Differential Influence of Ventromedial Prefrontal Cortex Lesions to Schema and Category Knowledge

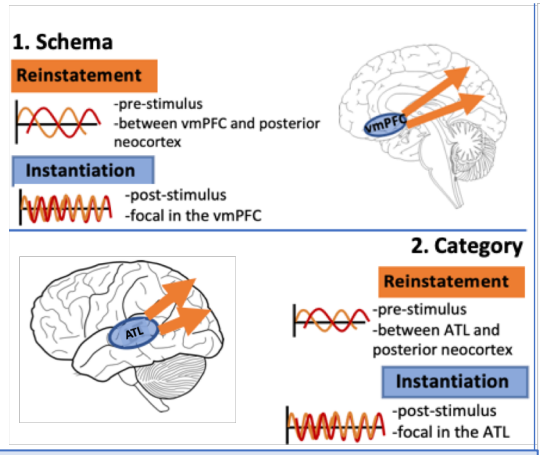
Giuliano, A.[1,2], Bonasia, K.[2], Ghosh, V.[2], Moscovitch, M.[1,2], Gilboa, A.[1,2]

1) University of Toronto 2) Rotman Research Institute, Baycrest.

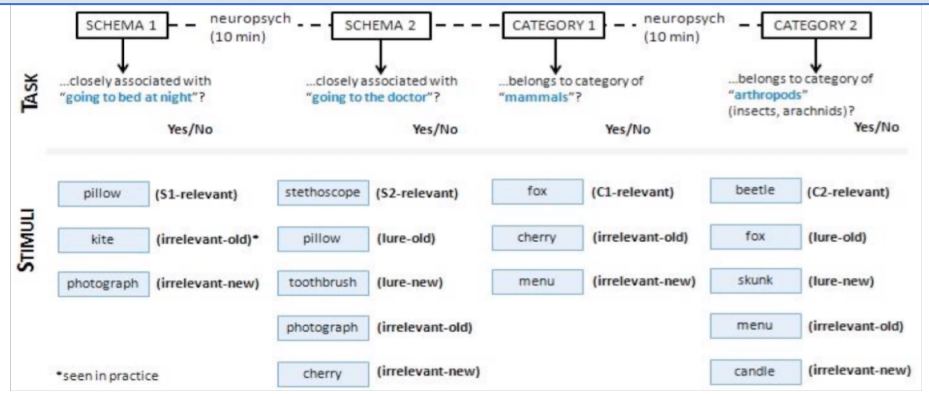
Main Questions

1. **How does prior knowledge influence information processing at the neural level?**
   - Reinstatement: Activating prior knowledge for use in a specific context.
   - Instantiation: Using your prior knowledge to interact with incoming information.
2. **Can we differentiate prior knowledge (schemas and categories)?**

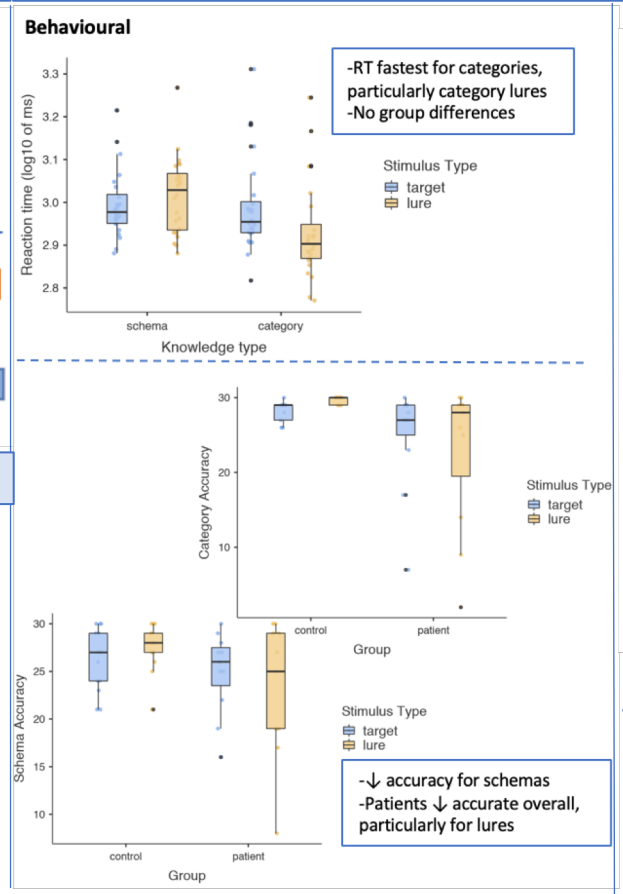
Predictions



Task (EEG)



Results



Pre-stimulus (EEG)

1. Theta
- 4-7 Hz
- -500 – 0ms
- Theta desynchronization
- Patients: theta synchronization

2. Alpha
- 8 – 14Hz
- -500 – 0ms
- Alpha desynchronization
- Patients: alpha synchronization

vmPFC → pNC
Theta & Alpha → Faster schema RT

LT → pNC
Alpha → Faster RTs overall

Post-stimulus (EEG)

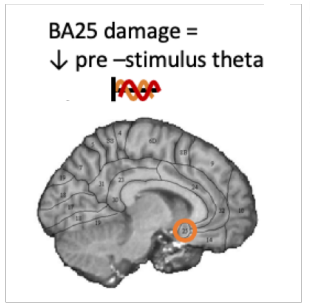
1. Alpha
- 8-14Hz
- 700-1000ms
- Alpha desynchronization

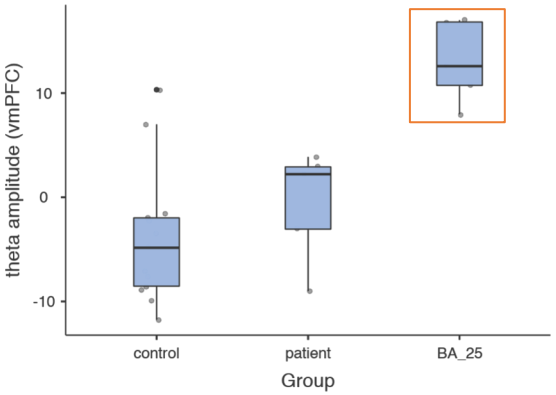
2. Beta
- 12-26Hz
- 700-1000ms
- Beta desynchronization

vmPFC → pNC
Patients: Alpha → Faster RTs overall
Controls: Alpha → Faster RTs overall

LT → pNC
Patients: Beta → Faster RTs overall
Controls: Beta → Faster RTs overall

Lesion Analysis





Discussion & Conclusions

How does prior knowledge influence information processing at the neural level?
- Reinstatement: pre-stimulus theta & alpha between vmPFC and posterior neocortex (schemas) and LT and posterior neocortex (categories)
- Instantiation: post-stimulus alpha & beta between vmPFC and posterior neocortex (schemas) and LT and posterior neocortex (categories)
- Patients: faulty reinstatement mechanism → affects task performance for both schemas **and** categories
- BA 25 lesions → impaired schema-related preparatory activity

Can we differentiate prior knowledge (schemas and categories)?
- Schemas & categories: underlying systems overlap
- Kinds of prior knowledge influence each other

References
1. Ghosh, V.E. et al. (2014), .J. Neurosci
2. Gilboa, A. and Moscovitch, M. (2017) , Cortex
3. Hebscher, M., & Gilboa, A. (2016), *Neuropsychologia*

Questions?

Contact: ariana.giuliano@mail.utoronto.ca