

# Investigating Blocked vs Interleaved Practice for Musical Style Recognition in Musicians and Non-Musicians



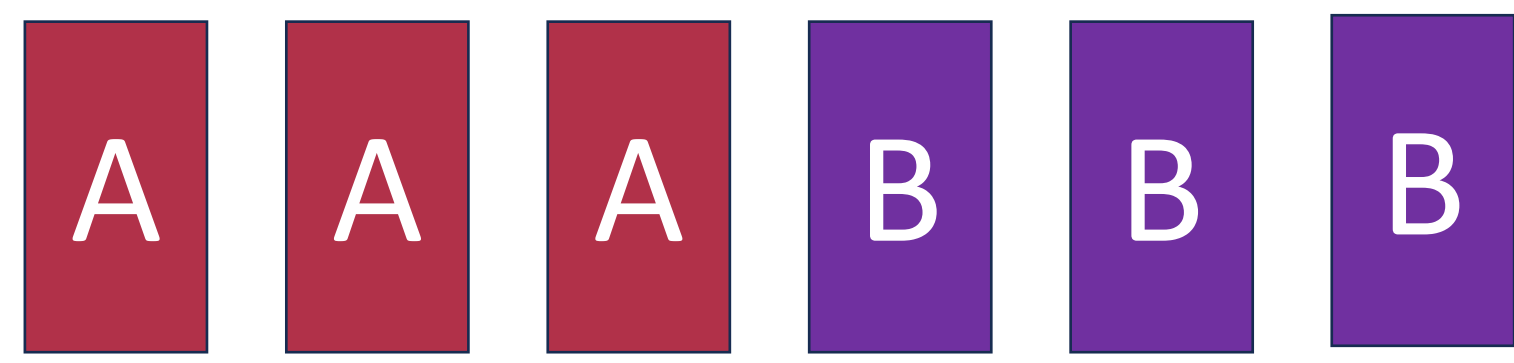
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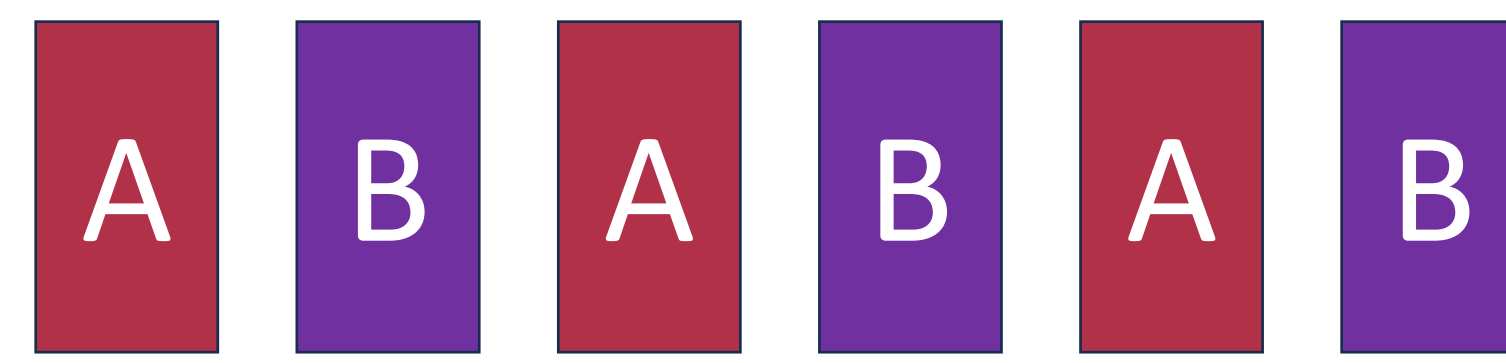
## Background

- Blocked practice is often used during learning.
- Contextual interference effect: Switching between tasks/categories can make learning harder in the moment, but increase long-term learning

### Blocked practice:



### Interleaved practice:



- Studied in various contexts, including sports performance<sup>1,2</sup>, math problem solving<sup>3</sup>, artistic style/category learning<sup>4,5</sup>

**Goal:** Assess whether interleaved practice can benefit learning of musical styles immediately and 24 hours after practice.

## Hypotheses:

- Performance: Interleaved > Blocked
- Performance in the interleaved vs blocked condition will be better on the second day (after consolidation) than on the first day.

## Methods

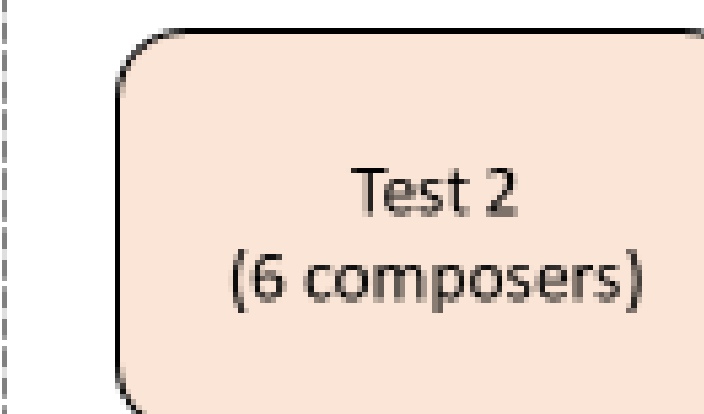
- Practice: Learned subset of composer styles in a blocked or interleaved order
- Test: Identify composer of novel excerpts
- Stimuli (musical styles)
  - Studies 1-4 (S1-S4): 20<sup>th</sup> century (Bartok, Cage, Debussy, Ligeti, Shostakovich, Webern)
  - Study 5 (S5): Classical (Boccherini, Dittersdorf), Romantic (Dvorak, Nielsen) and 20<sup>th</sup> century (Bartok, Shostakovich)
  - Study 6 (S6): Jazz pianist improvisation styles (Corea, Evans, Peterson, McPartland, Mehlidau, Monk)

### Study outline for S1, S2, S3

#### Session 1 outline

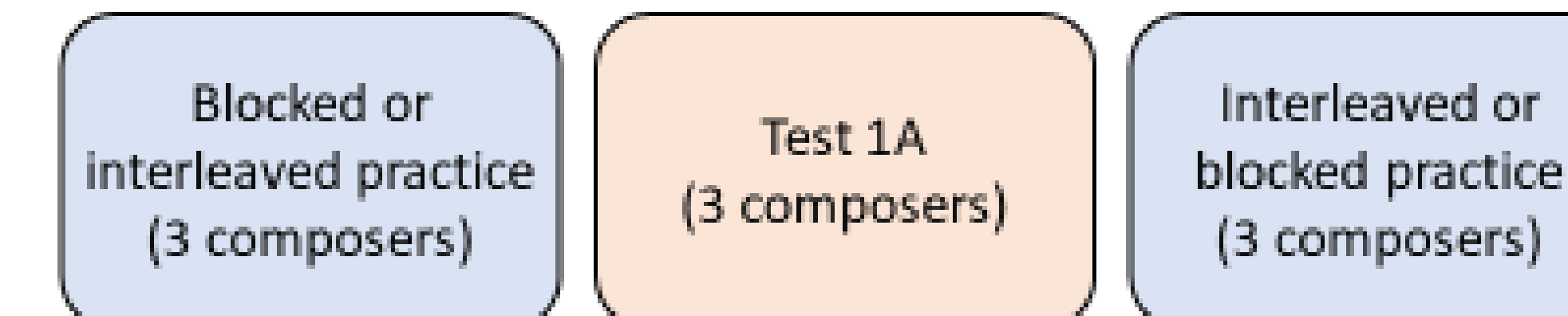


#### Session 2 outline (next day)

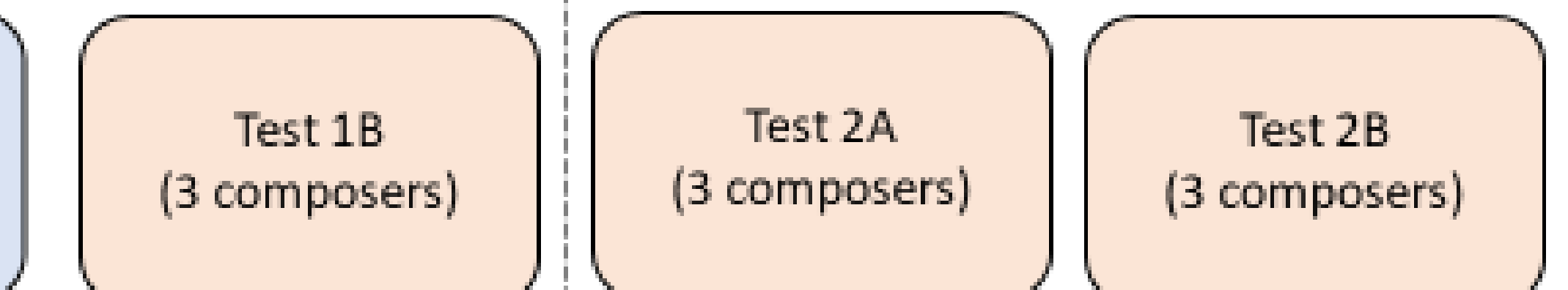


### Study outline for S4, S5, S6

#### Session 1 outline



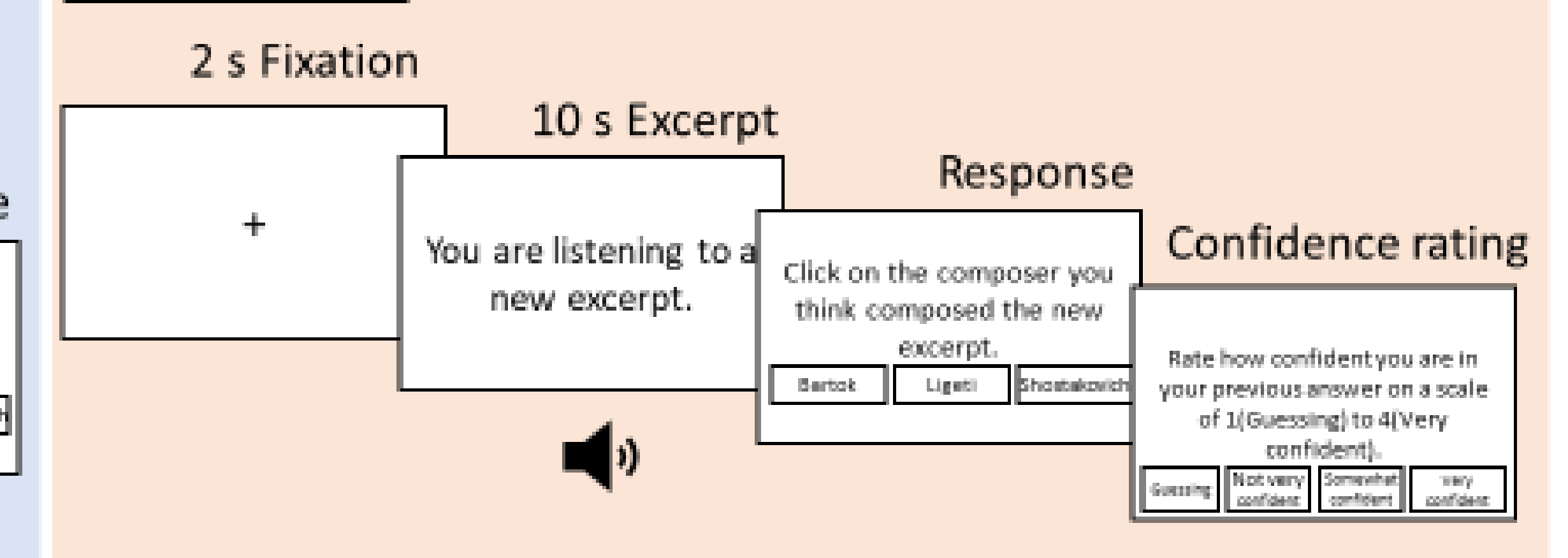
#### Session 2 outline



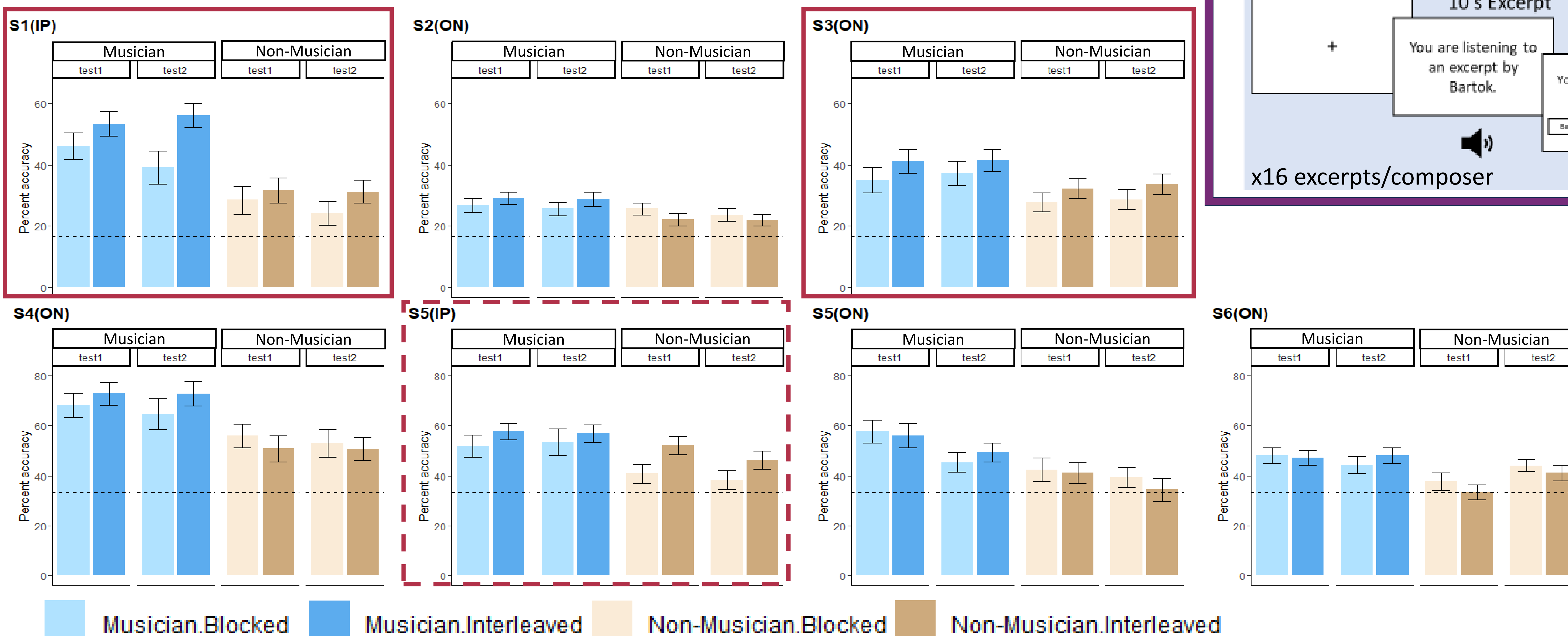
### Practice Trial Outline



### Test Trial Outline



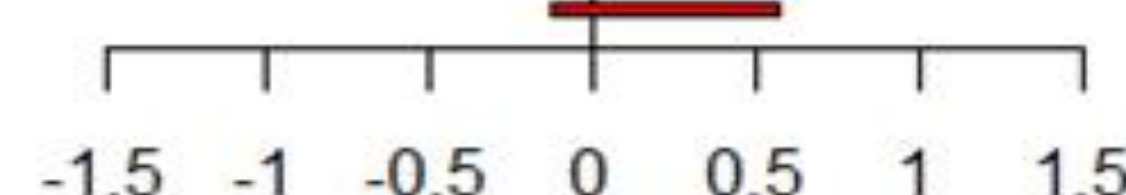
## Results



## Meta-analysis: Significant effect for interleaved > blocked practice

Study	SMD	SE(SMD)	Population	Testing	Standardised Mean Difference	SMD	95%-CI	Weight
S6-Jazz	-0.3156	0.2790	NM	IP		-0.32	[-0.86; 0.23]	6.6%
S5-Tonal	-0.2208	0.3820	NM	On		-0.22	[-0.97; 0.53]	3.9%
S4-Sep	-0.1747	0.2966	NM	On		-0.17	[-0.76; 0.41]	6.0%
S2-Online	-0.1715	0.1317	NM	On		-0.17	[-0.43; 0.09]	0.0%
S5-Tonal	0.0831	0.3870	M	On		0.08	[-0.68; 0.84]	3.8%
S6-Jazz	0.1197	0.2652	M	IP		0.12	[-0.40; 0.64]	7.1%
S2-Online	0.1565	0.1126	M	On		0.16	[-0.06; 0.38]	0.0%
S3-NFB	0.2224	0.1035	M	On		0.22	[0.02; 0.43]	21.6%
S3-NFB	0.2498	0.1509	NM	On		0.25	[-0.05; 0.55]	15.3%
S5-Tonal	0.2598	0.3271	M	IP		0.26	[-0.38; 0.90]	5.1%
S1-Original	0.2830	0.2965	NM	IP		0.28	[-0.30; 0.86]	6.0%
S4-Sep	0.2956	0.2574	M	On		0.30	[-0.21; 0.80]	7.5%
S1-Original	0.6191	0.1683	M	IP		0.62	[0.29; 0.95]	13.5%
S5-Tonal	0.8218	0.3878	NM	IP		0.82	[0.06; 1.58]	3.8%
<b>Random effects model (HK)</b>						<b>0.22</b>	<b>[0.05; 0.40]</b>	<b>100.0%</b>
<b>Prediction interval</b>							<b>[-0.13; 0.58]</b>	

Heterogeneity:  $I^2 = 28\%$ ,  $p = 0.17$



### Results summary:

- Musicians > Non-musicians in all studies except S2
- Effect of order (In>Bl) in S1, S3, S5 IP (trending)
- Effect of day
  - S5 ON: D1 > D2
  - (S6) : Non-musicians D1 < D2

### Meta-analysis subgroup analysis:

Significant effect of interleaving for musicians ( $g = 0.31$ ,  $CI = [0.10; 0.51]$ ) than for non-musicians ( $g = 0.10$ ,  $CI = [-0.29; 0.50]$ )

## Discussion & Conclusion

Is interleaved better than blocked? Yes! But...

- More benefit for **musicians** than non-musicians
  - Advantage of prior experience?
- Might depend on the **task difficulty**
  - Little/no advantage when task is too difficult
  - Similarity between/within categories
- Effects were similar across testing days

Is there an effect of online vs in-person?

- Difference in data quality depending on recruitment source
- No consistent evidence for differences in effects

## References

- 1- Magill, R. A. & Hall, K. G. A review of the contextual interference effect in motor skill acquisition. *Human Movement Science* 9, 241–289 (1990).
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- 3- Taylor, K. & Rohrer, D. The effects of interleaved practice. *Appl. Cognit. Psychol.* 24, 837–848 (2010).
- 4- Brunmair, M. & Richter, T. Similarity matters: A meta-analysis of interleaved learning and its moderators. *Psychological Bulletin* 145, 1029–1052 (2019).
- 5- Wong, S. S. H., Low, A. C. M., Kang, S. H. K. & Lim, S. W. H. Learning Music Composers' Styles: To Block or to Interleave? *Journal of Research in Music Education* 68, 156–174 (2020).

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