Co-representation vs. attenuation: whether motor representation of a distractor makes it more or less distracting

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TL; DR

In a synchronization task with a **distractor**, we tested whether inducing a **motor representation** of the distractor **made it more distracting**.

We found **no effects** of motor representation on tapping asynchrony. We propose a new design to verify these results.

3' Speech
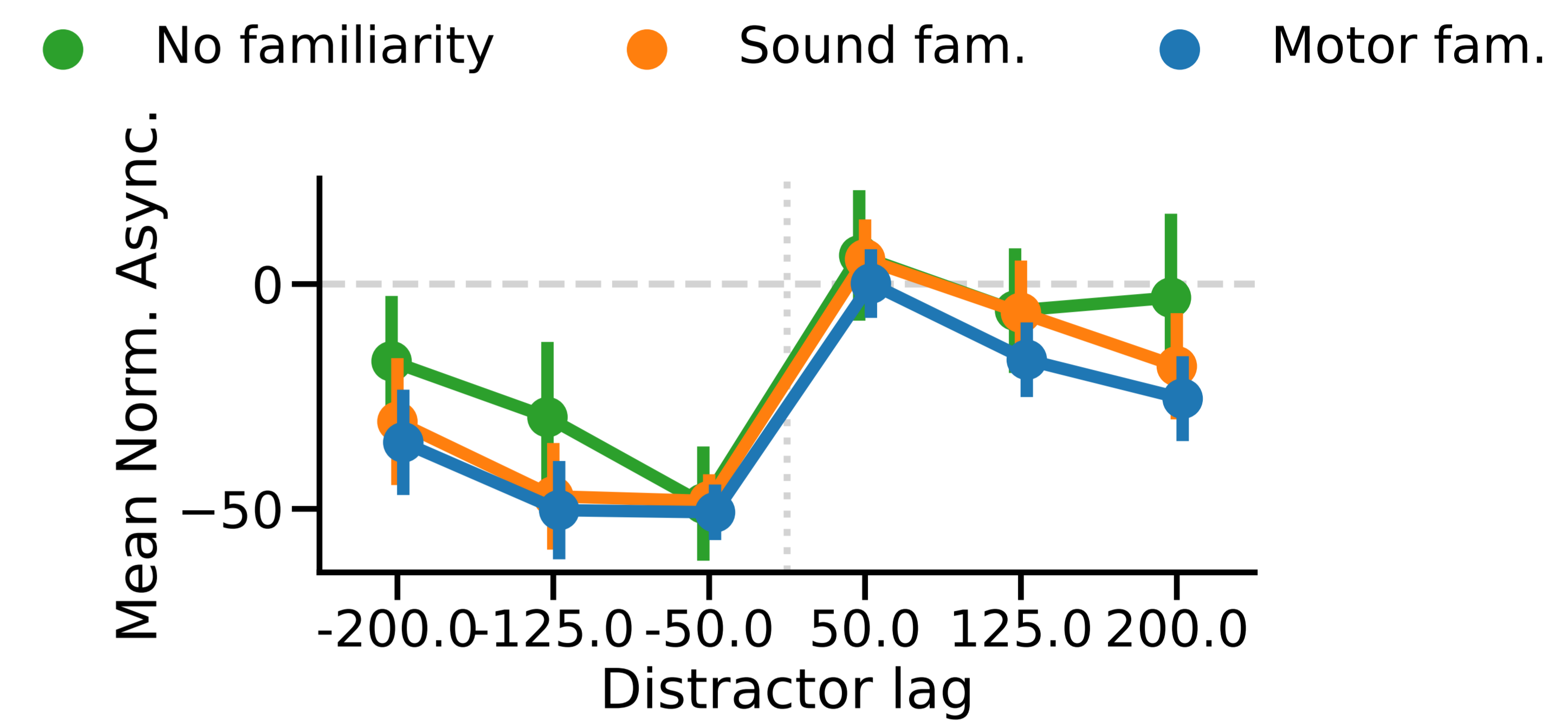
Previously...

- Humans can focus attention to relevant parts of a stimuli, ignoring distracting information (e.g.: visual: selective attention task, auditory: cocktail party).
- Yet, this ability is modulated by our internal representation of the task (Social simon effect [?]).
- In social interactions, we involuntary synchronize with each other (gait, leg swinging, rocking chairs) [?].
- During sensorimotor synchronization (SMS) tasks, a distractor signal can attract our tapping [??].

What's New

Question: is **involuntary synchronization** related to a **inner representation of the distracting** stimuli?

Proposal: test changes in tapping asynchrony given differently **primed representations** of a distractor in a SMS task.

- Participants synchronized to a target metronome while a lagged distractor metronome played.
- 3 primed representations of the distractor: *no familiarity*, *sound familiarity*, *motor familiarity*.

Did it work?

- We replicated distractor lag effects as found in ??.
- We found no effect of distractor familiarity condition in mean tapping asynchrony or tapping asynchrony variability.

Future work:

- To check for robustness, we propose a new design to avoid fading of the priming effect.
- An interaction with musical training may suggest further detailed data collection.

The Experiment

Experiment design

- Representation conditions are organized in blocks:
  no familiarity: the distractor was not heard before
  sound familiarity: the distractor was heard before
  motor familiarity: the distractor was produced before
- A priming task induces the representation condition.
- Priming and test tasks are interleaved in sub-blocks.

Priming tasks:

- COUNTING task (no familiarity/sound familiarity): participants hear a metronome continuation and indicate total number of sounds
- CONTINUATION task (motor familiarity): participants hear a metronome and continue it for a given number of sounds
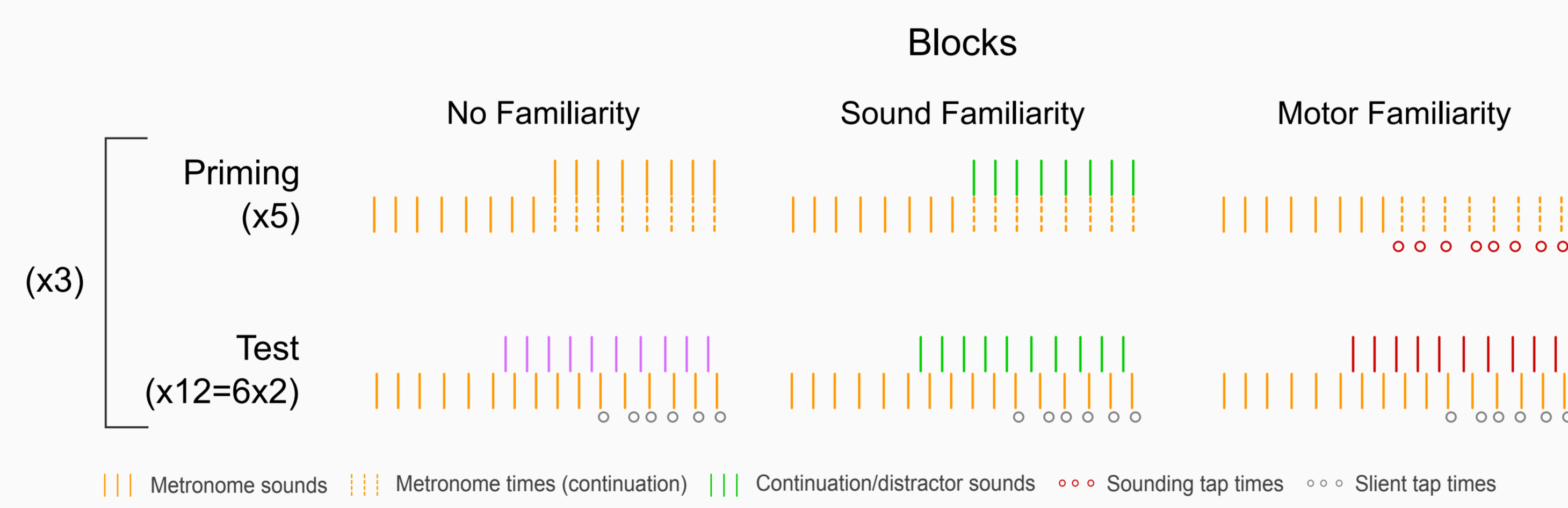
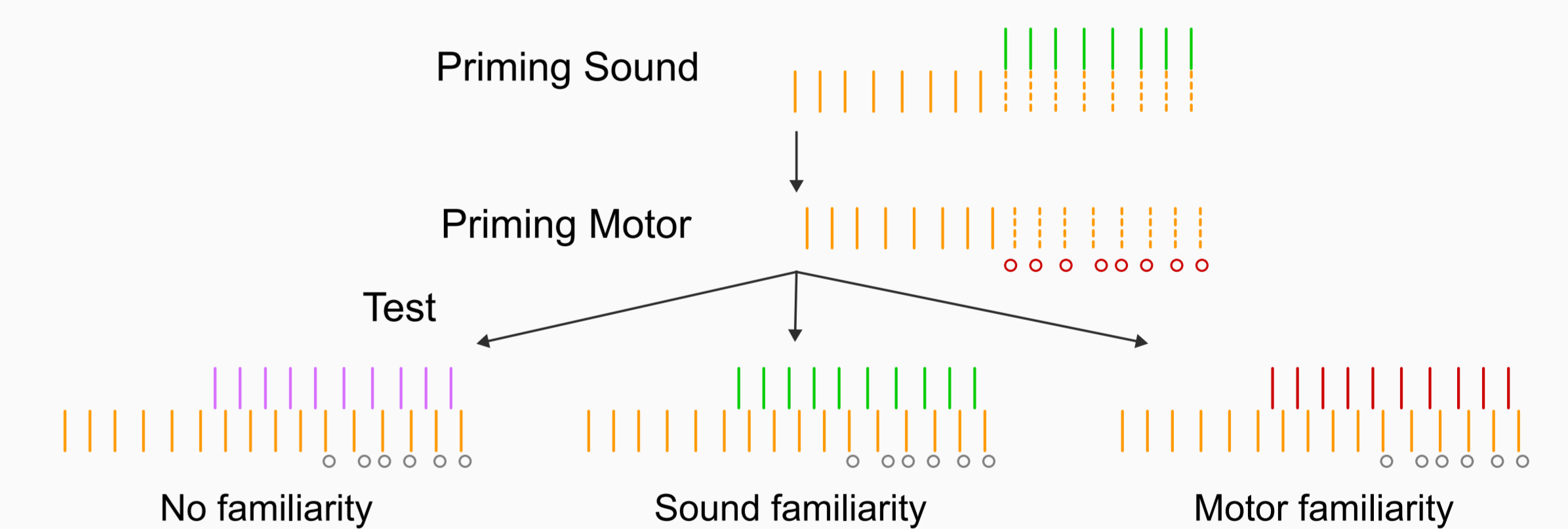### New design proposal

Concerns

- Sounds may not be discernable
- No familiarity condition fades as experiment progresses
- Test sub-blocks contain 12 trials during which the priming effect may fade

Proposal

- Prime before each test
- Equal tapping practice per test
- Representation sounds are heard twice as much as no familiarity

Details

Experiment details

Main task: synchronize tapping to a target metronome while a lagged distractor is sounding.

Asynchrony is measured from the last 8 taps. Trial negative mean asynchrony (NMA) is calculated from the metronome synchronization section and substracted.
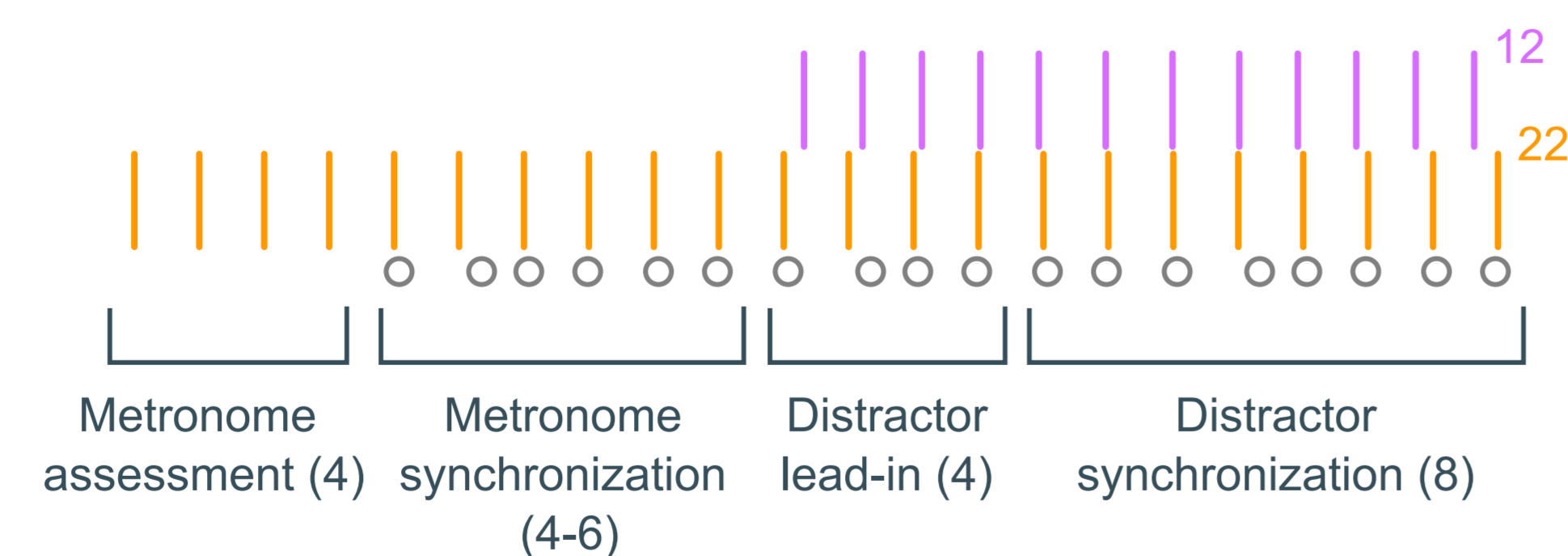
Participants

- Total participants = 24
- Participants after filtering = 22 (incomplete experiment)
- Gender: 8 man, 13 women, 1 NA

	Training years	Musial Instrument	Rhythmic Instrument
Low	1 or less	2	3
	2	4	2
Med	3	2	0
	4-5	0	3
High	6-9	2	2
	10 or more	9	1
	Total	19	11

Materials

- Target metronome was a 20ms sine wave at A3 (220hz)
- Distractor sounds were:
  - 40ms long
  - 2.5 ms attack time and 10 ms decay time
  - Banjo at C5
  - Glockenspiel at E5
  - Steel Drums at G5
- Sound assignment to condition was counter-balanced between participants
- Loudness of distractors were calibrated on a separate experiment (N=1) to match the target metronome sound
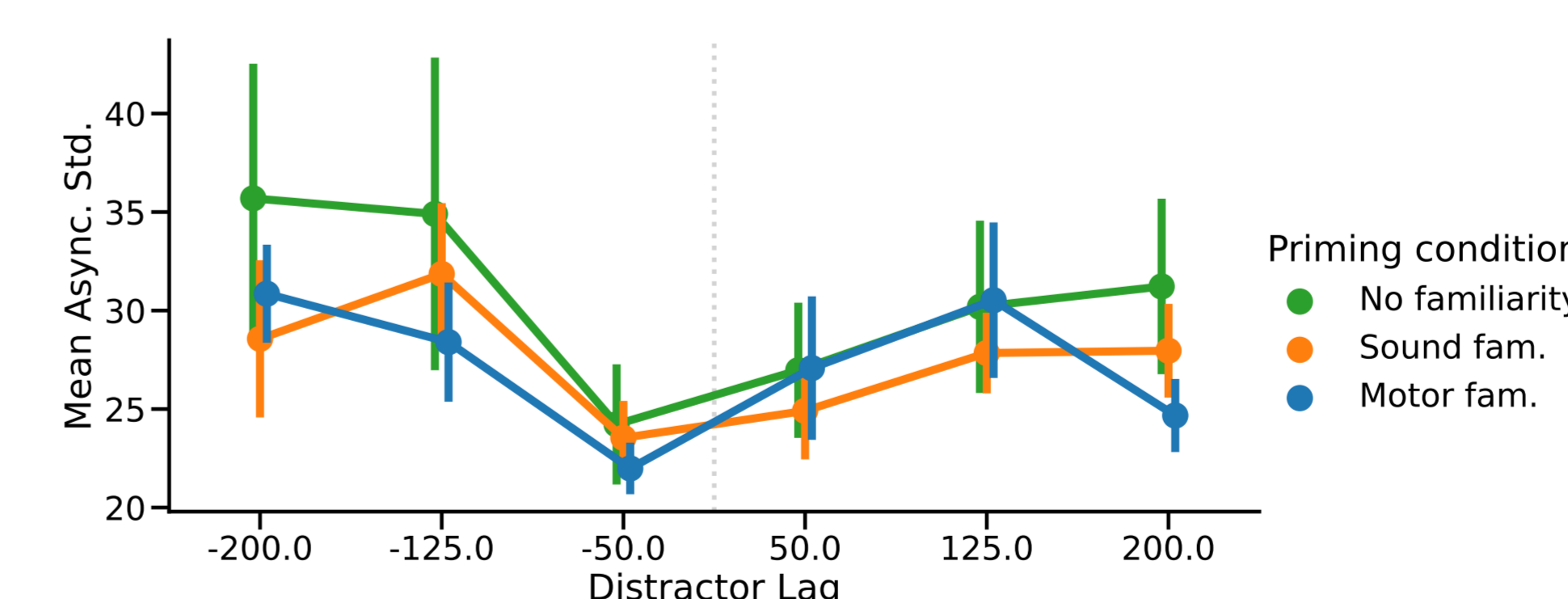
More results
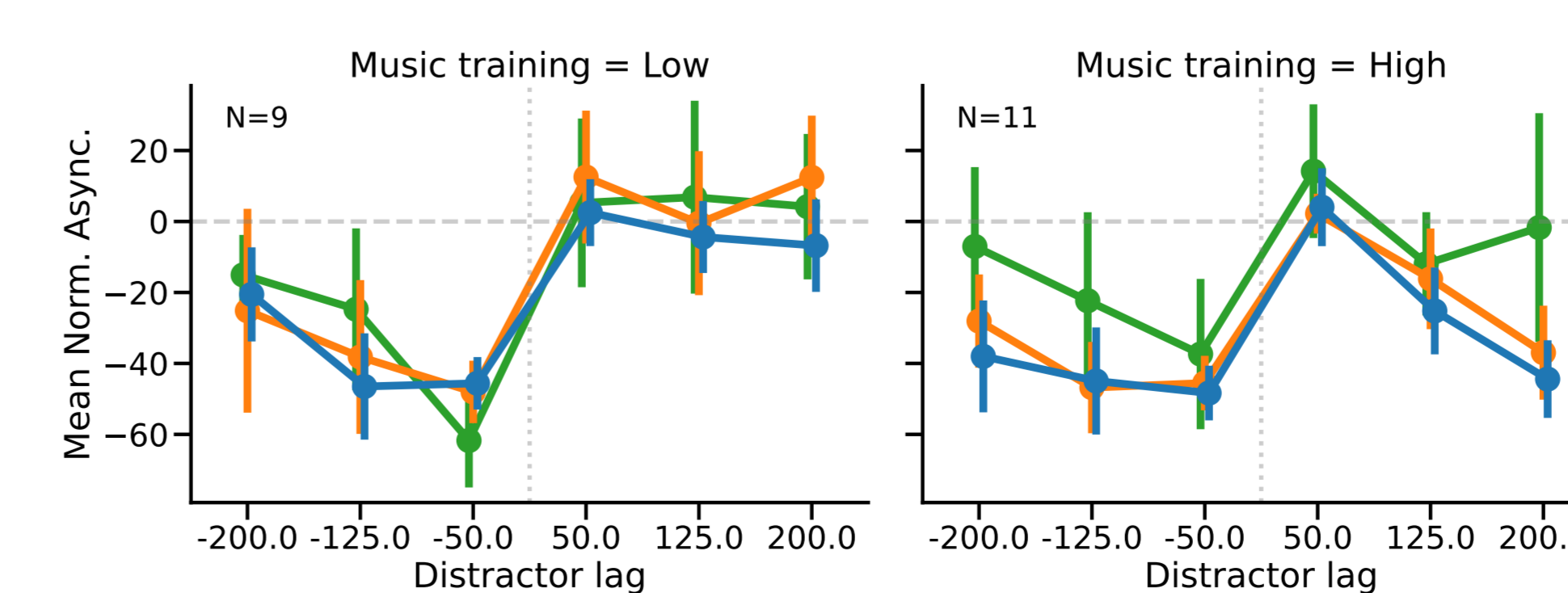

Figure 1. Mean standard deviation per condition.

Figure 2. Mean tapping asynchrony per condition separated by level of musical training.

Source	F	p-unc
0 condition	0.80	0.46
1 distractor_lag	13.22	0.00
2 condition * distractor_lag	0.90	0.54

(a) Two-way repated measures ANOVA for mean asynchrony.

Source	F	p-unc
0 condition	0.67	0.52
1 distractor_lag	3.90	0.00
2 condition * distractor_lag	0.57	0.84

(b) Two-way repated measures ANOVA for asynchrony std.

Source	F	p-unc
0 condition	0.77	0.47
1 distractor_lag	5.54	0.00
2 condition * distractor_lag	1.09	0.38

(c) Two-way repated measures ANOVA for mean asynchrony of highly trained participants.

References