



Revisiting the Mental Representation of Object Properties and State Change in Situation Models



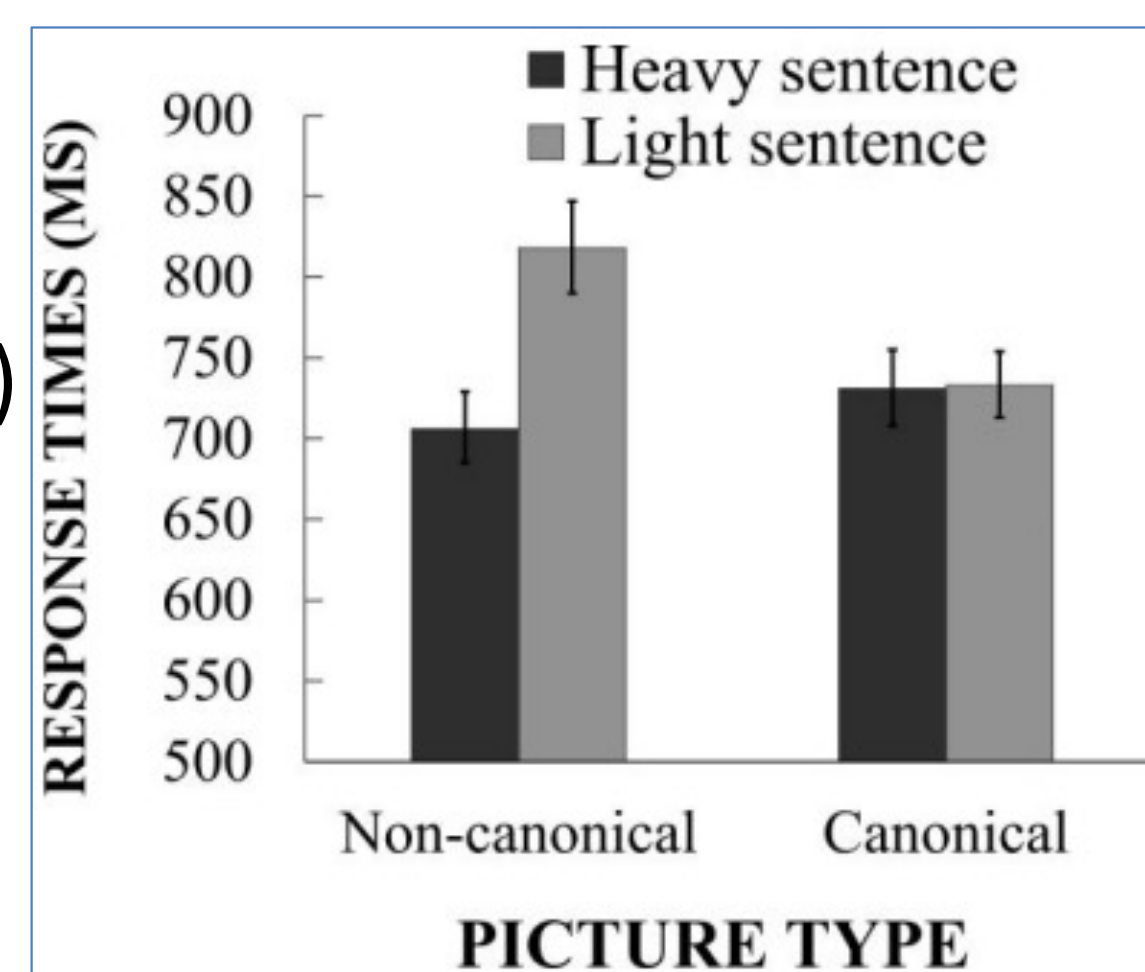
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Introduction

Situation Models and State Change

- During **language comprehension**, humans construct “**situation models**” (van Dijk & Kintsch, 1983) to track events, integrating new information and global knowledge with the current representation on common dimensions (causation, objects, space, etc.).
- Prior work shows many physical object properties (ex. shape, orientation) are mentally represented during on-line sentence comprehension.
- **Nonvisual object properties** and the **mental representation of object state change** have received less attention.
- Horchak & Garrido (2021) found that **implied object weight** is represented during the comprehension of state change events (e.g., a ball being dropped on a tomato), such that the **initial** (e.g., intact tomato) **and final object states** (e.g., smashed tomato) **compete** in the mental model.



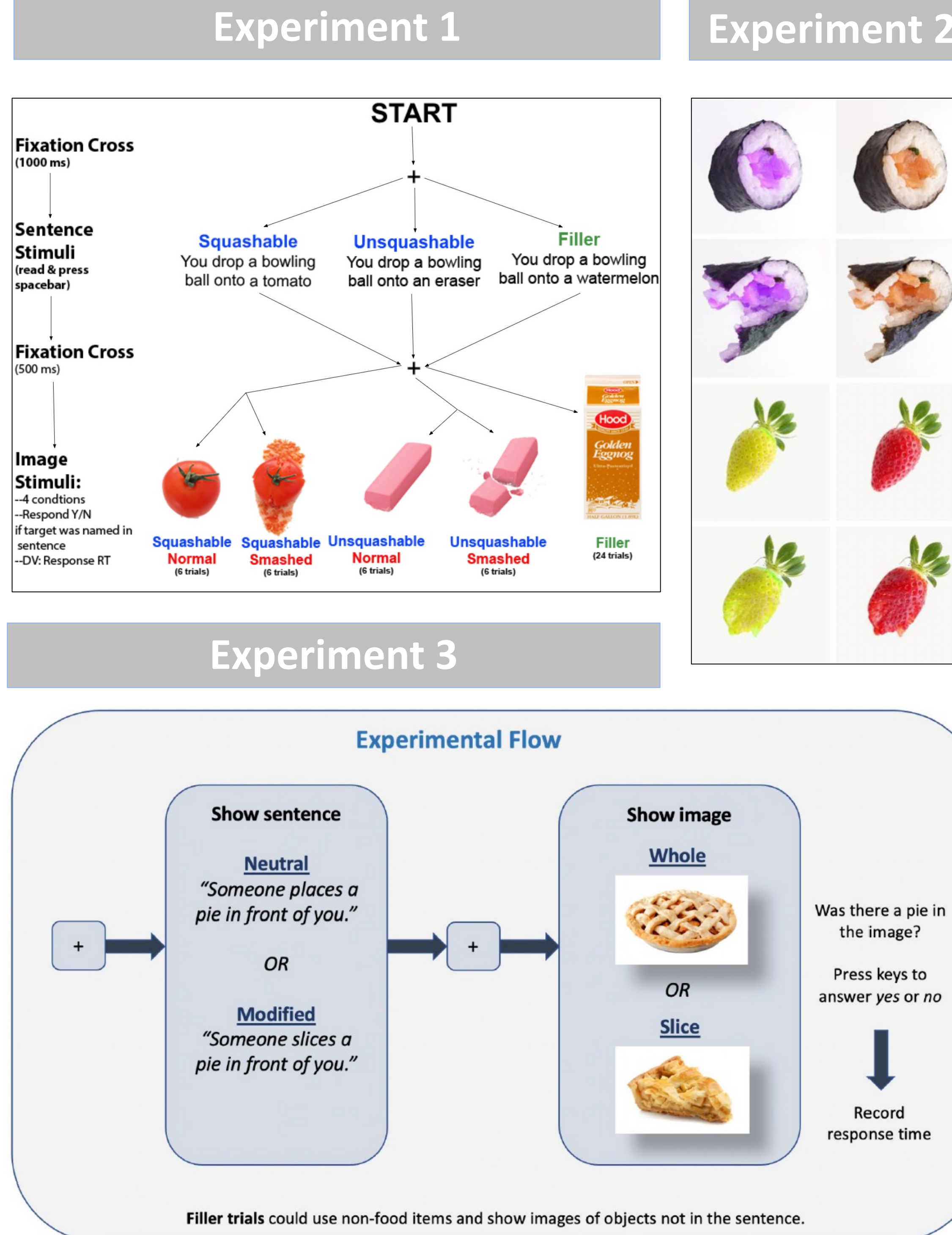
The Current Study

- We attempted to replicate the above study.
- We also designed **three extensions** to examine how the following affect response times (RTs) on a sentence-picture verification task:
 - another type of state change: **slicing**
 - other properties: **squashability, color**

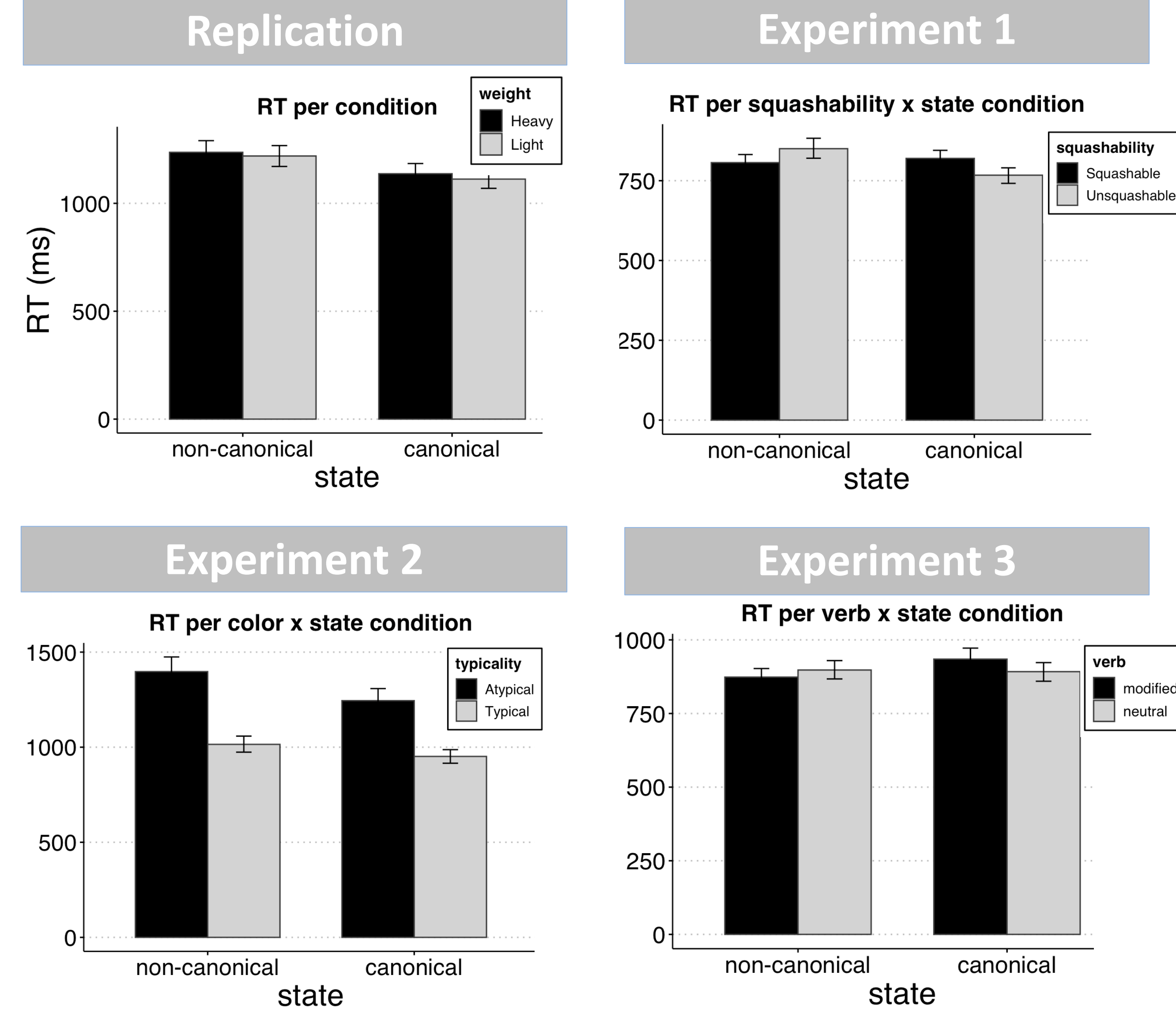
Design

- 2 x 2 within-subjects design (4 experiments)
- **IV'S:** _____ x target state (smashed, intact)
 - Replication:** weight (heavy, light)
 - Exp1:** squashability (squashable, unsquashable)
 - Exp2:** color typicality (typical, atypical)
 - Exp3:** verb (places, slices)
- **DV:** reaction time (ms)

Procedure and Stimuli



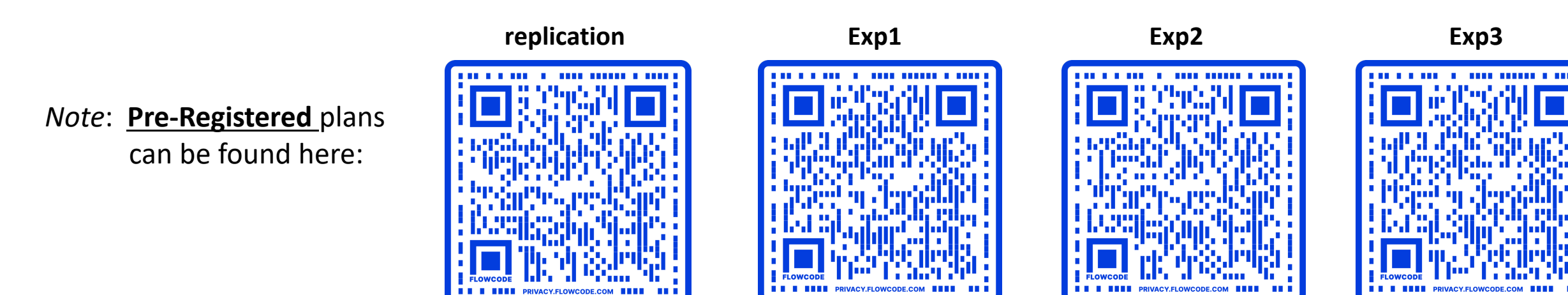
Results



Replication: No interaction ($p > 0.57$), no main effects
Exp1: Marginal interaction ($p = .07$). *Partially matches* Horchak & Garrido (2021).
Exp2: Main effect of typicality ($p < .001$) and state ($p < .05$). No interaction.
Exp 3: Significant interaction ($p < 0.01$). Replicates original pattern.

Key Findings

We failed to directly replicate the interaction found by Horchak and Garrido for object weight. However, a sentence-picture interaction was found, when state change was caused by slicing instead of dropping and when the squashability of the target object was manipulated instead of the weight of the object being dropped. These findings suggest that the representations of object state changes during language comprehension may critically depend on the type of change and the perceptual property.



References

Horchak, O. V., & Garrido, M. V. (2021). Dropping bowling balls on tomatoes: Representations of object state-changes during sentence processing. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 47(5), 838–857.
 Van Dijk, T. A., & Kintsch, W. (1983). *Strategies of discourse comprehension*. Academic Press.