

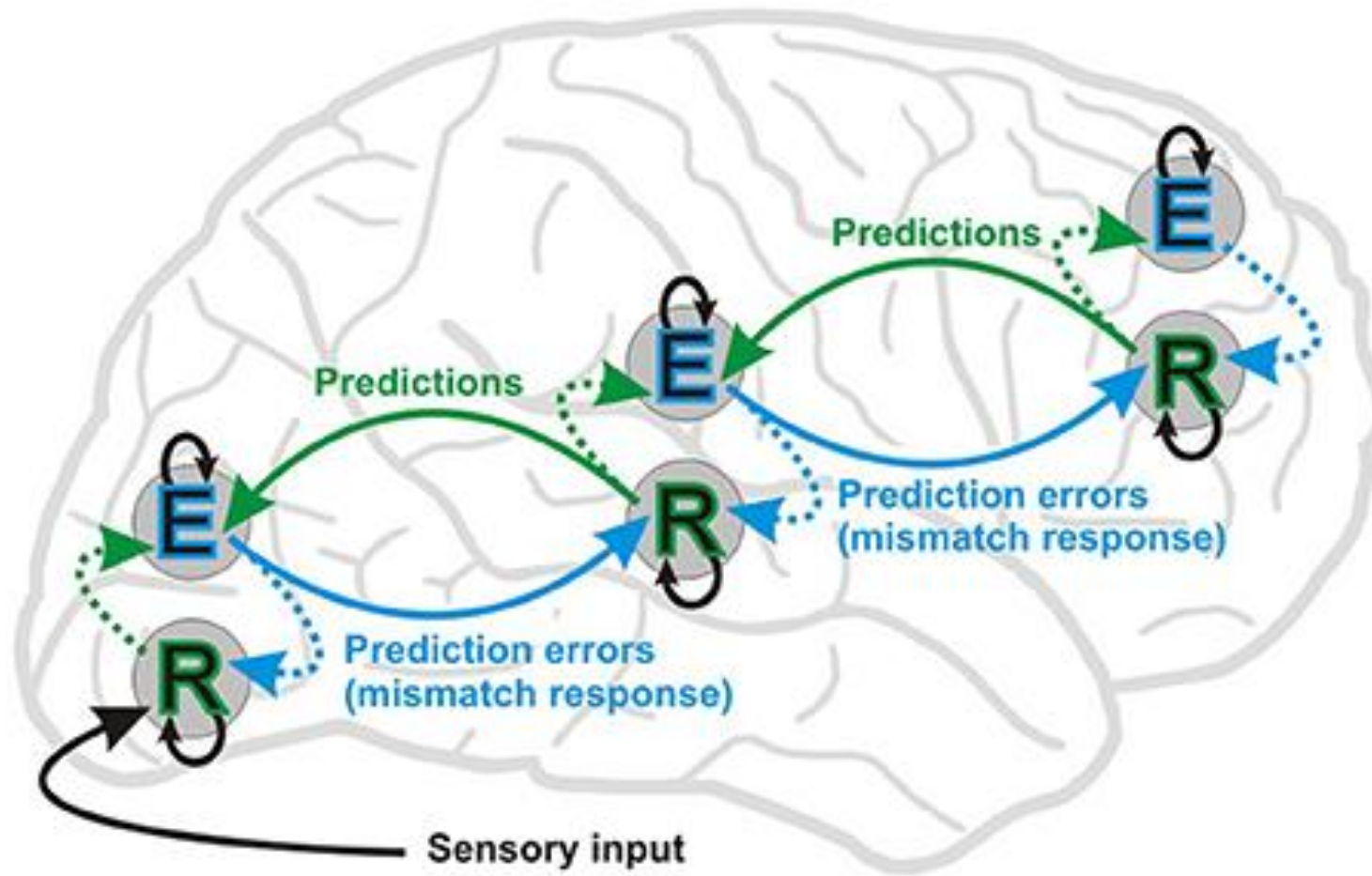
# The sound of silence: Predictive error responses to unexpected sound omission in adults

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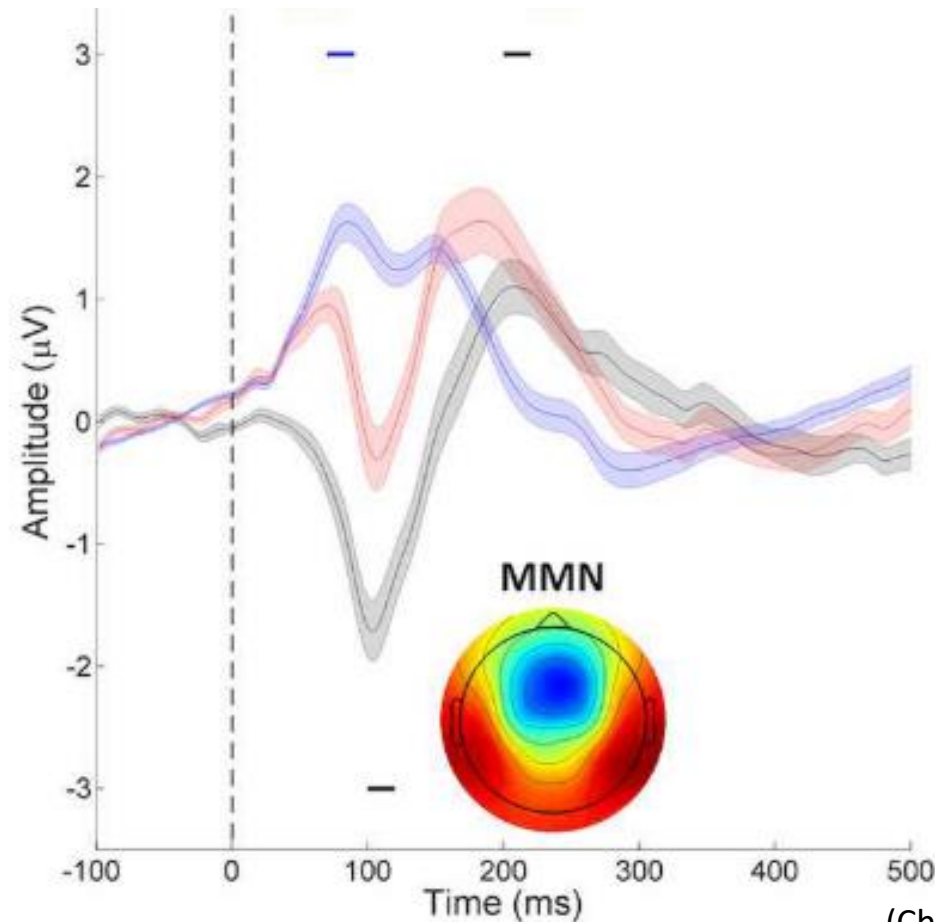
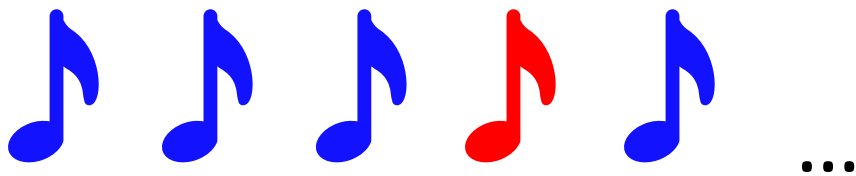


# Predictive Coding



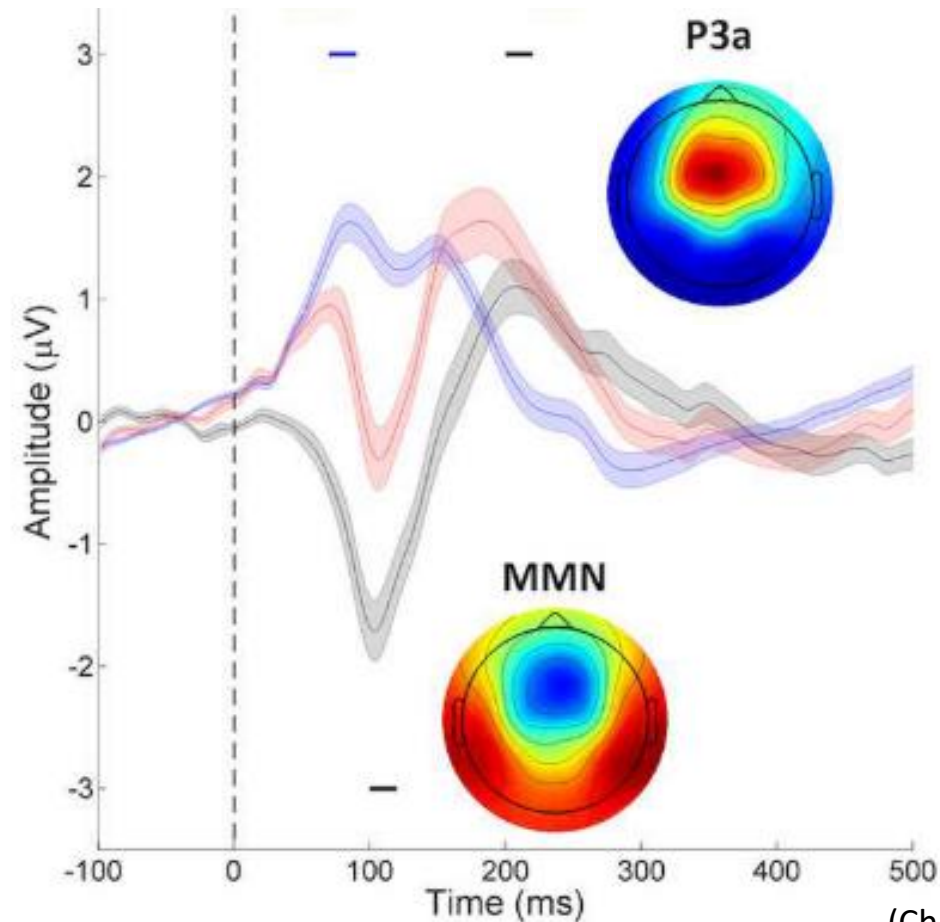
# Prediction Error and Event Related Potentials

- Prediction error response can be measure via Event Related Potentials (ERP)
  - Mismatch Negativity (MMN)



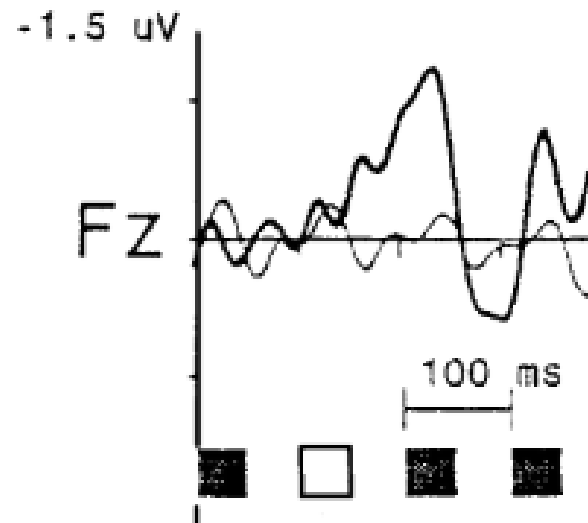
# Prediction Error and Event Related Potentials

- Prediction error response can be measured via Event Related Potentials (ERP)
  - Mismatch Negativity (MMN)
  - P3a component



# “Golden test”

- Truly test predictive coding look at the response to omission of an expected sound



(Yabe, Tervaniemi, Reinikainen & Naatanen, 1997)



- However, several caveats to previous results
  - Compared the response to the omission to the response to a sound
  - Had very short intervals between sounds or sound and omission
- Can we elicit an error prediction response in sequences at larger distances?
- How does the response to an unexpected silence compared to an expected silence?



# Hypothesis

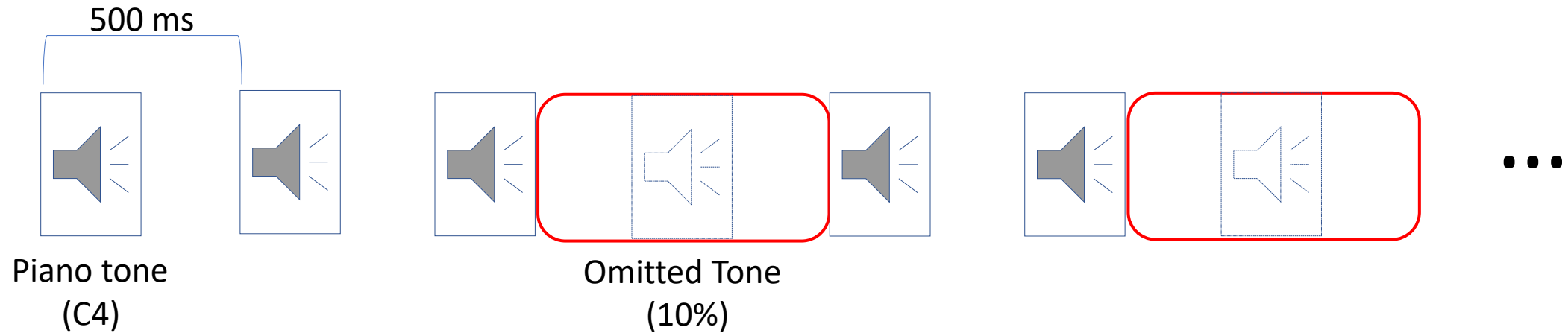
- An unexpected silence would elicit ERP components related to prediction error, index by lack of these components when compared to an expected silence in the auditory sequence.



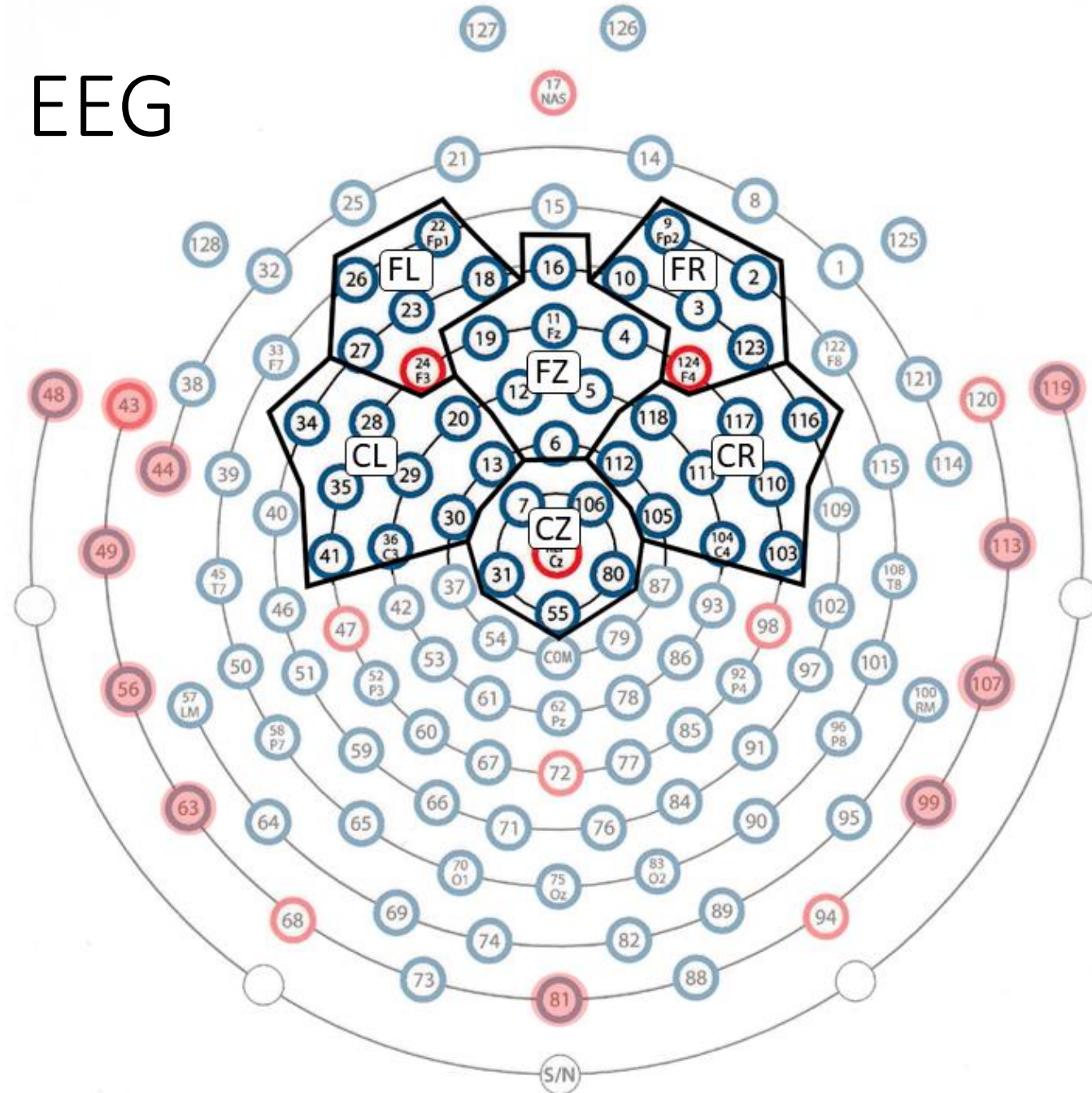


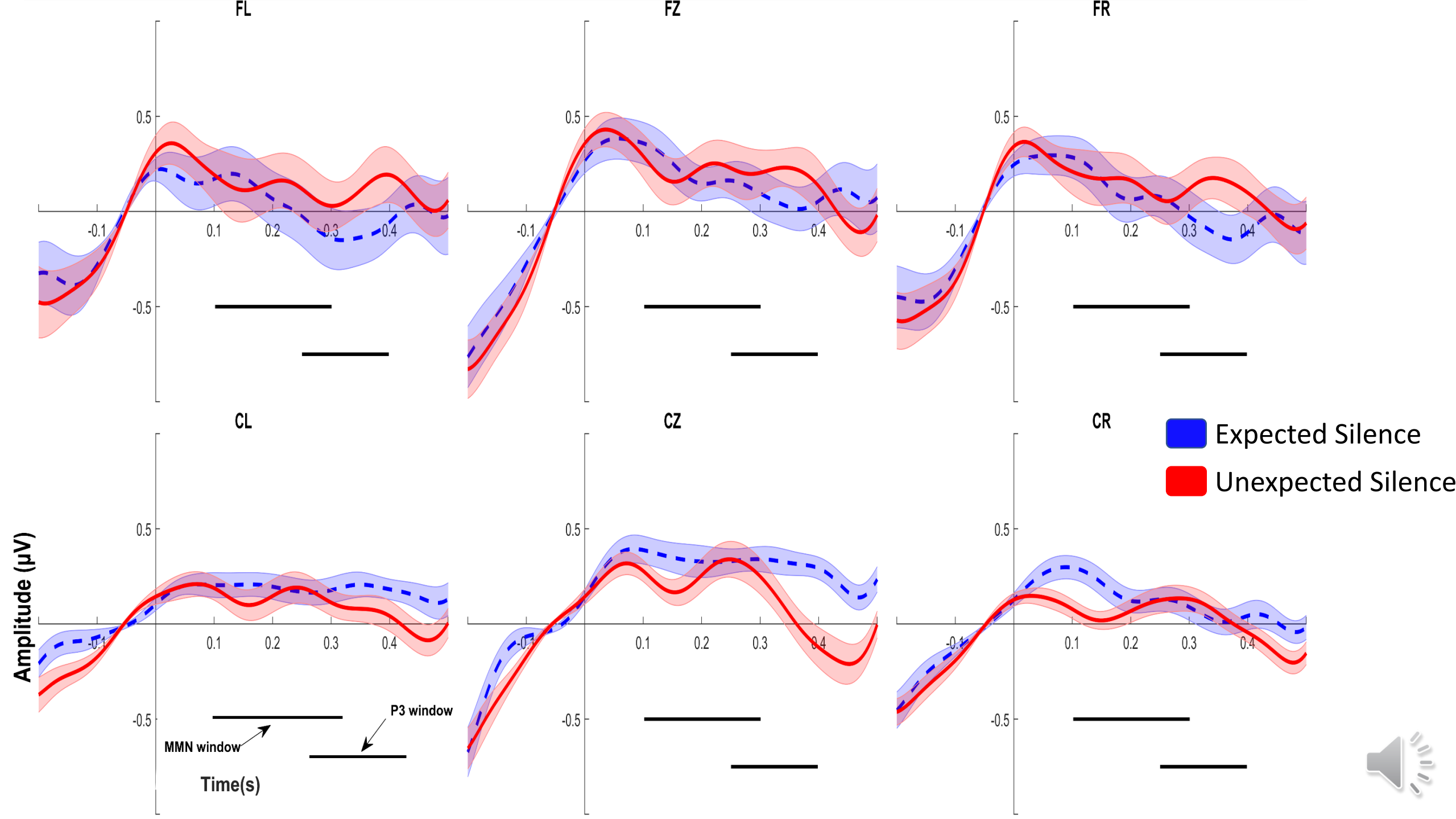
# Methods: Stimuli

## Unexpected Silence:

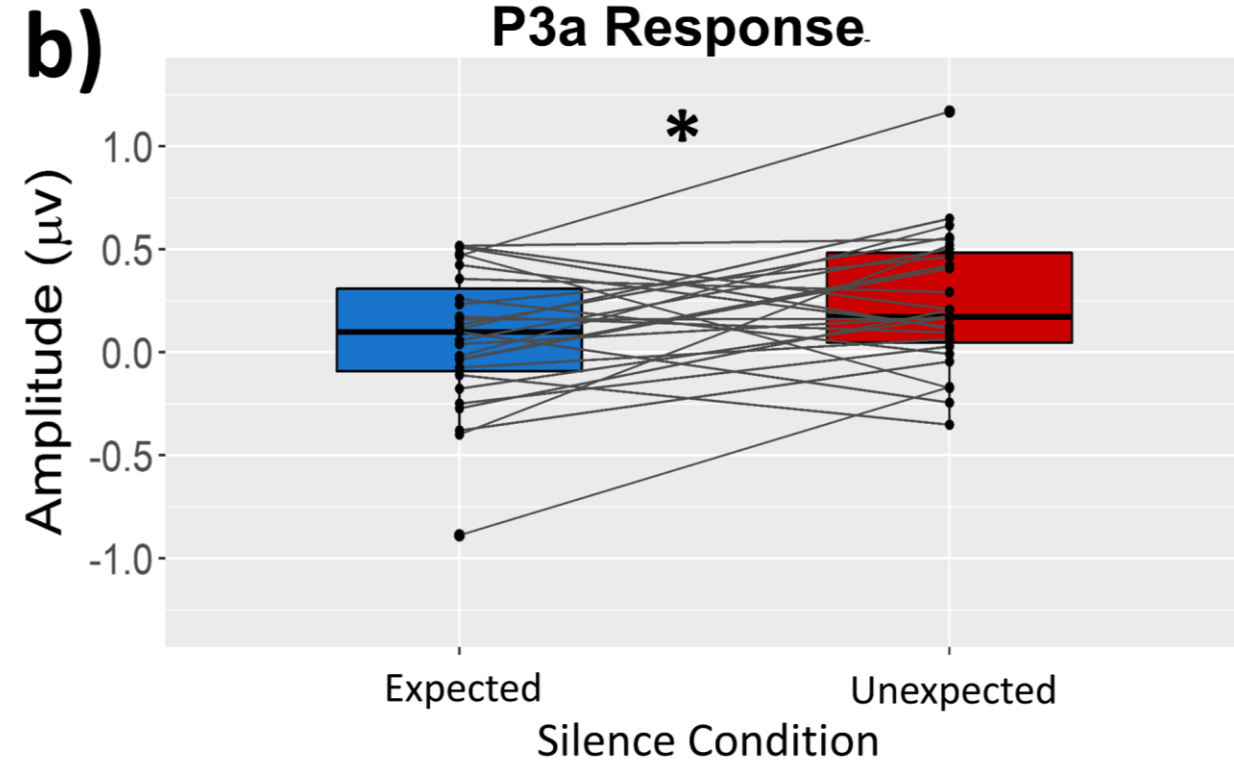
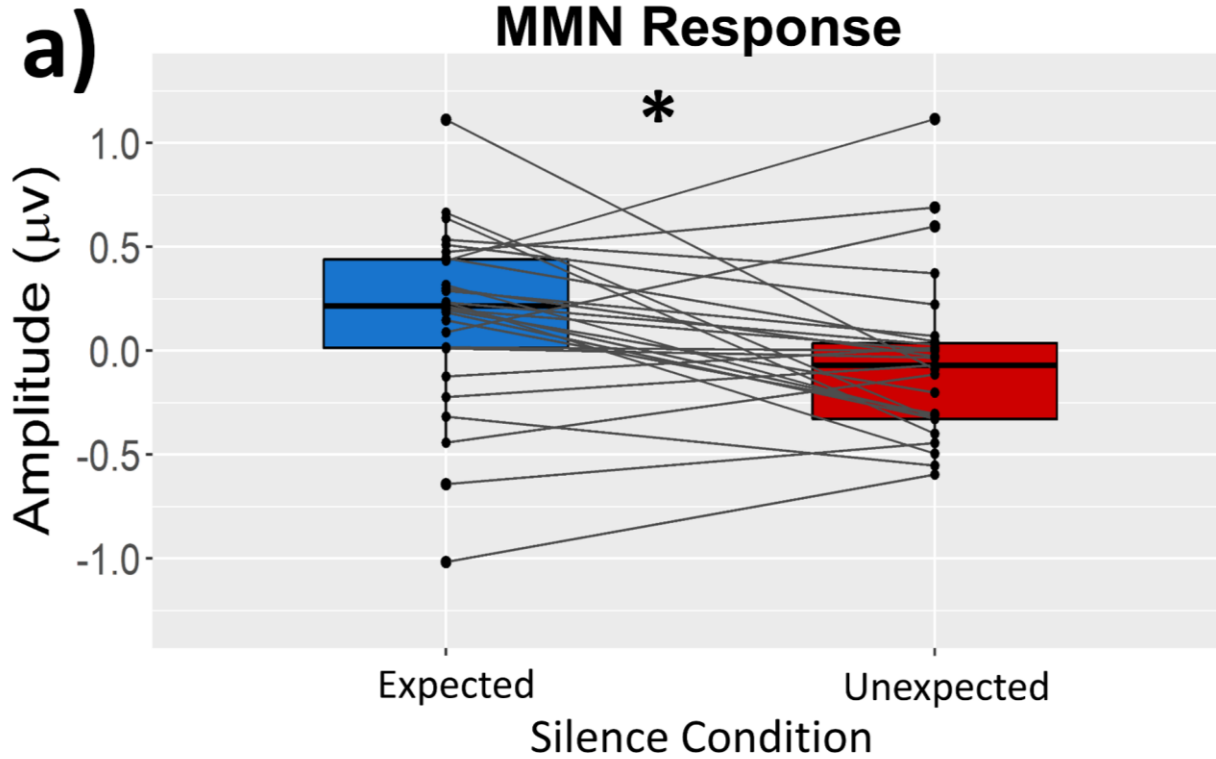


# Method: EEG





# Results: Mean Amplitude



# Discussion and Conclusion

- An unexpected silence elicits the same error related ERP components as an unexpected sound changes (Naatanen et al., 2007; Chang et al., 2016)
- Further evidence that pattern detection and processing of auditory stimulus is based on predictive coding (Friston & Kiebel, 2009; Trainor 2012 ; Stefanics et al., 2016)
- However, the difference in the peak amplitudes was small
  - High variability in the timing of the response (Hugh et al., 2001)



# Future directions

- Do unexpected silence differ based on their predictability?
- How does having a cue for the sounds affect the strength of the responses?
- Are the sources of error processing for a deviant silence the same as sources related processing a deviant sound?



# Thank you 😊



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