Constructing complex social categories from distinct group membership information

Alice Xia[1], Sarah H. Solomon[1], Sharon L. Thompson-Schill[1], Adrianna C. Jenkins[1]
[1]Department of Psychology, University of Pennsylvania

MOTIVATION

HOW ARE COMPLEX SOCIAL CATEGORIES CONSTRUCTED FROM INFORMATION ABOUT THEIR CONSTITUENT GROUPS?

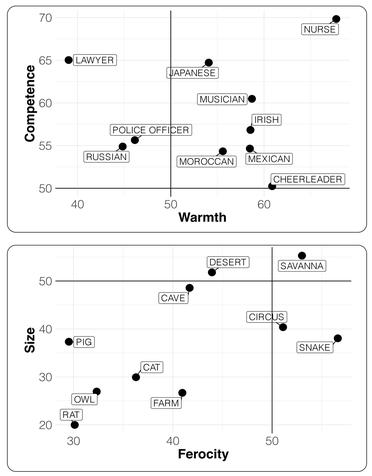
Previous research has examined how inferences about compound objects (e.g., fuzzy chair) are produced from their constituent concepts[1,2], but little is known about the **combinatorial processes** that subserve our ability to evaluate complex social categories (e.g., Irish Musician).

Capitalizing on the observation that social perceptions can be organized along dimensions of **warmth** and **competence**[2], we test the abilities of two different models to predict ratings of 25 nationality-occupation concepts in those dimensions. For comparison, we also examine 25 combined animal habitat-animal type concepts (e.g., cave rat) in the **ferocity** and **size** dimensions, which have been shown to organize the animal concepts space[4].

MODEL CONSTRUCTION

10 social concepts, 10 animal concepts

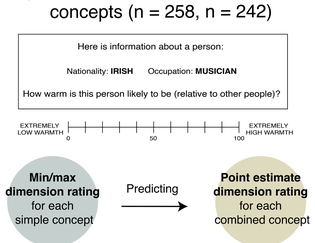
Stimulus set normed on Amazon Mechanical Turk (MTurk) (n = 100)



Attempted to minimize correlation between dimensions for social and animal concepts, respectively

Survey ratings

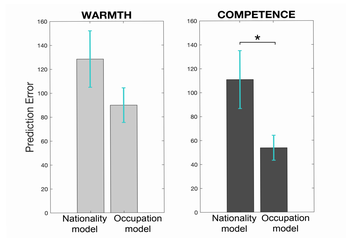
2 groups of MTurk raters for social and animal concepts (n = 258, n = 242)

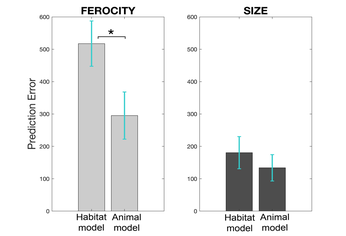


Familiarity ratings:
Composite of 3 questions, given by same raters from each group

Baseline non-combinatorial models

If participants use only one concept to make combination ratings:



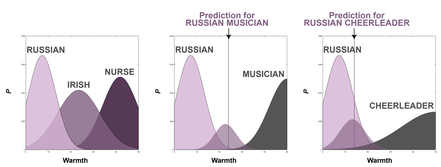


Head concept (e.g., occupation) prioritized over modifier concept (e.g., nationality)

Combinatorial models

Additive model:
Weighted average of simple concept ratings

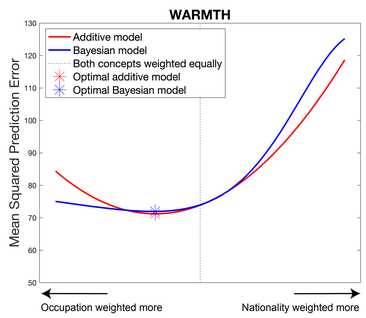
Bayesian model:
Combines **distributions created from min/max ratings** to predict combined concept ratings; variance (i.e., concept uncertainty) used to adjust weight of one concept relative to the other

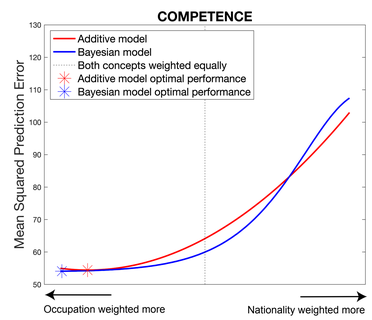


MODEL COMPARISON

Predictions in warmth and competence dimensions

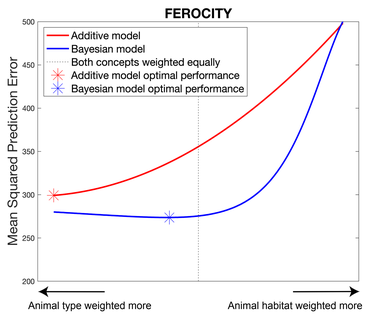
Both models predict that participants will weight occupation more than nationality, in both the warmth and competence dimensions

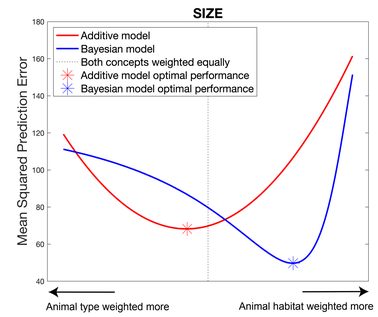




Predictions in ferocity and size dimensions

Both models predict that participants will weight animal type more than animal habitat in the ferocity dimension; both models performed better in the size dimension, relative to ferocity (t = -3.41, p = .002); optimal Bayesian model outperforms optimal additive model in size dimension (t = 2.1104, p = .05)





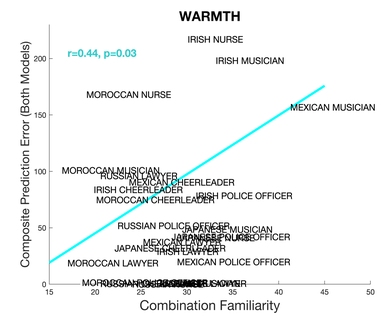
CONCLUSIONS & FUTURE DIRECTIONS

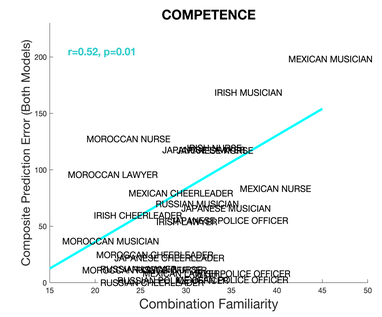
- Participants tend to prioritize head concepts more than modifier concepts in their evaluations of both the social and animal combinations
- Additive and Bayesian models show that occupation is weighted more than nationality in social combinations, in both the warmth and competence dimensions
- As people gain more experience with a social combination, they may develop a new concept for that combination that shares fewer and fewer features with its constituent concepts, but the opposite appears to be true for animal combinations
- More familiar social combinations are characterized by higher model prediction errors as well as greater distance between the combination and its constituent occupation concept in 2D warmth and competence space
- Model predictions will guide hypotheses about patterns of brain activation associated with combinatorial processes in a planned fMRI study

FAMILIARITY WITH COMBINATIONS

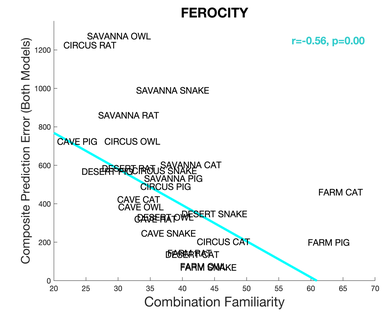
Familiarity modulates model performance

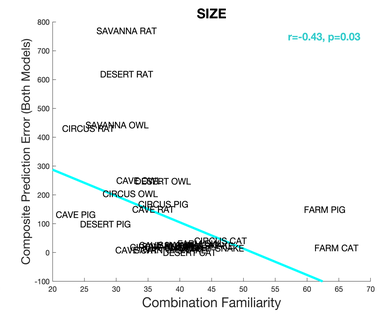
Composite prediction error derived from averaging errors of both models; higher composite error for more familiar **social combinations**, but only when nationality and occupation are weighted equally





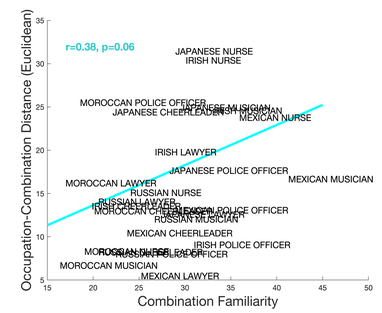
Lower prediction errors in both models for more familiar **animal combinations**, contrary to pattern of results found for social combinations



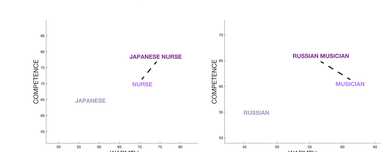


Familiarity modulates distance in 2D concept space

More familiar social combinations are located farther from their constituent occupation concepts in 2D warmth-competence space



Occupation-Combination Distance:



1. Gluckberg & Estes (2011). Psychonomic Bulletin and Review.
2. Tyler, Moss, Durrant-Peatfield, & Levy (2000). Brain and Language.
3. Fiske et al. (2008). Trends in Cognitive Sciences.
4. Henley (1969) Journal of Verbal Learning and Verbal Behavior.