

# An investigation of the neural dynamics of top-down meter perception in 6-month-old infants



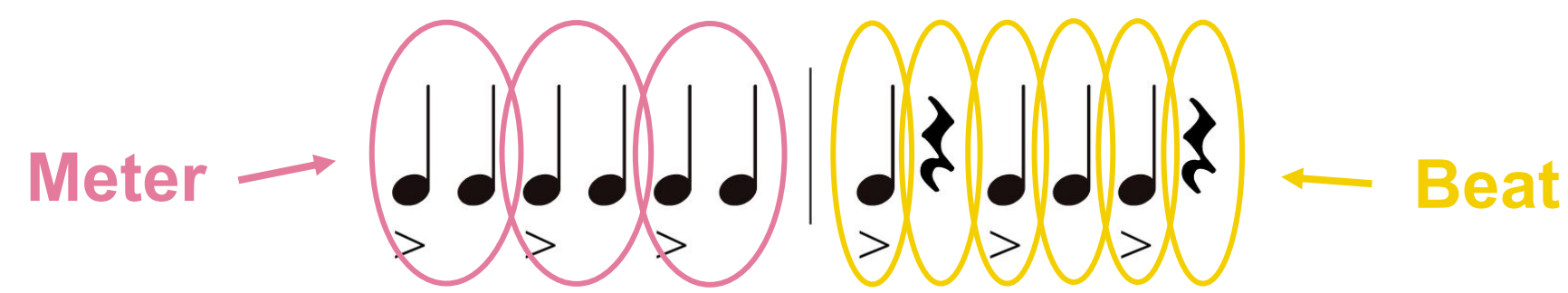
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## INTRODUCTION

- **Rhythm perception** has been implicated in early language acquisition and prosocial behaviours.<sup>1-3</sup>
- Rhythm processing deficits are often correlated with developmental disorders.<sup>4-6</sup>

Rhythm: ta-ta-ta-ta-ta-ta | ta-rest-ta-ta-ta-rest



- To investigate if infant top-down meter perception is generalizable across different tempos, we used two **electroencephalography (EEG)** measures...

### Mismatch Response (MMR)

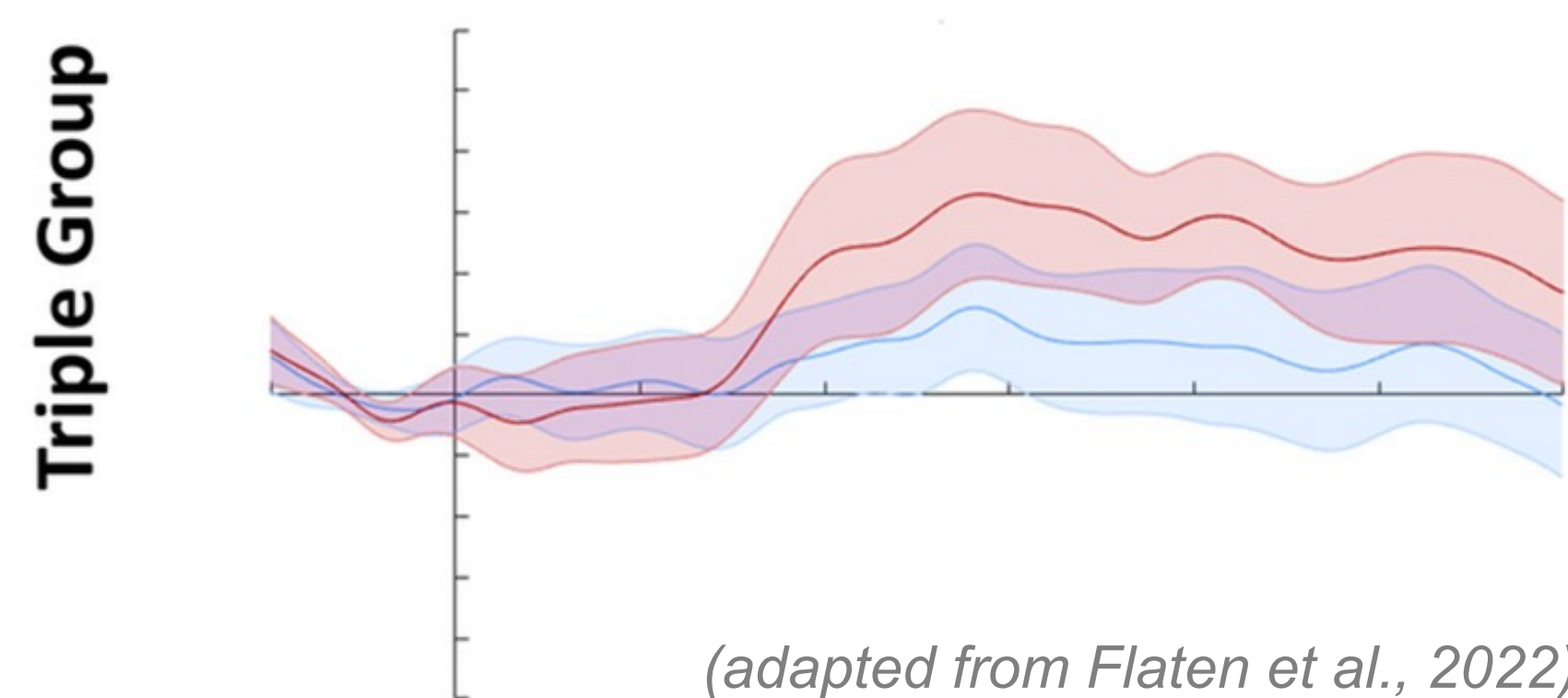
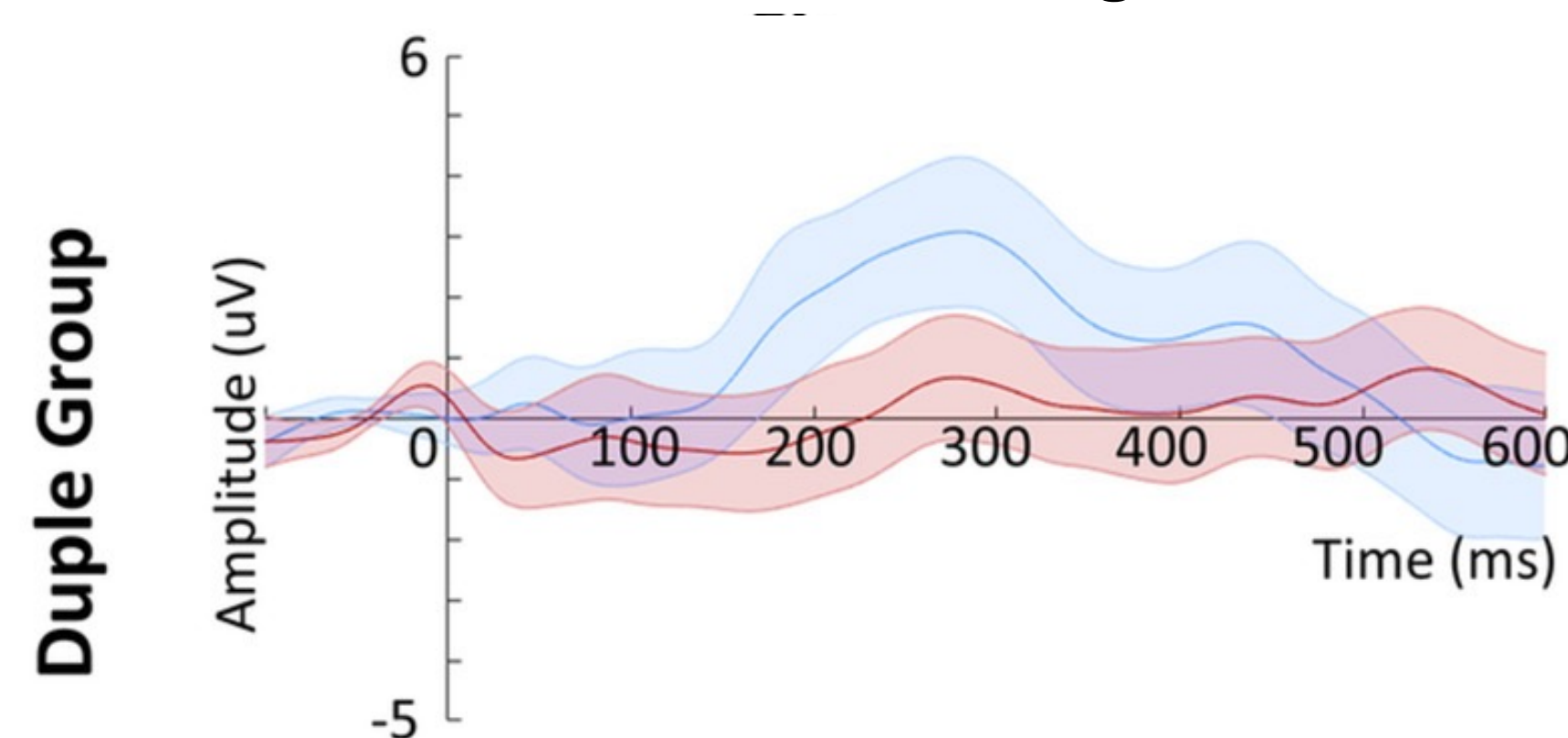
- An event-related potential evoked by an unexpected (oddball) sound

Previous work done in our lab (Flaten et al., 2022):

- 6-month-old infants (N=24)
- 6-beat piano tones
- 300 ms inter-beat interval (IBI)
- Higher MMR amplitude for deviants at the strong beat position as opposed to the weak beat
- Priming effects stronger in duple group, perhaps due to enculturation



### MMR in Frontal Left Region



(adapted from Flaten et al., 2022)

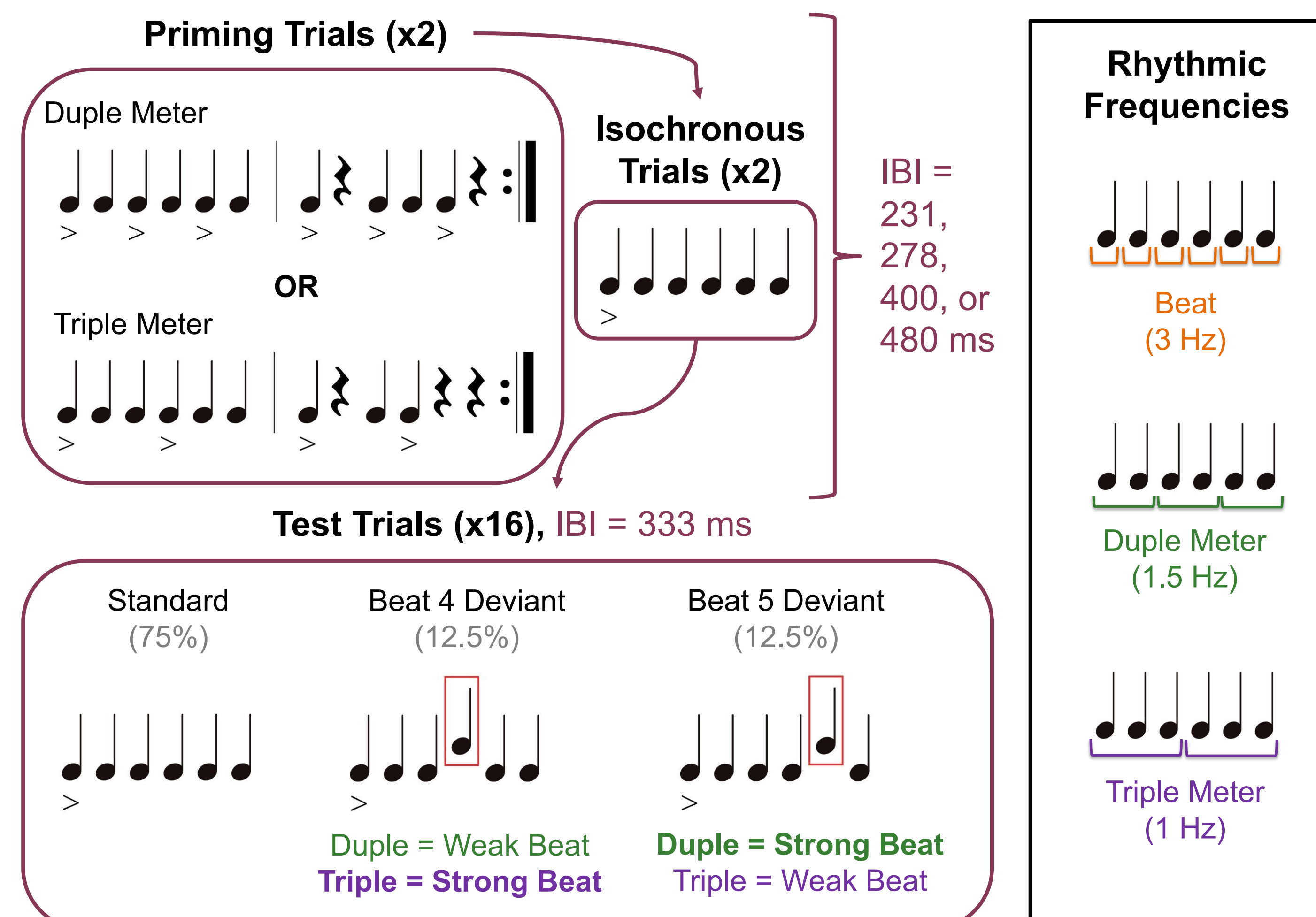
### Intertrial Phase Coherence (ITPC)

- Measures consistency of the phase angle of the rhythmic brain, at stimulus frequencies, across trials
- After exposure to trisyllabic pseudo words, infants' ITPC for the frequency of word-like units increased logarithmically over time relative to their ITPC at the frequency of isolated syllables<sup>8</sup>

### RESEARCH AIMS:

1. Find out whether MMR in Flaten et al., 2022 can be replicated across various tempos.
2. To see if infants demonstrate higher ITPC at the frequency of the primed meter.
3. Secondly, investigate whether duple bias in Flaten et al., 2022 remains in the new data.

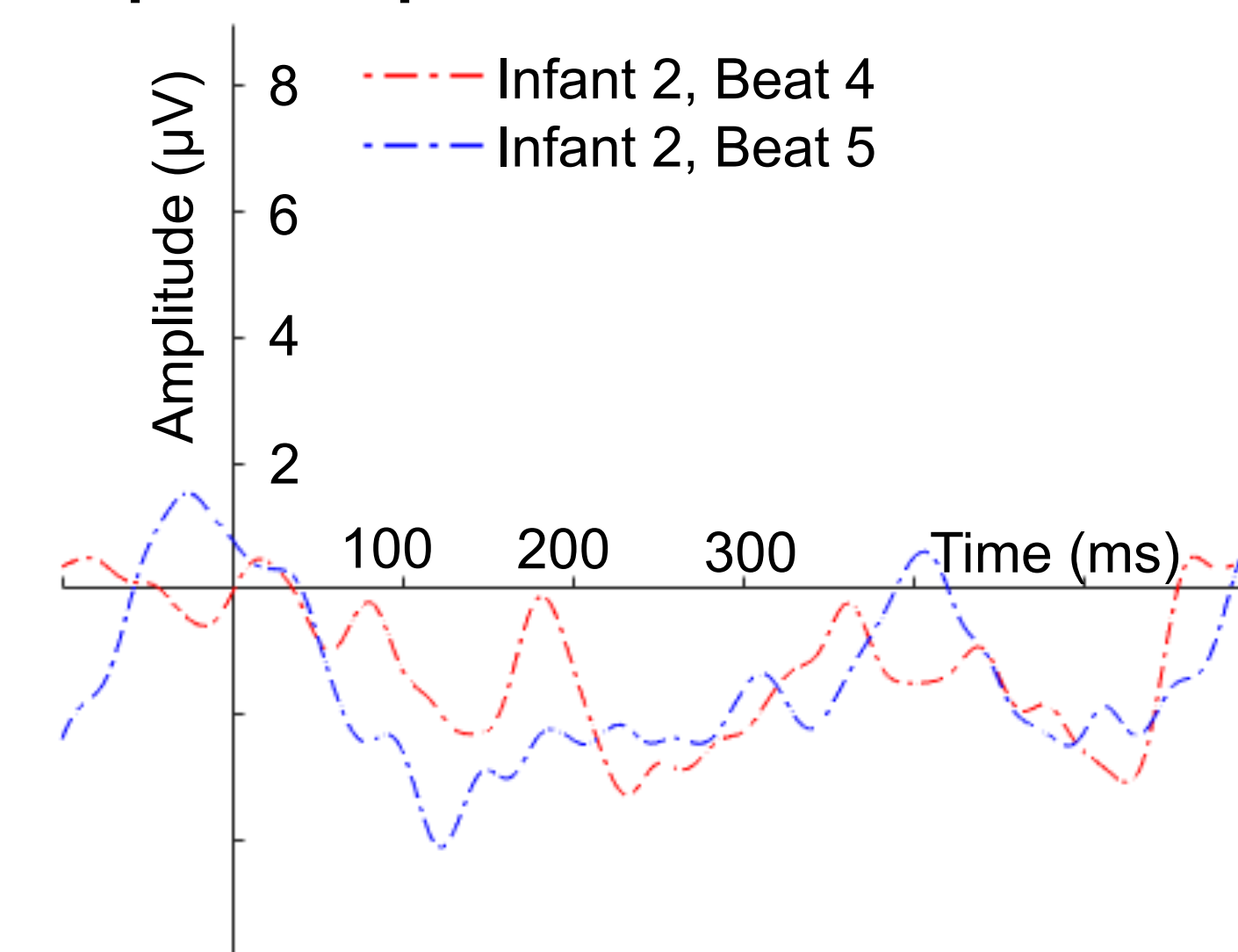
## METHODS



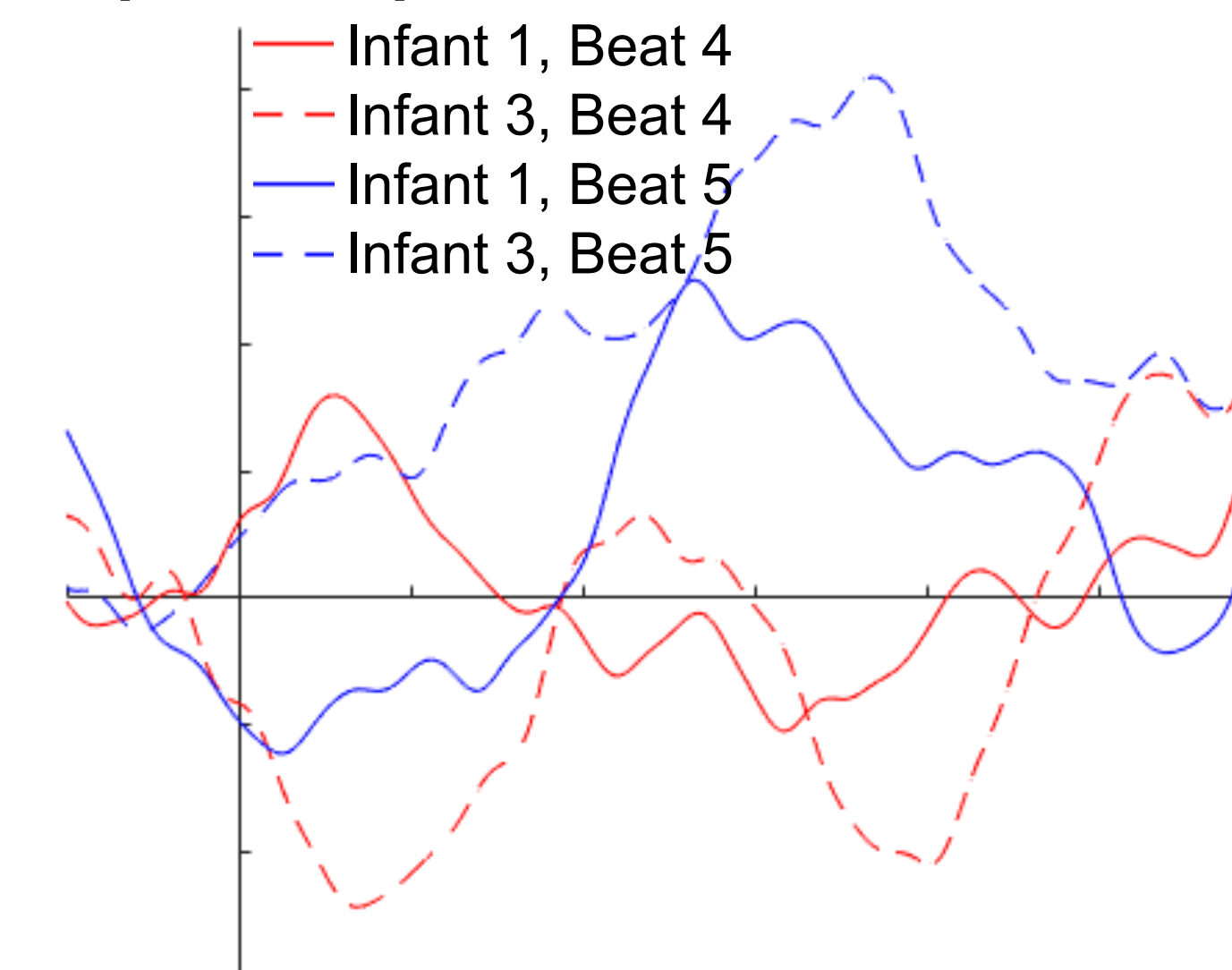
## RESULTS

### Preliminary MMR Findings, Midline Frontal (FZ) Region

#### Duple Group

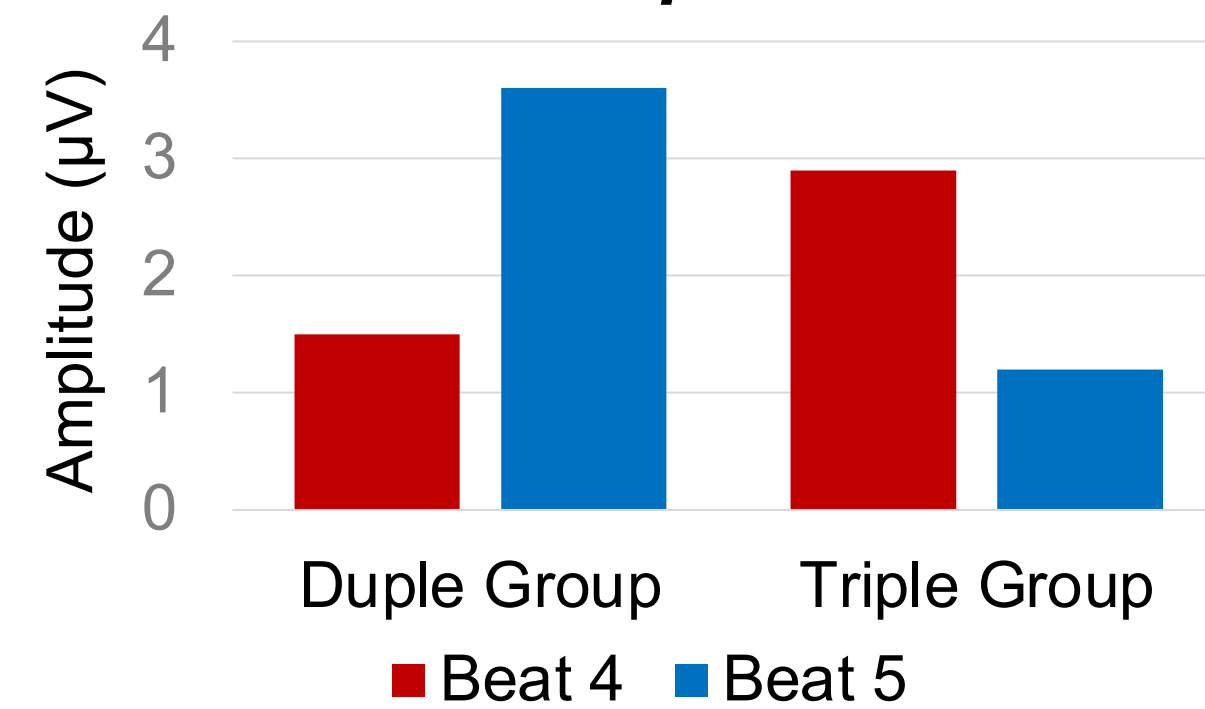


#### Triple Group

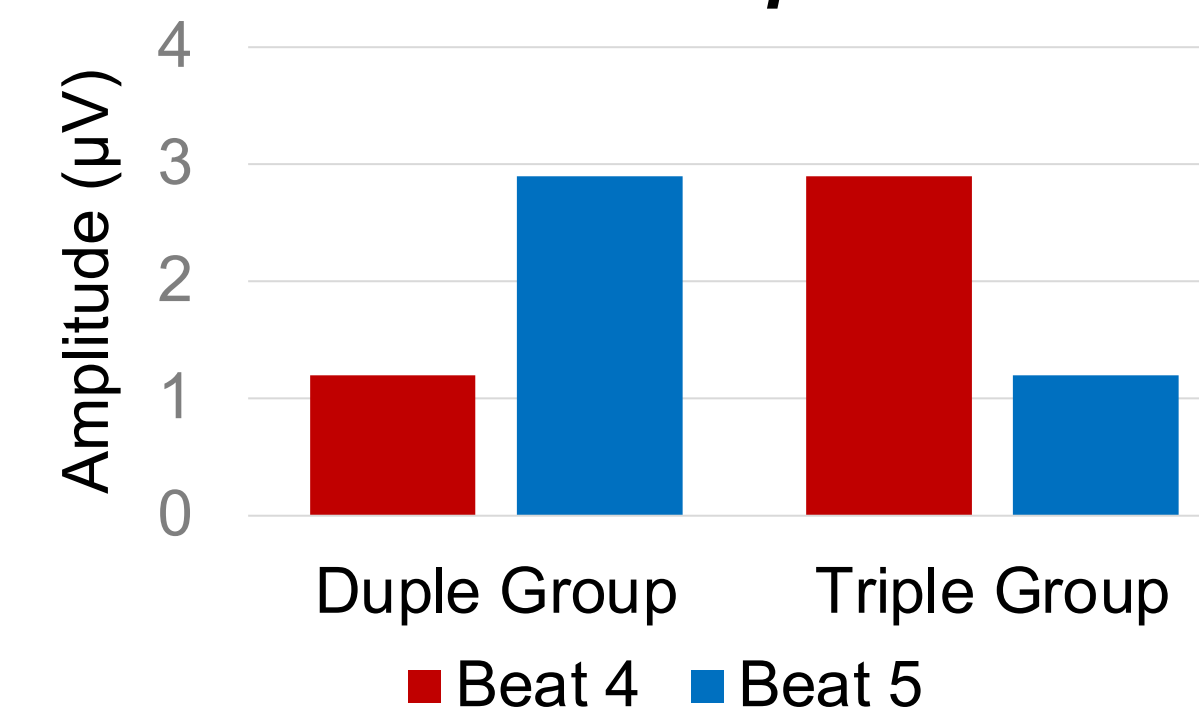


### Expected MMR Results

...if duple bias:

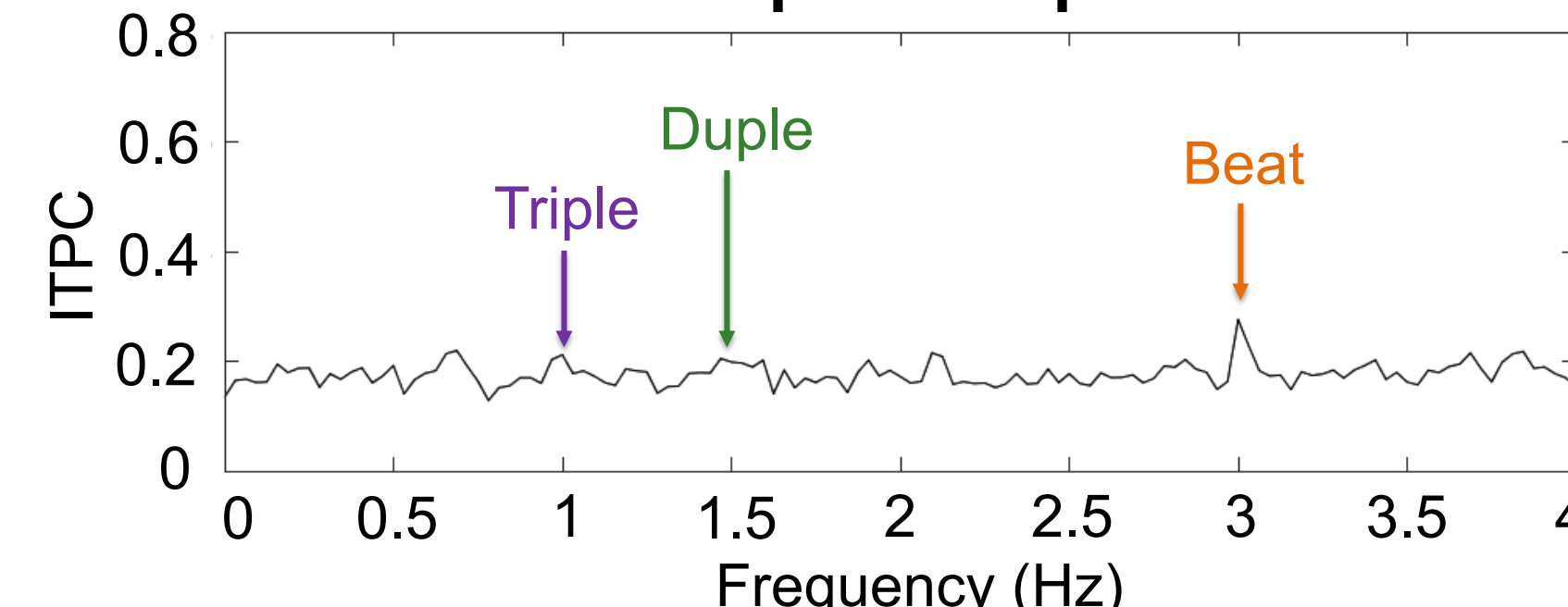


...if no duple bias:

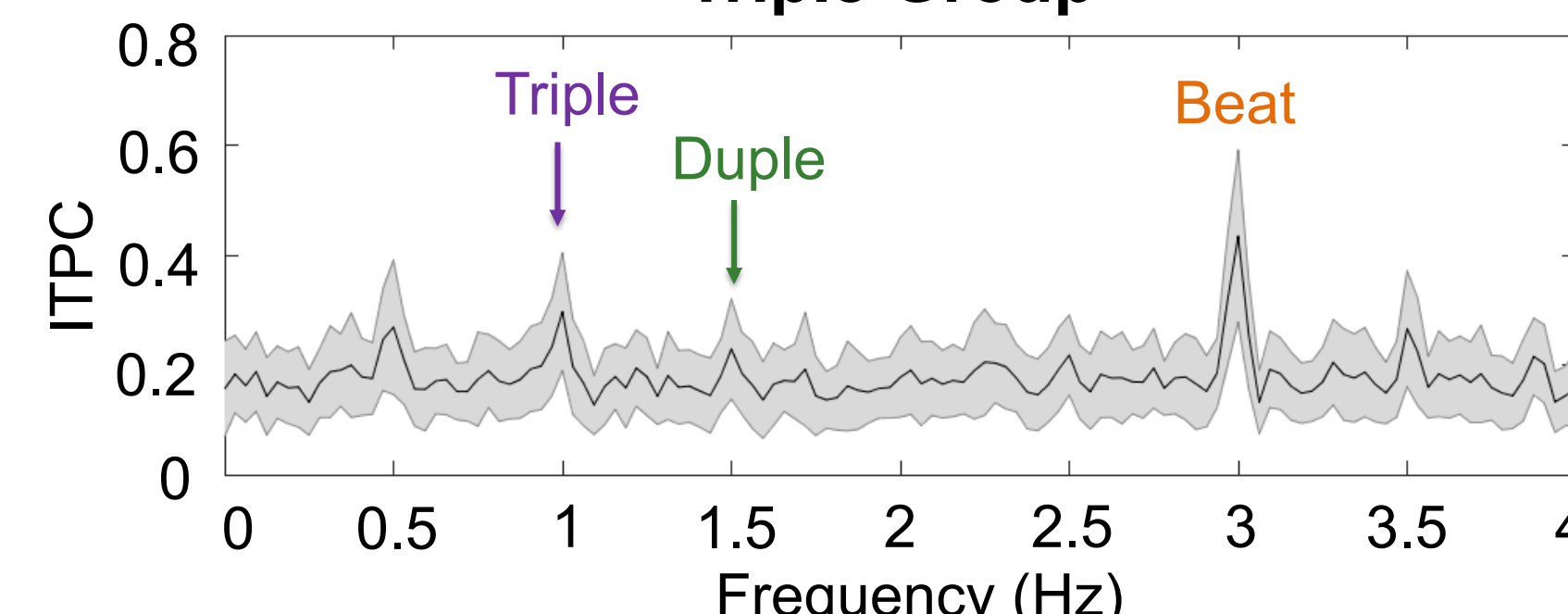


### Preliminary ITPC Findings, FZ Region

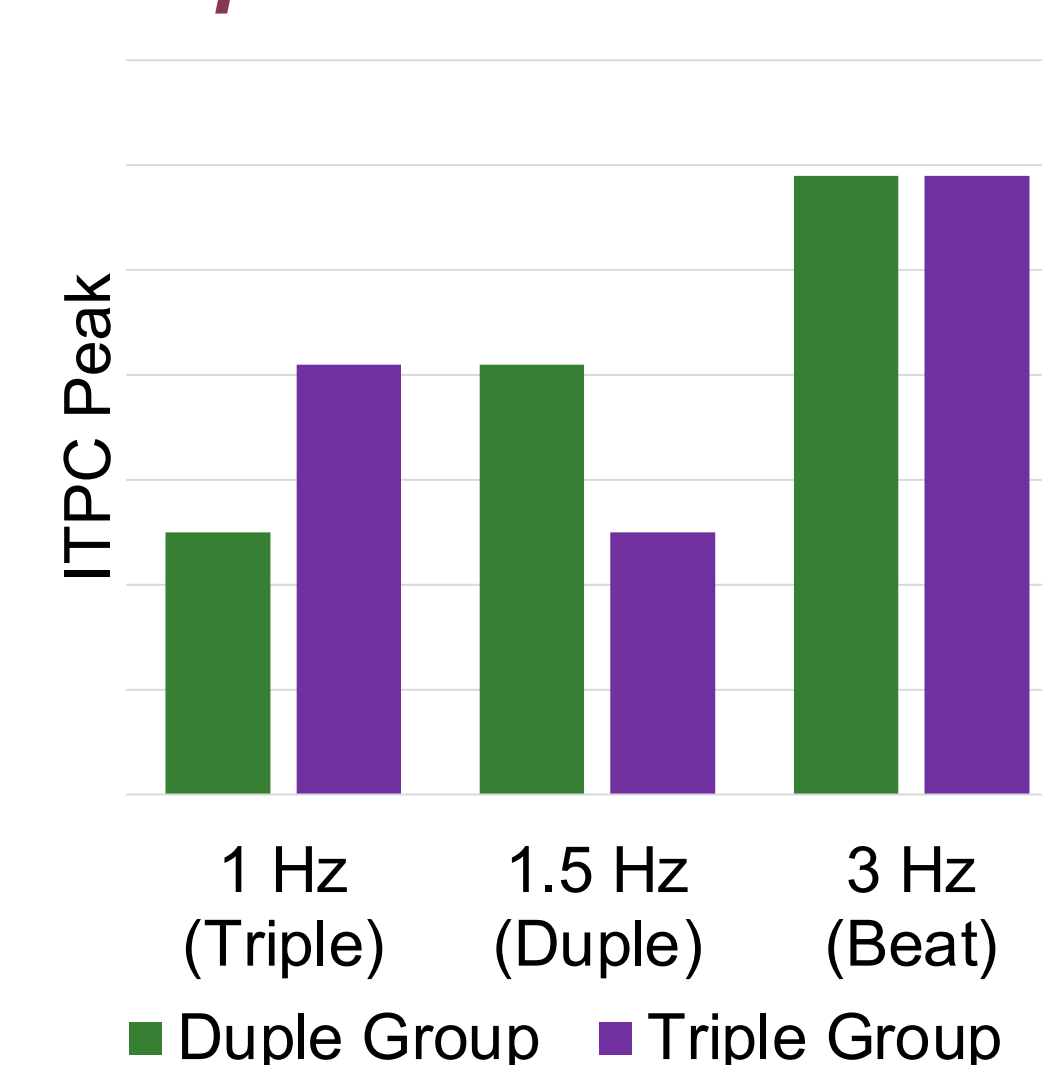
#### Duple Group



#### Triple Group



### Expected ITPC Results



## DISCUSSION

### CONCLUSIONS

**MMR:** Difficult to extract from individual infants  
• However, expect to replicate the findings of Flaten et al., 2022

**ITPC:** Preliminary evidence of phase coherence at the beat frequency for both groups

- No strong peaks at duple or triple meter frequencies

**Duple Bias:** Unable to tell so far, but hypothesize that a duple bias will exist due to enculturation

**Next Steps:** Continue collecting data to increase statistical power

### IMPLICATIONS

- Findings may improve understanding of the complex dynamics of infant auditory development
- Findings may improve understanding of social development and developmental disorders
- Implications for early language acquisition: top-down meter perception may be associated with top-down processing of word-level speech structures<sup>8</sup>

## REFERENCES

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## ACKNOWLEDGEMENTS



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