Max-Planck-Institut
für empirische Ästhetik

Perception of pitch accuracy in melodies

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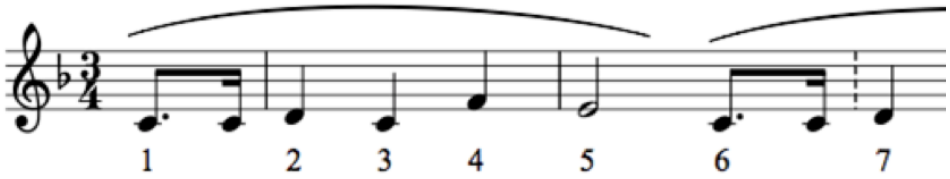
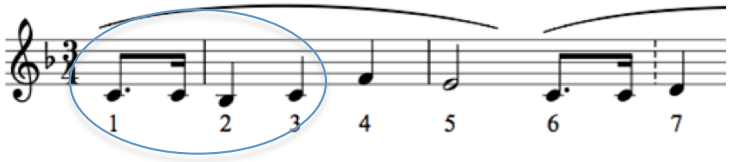
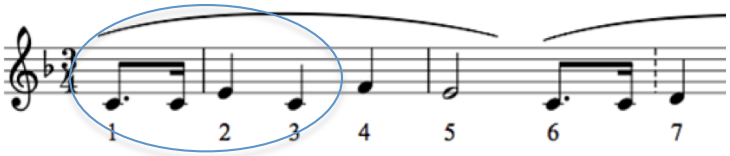
Pitch accuracy



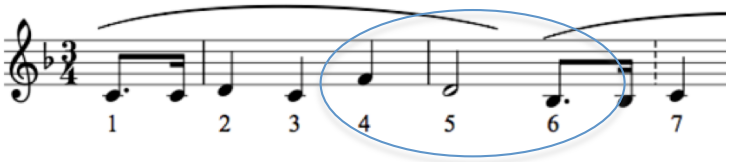
Contour error



Interval error



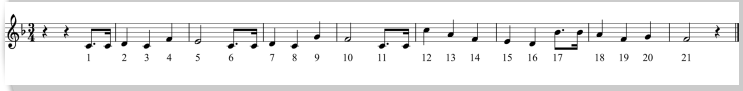
Tonality error



Sensitivity from early age and perception in adults: e.g., Dowling & Fujitani, 1970; Edworthy, 1985; Ferland & Mendelson, 1989; Hannon & Trainor, 2007; Gooding & Stanley, 2001; Plantinga & Trainor, 2005; Stalinski et al., 2008; Trainor & Trehub, 1992

Pitch accuracy

166 performances

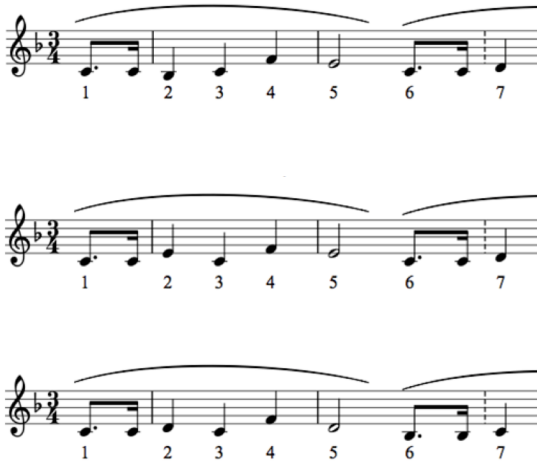


http://sldr.org/sldr000774/en

Computer assisted method

3 criteria

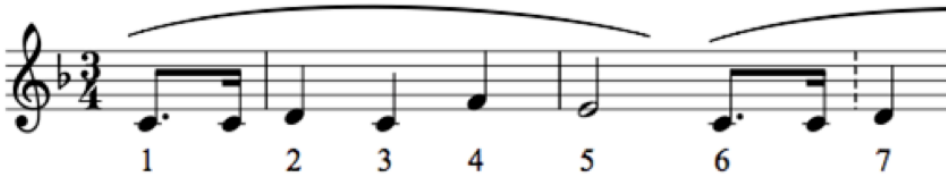
Judges



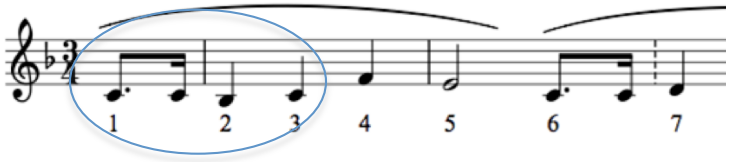
1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9

Out of tune In tune

Pitch accuracy – Music experts



Contour error



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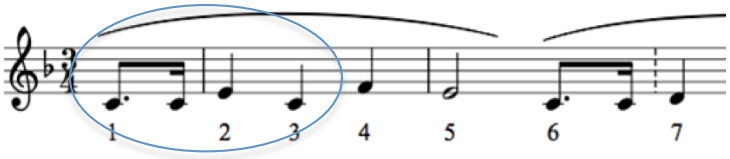
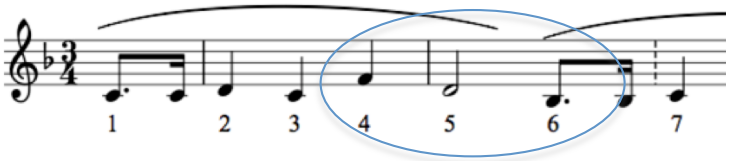
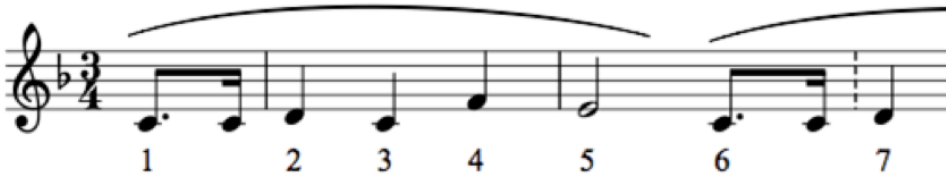


Tonality error



Larrouy-Maestri, Lévêque, Schön, Giovanni, & Morsomme (2013). *Journal of Voice*.

Pitch accuracy – Layman listeners



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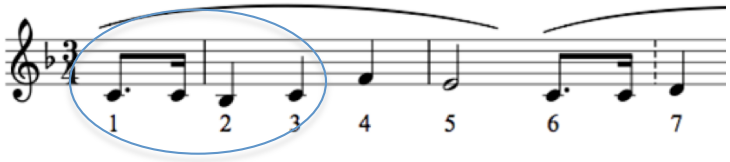
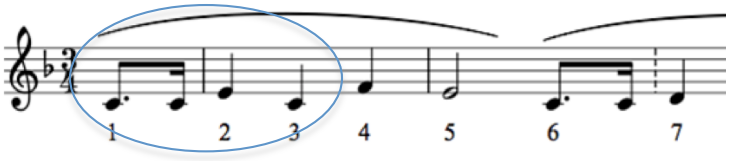
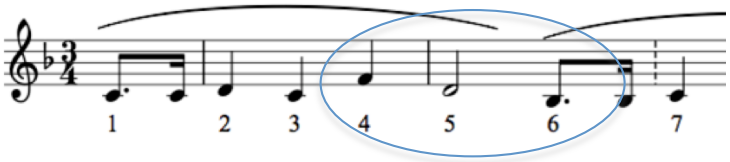


Interval error

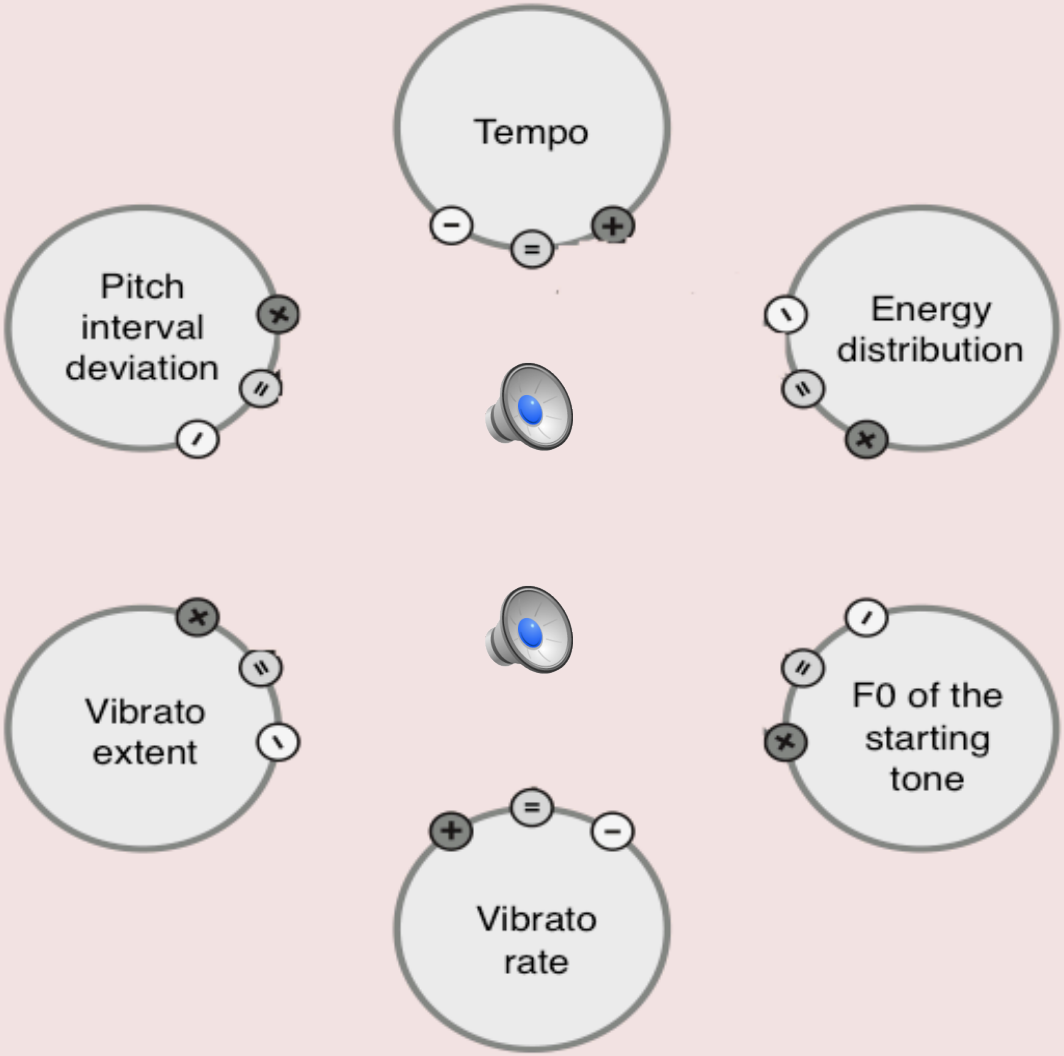


Tonality error



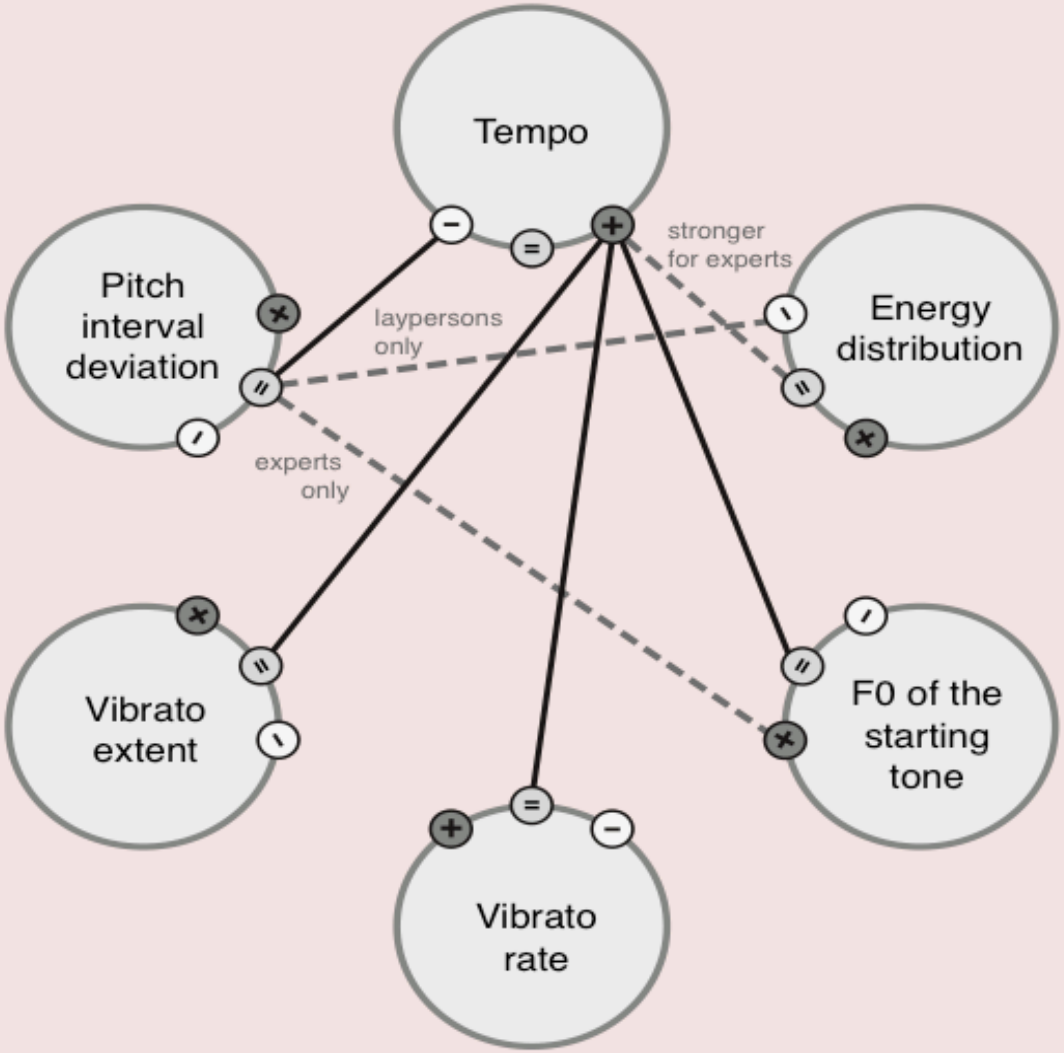
Larrouy-Maestri, Magis, Grabenhorst, & Morsomme (2015). *PlosOne*

(The case of operatic singers – Definition)



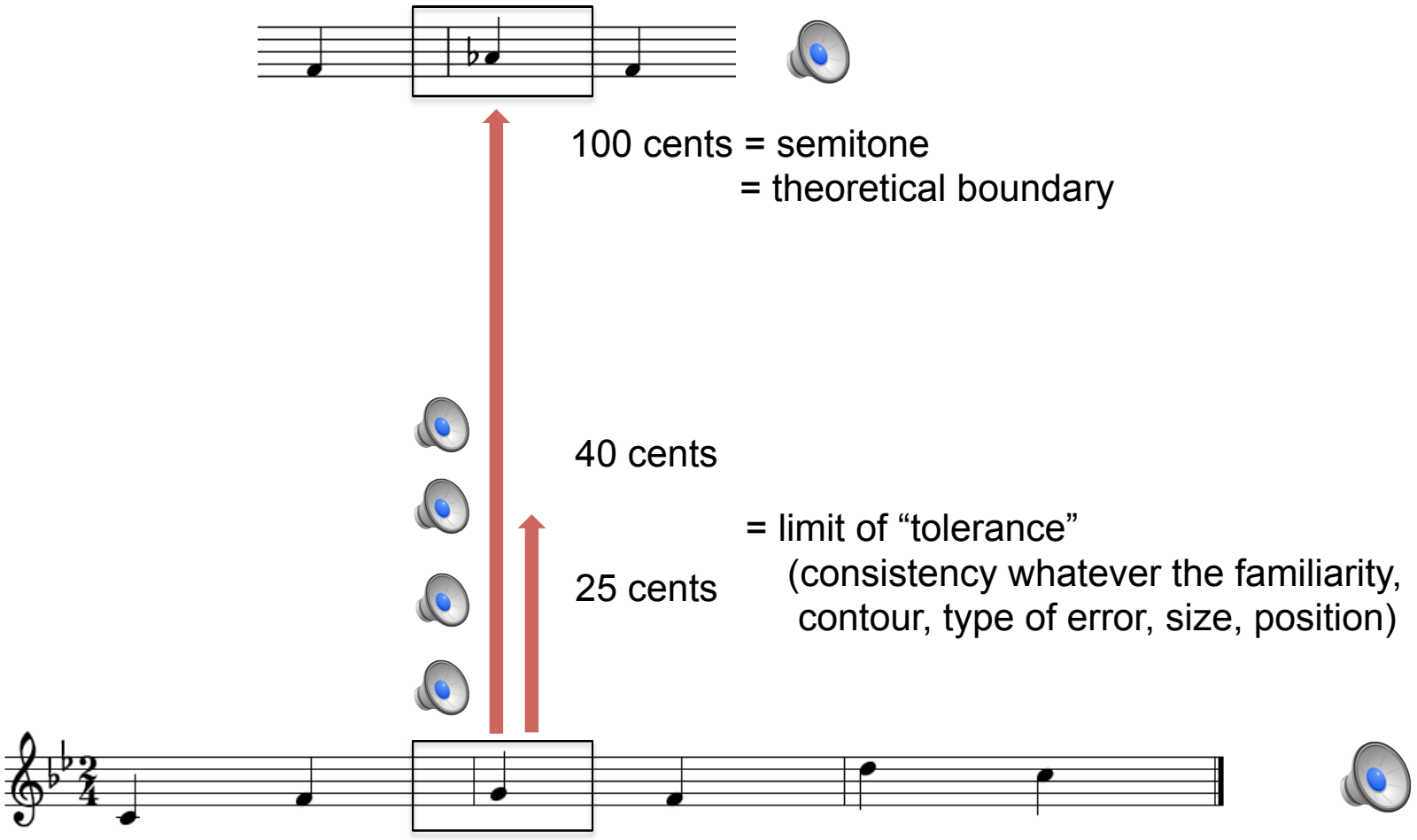
Larrouy-Maestri, Magis, & Morsomme (2014). *Journal of Voice*

(The case of operatic singers – Evaluation)

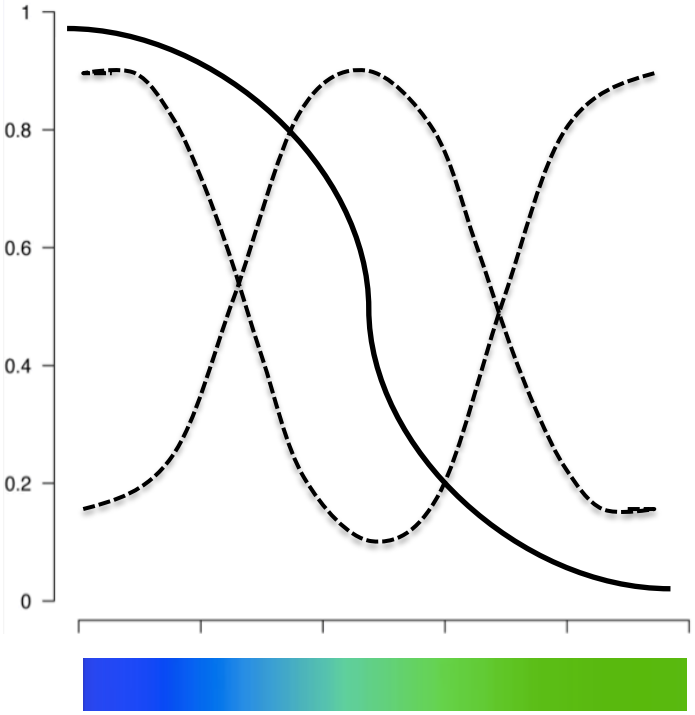


Larrouy-Maestri, Morsomme, Magis, & Poeppel (under revision)

Pitch accuracy – Definition

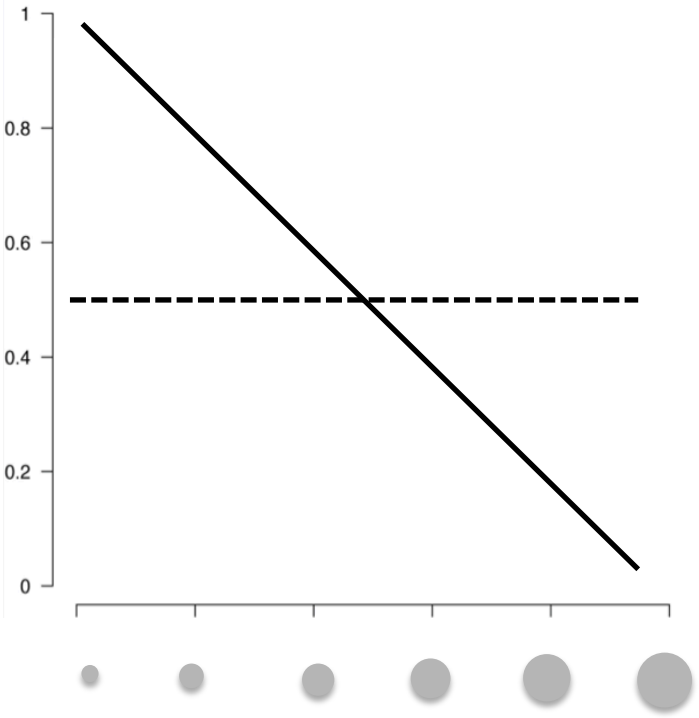


Mechanisms driving perception



Categorical

Transformation of varying sensory signals into categorical internal representations



Continuous

Perception (sometimes linearly) of the variation of sensory signals

Gereral: Harnard, 1987; Goldstone & Hendrickson, 2010 (review); Liberman et al., 1957
Use of labels: Maier, Glage, Hohlfeld, Rasha, Rahman, 2014 (review)

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Perception of pitch accuracy in melodies: **A categorical or continuous phenomenon?**

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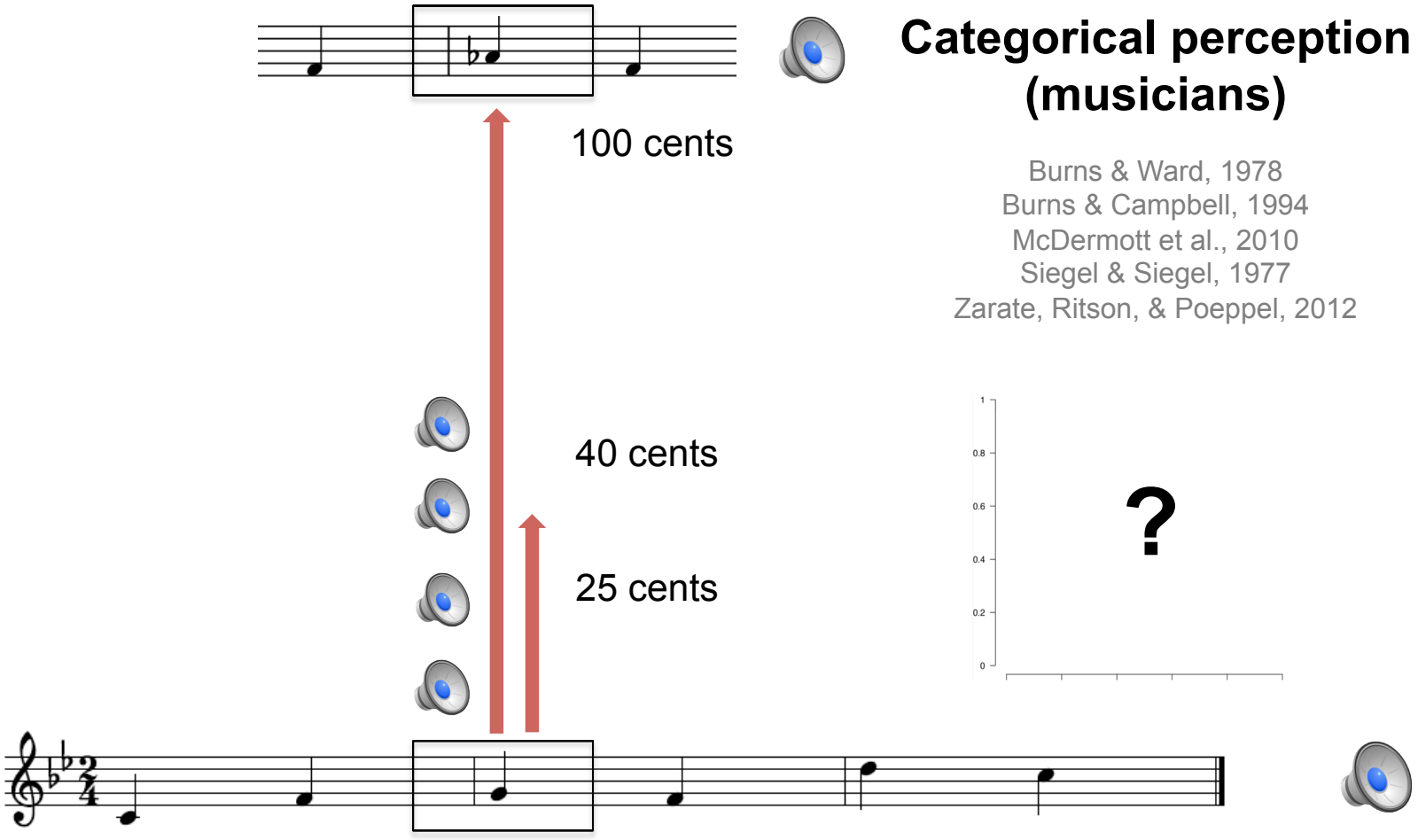
Mechanisms driving perception



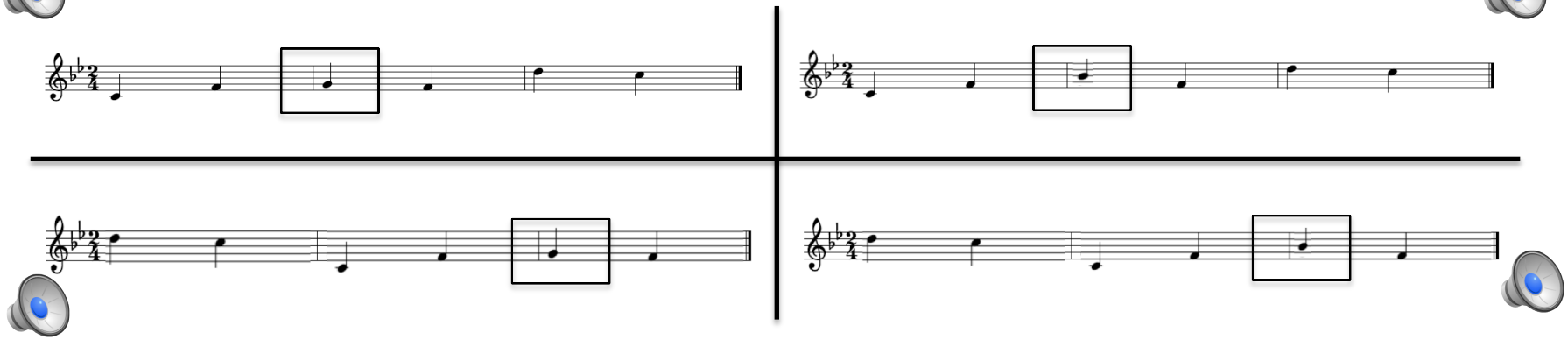
Categorical perception (musicians)

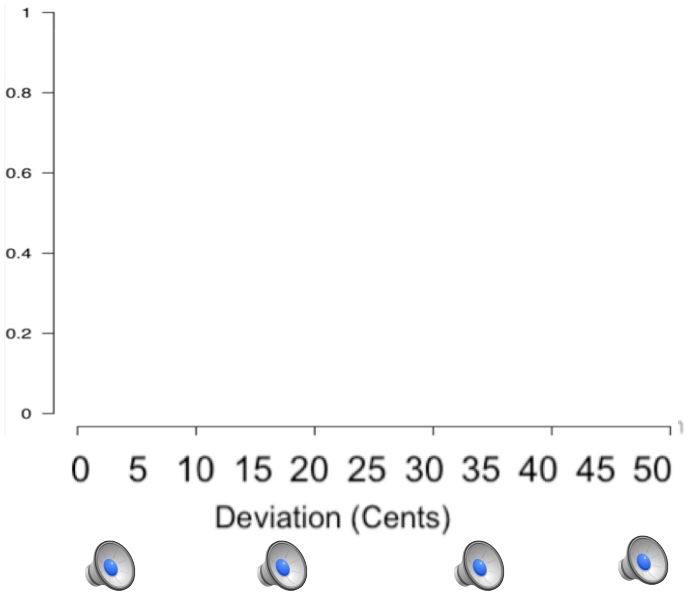
Burns & Ward, 1978
Burns & Campbell, 1994
McDermott et al., 2010
Siegel & Siegel, 1977
Zarate, Ritson, & Poeppel, 2012

Perception of correctness - Material

Major 2nd

Perfect 4th





Identification

In-tune | Out-of-tune

Confidence

0 | 1 | 2 | 3

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Perception of correctness - Procedure

Screening

PRE learning
4 blocks
random order deviations

Identification

In-tune | Out-of-tune

Confidence

0 | 1 | 2 | 3

Label learning
1 melody (0 vs. 50 cents)
Examples of labels
Test with feedback
Until 80% of correct answer

Selection
1 block on the trained melody

POST learning
4 blocks
random order deviations

Identification

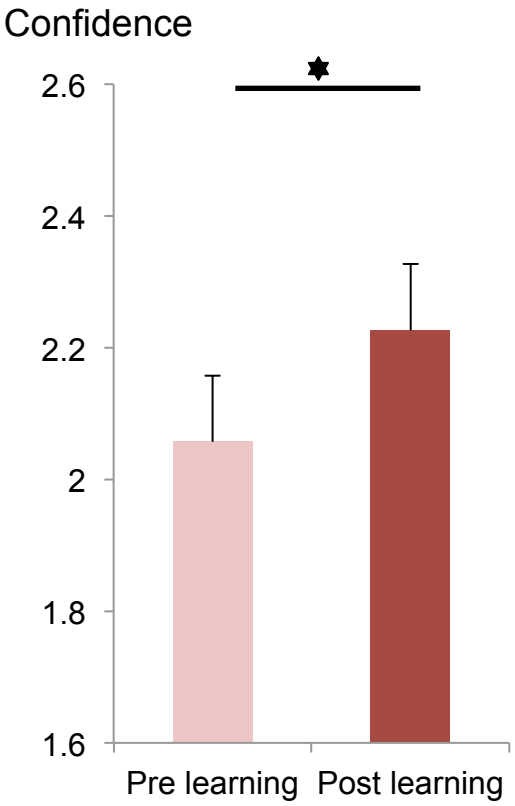
In-tune | Out-of-tune

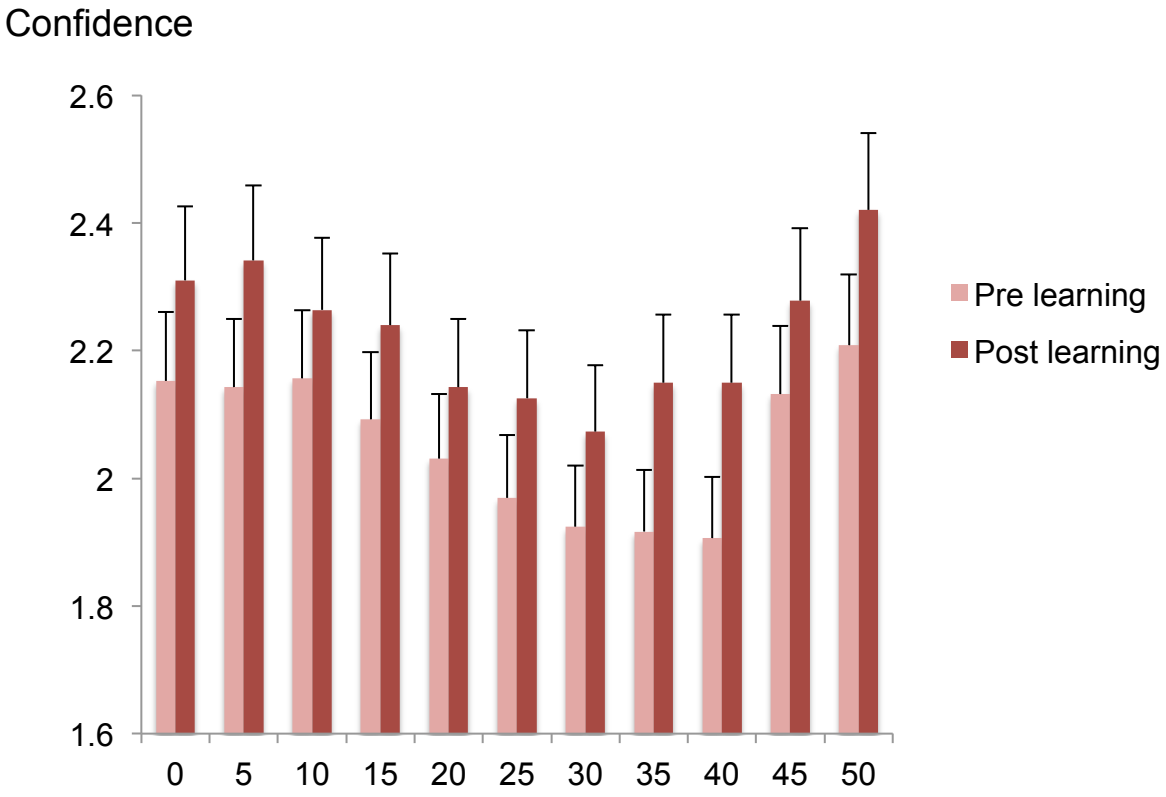
Confidence

0 | 1 | 2 | 3

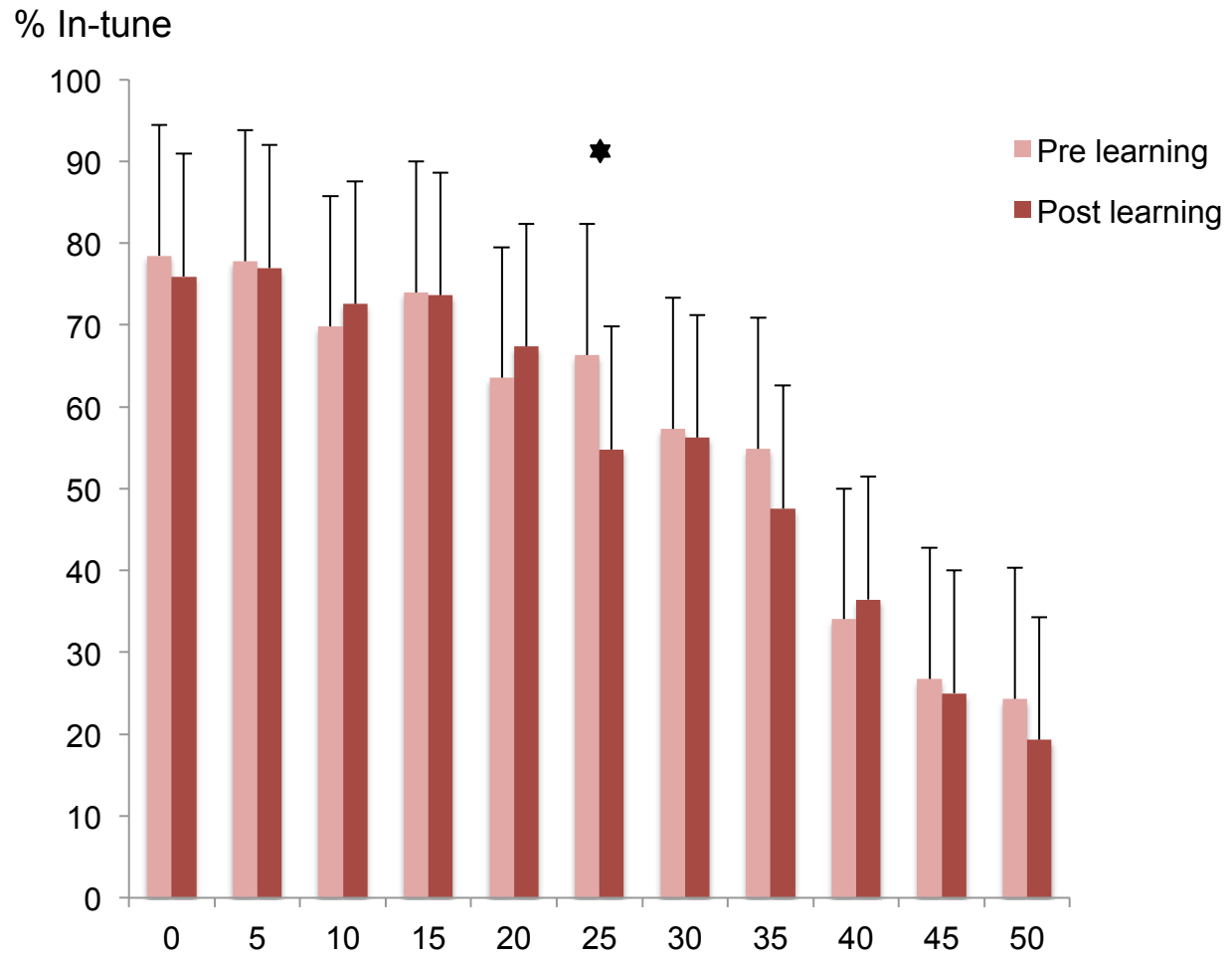
+ Retest 8 to 15 days later

Effect of learning – Confidence (n = 36)

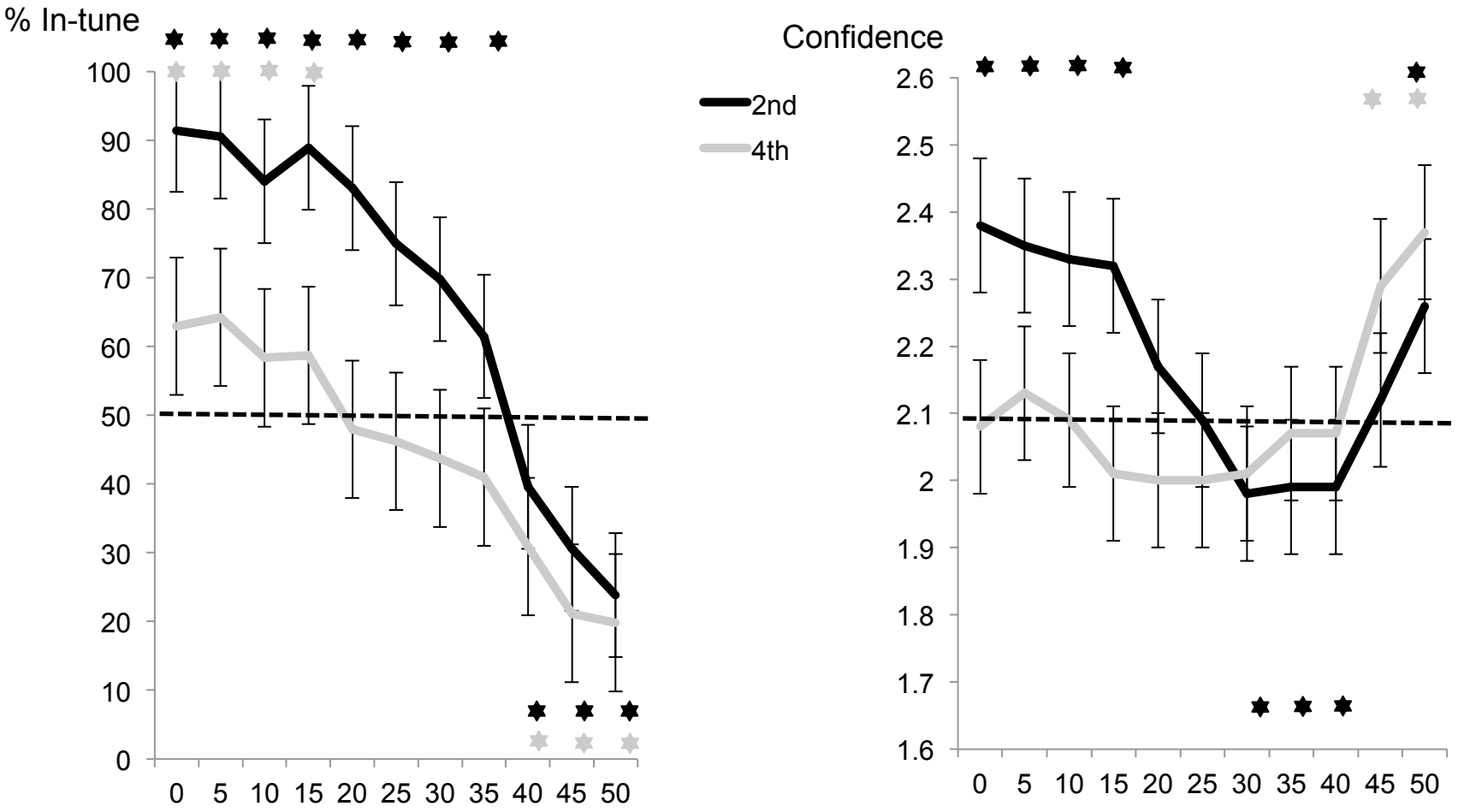




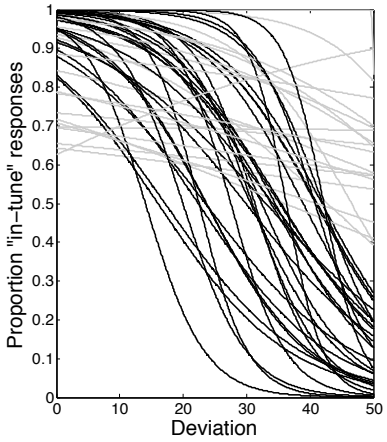
Effect of learning - Identification (n = 36)

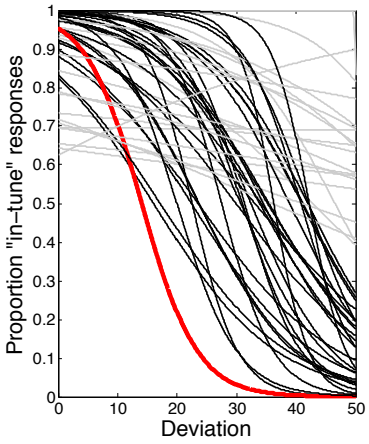


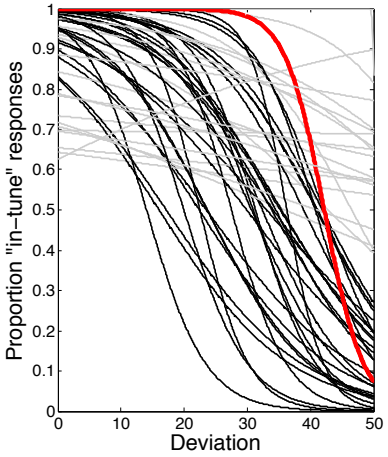
Effect of the material (n = 36)

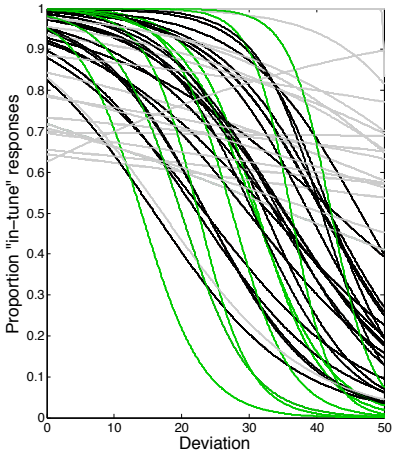


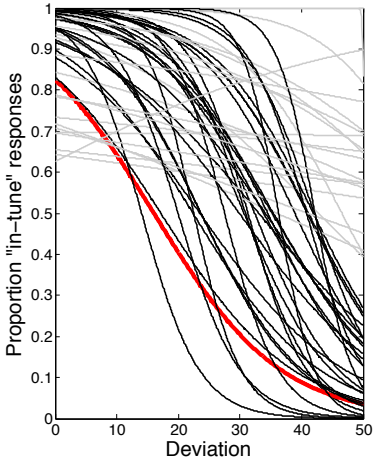
Individual differences (n = 50)

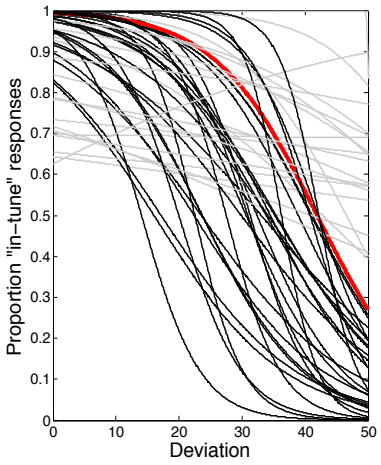




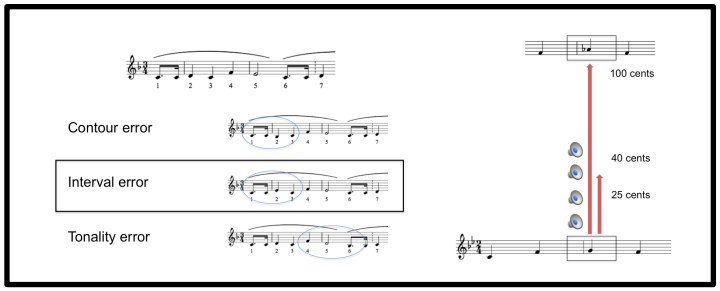






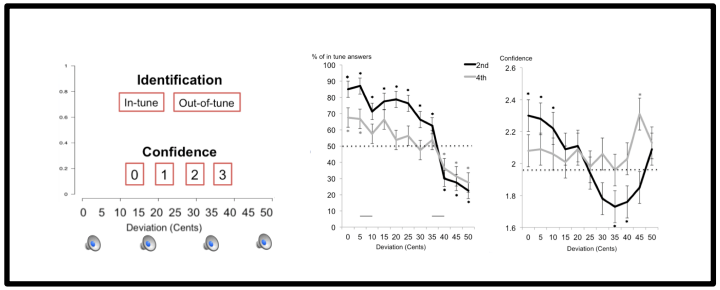


Take home message – Future directions



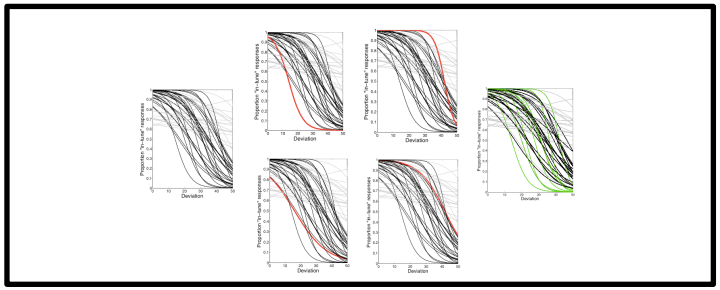
Perception of pitch accuracy in melodies

- Pitch interval deviation is important
- Low tolerance, consistency
- No need of explicit learning



Categorical and continuous phenomenon

- Correctness can be categorized
- Effect of material: Frequency? Size?



Individual differences

- Two/three groups?
- Predictors?
- Cross-domain abilities?

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David Magis

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Claudia Lehr and Freya Materne

Matthias Grabenhorst

Marie-Reine Ayoub

Laura Gosselin

Thanks for your attention!