Age-related differences in the neural process underlying explicit and implicit false memories

Wachowicz, B.[1], Lewandowska, K.[2], Marek, T.[3], Fafrowicz, M.[3]

[1] Institute of Applied Psychology, Faculty of Management and Social Communication, Jagiellonian University in Krakow, Poland
[2] Institute of Culture, Faculty of Management and Social Communication, Jagiellonian University in Krakow, Poland
[3] Department of Neurobiology, Malopolska Centre of Biotechnology, Jagiellonian University in Krakow, Poland

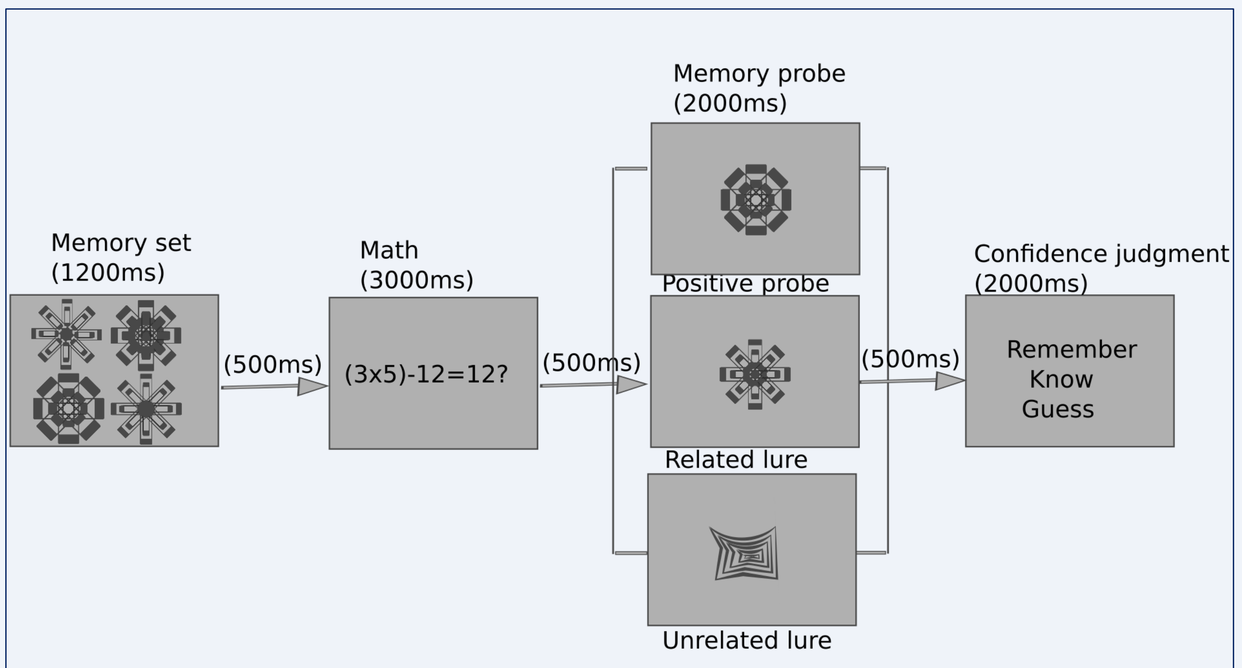
Introduction

False recognition may occur even in a 4 seconds after memorizing a stimuli set (Atkins & Reuter-Lorenz, 2008). Interestingly, during performing the explicit memory task, the neural structures linked with implicit processing seem to be more intensively activated in the group of older than younger adults (Dennis et al., 2014; Dennis & Cabeza, 2011).

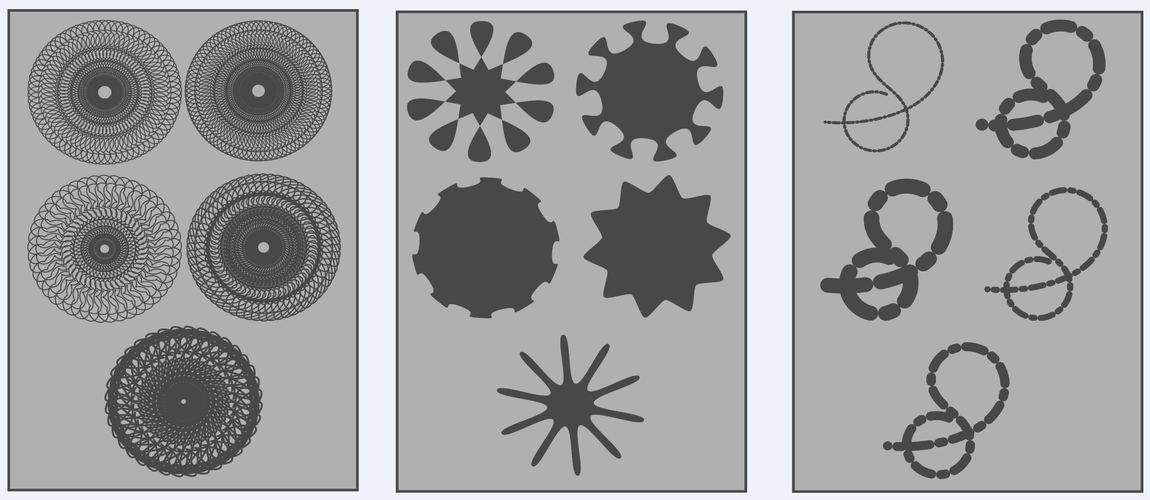
Does the stronger recruitment of the implicit process in older adults contribute to the increase of the false memories occurring in this age-group? To date, neither it was verified in the context of ***short-term memory***, nor the implicit false memories was measured in the ***explicit DRM procedure***.

Method

- The ST-DRM procedure (Atkins & Reuter Lorenz; 2008) will be used with two modifications:
  - the 'remember/know/guess' confidence judgments added after each memory probe (The implicit process can be measured as a number of 'guess' responses in the explicit memory task; see Voss & Paller, 2009)
  - the meaningless objects used instead of words (To avoid the dominance of explicit processing; see Voss & Paller, 2009)
- Functional and anatomical scans will be performed (3T MR, E-Prime)
- Data analysis: behavioral, functional connectivity analysis with the GLM and the ICA
- 20 younger adults (age 20-30, 10 men) and 20 older adults (age 60-70, 10 men). Exclusion of individuals with low cognitive performance and changes in the brain anatomy.



Experimental design - a modified version of experimental paradigm created by Atkins& Reuter-Lorenz (2011)



Stimuli examples.

Stimuli & Method Development

Stimuli: meaningless (abstract); 2-coloroued (dark gray RGBA 484848ff, light gray RGBA b0b0b0ff) – black and white are excluded in order to avoid strong visual contrast during fMRI; made in Inkscape, exported to .png at 270 dpi, IrfanView bath conversion to 144x144px .bmp to match the E-Prime presentation displayed on the NNL VisualSystem (resolution 800x600px)

Stimuli sets: 120 sets, 5 stimuli in each set (one to be selected as a related lure)

Future steps

(1) choosing most `typical` object in each set - a lure; (2) pilot study I; (3) selection of 80 stimuli sets with established level of stimuli difficulty; (4) preparing 4 versions of experimental procedure (60 memory sets in each, divided as in the experimental paradigm used by Atkins & Reuter-Lorenz, 2008); (5) pilot study II; (6) fMRI pilot study; (7) main experiment

Novelty & Significance

- Investigation of `implicit` false memories in the explicit memory task
- Determining whether the age-related differences in false short-term memories are partially caused by the greater involvement of the implicit process in older adults
- Potential to be applied in education.

References

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Contact

Correspondence should be addressed to Barbara Wachowicz; e-mail: barbara.wachowicz@uj.edu.pl