

Influence of perceptual strength on conceptual processing : Investigation in aging and in lexical-semantic decisions

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Introduction

While the intervention of the sensorimotor system in semantic processing has already been demonstrated in young adults (1) and more recently in children (2), very few studies have investigated this question in aging. The purpose of this study is to explore the effect of **perceptual strength (PS)** - the extent to which a word can be experienced by multiple sensory modalities, i.e. visual, auditory, haptic, gustative and olfactive (3) - and aging on lexical-semantic processing with 2 different tasks : one focusing on linguistic representations (lexical decision task, LDT) and one focusing on modal representations (semantic decision task, SDT) (see 4). We would like to explore the impact of low PS (LPS) and high PS (HPS) concepts in these processing.

Method

Population

Group	N	Gender	Age		Years of education*	
			Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Young Adults (YA)	32	14 women	21.38 (2.81)		4.22(.42)	
Older Adults (OA)	36	16 women	73.78 (7.26)		4.25 (1.18)	

* 1 = less than primary grades; 2 = primary grades; 3 = middle school; 4 = high school; 5 = bachelor's degree; 6 = master; 7 = PhD.

The 2 groups were matched in gender ($p = .954$) and on the number of years of study ($p = .467$)

Cognitive assessment : global (MMSE), executive (BREF), episodic memory (5 words test), and lexical-semantic (TCD-MA, Mini-QCS, phonological and semantic fluency)

→ allowed to exclude older adult participants with abnormal cognitive functioning

Stimuli

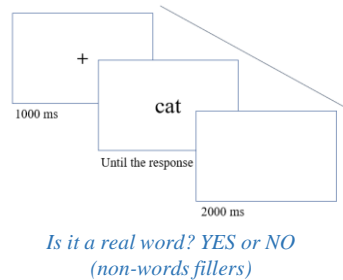
56 stimuli of interest :

- 28 **Low (L)PS** words
- 28 **High (H)PS** words*

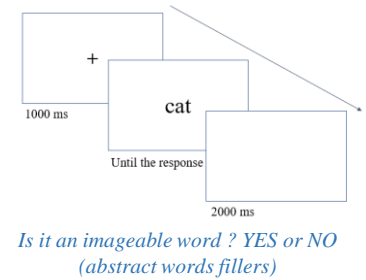
+ 56 fillers

*No significant difference for 15 psycholinguistic/semantic variables like frequency, concreteness, imageability, familiarity, arousal, body-object-interaction...

Lexical decision task (LDT)



Semantic decision task (SDT)



Accuracy (ACC)
 +
 Reaction Times (RTs)

Results

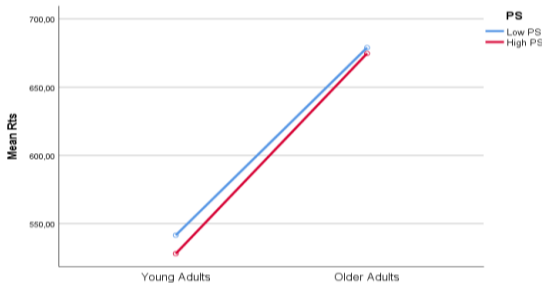
We ran a **linear/logistic mixed effects model** that predicted RTs and ACC to compare YA and OA:

LDT

ACC : non significant ($p > .05$)

RTs :

- Condition [$\chi^2(1) = 3.52, p = .061$]
- Group [$\chi^2(1) = 46.4, p < .001$]
- Interaction [$\chi^2(1) = 2.23, p = .135$]

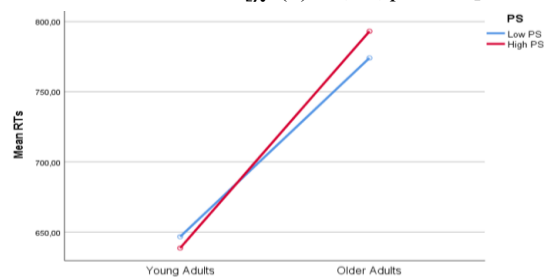


SDT

ACC : non significant ($p > .05$)

RTs :

- Condition [$\chi^2(1) = .10, p = .747$]
- Group [$\chi^2(1) = 22.72, p < .001$]
- Interaction [$\chi^2(1) = 5.98, p = .014$]



Discussion

We wanted to explore the impact of PS in lexical-semantic processing in aging using 2 different tasks. While no results are observed for the LDT, we observe interesting results for the SDT which show an opposite processing between the YO and the OA. According to the language as situated theory (4), a LDT will emphasize a linguistic processing that will be superficial while a SDT will require a deeper processing by activating the modal system. From this point of view, the LDT would not have shown any results because subjects can respond based only on superficial statistic linguistic associations (e.g., frequency) whereas the SDT would have activated the modal system, revealing differences between HPS and LPS processing. Therefore, these results suggest differences between YA and OA in perceptual processing and open up perspectives for future research in this area. Potential avenues such as the involvement of inhibitory processes in the processing of HPS need to be explored, as well as the possibility that aging involves modifications to the perceptual system.