

# The Effect of Survival Processing on Event Related Potentials during Word Encoding

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## Introduction

### Survival Processing Effect

- Enhanced memory for words encoded in an imagined survival scenario [1].
- The effect is modulated by the imageability of the words.
- Hypothesis: The survival context promotes richer elaboration of high imageability words during encoding [2].

### ERP Subsequent Memory Effects (SMEs)

- Encoding ERP activity that distinguishes between subsequently remembered and subsequently forgotten words [3].
- Parietal SME: elicited by unexpected or salient stimuli; reflects early, item-specific encoding
- Frontal slow wave SME: related to working memory; reflects elaborative/associative encoding

## 1) How do encoding mechanisms differ between survival and control scenarios and between words low vs. high in imageability?

- Examine ERP activity during encoding

## 2) Does the survival processing effect reflect increased elaboration during memory encoding?

- If so, then the frontal slow wave SME should be more pronounced when words are encoded in the context of a survival scenario.

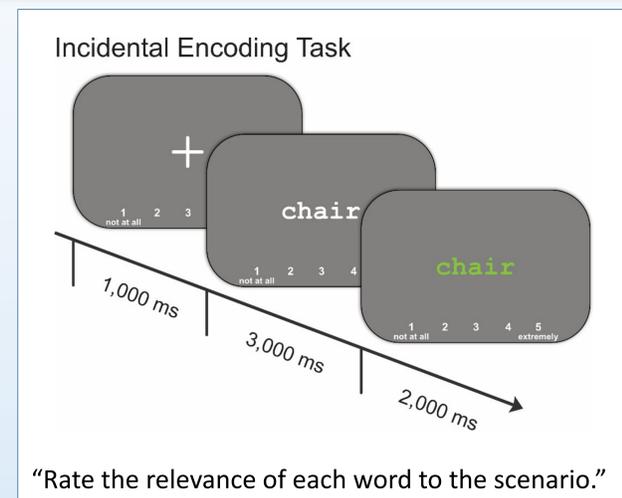
## Methods

### Experiment 1

- 36 participants: 18 survival and 18 control
- Mixed high and low imageability words
- Incidental encoding: rate relevance of word
- Recognition
- Encoding ERP main effects

### Experiment 2

- 52 (of 102 total) participants: 27 survival and 25 moving
- High imageability words
- Incidental encoding: rate relevance of word
- Free recall
- Encoding ERP subsequent memory effects



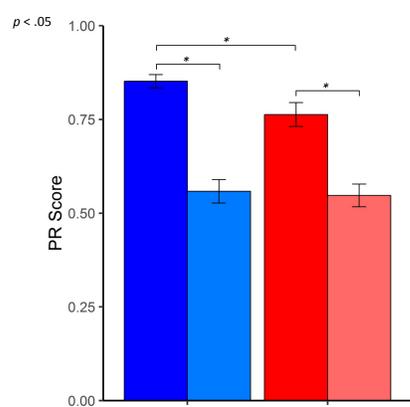
**Survival Scenario:** “...imagine that you are stranded in the grasslands of a foreign land, without any basic survival materials. Over the next few months, you’ll need to find steady supplies of food and water and protect yourself from predators...”

**Moving (Control) Scenario:** “... imagine you are planning to move to a new home in a foreign land. Over the next few months, you’ll need to locate and purchase a new home and transport your belongings...”

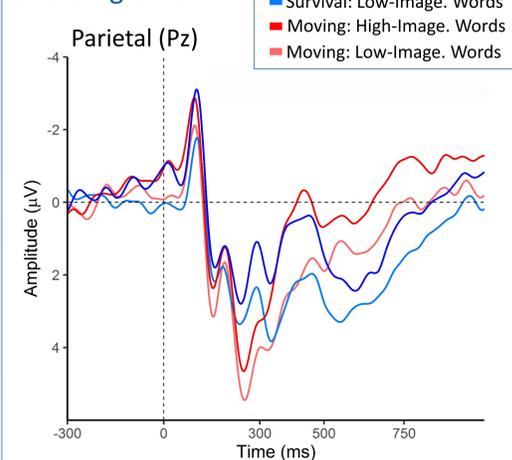
## Results

### Experiment 1

#### Recognition Memory Performance

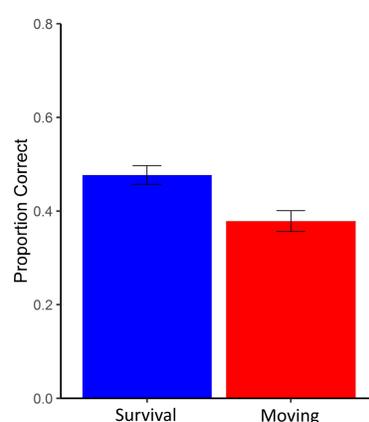


#### Encoding ERPs



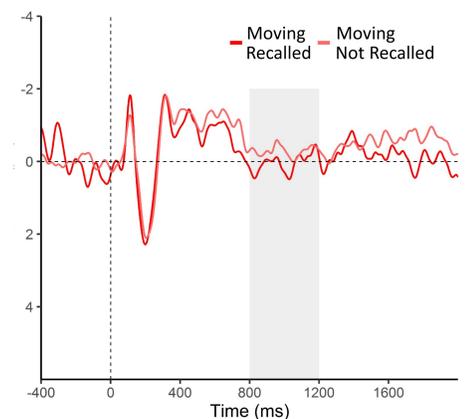
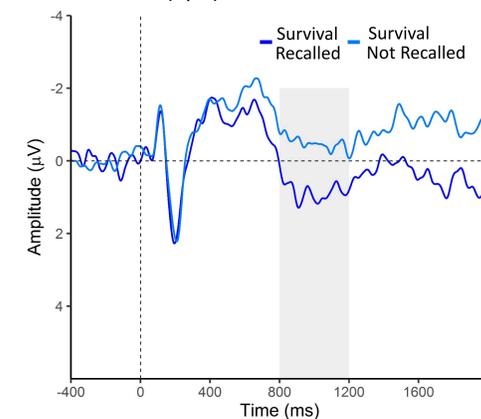
### Experiment 2 – Preliminary Results

#### Recall Memory Performance

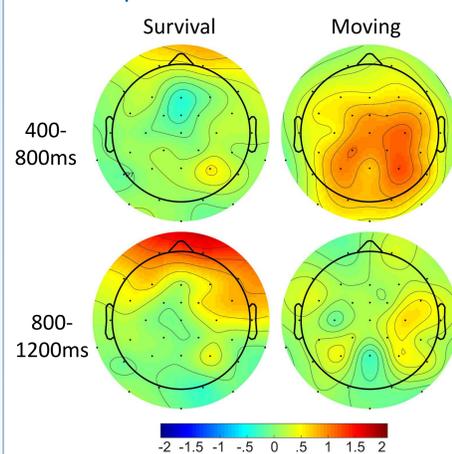


#### ERP Subsequent Memory Effects

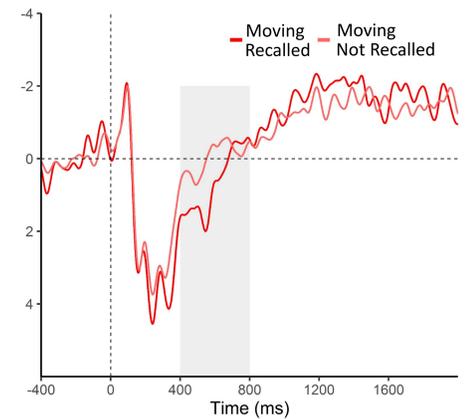
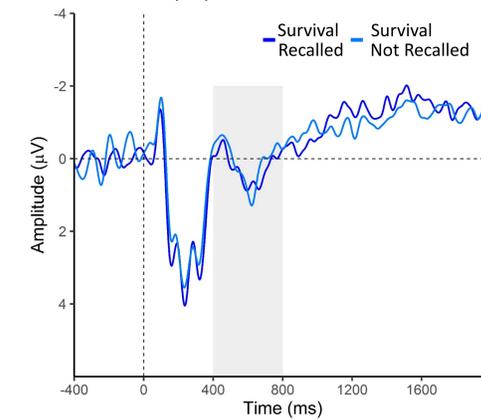
##### Frontal (Fp2)



#### SME Scalp Distributions



##### Parietal (Pz)



## Discussion

### Experiment 1

- The survival condition tended to elicit an increased P300 for both word types.
- This finding could suggest that the words are processed more deeply in the survival condition, thus improving recognition memory. However, it is now known whether the amplitude of the P300 distinguished between subsequently recognized and unrecognized words.

### Experiment 2

- In the survival condition, subsequent memory was associated with a (pre)frontal slow wave during encoding.
- In the moving condition, subsequent memory was associated with a centro-parietal positivity during encoding.
- This finding suggests that survival processing increases elaboration during encoding, resulting in improved memory recall.

## References

- [1] Nairne, J. S., Thompson, S. R., & Pandeirada, J. N. (2007). Adaptive memory: Survival processing enhances retention. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 33(2), 263.
- [2] Kroneisen, M., & Erdfelder, E. (2011). On the plasticity of the survival processing effect. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 37(6), 1553–1562.
- [3] Wagner, A. D., Koutstaal, W., & Schacter, D. L. (1999). When encoding yields remembering: insights from event-related neuroimaging. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*, 354(1387), 1307-1324.