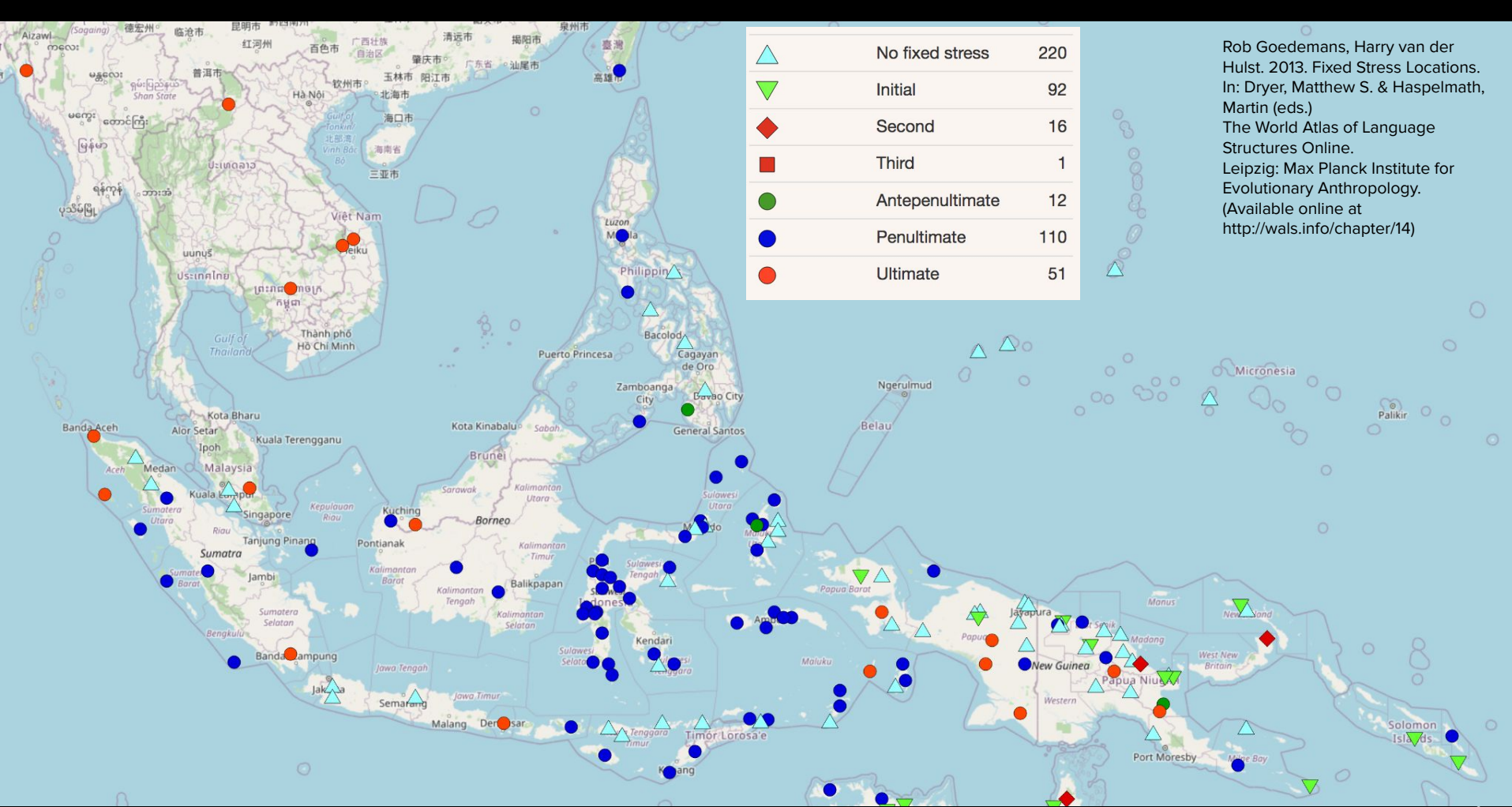


Gesture alignment in a “stressless” language

Daniel Kaufman (Queens College, CUNY & ELA)
Alessa Farinella (U Mass, Amherst)

Mapping Austronesian prosodic typology

- WMP languages show fascinating diversity of prosodic systems but few attempts have been made to account for these in a single framework.
- Some generally accepted facts:
 - Philippine languages possess a contrastive “stress system” while this is extremely rare among other Western Malayo-Polynesian languages.
 - Indonesian and Malay varieties show evidence of stresslessness although there are strong L1 effects.
 - Many scattered descriptions of penultimate stress patterns across WMP
- First geographical overview provided by StressTyp database, served as the basis of the WALS chapter on Fixed Stress patterns (Goedemans & van der Hulst 2013).



Rob Goedemans, Harry van der Hulst. 2013. Fixed Stress Locations. In: Dryer, Matthew S. & Haspelmath, Martin (eds.) The World Atlas of Language Structures Online. Leipzig: Max Planck Institute for Evolutionary Anthropology. (Available online at <http://wals.info/chapter/14>)

Mapping Austronesian prosodic typology

- No clear geographical patterns emerge from the WALS map.
- Himmelmann & Kaufman (2021) and Kaufman & Himmelmann (forthcoming) attempt to uncover larger areal patterns that had been previously overlooked.
 - **Philippine prototype:** Phonemic vowel length distinction in open penultimate syllables. Long vowels and both initial and final phrase edges are tonal targets. Suffixes but not clitics shift length rightwards.
 - **Eastern prototype:** No phonemic length/stress distinctions. Predictable penultimate word-level stress commonly shifting to final stress if penult contains schwa. Suffixes and possibly certain enclitics included in the stress window. Penultimate prominence may be phrasal rather than word-based, especially in fast speech, i.e. prominence only occurs on the penultimate syllable of a phrase and not on every (phonological) word.
 - **Java prototype:** No length distinctions and no word-level prominence. Prominence in pitch, duration and intensity is inherited from higher prosodic levels (prosodic phrase and intonational phrase). Effects of suffixes and enclitics on prominence are variable and difficult to discern.
 - **Western Rim prototype:** Final prominence either on the word or phrase level.



Mapping Austronesian prosodic typology

- Malay/Indonesian has prompted particular interest due to claims that it lacks stress altogether (see Van Heuven & van Zanten 2007 for summary).
- Here, we are interested in looking at the question from a completely novel perspective: the coordination of manual beat gestures.
- What is a beat gesture and what do we expect from its timing?

Co-speech gesture

- Beat gestures (McNeill 1992)
 - Non-referential
 - Involve quick, abrupt and often rhythmic movements, with clear targets and starting and stopping points
 - Biphasic
 - Do not convey meaning and are not associated with the content of the utterance

Alignment of gesture and prosody

Anchoring points in previous studies include:

Prosodic anchors:

- **Pitch accents** (Loehr 2004, 2012; Jannedy & Mendoza-Denton 2005; Esposito et al. 2007, *a.o.*)
- **Stressed syllables** (Rochet-Capellan et al. 2008)

Gesture anchors:

- **Stroke:** the point of maximal effort (Kendon 1972, 1980; Kita et al. 1998)
- **Peak Velocity** (Leonard & Cummins 2009, 2011; Pouw & Dixon 2018)
- **Apex:** The target or endpoint of movement (Loehr 2004, 2012; Jannedy & Mendoza-Denton 2005; Shattuck-Hufnagel et al. 2007; Yasinnik et al. 2005, *a.o.*)

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Beat gestures and prosody

- Studies on the alignment of beat gestures to prosodically prominent syllables have focused almost exclusively on languages with word level stress (English, Dutch, Catalan, Italian, Brazilian Portuguese)
- What are the expectations for gesture alignment in stressless languages?

Gesture alignment in stressless languages

Hong Kong Cantonese (Fung & Mok 2018)

- Looked at the alignment of deictic gestures to words with one syllable realized with prosodic focus (cued by duration)
- Gesture was NOT aligned with the prosodically prominent syllable, but consistently aligned to the beginning of the word

French (Rohrer, Prieto, & Delais-Roussarie 2019)

- Beat gesture apexes aligned with pitch accents marking the right edge of the AP ~73% of the time, not as closely as in stress languages
- Beats that did not coincide with a pitch accent tended to occur at left edge of AP
- Gesture possibly marks boundaries of prosodic domains (Accentual Phrases)

Data

- The data analyzed here come from two publicly available video recordings of religious sermons: a lecture by Imam Ustadz Abdul Somad (henceforth Somad) and a sermon by Pastor Nadia Manuputty-Jambormias (henceforth Manuputty).
- Somad is from West Sumatra and speaks Minangkabau in addition to Indonesian (although maybe from a Javanese family).
- Manuputty is from Ambon, in east Indonesia.
- Both speak regional varieties of Indonesian but Manuputty is *not* speaking Ambon Malay.
- Why religious sermons? Because they are highly emotive and full of gestures!

Predictions

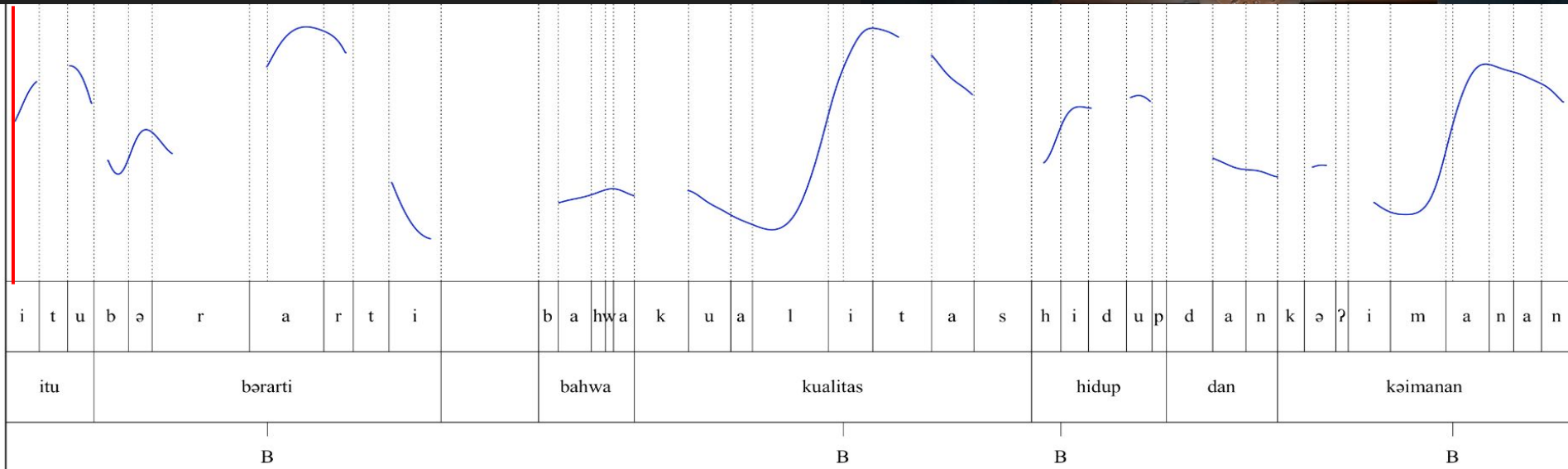
- If Malay/Indonesian is stressless, we expect less coincidence between gesture and particular syllables.
- We would expect a tendency towards higher prosodic boundaries rather regular alignment with words.
- On the other hand, if Malay varieties fit Kaufman & Himmelmann's general prosodic geography, we expect eastern varieties like Ambon to show a trochaic pattern of gesture alignment and western varieties like those of lowland Sumatra to show final alignment (on the word or phrase level).

Methodology and coding

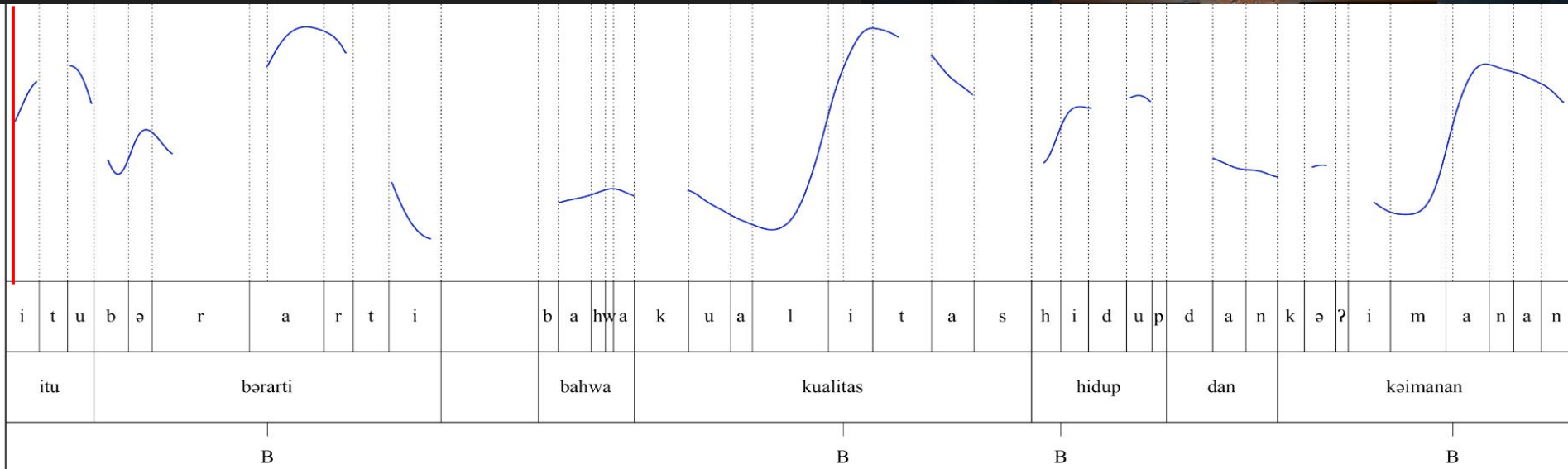
- In the first phase, the apex of each clear beat gesture was marked in Adobe Premiere without listening to the audio.
- In the second phase, this information was entered into a spreadsheet with additional information about the the position of the apex in relation to the word.
- 282 gestures were coded for Somad and 279 were coded for Manuputty.
- The quantitative data was subject to basic statistical analysis in R (R core team 2020) while coincidences between gestures and pitch accents were analyzed in Praat (Boersma & Weenik 2018).

| | A | B | C | D | E | F | G | H | I |
|----|----------|--------------|------------------|--------|-------------------------|--------------|--------------|---------------|---------------|
| 1 | Timecode | word | position in PrWd | suffix | 1 σ clitic in PV | phrase final | aligned to ə | penultimate ə | function word |
| 47 | 5:50:22 | isTRI | u | n | n | y | n | n | n |
| 48 | 5:51:28 | aNAK | u | n | n | y | n | n | n |
| 49 | 5:56:16 | sangGUP | u | n | n | n | n | n | n |
| 50 | 5:59:08 | ukur-uKURLah | p | n | y | n | n | n | n |
| 51 | 6:02:13 | CEK | u | n | n | n | n | n | n |
| 52 | 6:22:19 | berDUIT | u | n | n | n | n | n | n |
| 53 | 6:25:11 | berkurbanLAH | u | n | y | y | n | n | |
| 54 | 6:30:04 | solatLAH | u | n | y | y | n | n | |
| 55 | 6:40:28 | puTING | u | n | n | n | n | n | n |
| 56 | 6:43:10 | dihidupKAN | u | y | n | y | n | n | n |
| 57 | 6:46:00 | dihidupKAN | u | y | n | y | n | n | n |
| 58 | 6:49:17 | kənCANG | u | n | n | y | n | y | n |
| 59 | 6:50:28 | kənCANG | u | n | n | y | n | y | n |
| 60 | 7:14:19 | solat ID | u | n | n | y | n | n | n |
| 61 | 7:16:21 | tangGAL | u | n | n | n | n | n | n |
| 62 | 7:18:21 | səpuLUH | u | n | n | y | n | n | n |
| 63 | 7:19:21 | səbəLAS | u | n | n | y | n | n | n |
| 64 | 7:20:20 | duabəLAS | u | n | n | y | n | n | n |
| 65 | 7:21:22 | tigabəLAS | u | n | n | y | n | n | n |
| 66 | 7:22:21 | soRe | u | n | n | y | n | n | n |
| 67 | 7:23:16 | səbəLUM | u | n | n | n | n | n | n |
| 68 | 7:27:15 | saBAR | u | n | n | y | n | n | n |
| 69 | 7:30:06 | boLEH | u | n | n | y | n | n | y |
| 70 | 7:34:12 | boLEH | u | n | n | y | n | n | y |
| 71 | 8:05:05 | bəraPA dapat | u | n | n | n | n | n | y |
| 72 | 8:07:23 | HamdulilLAH | u | n | n | y | n | n | n |

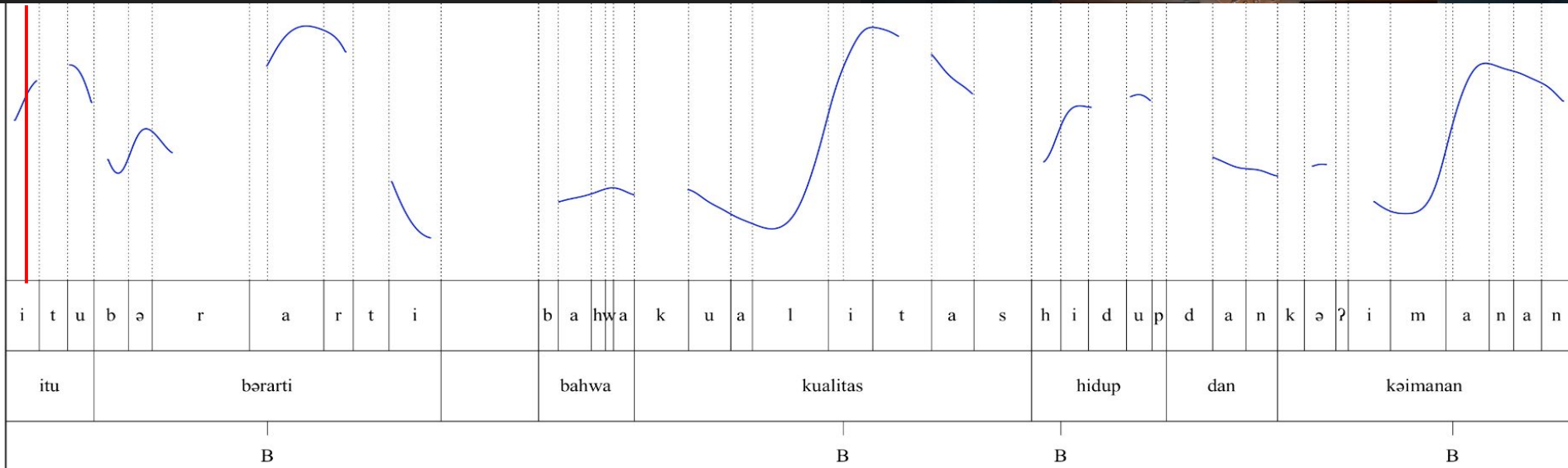
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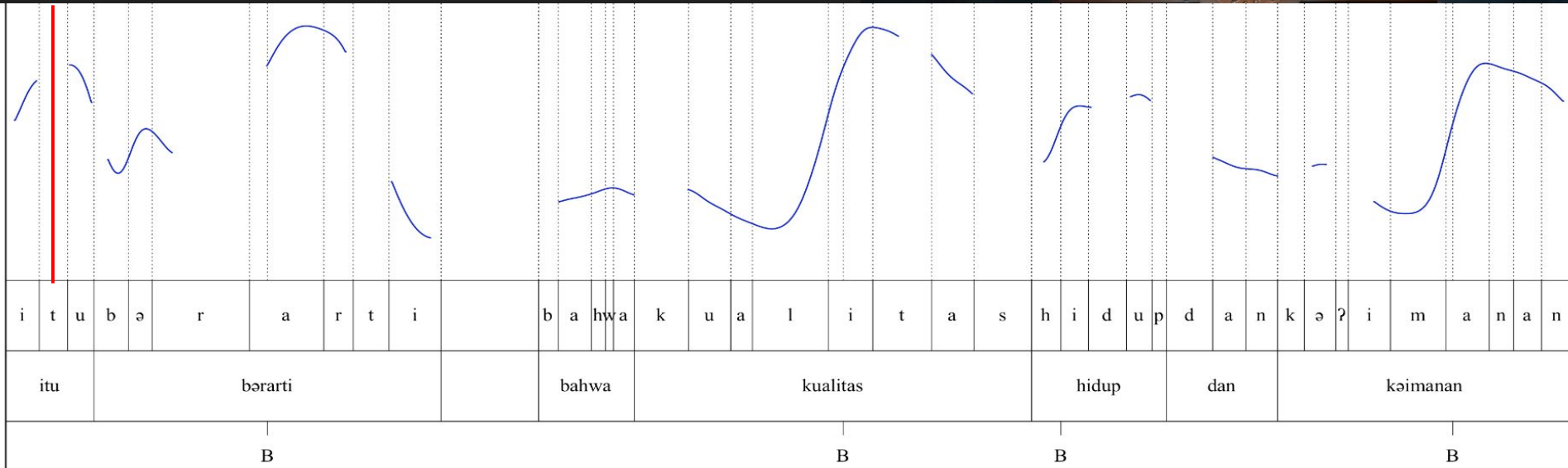
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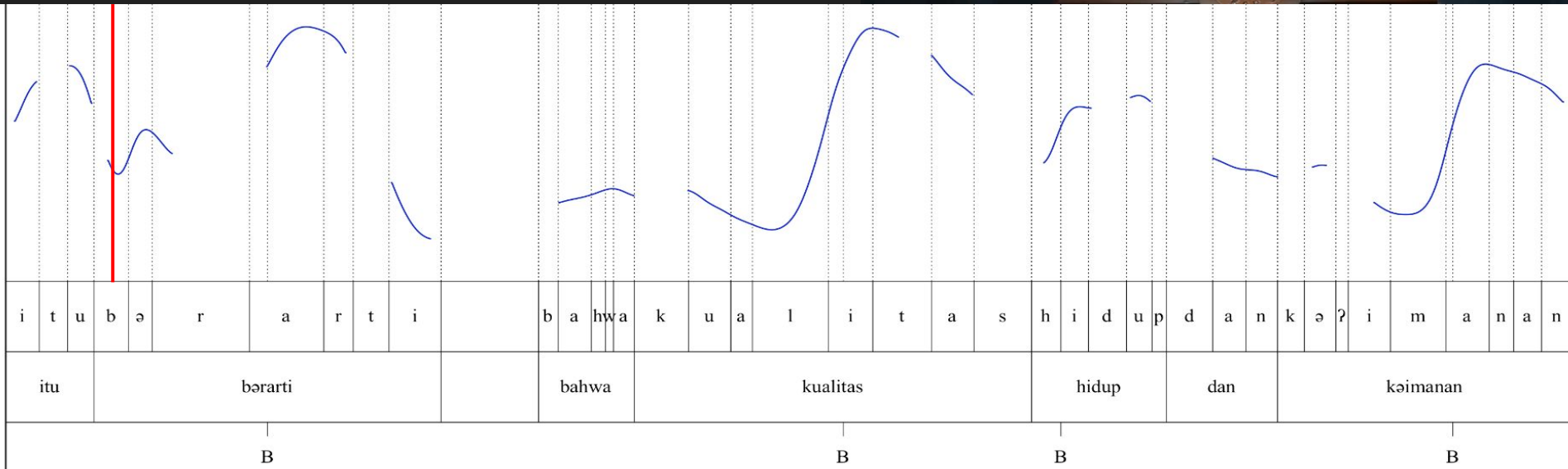
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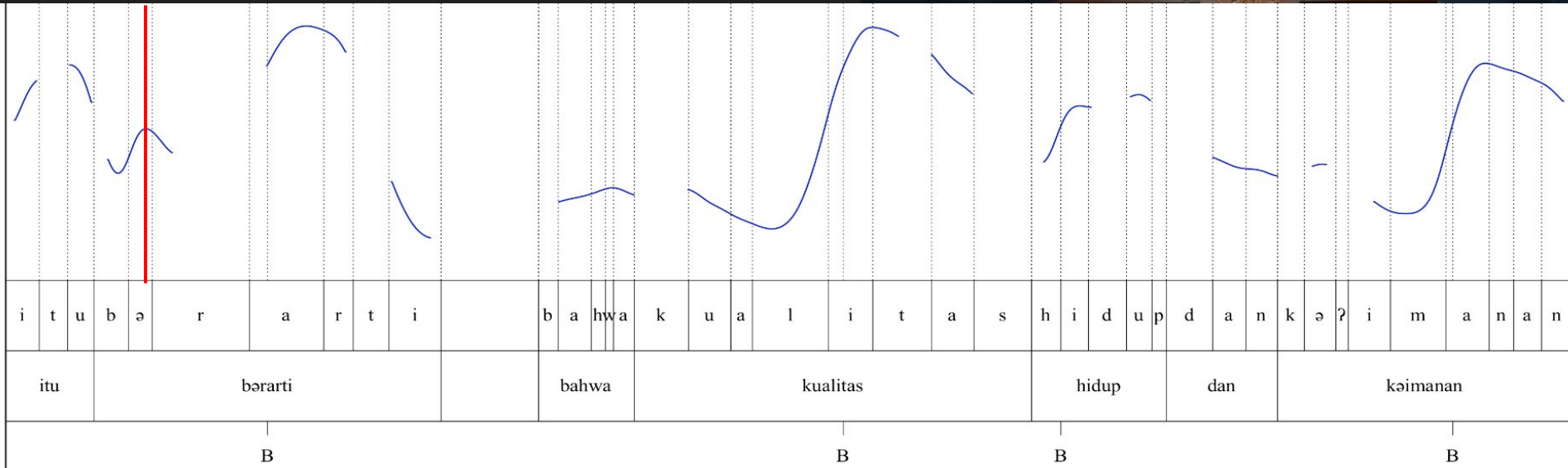
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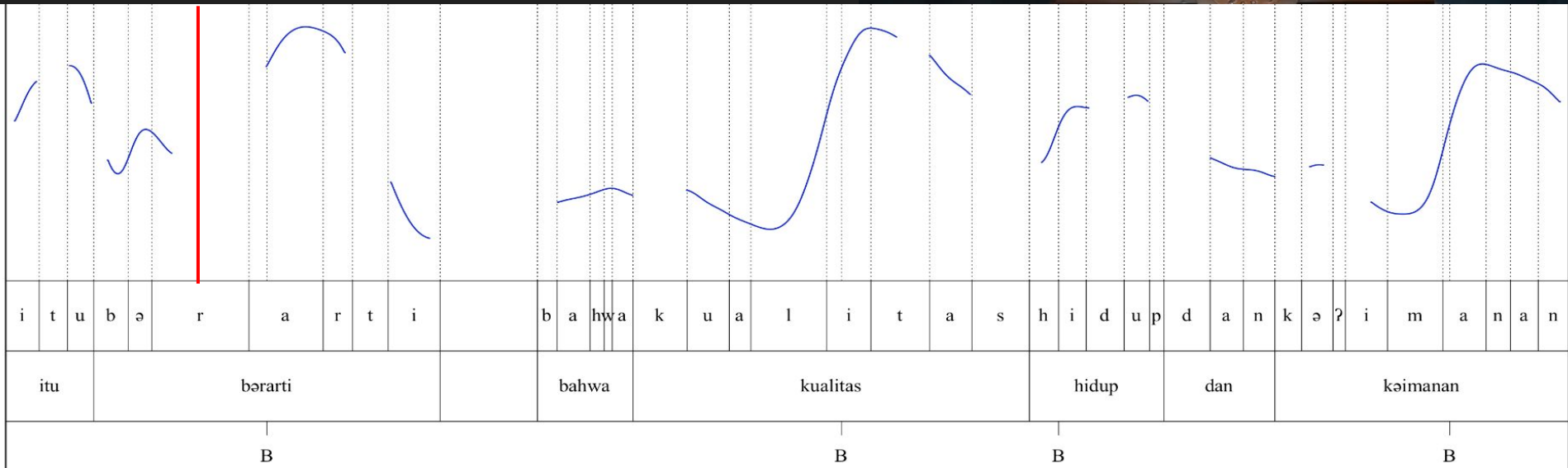
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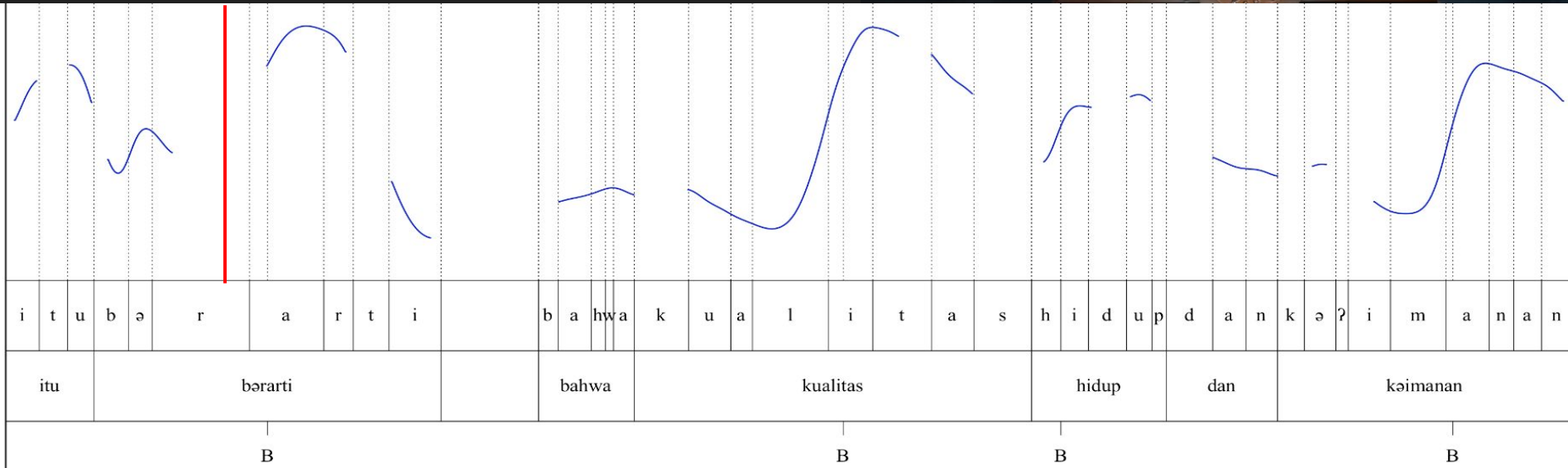
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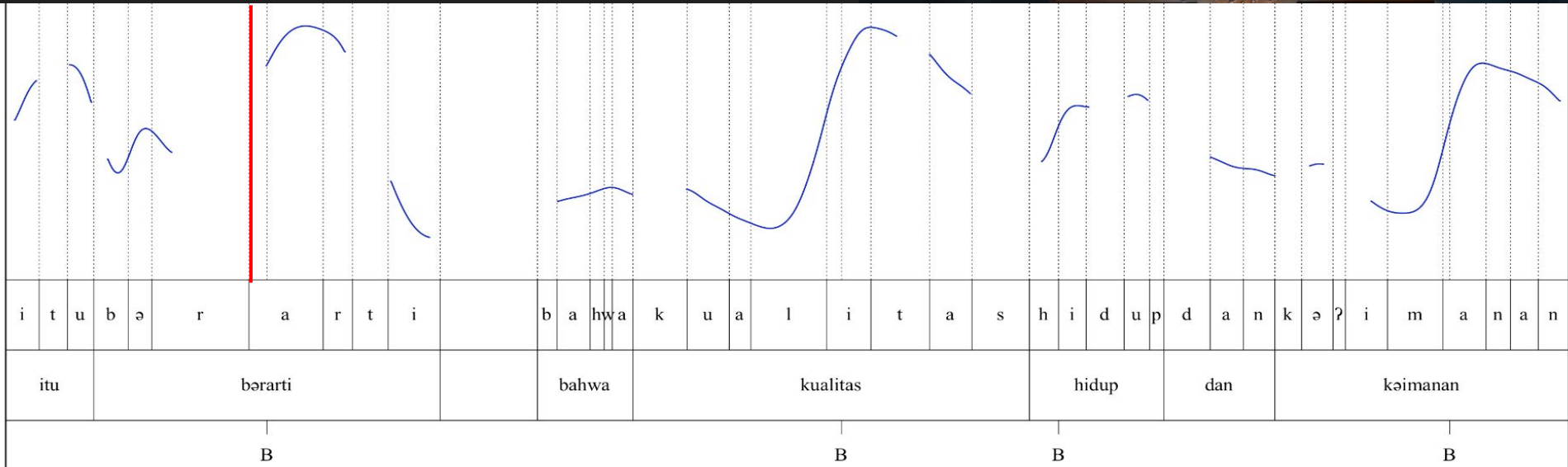
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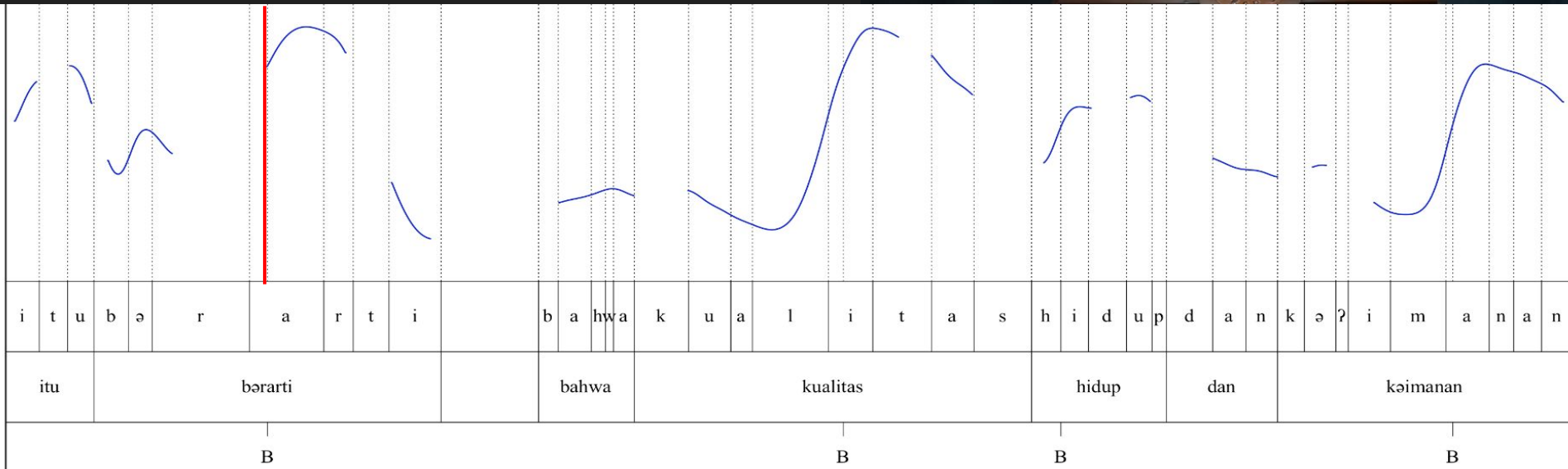
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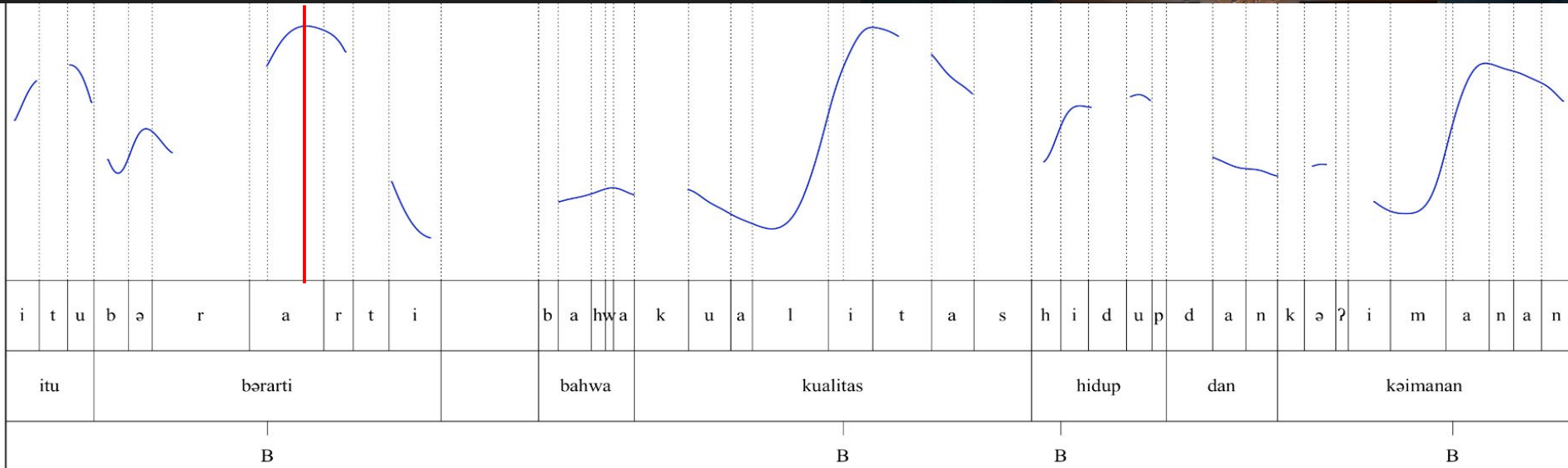
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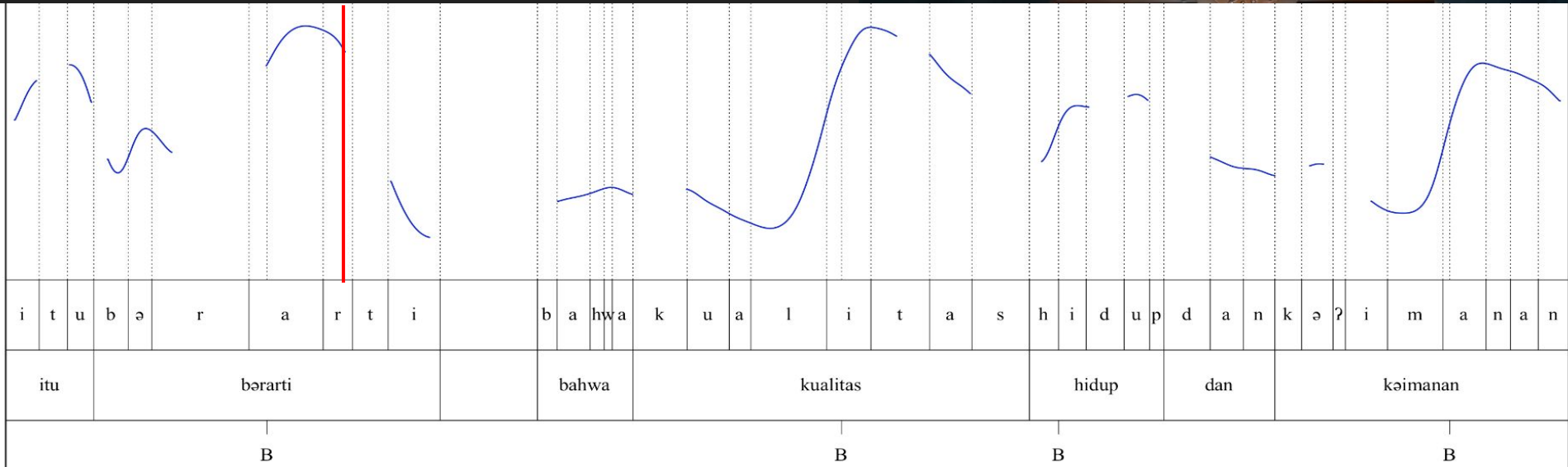
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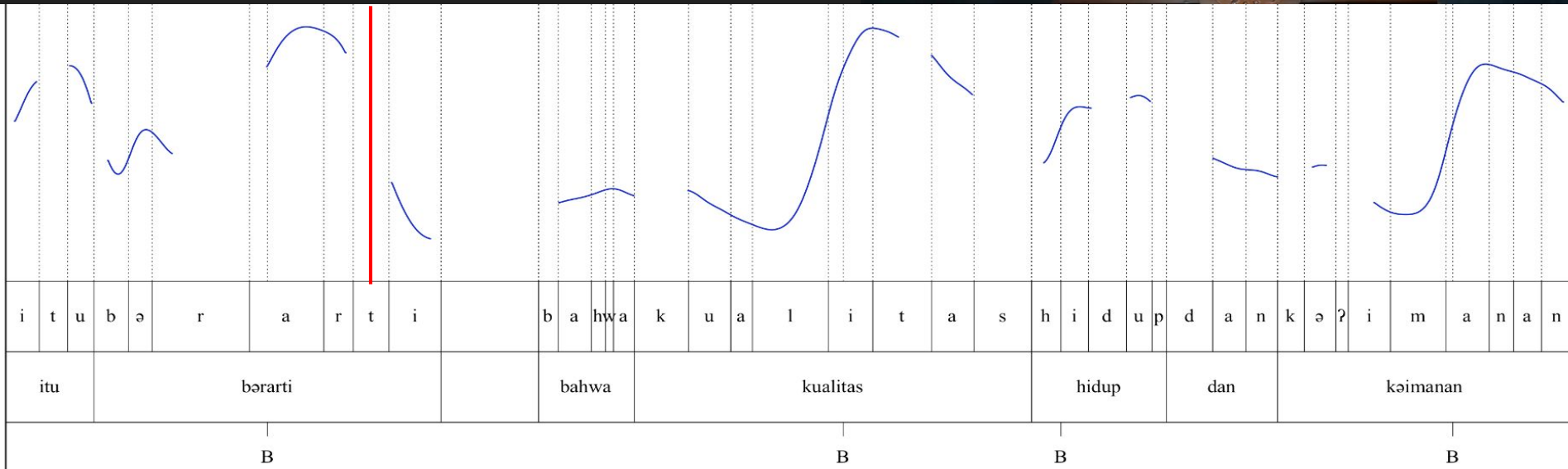
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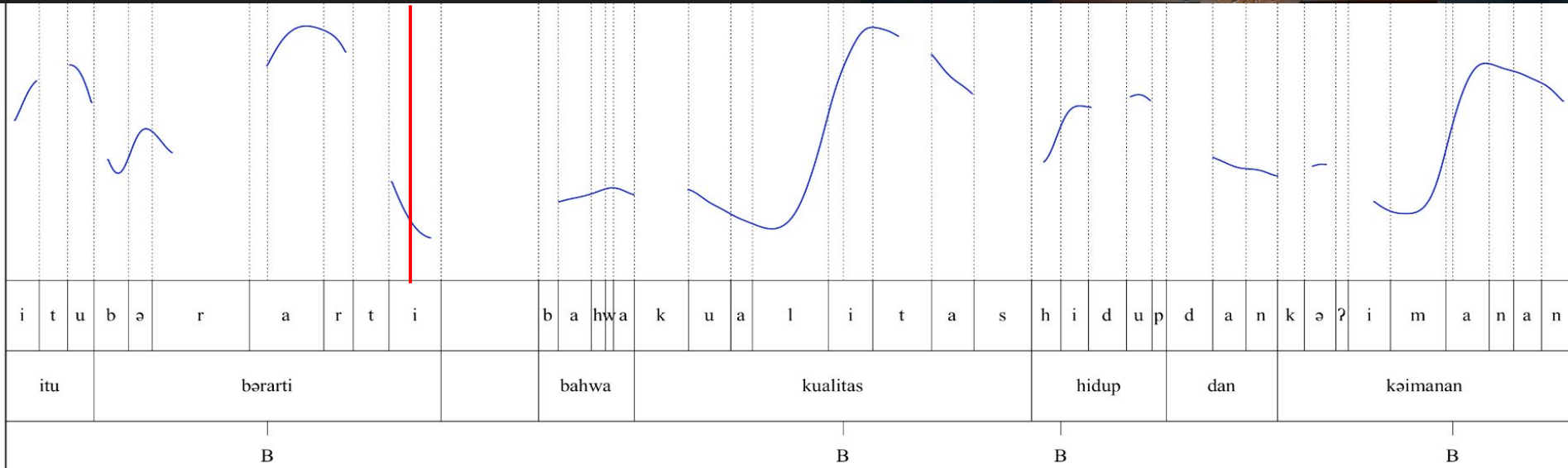
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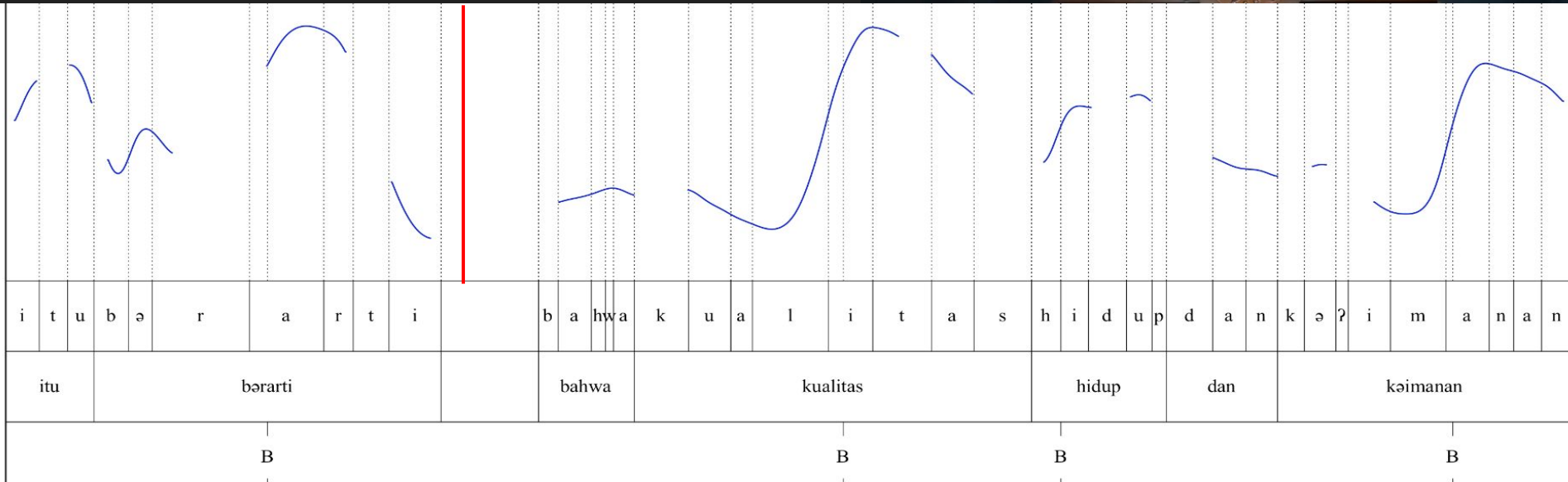
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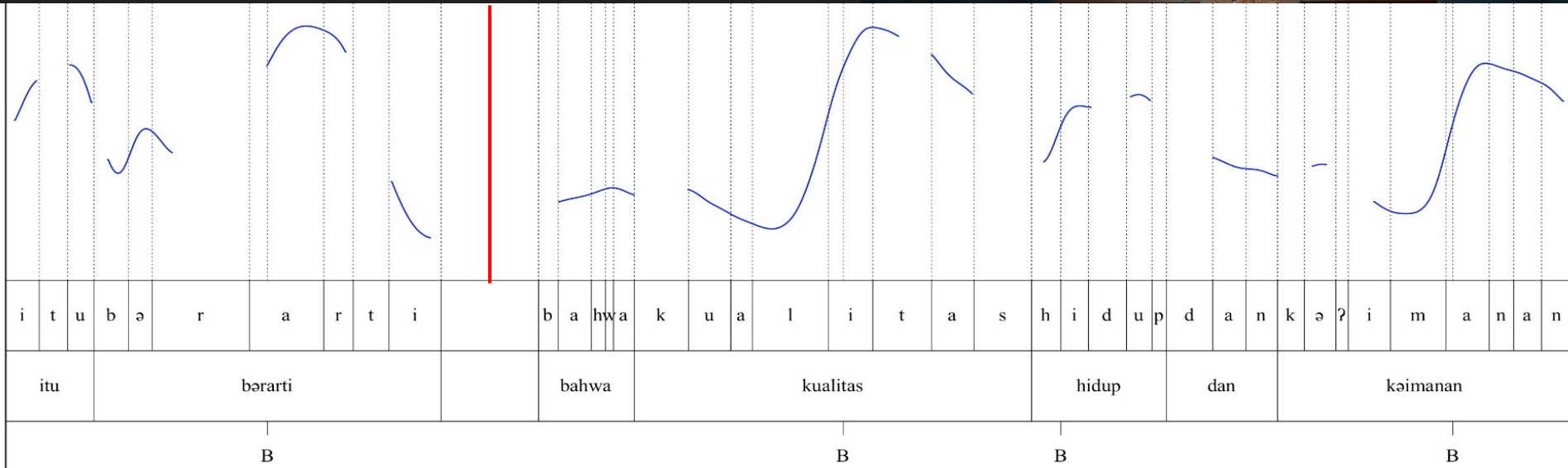
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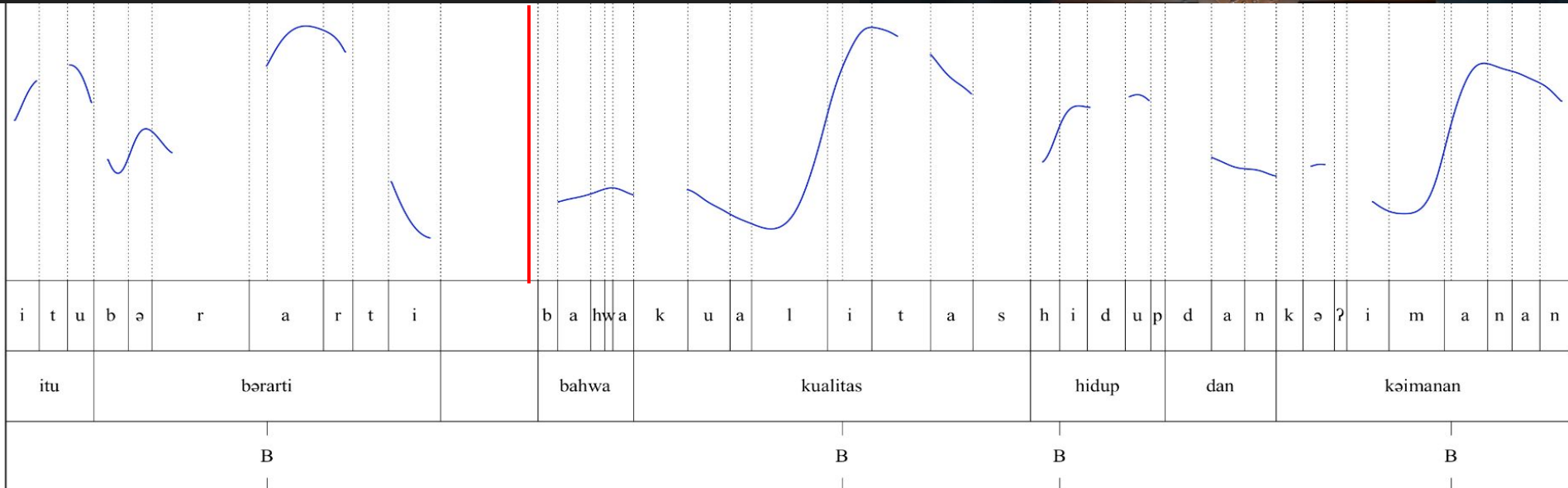
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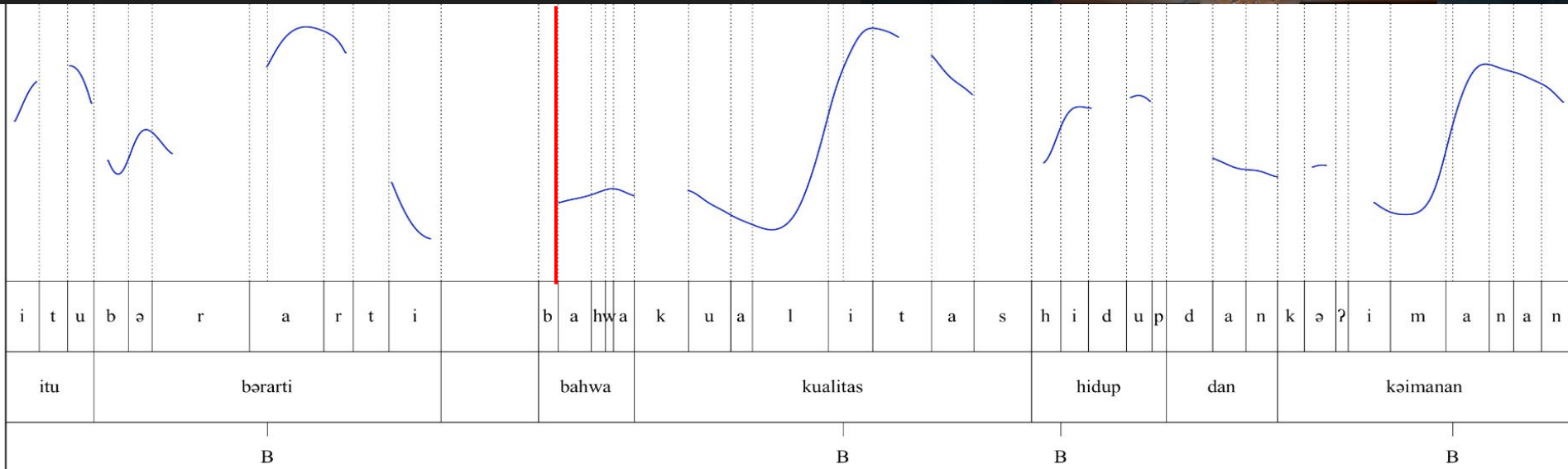
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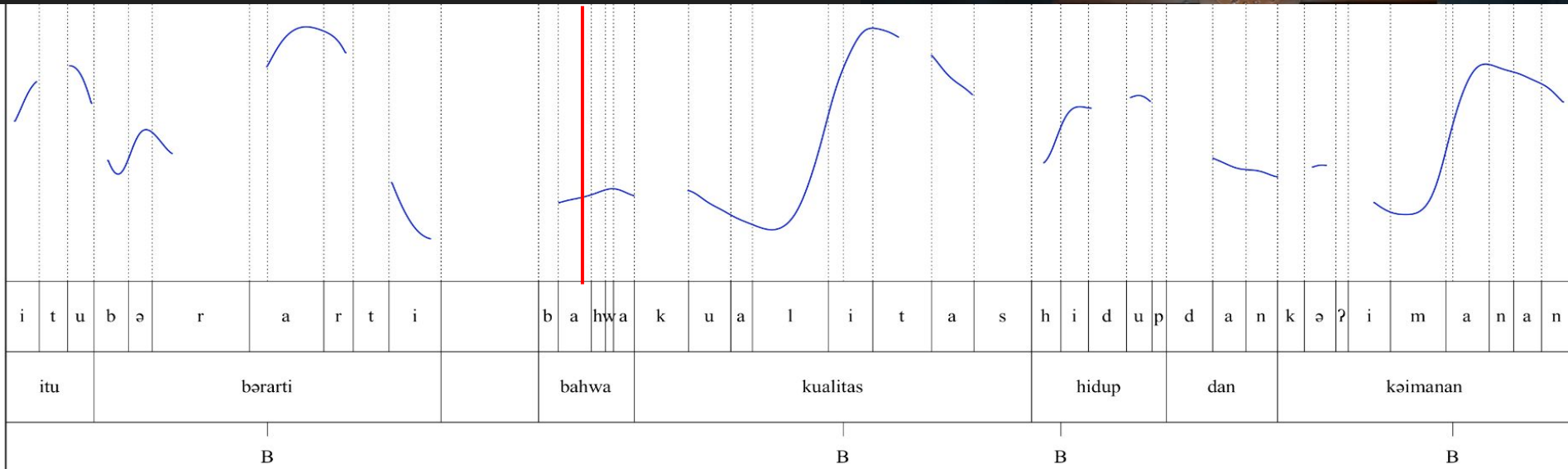
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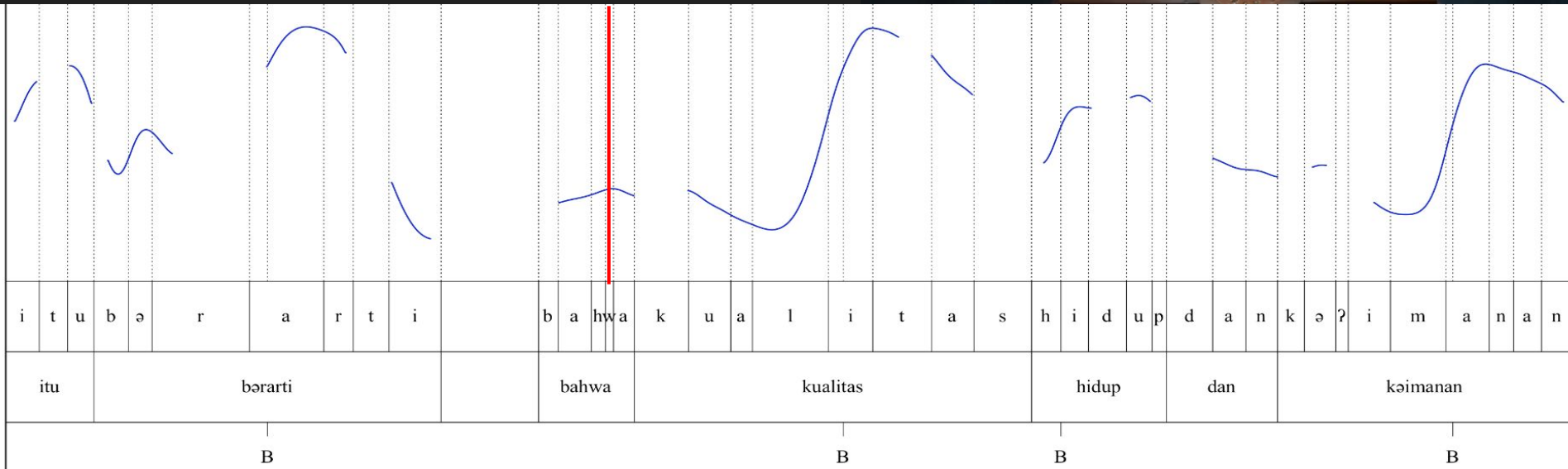
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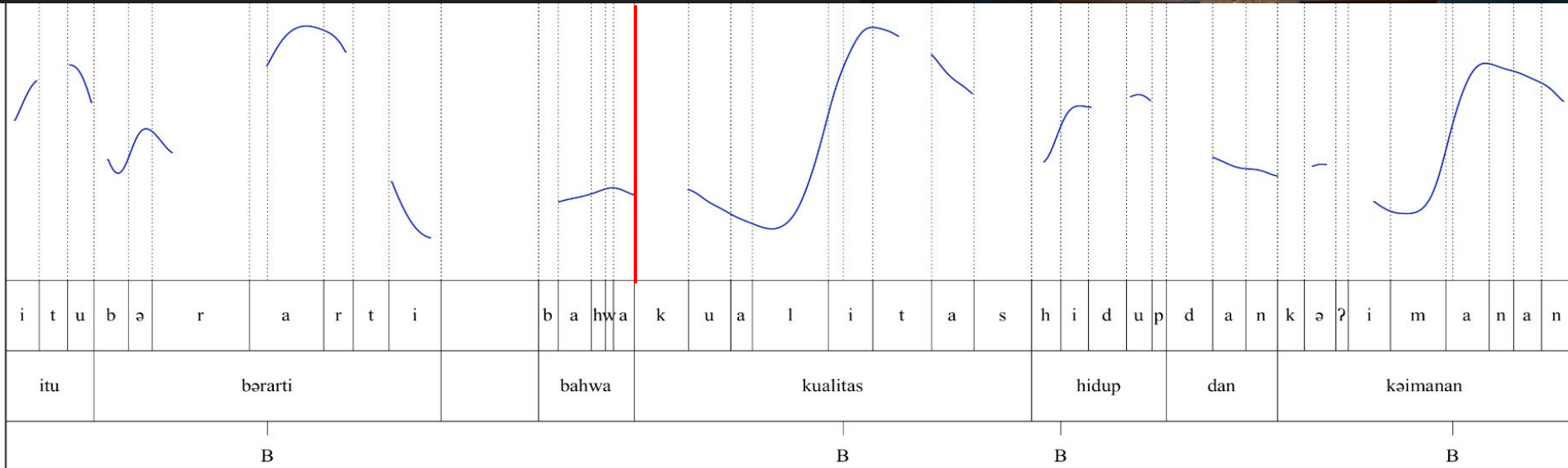
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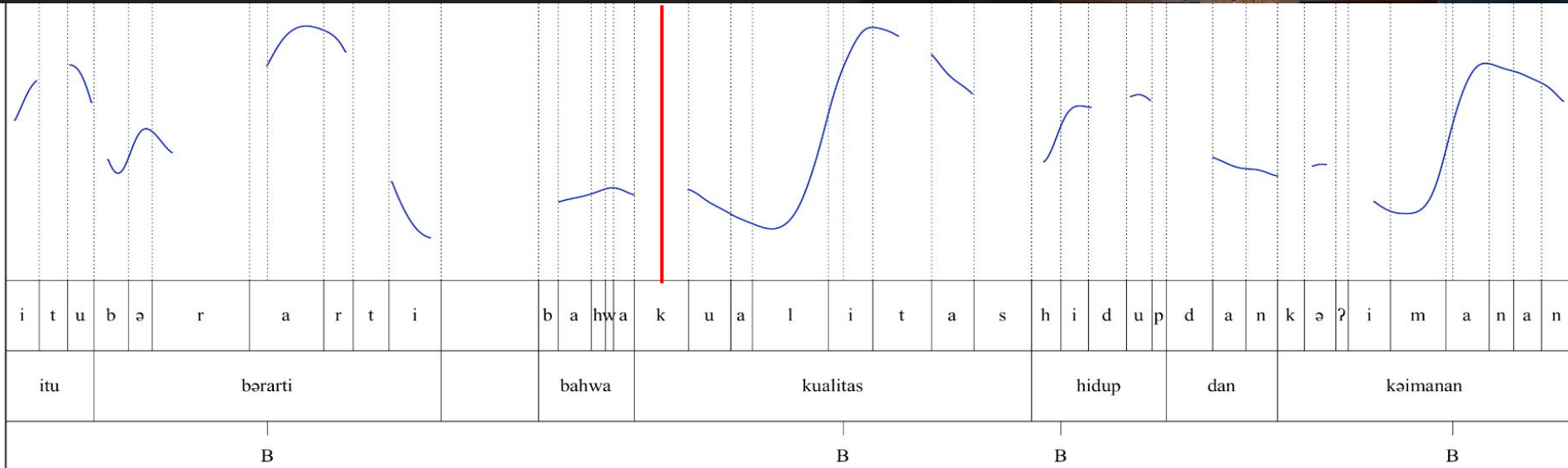
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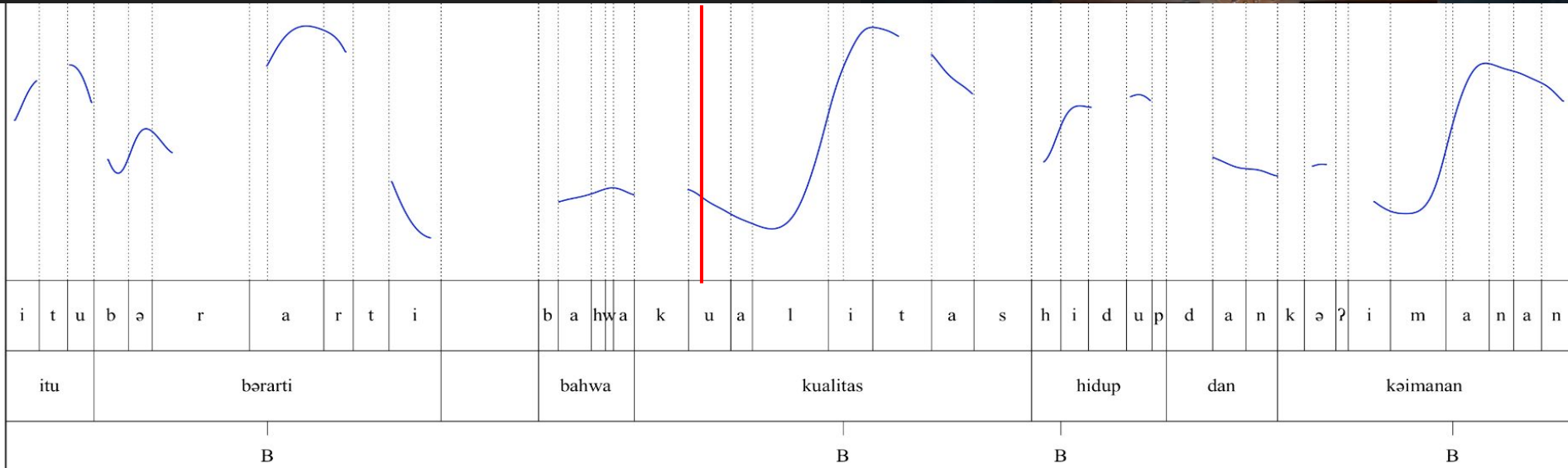
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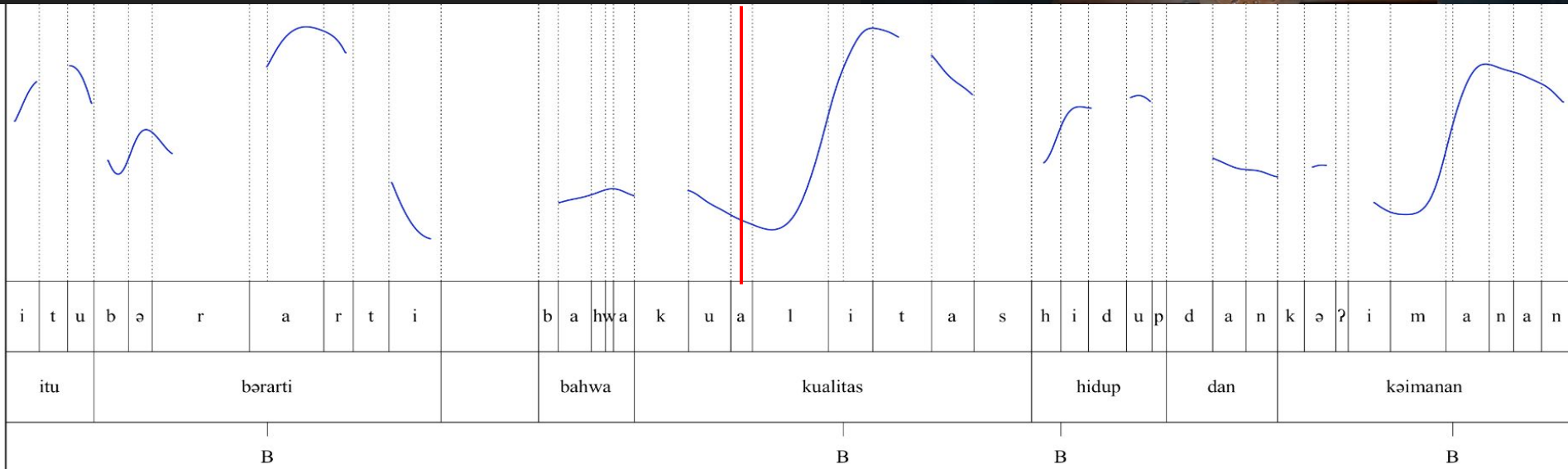
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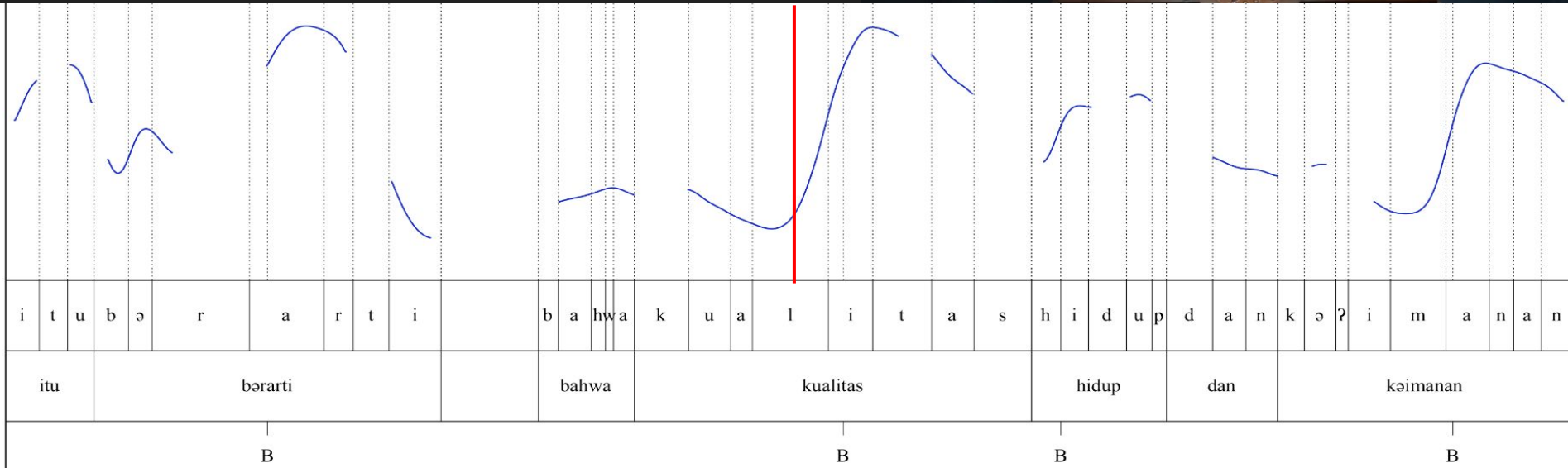
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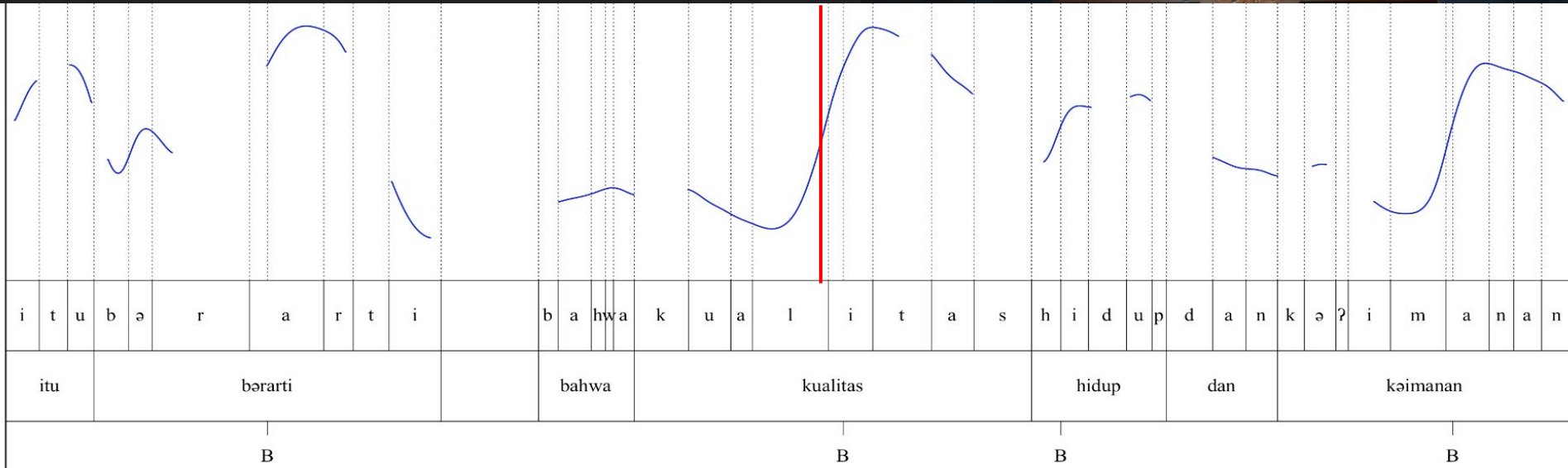
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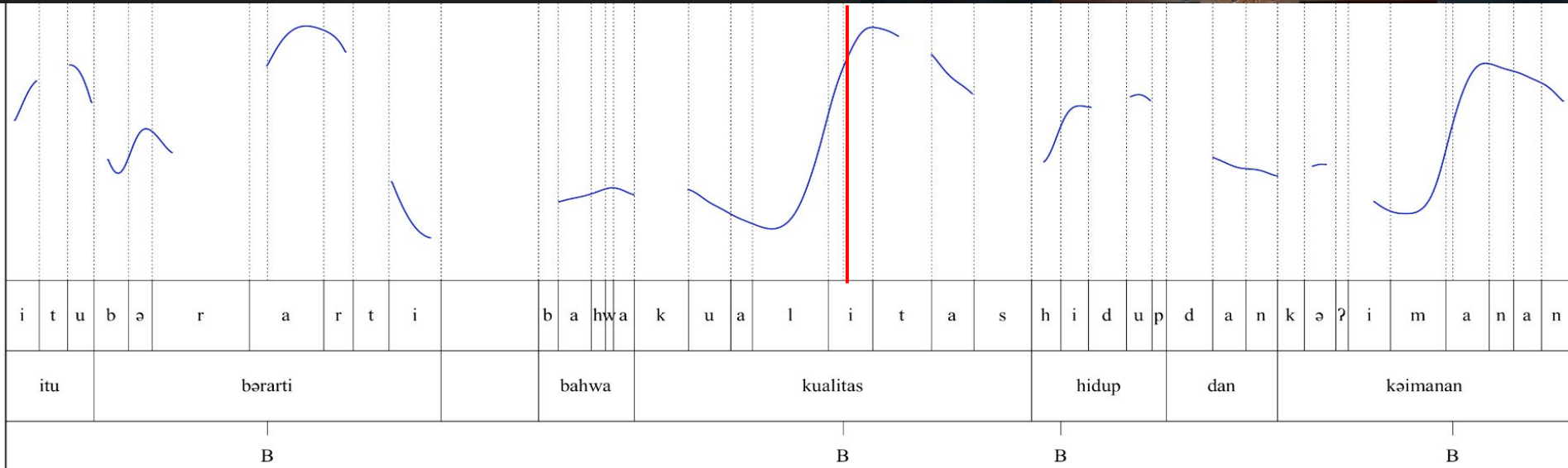
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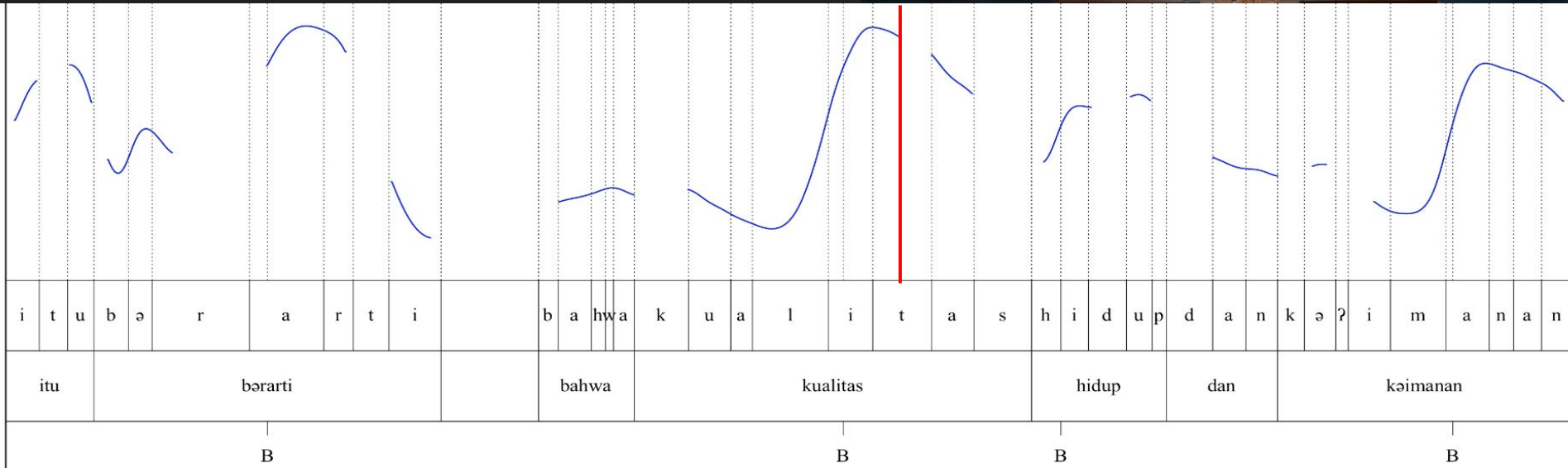
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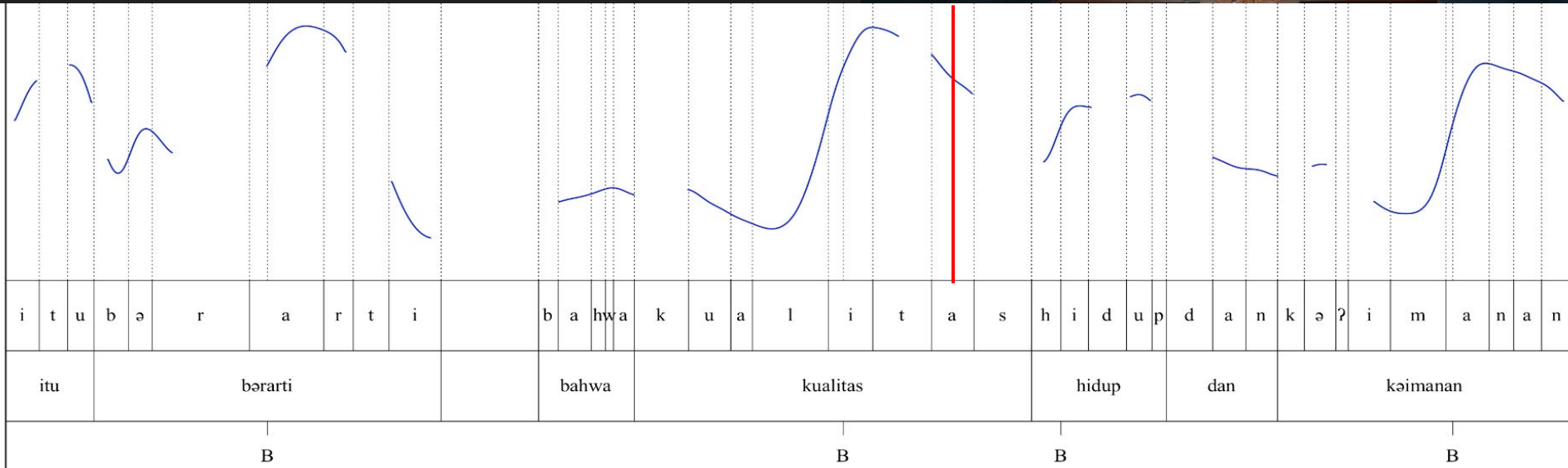
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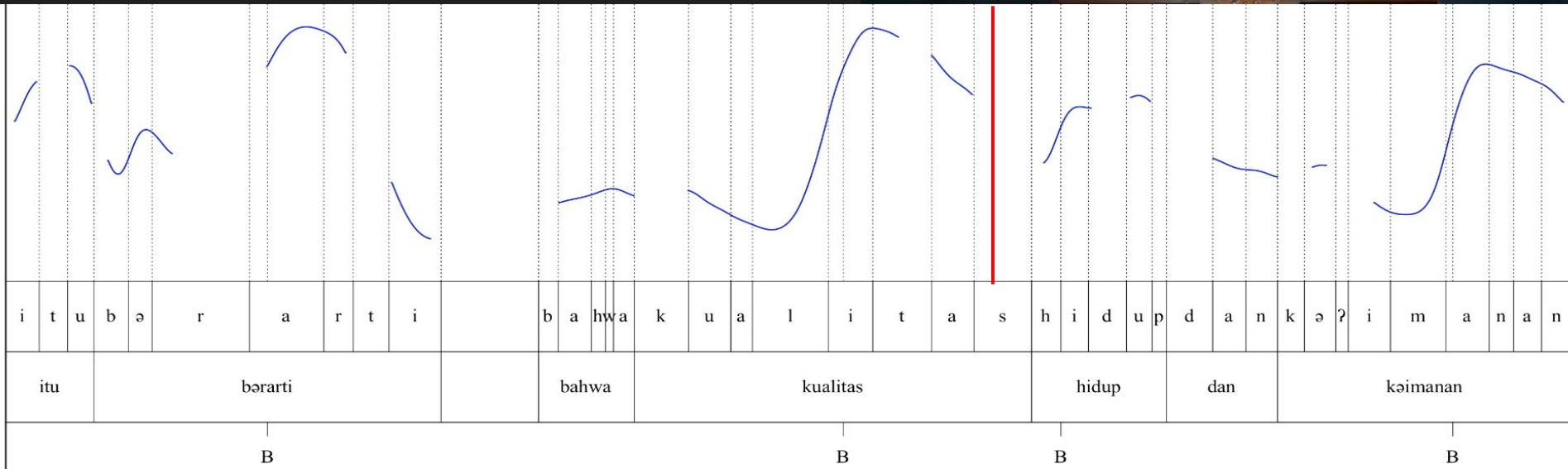
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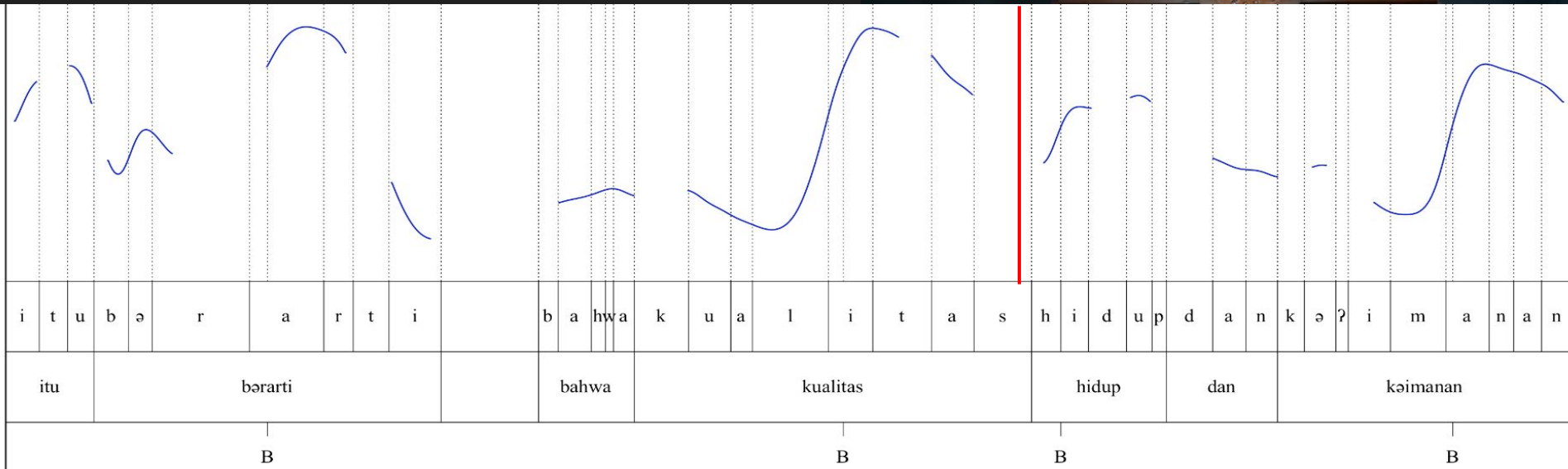
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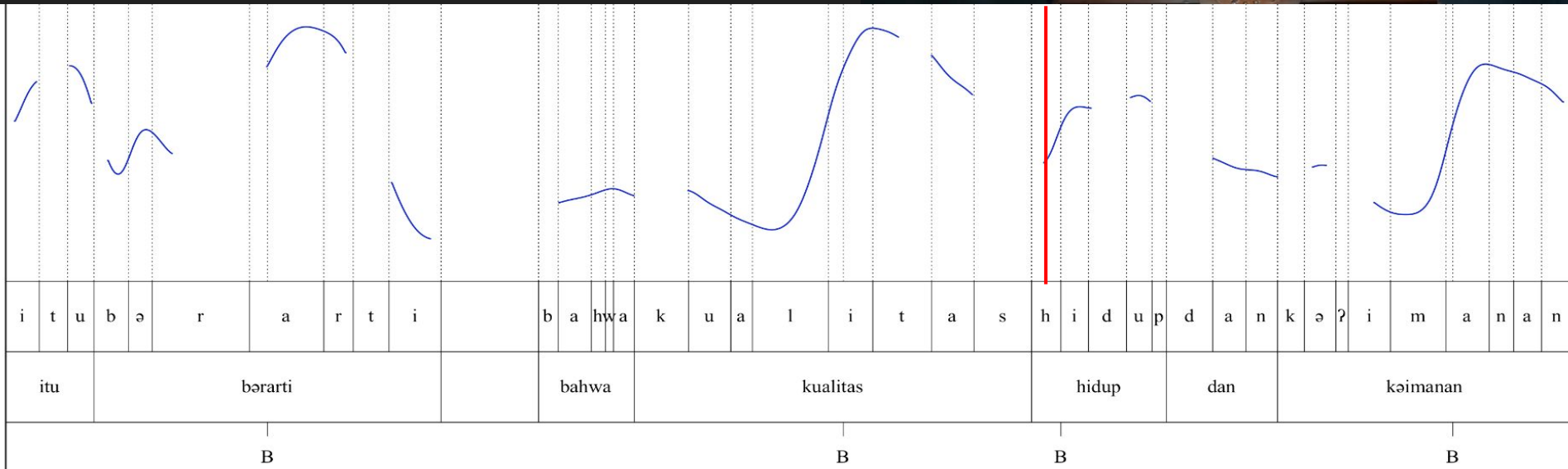
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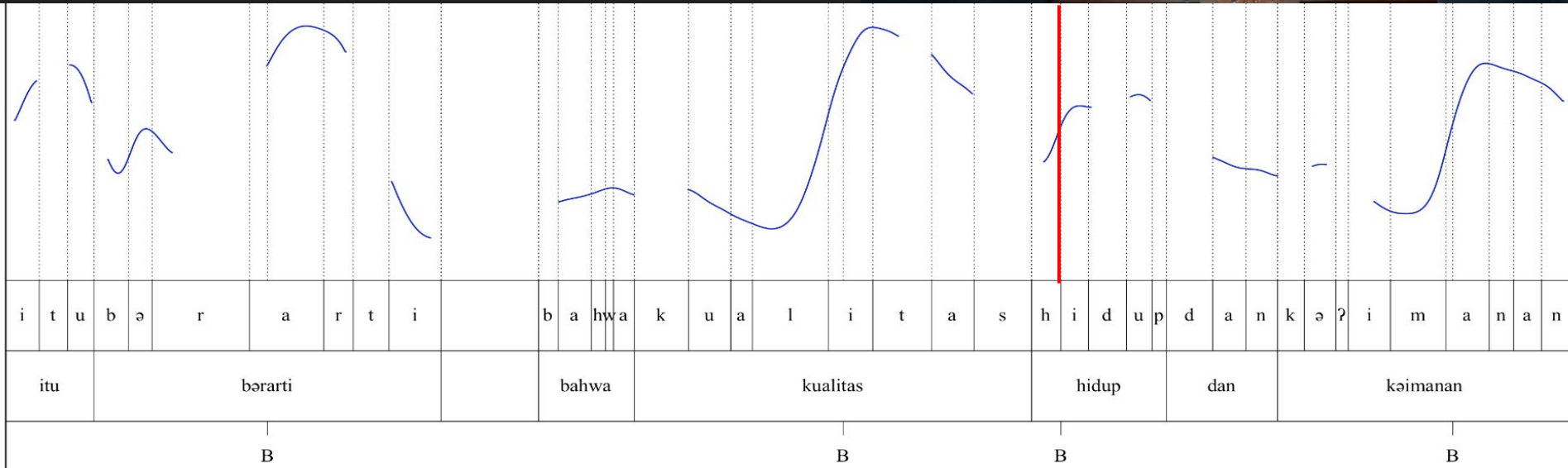


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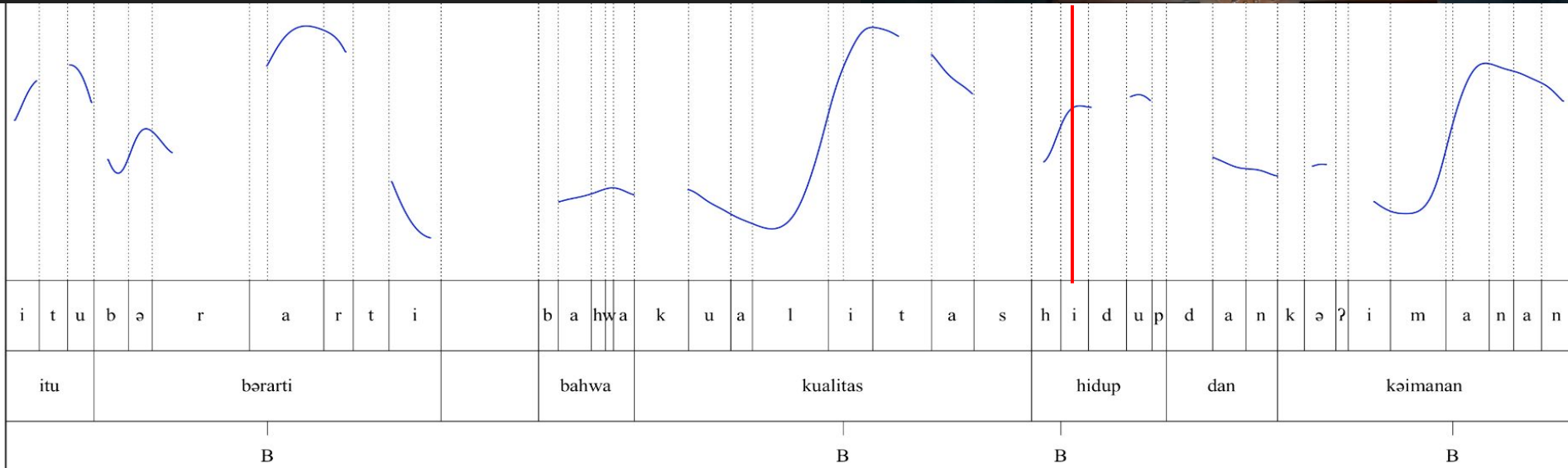


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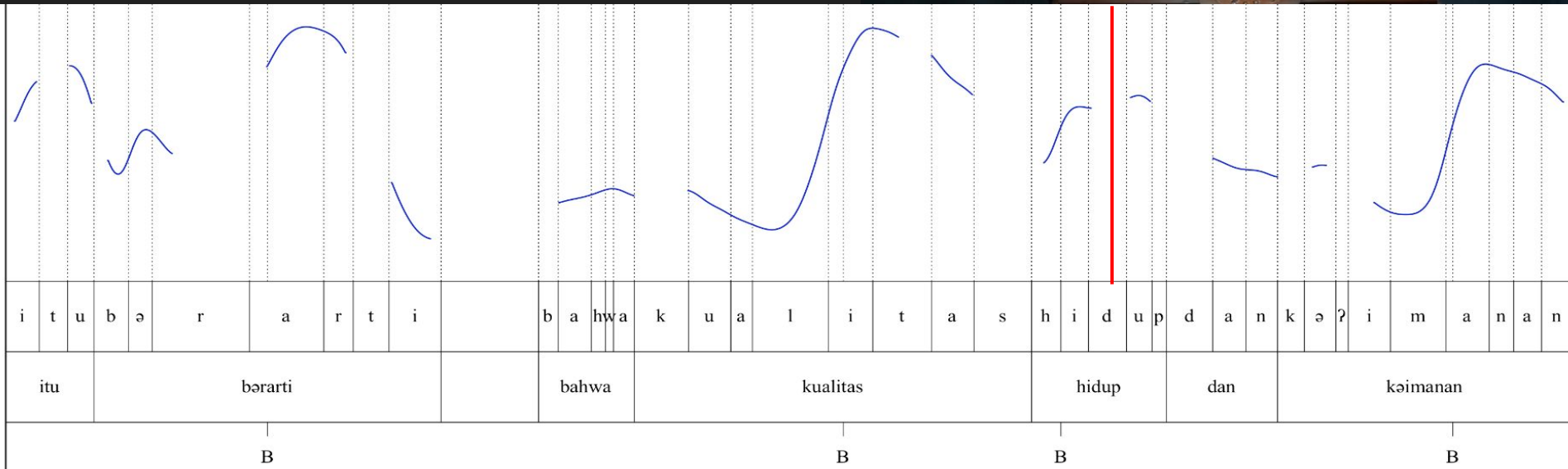




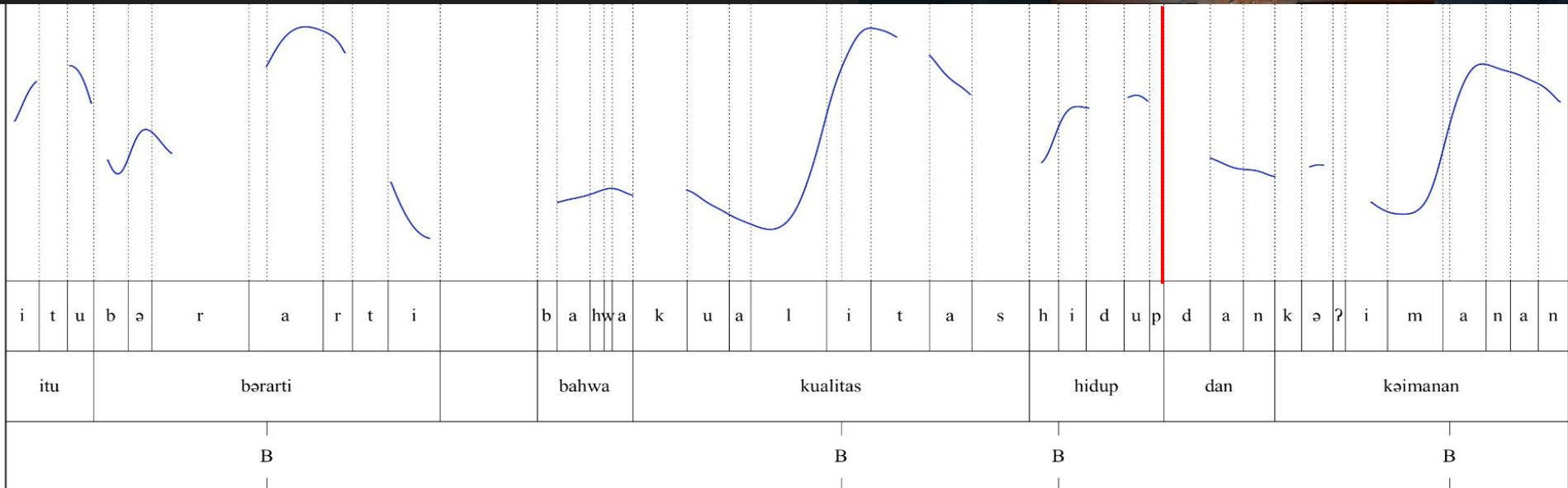
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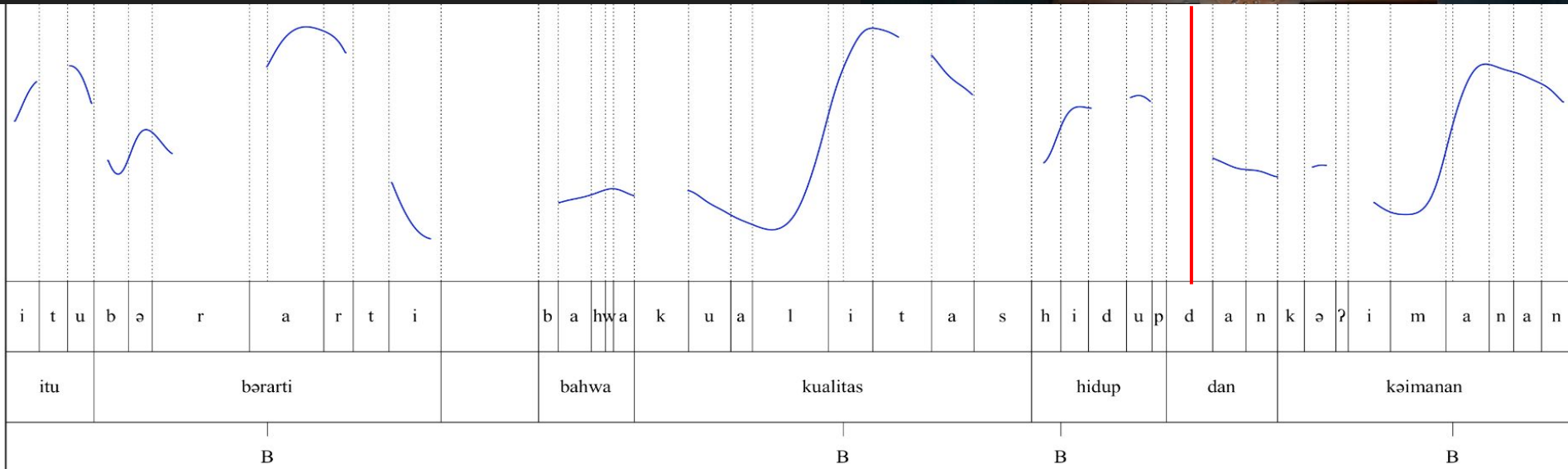
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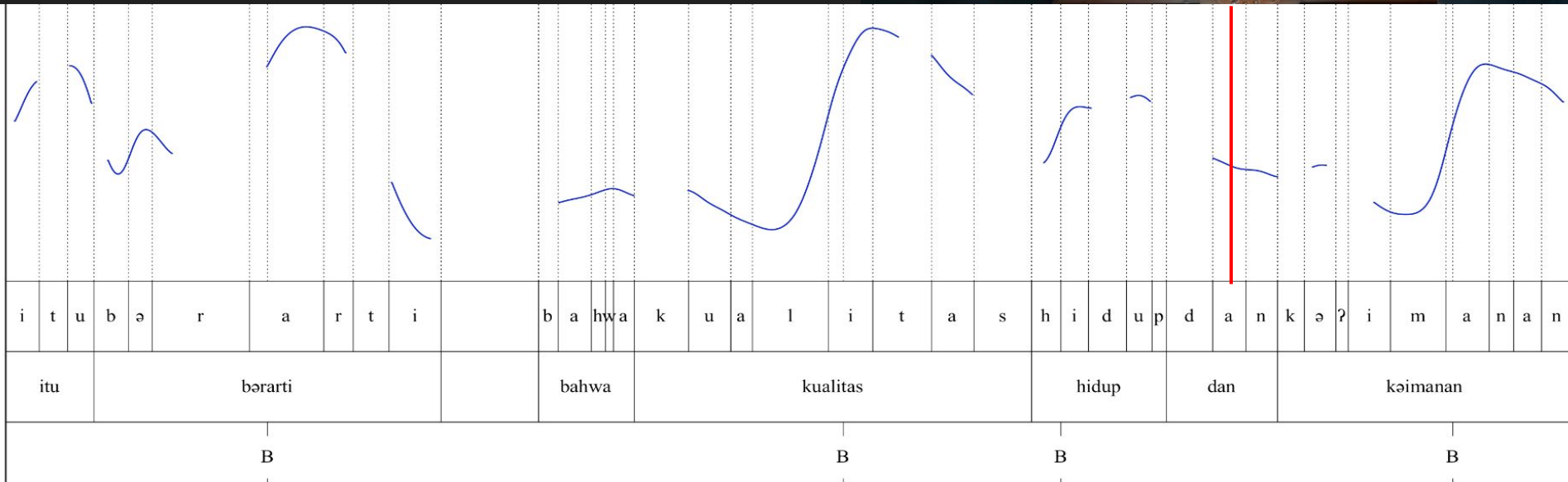
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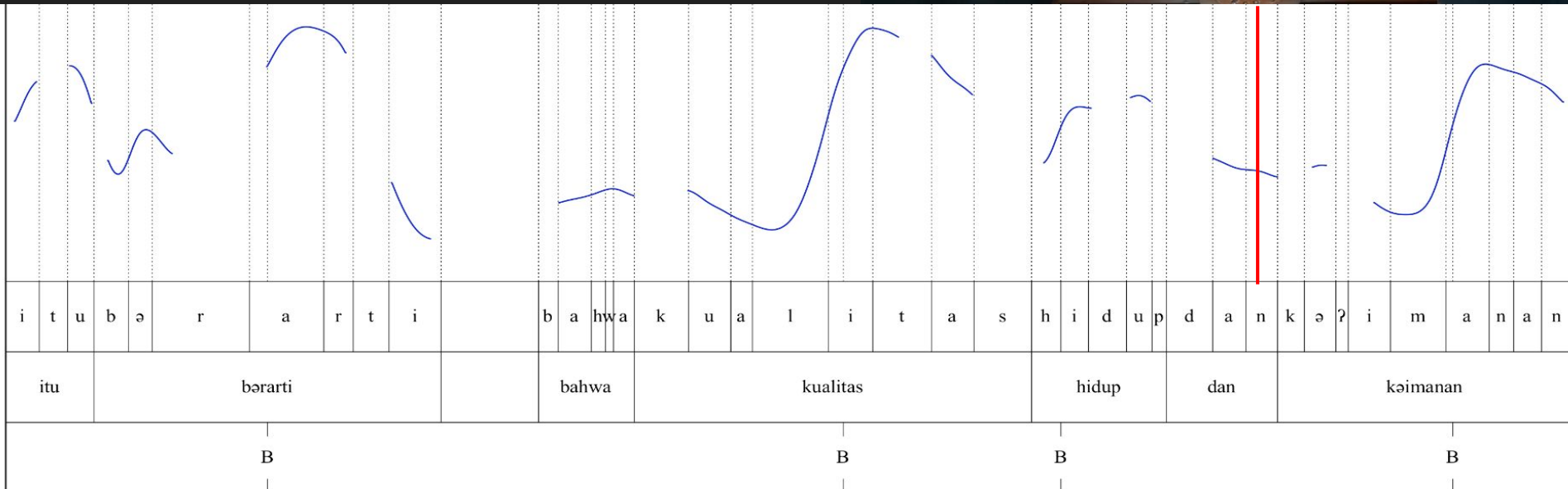
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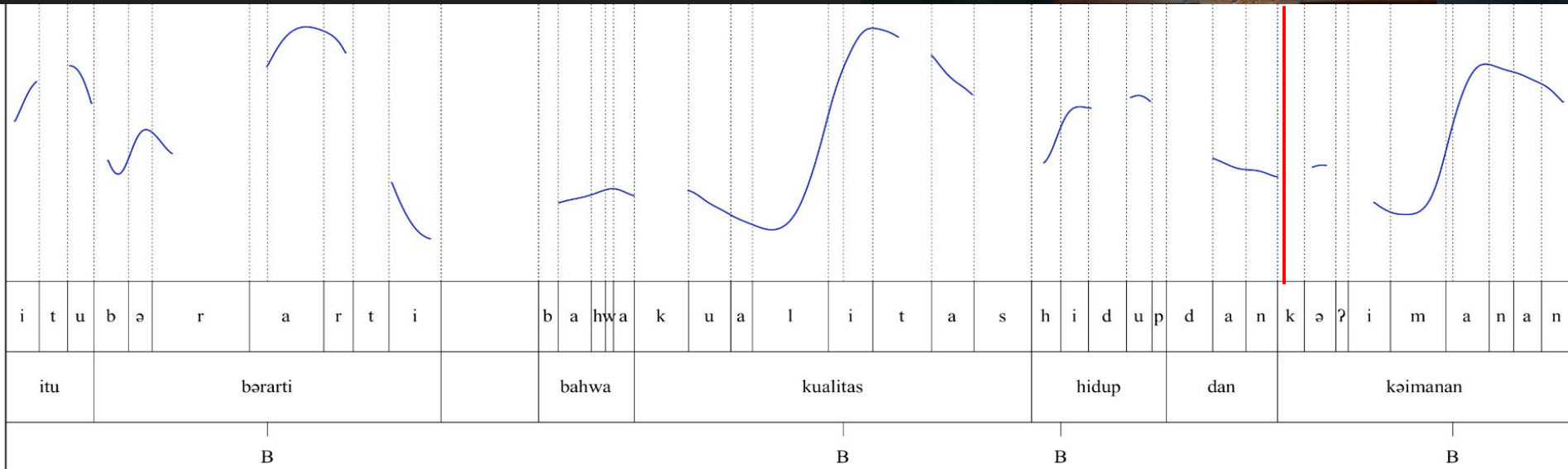
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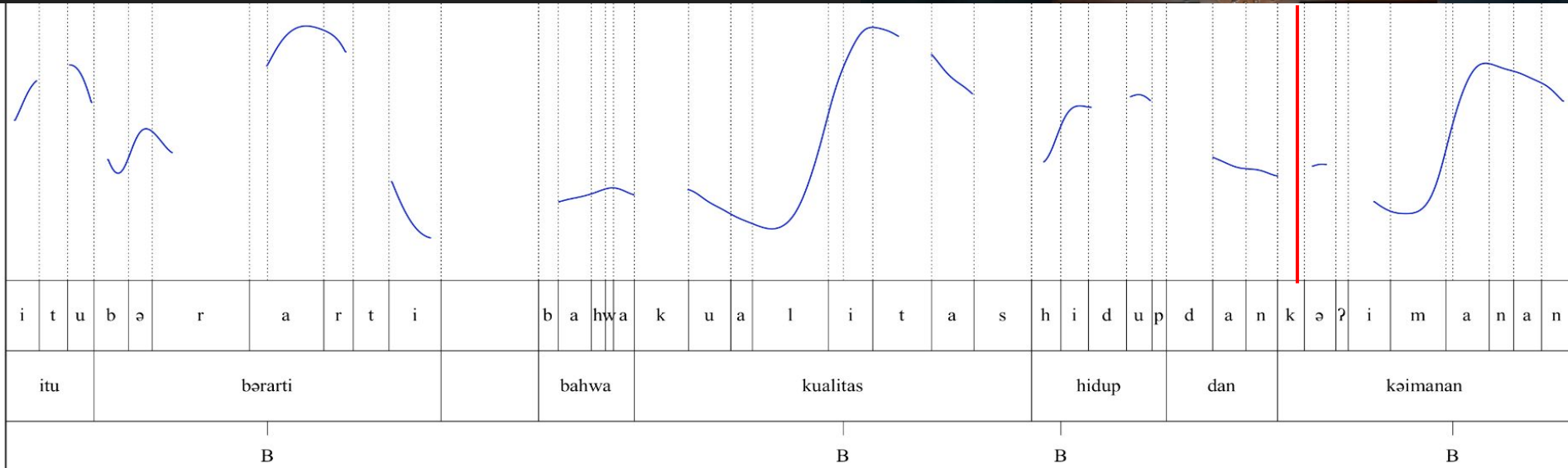
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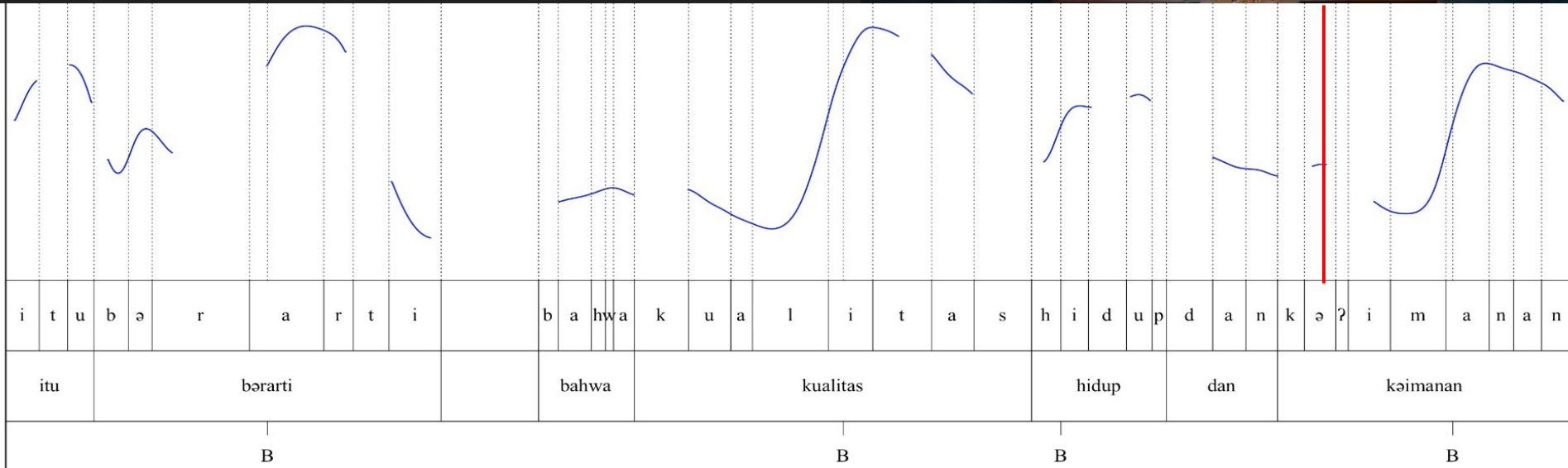
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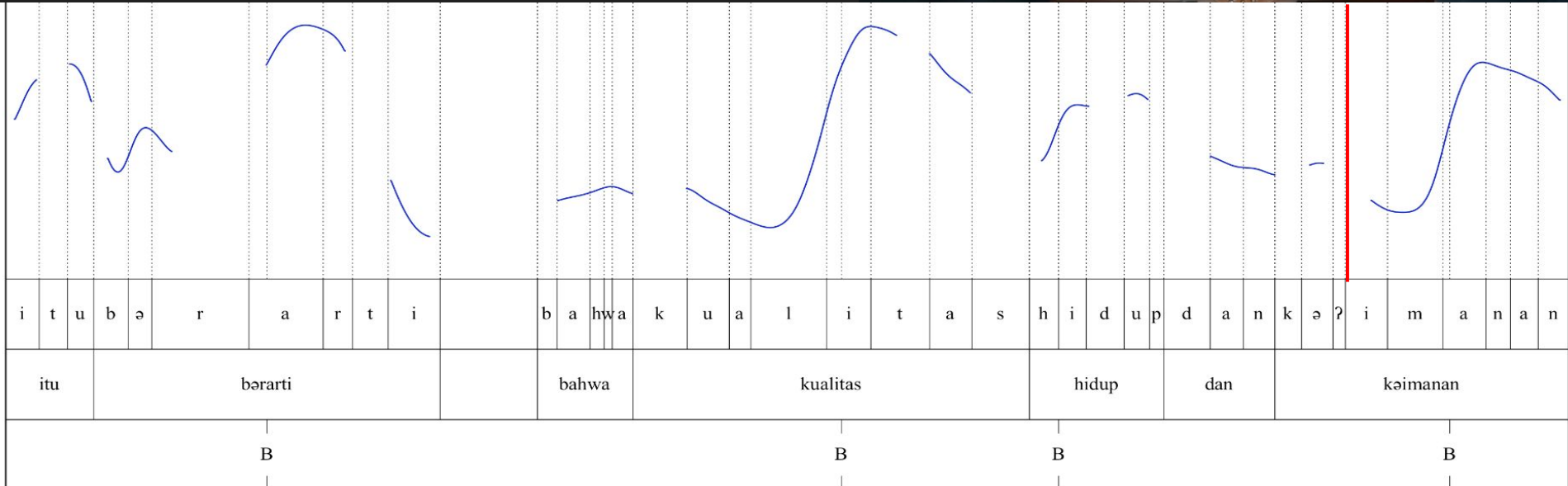
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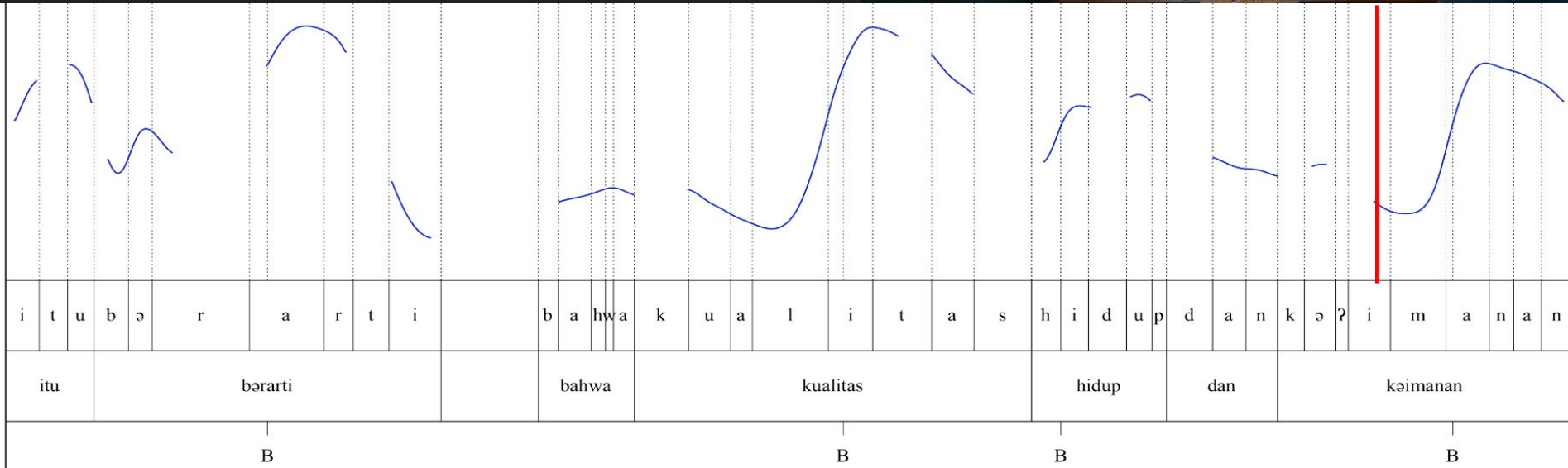
Itu bər-arti bahwa kualitas hidup dan kəimanan
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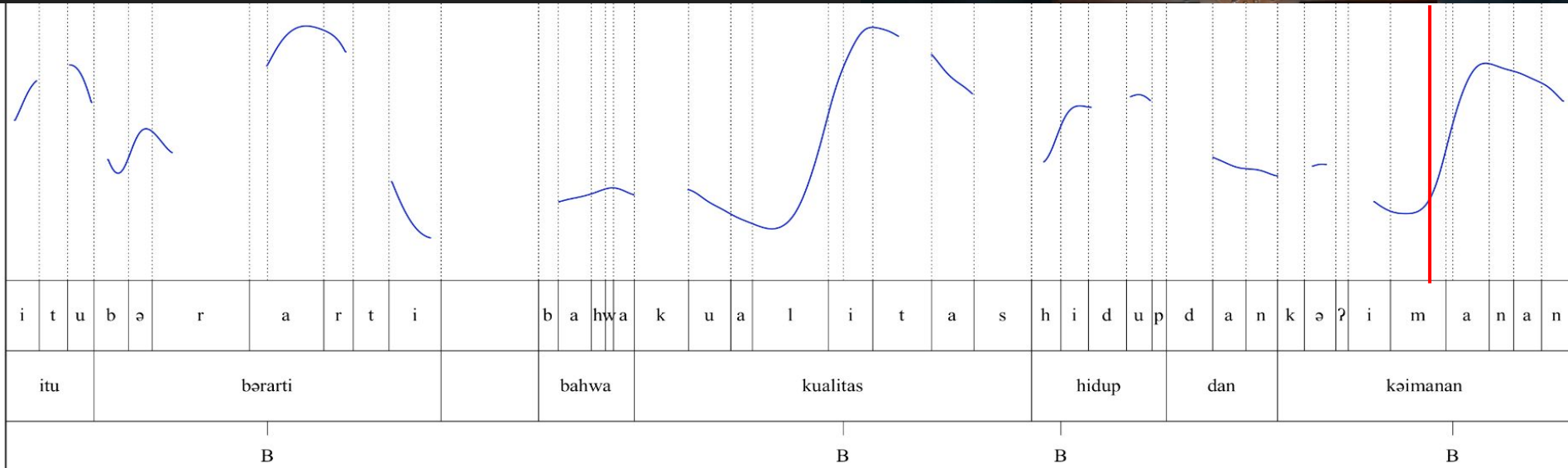
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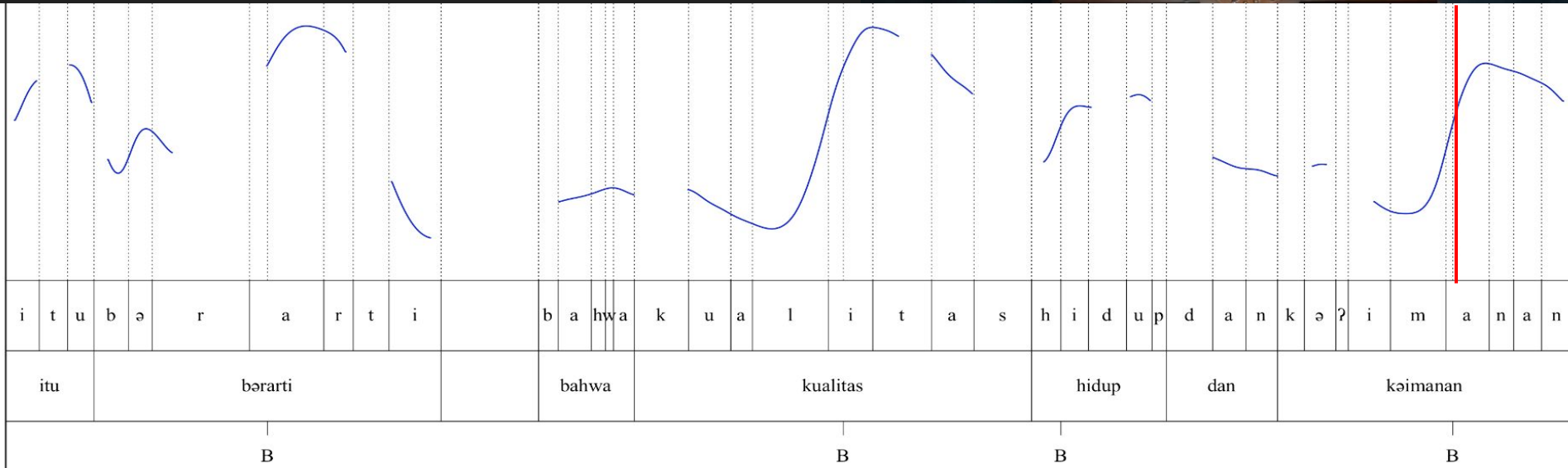
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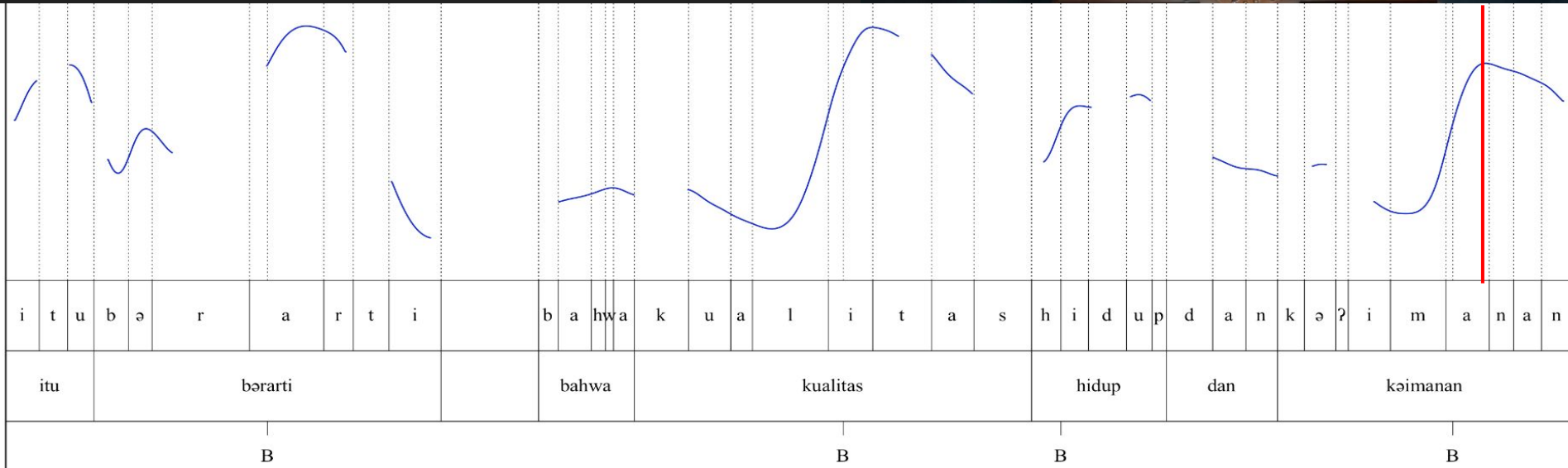
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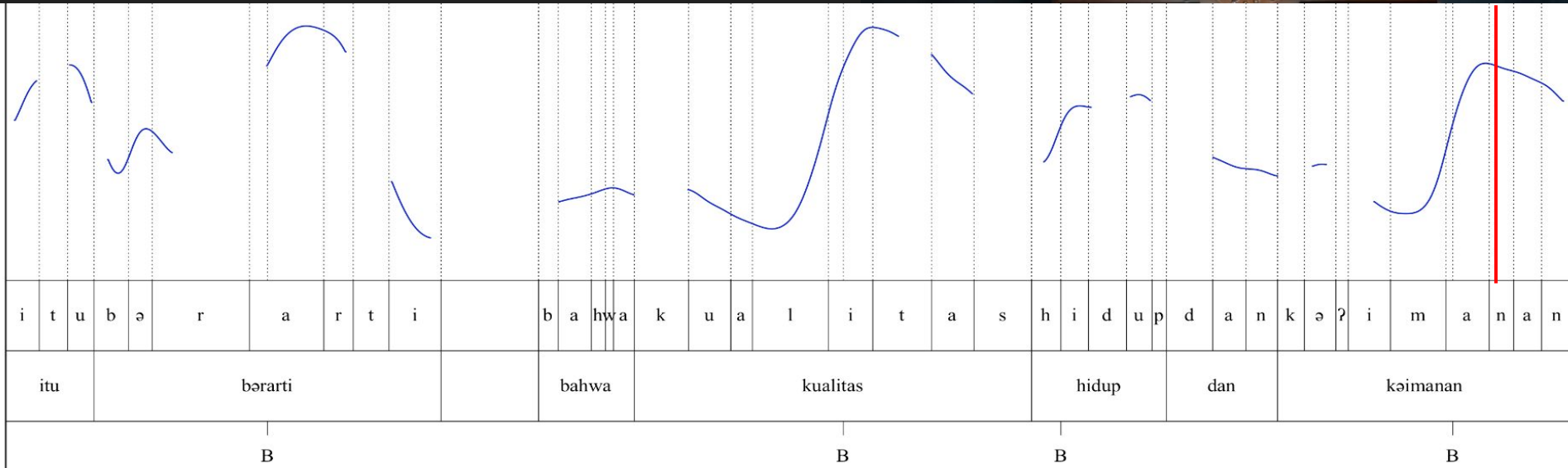
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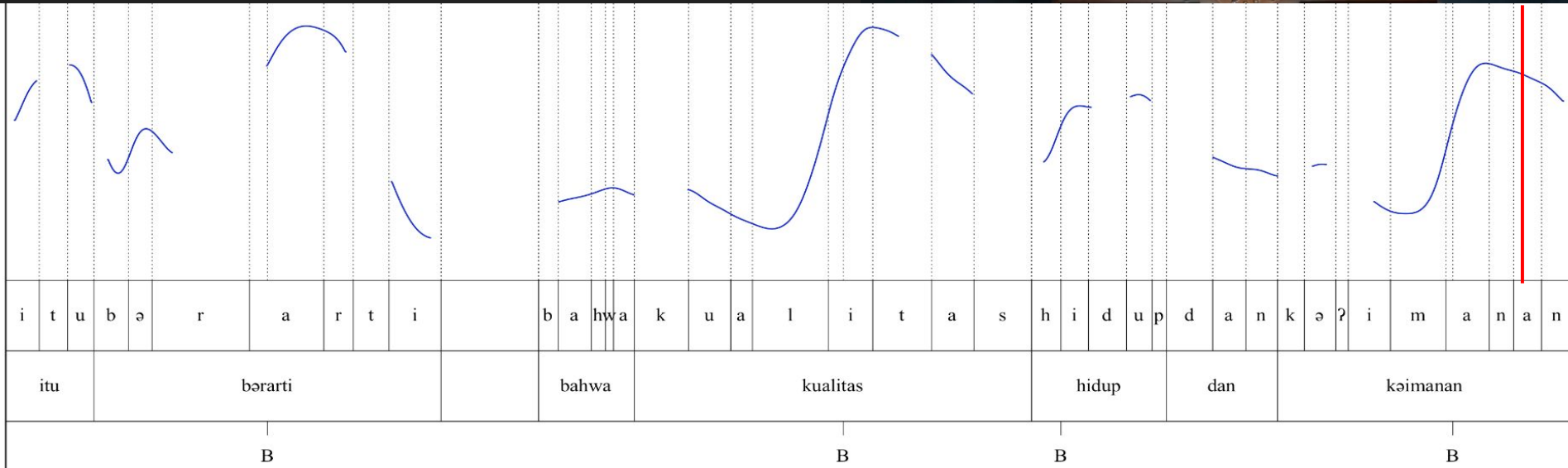
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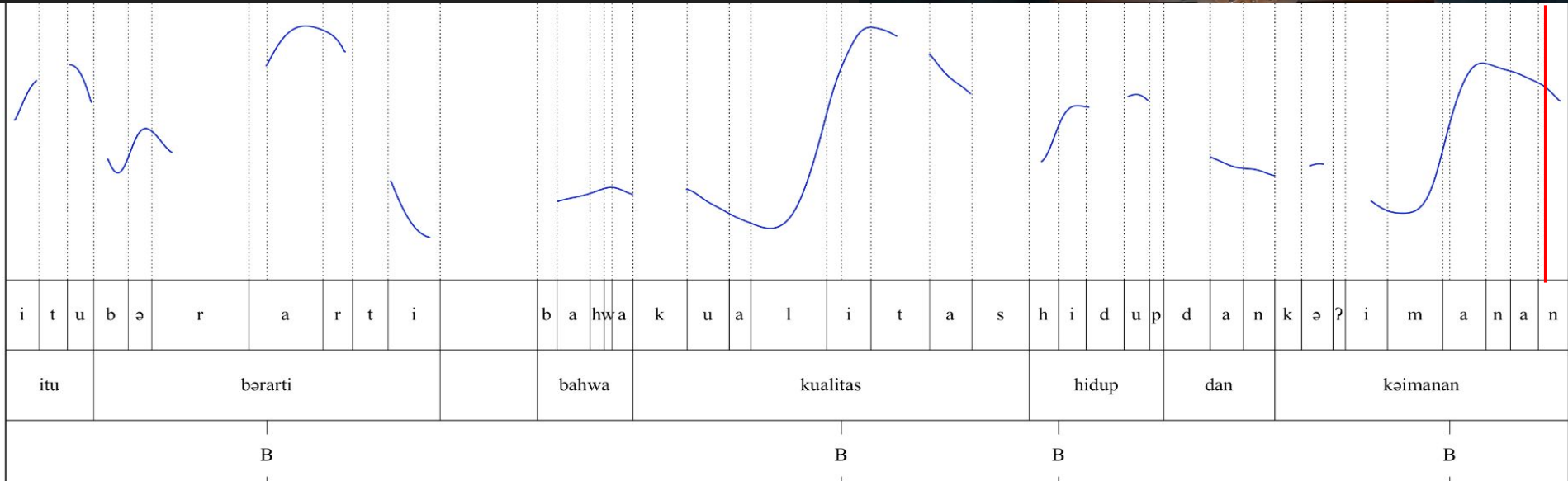
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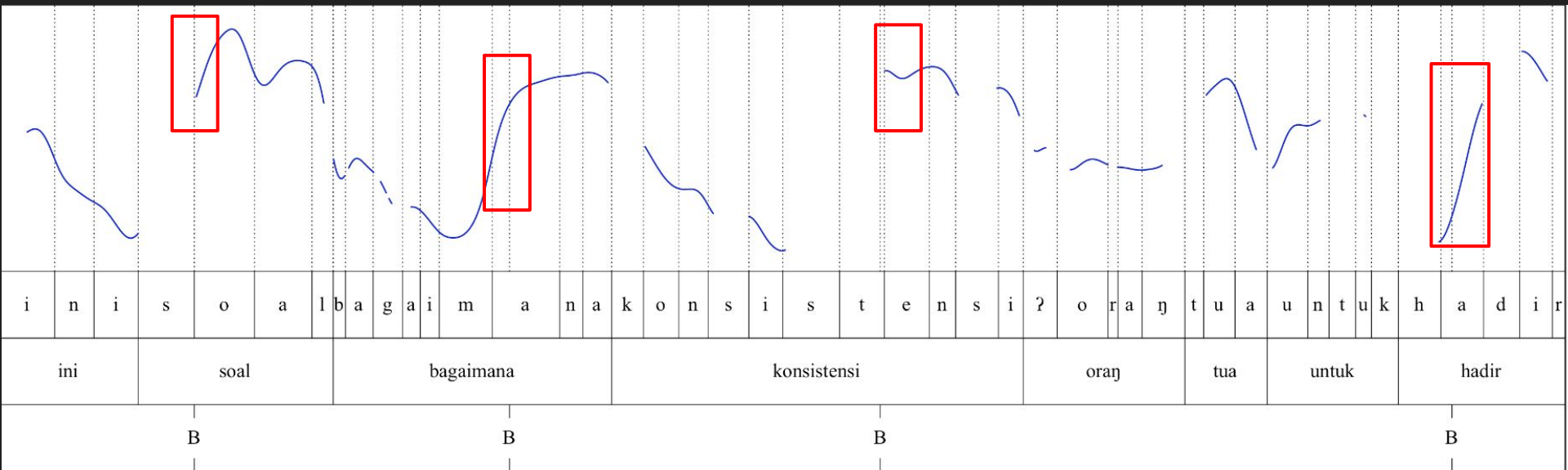


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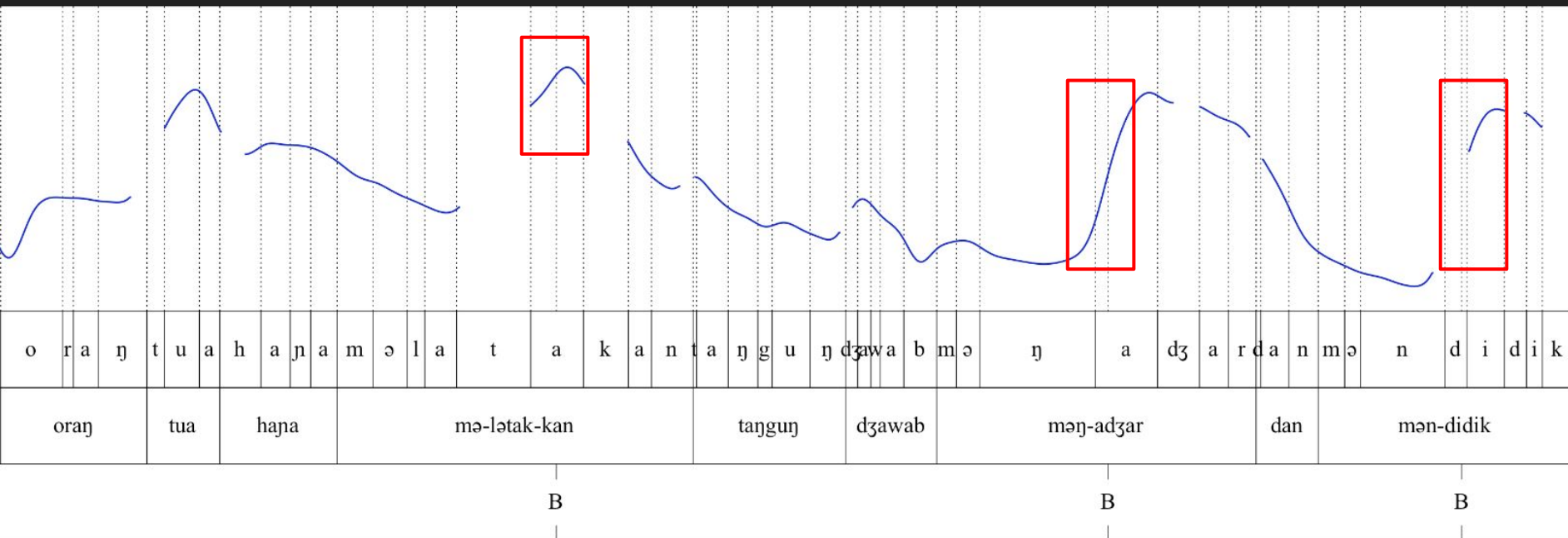
WORD-BASED ALIGNMENT

ini soal bagaimana konsistensi orang tua untuk hadir
this issue how consistent person old for present
'This is an issue of how consistent a parent is in being present.'



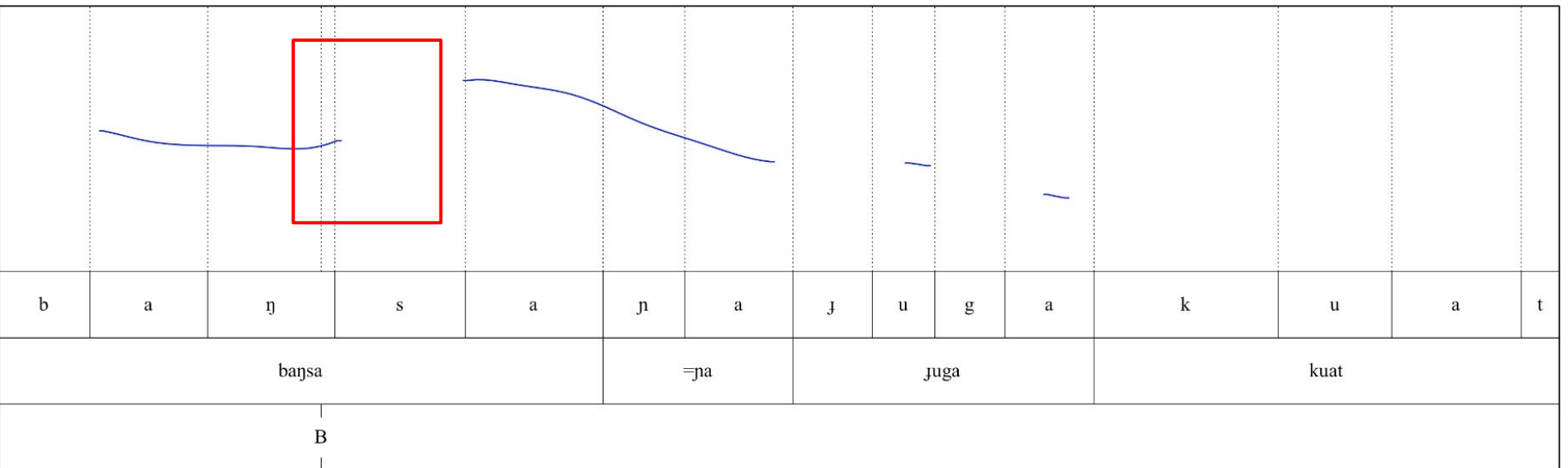
INTEGRATION OF SUFFIXES

orang tua hanya mē-lətak-kan tanggung jawab mēng-ajar dan mən-didik
 person old only AV-put-APPL bear answer AV-teach and AV-educate
 'parents only put the responsibility of teaching and educating...'



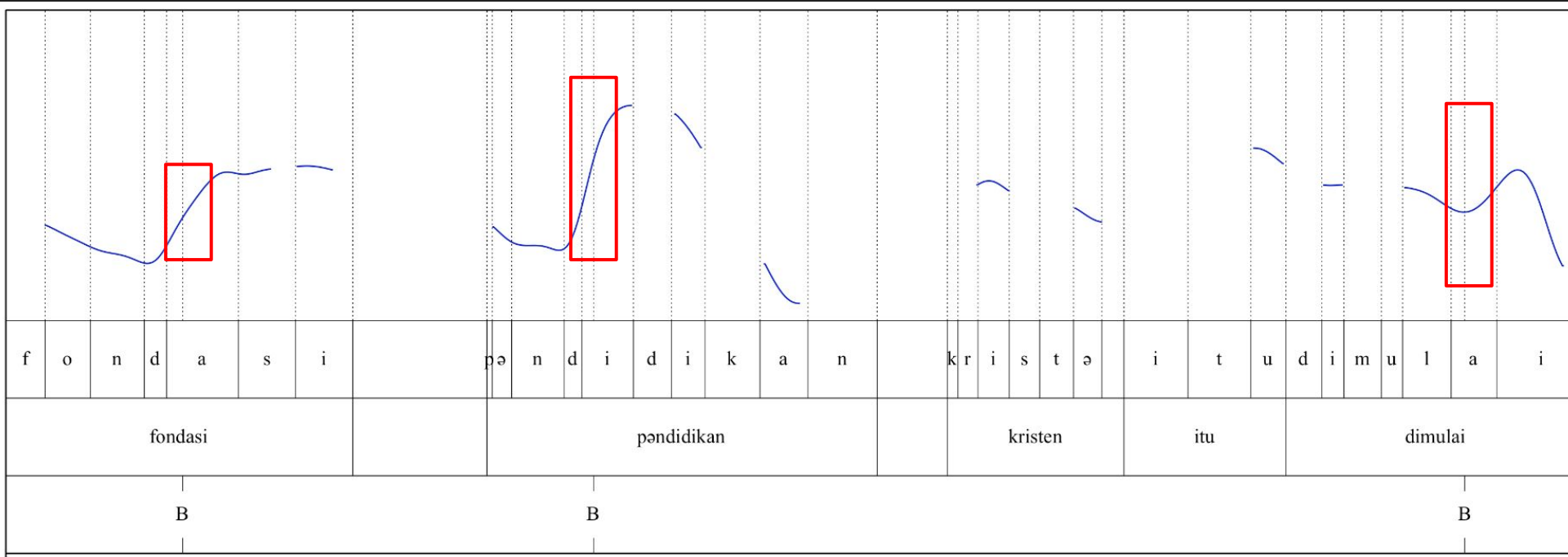
INTEGRATION OF CLITICS

bangsa=nya juga kuat
 nation=GEN also strong
 'Their nation is also strong'



EXCEPTIONAL EXCLUSION OF SUFFIXES

fondasi pən-didik-an kristən itu di-mulai
foundation NMLZ-educate-NMLZ Christian that PV-start
'The foundation of Christian education was started...'

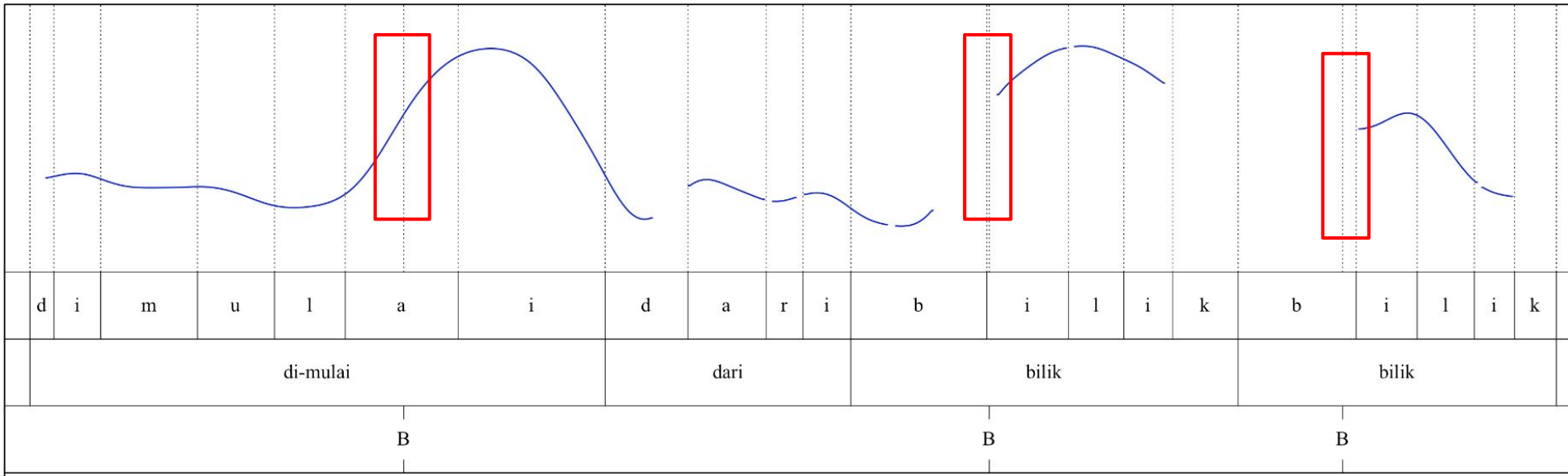


REDUPLICATION

di-mulai dari bilik~bilik

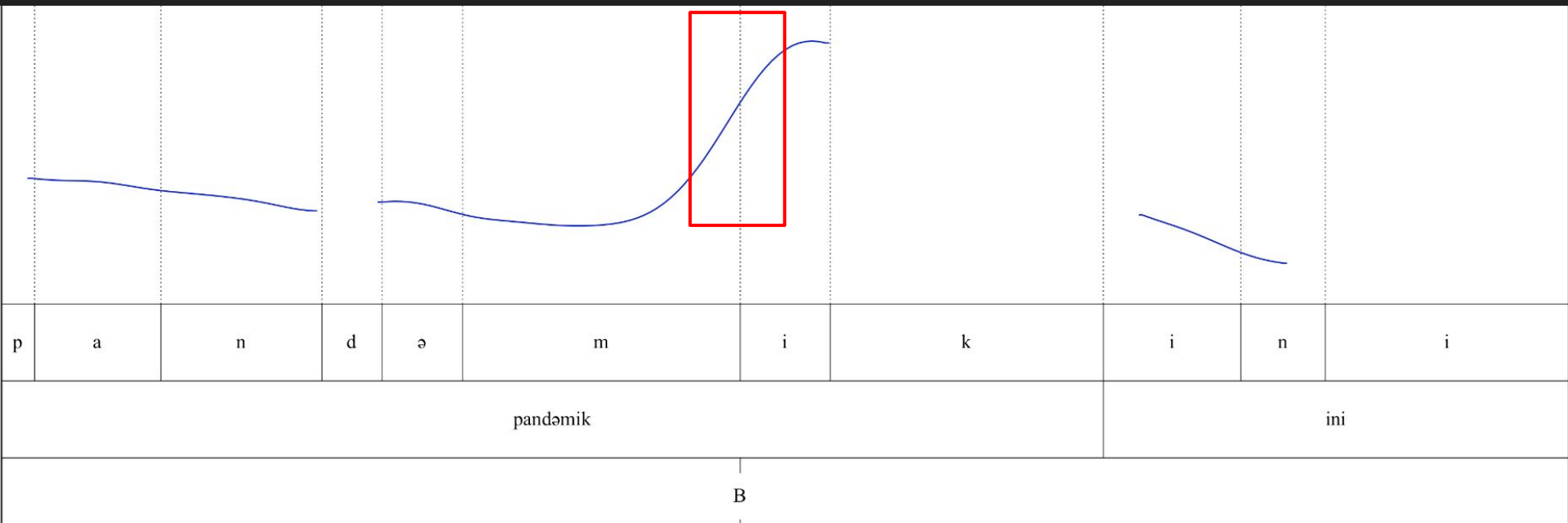
PV-start from room~PL

'It was started from the rooms...'



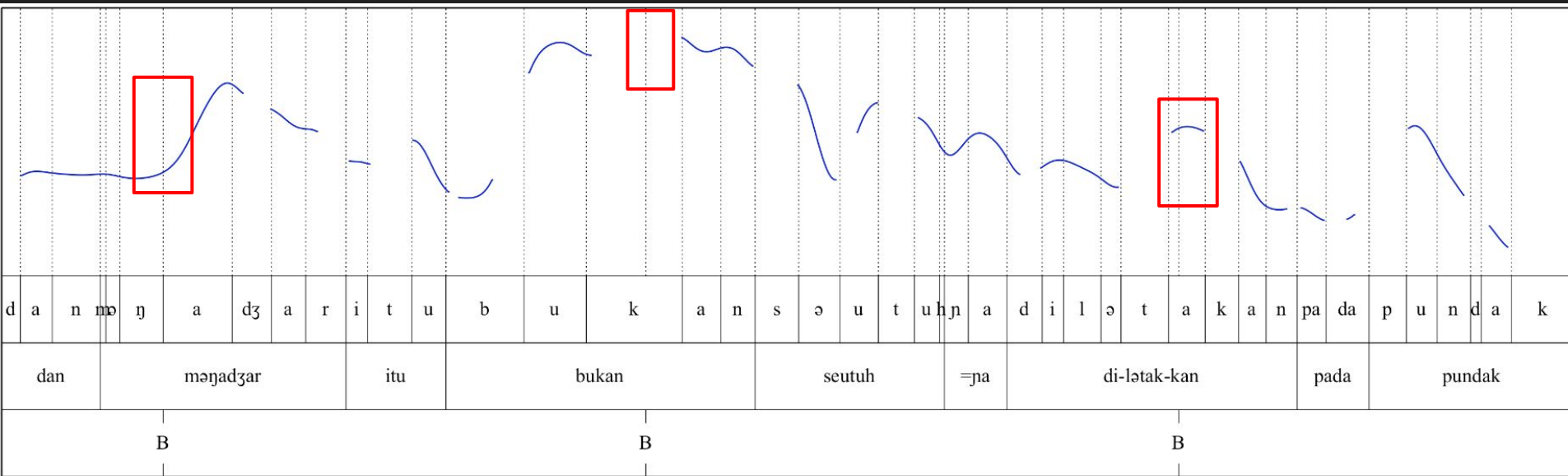
SCHWA AVOIDANCE

pandə**mik**
pandemic
'pandemic'



EXCEPTIONAL FUNCTION WORDS

dan meng-ajar itu bukan seutuhnya di-lətak-kan pada pundak
 and AV-teach that NEG completely PV-put-APPL on shoulder
 'and teaching shouldn't be completely shouldered..'

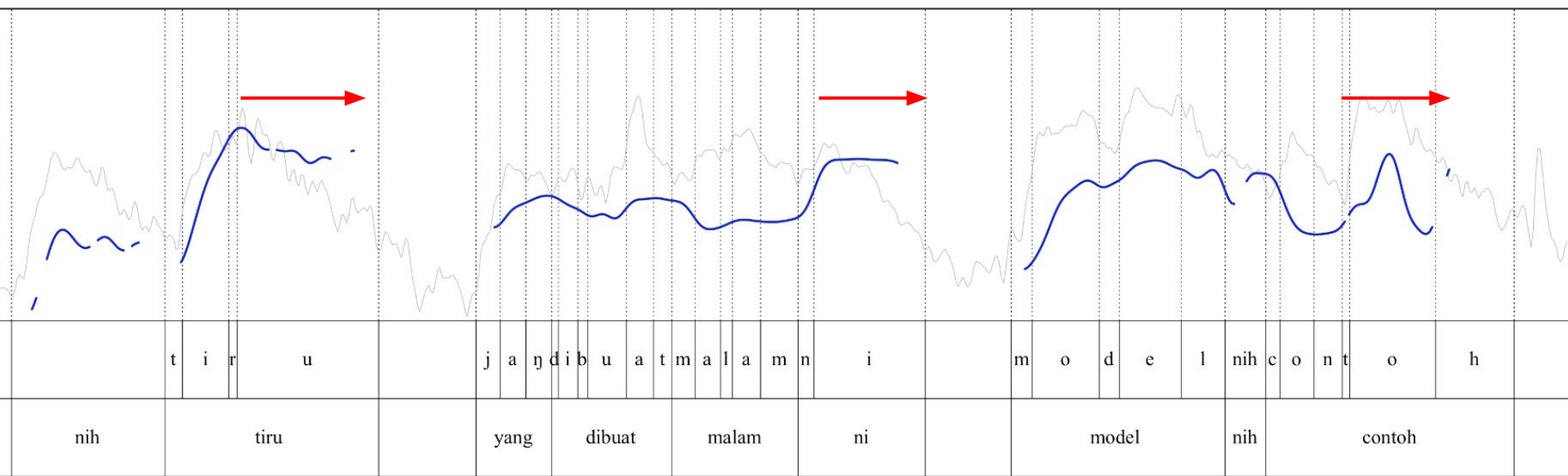


Somad / West Sumatran



PHRASE-FINAL LENGTHENING

nih tiru, yang di-buat malam ni, model nih contoh
this imitate RELT PV-do night this model this example
'Imitate this, what's being done tonight, this is a model, an example'

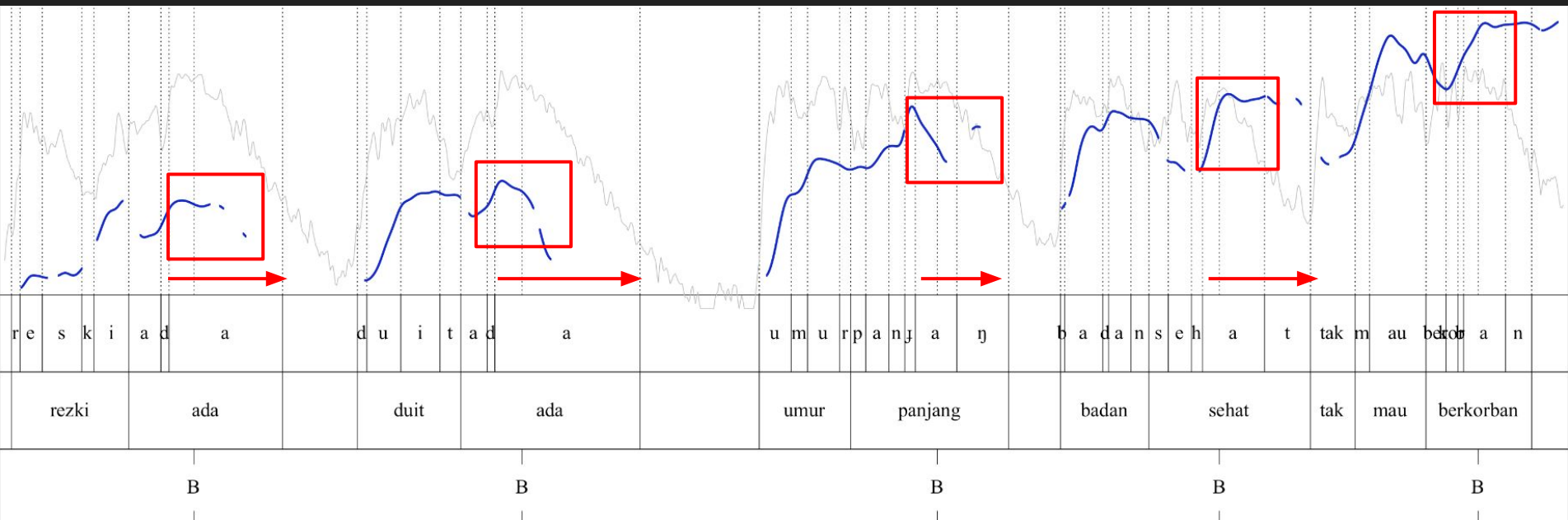


PHRASE-FINAL LENGTHENING

rezki **ada**, duit **ada**, umur **panjang**, badan **sehat**, tak mau ber-kor**ban**

wealth EXT money EXT age long body healthy NEG want AV-sacrifice

‘One has wealth, one has money, a long life, a healthy body and doesn’t want to sacrifice.’

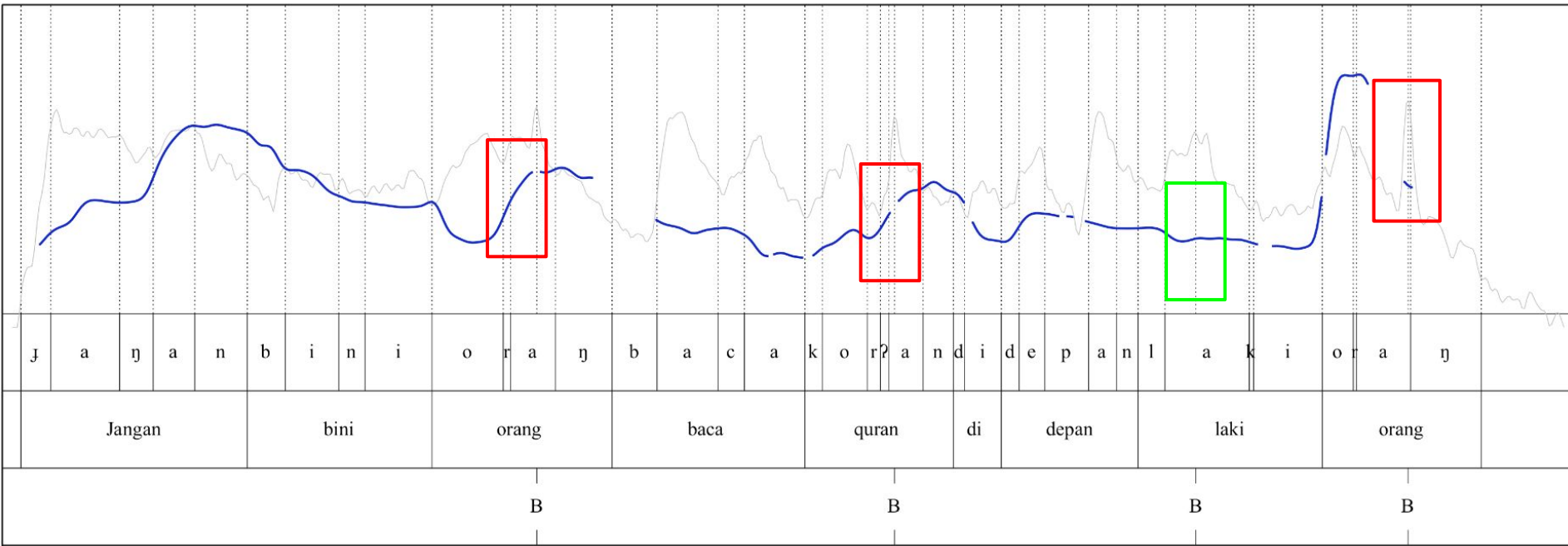


PRE-FINAL PENULTIMATE EXCEPTIONS

jangan bini orang baca kor^ʔan di depan laki orang

PROB woman person read Quran PREP front man person

‘a person’s wife should not read the Quran in front of a person’s husband’

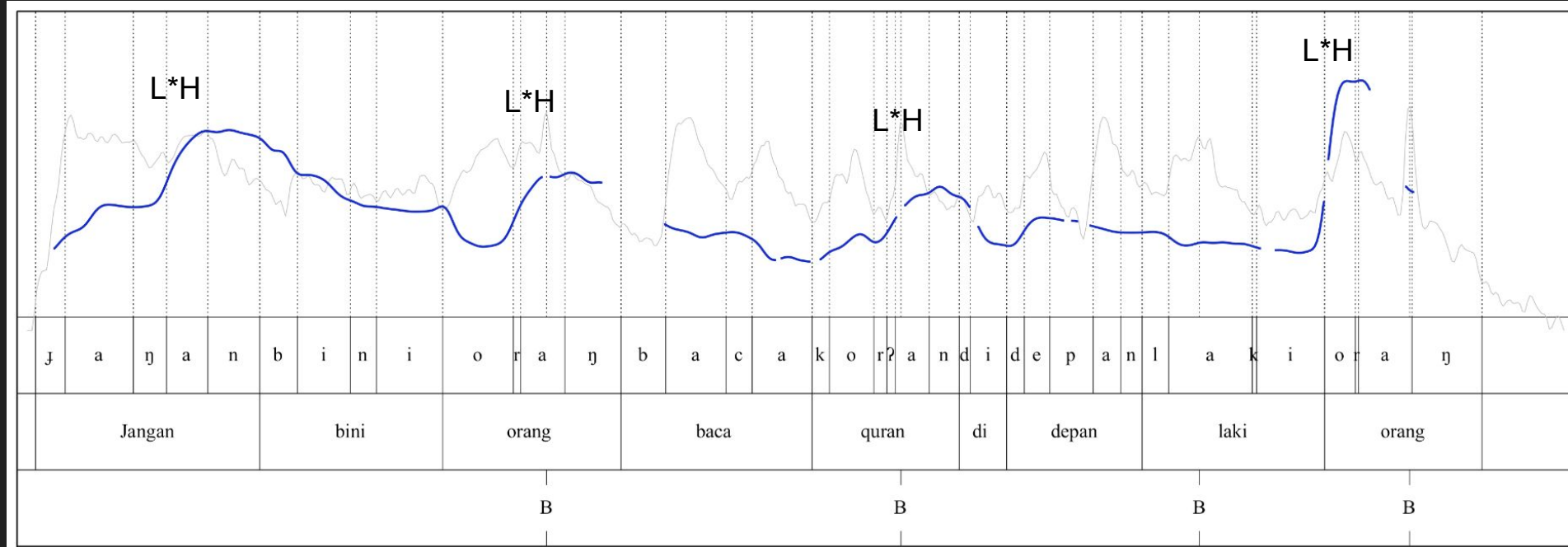


PITCH ACCENTS ARE PHRASALLY ALIGNED

[jangan] [bini orang] [baca korʔan] [di depan laki orang]

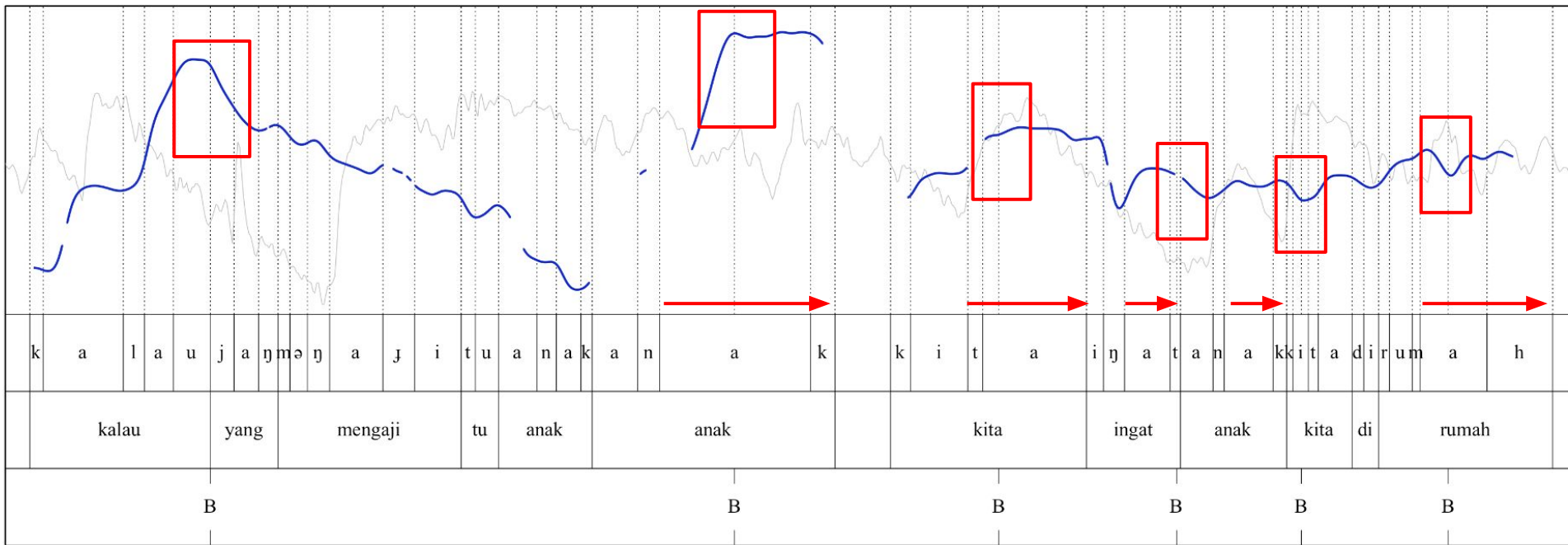
PROB woman person read Quran PREP front man person

‘a person’s wife should not read the Quran in front of a person’s husband’



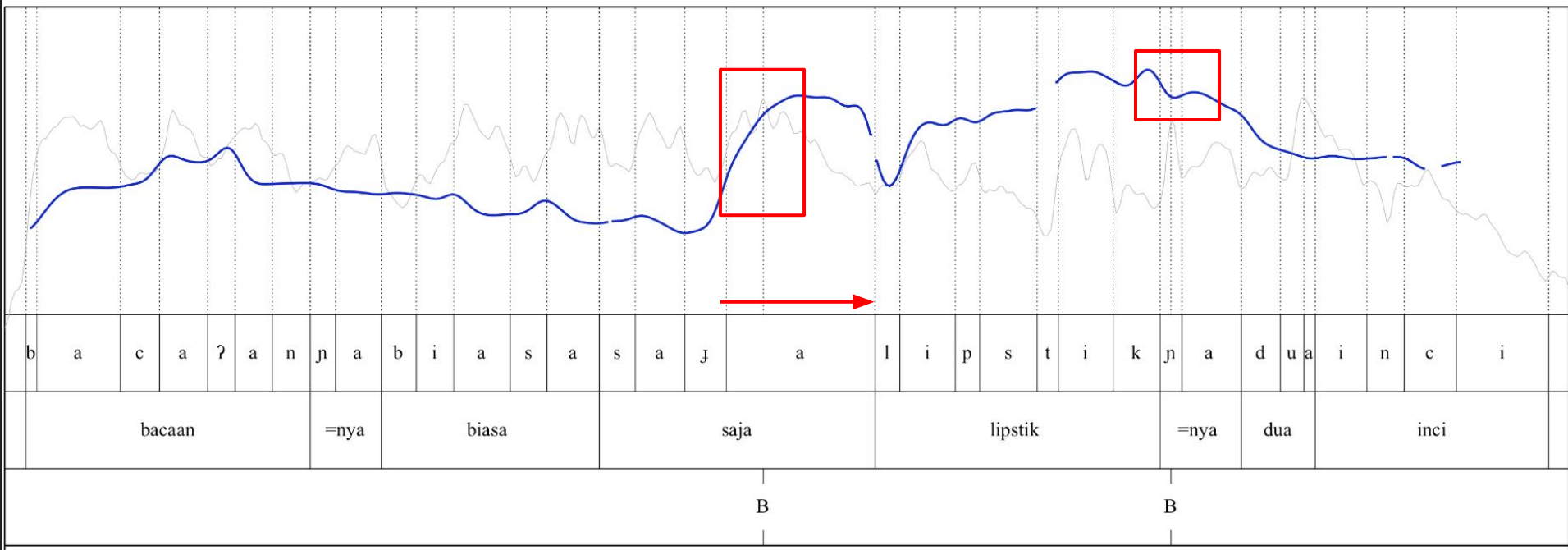
BUT SMALLER DOMAINS ARE POSSIBLE TOO WITH EMPHASIS

kalau yang meng-aji tu anak~anak, kita ingat anak kita di rumah
 if RELT AV-study that child~COLL 1PL remember child 1PL PREP house
 'if the one studying is a child, we remember our child at home'

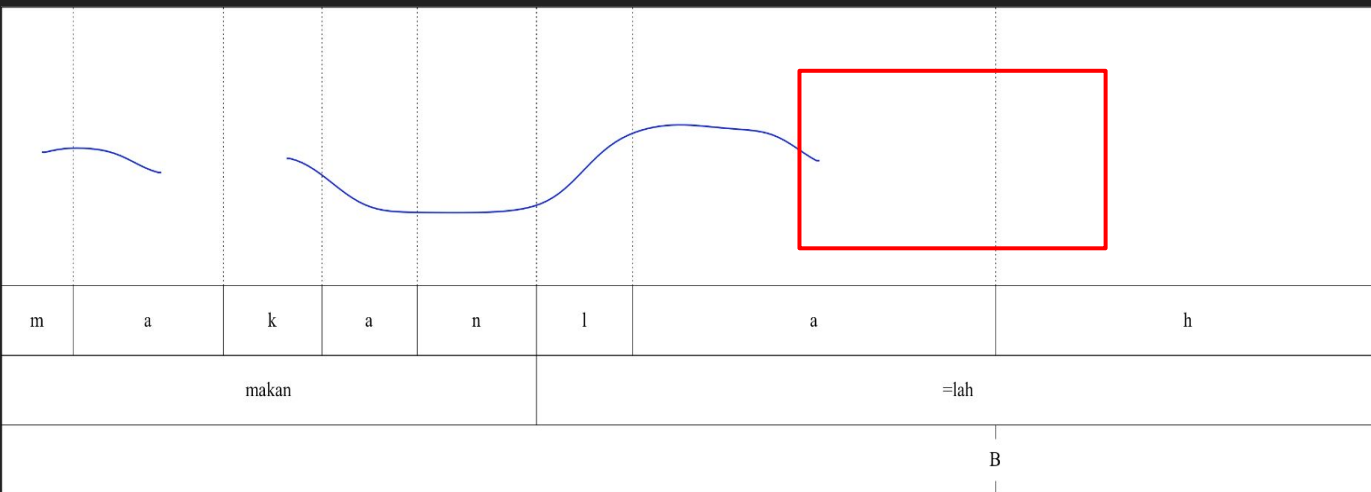


LITTLE FUNCTIONAL/LEXICAL DISTINCTION

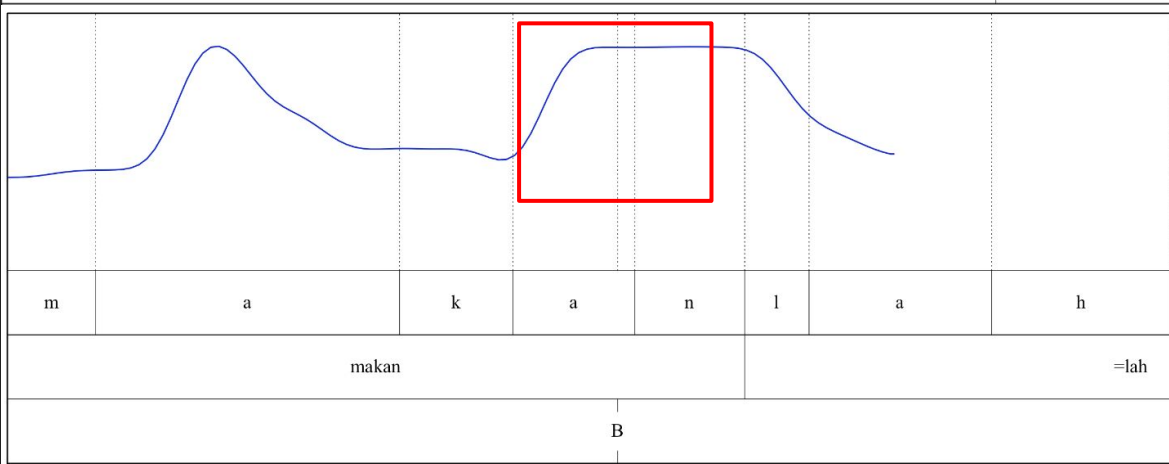
baca-an=nya biasa saja, lipstik=nya dua inci
 read-NMLZ=GEN ordinary only lipstick=GEN two inch
 'her reading is just ordinary, but her lipstick is two inches (thick)'



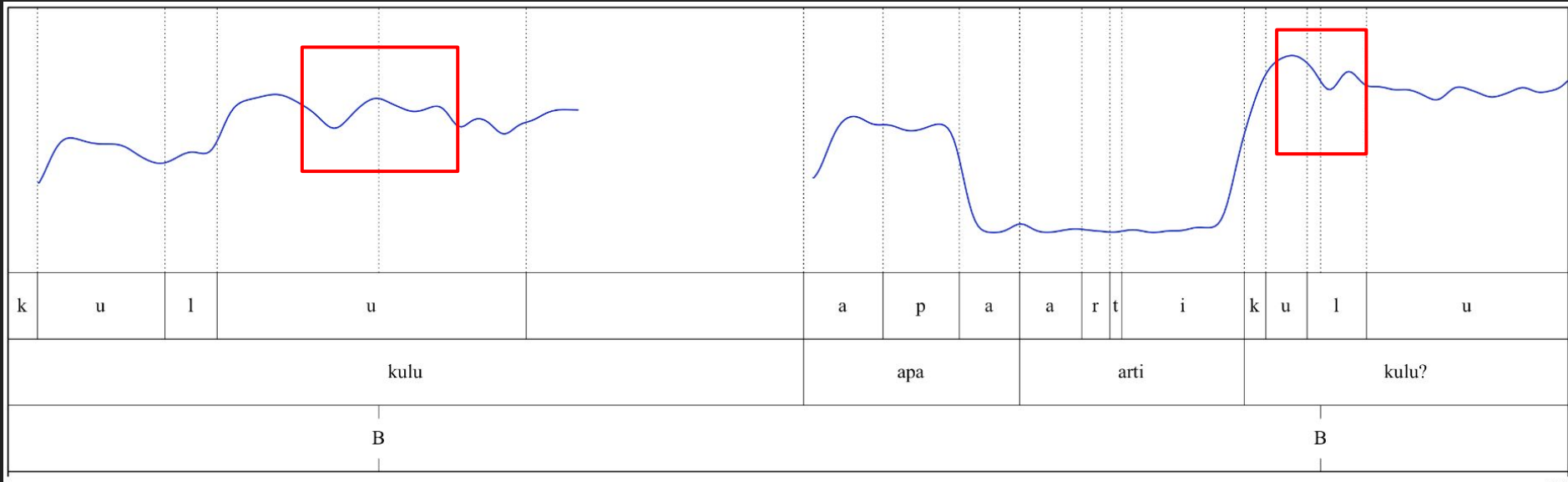
VARIATION



makan=lah
eat=EMPH
'Eat!'

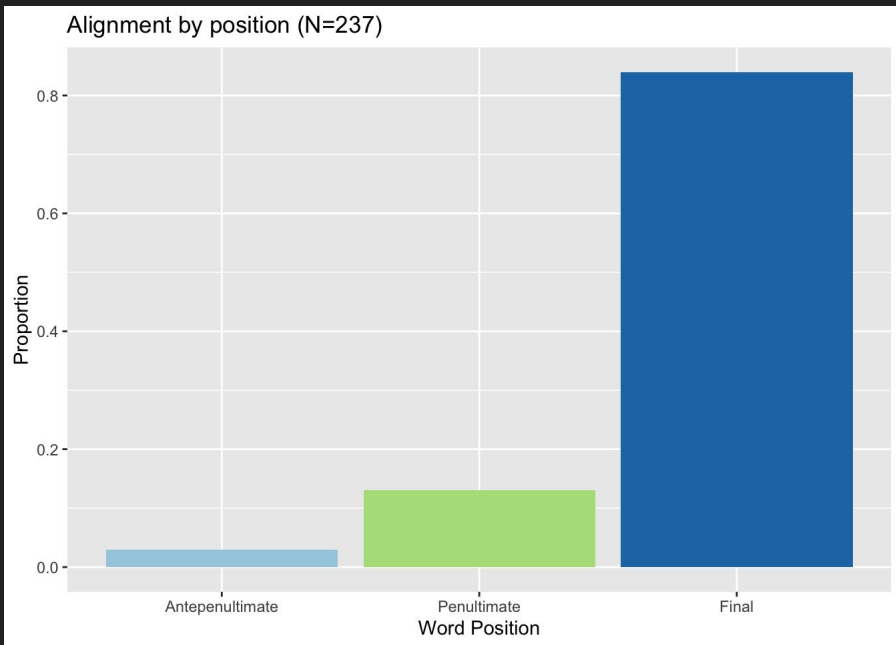


VARIATION



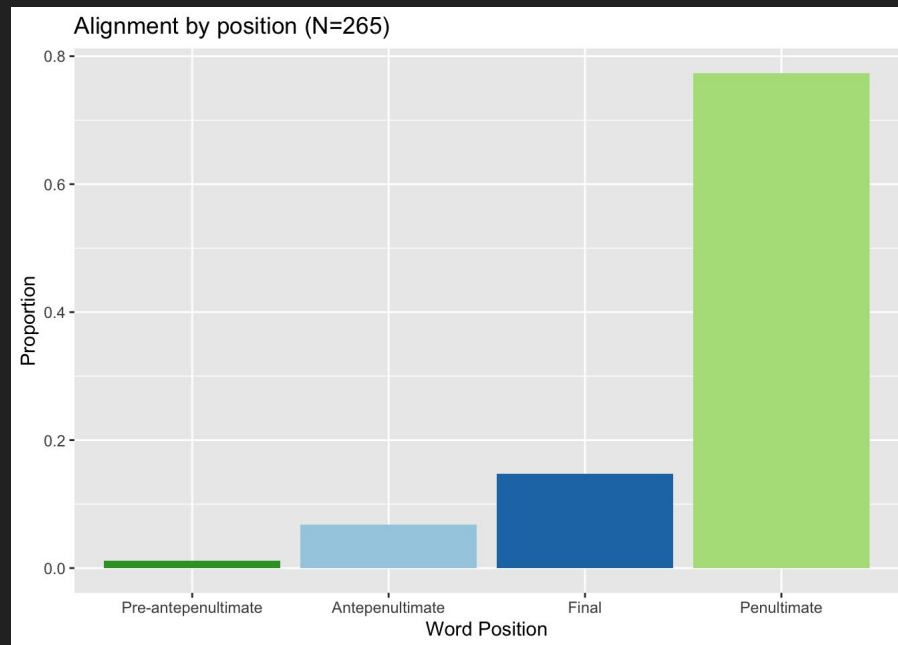
Results

Somad (West Sumatran)



Strong tendency toward final alignment

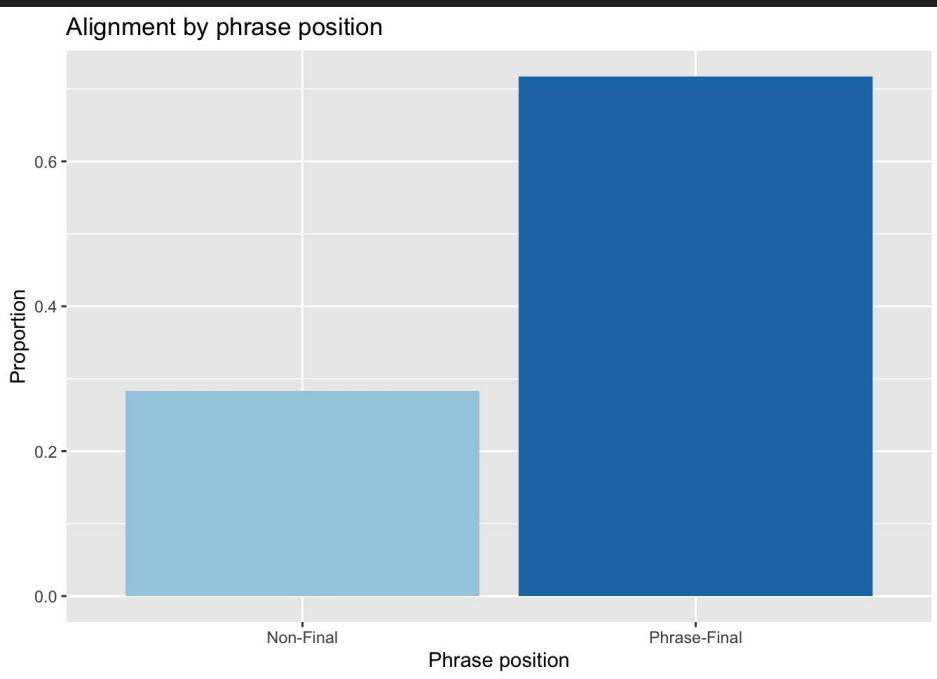
Manuputty (Ambonese)



Strong tendency toward penultimate alignment

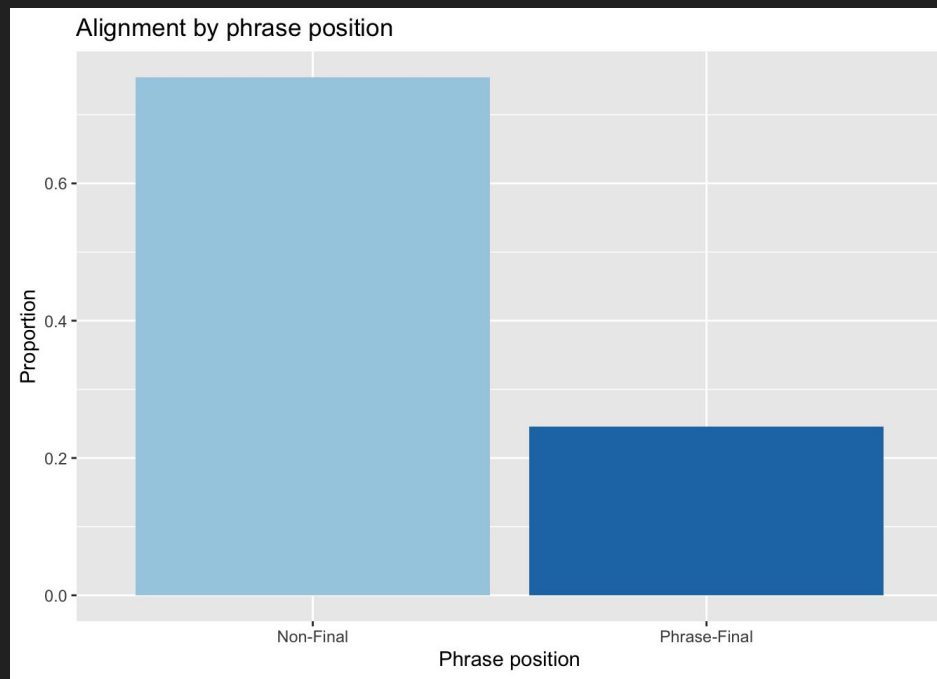
Alignment by phrase position

Somad



>70% of alignment is phrase-final
~30% non-phrase final

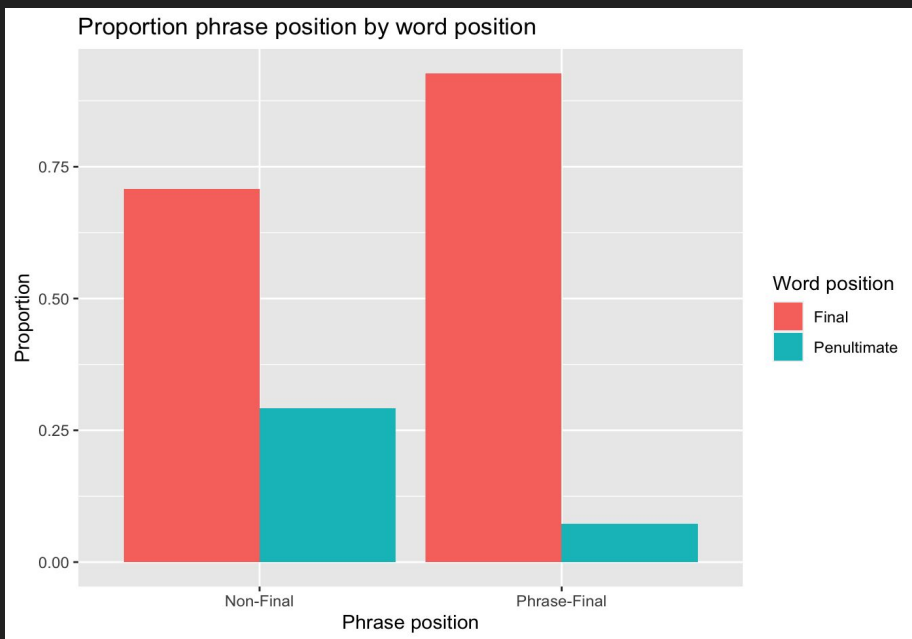
Manuputty



~25% of alignment is phrase-final
~75% non-phrase final

Word alignment by phrase position

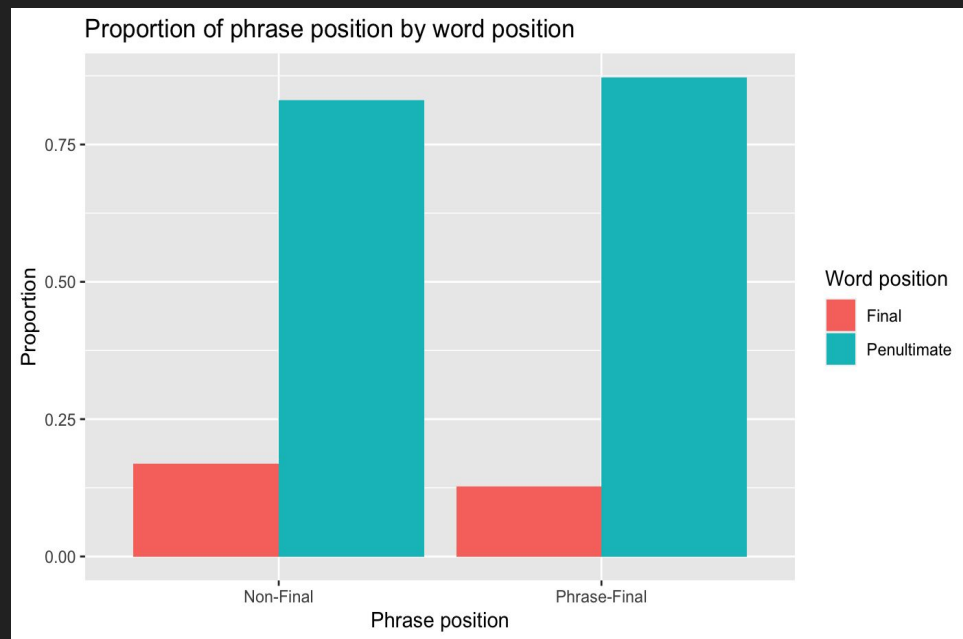
Somad



$$\chi^2(1, N = 230) = 17.44, p < .01$$

The results of a chi square test reveal that alignment within the word and phrase position (final vs. non-final) are correlated in Somad ($p < .01$, but not in Manuputty ($p > .01$))

Manuputty



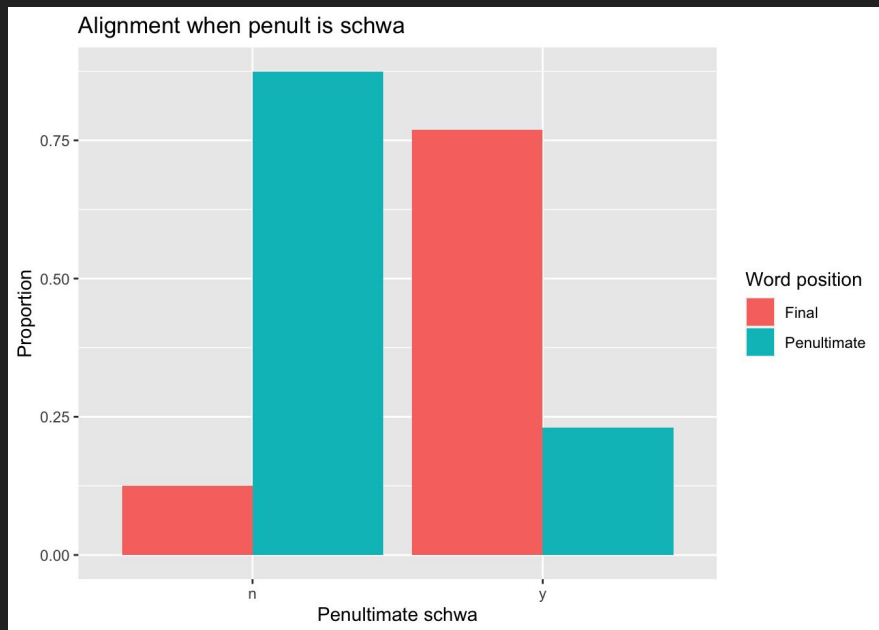
$$\chi^2(1, N = 244) = .29, p > .01$$

Exceptions: Somad

- 199 tokens with final alignment, which we take to be the basic pattern
- 31 tokens with penultimate alignment
- 7 tokens with antepenultimate alignment
- 13% are exceptions (if we exclude antepenultimate)
- We looked at other factors (phrase position, presence of a monosyllabic enclitic, presence of a suffix) to try and account for these exceptions, but none appear to do so

Exceptions: Manuputty

- 205 tokens of penultimate alignment
- 39 tokens of final alignment
- 18 tokens of antepenultimate alignment
- 3 tokens of pre-antepenultimate alignment
- 15% of total data (excluding A and Pre-A)



$$\chi^2 (N = 17) = 37.97, p < .01$$

- Presence of schwa in the penultimate syllable is correlated with position of alignment within the word
- Strong tendency for final alignment in words with a penultimate schwa
- This correlation is significant ($p < .01$)
- This coincides with reports of final prominence as a strategy of schwa avoidance (Alieva, Arakin, Ogloblin & Sirk 1991; Teeuw 1984)

Exceptions: Manuputty

- Penultimate schwa explains 25% tokens of exceptional final alignment
- Of the remaining, 58% had alignment of *apex* to final syllable, but the *peak effort* coincided with the penultimate syllable
- Total <6% unexplained exceptional final variation (compared to 15% unexplained penultimate for the Sumatran variety)

Conclusions

- We have shown that beat gestures follow regular prominence patterns and that gesture apexes are closely coordinated with (usually H or LH) pitch accents in very distinct and distant Indonesian varieties.
- Both varieties show consistent patterns that could roughly be described as trochaic vs. iambic.
- Ambonese Indonesian appears to have a strong word-based trochaic pattern as manifested both by pitch accents (pace Maskikit-Essed & Gussenhoven 2016) and manual gestures.
- West Sumatran Indonesian appears to have a strong final syllable prominence pattern, as expected for K&H's Western Rim Prototype (AKA Greater Iambia).
- We see further **phonologization** of the prosodic word in the Eastern Prototype (AKA Trocheenesia) when compared to the western WMP area. There is still far more phonologization in Sulawesi than Ambon Malay!
 - More phonologization = less overall variability; consistency in the treatment of clitics; split in internal and external clitics.
- Further work: Javanese and Betawi Malay

