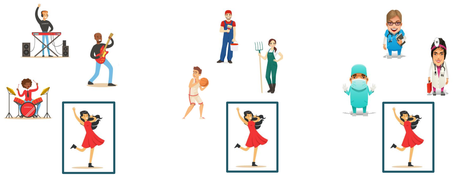
Item Memory Benefits from Schema Congruency and Incongruency

Regine Bader[1], Moritz Nicolai Braun[2], & Michael Weigl[1,3]

[1]Experimental Neuropsychology Unit, Saarland University, Saarbrücken, Germany; [2]Division of Clinical Psychology and Psychotherapy, Saarland University, Saarbrücken, Germany
[3]Institut für Prävention und Verkehrssicherheit (IPV GmbH), Kremmen, Germany

INTRODUCTION

In which context would you best remember the singer in the red dress?



congruent neutral incongruent

Information congruent to an activated schema can improve episodic memory by boosting direct cortical integration[1,2].

Incongruent information elicits a prediction error (PE) which triggers hippocampal encoding processes[1,3].

Evidence for this U-shaped relationship between in/congruency and memory performance is rare[3,4], especially for item memory.

HYPOTHESES

- Better memory performance for items presented in congruent and incongruent context compared to neutral context
- Increase in familiarity (K judgments and FN400 effect) for congruent condition
- Increase in recollection (R judgments and LPC effect) for incongruent condition

SAMPLE & EEG

PARTICIPANTS

right-handed; native German speakers

Experiment 1: n = 24 (age range: 18-29)
Experiment 2: n = 25 (age range: 18-30)

EEG

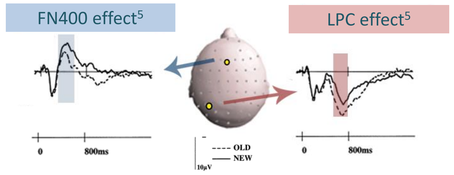
28 active electrodes (10-20 system)
sampling rate 500 Hz
amplified with a 0.016-100 Hz bp filter
re-referenced to averaged mastoids

Familiarity

FN400 effect[5]

Recollection

LPC effect[5]



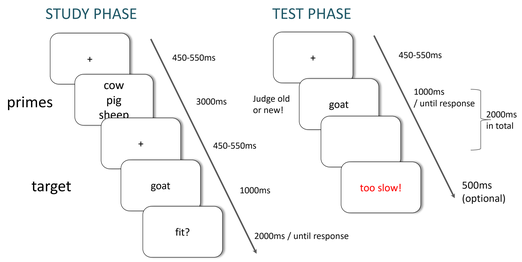
STIMULI & PROCEDURE

STIMULI

	congruent	neutral	incongruent
primes	cow	Badminton	Obama
	pig	Rome	Clinton
	sheep	lady	Kennedy
target (old)	goat	goat	goat
related new	lamb	lamb	lamb

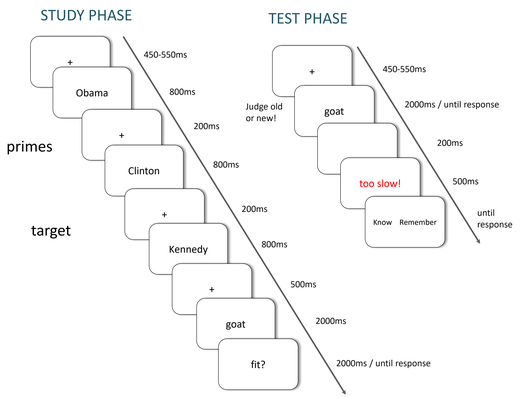
For all conditions, all 5 words of a semantic quintuplet were presented, either within one trial (congruent) or across different trials.

PROCEDURE EXP 1



50 quintuplets per condition; random presentation

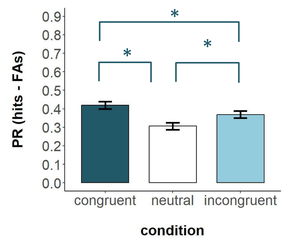
PROCEDURE EXP 2

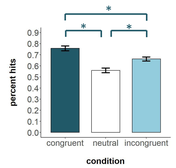


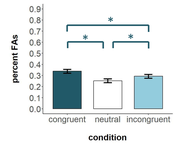
80 quintuplets per condition; random presentation

BEHAVIOR

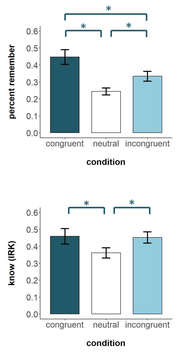
MEMORY PERFORMANCE
(across both experiments)







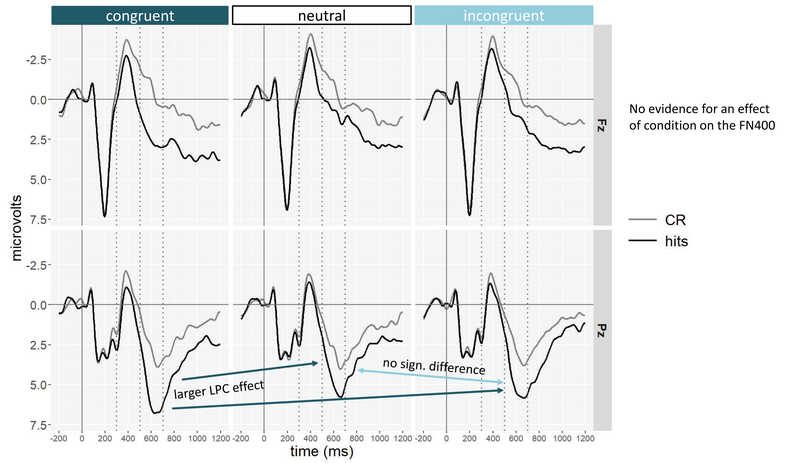
REMEMBER/KNOW (EXP 2)



Error bars denote the standard error of the mean.

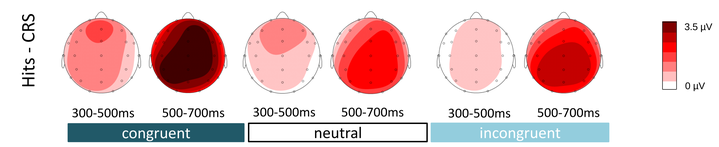
ERPs

RETRIEVAL ERPs
(across both experiments)



No evidence for an effect of condition on the FN400

TOPOGRAPHICAL MAPS



DISCUSSION

- Schema congruency and incongruency improved item memory, but schema congruency did so to a greater extent. This extends previous demonstrations of the U-shaped relationship between in-/congruency and associative memory performance[3,4].
- Behavioral and ERP measures suggest that schema congruency enhances memory by boosting recollection, maybe through deeper semantic processing.
- Behavioral familiarity estimates but not ERP measures suggest also a role of familiarity for congruent items, in line with direct cortical integration of schema-congruent information[1,2].
- Behavioral estimates suggest that better memory for incongruent information is associated with an increase in recollection, in line with a PE triggering hippocampal processing[1,3,4].
- However, ERPs do not support this view. Moreover, we also found more know responses for incongruent items than for neutral items. Increased semantic processing demands during learning might be associated with a boost in familiarity[6].

REFERENCES

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CONTACT & POSTER

E-Mail: regine.bader@mx.uni-saarland.de