

On the role of retrieval processes in the survival processing effect: Evidence from ROC and ERP analyses

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Introduction

Survival Processing Effect

- Encoding words in the context of an imagined survival scenario enhances memory, but only when words are high in imageability.
- This interaction may reflect that the survival processing effect is due to richer elaborative encoding.

Retrieval Mode

- Dual process theories maintain that there are two distinct processes that can contribute to recognition memory retrieval: familiarity and recollection. Recollection is sensitive to elaboration at encoding.

Hypothesis

- If the survival processing effect is the result of increased elaboration at encoding, then it should be associated with increased recollection of high-imageability words at retrieval.

Methods

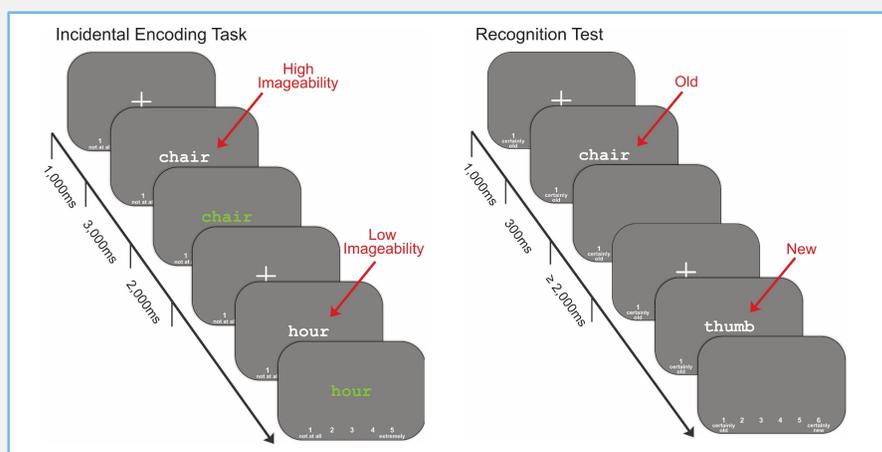
Design

- 36 participants: 18 in survival group and 18 in moving group
- 2 x 2 (Scenario x Word Imageability) mixed factor design

Procedure

1. Participants imagined one of two scenarios:
 - (1) survival scenario or (2) moving scenario
2. *Incidental encoding task*: rate relevance of words to scenario.
3. *Recognition test*: rate words as “old” or “new” along confidence scale.

Trial Structure



Behavioral Analysis

- Memory performance: Pr scores (hits – false alarms)
- ROC curve estimates of familiarity (d') and recollection (R_o)

Event Related Potential (ERP) Analysis

- *ERP Old/New effects*: ERPs that distinguish between “old” (previously encoded) and “new” items during recognition.
 1. Early (300-500ms) frontal correlate of familiarity
 2. Late (500-700ms) centro-parietal correlate of recollection

Results

Figure 1. Behavioral Results

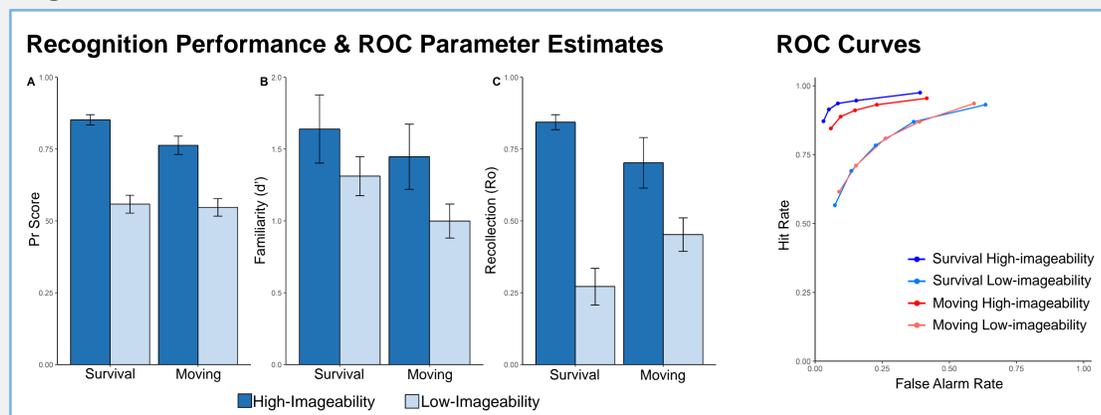
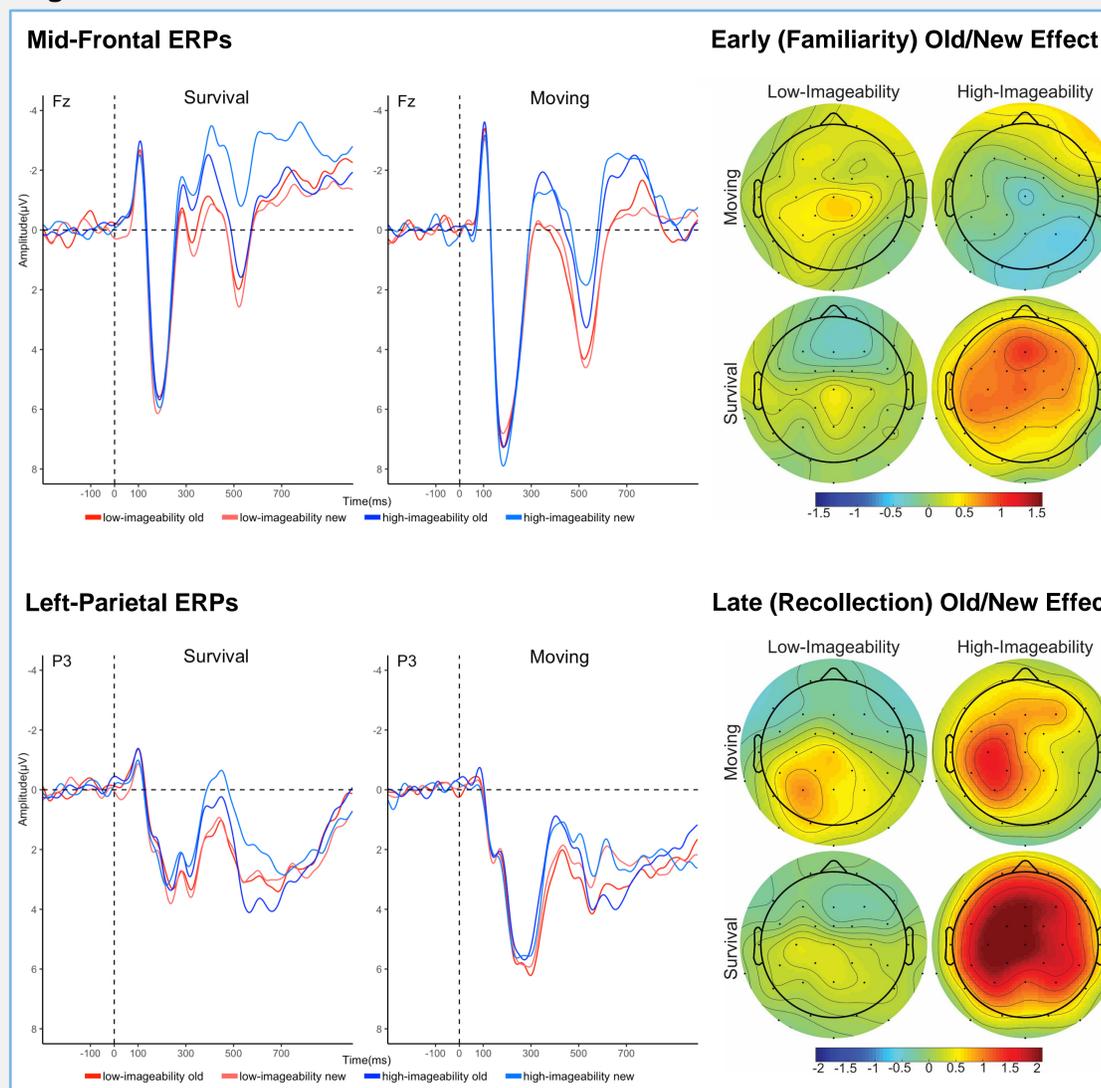


Figure 2. Event Related Potential Results



Statistical Analysis

- Mixed factor ANOVAs and follow up t-tests
- All listed results are significant at $p < .05$.

Recognition Performance

- Recognition performance was better in the survival group than the moving group for high-imageability words.
- Recognition performance was better for high-imageability words than low-imageability words in general.

Retrieval Mode: Behavioral Measures

- Survival group: *greater* recollection for high-imageability words and *reduced* recollection for low-imageability words compared to moving group.

- High-imageability words: greater familiarity than low-imageability words.

Retrieval Mode: ERP Measures

- Survival group: stronger magnitude and wider spatial distribution of old/new effects for high-imageability words during both the familiarity and recollection time windows.
- Words high, but not low, in imageability were associated with an early (familiarity) old/new effect.
- Low-imageability words lead to late (recollection) old/new effects only in the moving group.

Discussion

- Survival Processing increased recollection of high-imageability words.
 - Survival processing increases elaboration at encoding.
- Survival processing increased ERP familiarity signal, but not behavioral familiarity estimate.
 - Survival processing also increases familiarity, but recollection is used to make recognition judgements.
- Extended scalp distribution for familiarity and recollection.
 - Survival processing may recruit a wider network of brain areas during encoding and retrieval.