

Background

- Age-related changes are observed at all **language processing** levels.
- There is still a lot of debate about the origins and mechanisms of these changes.
- One possible mechanism (Burke, 1997): **decline of inhibitory processes**. Changes in language processing are secondary to this non-linguistic change.

Research questions

- Are age-related changes in language processing connected to inhibitory control?
 - Do older adults complete sentences in a less diverse way because it is hard for them to inhibit the most salient and evident ending for the sentence?
 - Will less predictable sentences cause greater slowing in older adults because of difficulty selecting one of the competing responses and inhibiting others?

Method

Participants

- 43 younger and 43 older participants (ages 18-32 and 59-82 respectively)
- Without neurological or speech/language disorders; native speakers of Russian

Analysis

- Diversity of sentence completion in the age group, measured by Shannon's diversity index (H-statistic)

$$H = \sum_{i=1}^k p_i \log_2(1/p_i)$$

- Mean reaction time for 25 most and 25 least predictable sentences.

Results

Younger adults completed sentences significantly more diversely than older adults (see **Chart 1**):

- H-statistics: $t(119)=5.90, p < .0001$

Low-predictable sentences cause a greater slowing in older adults (see **Chart 2**):

- Age x Predictability: $F(1, 168) = 11.04, p = .001$
- Age: $F(1, 168) = 57.87, p < .0001$
- Predictability: $F(1, 168) = 123.28, p < .0001$

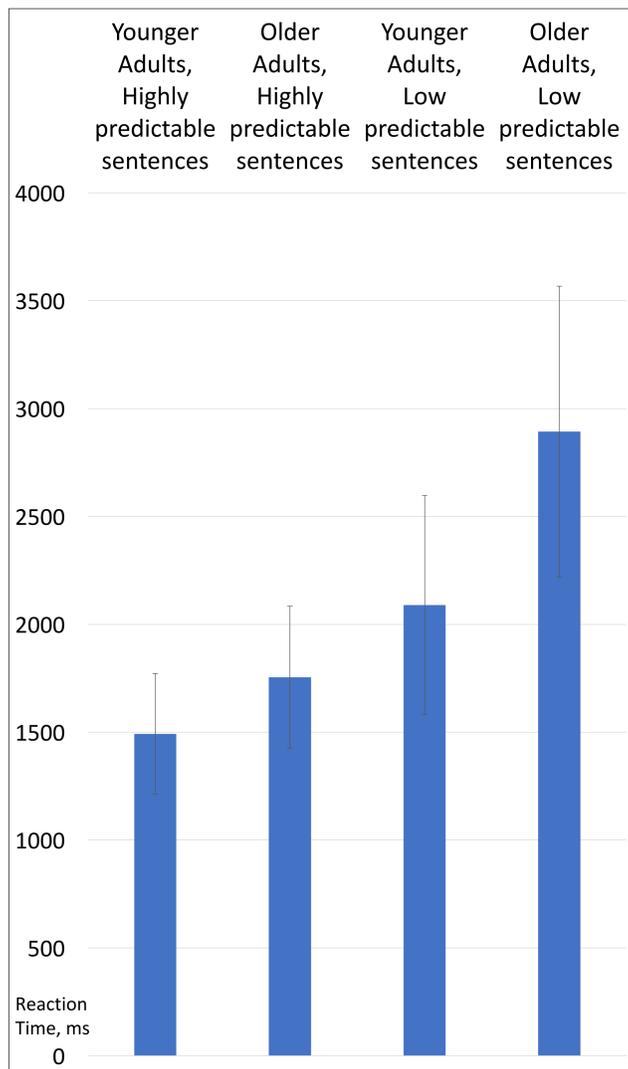


Chart 2. Average reaction time.

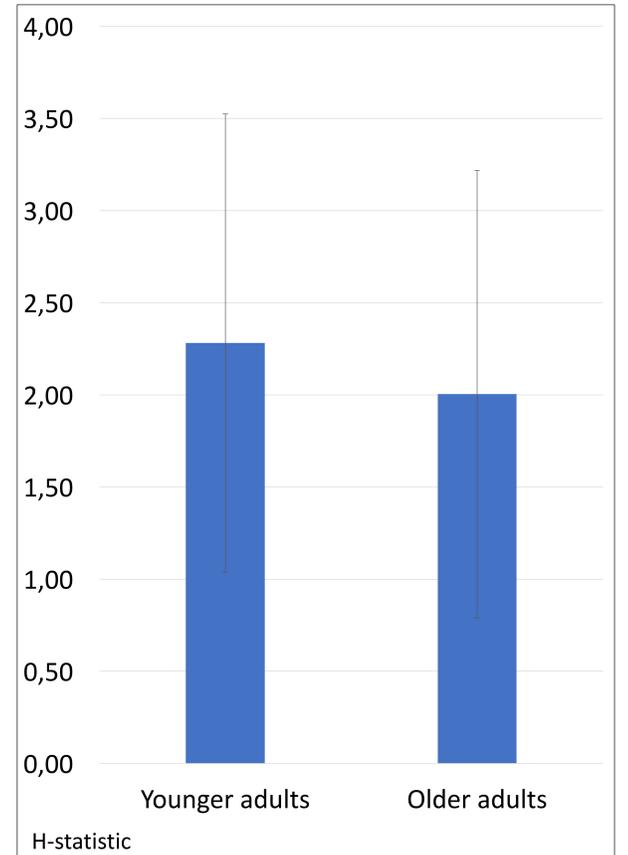


Chart 1. Sentence completion diversity.

Task and Stimuli

120 Russian sentences with variable predictability, presented in random order.
 Task: to complete the sentence with one semantically appropriate word.
 Sentences are presented word-by-word (See **Figure 1**).
 Participants read aloud and press spacebar to move to the next screen.
 DMDX software was used to present the stimuli and record the responses.



Figure 1. Example of stimuli used in the sentence completion task.

Conclusions and further research

The findings imply **the role of inhibitory control** decline in age-related changes in language processing:

- Older adults used less diverse sentence endings, possibly because of **difficulty inhibiting the most salient response option**. Younger adults inhibited automatically accessed salient words and searched for other distantly related alternatives.
- Older adults showed disproportionate slowing when completing low-predictable sentences that have numerous possible endings, likely because they were more **challenged by endorsing one of the competing responses and inhibiting others**.

Alternative interpretation:

The results may also be accounted for the **Right Hemisphere Aging Hypothesis** (Dolcos et al., 2002):

- Distant semantic search relies on the right hemisphere (Schmidt et al., 2007).
- Right-hemisphere functions may show a disproportionate decline in aging (Dolcos et al., 2002).
- Thus, older adults show selective difficulties with distant semantic search, but not with lexical retrieval of salient / closely related words.

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