Binding of Task-Irrelevant Contextual Dimensions in Language Switching

Elena BENINI[1], Iring KOCH[1], Susanne MAYR[2], & Andrea M. PHILIPP[1]

[1]RWTH Aachen University, Germany; [2]University of Passau, Germany

@ElenaBenini3

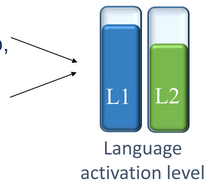
elena.benini@psych.rwth-aachen.de

poster https://github.com/ele-ben/psychonomic

Theoretical Background

The number of bi- or multilingual people is increasing. In multilinguals, the competing language is activated also when non-necessary (e.g., Spivey & Marian, 1999). Languages activation depends on:

- **Language control processes** e.g., inhibition (Declerk & Philipp, 2015).
- Short-term **language-context binding** (Frings et al., 2020; Hommel, 1998)

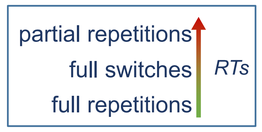


Definition: "context" = an irrelevant stimulus dimension.

Research question: Is **the context** bound with the language and the response in each trial in a multilingual setting?

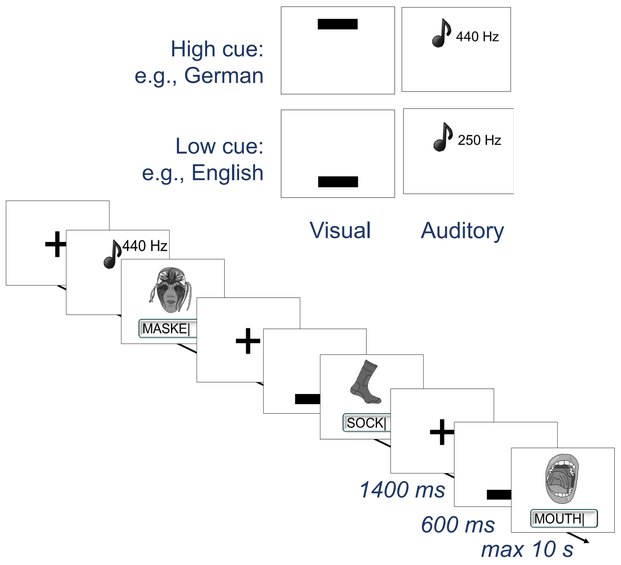
Empirical prediction: Repeating the context in subsequent trials augments language repetition benefits compared to switching it. The repeating context retrieves the previous language, thus facilitating language repetitions and impairing language switches.

Modulation of language repetition benefits by a repeating context is a marker for feature bindings.



The Language Switching Paradigm

Language switching paradigm (Meuter & Allport, 1999) with unpredictable languages sequence. The **cue** indicates the language in each trial. The **context** was the irrelevant cue modality (visual vs. auditory).

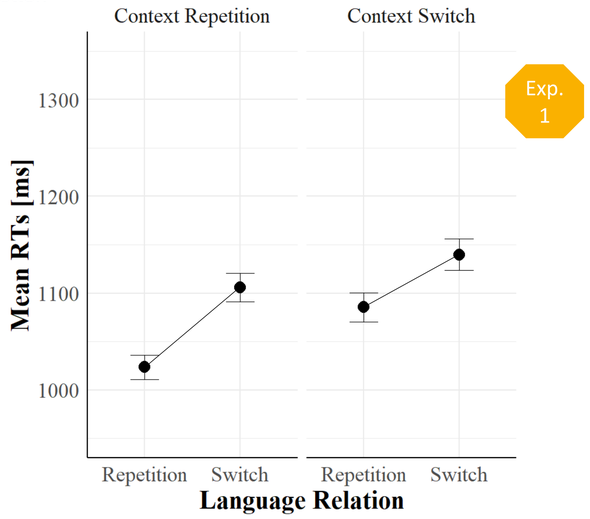


The language could repeat or switch in each trial.
Orthogonally, the context could repeat or switch in each trial. The target never repeated.
Participants typed the response.

Experiments 1 and 2

48+48 German native speakers, fluent in English, via Prolific.

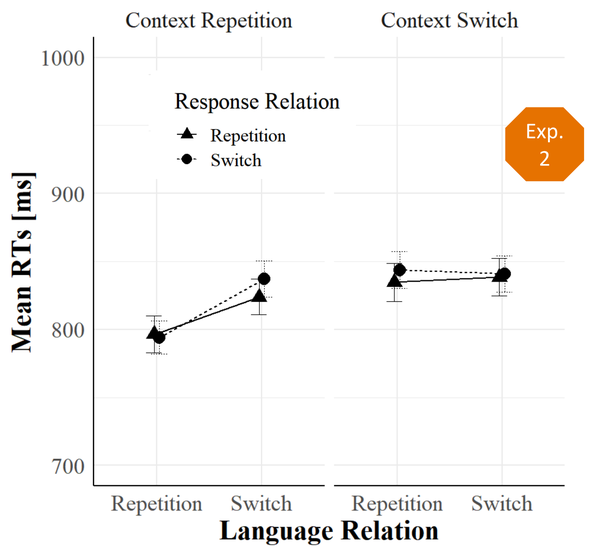
We analysed keypress reaction times (RTs) for the first letter.



Main Result: Language repetition benefits were smaller when context switched, $F(1, 47) = 7.76$, $p = .008$, $\eta_p^2 = 0.14$.

In Experiment 2, the first letter to type was always M or S so that the first keypress also switched or repeated orthogonally to language and context.

Allowed to investigate whether the **response** was also bound.

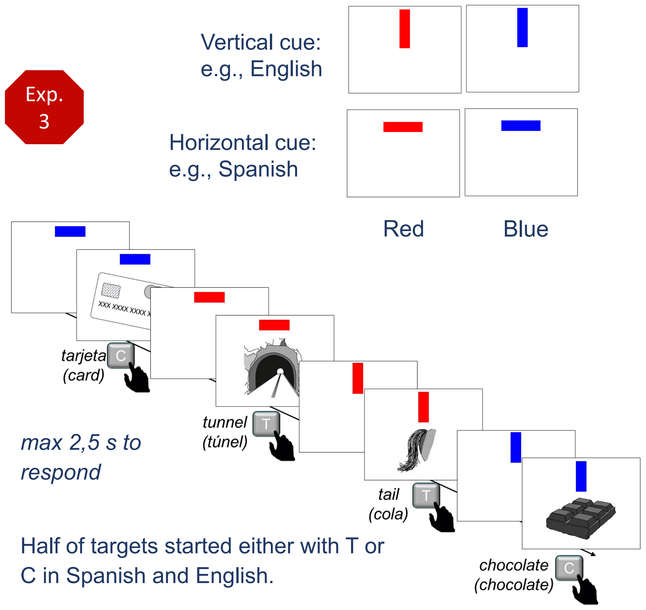


Main Results: Again language repetition benefits were smaller when context switched, $F(1, 47) = 25.25$, $p < .001$, $\eta_p^2 = 0.35$, but not especially in response repetitions → no full repetition benefits. Only the first letter repeated in response repetitions (e.g., **M**ASK and **M**OUTH). Maybe the response was bound and retrieved, but retrieving "mask" was not beneficial to type "mouth".

Experiment 3

We ensured the response repeated *exactly* in response repetitions, as participants' task was to **press the first letter of the target word**. The **context** was the irrelevant cue colour.

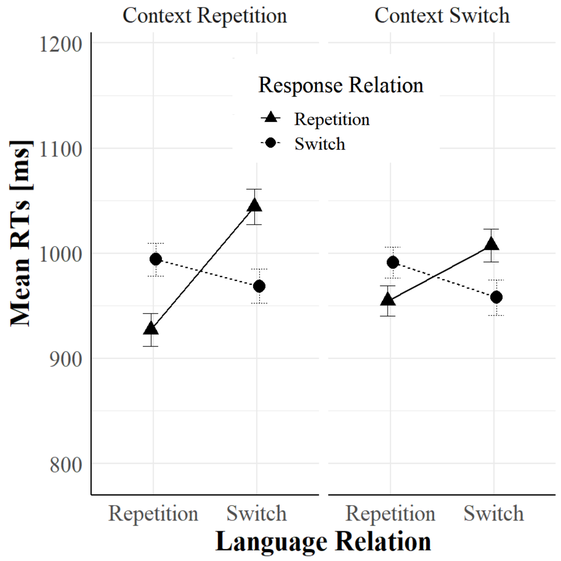
Exp. 3



Half of targets started either with T or C in Spanish and English.

Half started with T in Spanish and C in English or vice versa.

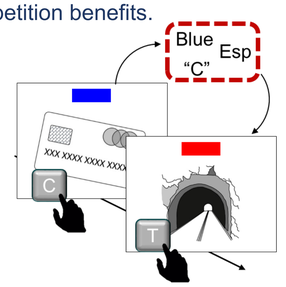
49 Spanish native speakers, fluent in English, via Prolific.



Main Results: Again, language repetition benefits were smaller when context switched, particularly in response repetitions, $F(1, 48) = 14.61$, $p < .001$, $\eta_p^2 = 0.23$. In L2 trials, significant three-way interaction of context relation, language relation and response relation, $F(1, 48) = 17.65$, $p < .001$, $\eta_p^2 = 0.27$.

Discussion

- First study to investigate context-language binding.
- Smaller language repetition benefits when the irrelevant context switched (Exp. 1 and 2) and even more so when the response also switched (Exp. 3) → may indicate that an irrelevant cue dimension can become bound with the language (all Exp.) and the response (Exp. 3) in each trial.
- Response-repetition benefits only found when a response repetition implied giving the same response (Exp. 3) and not when only the first keypress was the same (Exp. 2) → In Exp. 2, a repeating context might retrieve the previous response, but because this was different this was not beneficial, and we found no response repetition benefits.



- Results pattern in Exp. 3 resembles patterns observed in task-switching studies including an irrelevant context (Benini et al., 2022; Koch et al., 2018). Did Exp. 3 involve processes that overlap with task-switching processes since participants were *not* forced to *name* the pictures? However, it employs one task and is linguistic in nature.
- The presented results of Exp. 1 and 2 hold when considering whole-word RTs instead of first keypresses RTs.

Short term features binding including an irrelevant context can impact language switching performance

Literature Selection

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