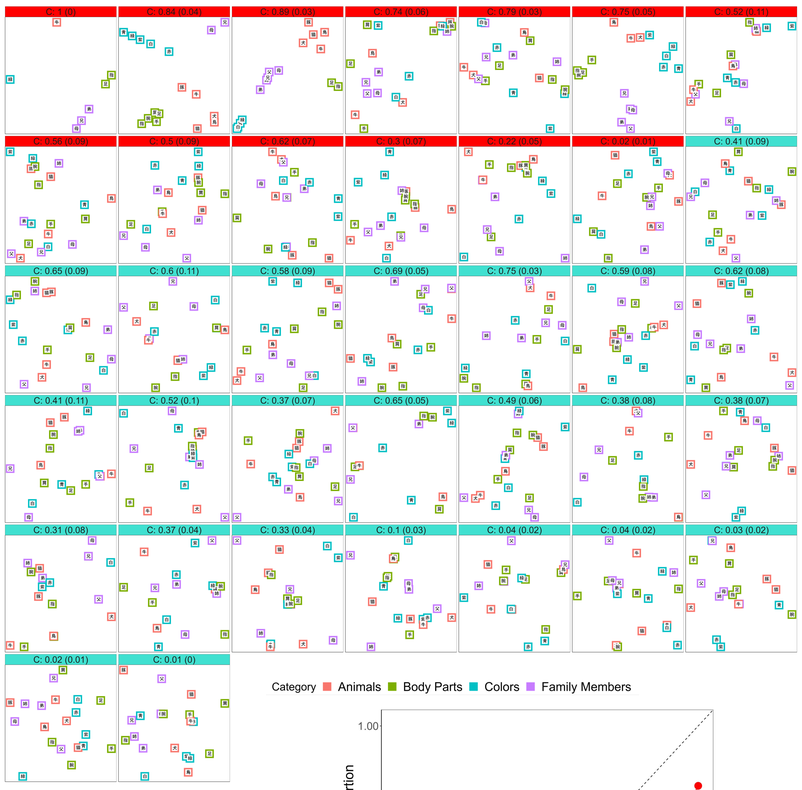




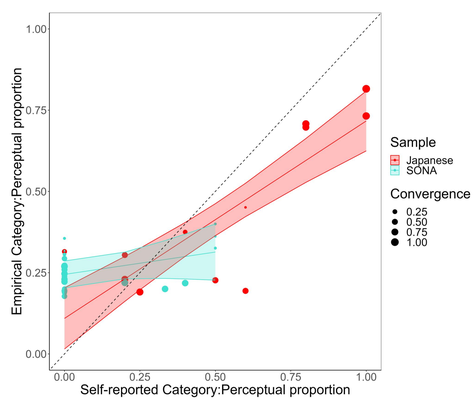
Embeddings revealed that experts showed conceptual category structure, fans/novices showed perceptual category structure

Judgments of kanji by Japanese and English readers

父 母 赤 白



Category: Animals, Body Parts, Colors, Family Members

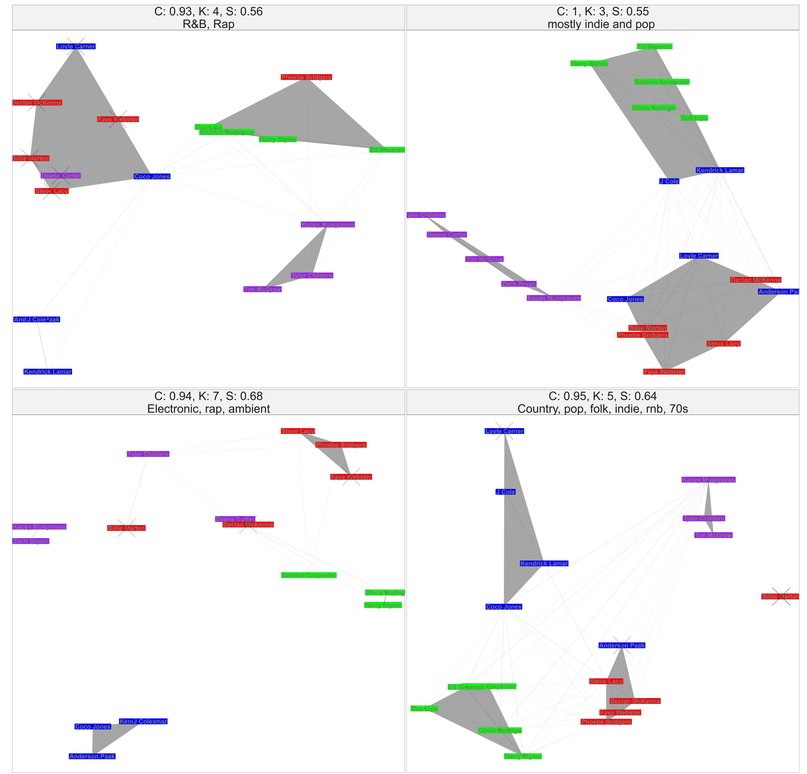


1. 13 **Japanese speakers** and 24 **non-speakers** complete **200 "4-choose-1" trials of 20 kanji from 4 semantic categories (animals, body parts, colors, family members)**
2. Ps **self-report degree to which they used conceptual vs. perceptual strategies**
3. Correlate **self-reports** with results obtained from **embeddings/matrices**

Embeddings captured subtle differences in Japanese participants' relative use of conceptual/perceptual strategies

Judgments of musical artists

Billie Marten, Dua Lipa, Kendrick Lamar, Ed Sheeran, Tim McGraw, Olivia Rodrigo



Note. **4 selected embeddings. *C* = Embedding convergence, *K* = # of clusters, *S* = *k*-means silhouette score**

1. 18 students complete **200 "4-choose-1" trials of 20 names of musicians from genres: *Alternative, Country, Hip-hop, Pop***
2. Ps self-report **genre listening, knowledge of artists**
3. Compare **'objective' categorization** (label colours) with **embedding categories** (*k*-means cluster analysis polygons), **explicit participant categorization** (dashed lines connecting same-category artists), and **artists Ps reported not knowing** ('Xs')

Embeddings reflected participants' 'islands of knowledge' and familiarity (or lack thereof) with different genres and artists