Pitch-induced illusory percepts of time

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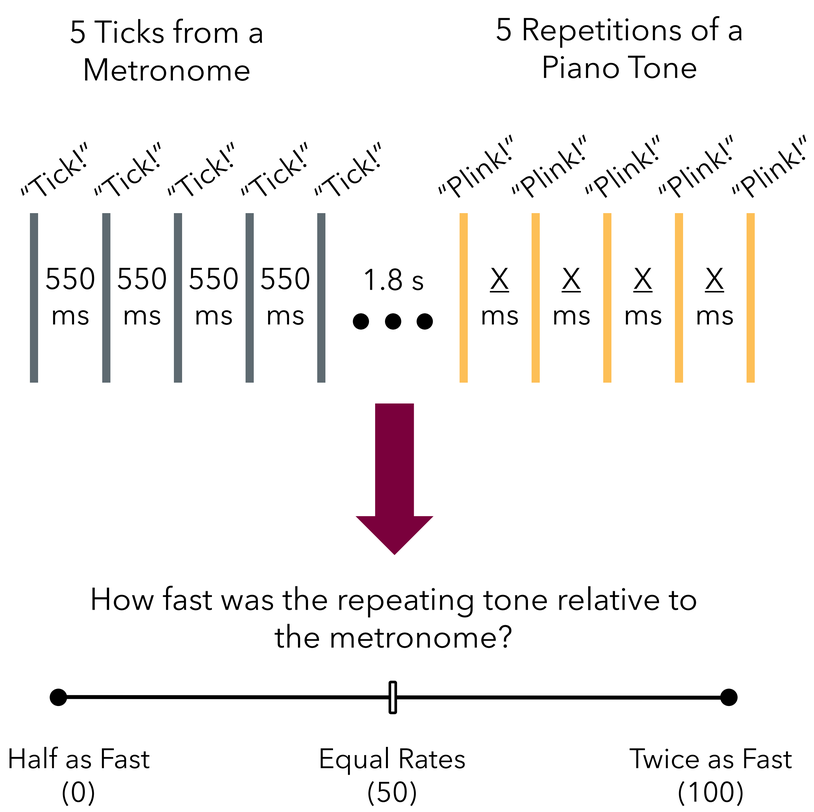
Introduction

- Tempo perception is critical for recognizing emotion in speech and music.[1,5]
- Acoustic and contextual features can alter perceived tempo and induce illusions of tempo change.[2,3,4]
- Humans perceive high-pitched speech/music as faster than low-pitched speech/music.[3,4]
- Prior studies are limited by comparing only one lower register to one higher register, leaving pitch height confounded with other factors.
- **Research Questions:**
  1. Is the influence of pitch consistent across the entire frequency spectrum?
  2. Does the influence of pitch vary with tempo?
  3. Do synchronous movements attenuate illusory tempo effects?
  4. Can illusory tempo effects be observed in a non-musical/non-language context?

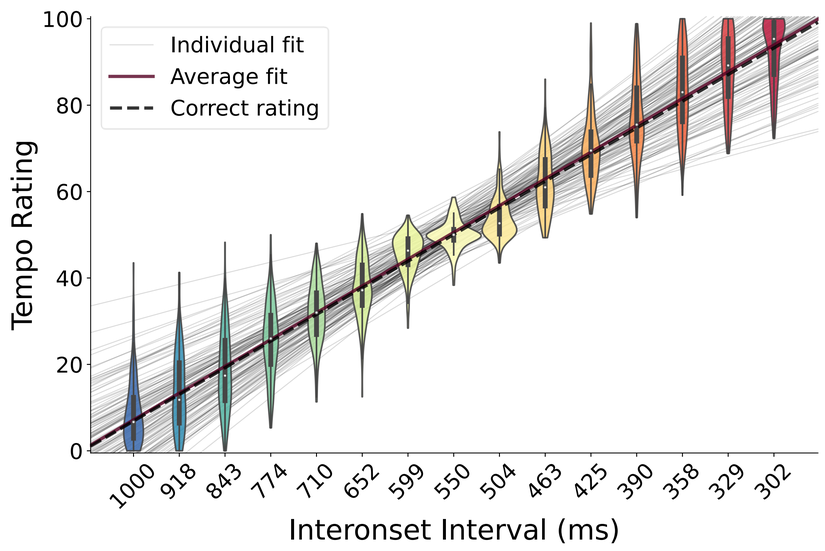
Methods

- **Participants:** 127 (65 tap; 62 no-tap)
- **Design:**
  1. Tone ranged from A2 (110 Hz) to A7 (3520 Hz)
  2. Tone repeated at rate between 1000 and 302 ms
  3. Instructed half of participants to tap with stimuli
- **Relative Tempo Judgment Task:**

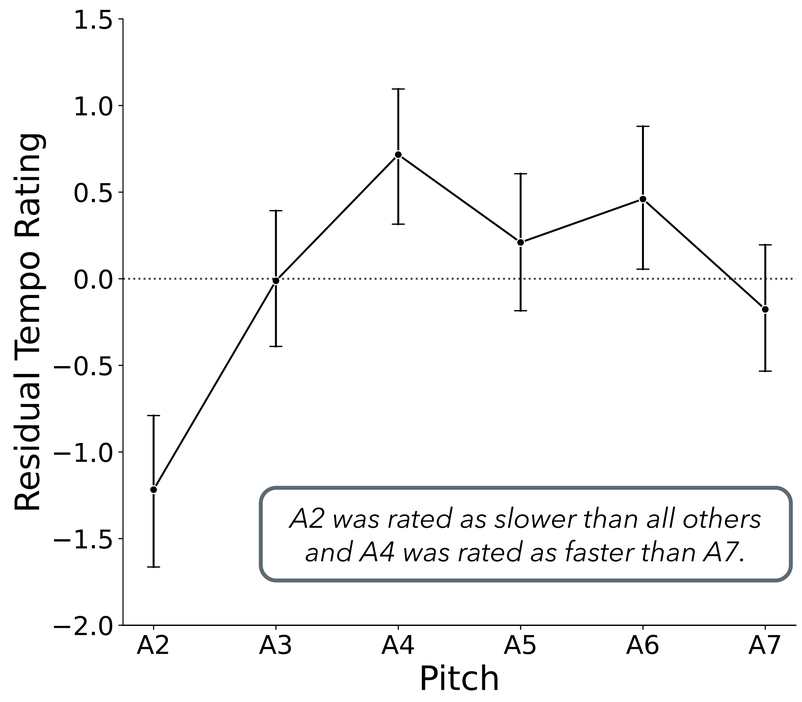


Results

Raw Tempo Ratings



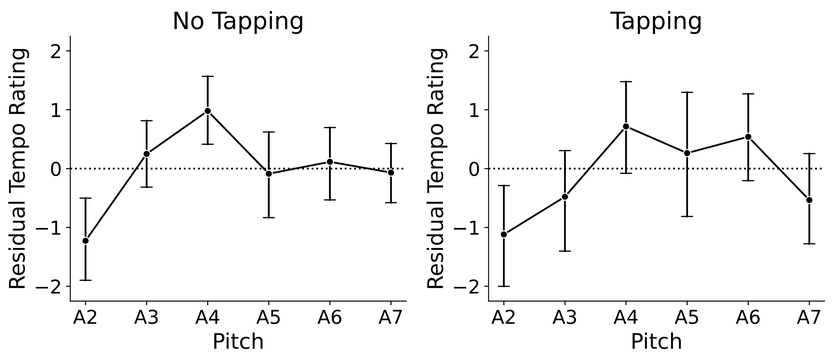
Illusory Tempo Effect



A2 was rated as slower than all others and A4 was rated as faster than A7.

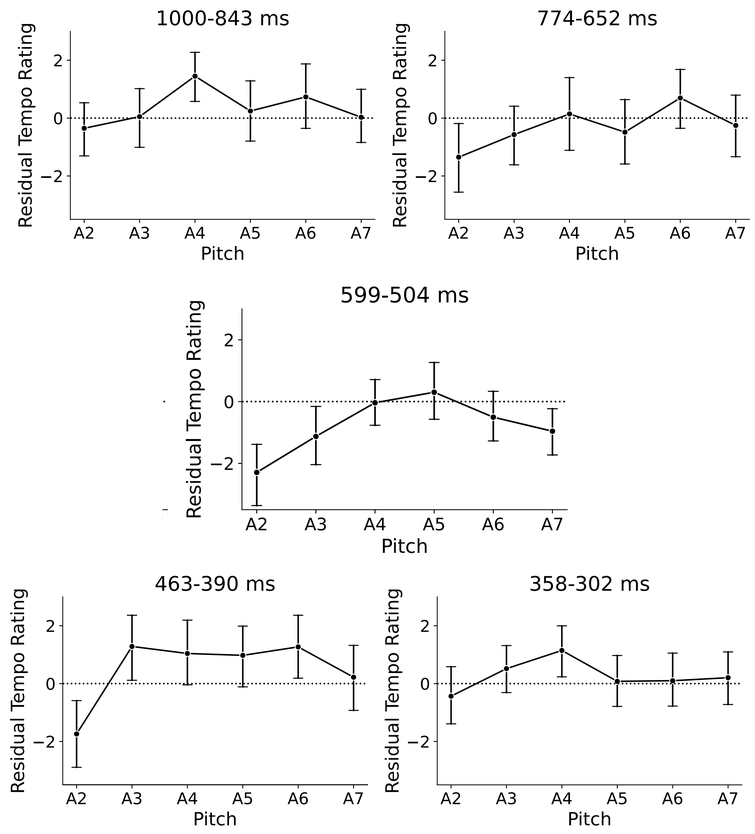
*Pitch height exerted a **positive linear** effect and **negative quadratic** effect on perceived tempo.*

Synchronous Tapping



*Synchronous tapping did **not** significantly alter the illusory tempo effect.*

Effects by Tempo Range



*The illusory tempo effect did **not** significantly differ across tempo ranges.*

Discussion

- Current findings challenge the idea that **pitch height** alone drives illusory percepts of time, as tempo ratings changed **nonlinearly** with octave.
- Results may reflect the **combined** influence of pitch height and another feature which peaks at middle frequencies, perhaps **pitch salience**.[6]
- Alternatively, temporal biases may reflect a true nonlinear correlation between pitch and tempo.
- The influence of pitch was **consistent** across a wide tempo range and was not attenuated by synchronous tapping.
- Illusory tempo effects **generalize** beyond speech and music.

References

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