

The influence of conceptual and visual factors on sentence production in younger and older adults

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Background

General background: Previous research has shown that extralinguistic factors such as time pressure, patient animacy and patient position can have an impact on sentence production.

Time pressure: Under time pressure, the extent to which people speak incrementally increases (Ferreira & Swets, 2002).

Animacy: Animate nouns tend to be mentioned first in a sentence (Esaulova et al., 2019).

Position: Left-positioned agents lead to faster speech onset times than right-positioned agents (Esaulova et al., 2019).

Research gap: Most studies have been conducted with younger adults whereas literature on studies which have been conducted with older adults is sparse.

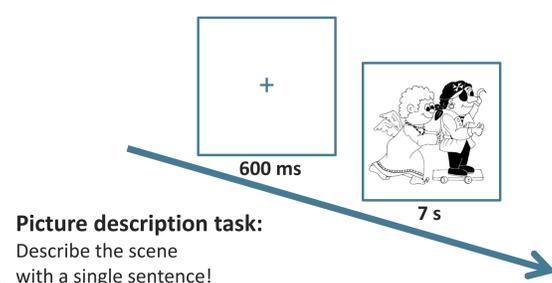
First evidence: There is first evidence showing that younger adults rather rely on patient animacy whereas older adults rather orient to patient position in making their syntactic choices (Altmann & Kemper, 2006).

Research Questions

- (1) In how far do younger and elderly adults use different sentence planning strategies?
- (2) In how far do conceptual and visual factors such as patient animacy and patient position affect younger and older adults' sentence production?

Method

Procedure



Design

Independent variables

- Patient animacy (animate/inanimate)
- Patient position (left/right)



Dependent variables

- Frequency of passive utterances
- Speech onset times

Materials

8 stimuli per condition

	patient left	patient right
patient animate		
patient inanimate		

32 Fillers

16 intransitive sentences



16 locative sentences

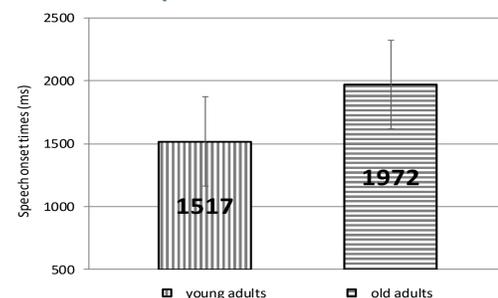


Participants

- 60 German-speaking participants in two age groups:
 - 30 young adults
age range: 18-27
 $M = 22.5$
 $SD = 2.33$
 - 30 older adults
age range: 63-80
 $M = 72.37$
 $SD = 5.28$
- Matched for gender, handedness and educational level
- Normal or corrected vision and hearing
- No disorders of attention, language or speech

Results

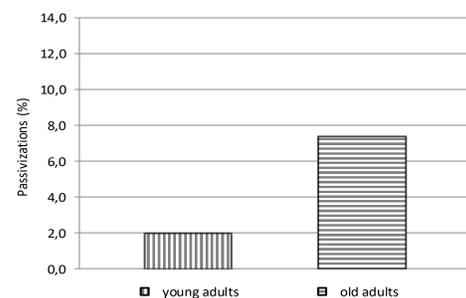
Speech onset times



Mixed three-way ANOVA:
Main effect of age group: $F(1, 58) = 24.86, p < .001, f = 0.65$

- Significantly longer speech onset times for actives in elderly adults than in younger adults.
- ➔ This indicates that sentence production is slowed down with aging.

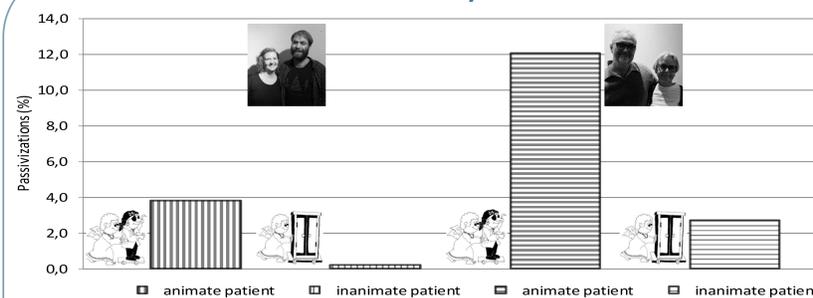
Passives



Mixed three-way ANOVA:
Main effect of age group: $F(1, 58) = 9.76, p = .003, f = 0.41$

- Significantly higher number of passivizations in older adults than in younger adults.
- ➔ This indicates that due to delayed sentence production older adults start speaking as soon as the first lemma is available whereas younger adults look up to the following sentence structure.

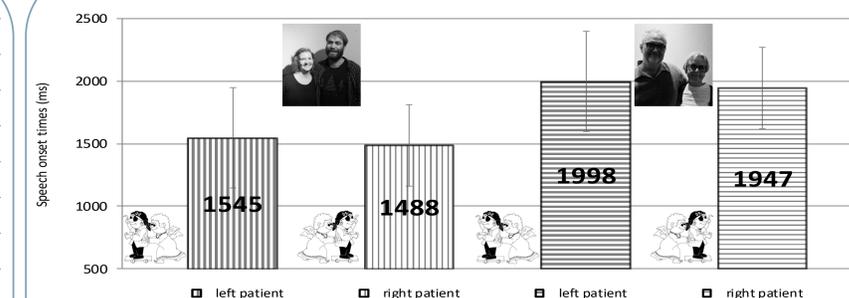
Animacy



Mixed three-way ANOVA:
Age group x animacy interaction: $F(1, 58) = 4.77, p = .033, f = 0.29$

- Only in the group of the elderly participants significantly more passivizations in the conditions with an animate patient than in the conditions with an inanimate patient.
- ➔ Only the elderly participants show a preference to realize animate patients as subjects of a passivization rather than inanimate ones whereas in younger adults animacy does not have an effect on syntactic choices.

Position



Mixed three-way ANOVA:
No age group x position interaction: $F(1, 58) = 0.02, p = .899$

- In both age groups longer speech onset times for active utterances in conditions with a left-positioned patient than in conditions with a right-positioned patient.
- ➔ This indicates a preference for left-positioned agents across age groups, which may be due to reading habits.

Discussion

Time pressure

- Due to delayed sentence production, older adults start speaking as soon as the first lemma is available without advanced grammatical planning (word-by-word incrementality) while in younger adults sentence planning is controlled by a larger linguistic unit, which allows them to look up to the upcoming structure (linear incrementality). This leads to a higher number of infrequent passivizations in elderly adults in comparison to younger adults.

Animacy

- Contrary to previous research (Altmann & Kemper, 2006), older adults even show a higher sensitivity to animacy manipulations in making their syntactic choices than younger adults by using their knowledge that is more probable to start a sentence with an animate than with an inanimate patient.

Position

- In both age groups, stimuli with left-positioned patients lead to slower speech onset times than stimuli with right-positioned patients. Thus, in the case of the elderly, the influence of reading habits apparently overrides the impact of the reduced dominance of the right hemisphere with aging.

In conclusion, there are similarities and differences between younger and older adults' sentence production. These new insights can serve as a tool to create age-appropriate material used in speech and language therapy and for marketing strategies.

References:

- Altmann, L. J. P., & Kemper, S. (2006). Effects of age, animacy and activation order on sentence production. *Language and Cognitive Processes*, 21 (1–3), 322–354. <https://doi.org/10.1080/016909605400006>
- Esaulova, Y., Penke, M., & Dolscheid, S. (2019). Describing events: Changes in eye movements and speech due to visual and conceptual properties of scenes. *Frontiers in Psychology*, 10, 1–15. <https://doi.org/10.3389/fpsyg.2019.00835>
- Ferreira, F., & Swets, B. (2002). How incremental is sentence production? Evidence from the production of utterances requiring the computation of arithmetic sums. *Journal of Memory and Language*, 46, 1, 57–84. <https://doi.org/10.1006/jmla.2001.2797>