

Introduction

- Music is a form of (non-verbal) communication which supports identity formation and the acquisition of various cognitive, motor, and social skills during development (Pearce & Rohmeier, 2012; Särkämö et al., 2013).
- Whether foetuses can discriminate musical timbres and major from minor chords has not been investigated to date. One-week old infants can, however, recognize timbres which they have been exposed to in utero, and they can discriminate the familiar timbre from unfamiliar ones (O'Connell, 2003). Furthermore, newborns as young as 1-4 days old are able to recognize and discriminate harmonies (Virtala et al., 2013).
- Heart rate (HR) is a valid measure of foetal auditory abilities. The presentation of auditory stimuli usually leads to an initial HR decrease in foetuses (e. g. Morokuma et al., 2008). This is followed by a continuous HR acceleration during auditory stimulation which slowly returns to baseline after stimulus offset (e. g. Kisilevsky & Hains, 2011). Foetal HR has also previously been used to show foetal auditory discriminatory abilities (Lecanuet et al., 2000).

Hypotheses

1. Initial HR decrease after stimulus presentation
→ orientation (e. g. Lecanuet et al., 2000; Morokuma et al., 2008)
2. Decreasing HR response over multiple trials of the same stimulus → habituation (Morokuma et al., 2008)
3. Increased HR response when introducing a new stimulus → discrimination (Lecanuet et al., 2000)

Methods

Current sample (data collection is ongoing): $N = 49$; gestational age = 251.61 days (SD = 4.04)

Inclusion criteria: Singleton pregnancy, GA: 245-258 days, healthy, age-appropriate foetal development

Procedure: 45-60 min

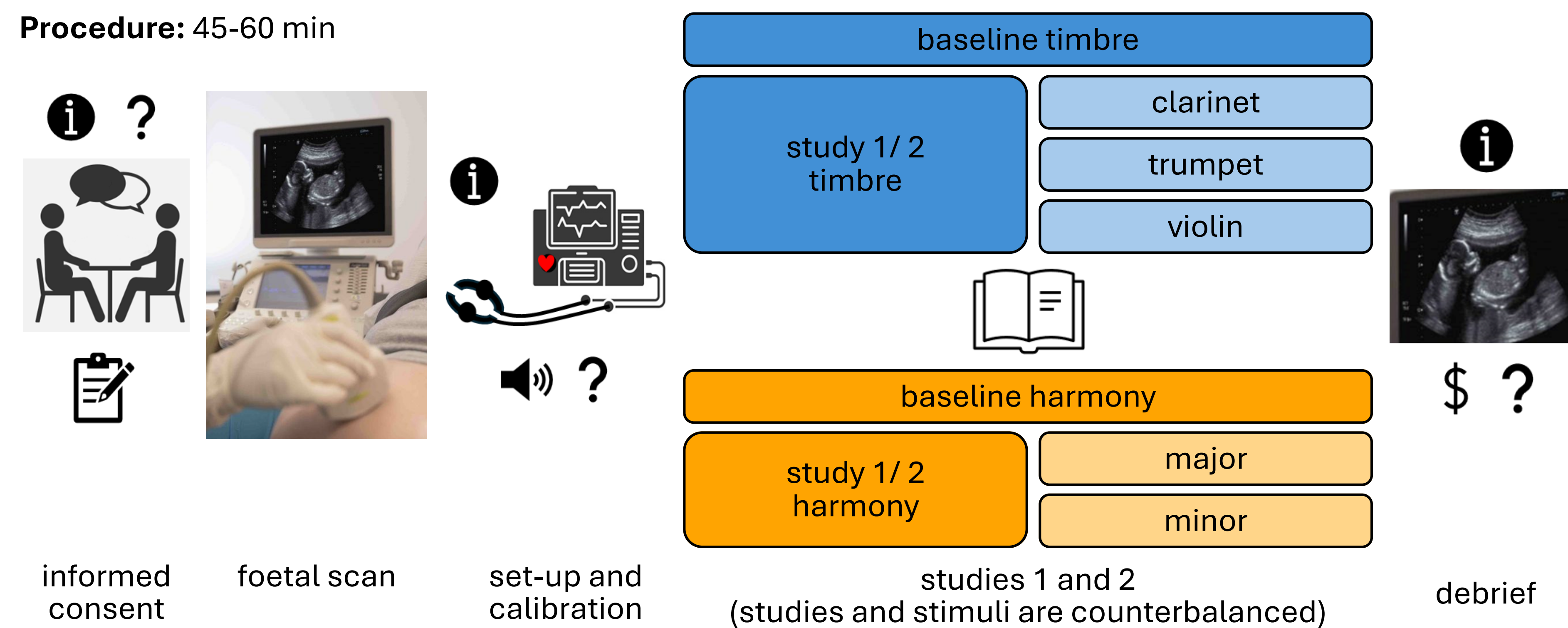


Fig. 1. Experimental procedure

Image acquisition: 2D Ultrasound, Cardiotocography



Fig. 2. Experimental set-up during studies 1 and 2

Results

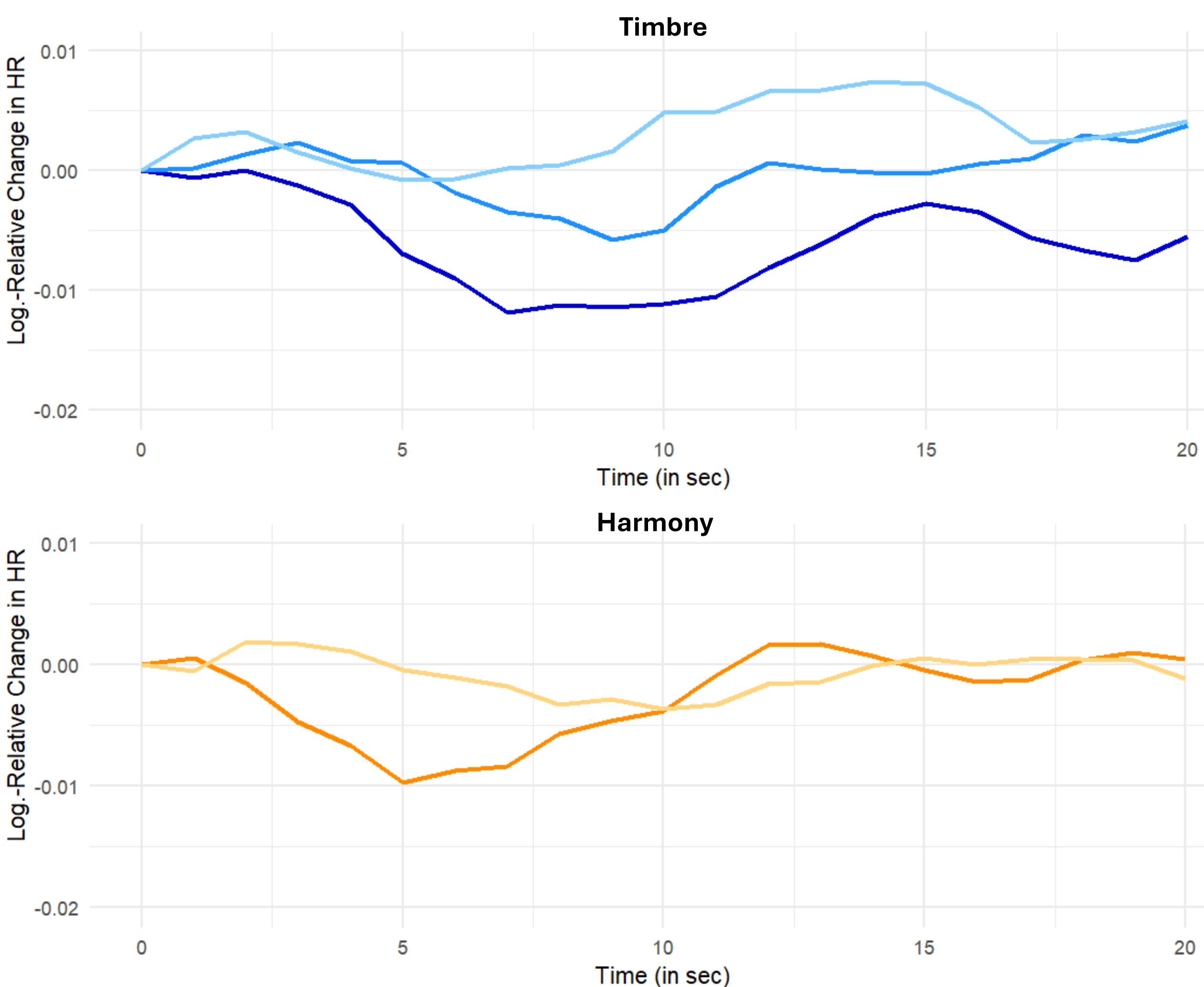


Fig. 3a & 3b. Log.-Relative Change in foetal HR over conditions. *Note.* HR = Heart rate.

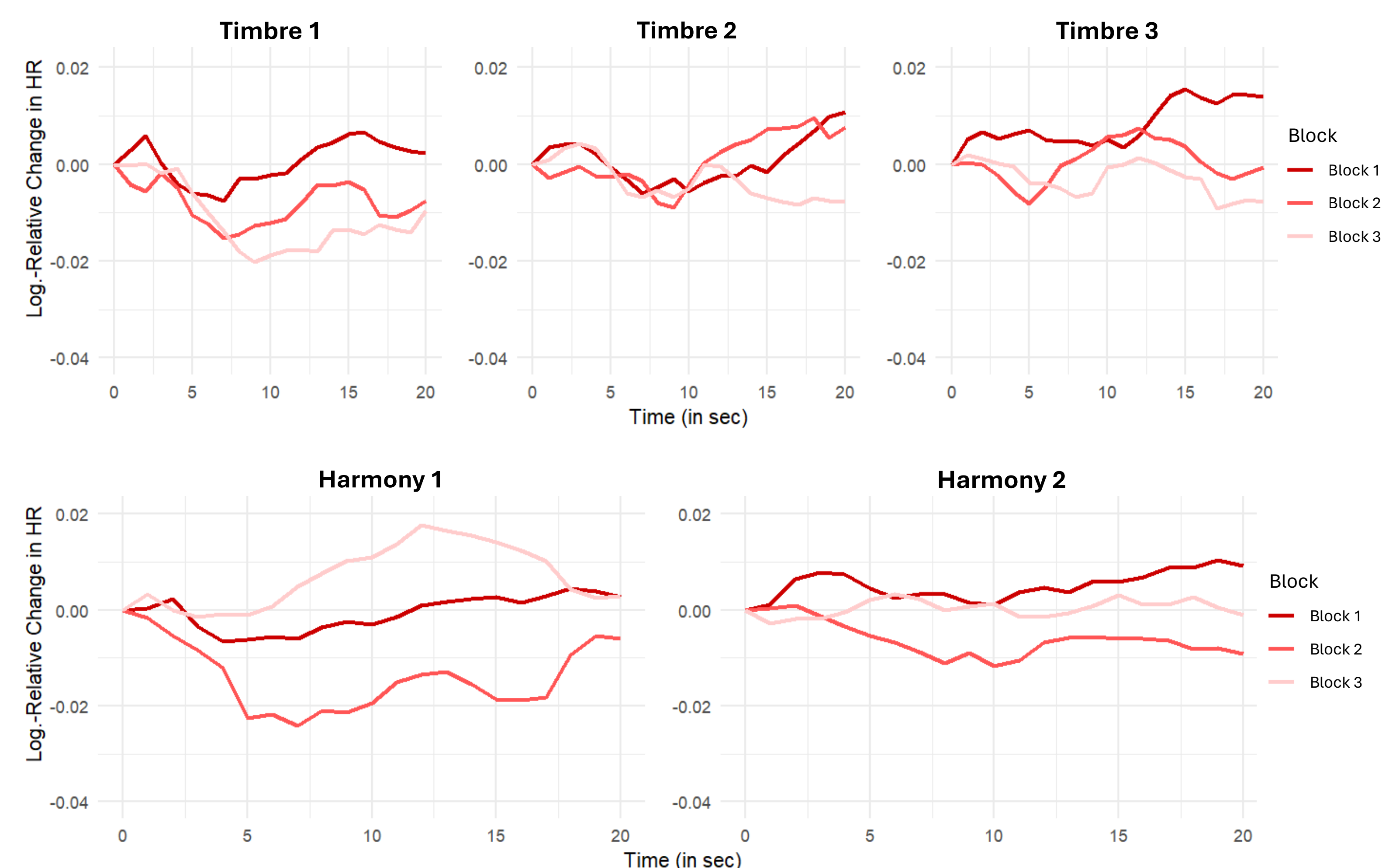


Fig. 4a & 4b. Log.-Relative Change in foetal HR over blocks. *Note.* HR = Heart rate.

Discussion

- More data is necessary to draw firm conclusions about the hypotheses.
- Preliminary results support orientation and discrimination response as well as habituation over the experiments. Foetuses seem to have the ability to perceive and discriminate complex musical information like timbre and harmony.
- The precise development of auditory abilities during the foetal period remains largely unknown and needs further investigation to improve our understanding of early auditory development and how music influences foetal development.
- Knowing how typically developing foetuses respond to sounds will allow the development of clinical assessment tools to measure the cognitive development of foetuses at risk. This will aid to inform policies of auditory stimulation in artificial environments and the development of early interventions to allow a more favourable development for foetuses with atypical developmental trajectories and for hospitalised preterm infants and newborns.

References

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