

Can behavioral and neural indices
predict language learning ability?

GA Data Science Pitch
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Intro

- Although language learning is most easily accomplished in early childhood, adults can become proficient in a new language!
- There is, however, considerable variability in adult's learning outcomes
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Question

- Can we predict whether an adult will excel in language learning based on **behavioral measures** (ie aptitude, IQ tests)?
- Can we predict whether an adult will excel in language learning based on **brain measures** (*ie: fmri brain scans*)?
- Are brain measures better predictors than behavioral? What if we combine them into one model.
- Which behavioral and neural characteristics were most predictive of learning success, either independently or in combination.

Data

- n=42 native English speakers to my lab and taught them a novel miniature artificial language.
- Prior to learning, participants completed:
 - a large battery of cognitive and aptitude measures (ie: extant aptitude tests, IQ tests, working memory, etc)
 - an fMRI scan while performing three separate tasks and during rest.
- The artificial language (MAL) was learned somewhat naturalistically over the course of 4 days. After each learning session, participants were tested for knowledge of all aspects of the language.
- Tasks during scanning measured neural recruitment during working memory, skill learning and language processing.

Analysis

Run classifier model on:

1. Behavioral predicts good vs bad learners
2. Brain data predicts good vs bad learners
3. Behavioral + Brain

Figure out which characteristics are most predictive of learning success:

1. which behavioral feature
2. which neural features (ie tasks, which brain regions)

Summary

- If this works, it could be the first demonstration that brain measures can help identify successful learning. This could help our understanding about which aspects of cognitive and neural architecture contribute to learning success.
- **Potential problems:** Data set is small small small ($n=42$). We need to reduce features like mad and not overfit. **234 potential features (at least)
- I have another dataset with a lot more data if this is not good.

Pitch#2: Predicting College Persistence

Longitudinal dataset following seniors in highschool through college (n=1754 a lot more, still waiting on full dataset)

- 1. Can we predict who is going to persist and who will not?
- 2. Which features are most predictive?

Persistence = college graduation or how many years they stayed in college and what kind of college

Data - SO MUCH

1. Cognitive assessments, teacher reported measures, self reported measures, personality measures, GRIT, grades, SAT scores, SES, 1078 features pretty much.