

Vowel quantity contrasts in sung Estonian



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Background

- Estonian vowel length is contrastive.

	Quantity 1 (short V1)	Quantity 2 (long V1)
(a)	<i>sada</i> [sa.ta] hundred	<i>saada</i> [saa.ta] send.SG.IMP
(b)	<i>koli</i> [ko.li] trash.NOM	<i>kooli</i> [koo.li] school.SG.GEN

$\sigma_1:\sigma_2 \approx 2:3$

$\sigma_1:\sigma_2 \approx 3:2$

(Lehiste, 1960)

- But how is vowel length expressed in music, where duration also has a musical role to play?

Questions

- In Estonian choral music, are Q1 and Q2 syllable pairs set to note pairs with ratios less than one and greater than one, respectively?
- Are quantity ratios for Q1 and Q2 in speech identified the same way in sung Estonian?

Corpus Exploration

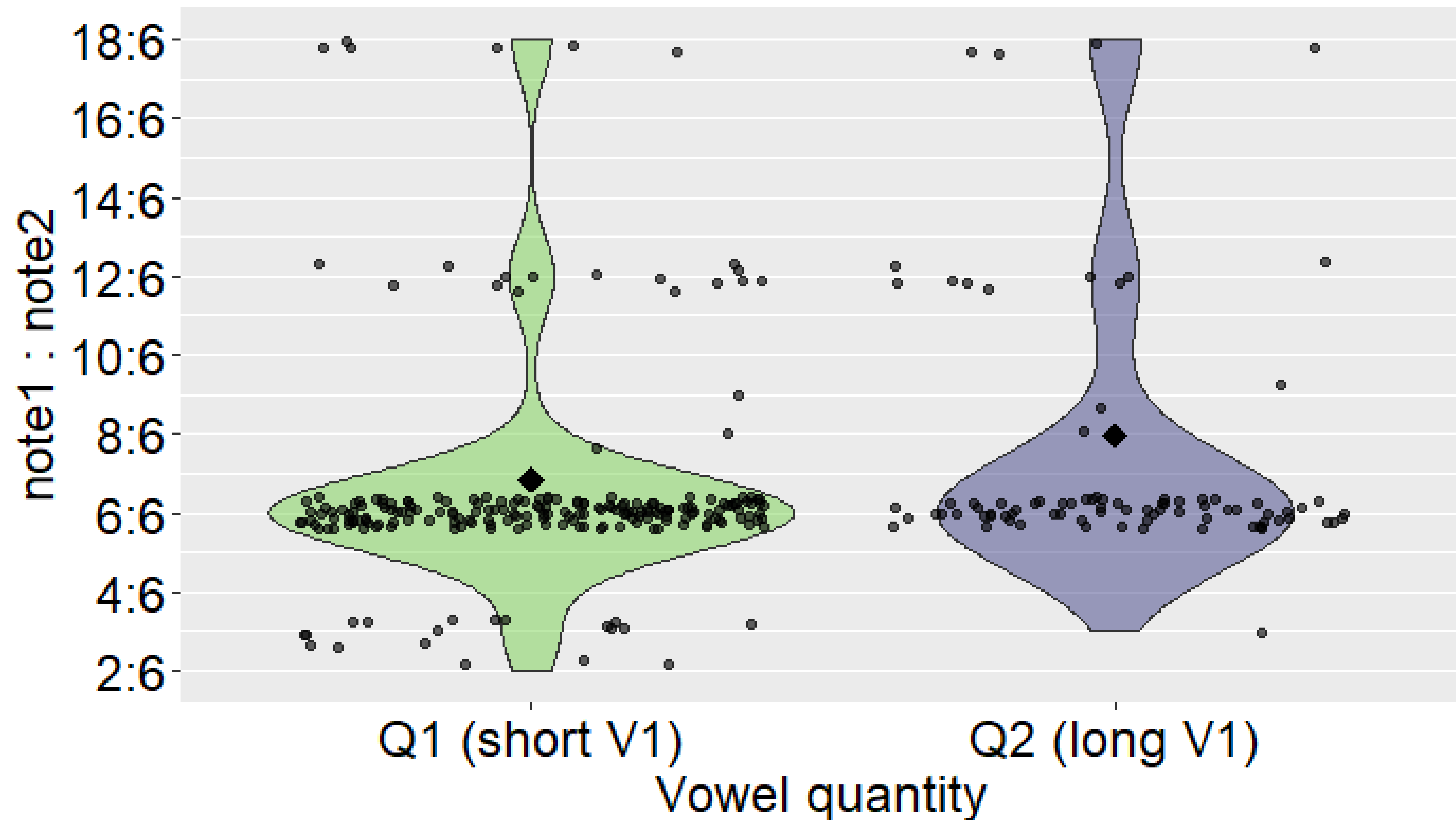
- 8 compositions \rightarrow 314 σ_1 - σ_2 pairs with open σ_1 .
- Determine each pair's note1:note2 ratio.

The image shows a musical staff with a treble clef and a key signature of one flat. The melody is written in a simple style. Below the staff, the lyrics are: ja len-dab me-si - puu poo - le;. Two red boxes highlight specific note pairs. The first box highlights the notes for 'me' and 'si', with the ratios $\frac{1}{8}$ and $\frac{1}{4}$ written below them, and the ratio **1:2** written below that. The second box highlights the notes for 'poo' and 'le;', with the ratios $\frac{1}{2}$ and $\frac{2}{4}$ written below them, and the ratio **1:1** written below that.

$\frac{1}{8}$	$\frac{1}{4}$
1:2	
$\frac{1}{2}$	$\frac{2}{4}$
1:1	

Corpus Exploration

Q1 and Q2 note ratios as set by composer



Questions Revisited

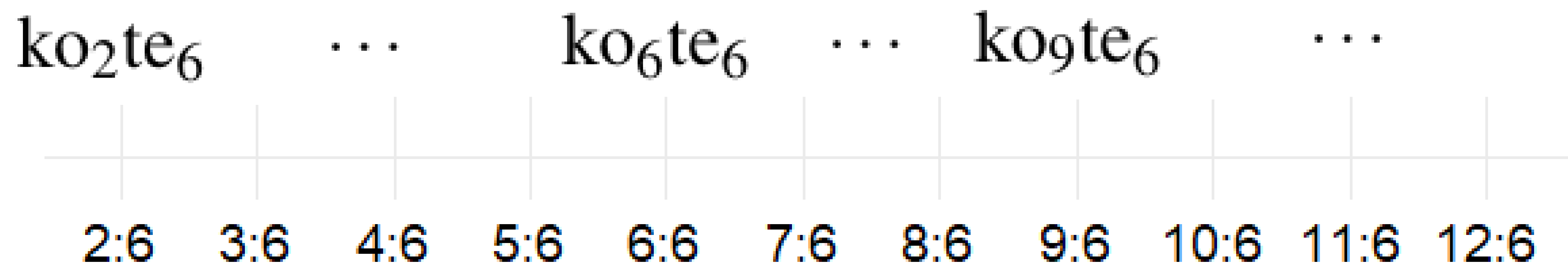
- In Estonian choral music, are Q1 and Q2 syllable pairs set to note pairs with ratios less than one and greater than one, respectively?
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Perception Experiment

- 20 CV(V)CV nonce words.


[ko(o)te], [me(e)ke], [pø(ø)te], [tʏ(ʏ)ke], ...

- 11-step continuum of $\sigma_1:\sigma_2$ duration ratios.



- 6 carrier phrases.

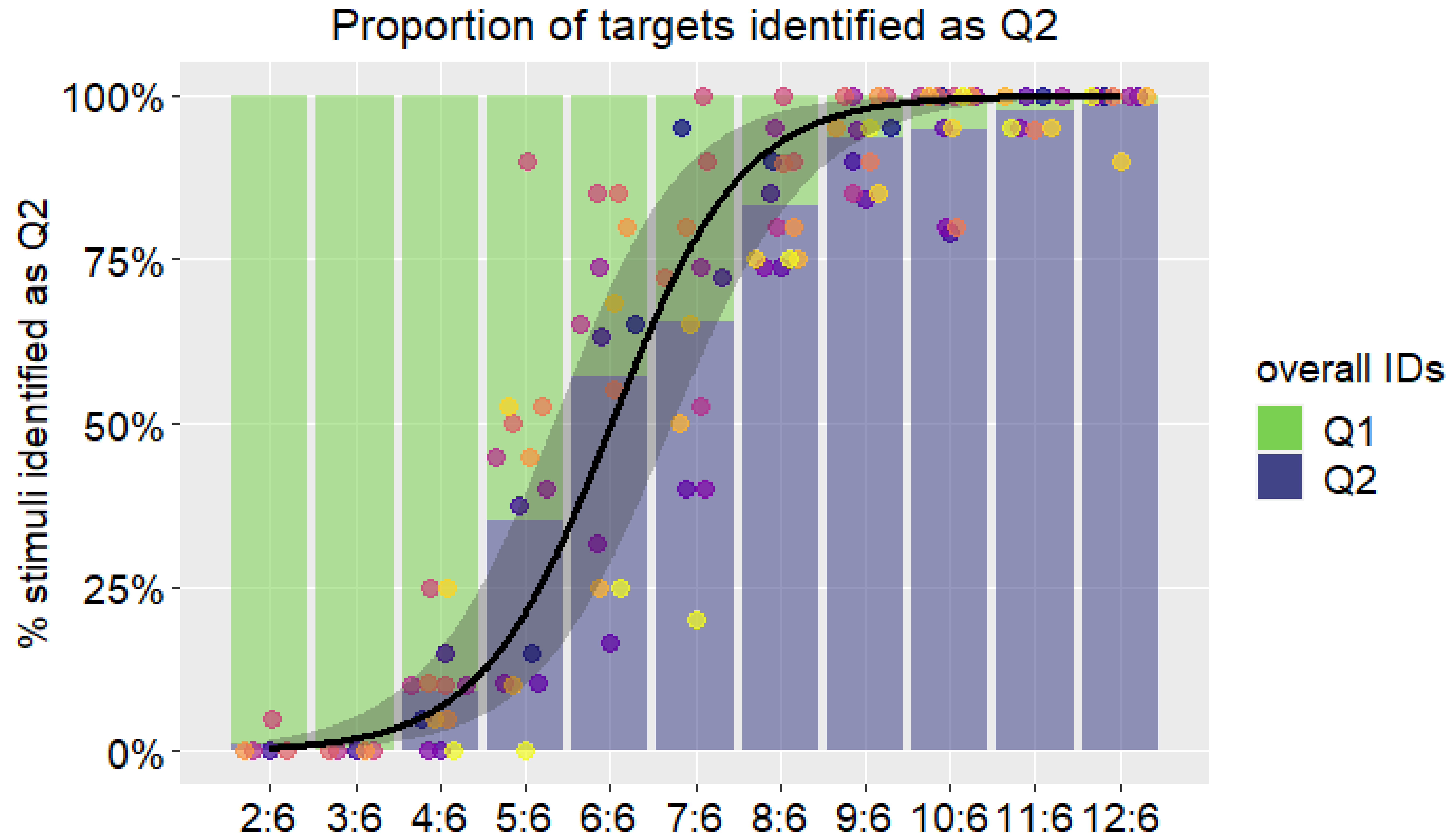
Perception Experiment

-  *Tule [kote] minuga.*
“Come [target] with me.”
- Is V1 short or long?

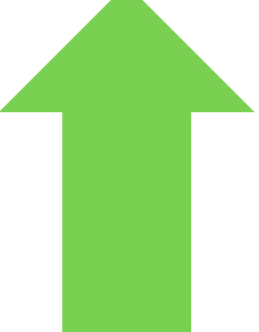
klõpsake valikul kord heli esitamise on lõppenud.

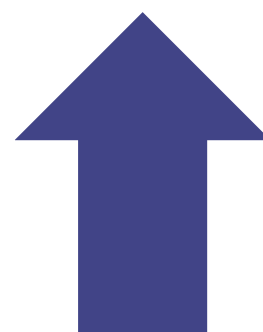
“Click your selection once audio has finished playing.”

Perception Experiment



Speech:
(Lehiste, 1960)

Quantity 1 
 $\sigma_1: \sigma_2 = 2:3$

Quantity 2 
 $\sigma_1: \sigma_2 = 3:2$

Conclusion

- Composers do not adhere to the expected syllable duration ratios when setting Estonian text to speech.
- Listeners do use the same temporal cues to perceive short vs long vowels in singing as in speech.

Thank you

- Looking forward to questions and discussion.

References

- Ehala, M. (2003). Estonian quantity: Implications for Moraic Theory. In D. Nelson & S. Manninen (Eds.), *Generative approaches to Finnic and Saami linguistics* (p. 51-80). Stanford: CSLI [The Center for the Study of Language and Information at Stanford University].
- Lehiste, I. (1960). Segmental and syllabic quantity in Estonian. In *American studies in Uralic linguistics* (p. 21-82). Bloomington: Indiana University.
- Lippus, P., Pajusalu, K., & Allik, J. (2009). The tonal component of Estonian quantity in native and non-native perception. *Journal of Phonetics*, 37(4), 388-396.