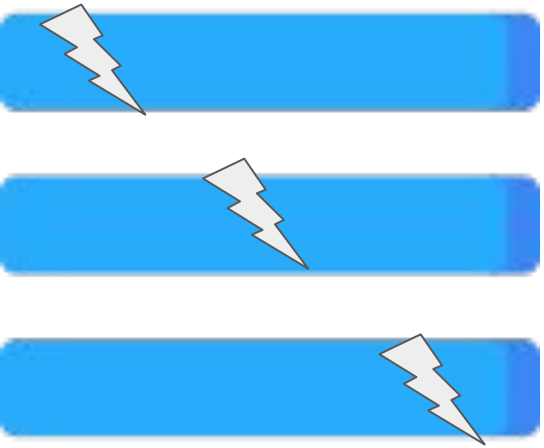
Should we stress fluency or teach fluent stress? Acoustic analysis and fluency judgments of L2 Italian stress

Seth Wiener, Adam Bramlett, Bianca Brown, Jocelyn Dueck

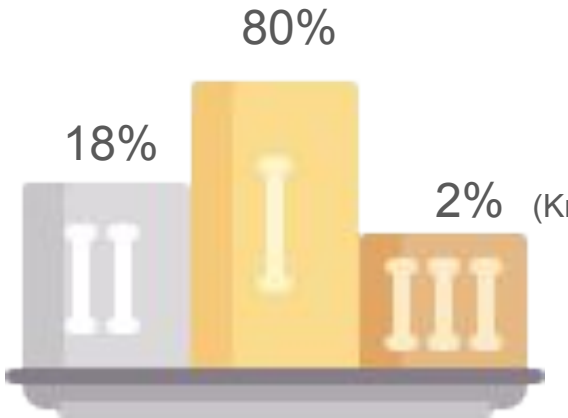


Antepenultimate stress: TAvolo ‘table’

Penultimate stress: coLOre ‘color’

Syllable final: serviTU ‘servitude’

Trisyllabic stress depends on penultimate syllable weight: If heavy (i.e., C#), then it must be stressed (Krämer, 2009).



(Krämer, 2009)

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Italians use abstract knowledge about lexical stress during spoken-word recognition

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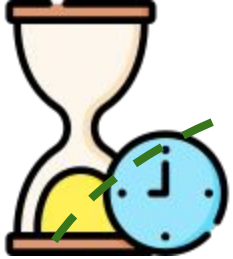


Duration (ms)

(Alfano, 2006; Alfano, Savy, & Llisterri, 2009)

Amplitude (dB)

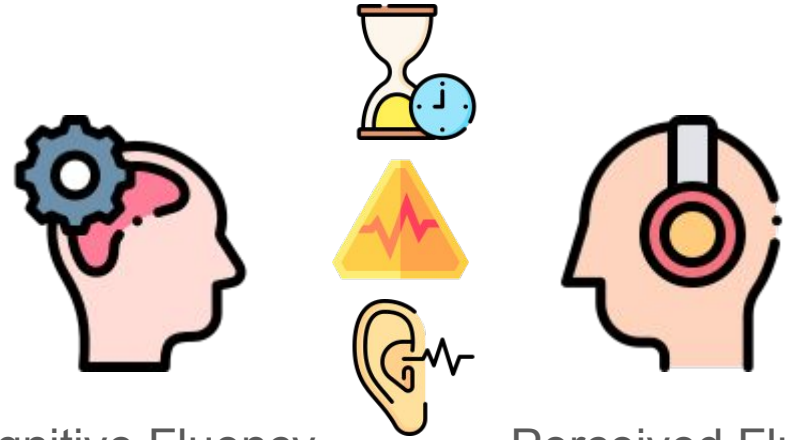
(Albano Leoni & Maturi, 1998).

Fundamental frequency (F0: Bark)

(Tagliapietra & Tabossi, 2005)

Surface Fluency

(Skehan, 2009; Tavakoli & Skehan, 2005)



Cognitive Fluency

Perceived Fluency

(Segalowitz, 2010, 2016; Tavakoli & Wright, 2020)

Research questions

1. To what degree do beginner L2 Italian speakers produce L1-like acoustic cues associated with different tri-syllabic stress types?

2. How do L1 Italian listeners rate L2 stress patterns across four fluency dimensions: overall, duration, loudness, and pitch?

3. How do these acoustic cues affect the fluency ratings?

Procedure: Audio Recording

10 L1 (USA) English-L2 Italian adult classroom learners (mean age: 21)

5 Adult L1 Italian speakers from Italy (mean age: 35)

Read aloud 32 pairs of common, frequency controlled, trisyllabic words via Gorilla.

COmico	‘funny’	coMIzio	‘meeting’
(1.7 mil/freq; 6 letters)		(1.3 mil/freq; 7 letters)	

Procedure: Cleaning and Measuring Audio

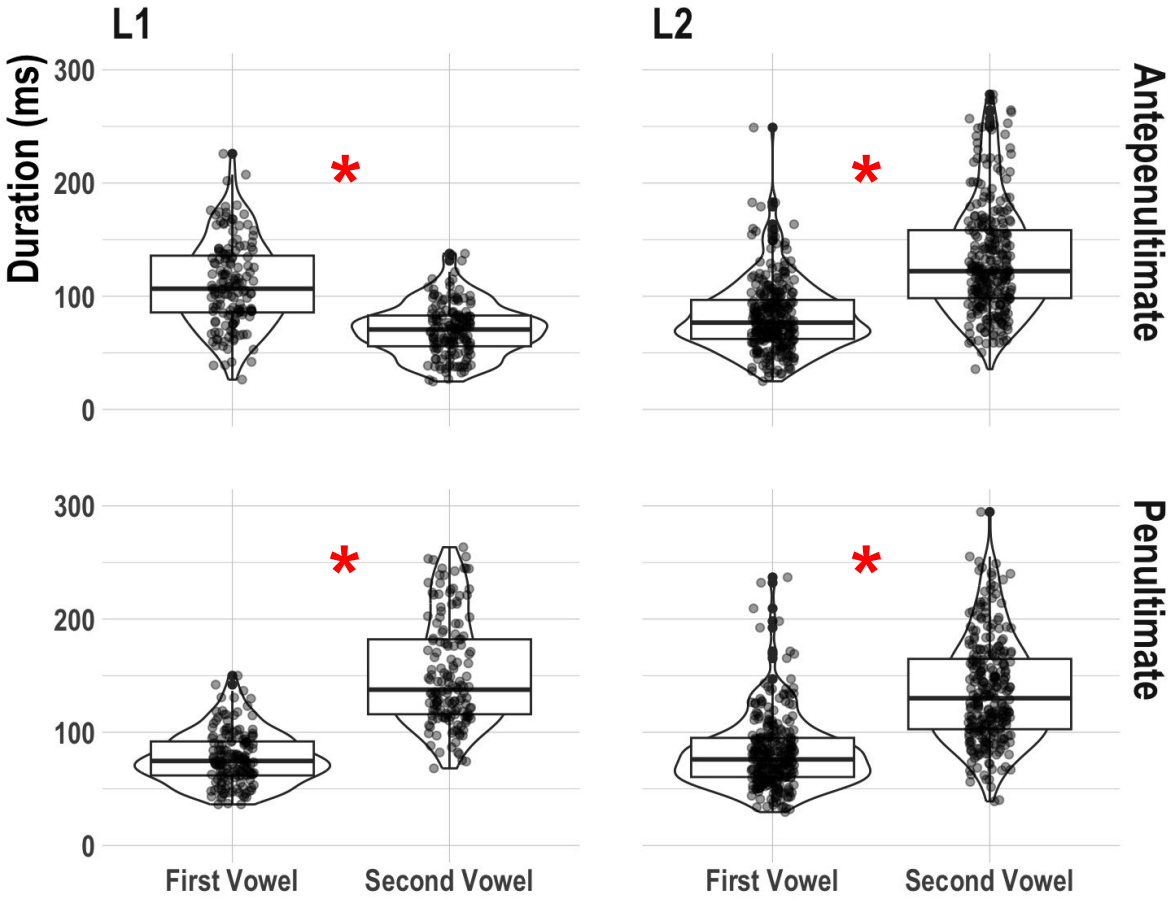
1. Manually trimmed, normalized for amplitude.

2. 900/960 recordings' vowels (1,800 vowels in total) manually tagged in Praat.

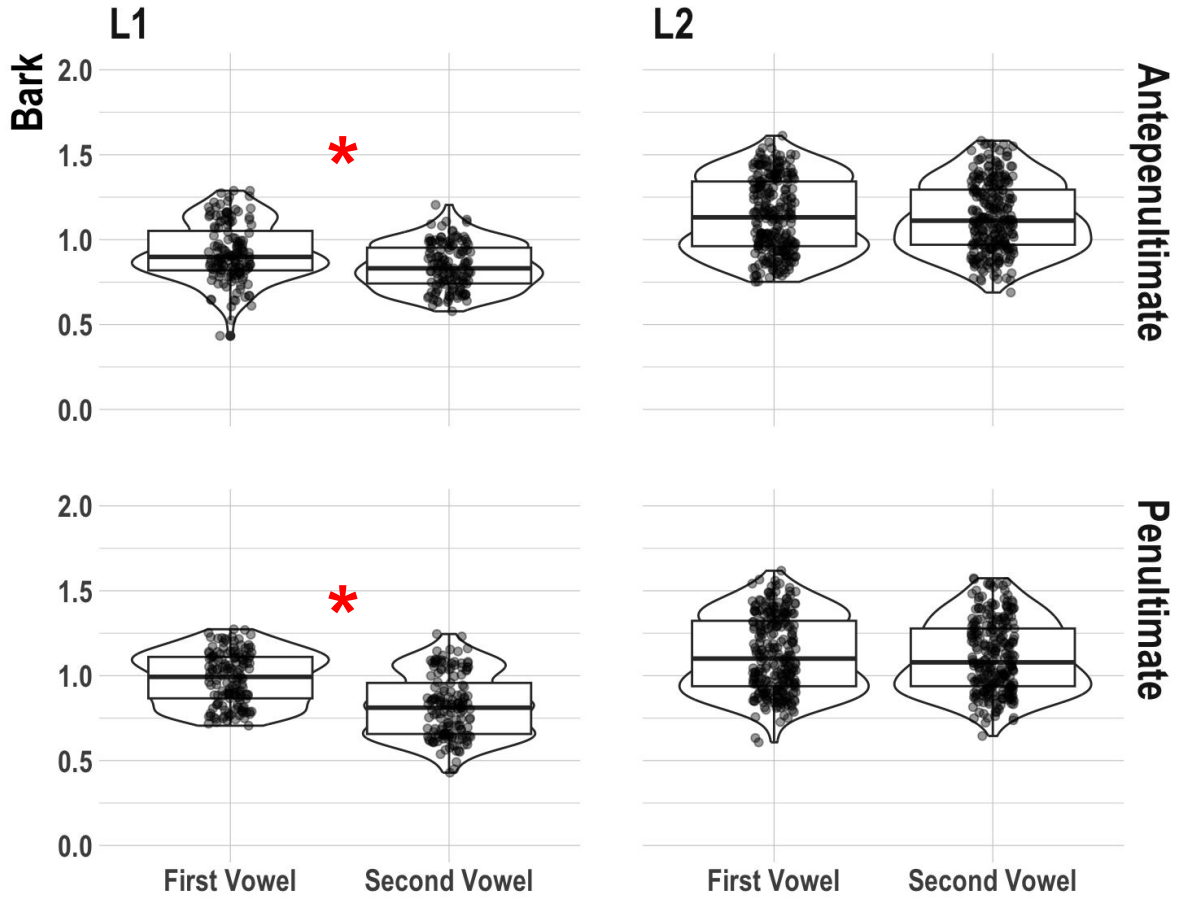
3. F0 (Bark transformed), amplitude (dB), and duration (ms) were extracted.

4. Outliers > 3 median absolute deviations were removed (~3% of acoustic data).

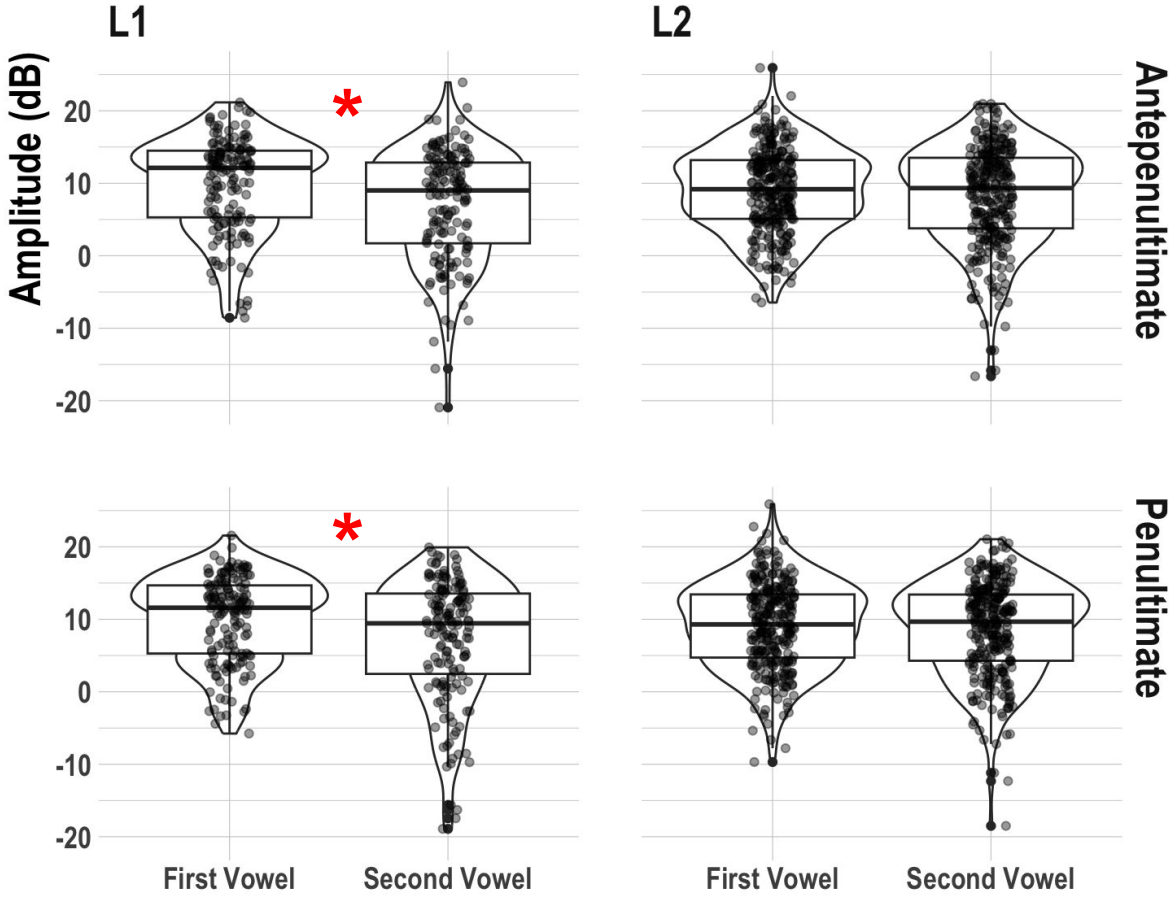
Results


L1
L2
Duration (ms)
300
200
100
0
Antepenultimate
Penultimate
First Vowel
Second Vowel
First Vowel
Second Vowel

Results


L1
L2
Bark
2.0
1.5
1.0
0.5
0.0
*
*
Antepenultimate
Penultimate
First Vowel
Second Vowel
First Vowel
Second Vowel

Results


L1
L2
Amplitude (dB)
20
10
0
-10
-20
*
*
Antepenultimate
Penultimate
First Vowel
Second Vowel
First Vowel
Second Vowel

1. *To what degree do beginner L2 Italian speakers produce L1-like acoustic cues associated with different tri-syllabic stress types?*

L2 speakers do **NOT** produce L1-like duration, amplitude, or F0 cues associated with different tri-syllabic stress types.

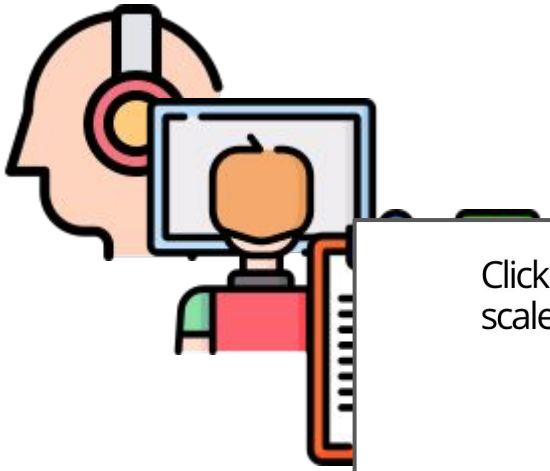
Only the penultimate duration cue was L1-like…

Procedure: Rating Audio via Gorilla

50 L1 Italian listeners recruited through Prolific (mean age = 36; mean Italian proficiency using LexITA = 57/60 Amenta et al., 2021).

Each participant heard 100 different L1 and L2 utterances (out of possible 900).

Participants rated overall fluency, and duration, loudness, and pitch fluency using visual analog scales.



Click on the line how fluent the word sounds. Please use the whole scale.

NOT fluent

Now click on the line how fluent the word sounds in terms of its duration, pitch, and loudness.

Duration

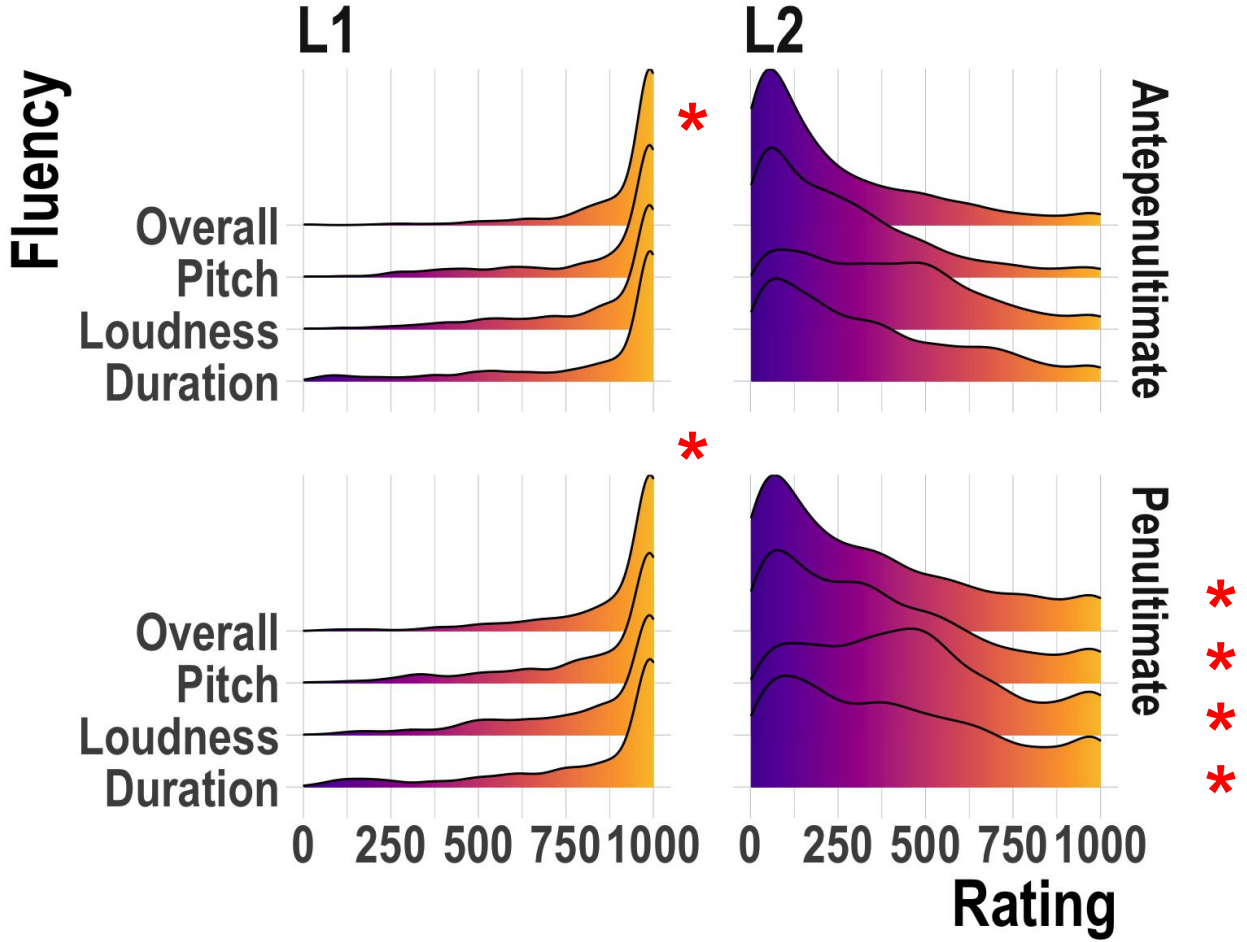
Pitch

NOT fluent

VERY fluent

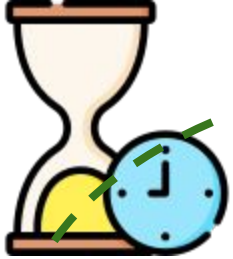
Loudness

Results


L1
L2
Fluency
Overall
Pitch
Loudness
Duration
Antepenultimate
Penultimate
*
*
*
*
*
0
250
500
750
1000
Rating

2. *How do L1 Italian listeners rate L2 stress patterns across four fluency dimensions: overall, duration, loudness, and pitch?*

- Not L1-like
- High variability
- Not fluent (across any dimension)
- Penultimate more fluent than Antepenultimate (across all dimensions)



Duration (ms)

(Alfano, 2006; Alfano, Savy, & Llisterri, 2009)

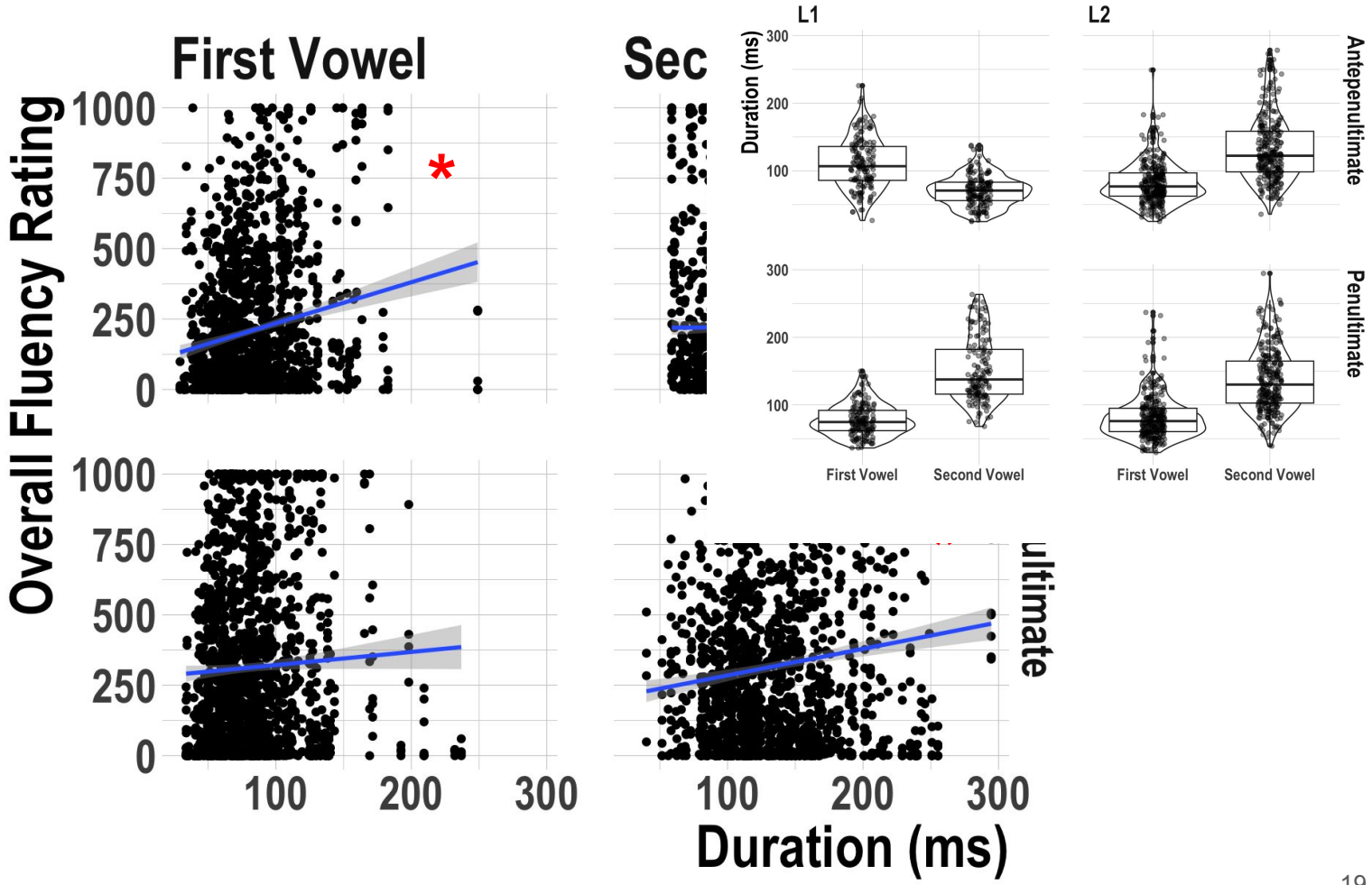
Amplitude (dB)

(Albano Leoni & Maturi, 1998).

Fundamental frequency (F0: Bark)

(Tagliapietra & Tabossi, 2005)

Results


First Vowel
Sec
Overall Fluency Rating
1000
750
500
250
0
100
200
300
Duration (ms)
L1
L2
Antepenultimate
Penultimate
First Vowel
Second Vowel

3. *How do these acoustic cues affect the fluency ratings?*

- Longer first vowel duration led to significantly higher fluency ratings for Antepenultimate stress (ß = 53.9, $p < .001$).
- Longer second vowel duration led to significantly higher fluency ratings for Penultimate stress (ß = 32.1, $p = .02$).
- All other predictors in the models were null at a .05 alpha-level.

L2 speaker

L1 listener

(✓).....

Penultimate

✘ ..... ?

✘ ..... ?

Duration as a primary cue for Italian stress recognition

(Alfano, 2006; Alfano, Savy, & Llisterri, 2009; Sulpizio & McQueen, 2012)

Stress duration

Practice length and loudness

Grazie!