

Introduction

- Emotions are important for social attunement in joint tasks.
- Performing music collectively often elicits emotions.
- Individuals show large differences in spontaneous production rates (Zamm et al., 2016).
- Problem:** the effect of emotions on group synchronization, influenced by individual differences in Spontaneous Production Rates (SPR), remains underexplored.
- Hypothesis:** positive emotion will strengthen dyadic synchronization, and negative emotion will weaken it.

Methods

Participants: 70 healthy adults (18–45 yrs), non-musicians or amateurs (<2 yrs training), with no hearing or neurological issues.



Within-subject Design:
2 (Positive/Negative emotions) x 2 (Matched/Mismatched blocks)

Tasks:

- Spontaneous Production Rate (SPR):** participants produce a familiar melody (e.g., Mary Had a Little Lamb) at a steady comfortable rate.
- Synchronization/Continuation (2x2 design):** Participants produce an unfamiliar (simple) melody together with instructions to beat a fictitious “average” score with pre-programmed feedback.

Positive/Negative feedback emotion induction (Smykovskiy et al., 2024):

"Well done! You and your partner succeeded."
"That's too bad! You and your partner failed."

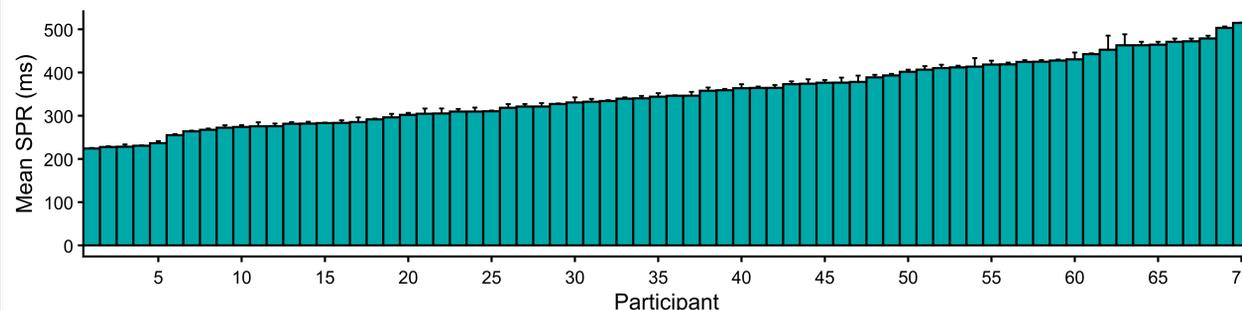
Matched/Mismatched Feedback across partners heard individually over headphones

Social Interaction Ratings: arousal, pleasantness, social bonding, perceived success.

The order of Matched and Mismatched blocks is counterbalanced, and emotion-induction trials are randomized. Participants complete no-feedback blocks before and after the feedback trials.

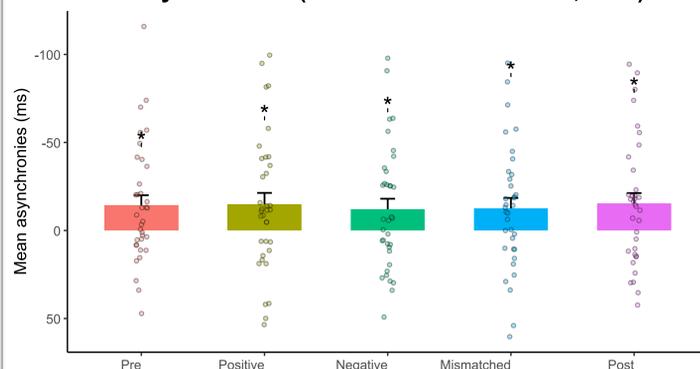
Results

Spontaneous Production Rates



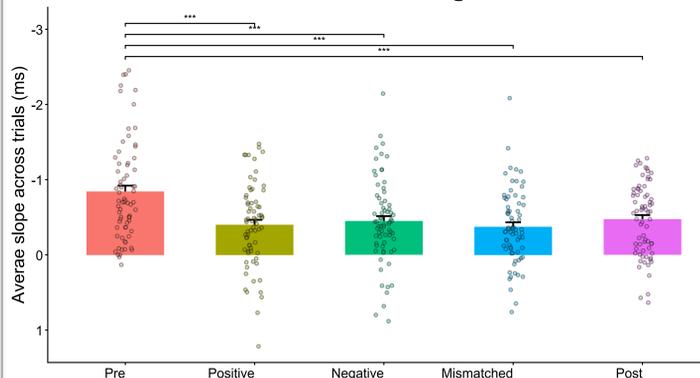
SPR values were consistent within individuals but varied largely across participants (230%).

Asynchronies (Faster - Slower Partner, SPR)



One-sample *t*-tests ($H_0: \mu = 0$, one-tailed, Holm-corrected) showed significantly negative asynchronies in all conditions, indicating faster-SPR participants tapped earlier. A repeated-measures ANOVA showed no significant differences between conditions ($p = .738$).

Joint Rushing



A repeated-measures ANOVA showed a significant effect of condition ($p < .001$). Post-hoc tests (Holm-corrected) showed steeper slopes in the Pre block than in all emotion blocks ($p < .001$), indicating that participants rushed less after the first emotion induction (Matched or Mismatched).

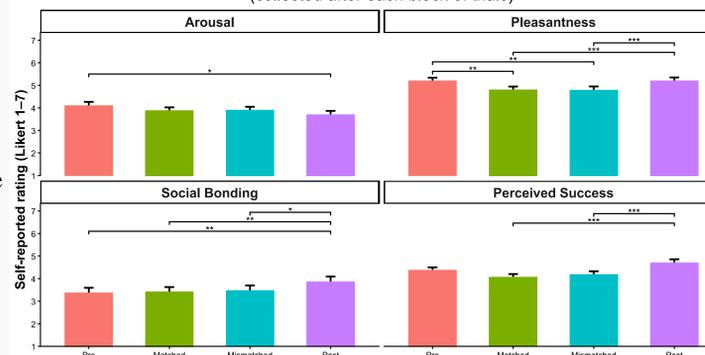
Arousal: Significant effect of condition ($p = .016$), with higher arousal in the Pre than Post block ($p = .029$), showing a pattern similar to joint rushing.

Pleasantness decreased under feedback compared to no-feedback ($p < .001$), suggesting that Negative emotion induction may have outweighed Positive effects.

Social Bonding was higher in Post than Pre, Mismatched and Matched ($p < .05$). Negative emotion induction during Mismatched and Matched blocks may have hindered social bonding.

Social Interaction Ratings

(collected after each block of trials)



Perceived Success was higher in Post than in Mismatched or Matched blocks ($p < .001$), likely driven by the absence of negative emotion induction in Post block, as asynchrony performance did not differ between conditions.

Discussion

- Emotion induction did not significantly affect dyads' synchronization.
 - Asynchrony patterns in synchronization-continuation partner task reflected individuals' intrinsic tempo tendencies (Zamm et al., 2016; Palmer et al., 2019).
 - Joint production rates showed speeding in the joint task, consistent with Joint Rushing (Wolf & Knoblich, 2022). Speeding decreased across trials.
 - Arousal ratings were highest at the beginning and declined over time, consistent with the reduction in speeding. Findings suggest that elevated Arousal may have driven early rushing, consistent with the arousal-induced joint rushing interpretation (Wolf et al., 2019).
 - Pleasantness and Social Bonding decreased under Negative emotion induction (Matched/Mismatched), while Perceived Success was highest after these blocks in the Post. These results suggest that negative feedback dampened emotional states and connection, aligning with the negativity bias (Rozin & Royzman, 2001), whereby negative emotions exert stronger influence than positive ones.
- Future work:**
- Future work should examine how arousal and individual SPR differences jointly influence coupling dynamics over time.

References

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Acknowledgments

