Lecture 15:
Joke Comprehension

COGS 153

Context & message-level representation

What we've looked into previously:

- Word Recognition lecture: Does context affect the initial choice of a word's meaning?
- Sentence processing lecture: Does context influence the first parse of a syntactic representation? How does context affect syntactic reanalysis?

→ These previous studies look at how context influences processing at *the individual word level*...

- How do words build up to representation at the message-level?
- Can a single word affect the overall interpretation of a message?

How do we construct meaning?

- Meanings vary across contexts
  - Many factors go into how we interpret an utterance, e.g. who the speaker is, who the audience is, what's in the surrounding, and our world knowledge

  → We recruit background knowledge to construct meaning of utterances

Jaimie came bouncing down the stairs.

Paul ran over to kiss her.

vs.

Coulson & Kutas (1998)

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- How do you know what "bouncing" means?
  - You need to use background knowledge based on Paul's actions
  - Meaning construction involves causal & relational information

Coulson & Kutas (1998)

What are ‘frames’?

- Language comprehension involves the ability to dynamically make inferences based on general knowledge...

- **Frames**: representation of general knowledge rules / data structures
  - Can be used to represent a wide variety of events, actions, and objects
  - Slot and Filler structure
  - Include causal and relational information
  - Hierarchically organized (you can embed a frame in a frame)

Coulson & Kutas (1998)

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- Example: A friend is telling you about how they went to the movies this weekend and almost snuck into a second movie.
  - Activate your 'Movie Theatre Frame'!
    - Activating this frame could activate other elements, such as an *Usher, an Usher checking tickets, hallway with multiple screens*, or *buying popcorn*
      - → These are implicit elements that are implied in the story without needing to be specifically referred to... because you've experienced going to the movies before!
      - Your brain fills in the slots
  - Relations between elements of a frame also helps integrate them into constructing an overall meaning of the message
      - e.g., buying a ticket involves the exchange of money (activates a purchasing frame? a goods and services frame?), an Usher's job is to check tickets

Coulson & Kutas (1998)

Humor & the concept of frame-shifting

- Jokes often rely on the subversion of expectations!
- **Frame-shifting**: a conceptual reanalysis to understand a message / reorganization of information into a new frame
  - Rephrase: Jokes are often constructed to suggest one frame, while evoking elements that are consistent with a different frame

I let my accountant do my taxes because it saves time.

Last spring it saved me ten years!

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  - "Disjunctor": *years*
    - Forces reader to go back and reinterpret!
      - Probably much longer than you expected (i.e., 10 hours, 10 days, etc. to do taxes)
      - Oh, tax fraud... "doing time" is a common way to say 'going to prison'
  - "Connector": *time*
    - Connects the two frames (time to complete taxes vs. time = prison)

Coulson & Kutas (1998)

Psychological reality of frame-shifting

- Why study jokes?
  - It can reveal more about the cognitive processes involved in reaching overall interpretation of a message
- How can we study frame-shifting?
  - Are there some sort of processing costs associated with reanalysis?
    - It's not syntactic reanalysis (e.g., different from garden-paths)
    - It's not just a word-level expectancy, it's about the *message-level representation*

Coulson & Kutas (1998)

3 Experiments looking at frame-shifting processing

Tasks: Self-paced reading, Eye-tracking, EEG

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Conditions:

High Constraint Sentence Context

I asked the woman at the party if she remembered me from last year and she said she never forgets a...

- name. (*Straight*)
- **dress**. (*Joke*)

→ 81% of people asked in a norming study completed sentence with FACE

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Low Constraint Sentence Context

My husband took the money we were saving to buy a new car and blew it all at the...

- tables. (*Straight*)
- **movies**. (*Joke*)

→ 18% of people asked in a norming study completed sentence with CASINO

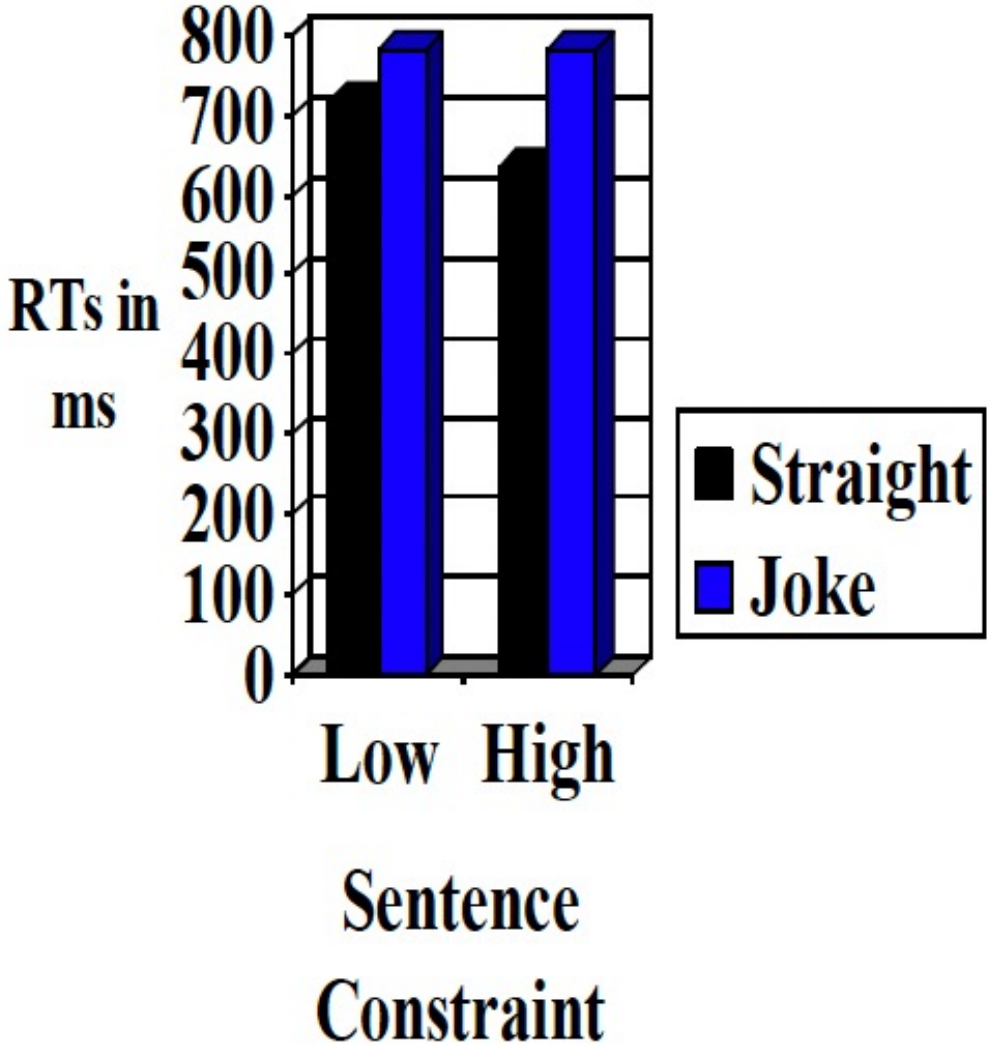
Coulson & Kutas (1998)

Frame-shifting in self-paced reading task

- Manipulated sentence final words
- Compared **reading times** for words that would trigger frame-shifting, with words that were equally unexpected, but were consistent with the frame

Results:

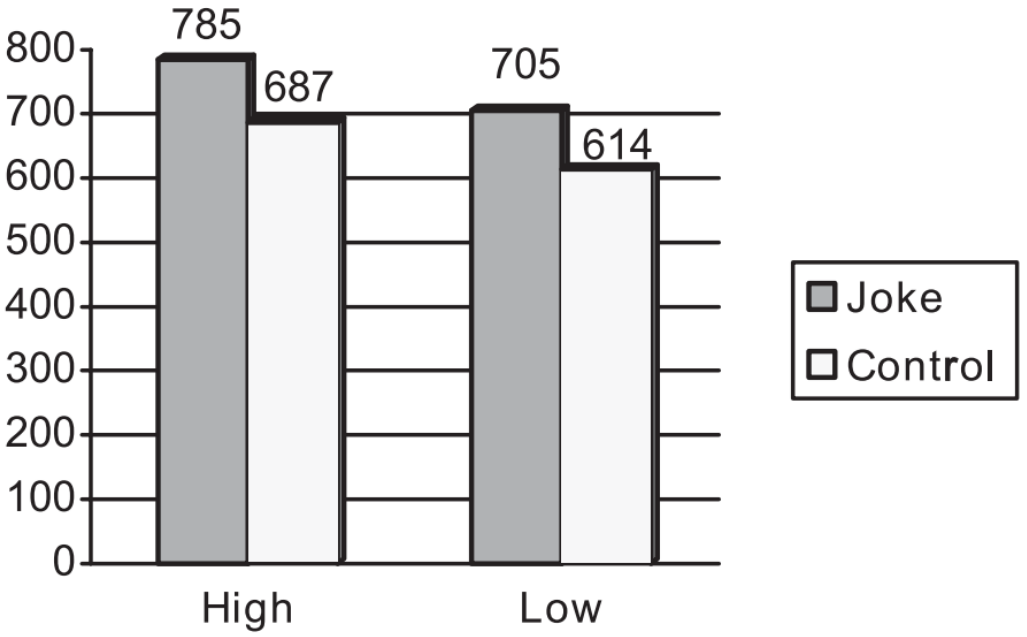
- Participants spent longer reading words that were ‘jokes’ compared to ‘straight’ controls
  - Bigger difference in High Constraint Sentence Condition
  - Suggests frame-shifting



Coulson & Kutas (1998)

What does eye-tracking reveal?

- **Results**:
- No effects on initial gaze duration
- Increased total viewing duration
  - 60ms effect in High Constraint condition
  - Suggests frame-shifting
- Regressive eye movements is a sign that readers revisit aspects of the context in order to understand the joke



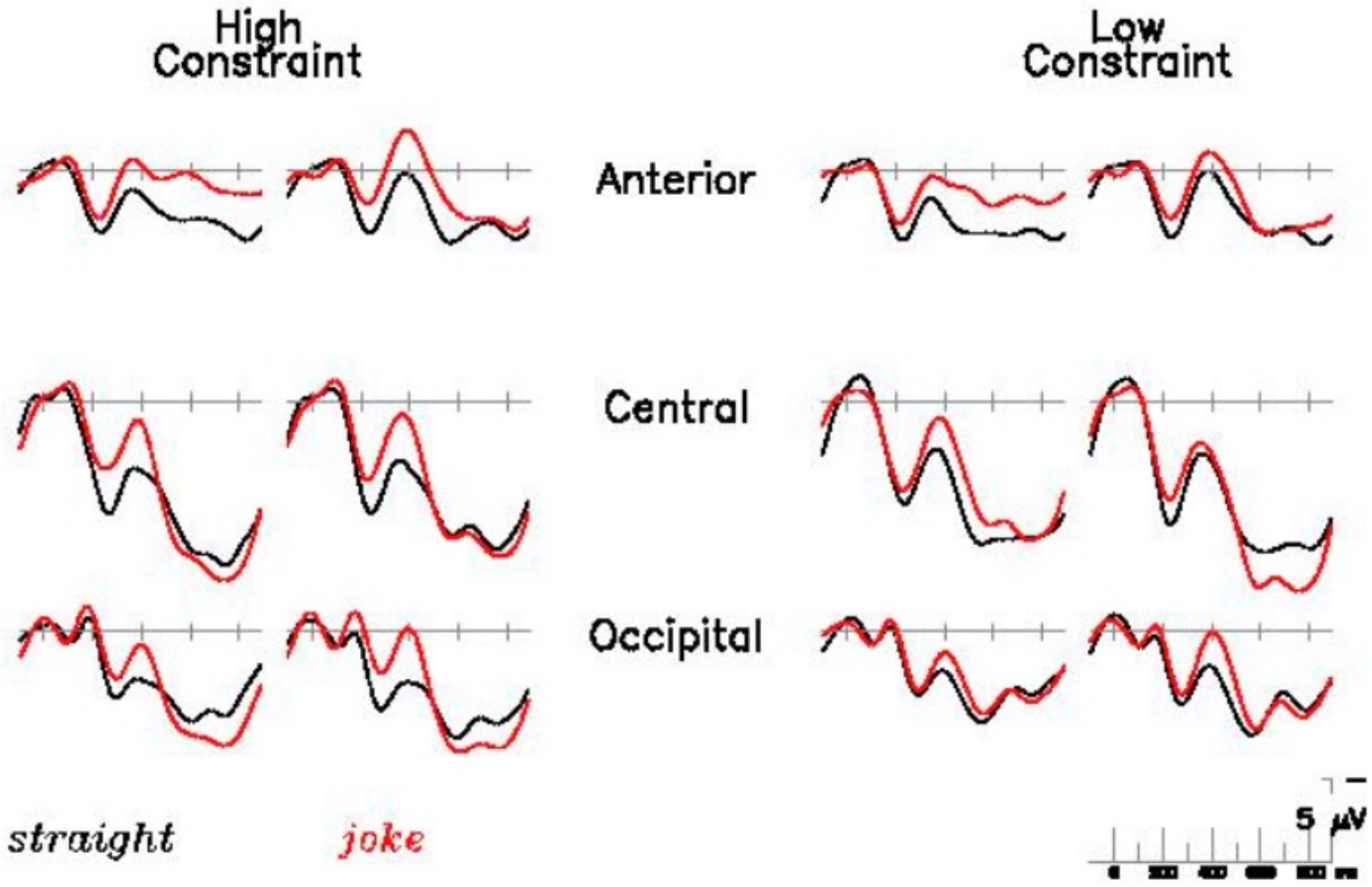
Region 2: Total viewing duration in ms

Coulson, Urbach, & Kutas (2006)

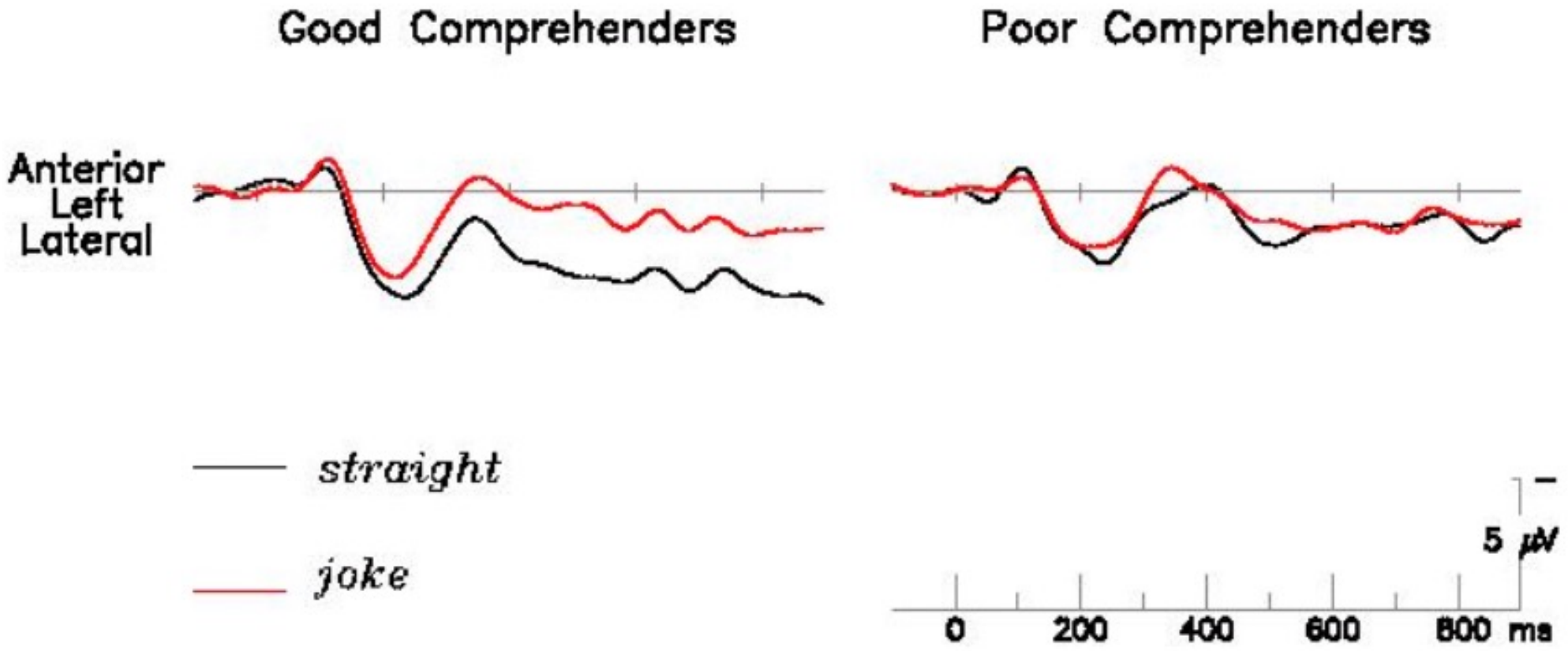
What do ERPs reveal?

- **Results**:
- All jokes elicited a left-lateralized sustained negativity (500–900ms)
  - Thought to index frame-shifting
- Low-constraint jokes elicited a frontocentral positivity (500–900ms)
- High-constraint jokes elicited an N400 and later posterior positivity

What about people who didn't understand the joke?



Coulson & Kutas (2001)

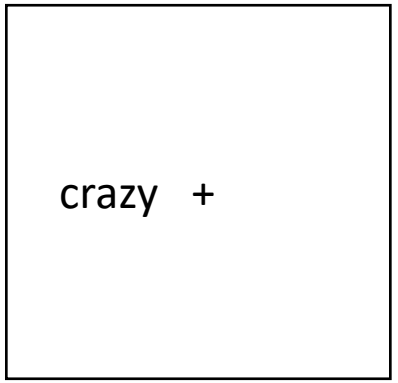


- **Results**:
- Individual differences!
- The left-lateralized sustained negativity (that is thought to index frame-shifting) from previous slide is driven by the good comprehenders
- Poor joke comprehenders showed only a right frontal negativity (300–700ms) to jokes

Coulson & Kutas (2001)

Are there hemispheric differences?

- **Procedure**:
- Participants read jokes and non-funny control sentences
  - *Everyone had so much fun jumping into the swimming pool, we decided to put in a (**little water**/**platform**).*
- Participants then read probe words (e.g., *CRAZY)*
  - Probes were related to the meaning of the jokes, but not the controls
  - To get at hemispheric differences, probes were presented in the left and right visual fields



Coulson & Wu (2005)

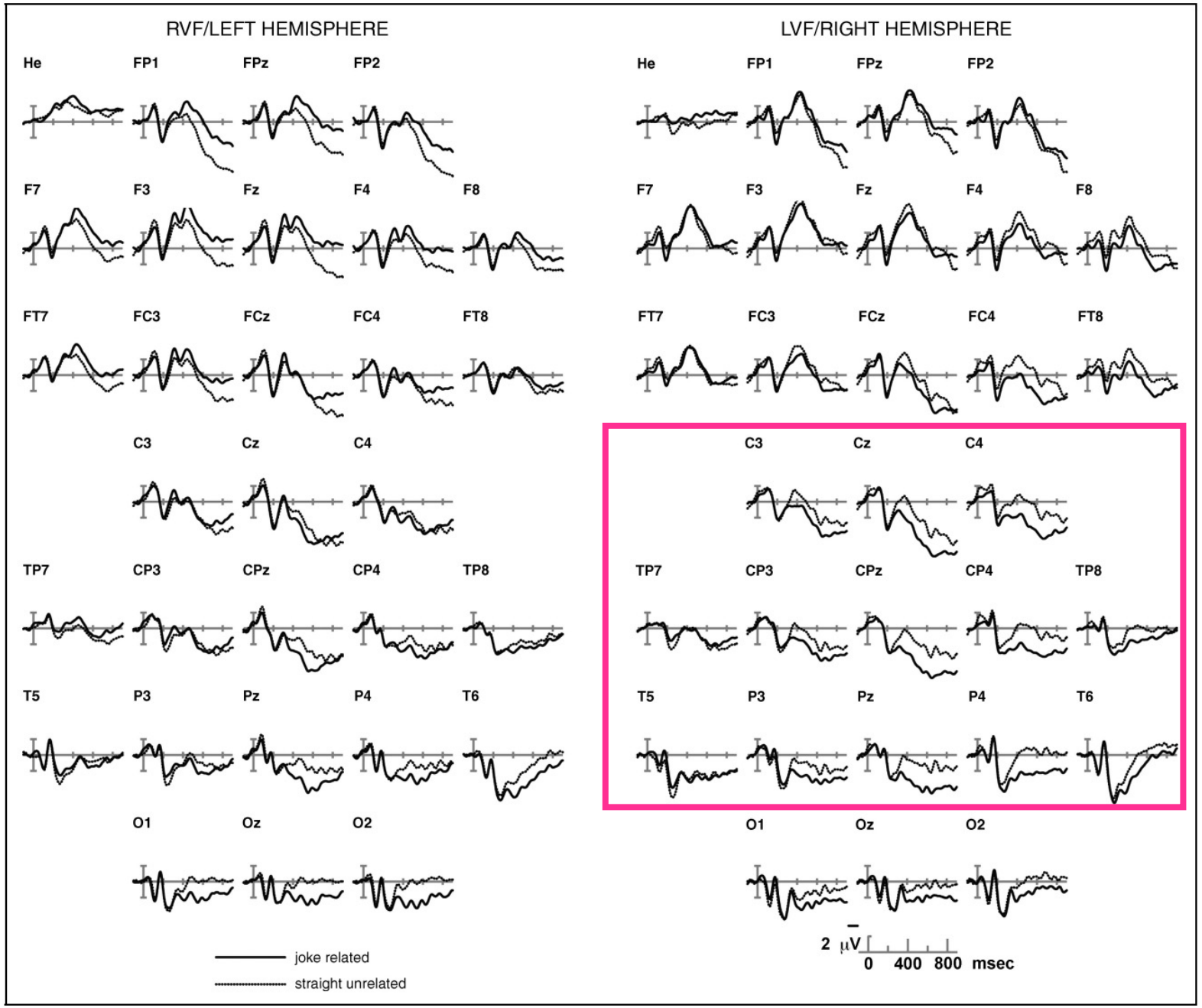
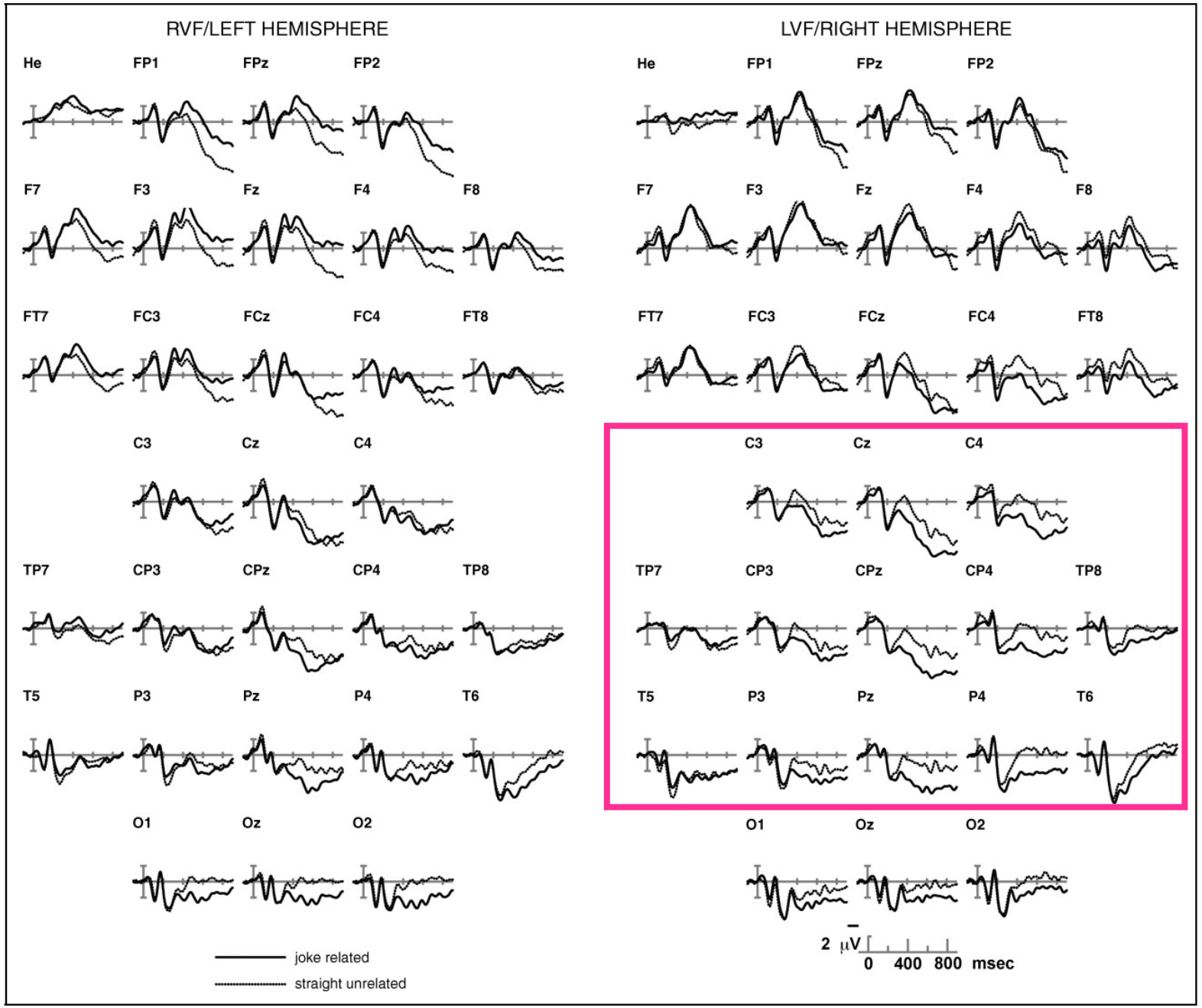


Figure 4. Relatedness effect in RVF and LVF.

- **Results**:
- Probes elicited a smaller N400 when preceded by jokes than controls
  - N400 effect was larger with presentation to the **LVF**
  - Suggests joke-relevant information was more active in the **right hemisphere**



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What does this remind you of?

Right-hemisphere damage and language

- Patients with right hemisphere damage have largely preserved language skills (including grammar and word meaning)
- Impairments are with pragmatic aspects of language use
  - Patients may also have deficits in integrating different kinds of information to arrive at an overall interpretation
  - Impairments are primarily with **non-literal** uses of language:
    - Irony / sarcasm, e.g., *She's a real genius...*
    - Idioms, e.g., *I heard it straight from the horse's mouth*
    - Metaphorical language, e.g., *She's an angel*
    - Indirect requests, e.g., *Can someone get the lights?*
    - Humor interpretation

Lateralization of language

- Both hemispheres are involved in language use, but there are major differences in the roles of each hemisphere
  - Aphasia usually results from damage to the Left Hemisphere (LH)
  - 1% of all aphasias result from damage to the Right Hemisphere (RH)
- Left Hemisphere: speech, finding words, grammar
- Right Hemisphere: “paralinguistic aspects of language”, i.e., discourse, metaphor, jokes