

# Context-specific Control: Retrieval or Reset?



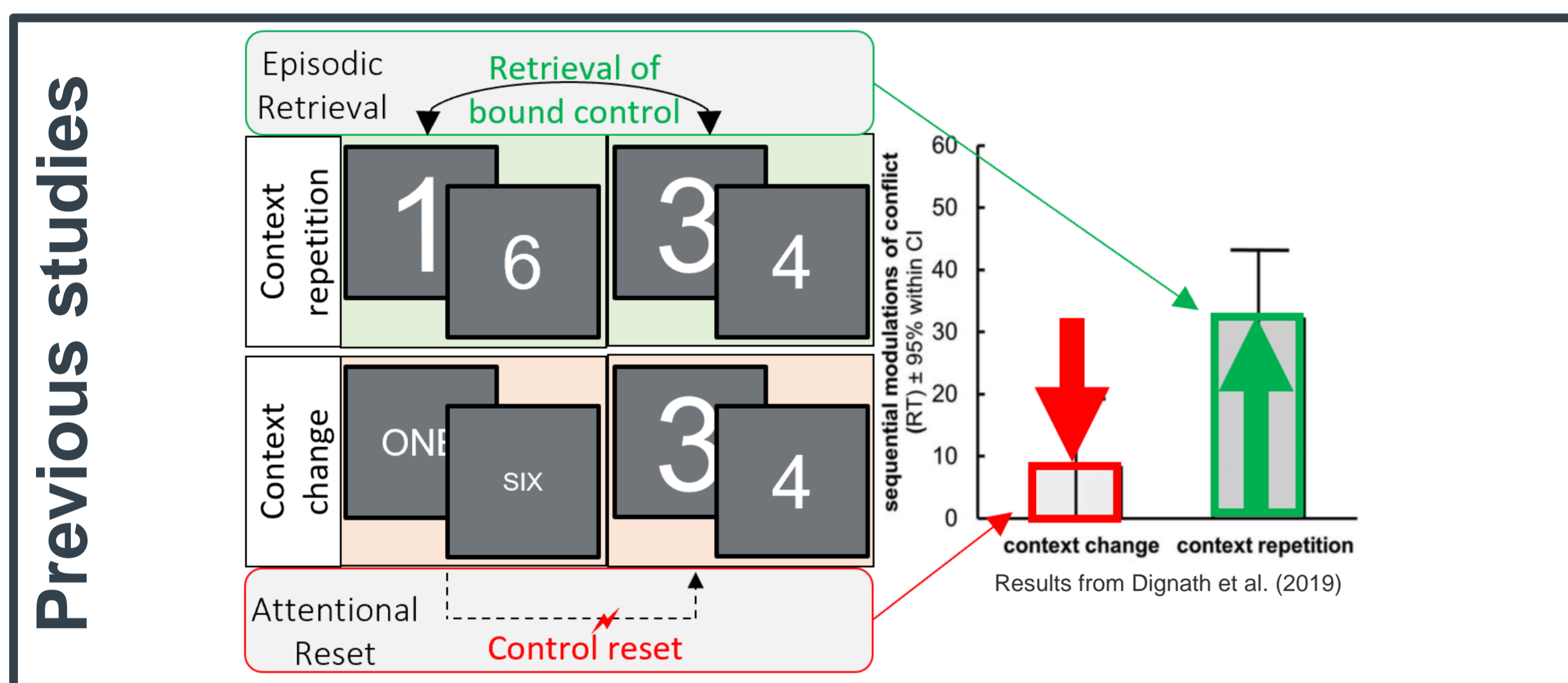
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## Research Question

Mounting evidence indicates that trial-by-trial cognitive control adaptations are reduced or disappear when the context changes (e.g., Spapé & Hommel, 2008; Dignath et al., 2019). There are two explanations for this context-specificity of control states:

**Episodic retrieval account:** Control states become bound to the context in episodic memory and are retrieved upon context repetitions

**Attentional reset account:** Contextual changes disrupt the maintenance of control processes



In three experiments, we contrasted these competing accounts.

## Methods and Hypothesis

We employed a prime-probe task in which number stimuli could be displayed in one of three formats serving as context (digit, word, dice). We manipulated trial order so that control-inducing (N-2) and control-probing (N) trials were interspersed by a trial presented in a different context (N-1), allowing us to derive distinct predictions:

**Episodic retrieval account:** N-2→N control adaptation effects should be larger if the control-inducing and the control-probing trials were displayed in the same context (N-2→N context repetition) than if the context changes (N-2→N context change)

**Attentional reset account:** No influence of N-2→N context transition on N-2→N control adaptation effects.

Changes across experiments: Experiments 2 and 3 controlled response conflict in the N-1 trial, and experiment 3 controlled for across-trial response hand transitions.

## Analysis and Results

RTs were analyzed using Bayesian generalized linear mixed models. RT distributions were modeled as shifted log-normal distribution.

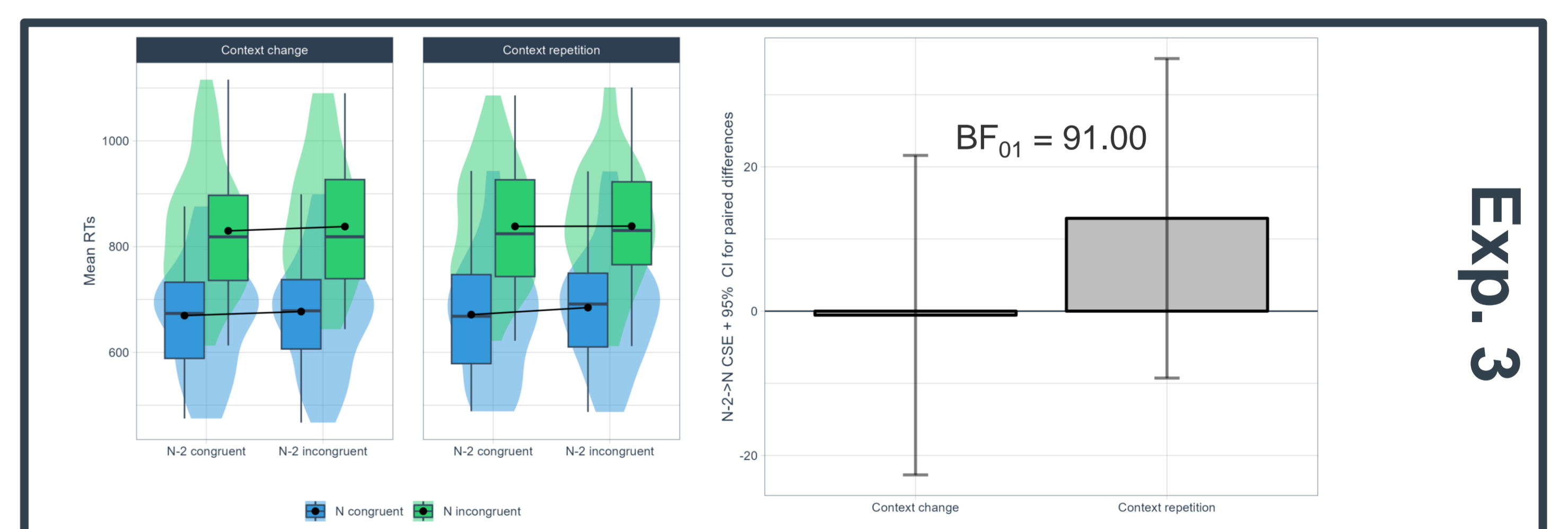
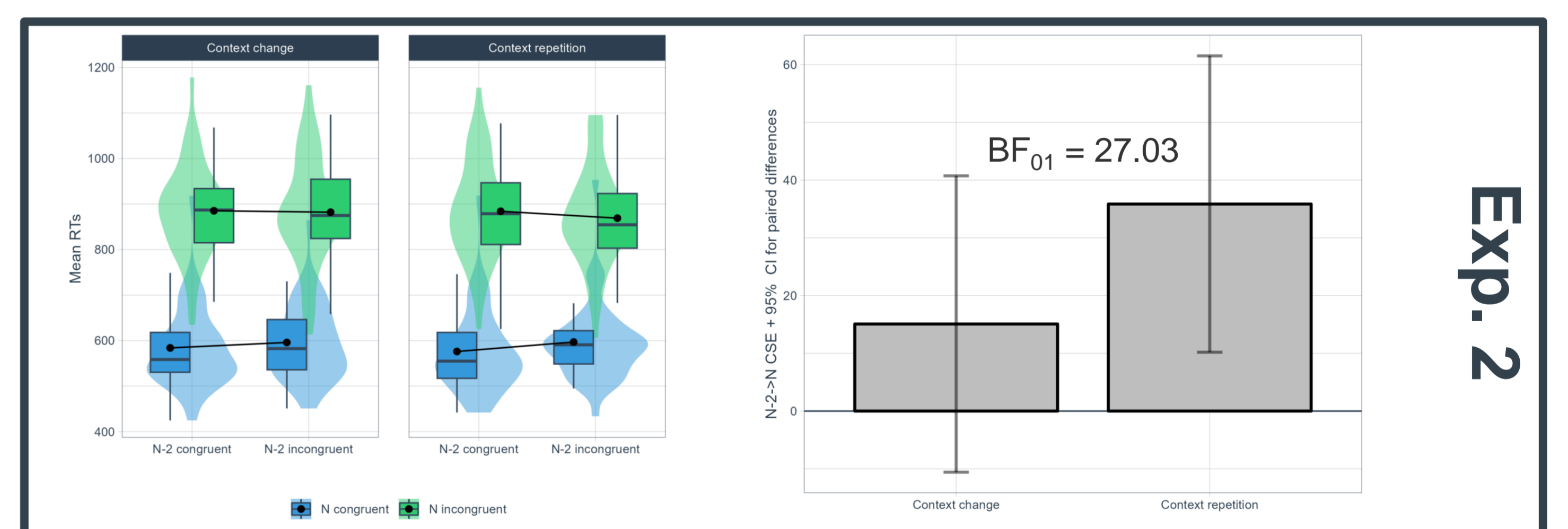
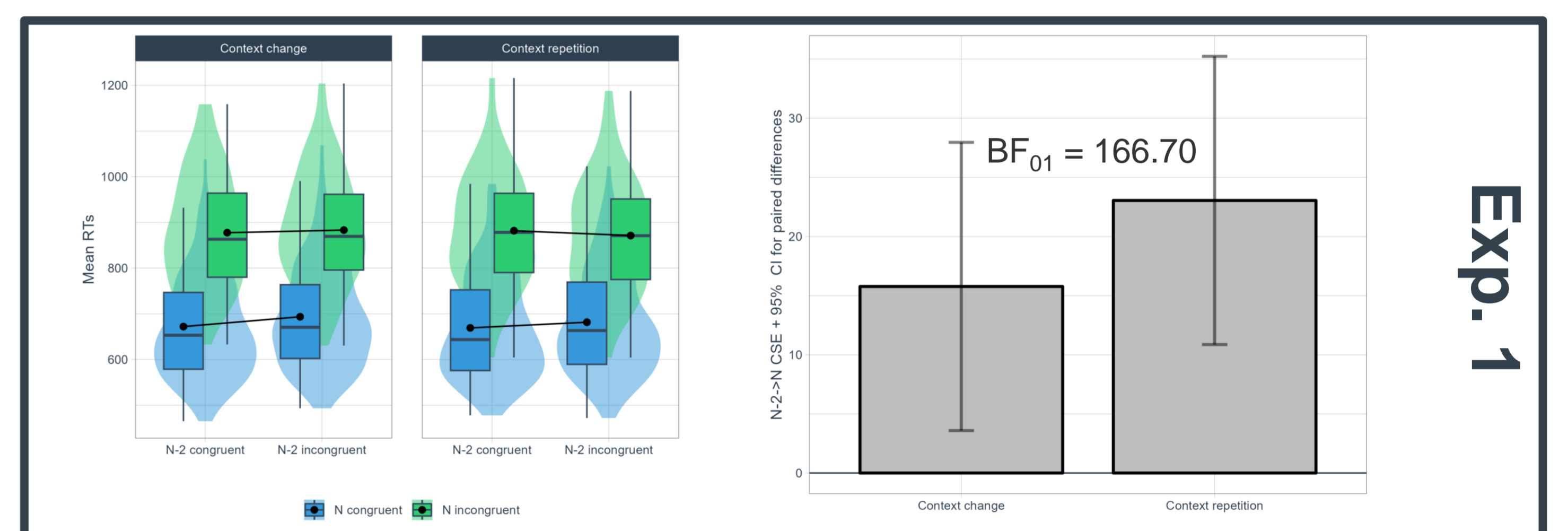
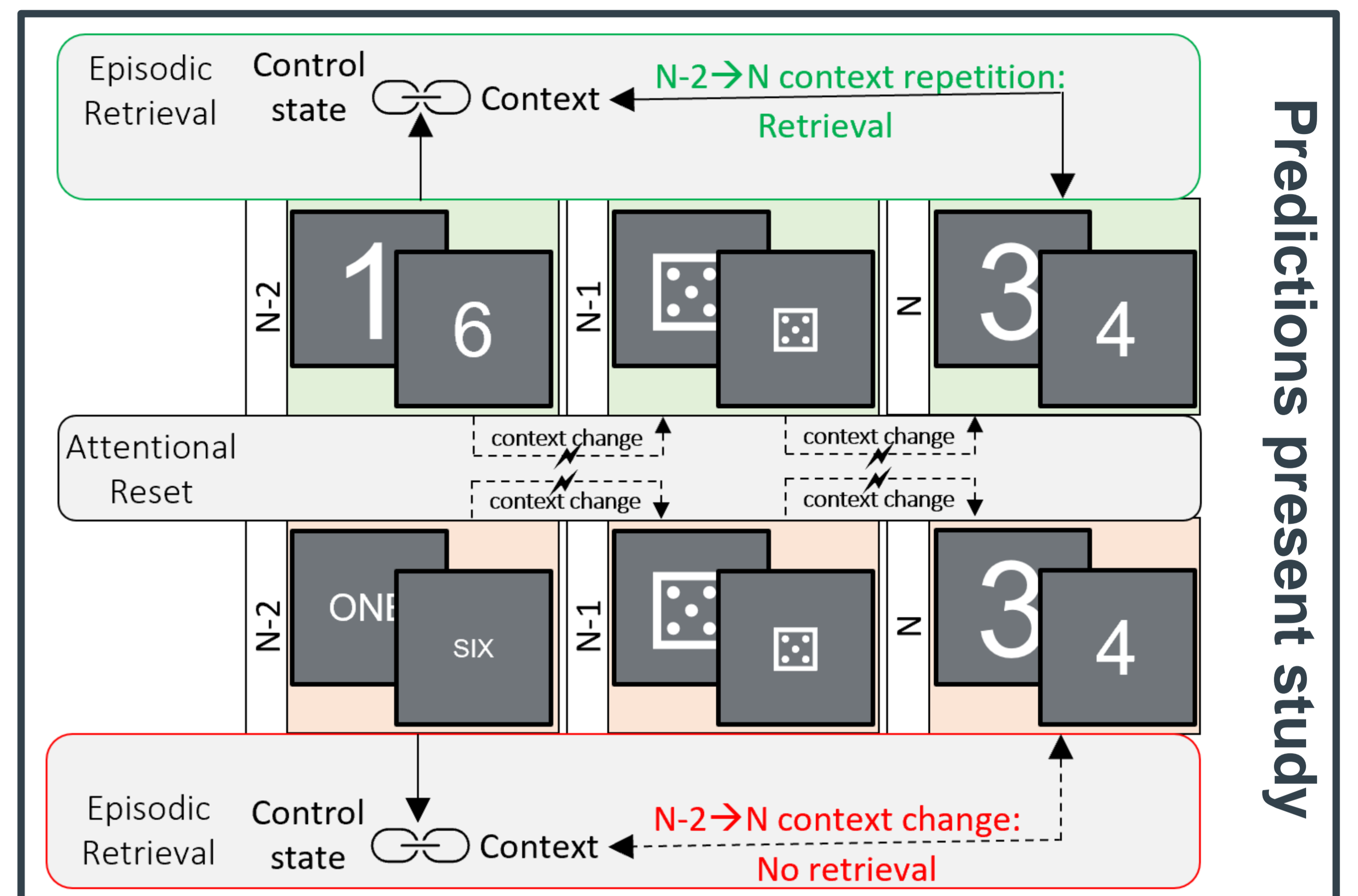
Fixed effects:

$Congruency_N \times Congruency_{N-2} \times Context\ transition_{N-2 \rightarrow N}$  (x  $congruency_{N-1}$ )<sub>only exp. 1</sub>

Random effects:

Participant intercept and by-participant random slopes for all fixed effects and their interactions.

	Exp. 1	Exp. 2	Exp. 3
$Congruency_N$	$BF_{10} = 7.9 \times 10^{15}$	$BF_{10} = 7.5 \times 10^{31}$	$BF_{10} = 1.3 \times 10^{17}$
$Congruency_N \times Congruency_{N-2}$	$BF_{10} = 8.0 \times 10^6$	$BF_{10} = 12.30$	$BF_{01} = 15.60$
$Congruency_N \times Congruency_{N-2} \times N-2 \rightarrow N$ context transition	$BF_{01} = 166.70$	$BF_{01} = 27.03$	$BF_{01} = 91.00$



## Discussion

Across three experiments, Bayesian analysis yielded decisive evidence contradicting the episodic retrieval account, indicating that changes in contexts disrupt maintained control states. Importantly, this effect persisted even after accounting for influences of response conflict in the N-1 trial and trial-to-trial hand transitions. Future research should focus on exploring the mechanisms underlying attentional reset. Interestingly, even though the present study provides compelling evidence against episodic retrieval, previous research on binding may offer valuable insights into how control is embedded in contexts.

## Literature & Digital Copy

Dignath, D., Johannsen, L., Hommel, B., & Kiesel, A. (2019). Reconciling cognitive-control and episodic-retrieval accounts of sequential conflict modulation: Binding of control-states into event-files. *Journal of Experimental Psychology: Human Perception and Performance*, 45(9), 1265–1270. <https://doi.org/10.1037/xhp0000673>  
Spapé, M. M., & Hommel, B. (2008). He said, she said: Episodic retrieval induces conflict adaptation in an auditory Stroop task. *Psychonomic Bulletin & Review*, 15(6), 1117–1121. <https://doi.org/10.3758/PBR.15.6.1117>



schivo.github.io/taik