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

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# How does prior knowledge influence information processing at the neural level?

**Main Questions** 

- 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)?

..closely associated with

(S1-relevant)

(irrelevant-old)\*

"going to bed at night"?

pillow

kite

photograph

\*seen in practice

# **Predictions Behavioural** 1. Schema Reinstatement -between vmPFC and posterior Instantiation -post-stimulus -focal in the vmPFC 2. Category Reinstatement -pre-stimulus between ATL and Instantiation -focal in the ATL Task (EEG) CATEGORY 1 CATEGORY 2 (10 min) belongs to category of .. closely associated with .. belongs to category of (insects, arachnids)? Yes/No stethoscope (S2-relevant) (C1-relevant) (C2-relevant) (irrelevant-old) (lure-old) (irrelevant-new)

## candle (irrelevant-new) **Discussion & Conclusions**

(irrelevant-old)

# How does prior knowledge influence information processing at the neural level?

(irrelevant-new)

SCHEMA 2

- 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

cherry

# Can we differentiate prior knowledge (schemas and categories)?

Schemas & categories: underlying systems overlap Kinds of prior knowledge influence each other

Group

- Ghosh, V.E. et al. (2014), J. Neurosci
- Gilboa, A. and Moscovitch, M. (2017), Cortex

category

Knowledge type

Hebscher, M., & Gilboa, A. (2016), Neuropsychologia

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# Results

# Pre-stimulus (EEG)

1. Theta 4-7 Hz

RT fastest for categories,

particularly category lures

-↓ accuracy for schemas

particularly for lures

Patients ↓ accurate overall,

-No group differences

Stimulus Type

- -500 0ms
- Theta desynchronization
- · Patients: theta synchronization

### 2. Alpha

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





vmPFC → pNC

Alpha → Faster RTs overall

Theta & Alpha → Faster schema RT

### Post-stimulus (EEG)

1. Alpha • 8-14Hz

Stimulus Type target

- 700-1000ms
- · Alpha desynchronization



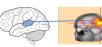
## vmPFC → pNC

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



### 2. Beta

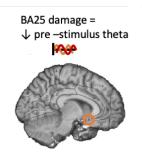
- 12-26Hz
- 700-1000ms
- Beta desynchronization



### LT → pNC

Patients: Beta → Faster RTs overall Controls: Beta ♠♠ → Faster RTs overall

## **Lesion Analysis**



(vmPFC) BA 25 control patient Group