

Audiovisual integration in Musicians vs. Non-musicians: improved precision and flexibility in audiovisual temporal processing

Subin Jeon, Hyun Ji Kim, & Chai-Youn Kim / School of Psychology, Korea University, Korea.



INTRODUCTION

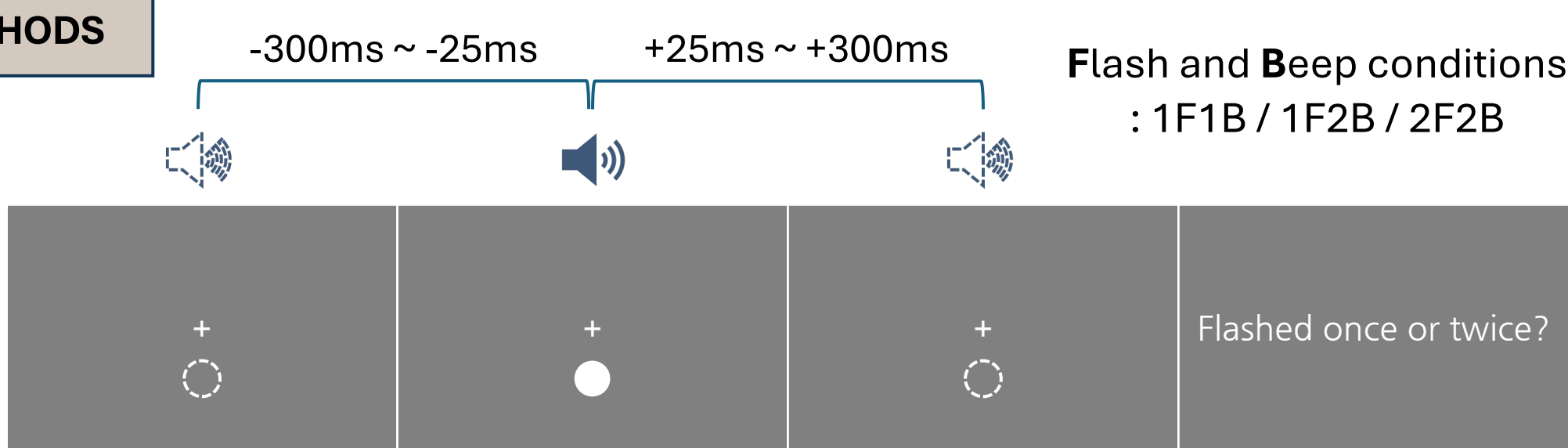
Previous research suggests that musicians exhibit enhanced audiovisual temporal processing compared to non-musicians, as evidenced by a narrower temporal binding window (Bidelman, 2016). High multisensory temporal acuity has also been associated with reduced sensory recalibration. This study investigates group differences between musicians* and non-musicians in these two aspects of audiovisual temporal processing.

*those who majored in an instrument at a Seoul-based college of music and had over 10 years of formal training

SOUND-INDUCED FLASH ILLUSION (SIFI)

RQ: Are **musicians** less susceptible to SIFI than **non-musicians**, due to their enhanced precision in audiovisual temporal processing?

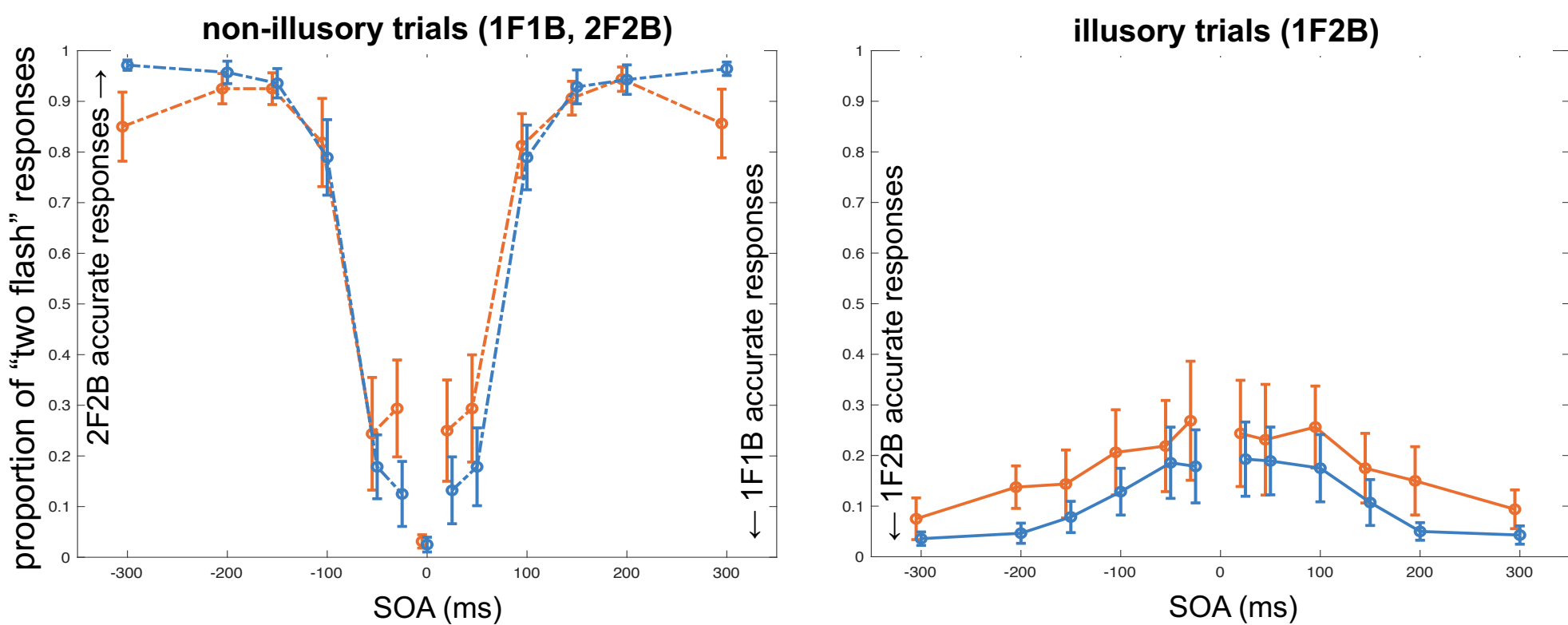
METHODS



Task: Participants responded whether they had seen one or two flashes. (2-AFC)

RESULTS

8 non-musicians (5 male, 24.5 yrs), **14 musicians** (1 male, 30.3 yrs)

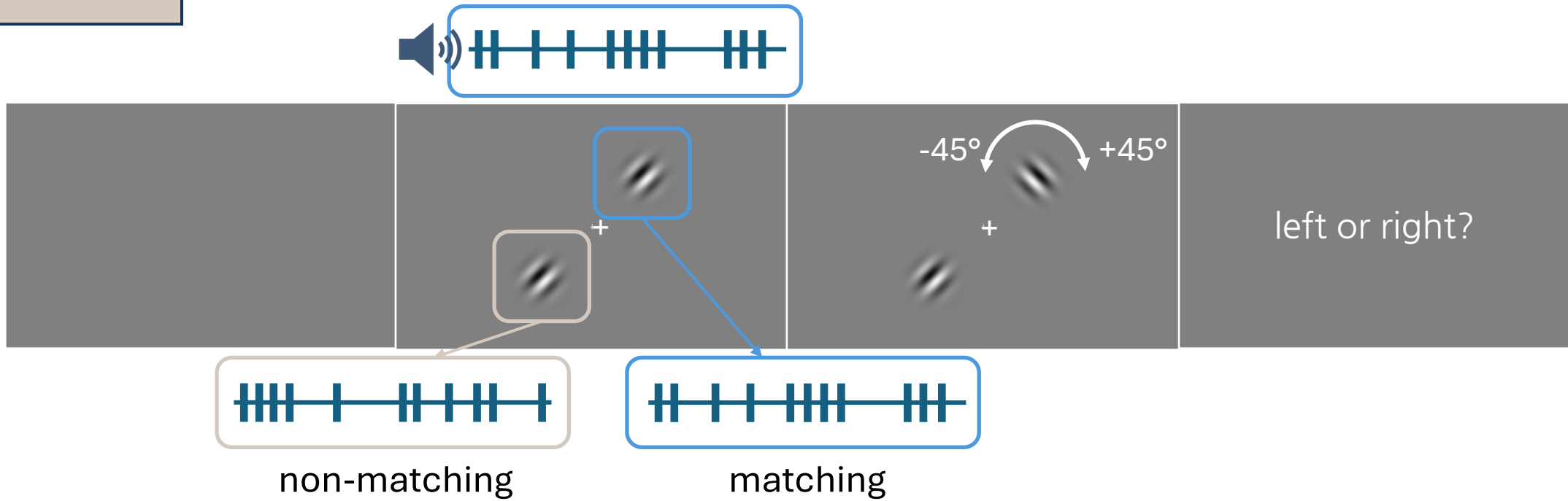


- Participants experienced the illusion. [$p < .05^*$]
- Group differences (**non-mus** vs **mus**) were statistically insignificant. [$p = .497$]

AUDIOVISUAL CORRESPONDENCE DETECTION TASK

RQ: Do **musicians** perform better in the audiovisual correspondence detection task (Denison et al. 2013) than **non-musicians**, due to enhanced sensory recalibration abilities?

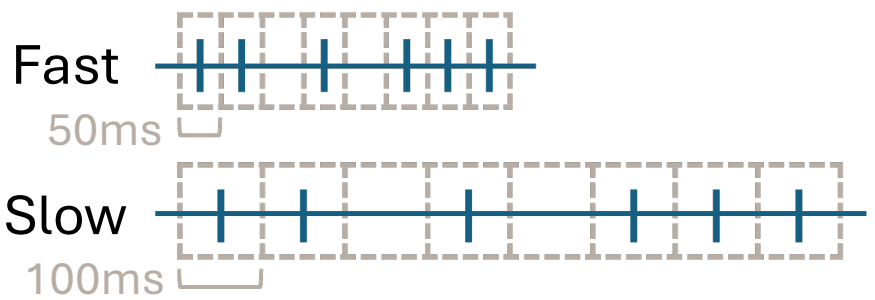
METHODS



Task: Participants chose the oriented grating that oscillated in the same rhythm as the concurrently presented stream of beeps. (2-AFC)

CONDITIONS: Rate (2) x Lag (2)

- Rate:** the smallest time bin in which a single flip or beep can occur.



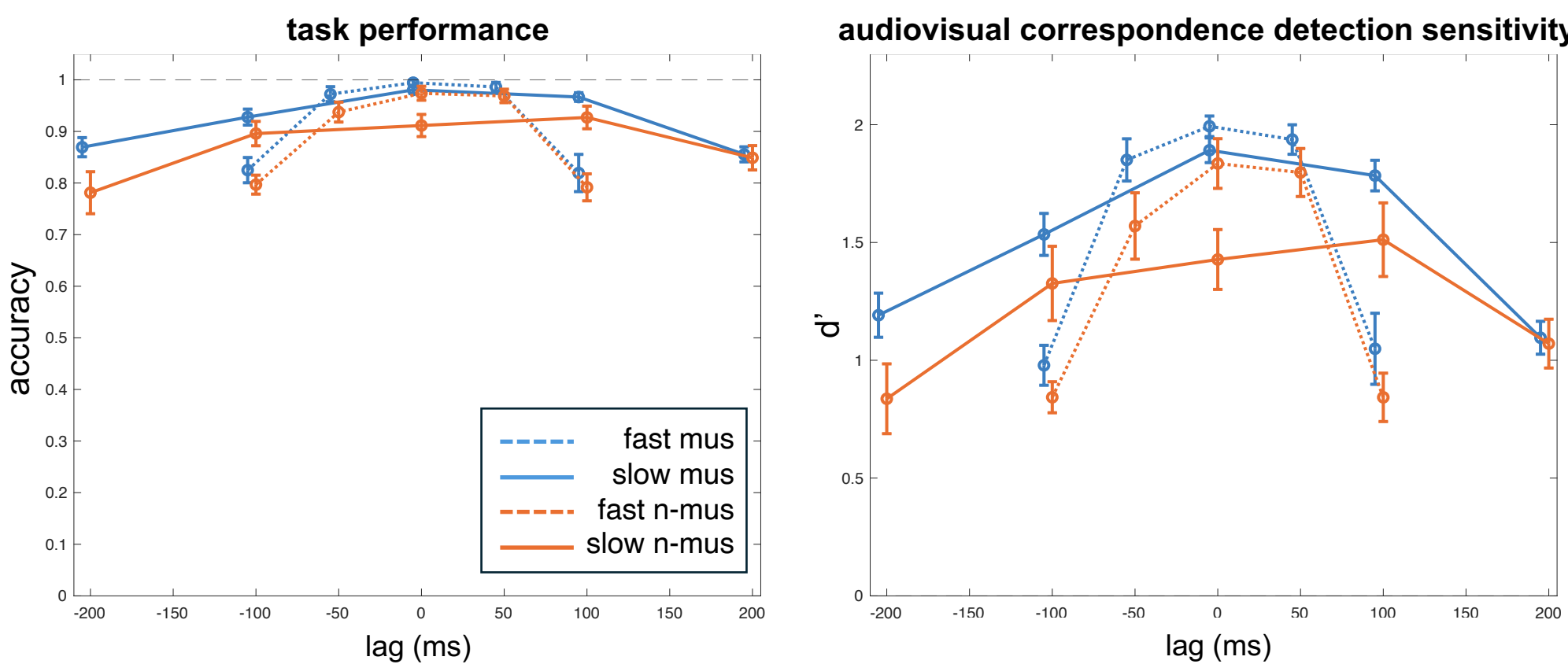
- Lag:** the time bin difference between the visual and auditory streams.

rate \ bins	-2	-1	0	+1	+2
Fast	-200ms	-100ms	0	+100ms	+200ms
Slow	-100ms	-50ms	0	+50ms	+100ms

auditory precedes \leftarrow | \rightarrow auditory follows

RESULTS

8 non-musicians (5 male, 24.63 ± 4.17 yrs), **15 musicians** (1 male, 30.3 ± 5.56 yrs)



- No significant effect of rate was found. [$p = .188$]
- Performance accuracy [$p < .001^{***}$] and sensitivity [$p < .001^{***}$] were higher for shorter vs. longer lags.
- Musicians** outperformed **non-musicians**, showing better accuracy [$p = .042^*$] and higher sensitivity [$p = .015^*$].

FUTURE DIRECTIONS

multisensory recalibration or unisensory rhythm processing?

- We plan to include unisensory rhythm tasks with the same temporal structure as the current task.
- This way, we can dissociate multisensory recalibration from unisensory rhythm sensitivity and clarify whether musicians have enhanced temporal processing.

CONCLUSION

The findings of this study suggest that musicians' enhanced audiovisual temporal processing is reflected not only in abilities to parse temporally contingent audiovisual information but also in integrating temporally disparate audiovisual information. These results may indicate that musical training improves the ability to flexibly adjust audiovisual temporal processing in accordance with task demands.

Bidelman, G. (2016). Musicians have enhanced audiovisual multisensory binding: experience- dependent effects in the double-flash illusion. *Exp Brain Res.* 234:3037-3047.

Denison, R. et al. (2013). Temporal structure and complexity affect audio-visual correspondence detection. *Front. Psychol.* 3:619

Supported by: NRF2023R1A2C2007289