Reexamination of coarticulative tones in Thai

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Project supported by JSPS KAKENHI Grant Numbers (B) 23300093, and (C) 23520457

Topics of our presentation

- Re-examining the acoustic phonetic characteristics of Thai tones from dynamic perspectives.
- Focusing on the pitch contour of combinations of two monosyllabic words in citation forms.

Previous Works: Abramson (1979)

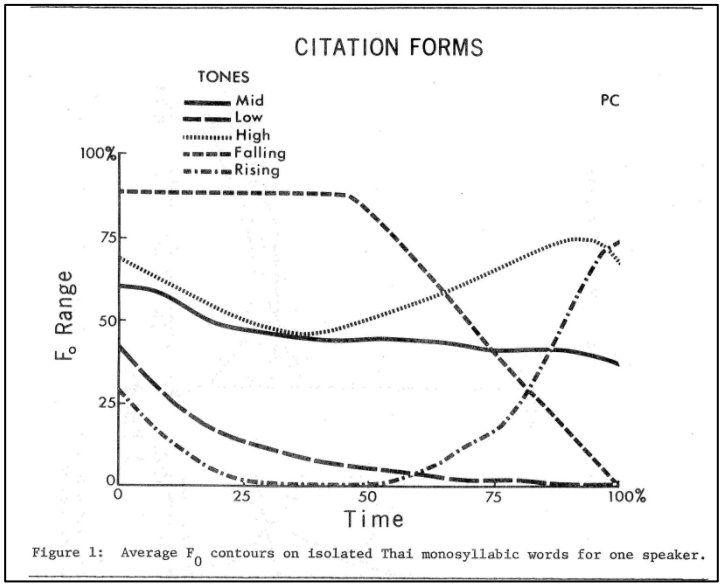


Figure 1: Average F_0 contours on isolated Thai monosyllabic words for one speaker.

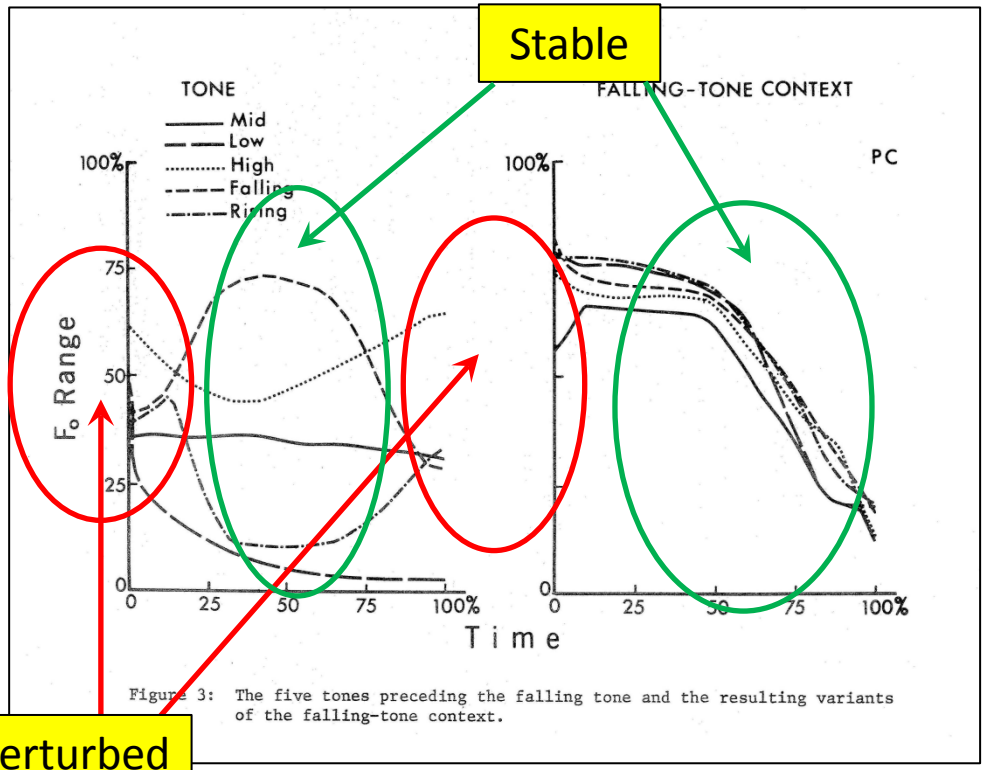


Figure 3: The five tones preceding the falling tone and the resulting variants of the falling-tone context.

Abramson (1972: 121) Figure 1: Average F0 contours on isolated Thai monosyllabic word for one speaker.

Abramson (1972: 123) Figure 3: The five tones preceding the falling tone and the resulting variants of the falling-tone contour.

Problems in previous works

1. Abramson (1979) showed only part of the results:

   the five tones preceding the mid-level tone (T1) and the falling (T3) tones.

2. Normalization of duration and F0 range of pitch contour obscured the transitional pattern of contour from one syllable to another.

3. How normalization was done is not clear.

Drawback of normalization

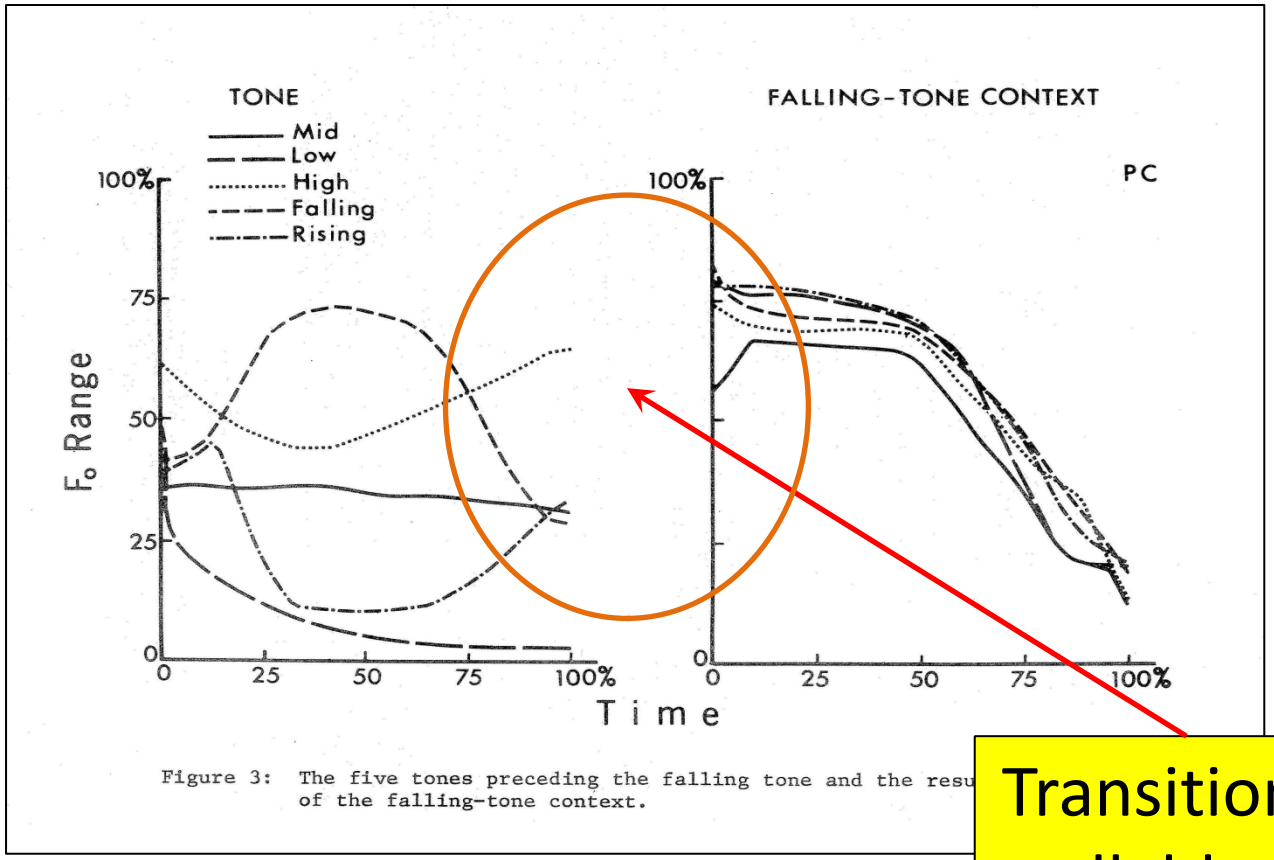


Figure 3: The five tones preceding the falling tone and the resu
of the falling-tone context.

Normalization of both duration (x-axis) and F0 range (y-axis) makes contours discontinuous

Transition between two syllables are obscured

- **Abramson (1972: 123) Figure 3:**
  The five tones preceding the falling tone and the resulting variants of the falling-tone contour.

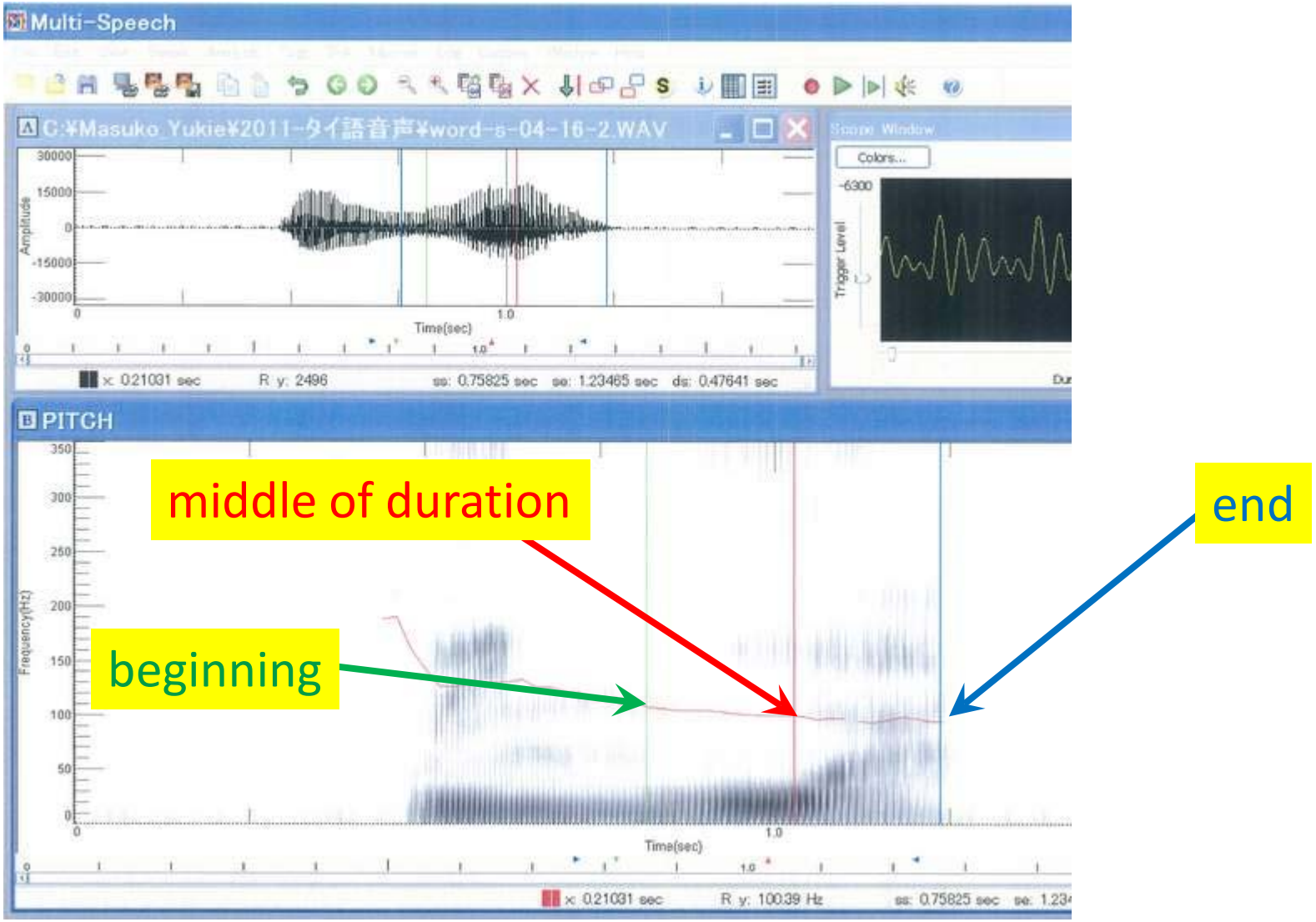
Research Questions: focusing on transition

1. How is the transition like from the first to the second (last) syllable?
2. Does combination of two monosyllables form a new 'dynamic' domain where some tendencies are found?
3. What are the clues to distinguish tones in the combination of monosyllables?

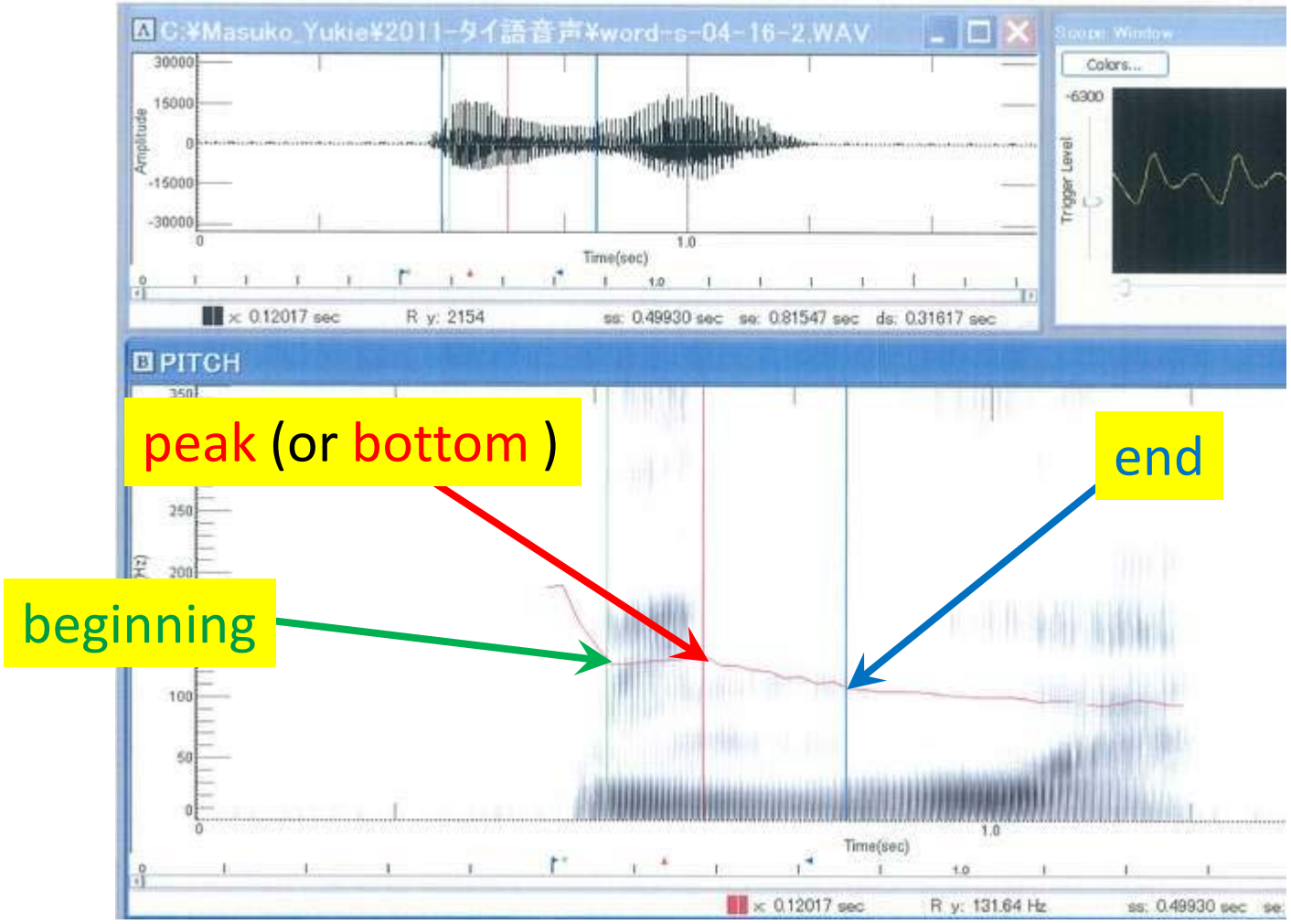
Methods for preliminary examination

1. Recording all possible two tone combinations
2. Various grammatical combinations included
3. Nasal ([m, n, ŋ]), approximant [j](/y/) or [o]/w/ consonants are preferred
4. Recorded by one Thai male subject. Each combination for three times
5. Duration and F0 measured
6. Measuring duration and F0 at three positions (including voiced consonants) according to whether the curve is contoured or level

Measuring level tones: the beginning, the middle point, and the end of the syllable



Measuring contours: the beginning, the end of the syllable, and the peak (or bottom) of F0



Analysis

1. The tonal patterns **without normalizing pitch and duration** will be shown.
2. Syllable structure: /CVV/ or /CVN/
   C=Nasals /m, n, ŋ/ or approximant /y, w/
3. The speaker's range of F0: 80-160Hz.

Findings

1. The duration of the 1st syllable is always shorter than that of the 2nd syllable.
- → Two syllable combination forms one unit for pronouncing.
- → The second syllable is dominant.
2. Tones are grouped into two groups:
    1. level tones: T1=mid, T2=low
    2. contour tones: T4=level-high, T5=rising, T3=falling

Findings: actual tonal curves of "contour" tones

1. T3=rise-fall (phonemically described as 'falling')
2. T4=(fall)-rise (described as 'high-level')
3. T5=fall-rise (described as 'rising')

Phonemic description of each tone coincides to the pitch characteristics on the latter part of the syllable.

Q: How T4 and T5 are distinguished?

Fig. 1. T3 + T4
[yə̂n yə́ə] [nɛ́ŋ nɔ́ɔi]/-nɔ́ɔy/

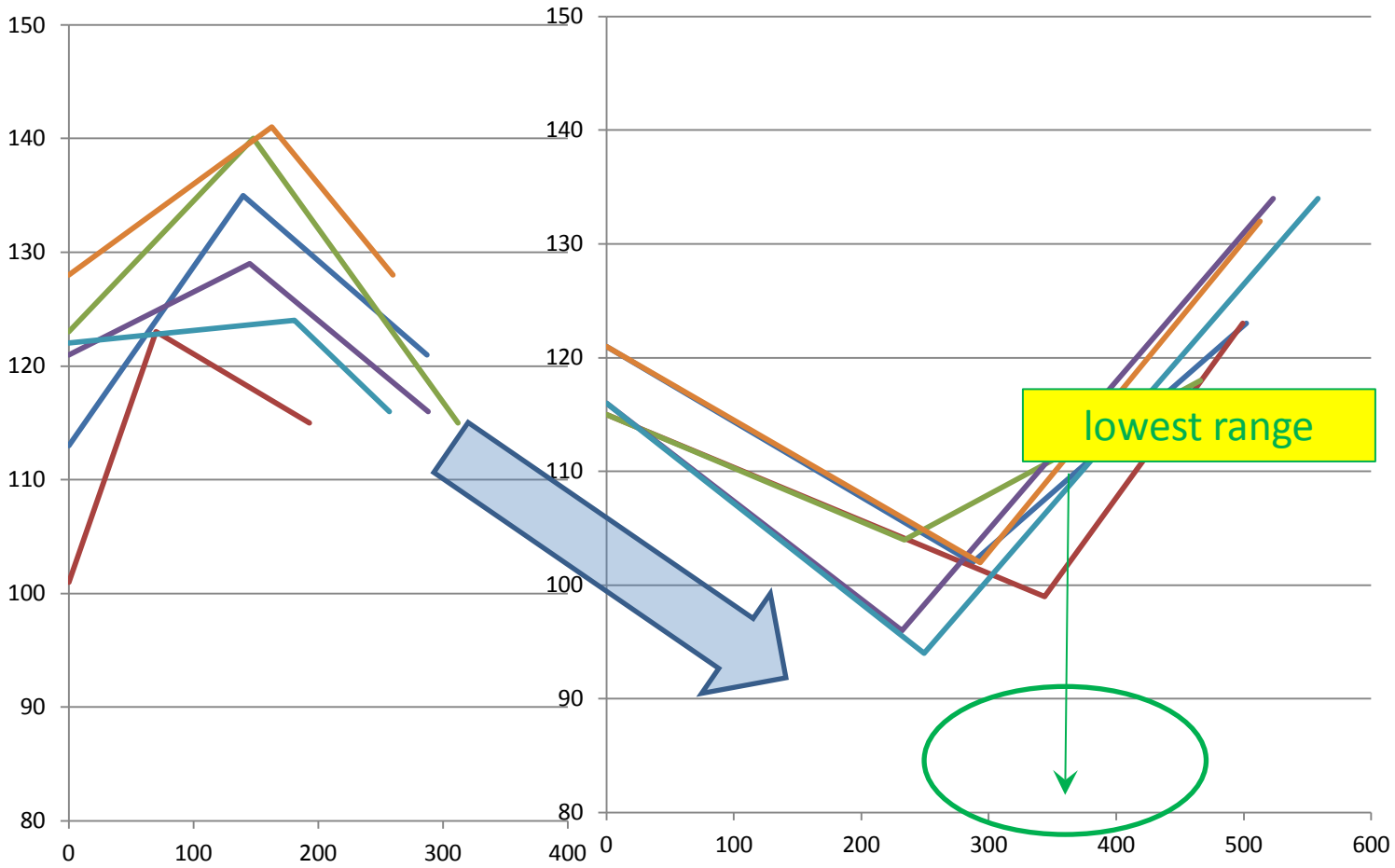


Fig. 2. T3 + T5
[mân măai] [mûŋ măai] /maăy/

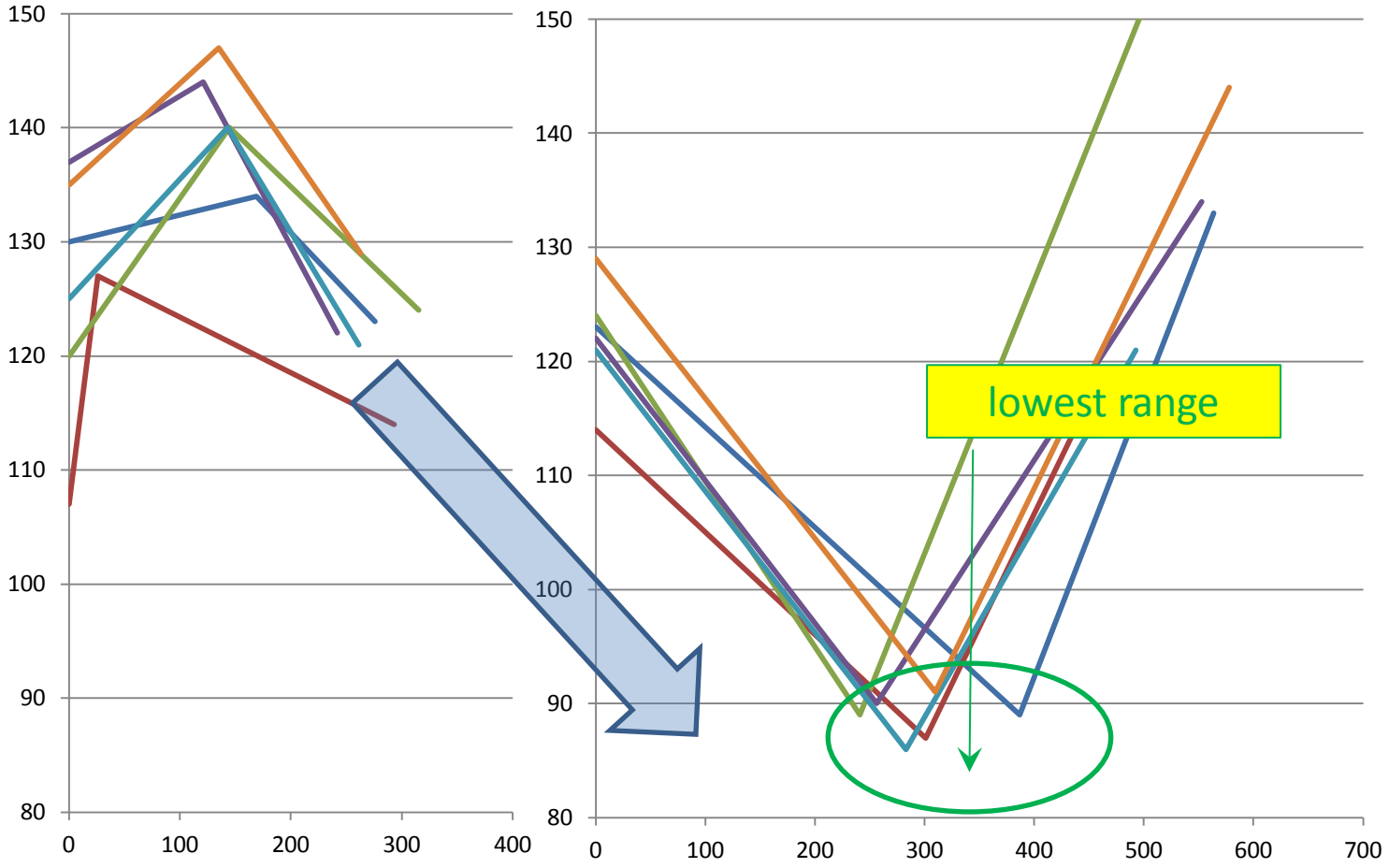
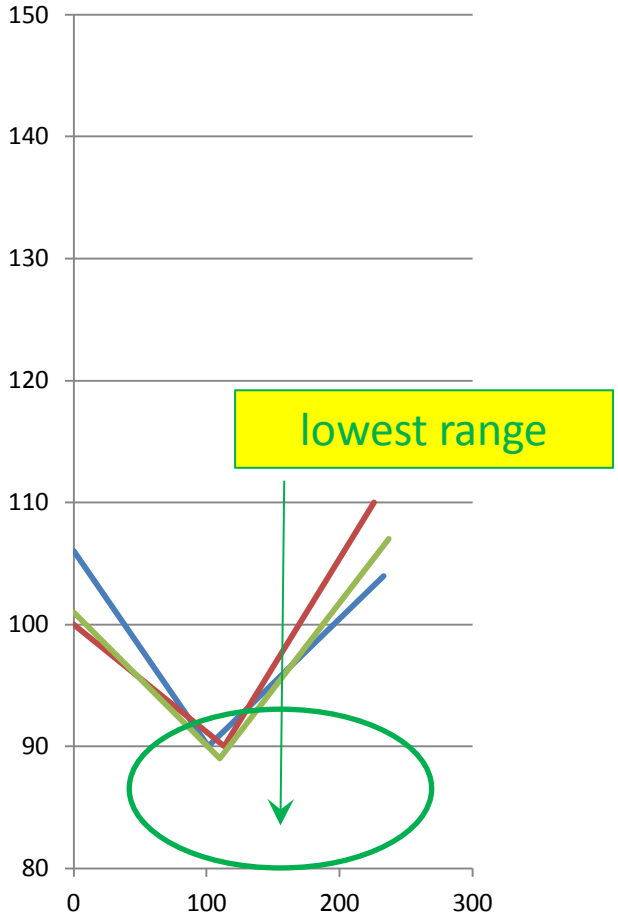


Fig. 3. T5 + T5
[năŋ niău] /niăw/



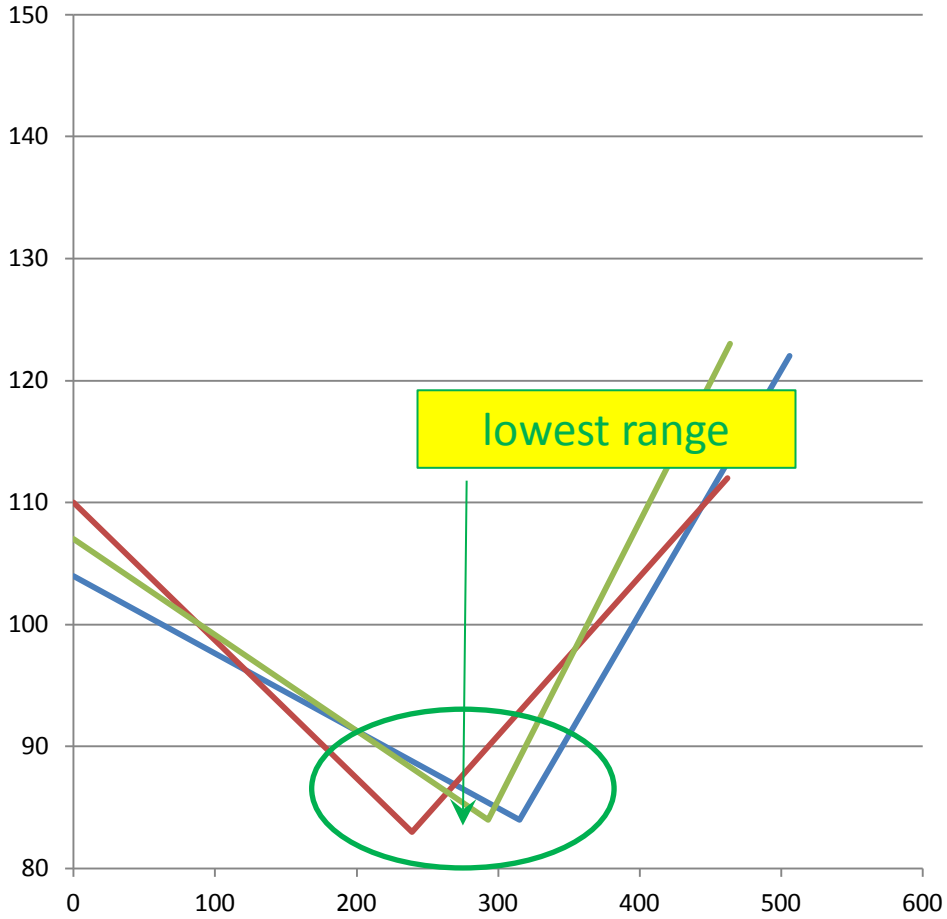
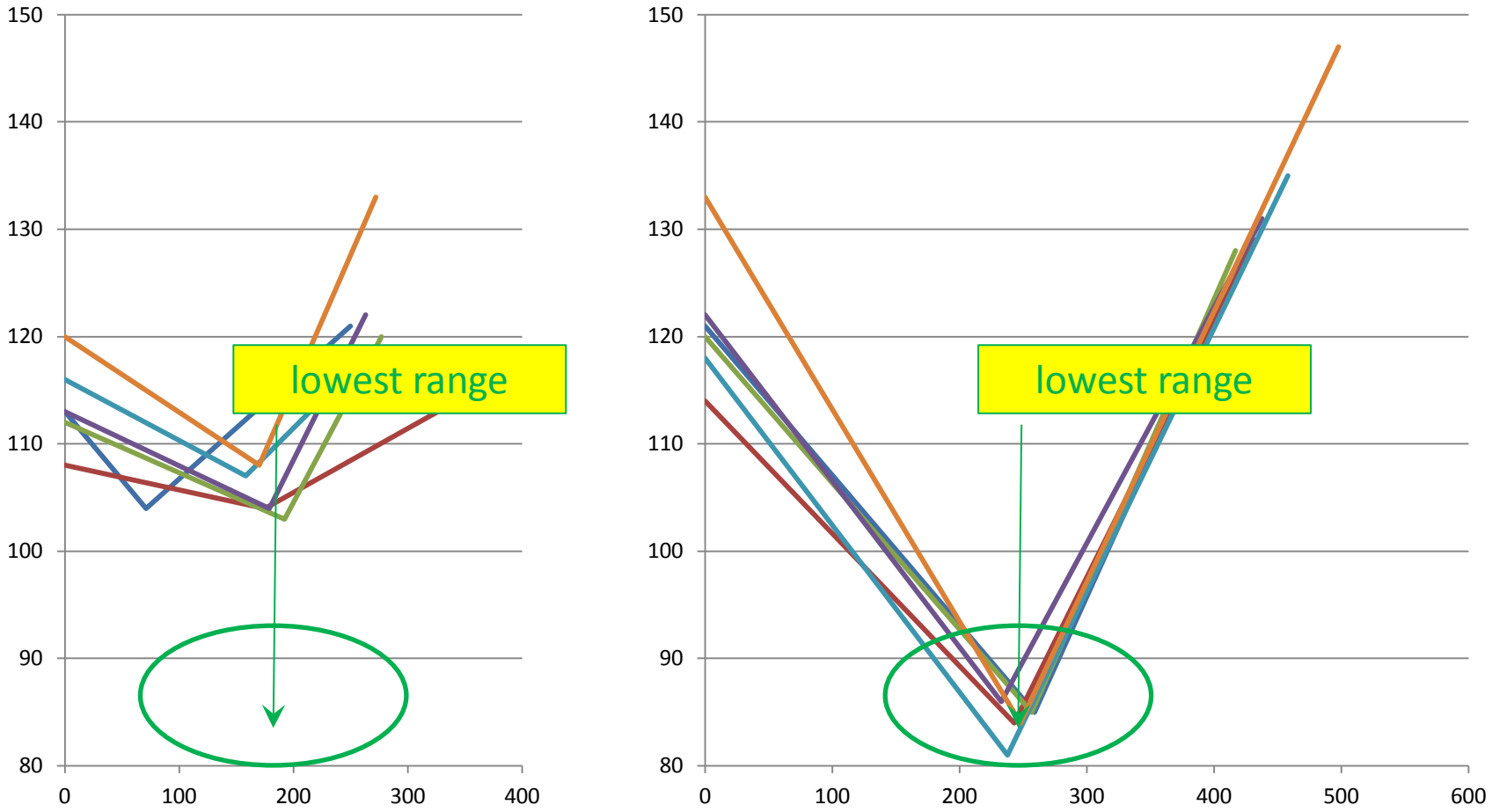


Fig. 4. T4 + T5
[máa mŭn] [nɯ́a năŋ]



Analysis: how T4 and T5 (both fall-rise) are distinguished?

1. If the bottom reaches the lowest region of the speakers' dynamic range, then the fall-rise is T5.
2. Otherwise, the fall-rise is T4.

Findings: actual tonal curves of “level” tones

1. T1=mid-level (with or without gradual declination)
2. T2=low-level with declination

Q: How T1 and T2 are distinguished?

Fig. 5. T1 + T1 [mii ŋən] [mɯɯ wai]/-way/

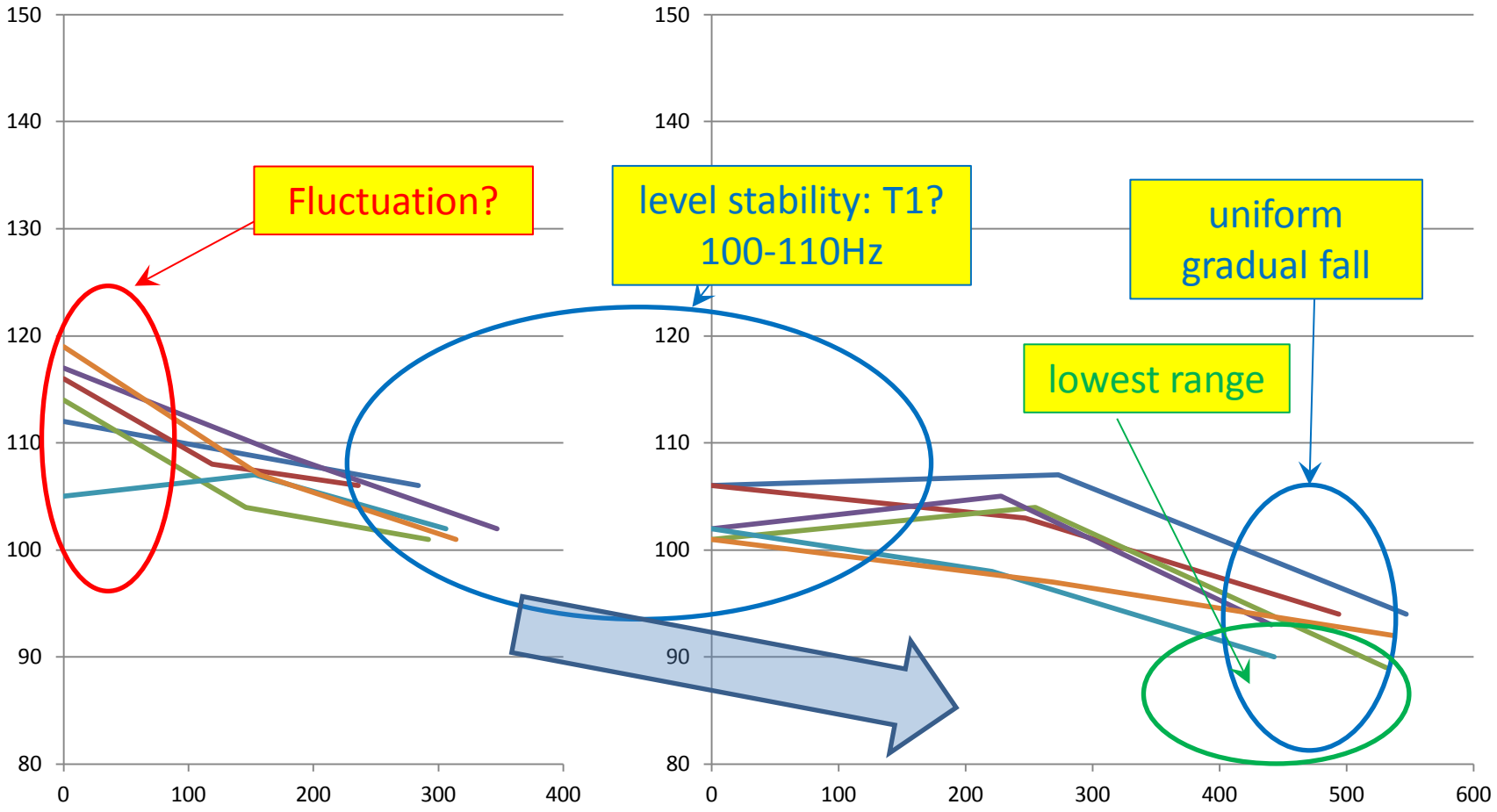


Fig.6. T2 + T1
[nìau nam]/nìaw-/

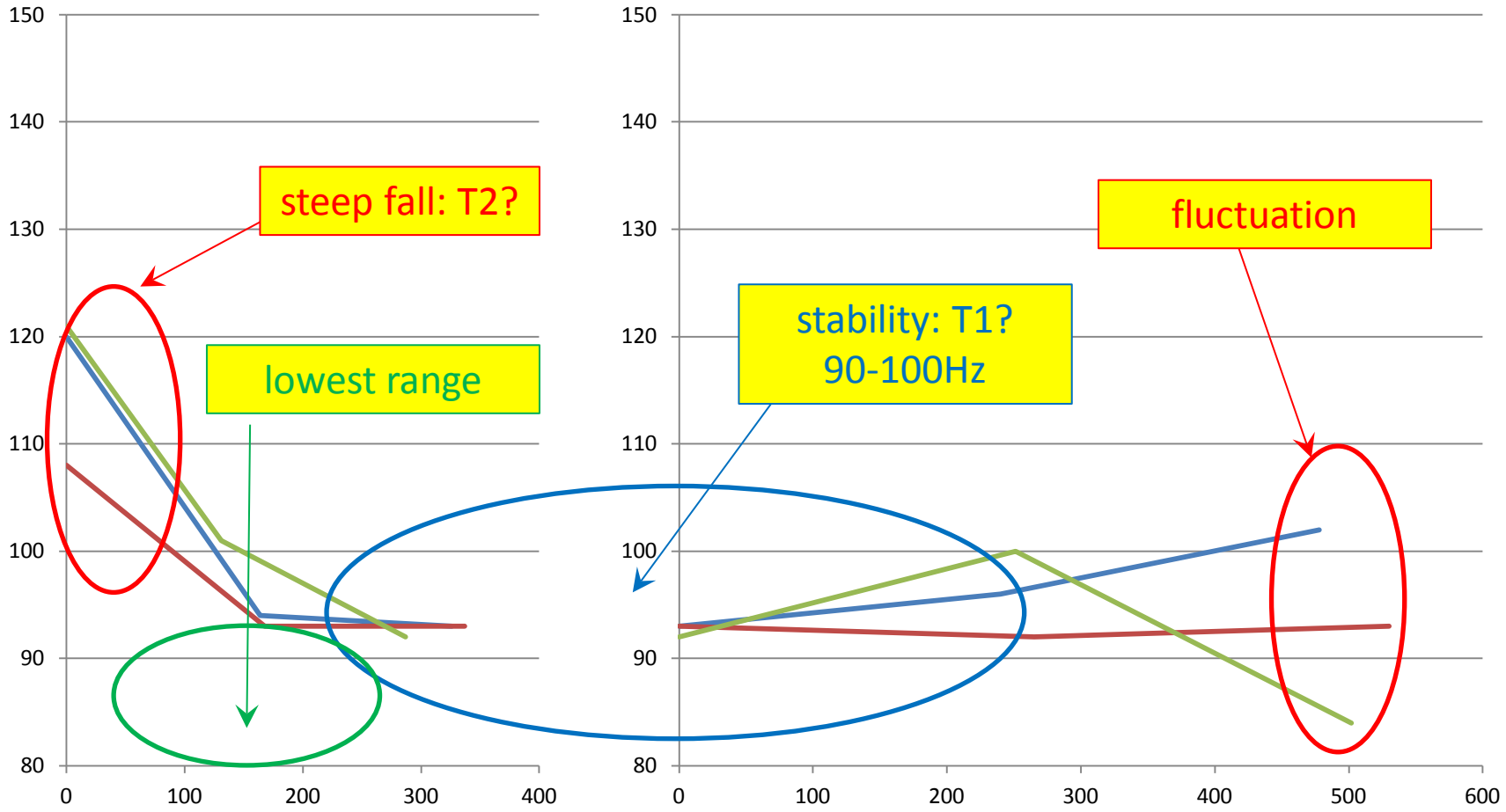


Fig. 7. T1 + T2 [mɯɯ nɯ̀ŋ]

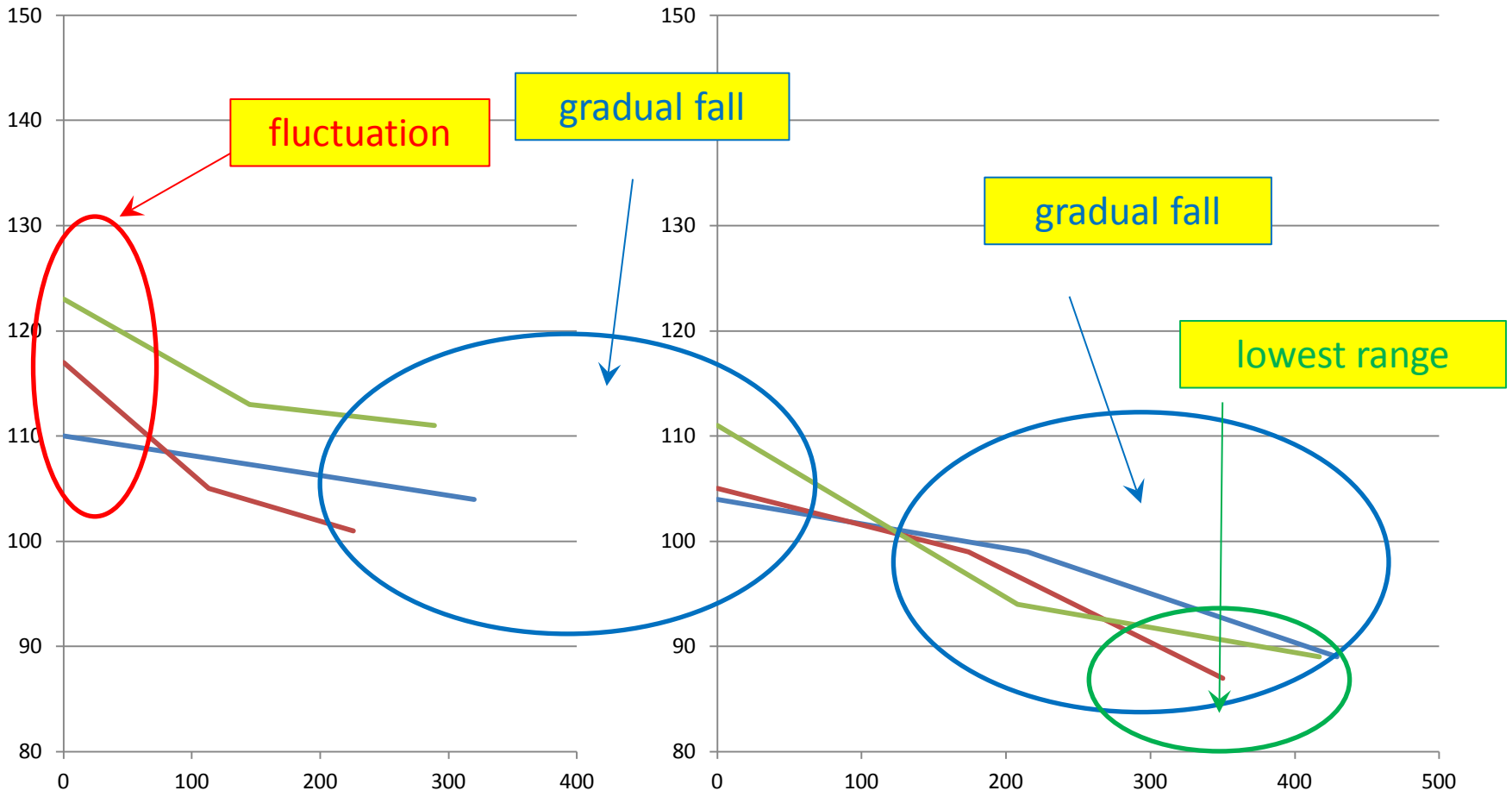
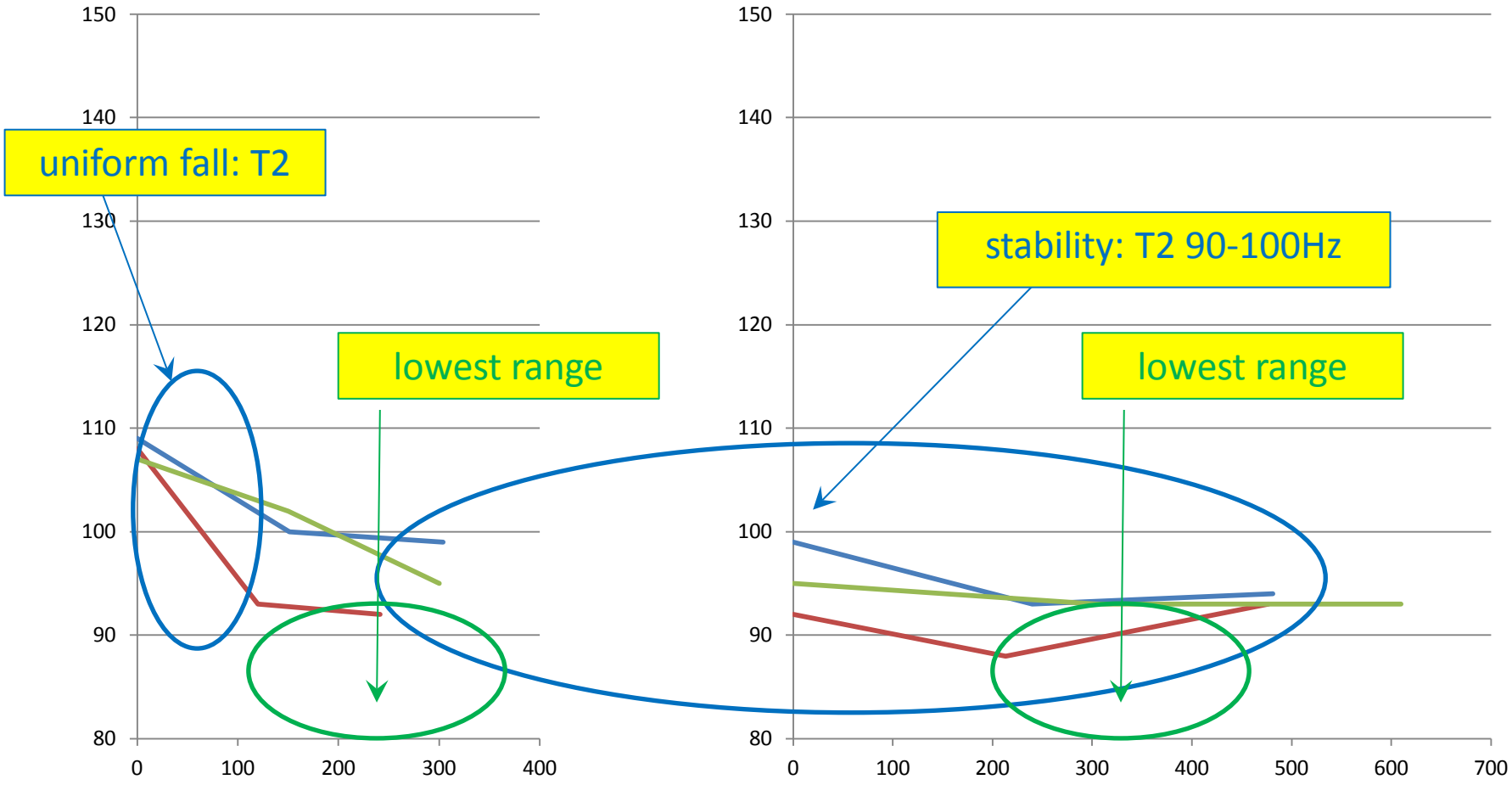


Fig. 8. T2+T2
[nùm yài]/-yày/



Analysis: how T1 and T2 (both level) are distinguished?

1. If the bottom reaches the lowest region of the speakers' dynamic range, then the level tone is T2.
2. Otherwise, the level tone is T1.

Conclusive Remarks

1. One continuous tonal domain is formed in two combined monosyllables.
2. The lowest region of the speaker's dynamic pitch range (approx. 80-90Hz for our speaker's case), not the peak, is the clue to distinguish tones T5 from T4, and T2 from T1, respectively.