Behavioural and electrophysiological markers of integration in novel word learning

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VIRTUAL PSYCHONOMICS

What does it mean to learn a word?
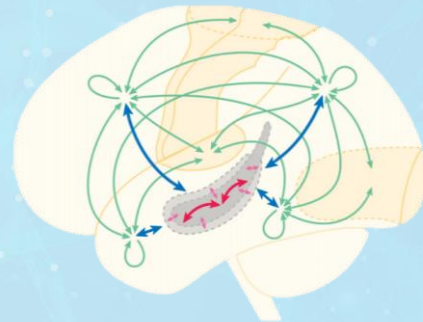
Encoding and storing

- phonological form, concept & the association between them
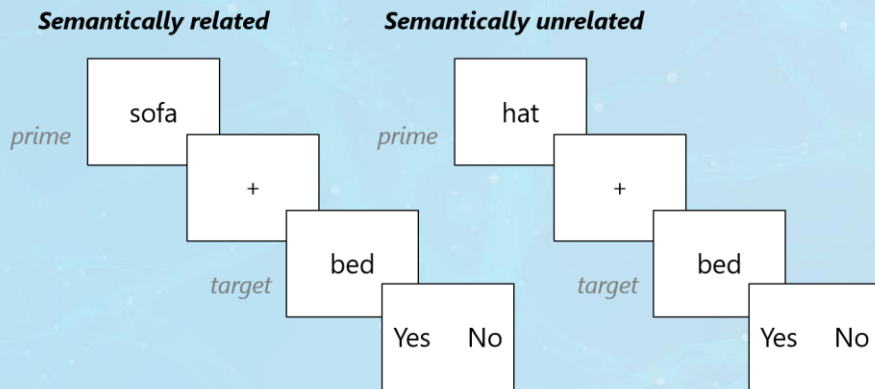
Integrating

- in the network of connections over which processing occurs

Complementary Learning Systems (CLS) [6,9,11,12]

- 2 systems ➜ 2 stages of word acquisition

  - ➤ Formation of traces in episodic memory (MTL)
  - ➤ Integration into neocortex through systems consolidation

- In tasks that require activation flow over multiple pathways, only integrated novel words can compete for selection

Semantic priming

Semantically related

prime   sofa

+

target   bed

Yes   No

Semantically unrelated

prime   hat

+

target   bed

Yes   No

Semantically related condition:

- **Shorter RTs** [14]

- **Reduced N400** ➔ automatic processes of lexical-semantic retrieval [10]

- **Enhanced LPC** ➔ episodic memory retrieval & explicit semantic access [16]

Novel words as primes

- Shorter RTs not always found [2,18]

- Unclear when reduction in N400 occurs: immediately vs. 24h after exposure or even later [3-5,15, 17, 18]

Novel words as targets

- Shorter RTs [1]

- No reduction in N400 either immediately or 24h after exposure [1]

- Enhanced LPC immediately and 24h after exposure [1]

Integrated or not?

Suggested interpretation:

- reduced N400 & enhanced LPC → novel words at least partly integrated
- enhanced LPC → behavioural effect subserved by episodic memory

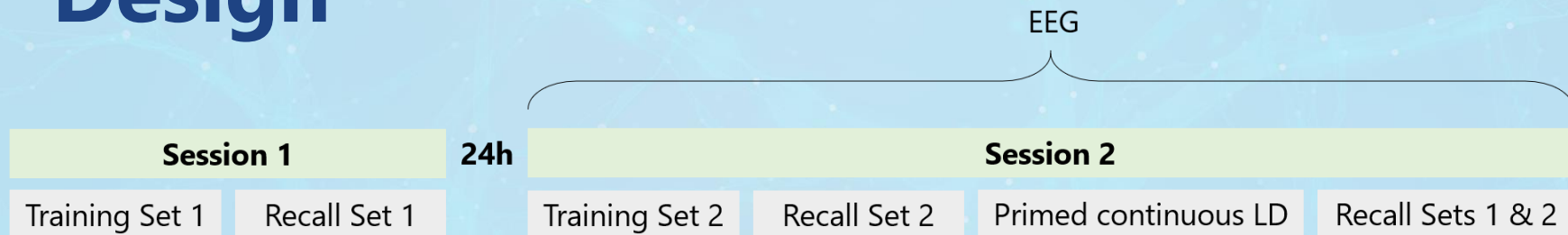**Yet… are previous results inconsistent due to…**

- methodological limitations?
  - ➤ *Word-to-word association priming* [4, 14]
  - ➤ *Strategic processing & awareness of manipulation*
    - Relatedness or animacy judgements at targets [1, 4, 14] & word judgements at targets only [1-4,14,15, 18]
- differences in training procedures?

Current study

- In learning of novel names for novel concepts, how do behavioural markers of integration map onto electrophysiological markers of integration?

Design

EEG

Session 1	24h	Session 2			
Training Set 1	Recall Set 1		Training Set 2	Recall Set 2	Primed continuous LD	Recall Sets 1 & 2

- 2 sessions with 24h in between
- 2 sets of novel concepts with 20 novel names per set

- **Training**

  ➤ novel names paired with definitions (4 sentences per concept)
  ➤ 4 EEG measures per name in Session 2

- **Primed continuous LD**

  ➤ Targets: novel names from both sets
  ➤ Primes: familiar words, semantically related or unrelated to targets
  ➤ LD at both primes and targets

To conclude…

- We will analyse whether RTs, N400 & LPC at newly trained words are modulated by

  ➢ prime-target relationship (related vs. unrelated)

  ➢ time after exposure: 24h (Set 1) vs. 0h (Set 2)

- **Pre-registration to be released soon!**

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Thank you!

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