

The Influence of the Musical Piece Familiarity Factor on Subjective Perception of its Duration

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Abstract

Subjective time duration is a complex phenomenon that normally involves interaction of different sensory modalities, as well as cognitive factors. Music perception is another fascinating phenomenon that involves hierarchically distributed brain circuitry implementing prediction-based coding [1]. We hypothesized that familiarity of a music piece interacts with brain's predictive mechanisms [2,3] and therefore may influence subjective time perception. If time duration perception reflects brain's efforts spent for tune's progression prediction, then familiar tunes should reduce the subjectively perceived time, at the same time if memory trace left by the tune affects the temporal judgement, the familiar and most recent should be perceived longer.

Methods

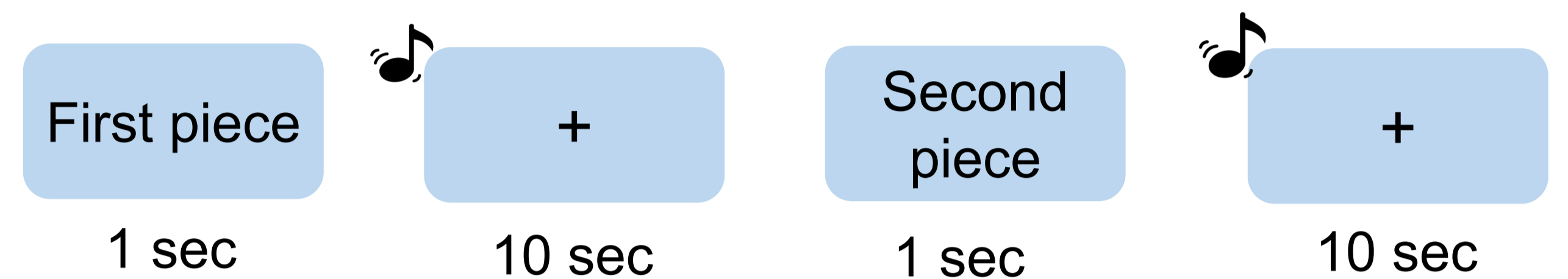
Participants: 31 healthy volunteers (19 males; average age 25.06) were asked to compare the subjective duration of two consecutive musical pieces (each 10 s long) and report which one was shorter. Next, they ranked the familiarity of the music on a scale from 1 to 4. Experiment was conducted online using Pavlovia platform.

Stimuli: 12 pairs with order familiar-familiar, 12 pairs with unfamiliar-unfamiliar, 12 pairs familiar-unfamiliar, 12 pairs unfamiliar-familiar.

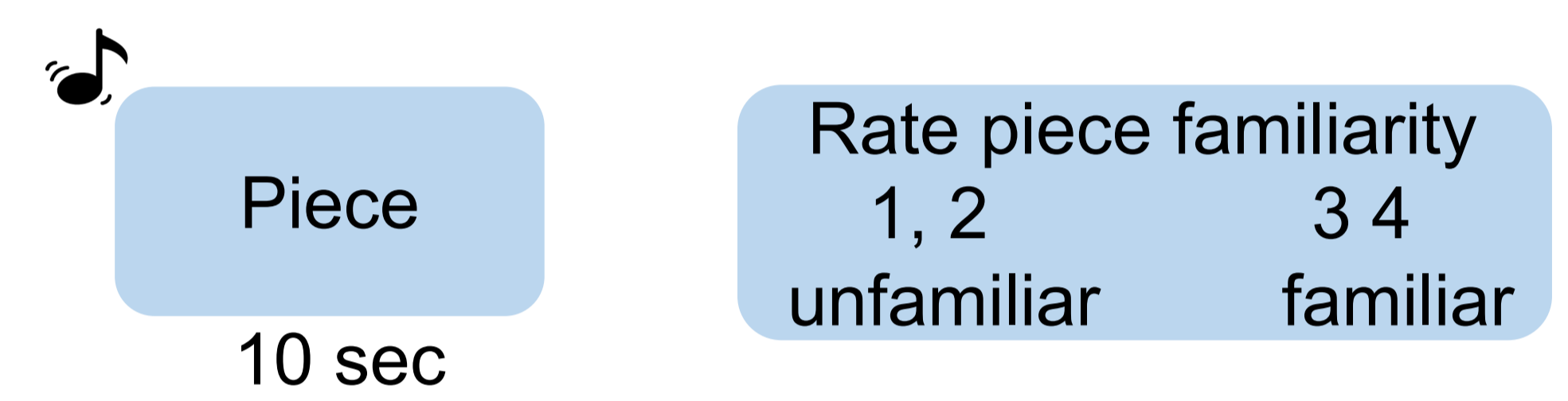
The tunes from children's cartoons and nursery rhymes were chosen as more familiar pieces, and sequences from solfeggio textbooks served as unfamiliar ones.

Procedure

Part 1



Part 2



Results

Table 1. Distribution of responses by group all groups pairs

Answer	1st < 2nd	1st > 2nd	1st = 2nd
(fam - unfam)	124	120	84
(unfam - fam)	183	136	81
(fam - fam)	143	132	105
(unfam - unfam)	161	109	79

The answer distributions of these four groups are not different: $p = 0,053$, $\chi^2 = 12.4133$.

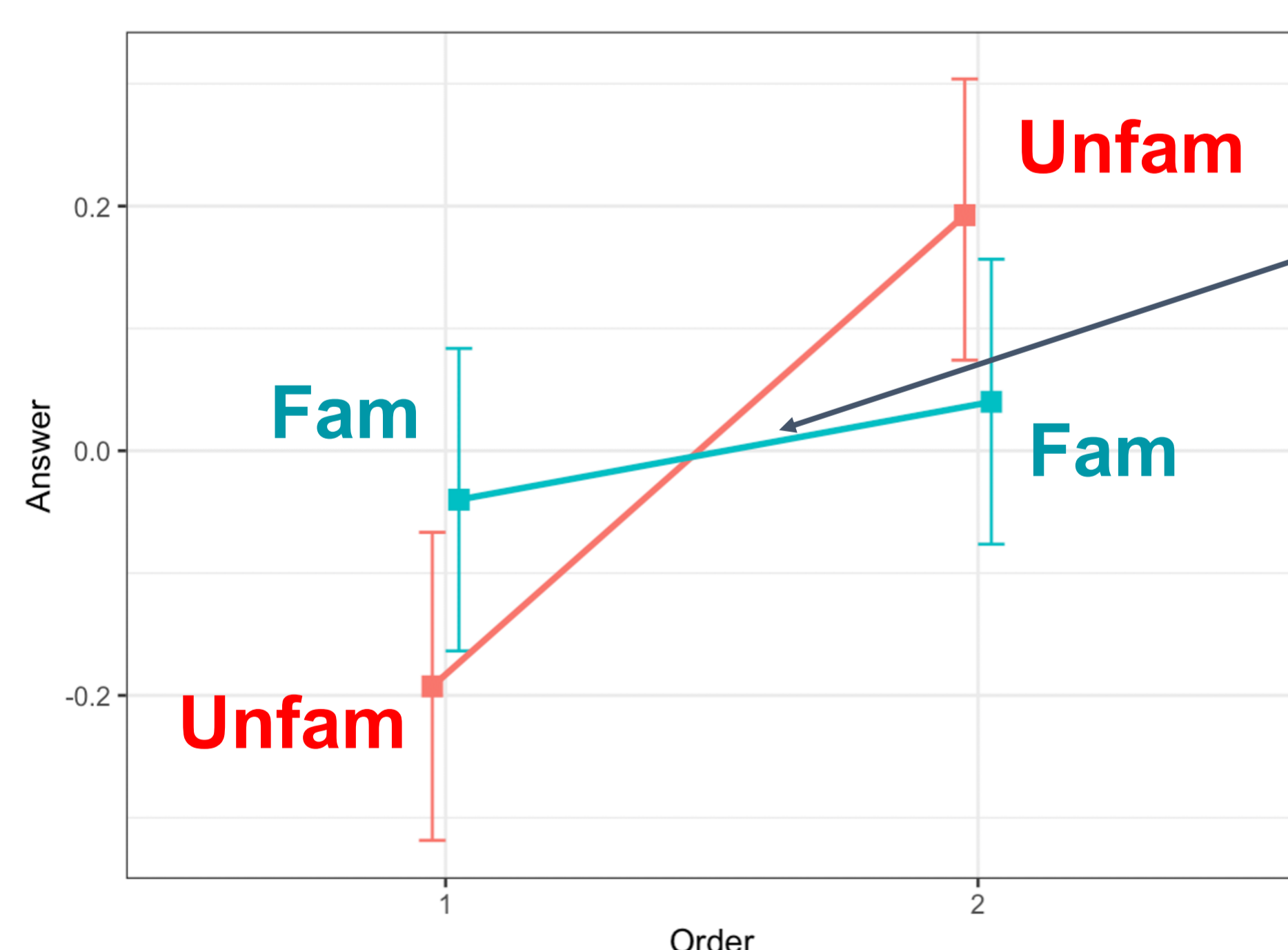


Figure 1. Order effect is strongest for Unfam-Unfam pairs

Table 2. Distribution of responses by group: (fam-unfam, fam-fam) and (unfam-fam, unfam-unfam)

Answer	1st < 2nd	1st > 2nd	1st = 2nd
(fam - fam, fam - unfam)	267	252	189
(unfam - unfam, unfam-fam)	344	245	160

The duration of the first unfamiliar tune is underjudged when it is followed by either unfamiliar or familiar tunes: $\chi^2 = 11,0671$, $p=0.0039$.

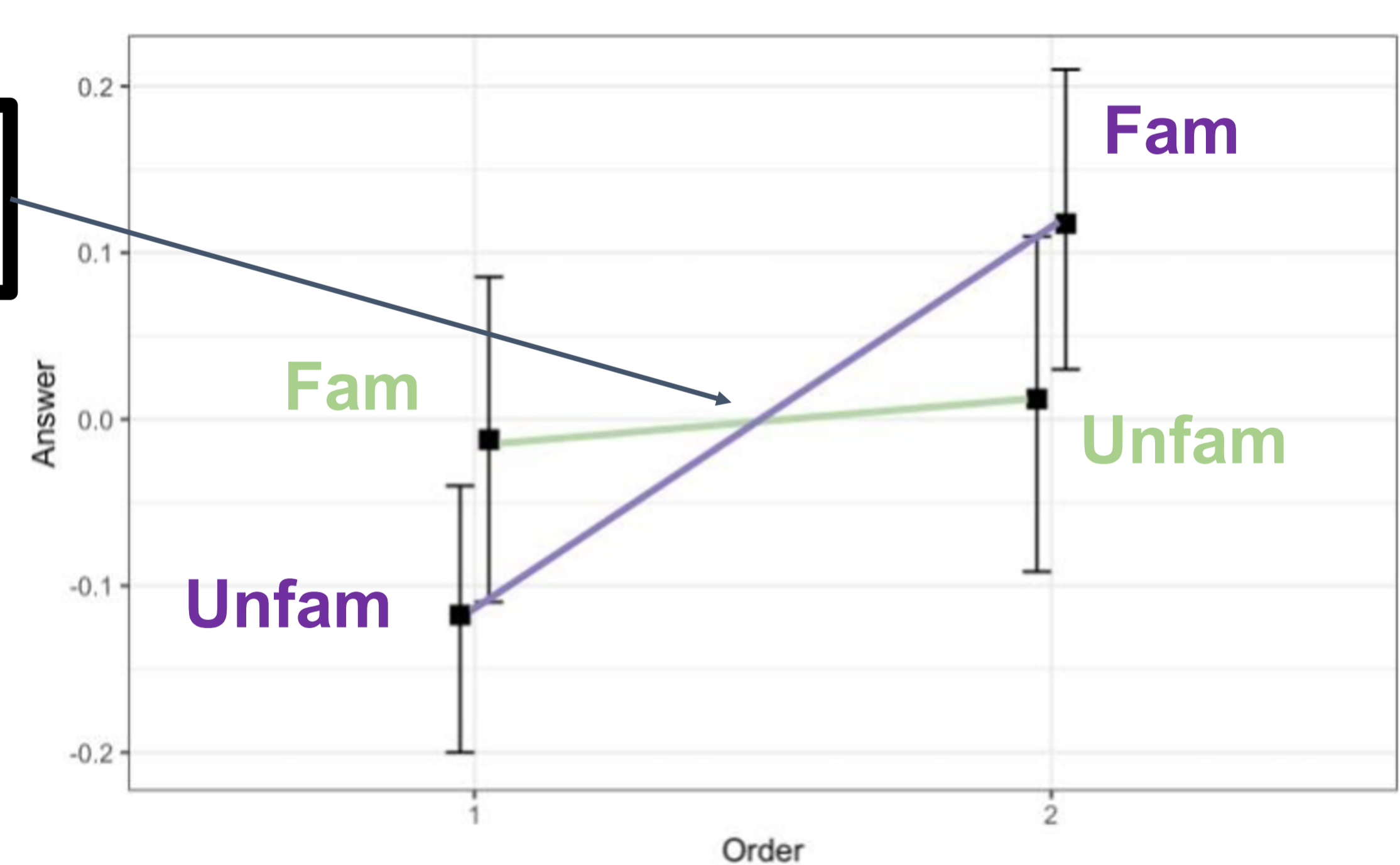


Figure 2. Order effect is gone for Fam - Unfam pairs

Answer codes: answer of participant ('-1' - melody was perceived shorter, '0' - equal, '1' - longer) Factor codes: level of tune's familiarity (0 - unfamous, 1 - famous), tunes's order (1 - melody was presented first in pair, 2 - melody was presented second in pair), similarity in presented pairs (0 - different melodies in pair, 1 - equal melodies in pairs)

Conclusion

The obtained results are consistent with memory trace related mechanisms hypothesis. First of all, we witness a very pronounced order effect, so that the last tune is consistently perceived as the longer. Interestingly, this effect is present in UnFam-UnFam and Unfam-Fam pairs, but nearly disappears in Fam-Fam and Fam-UnFam ones. So, a familiar tune "rings a louder bell" and when presented first forms a memory trace that appears to be comparable to that produced by the most recent tune which leads to order effect compensation.

References

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3. Matthews, W. J., & Meck, W. H. (2016). Temporal cognition: connecting subjective time to perception, attention, and memory. *Psychological bulletin*, 142(8), 865.