

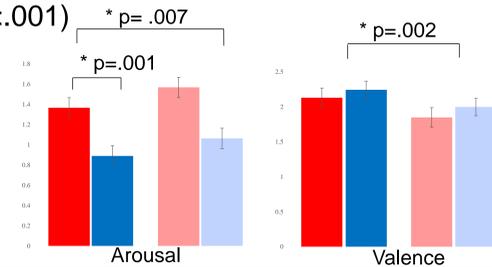
## Highlights

How does ironic and literal language affect the perceived mental state of a speaker in high or low emotional situations?

- **Behavioral study:** speakers using irony are perceived as being in a less negative mental state (higher in valence and lower in arousal) compared to speakers using literal language
- **ERP study:**
  - P200: main effect: irony > literal
  - N400: interaction: literal > irony in high emotional but not low-emotional context
- **Results** suggest that emotional context affects language comprehension

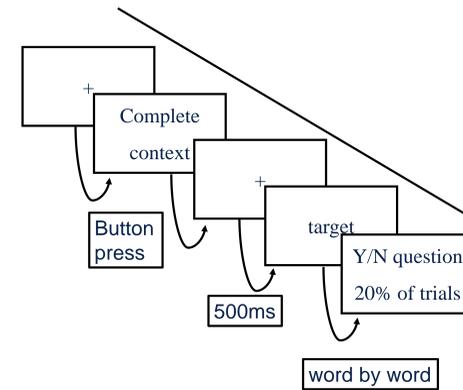
## Experiment 1: Rating study

**Subjects:** 83 native speakers of English  
**Task:** Web-based rating study, judging the emotional state of a protagonist on two dimensions, valence and arousal  
**Results:** RM-MANOVA with valence and arousal as DVs: main effects for literality ( $p < .001$ ) and emotion ( $p < .001$ )

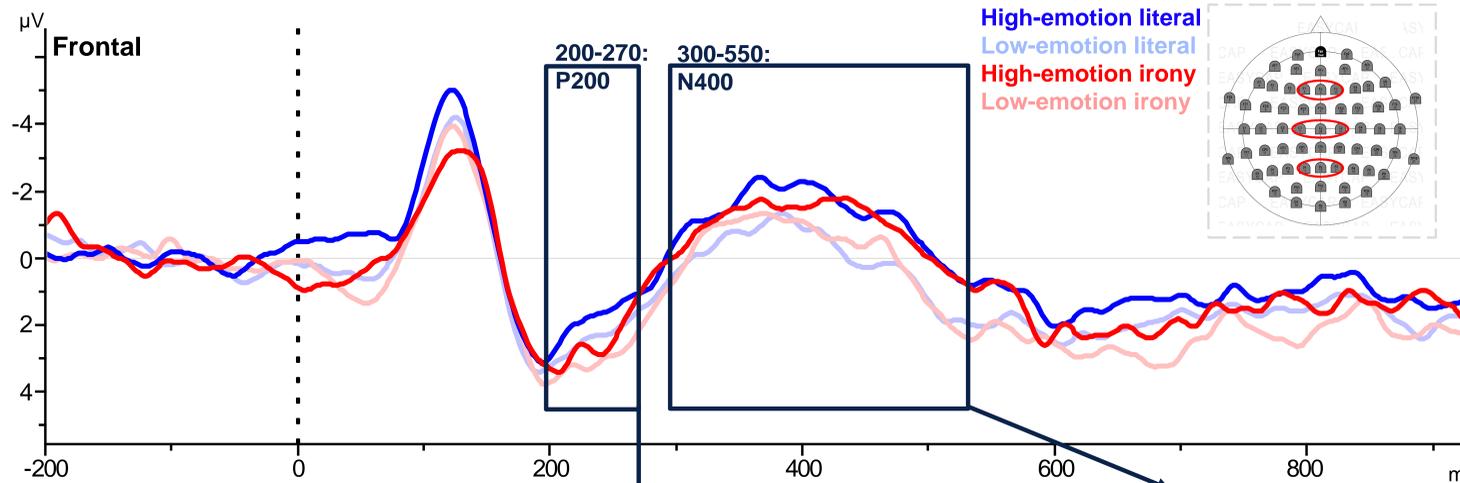


## Experiment 2: EEG

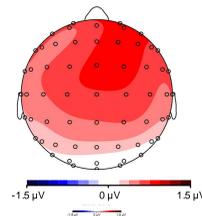
**Subjects:** 24 right handed, healthy native speakers of English  
**Task:** silent reading paradigm, comprehension questions after 20% of trials



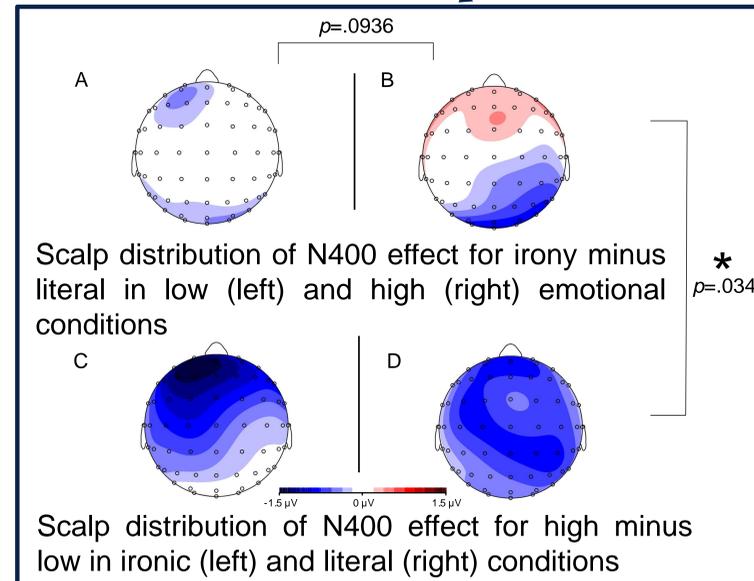
## Results ERPs



**RM-ANOVA:** 2 emotion (high, low) x 2 literality (literal, ironic) x 3 location (frontal, central, parietal)  
**P200 (200-270ms):** main effect of literality ( $p = 0.053$ )  
**N400 (300-550ms):** significant interaction of emotion x literality in frontal sites ( $p = .0439$ ).



Scalp distribution for P200 effect: Irony - Literal



Scalp distribution of N400 effect for high minus low in ironic (left) and literal (right) conditions

## Introduction

Verbal irony is when a speaker uses words that mean the opposite of what the speaker implicates.

**What does this convey about the speaker's mental state?**

- primarily used to convey negative emotions; additional information gained through use must outweigh possible misinterpretations [1]
- perceived as less negative, less hurtful and more amusing than literal statements [2]
- reliably elicits P2-P6 ERP response (e.g. [3])

**Hypothesis:** A speaker using ironic language is perceived as being in a less negative mental state, depending on how emotional the situation is.

## Methods

**Design:** 2x2, emotion (high, low) by literality (literal, ironic)

High literal	Low literal
High irony	Low irony

**Stimuli:** 121 short stories, normed for valence, arousal and literality, all critical words were used for all conditions

<b>High:</b> Max is helping Jenny with her computer when he accidentally spills a glass of water over the open computer. Jenny says:	<b>Literal:</b> How clumsy of you!
<b>Low:</b> Max is helping Jenny with her computer when he accidentally spills a glass of water over the closed computer. Jenny says:	<b>Ironic:</b> How considerate of you!

## Discussion

We provide initial evidence for the relationship between context emotionality and figurative language processing

**Behavioral study:** language choice influences perceived mental state

**P200-timewindow:** ironic statements eliciting a larger positivity than literal statements

- suggests that irony requires more attentional resources
- consistent with previous research showing enhanced P200 for irony compared to literal language [3]

**N400-timewindow:** Literal statements in high emotional conditions elicit the largest N400 effect

- N400 associated with expectancy effects [4]
- Increased N400 suggests literal language may be unexpected in highly emotional situations: might be considered rude?

The **absence of a P600 effect**, found in previous research (e.g. [3]) may be caused by the extended N400-timewindow, and related to the emotional manipulation of the context.

**ERP results suggest how emotional the context is modulates how we perceive ironic versus literal language.**

## Conclusion

- a speaker using ironic language is considered as being in a less negative mental state, may be indicated by a smaller N400 effect for ironic language.
- N400 amplitudes were found to decrease when using reappraisal strategies [5]
- attenuated N400 effects may signalize greater emotional congruity

## References

[1] Roberts, R. M., & Kreuz, R. J. (1994). Why do people use figurative language?. *Psychological science*, 5(3), 159-163.  
 [2] Filik, R., Brightman, E., Gathercole, C., & Leuthold, H. (2017). The emotional impact of verbal irony: Eye-tracking evidence for a two-stage process. *Journal of Memory and Language*, 93, 193-202.  
 [3] Regel, S., Coulson, S., & Gunter, T. C. (2010). The communicative style of a speaker can affect language comprehension? ERP evidence from the comprehension of irony. *Brain research*, 1311, 121-135.  
 [4] Kutas, M., & Hillyard, S. A. (1984). Brain potentials during reading reflect word expectancy and semantic association. *Nature*, 307(5947), 161.  
 [5] Deveney, C. M., & Pizzagalli, D. A. (2008). The cognitive consequences of emotion regulation: an ERP investigation. *Psychophysiology*, 45(3), 435-444.