

Synchronous and anti-phase drumming elicit similar prosocial behavior

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General purpose of this study

Test the effect of phase on the relationship between sensorimotor synchronization and prosocial behavior

Background

- Music as a coevolved system for social bonding¹
- Sensorimotor synchronization (SMS) leads to increase in trust, cooperation, and prosocial behavior²
- Complex relationships among synchronization, self-other merging, endogenous opioid system, and social bonding³
- Mixed results for anti-phase coordination and prosocial effects⁴

Research Questions

1. Does anti-phase coordination result in similar prosocial effects to in-phase coordination (i.e., synchrony)
2. Are coordination dynamics in drumming related to behavioral measures of trust and cooperation?

Participants

- Students ($n = 100$) in paired dyads with a stranger
 - No musical training required
- Quasi-random assignment to one of three conditions
- Awarded \$0-\$10 based on results from stag-hunt game

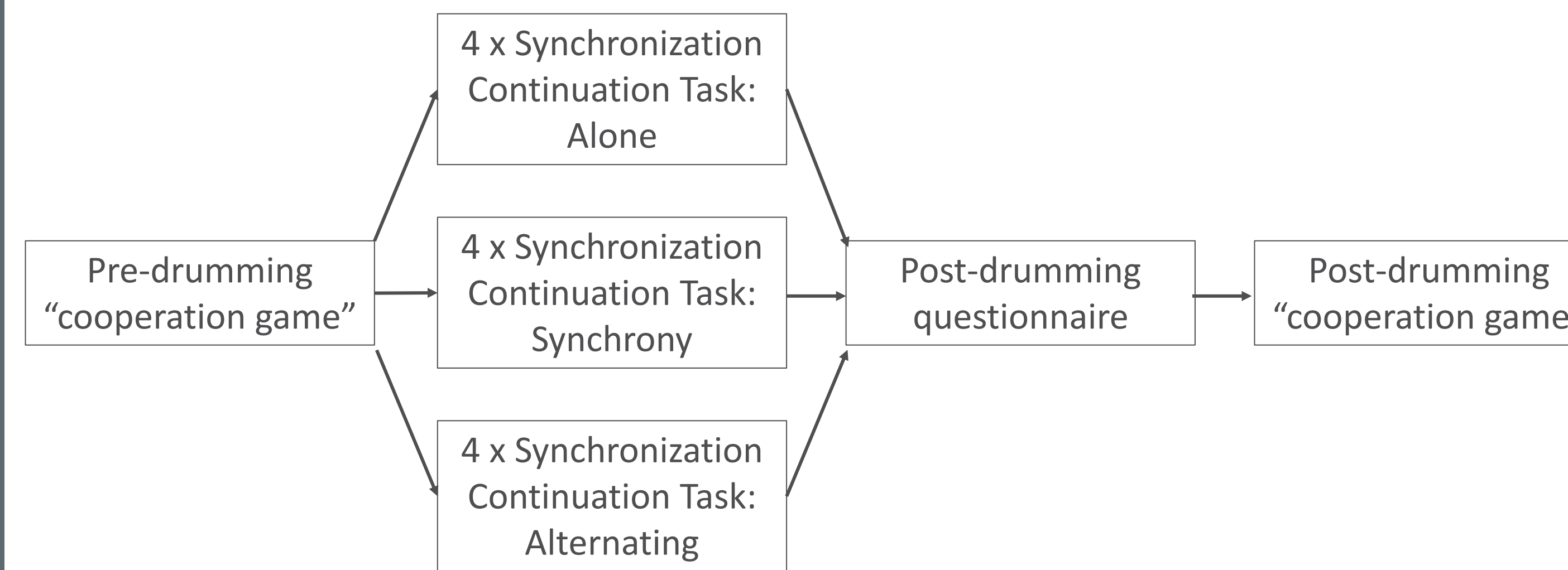
Experiment: Stag-hunt game and questionnaire

- Stag-hunt game adapted for students
 - Context of group work vs. working alone
- 7-point Likert scale: “how much they and their partner...”
 - 1. Were a unit 2. were on the same team 5. cooperated during the drumming task
- Additionally, we asked
 - 3. how similar they were to their partner 4. how much they trusted their partner going into the task and 6. how happy they were now

Experiment: Synchronization-Continuation Task

- All conditions: 4 trials of synchronization-continuation
 - Sync Phase: 8 measures of 4 beats
 - Continuation Phase: 60 seconds
- In-phase condition: 60 bpm
- Anti-phase condition: 120 bpm, each person at 60 bpm
- Alone condition: 60 bpm

Experiment: Flowchart



Results: Stag-hunt game

- Extremely high levels of cooperation at baseline across all conditions; ceiling effect

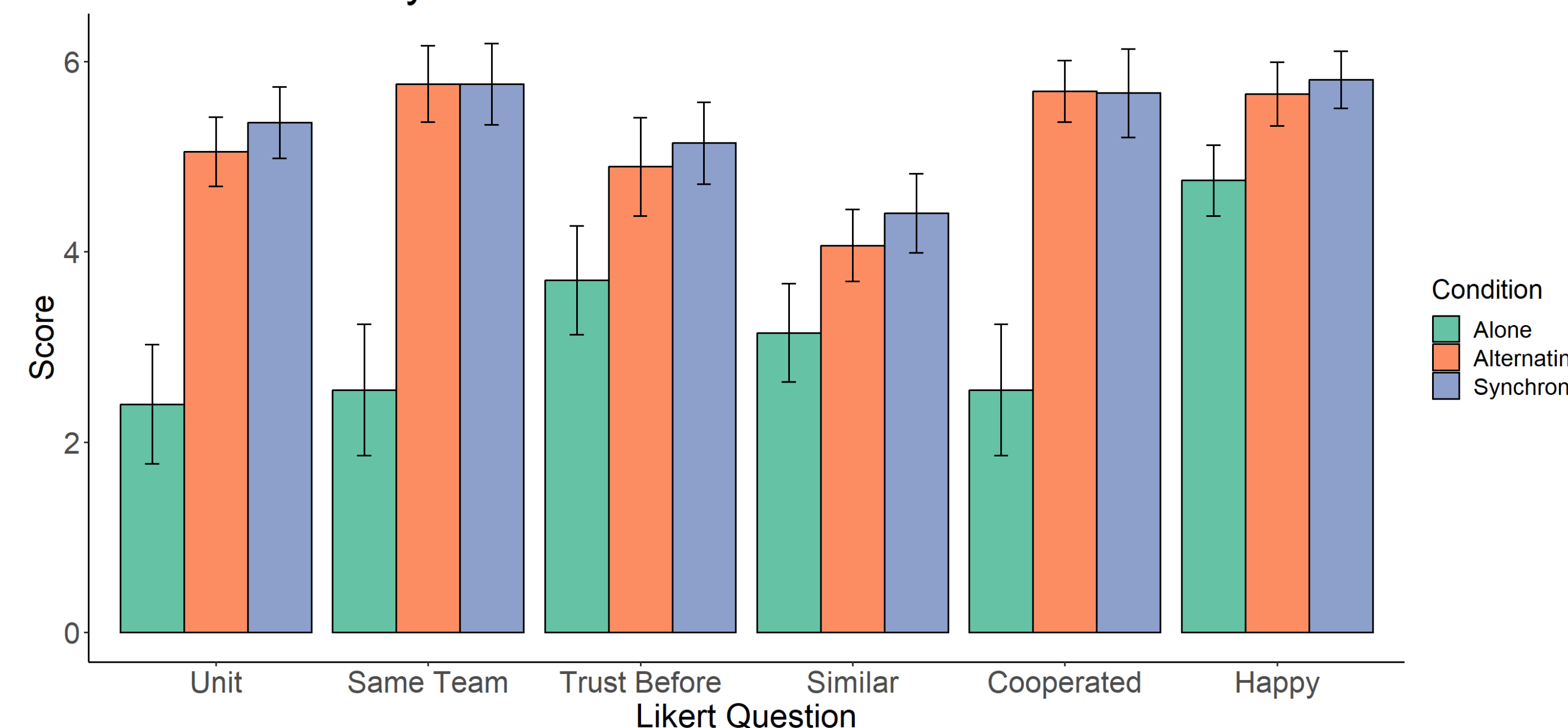
	Alone	In-phase	Anti-phase
Pre	17/20 = 85%	37/42 = 88%	32/38 = 84%
Post	17/20 = 85%	39/42 = 93%	33/38 = 86%

- Moderate biserial correlations between cooperation status and Likert questions ($r_{bs} > .3, p < .05$, Questions 1,2,5,6)

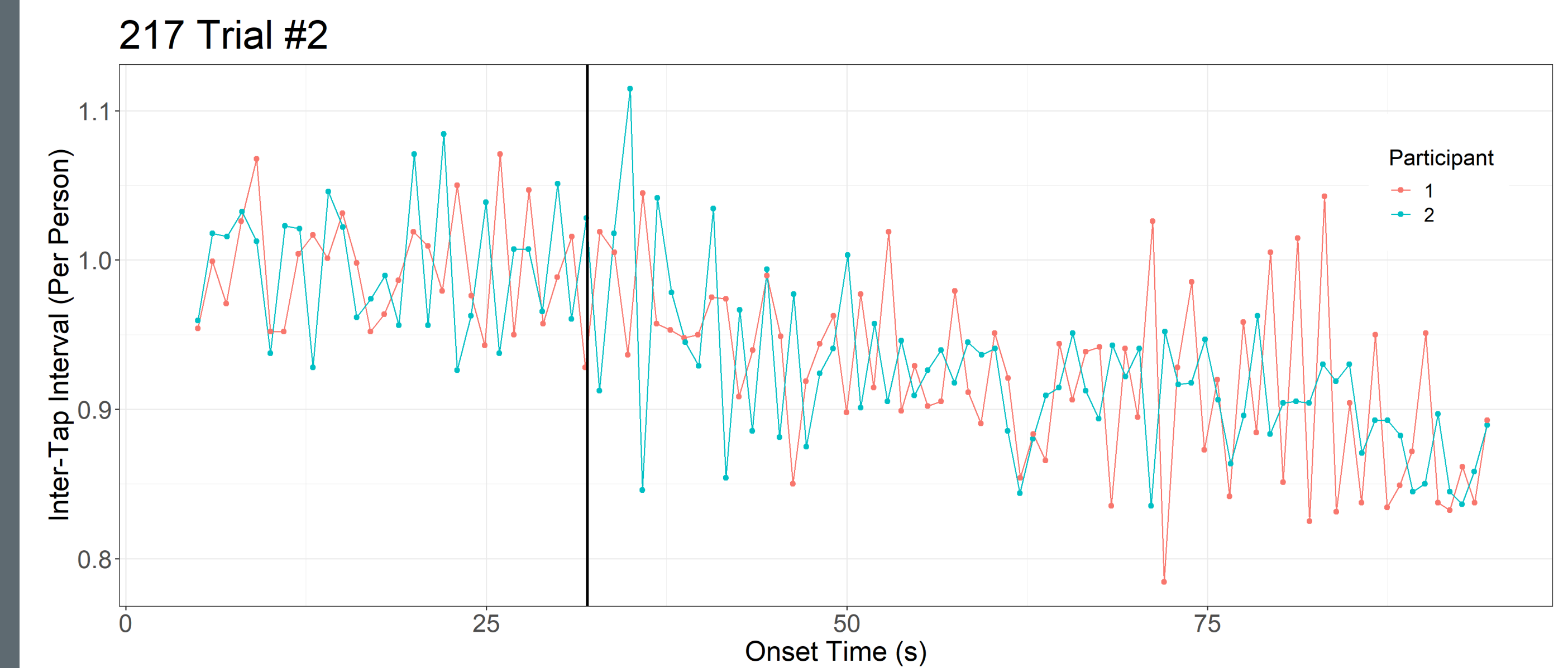
Results: Likert questionnaire

- All groups, averaged across dyads: $F(2, 47) > 6$, all p 's $< .01$
 - Tukey HSD: Alternating, Synchrony \gg Alone, all p 's $< .05$
 - Alternating vs. Synchrony: all p 's $> .5$
- Bayesian approach only comparing Alternating vs. Alone
 - “There is $[BF_{10}]$ times more evidence for H_1 than H_0 ”
 - $BF > 3$ is considered moderate evidence, $1 < BF < 3$, weak
 - $BF_{10} > 3$: “same team” and “cooperated”
 - $BF_{10} > 2$: “unit”, “trust before”, “happy”
 - $BF_{10} = 1.8$: “similar”

Likert Scores by Condition

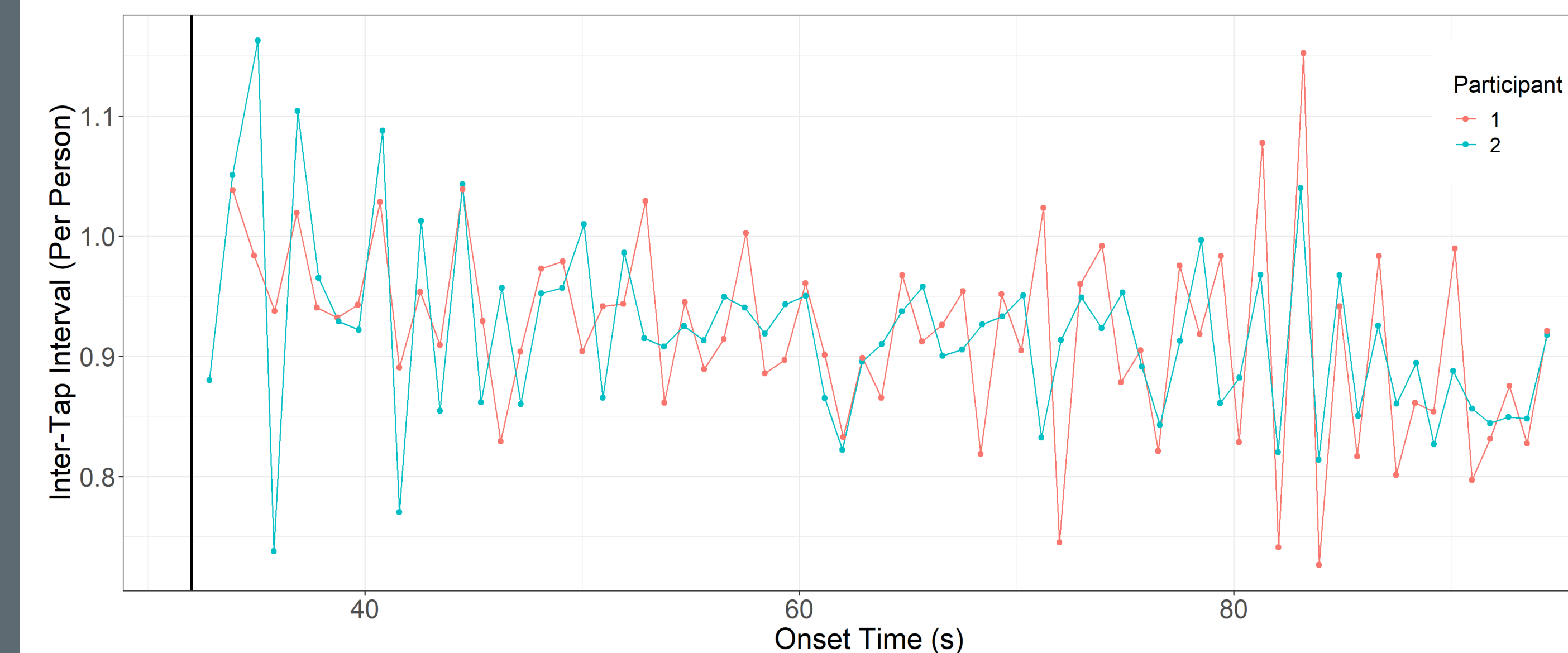


Data Cleaning: Drumming Behavior



- Extract time series of Inter-tap interval (ITI)
 - Lag-1 Autocorrelation: metric of adaptation to tempo
 - For stable tempi, negative as correction occurs
 - ITI Variance: tempo stability
- Detrending required

217 Trial #2: Detrended



Discussion

- Similar prosocial behavior elicited by synchronous and alternating SMS
- Ceiling effect for cooperation, links to Likert questions
- Planned analyses:
 - Bayesian mixed effects models for Likert responses
 - Correlations between drumming task performance and Likert responses
- Future Directions:
 - Simultaneous EEG during joint drumming tasks, parse out effect of phase

References

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3. Tarr, B., Launay, J., & Dunbar, R. I. (2014). *Frontiers in Psychology*, 5, 1096.
4. Mogan, R., Fischer, R., & Bulbulia, J. A. (2017). *J Exp Soc Psych*, 72, 13-20.