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Cognitive Psychology and Neuropsychology

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Vantwembeke, C.[1,] Invernizzi, S.[1], Demonty, M.[2], Jockin, C.[1], Delhaye, E.[2], Simoes Loureiro, I.[1], Bastin, C.[2], & Lefebvre, L.[1]

Exploring Thematic and Taxonomic Links and the Processes of Recollection and Familiarity in Alzheimer's Disease Using the Jacoby and Whitehouse Effect.

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INTRODUCTION

Thematic Links =

concepts from different semantic categories within the same spatio-temporal context.

Two dissociable systems that interact with each other. [2]

Taxonomic Links =

concepts from the same ordered semantic category.

➔ **Altered in early-stage Alzheimer's disease (AD)**[1]

Recollection Process =

conscious retrieval <u>including</u> the spatio-temporal context of encoding = I remember.

➔ **Altered in early-stage AD**[3]

Familiarity Process =

automatic retrieval <u>without</u> the spatio-temporal context of encoding = I know.

➔ **Altered or preserved in early-stage AD ?**

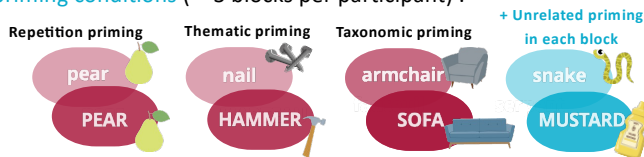**Memory illusion** = repetition priming effect = unconscious perception influences the feeling of familiarity [4].
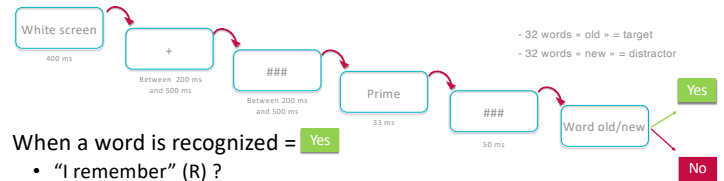
METHOD

Participants :

- 21 early-stage AD patients (MMSE = 24.67 ± 2.65).
- 35 healthy controls (MMSE = 29.4 ± 0.7).
- Aged between 60 and 75.

➔ Completed the experimental protocol[5], inspired by the memory illusion of Jacoby and Whitehouse[4].

3 priming conditions (= 3 blocks per participant) :

Repetition priming: pear / PEAR

Thematic priming: nail / HAMMER

Taxonomic priming: armchair / SOFA

+ Unrelated priming in each block: snake / MUSTARD

Each block includes 3 successive tasks :

- Encoding task = 32 word presented for 2 000 ms to be memorized.
- Distraction task = 2 minutes of mental arithmetic.
- <u>Recognition task</u> = 64 words, each preceded by a 33 ms prime, either related (depending on the block) or unrelated to the target.

White screen — 400 ms → + (Between 200 ms and 500 ms) → ### (Between 200 ms and 500 ms) → Prime 33 ms → ### 50 ms → Word old/new → Yes / No

- 32 words « old » = target
- 32 words « new » = distractor

When a word is recognized = Yes
- "I remember" (R) ?
- "I know" (K) ?
- "I guess" (G) ?
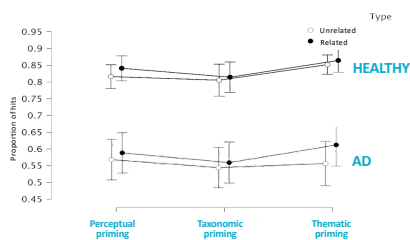
RESULTS

Age = controlled variable

Repeated measures ANOVA – analysis of hits ➔ 2 main effects :

- **Link**

Related > Unrelated

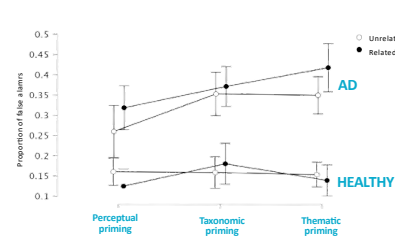$F_{(1,52)} = 5.276$, $p = .026$

- **Group**

Healthy > AD

$F_{(1,52)} = 15.059$, $p < .001$

Repeated measures ANOVA – analysis of FA (false alarms) ➔ 1 main effect :

- **Group**

AD > Healthy

$F_{(1,52)} = 29.483$, $p < .001$

Repeated measures ANOVA – analysis of R/K :

- **1 main effect = Group** :
  - R responses from hits : Healthy > AD ; $F_{(1,20)} = 11.918$, $p = .003$
  - K responses from hits : AD > Healthy ; $F_{(1,20)} = 12.393$, $p = .002$
  - K responses from FA : AD > Healthy ; $F_{(1,20)} = 5.263$, $p = .033$

- **1 interaction effect = Category*Group** :
  - K responses from hits : AD > Healthy ; $F_{(2,40)} = 3.553$, $p = .038$

DISCUSSION

AD patients :

✔ Early degradation of recollection.

✔ Preservation of familiarity.

✔ Beneficial use of semantic priming.

➔ More hits from familiarity.

➔ More hits in the related condition.

✘ No results confirming early degradation of taxonomic links, though <u>this trend is observable</u>.

➔ More false alarm, regardless of the prime type.

Limitations and future directions:

- Increase the number of participants in each group.
- Narrow the age ranges.
- Improve and simplify the assessment of recollection and familiarity processes.
- Measure priming effects through reaction time.
- Investigate these issues in mild cognitive impairment (MCI).

References :
(1) Simoes Loureiro, I. & Lefebvre, L. (2016). Distinct progression of the deterioration of thematic and taxonomic links in natural and manufactured objects in Alzheimer's disease. *Neuropsychologia, 91,* 426–434. https://doi.org/10.1016/j.neuropsychologia.2016.09.002
(2) Mirman, D., Landrigan, J.-F., & Britt, A. E. (2017). Taxonomic and Thematic Semantic Systems. Psychological Bulletin, 143(5), 499-520. http://dx.doi.org/10.1037/bul0000092
(3) Simon, J., & Bastin, C. (2015). L'impact du trouble cognitif léger et de la maladie d'Alzheimer sur la recollection et la familiarité. *Revue neuropsychologique, 7*(3), 177-188. https://doi.org/10.1684/nrp.2015.0347
(4) Jacoby, L., & Whitehouse, K. (1989). An illusion of memory: False recognition influenced by unconscious perception. *Journal of Experimental Psychology: General, 118*(2), 126-135
(5) Invernizzi, S., Demonty, M., Lefebvre, L., Bastin, C., Simoes Loureiro, I., & Delhaye, E. (2020). *Manipulating depth of encoding and condition of priming; the influence of semantic variation on the Jacoby and Whitehouse effect* [Article en préparation]. Service de psychologie cognitive et neuropsychologie, Université de Mons.