

# Investigating how rhythm, bass, and social movement motivate dancing

## at an electronic dance music concert



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### INTRODUCTION

- Group dancing to music is a common experience across cultures
- Low frequency sounds (bass) and complex rhythms tend to elicit a stronger urge to move compared to simpler ones<sup>1,2</sup>
- Social factors have also been shown to affect movement energy and groove<sup>3</sup>
- It is unknown how social interactions compete or combine with rhythm and bass to motivate movement in a live environment
- Here, we analyze head movements during a live concert to determine how these factors affect movement in a live concert



**Figure 1.** Electronic dance music duo Orphx performing live at the LIVELab.

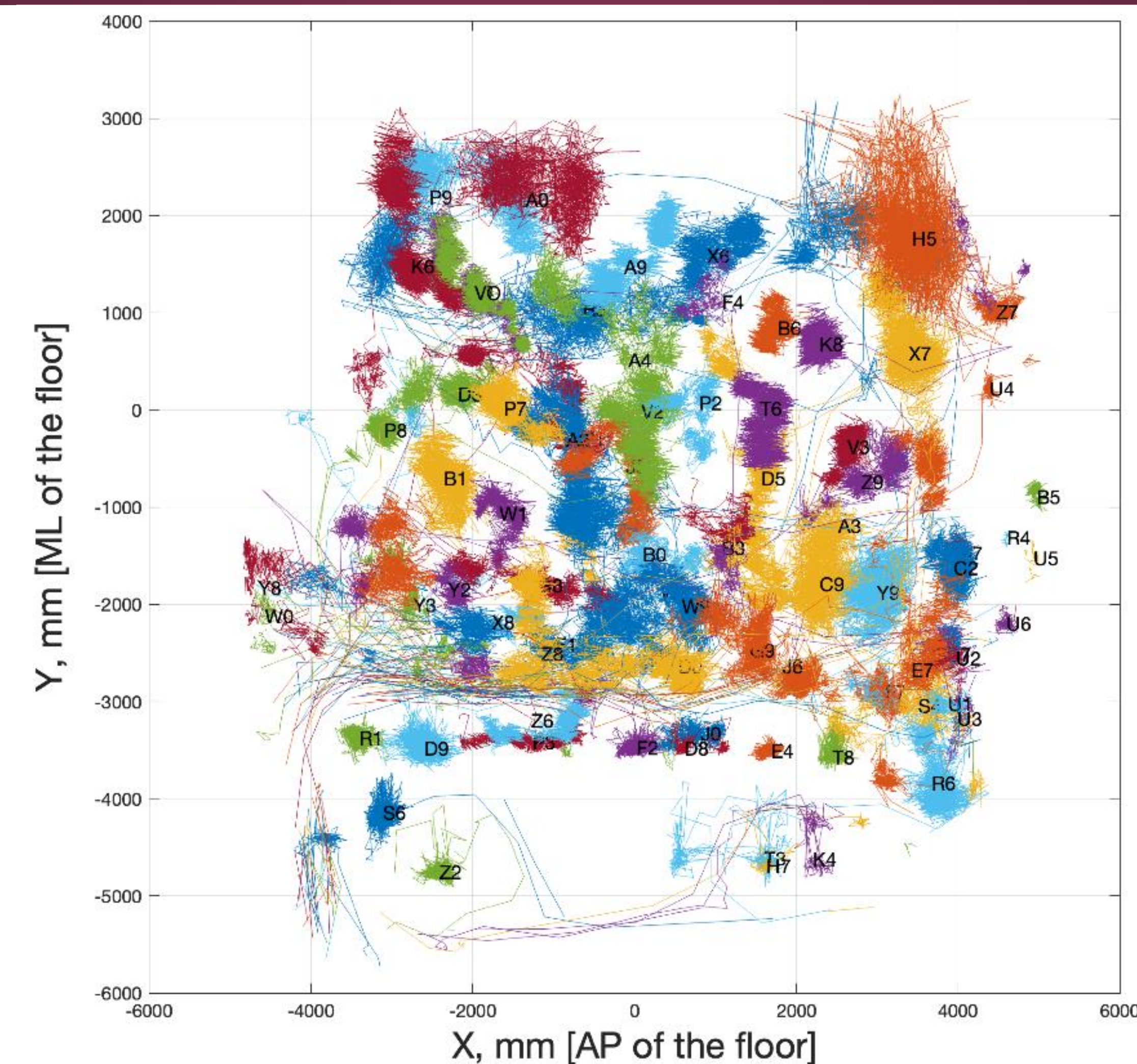
### RESEARCH QUESTION

**Do rhythm, bass, and social interactions compete or combine in driving movement on the dancefloor?**

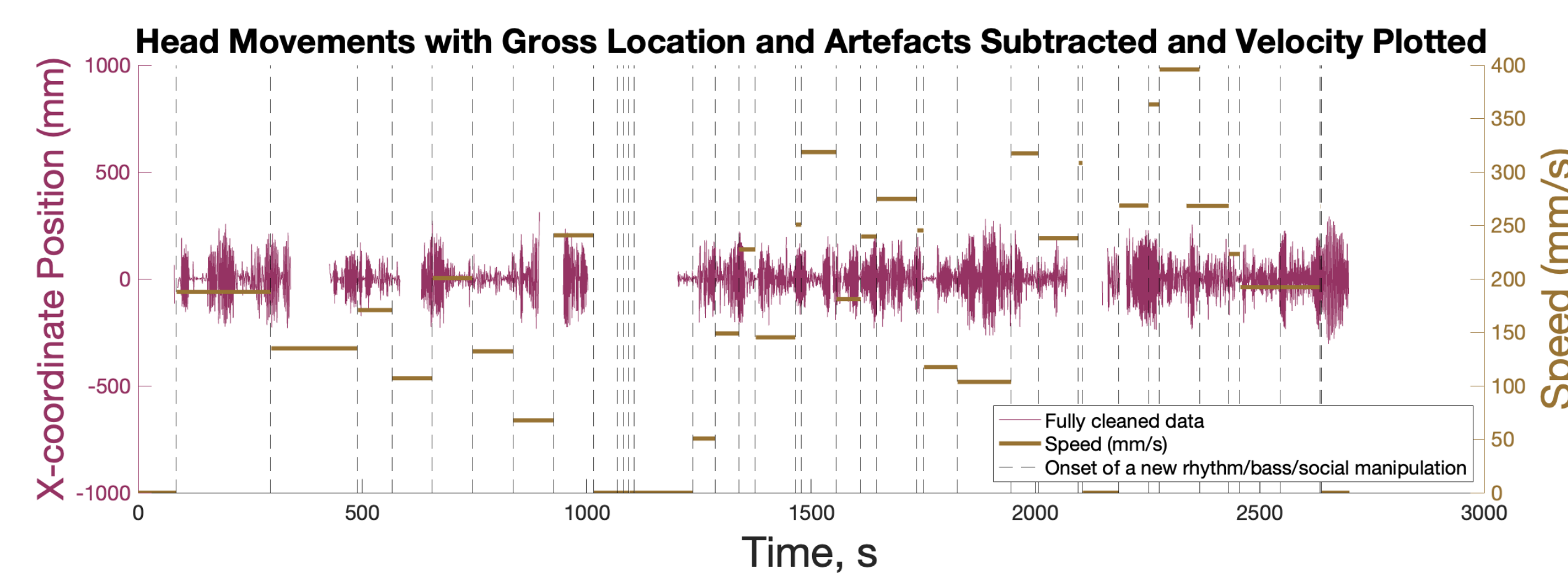
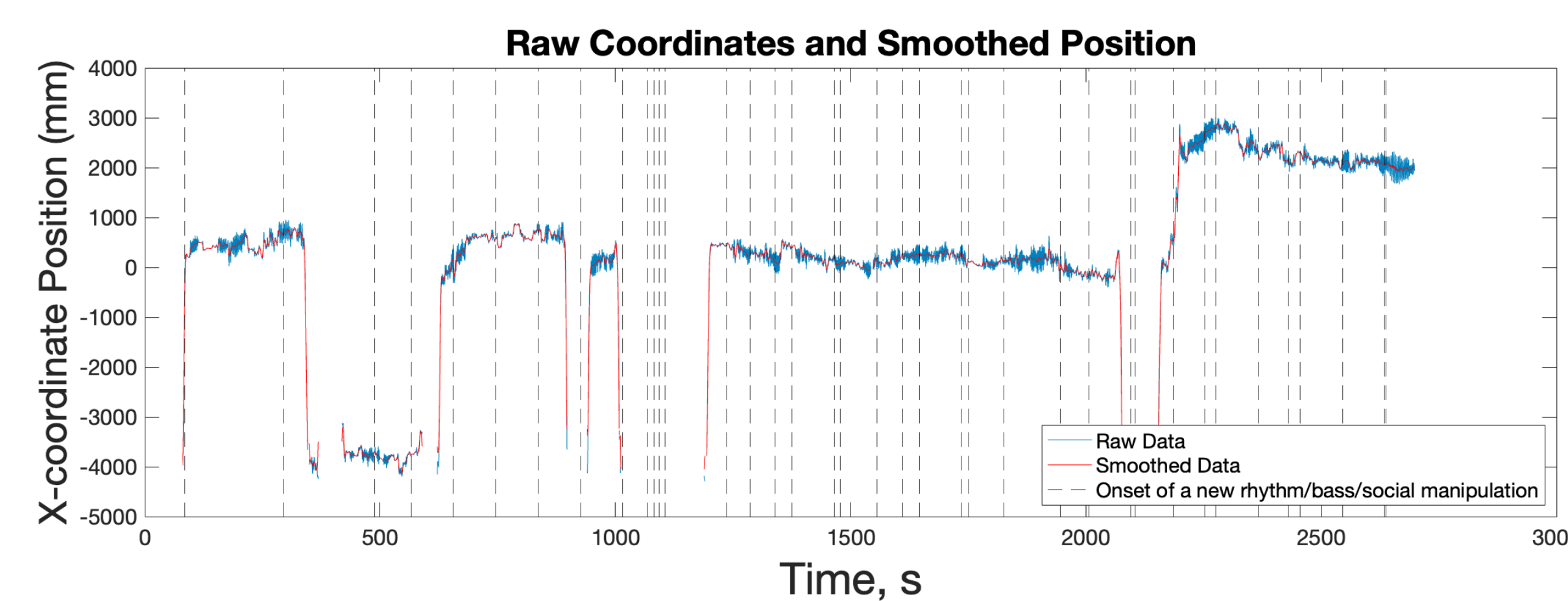
### METHODS

- Participants (n=65, M=37.9 years of age), plus confederates (n=10)
- 3 experimental variables; 12 conditions
  1. Social Movement Energy (low/high)
  2. Rhythm (drone/pulse/complex)
  3. Bass (low/high)
- 65 trials (M = 85 seconds)
- Each participant given a headband with two retroreflective markers which were trackable by the motion capture (MOCAP) cameras
- 25 MOCAP cameras; 100Hz capture rate
- 6 video cameras; aid in labelling data

### METHODS

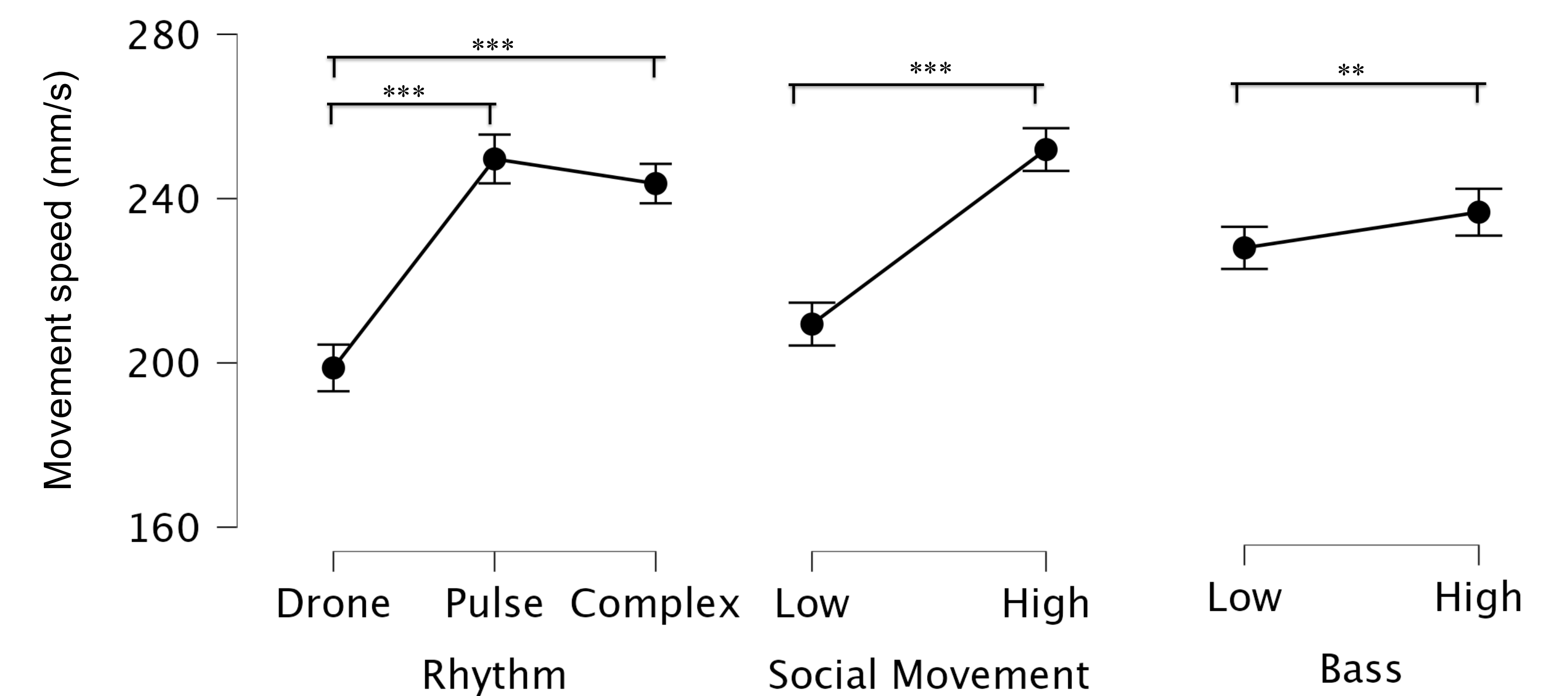


**Figure 2.** Aerial view of the dancefloor and all 75 participants' (alphanumeric codes) movement throughout the concert.

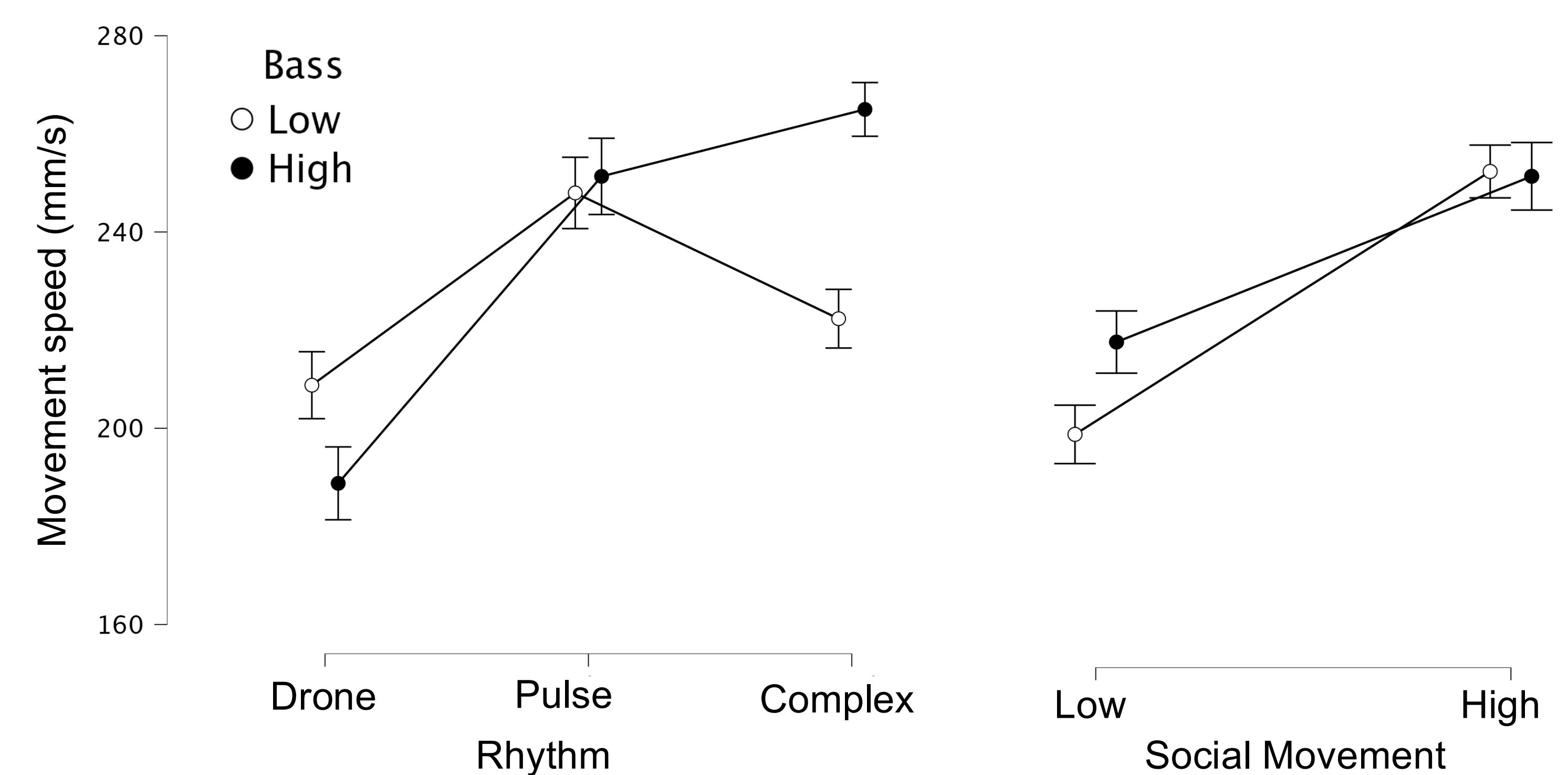


**Figure 3.** A) One participant's raw data fitted with a smoothing spline. B) The same participant's fully cleaned data, excluding artefacts and gross movement, with the corresponding velocity (mm/s).

### PRELIMINARY RESULTS



- Rhythm has a significant effect on movement speed ( $F_{2, 130} = 25.49, P < 0.001$ )
- Social movement also has a significant effect on movement speed ( $F_{1, 65} = 23.45, P < 0.001$ )
- Bass has a significant effect on movement speed ( $F_{1, 65} = 7.87, P = 0.007$ )



- Rhythm, bass and social movement interact ( $F_{2, 130} = 14.83, P < 0.001$ )
- The effect of rhythm depends on bass intensity—bass makes complex rhythms elicit greater movement speed but does not have the same effect on drone or pulse ( $F_{2, 130} = 14.29, P < 0.001$ )
- Social contagion can overcome the movement-reducing effect of low bass ( $F_{1, 65} = 10.87, P = 0.002$ )
- Preliminary analyses of questionnaire data indicate the use of psychoactive substances, proximity to friends, and friend group size were not related to movement speed or effects of rhythm, bass, or social contagion

### DISCUSSION & NEXT STEPS

- Preliminary results are consistent with our hypotheses and suggest that confederate dancing levels are contagious, and that complex rhythm and higher bass are associated with greater movement speeds. These factors were found to interact and may benefit from further analyses to understand how musical and social factors drive group dance at live concerts.
- Questionnaire data can be further explored by means of linear mixed effect models.
- Synchrony and group dynamics will be further investigated.

### References

- <sup>1</sup> Cameron, et al (2022) *Current Biology*
- <sup>2</sup> Witek, et al (2014) *PLoS One*
- <sup>3</sup> Dotov, et al (2021) *Quar J Exp Psych*

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