# Linguistic Prediction Across the Lifespan

Rachel Ryskin (rryskin@ucmerced.edu) & Vera Nicolette Sanchez
University of California, Merced

Abstract # 2342

## Background

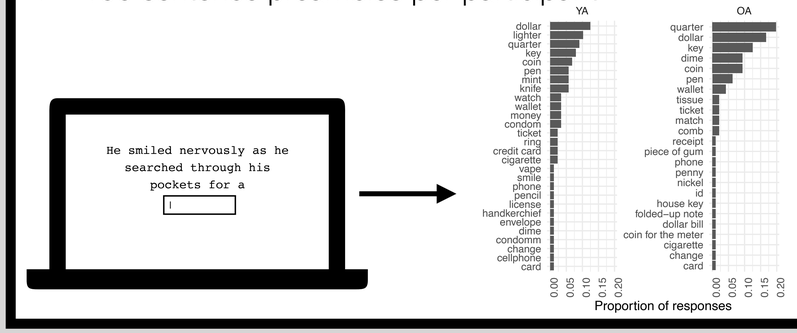
- Prediction of upcoming input based on preceding context appears ubiquitous in everyday language comprehension (Federmeier, 2007; Dell et al., 2014; Kuperberg & Jaeger, 2016; but see Pickering & Gambi, 2018; Huettig & Mani, 2016, Ferreira & Chantavarin, 2018).
- Yet, prior work shows that indices of prediction (e.g., differences in ERPs to predictable vs. unpredictable words) are less robust in older adults (OA) than younger adults (YA).
- These age-related differences may reflect a reduced tendency to predict (e.g., if prediction relies on executive resources known to be diminished in OA) or a mismatch in the content of predictions due to different language experience (Ryskin, Levy & Fedorenko, 2020).

## Question

Do individuals of different ages generate partially distinct linguistic predictions as a result of differences in the amount and content of their language experience?

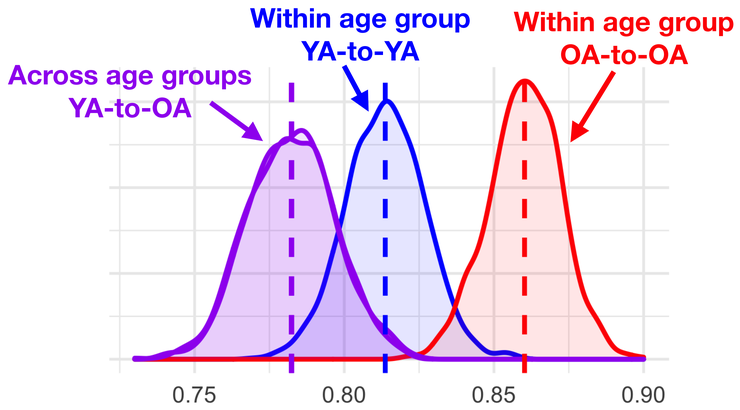
## Dataset

- **166** YA [18-35 years] (actual range collected: 18-31 yrs)
- **170** OA [50-80 years] (actual range collected: 50-77 yrs)
- Self-reported native English speakers
- Sentence completion (cloze) task on MTurk using jsPsych
- Materials from Wlotko et al. (2012): a set of 300 sentences ranging in cloze probability from 0 to 1
- 150 sentence preambles per participant




## Results

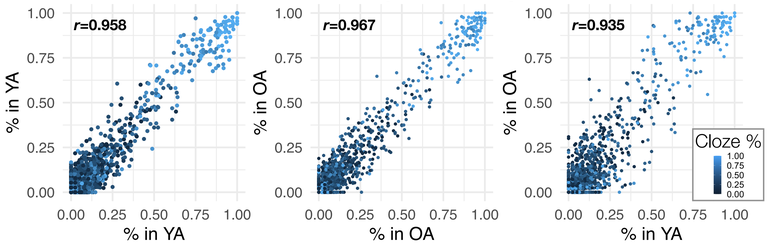
### Rates of highest probability completion being the same across two independent samples*




*Distributions obtained by resampling 1000 times, splitting the data from each age group into independent halves each time

- Individuals from different age groups are less likely to assign highest probability to the same completions than individuals from the same age group.
- OA are more consistent in their highest probability completions than YA.

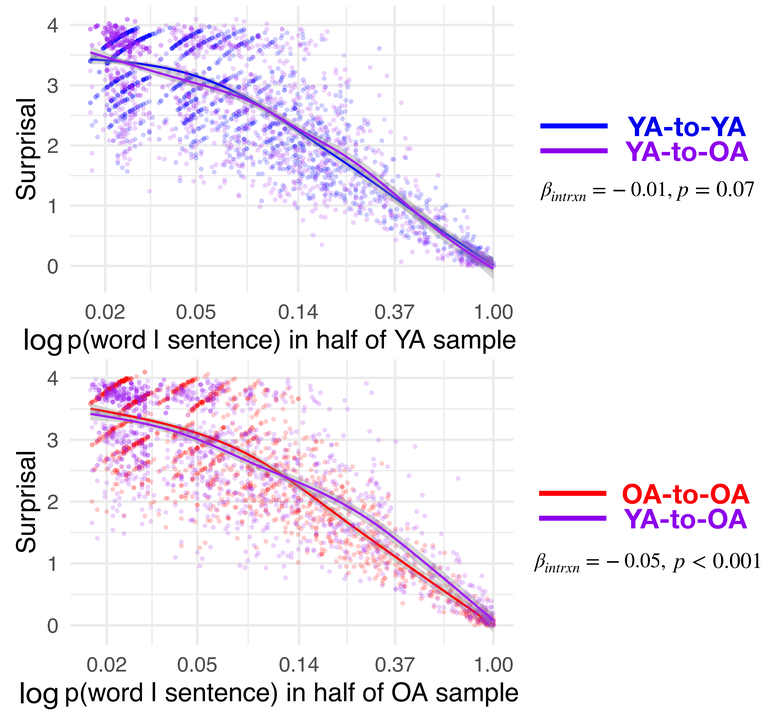
### Correlations of completion probabilities




- Contextual probabilities (proportion of people who provided a given continuation) were more correlated within than across age groups. (All samples are independent.)

## "Prediction" effects across age groups

- Half of data per age group used to "norm" sentence completions (select predictable and unpredictable items)
- Other half as the measure of prediction shows that effects in OA appear smaller than those of YA when data from YA are used to generate norms, and, critically, prediction effects in YA appear smaller than in OA when data from OA are used to generate norms.
- **Note**: Any responses which appeared in one group's responses but not the other's were excluded
- Regression analsyes: `Surprisal~log_prop*age`




- When data from YA are used to generate norms, no evidence of a significant difference between YA and OA in the relationship between norms and surprisal.
- When data from OA are used to generate norms, surprisal is less well predicted from norms for YA than OA.

## Conclusions

- Observed differences in prediction across the lifespan may be explained in part by language experience.
- Methodological implications: Age-specific norms are important for language research
- Limitations: 1) Many datapoints are omitted if they do not show up in multiple samples. They may actually be the most informative 2) Age groups are fairly close together. 3) An offline behavioral measured used as a proxy for prediction.