

Approximants in Urdu Language

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مرکز تحقیقات لسانیات

Outline

- Introduction
- Literature Survey
- Urdu Approximants
- Exceptional cases with [j] approximant

Introduction

- Ladefoged (1964: 25) coined the term Approximant; he used this term in Phonetic Study of West African Languages. According to him “approximants have narrow vocal tract but not narrow enough to result in a turbulent airstream”.
- Reetz Jongman(2009) in his book Acoustic Characteristics of Speech Sounds states that approximants are weaker and shorter than vowels and also have longer transition duration.

Contd

- Ladefoged and Maddieson (1996) defines approximants as “vowel-like segments that function as consonants”.
- Forel and Paskas (2005) said that approximants are the sounds which produced when the tongue approaches the root of the mouth and due to this friction does not create.

Literature Survey

English Approximants

- According to Forel and Paskas (2005) Southern British English language has three approximants [r], [j], [w]. [r] is alveolar and only occurs before vowels in Southern British English. [j] is palatal and [w] is velar approximant.

American English

- American English has four approximants /w, j, r, l/ (Carol Y. Espy-Wilson 1992).
- Phonetically, /l/ has two allophones. /l/ is light at word initial position. Whereas, at word final position it is always dark.
- Glides /w/ /j/ mostly occur at prevocalic position.
- Lip rounding occurs when /r/ is prevocalic or intervocalic and before a stressed vowel (Delattre and Freeman, 1968). Due to lip rounding all **formants of /r/ lowers**

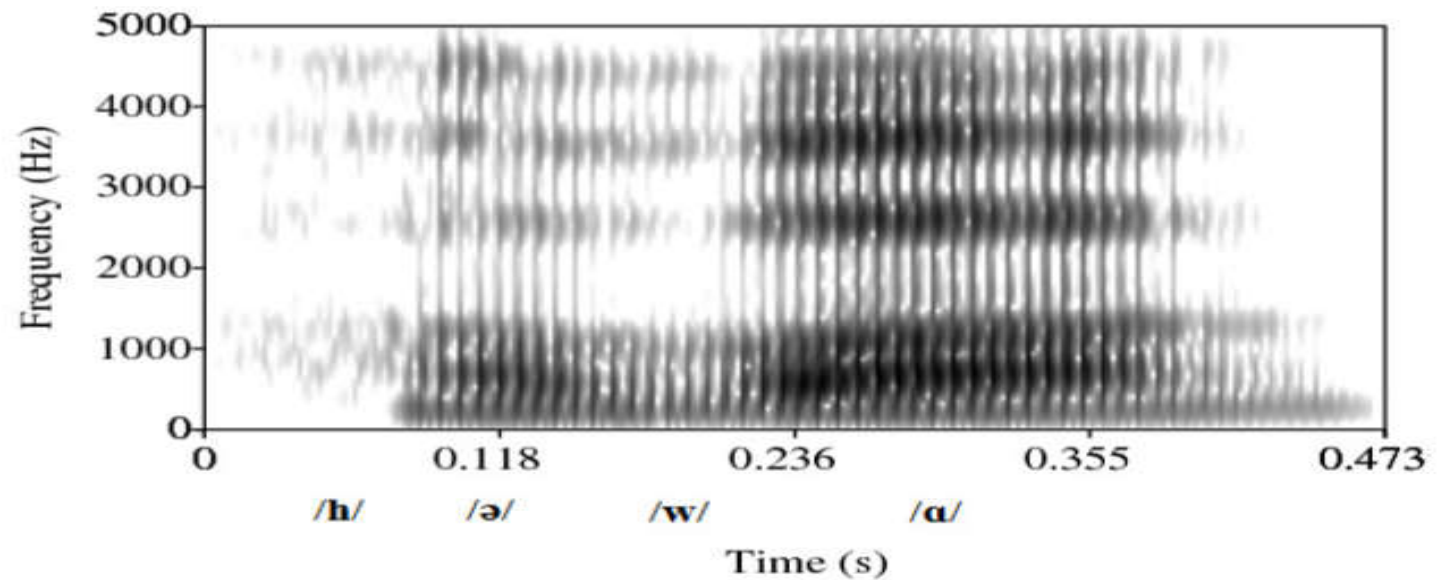
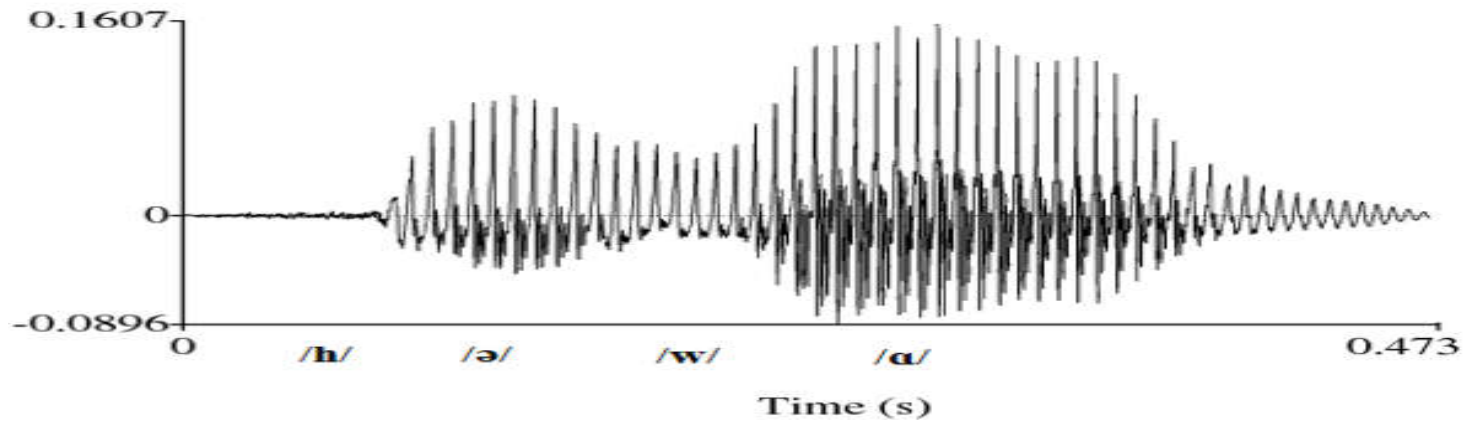
Sindhi Language

- Glides, in Sindhi language has some acoustic vowel characteristics like formant structure and periodic wave forms.(Ayaz Keerio et. al 2011). This is the reason Glides are also called Semi-vowel.
- In Sindhi language, Glides cannot form syllable individually because they do not form the prominent part of speech signal in a syllable like vowels.

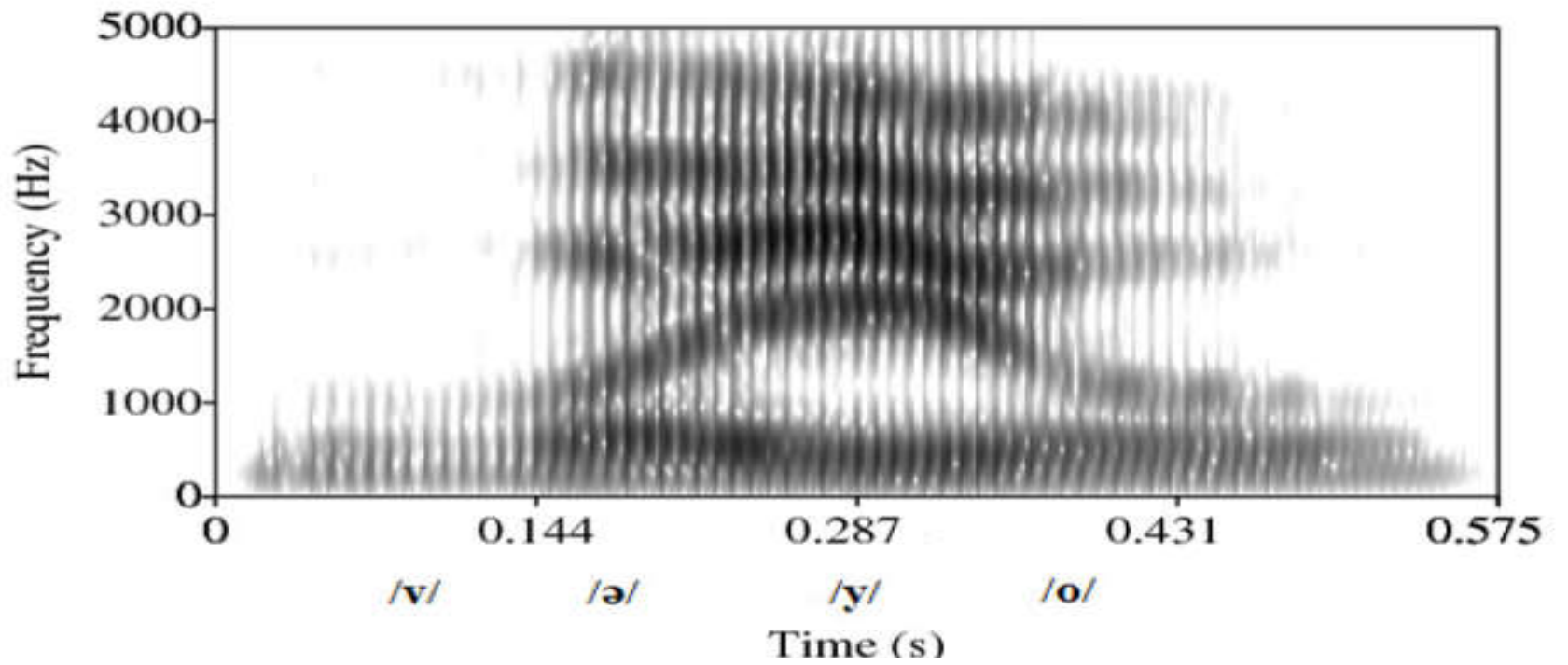
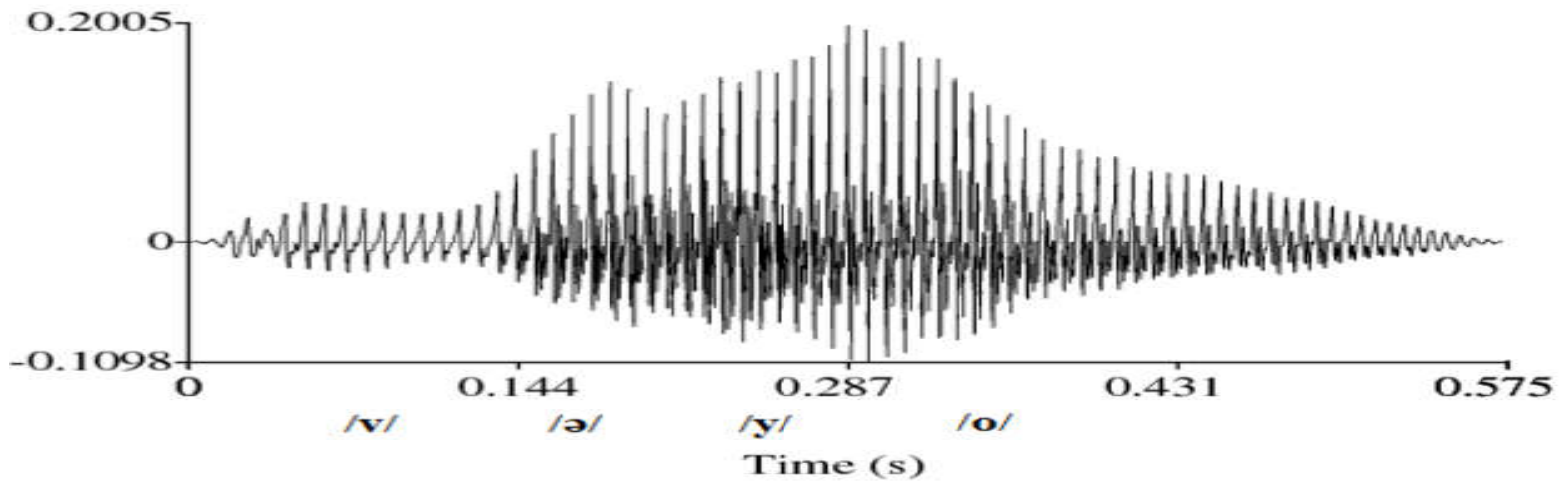
Contd

- In Sindhi language Glides [w] and [j] are voiced phonemes and voiced region can also be seen easily.
- Glides show sharp transitory segment in Sindhi language.

Example of Sindhi Glides



Approximants in Urdu Language



Korean Language

- According to C. Kim and A. J. Lotto (2004) Korean language has three approximants [w], [j], [l].
- The phoneme [l] is alveolar. In word initial position, [l] is deleted when it is followed by [i] or change to [n] (Sohn 1999). Word initial position of loan words and some Korean names [l] is produced as [r].
- [r] is also produced in intervocalic position. At the word final position [l] is produced as light[l].

Contd

- [w] and [j] are known as glides. Glides mostly come at prevocalic position in Korean language (C. Kim and A. J. Lotto 2004).
- [w] phoneme has the same vocal tract of the [u] vowel when it comes before [l, e, a, ə] and the glide [j] when comes before the vowels [e, a, u, ə, ε, o] has the same vocal tract as of [i].

Urdu Approximants

- Suleman Mazhar (CRULP) worked on Aspirated approximants in Urdu language, according to him aspirated approximants are not part of Urdu dialect now.
- Aspirated approximants do not occur word initially, might have occurred medially in old Urdu but now they have changed to their non-aspirated counterparts.

Contd...

- Khalid. N in his paper “**Existence Of [v] and [w] in Urdu Language**” (2002), concluded that the native speakers of Urdu do not distinguish between the use of [v] or [w] in words.
- It is also concluded that if freedom is given to pronounce anything from [v] to [w], the speakers generally tend towards a more loose pronunciation, somewhere between the approximant [w], the fricative [v], and the vowel [u]

Contd...

- Urdu language, like Korean language has three approximants i.e. [r], [l] and [j]. So /w/ is not present in Urdu language. These approximants also present at word initially, finally and medially
- Unlike, Southern British English [r] approximant in Urdu language produced in every position like before vowel, after vowel and it is also produced at intervocalic position.

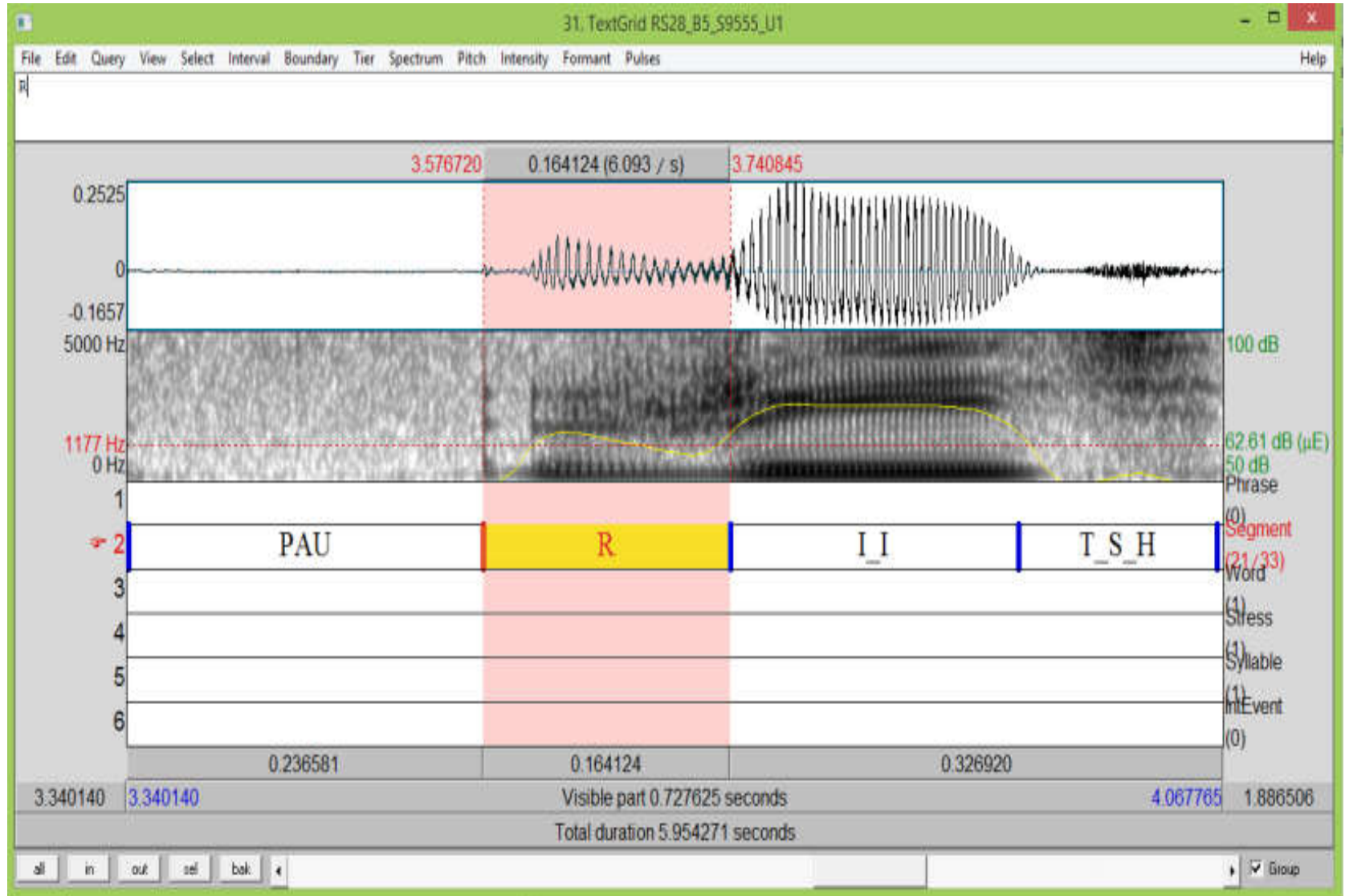
[r] Approximant

- In Urdu language, [r] approximant can occur at word initially, finally and within the word (word medially).
- At word initial position [r] comes at two positions firstly, [r] preceded with pause and secondly, [r] preceded without pause.

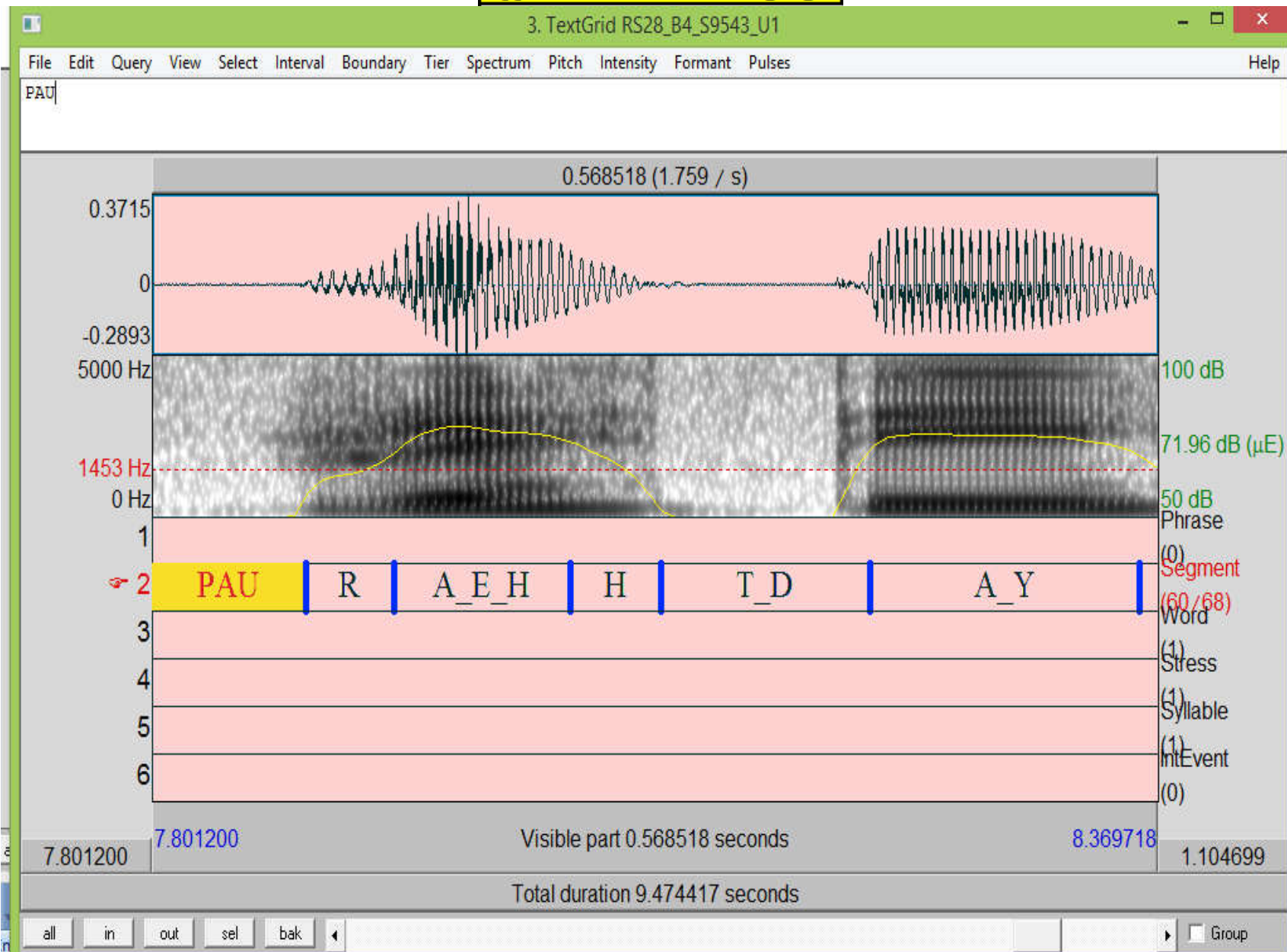
Word Initially With Pause

- When [r] comes at word initial position and it is preceded with pause then it has fricative features and also has light formants
- Intensity is higher at formant position then falls when reaches at fricative position.
- Duration is longer when [r] is produced before long vowel and duration is shorter when comes before short vowel or medial vowels.

Example



Approximants in Urdu Language

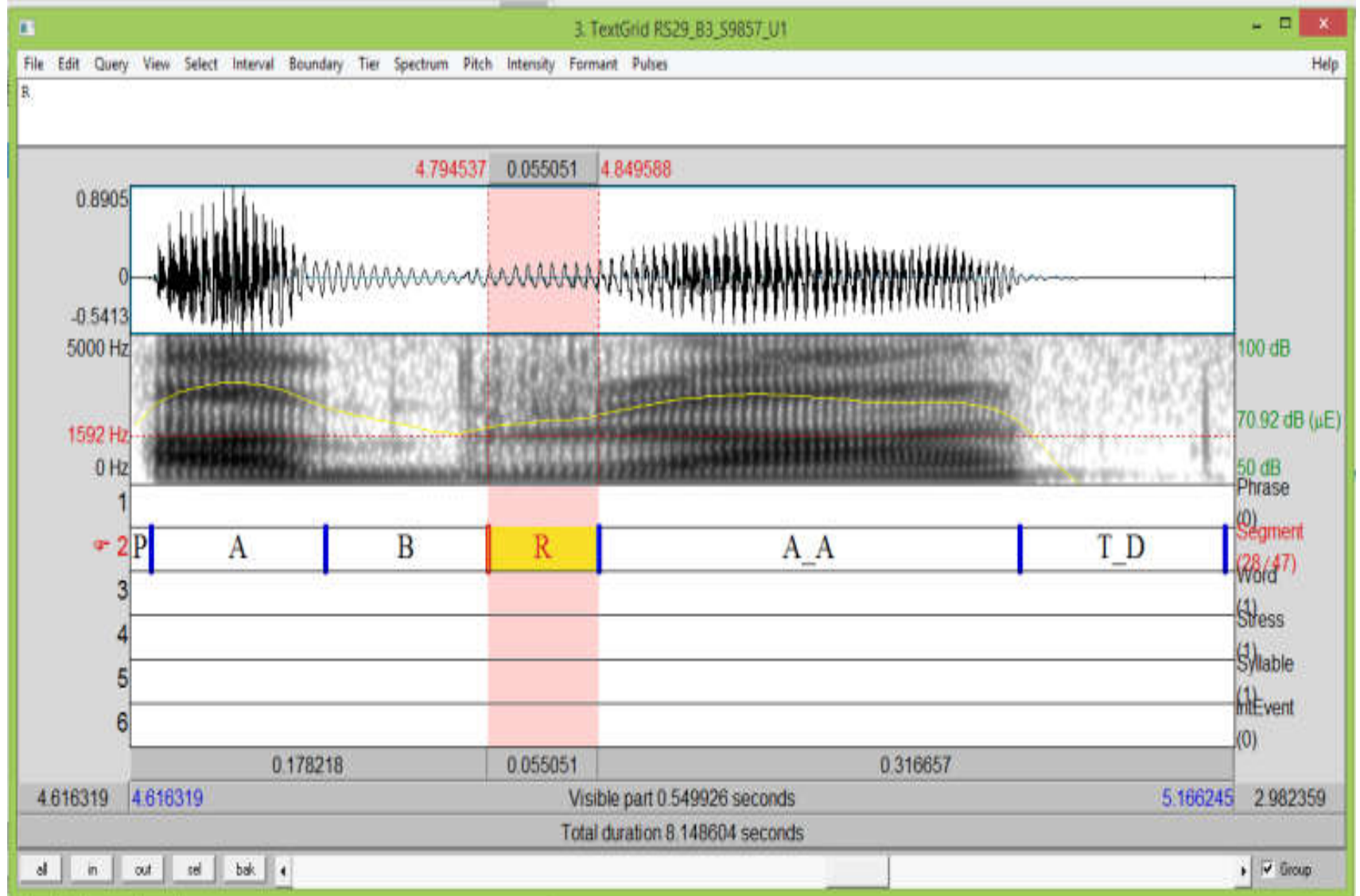


Word Initial Without Pause

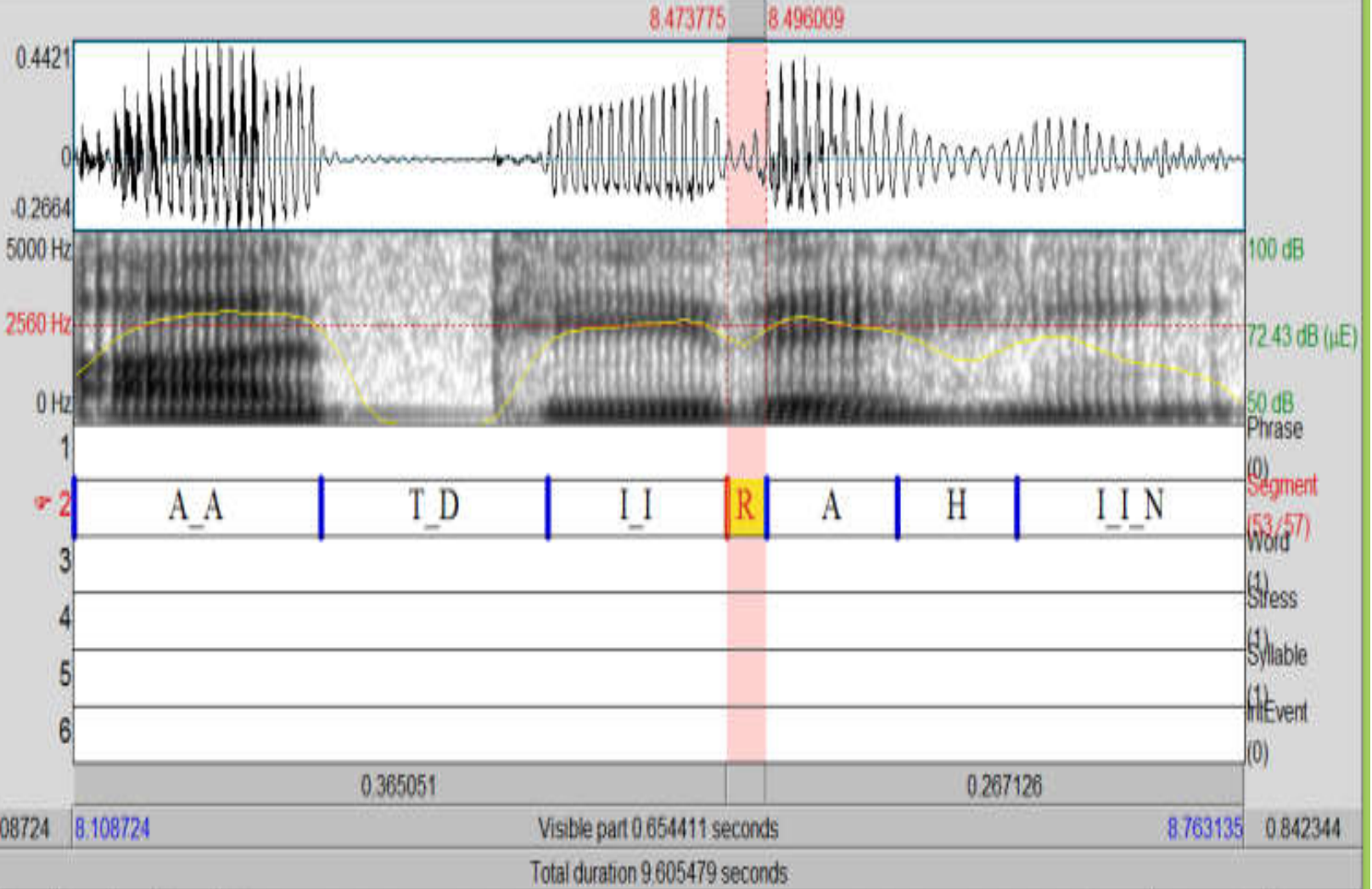
- When [r] comes at word initial position but preceded without pause then it has same features as when it comes at intervocalic position.
- When [r] comes at word initial position without preceding pause but preceded word final phoneme is stop then it has longer duration.
- Intensity is lower and it has formants but these formants are lighter than vowels' formants.

Approximants in Urdu Language

Example



R|



8.108724 8.108724 Visible part 0.654411 seconds 8.763135 0.842344

Total duration 9.605479 seconds

all in out sel bak Group

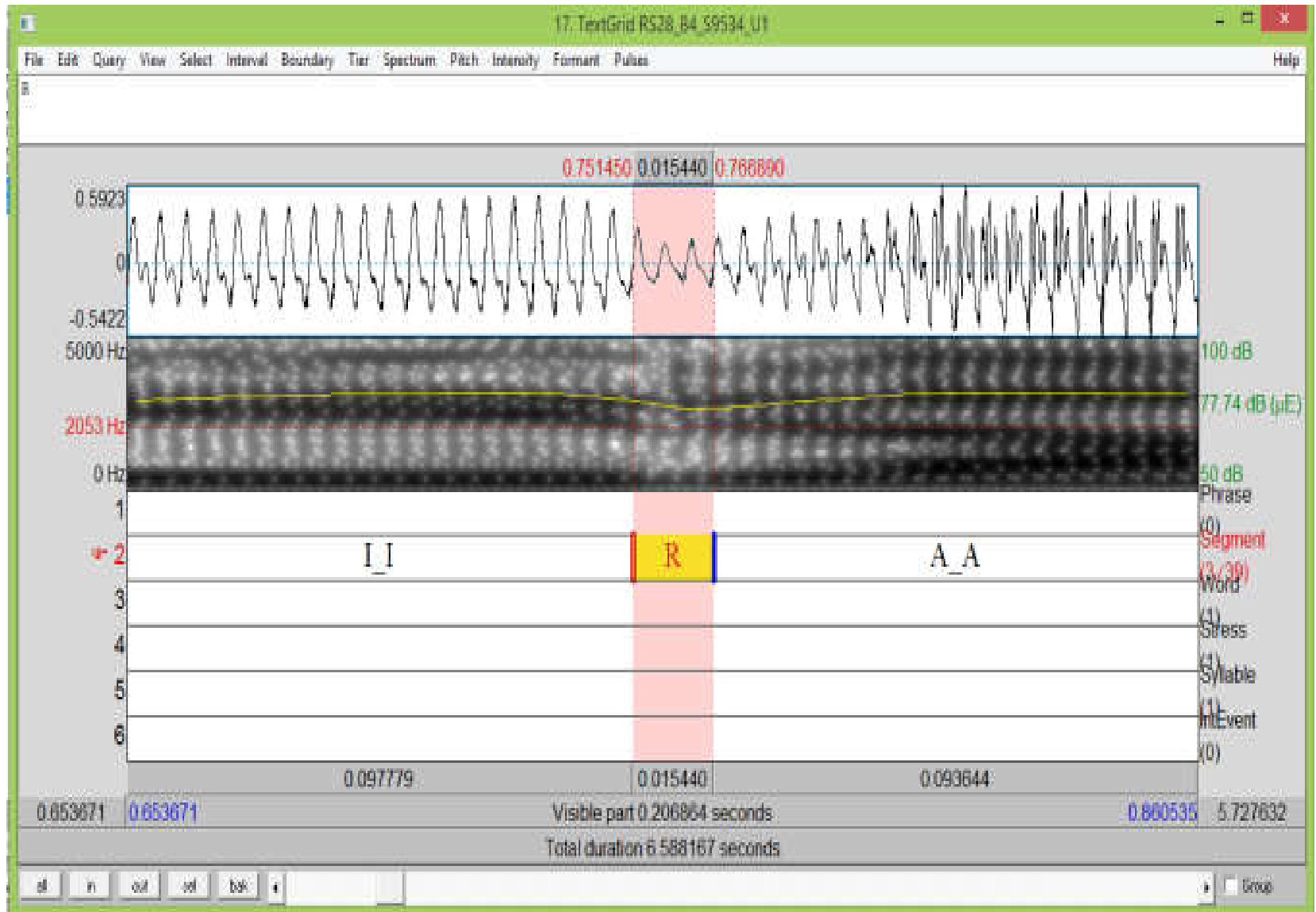
Word Medial Position

- At word medial position [r] comes at two positions i.e.
- within two vowels and
- within vowel and consonant.

Within Two Vowels

- When [r] approximant comes in intervocalic position then its duration is very short only three to four cycles and does not exceed from 0.025 ms.
- The formants of the semi vowel are visible but become very light and sometimes vanished
- Intensity falls slightly but there is a clear change in wave form of [r] approximant.

Example

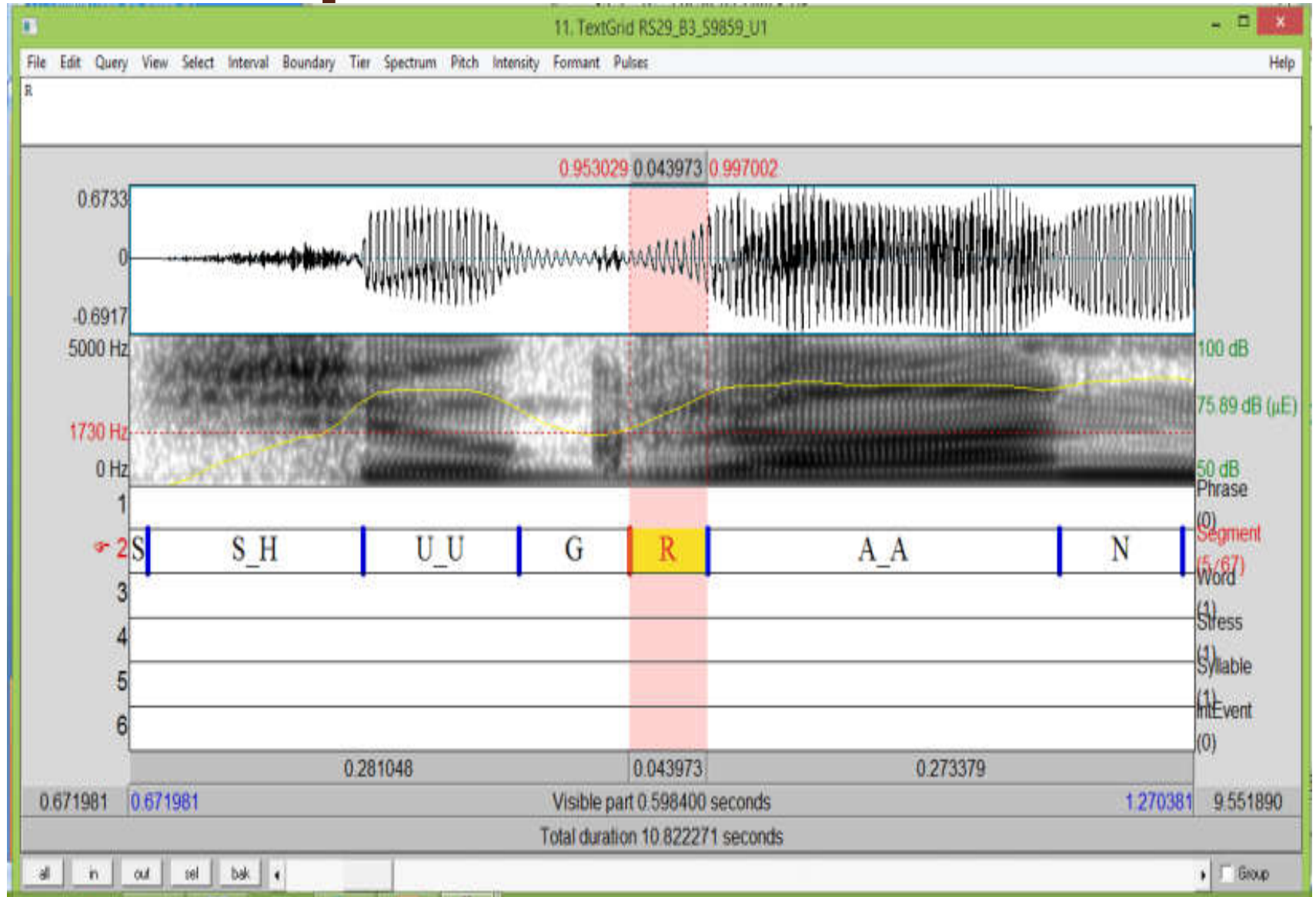


Within Vowel and Consonant

- When [r] approximant produced in between consonant and a vowel then the spectrogram shows frication but the waveforms have clear waves.
- Intensity falls and
- The duration varies and reached up to 0.050ms.

Approximants in Urdu Language

Example



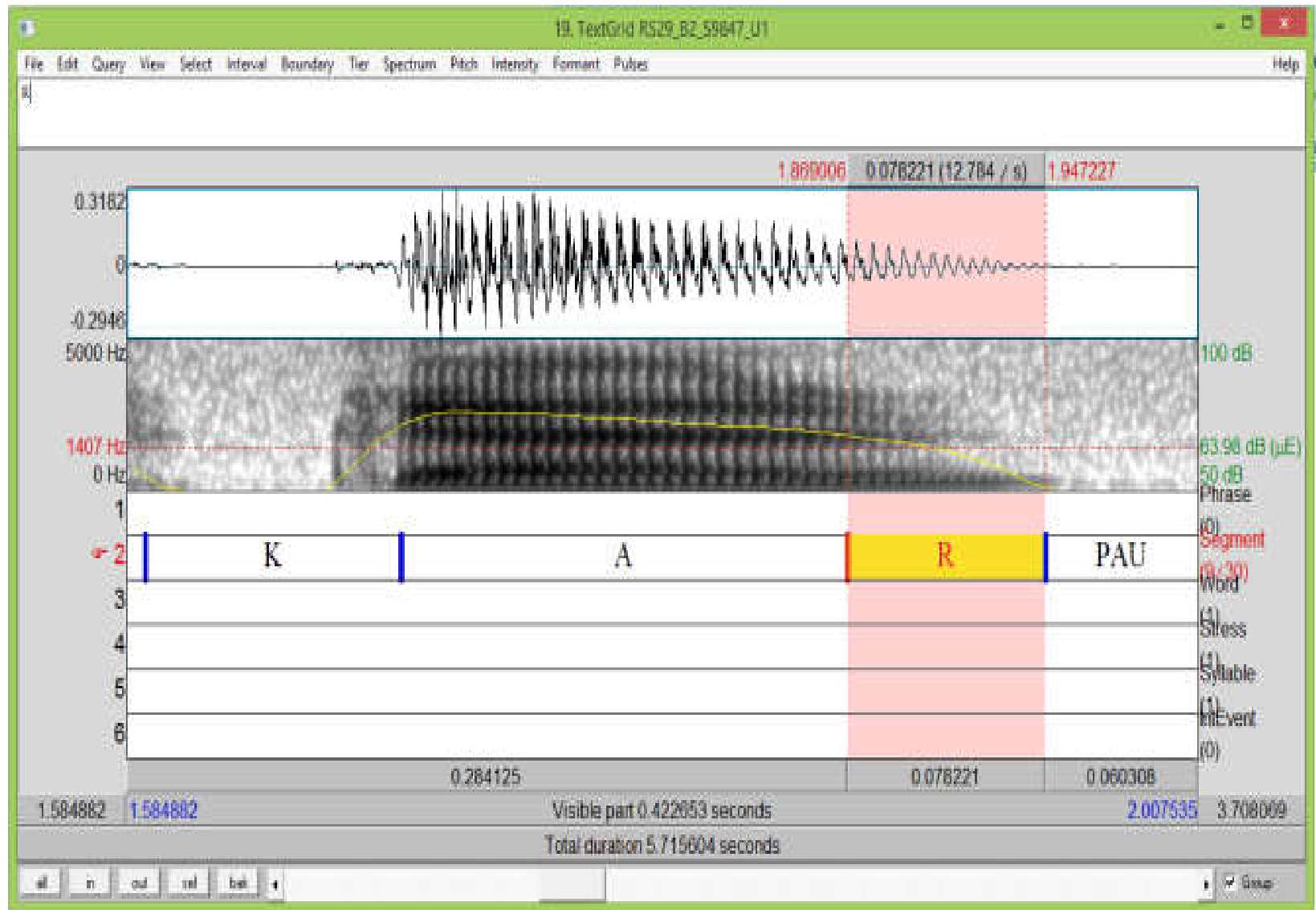
Word Finally

- At word final position [r] approximant again comes at two positions i.e.
- Word final with pause
- Word final without pause

Word Final With Pause

- When [r] comes at word final position and it is succeeded with a pause then it takes the features of the preceding vowel.
- It has lighter formants as compared to the preceding vowel and
- Intensity started to fall.
- Duration reaches up to 0.080ms.

Example

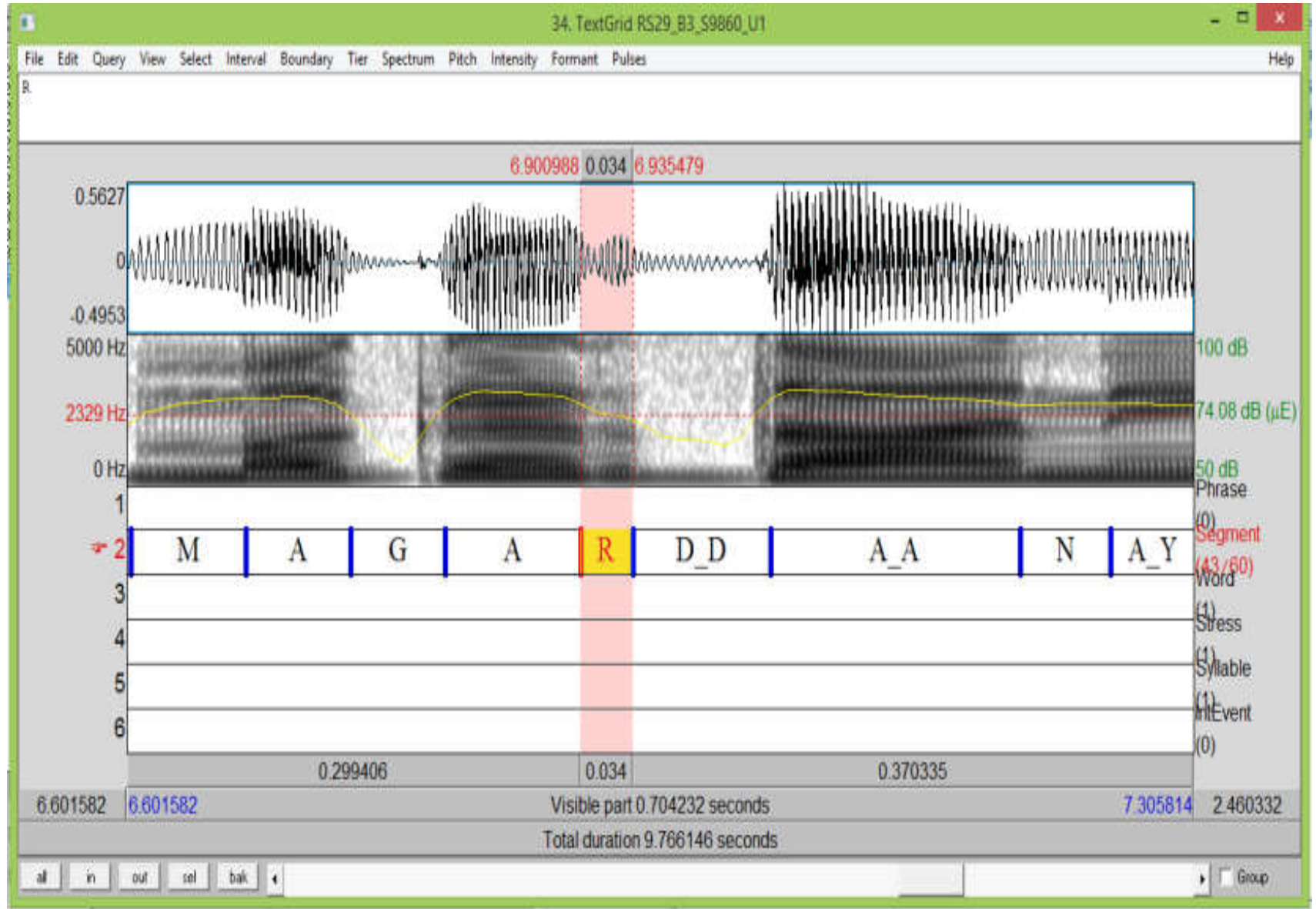


Word Final Without Pause

- When [r] comes at word final position but it is not succeeded with pause then it has some light formants. There is also a slight disjuncture before the formants
- Intensity decreases.
- Duration reaches up to 0.040ms.

Approximants in Urdu Language

Example



[l] Approximant

- [l] phoneme is another approximant in Urdu Language. it also change its shape and features when it comes at different places. Like English language [l] in Urdu language also comes at every position like
 - word initially,
 - finally and
 - within the word.

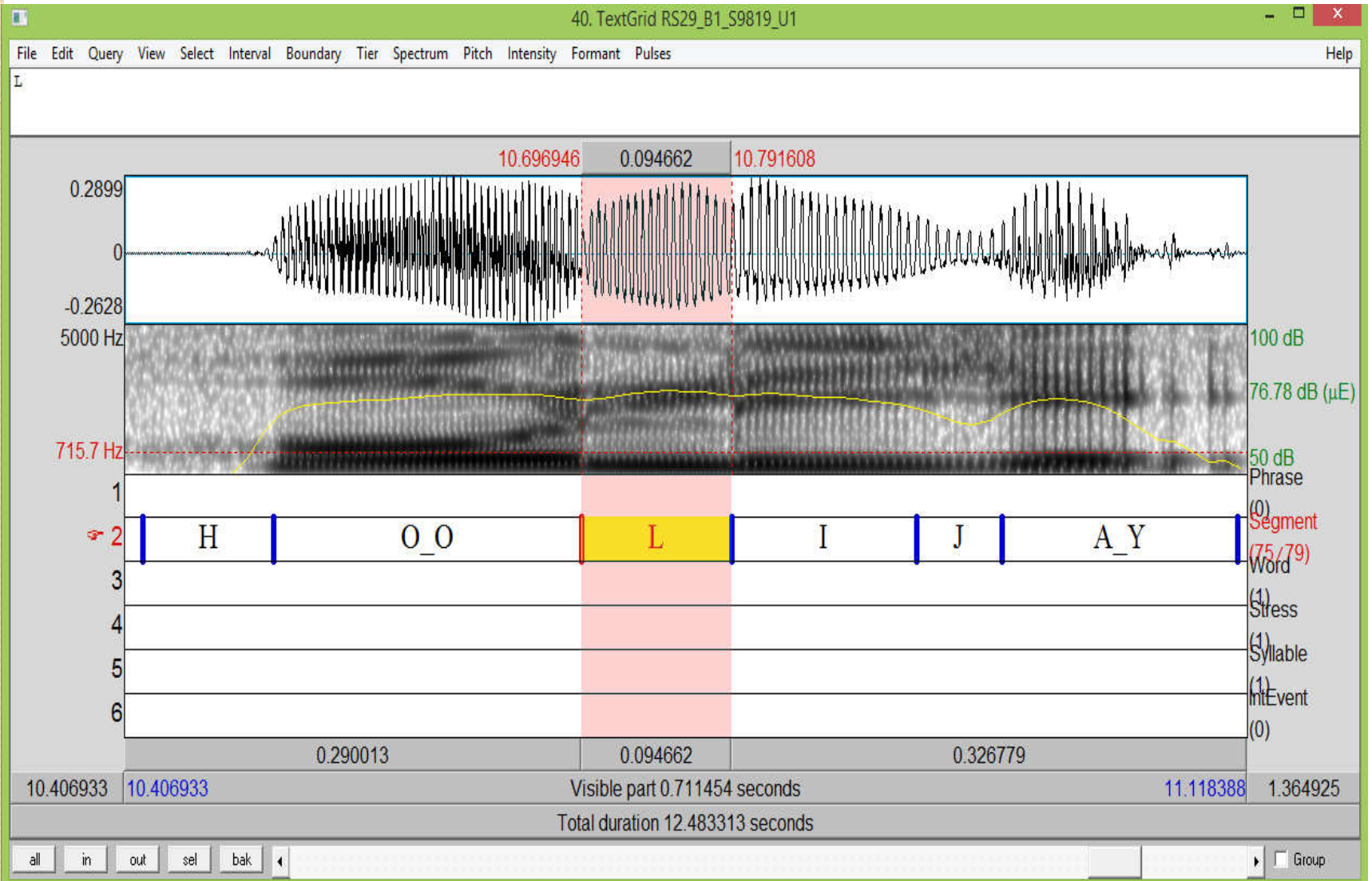
Word Initial Position

- At word initial position [l] approximant occur at two positions:
- proceeded with pause
- and without pause.

Without Pause

- When it comes at word initially and does not preceded with pause then it has formants similar to the succeeded vowels but these formants are lighter than the vowel formants.
- Sometimes it has frication before the formants.
- Intensity remains same as the succeeded vowel.
- And duration reaches up to 0.120ms.

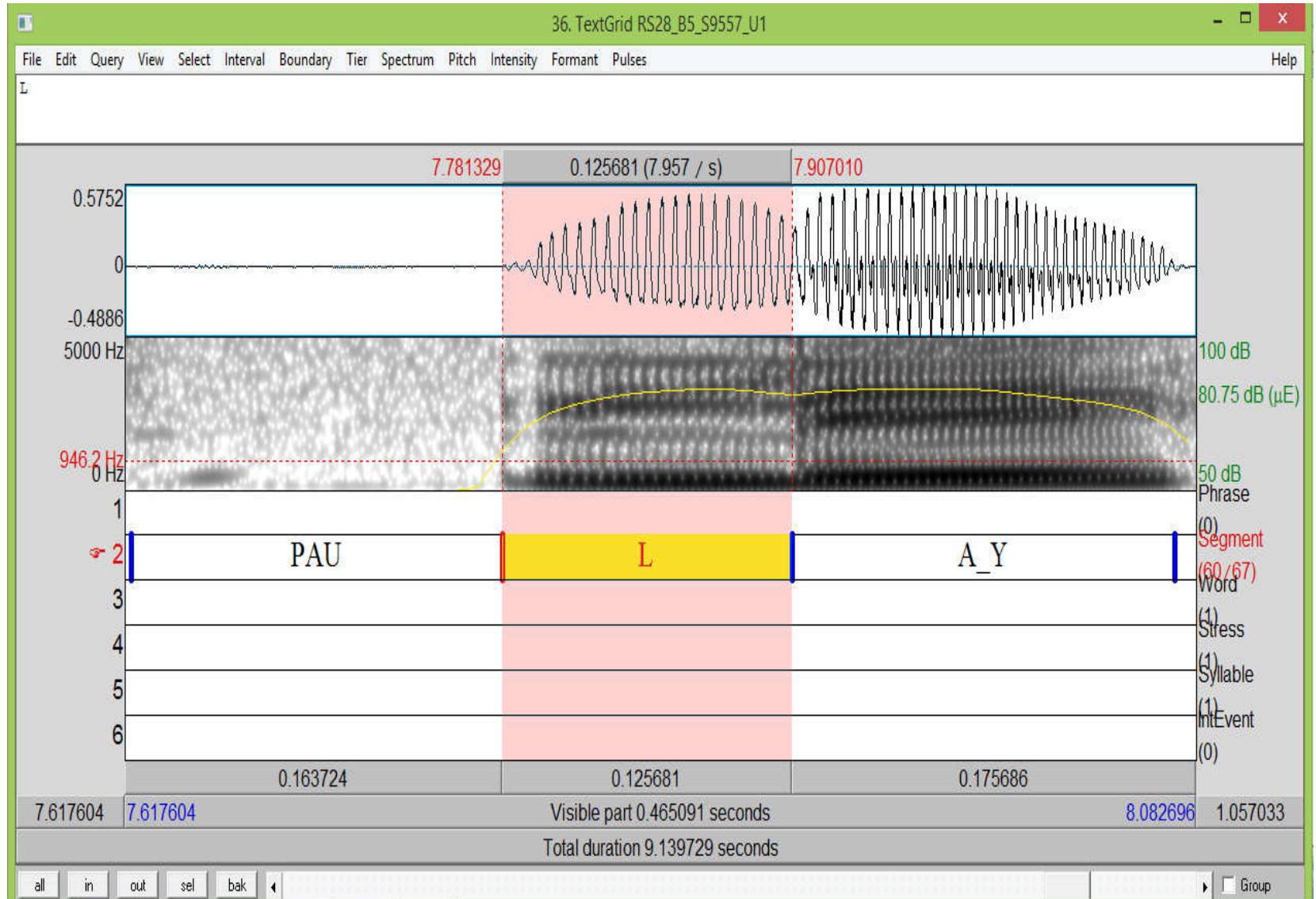
Example



With Pause

- When [l] comes at word initial and proceeded with pause,
- Its intensity does not falls but remains the same as the succeeded vowel.
- It has similar formants as of the vowel these formants are lighter than the vowel formants.
- Duration varies and reaches up to 0.155ms.

Example



Word Middle Position

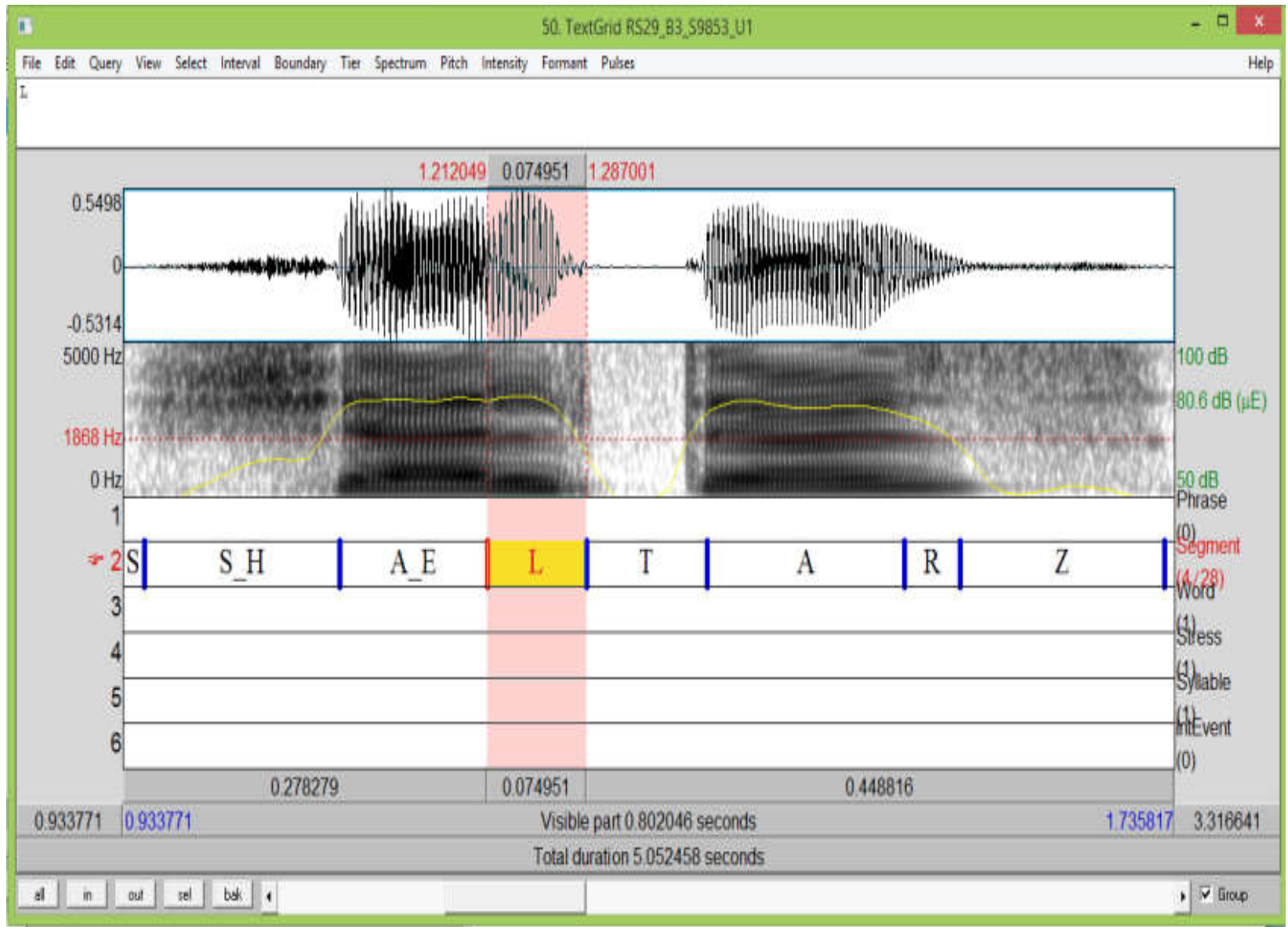
- [l] approximant take two positions at word medially i.e.
- at intervocalic position and
- between vowel and consonant.

Between Vowel and Consonant

- When [l] phoneme comes in between vowel and consonant, it has frication at the end.
- The formants are lighter than the vowel formants but the wave form is completely different from the preceding vowel.
- Intensity is higher at the formant level and suddenly decreases when reaches at fricative portion.
- Duration of [l] phoneme at this position is more than 0.060ms.

Approximants in Urdu Language

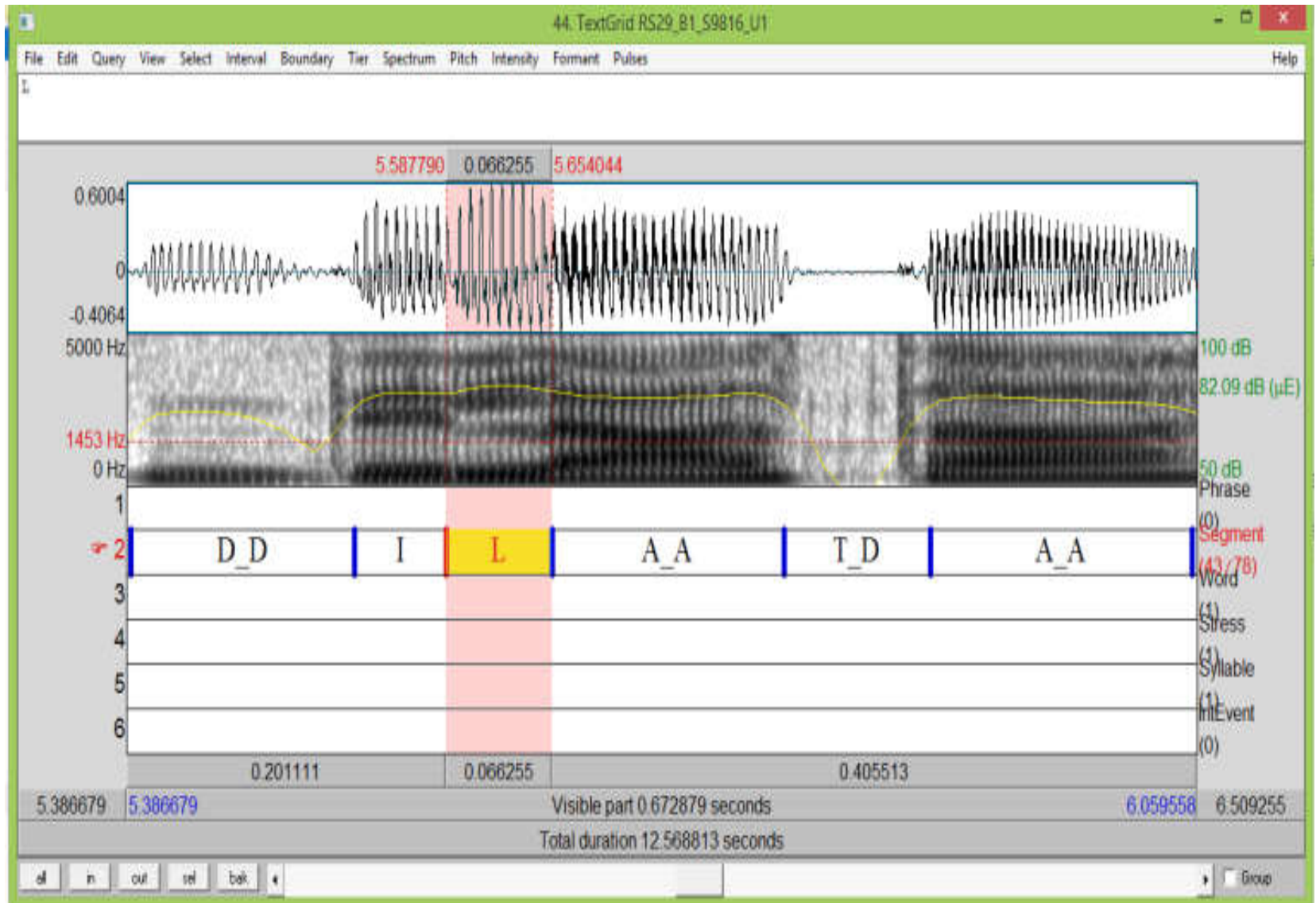
Example



Intervocalic Position

- When [l] phoneme comes in between two vowels then
- The formants are lighter than the vowels' formants.
- Intensity rises slightly.
- The duration of [l] at intervocalic position is 0.070ms,

Example



Word Finally

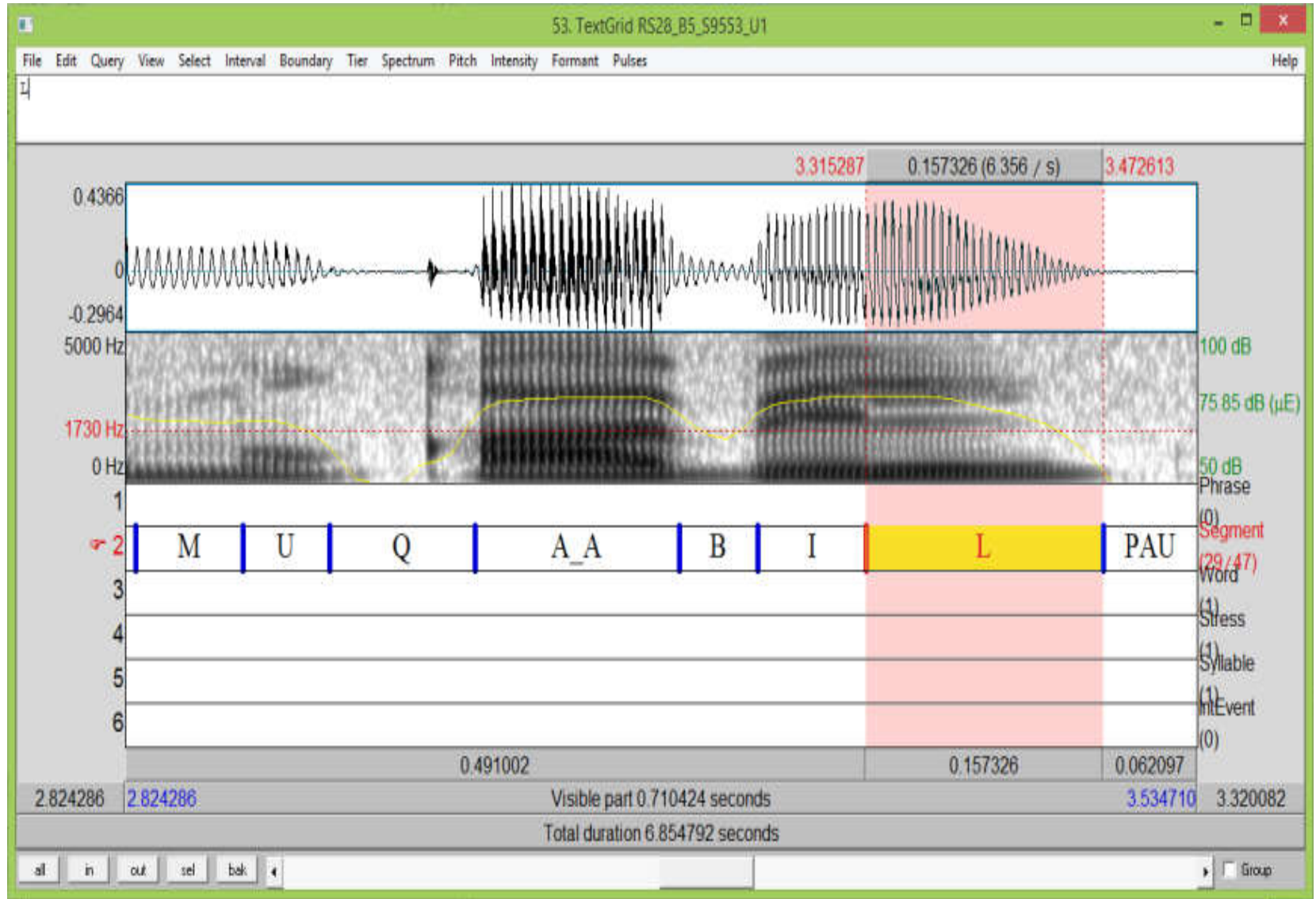
- [l] approximant in Urdu language also found at word final position. At word final position it occurs at both positions i.e.
- Succeeded with pause and
- Succeeded without pause

Succeeded With Pause

- When it comes at word final position and succeeded with pause then:
- Its duration more than 150ms and due to the succeeded pause [l] phoneme lengthens.
- Formants are lighter than the preceding vowel.
- Intensity does not fall but remain the same as it is at vowel part but sharply decrease at the end of [l] approximant.

Approximants in Urdu Language

Example

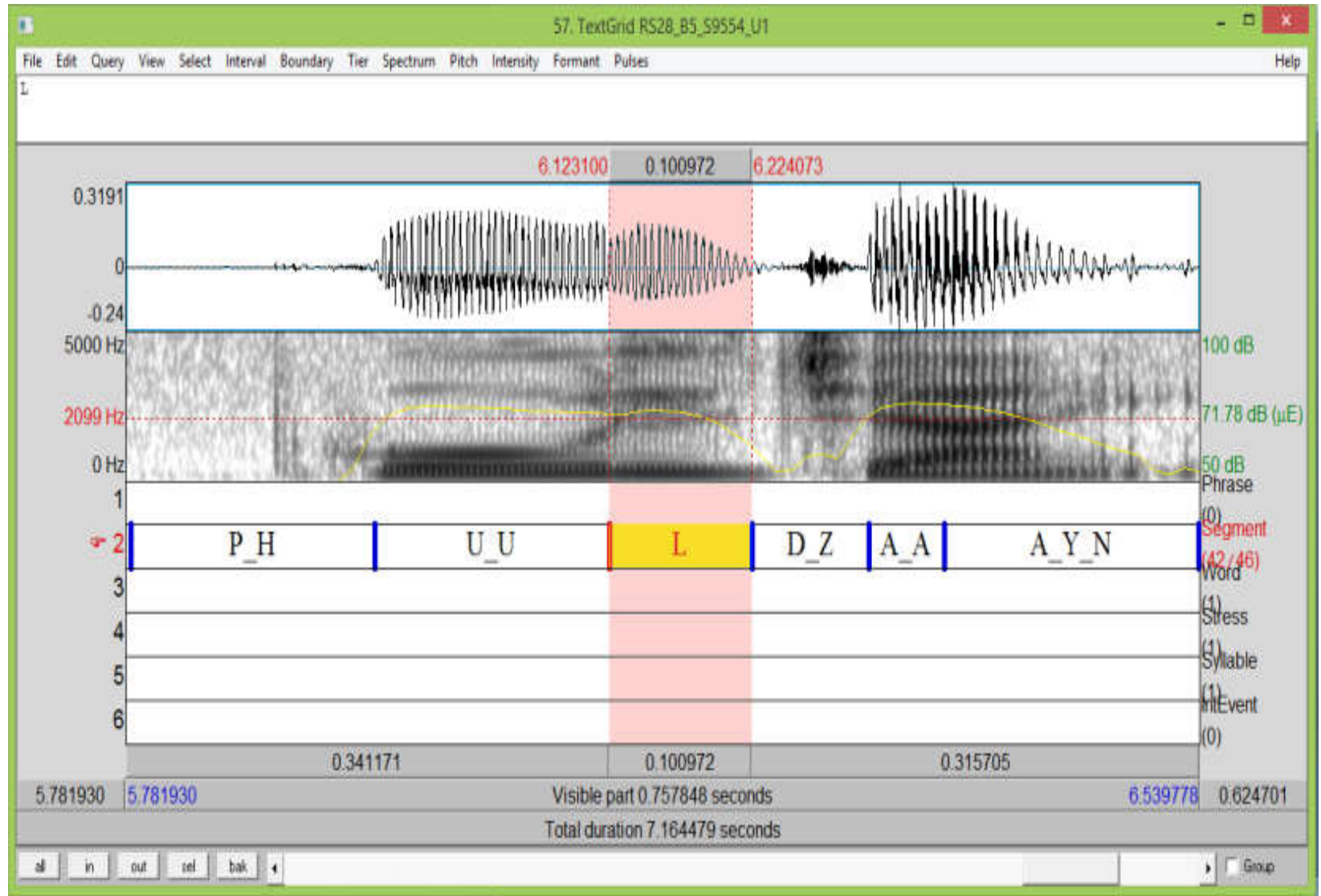


Without Pause

- When [l] approximant comes at word final position and does not succeeded with pause then
- Its duration is short and ranges between 0.060ms to 0.100ms.
- Intensity slightly rises and then sharply decreases as the phoneme ends.
- Formants are lighter than the vowel formants.

Approximants in Urdu Language

Example



[j] Approximant

- The third approximant in Urdu language is [j].
- [j] Approximant in Urdu language does not found at word finally.
- It only occurs at word initially and word medially.

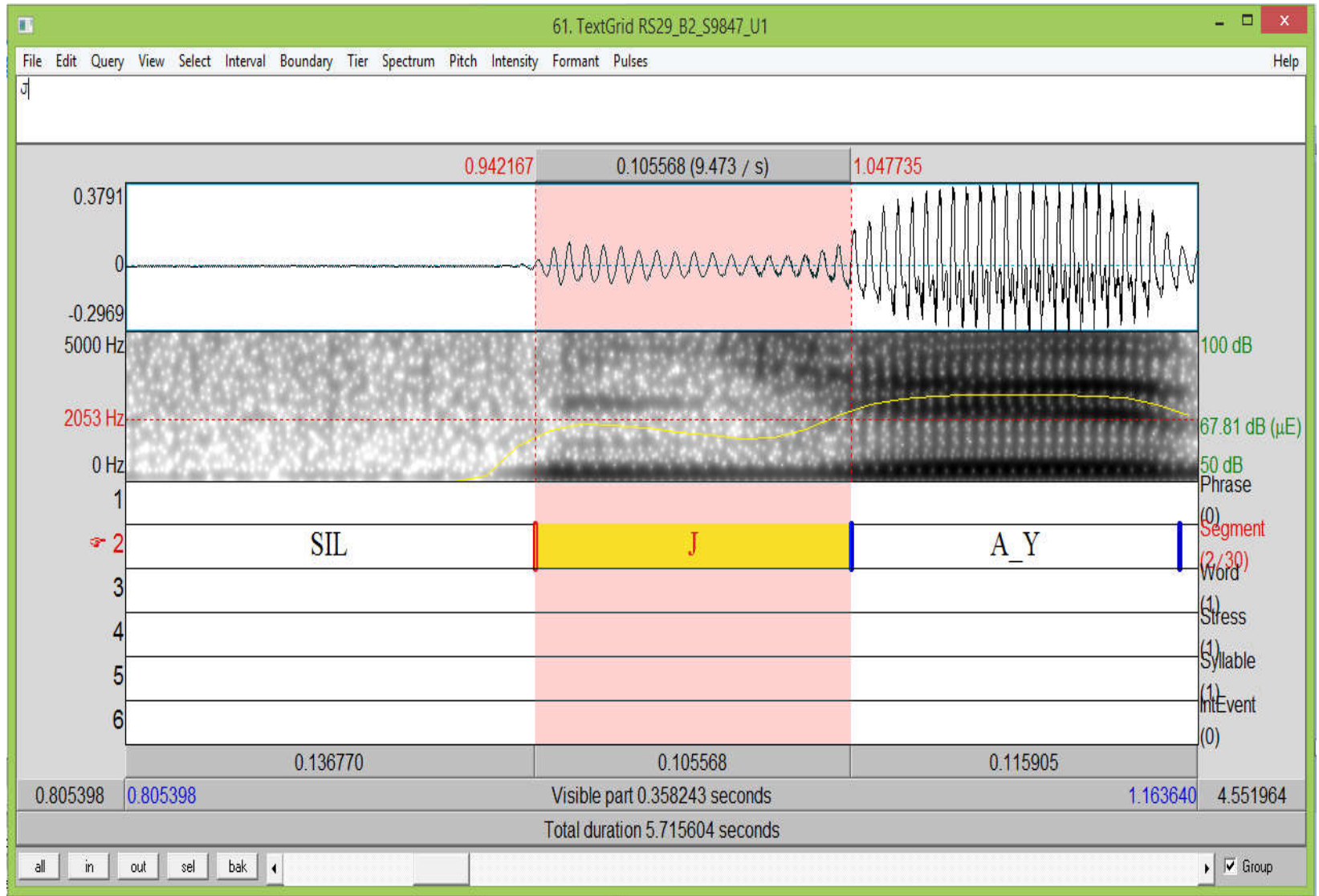
Word Initial

- At word initial position [j] approximant comes at two position
- firstly preceded with pause and
- secondly, without preceding with pause.

Preceded With Pause

- [j] approximant when comes at word initial position and it is preceded with pause then it has two parts, one is fricative part and second part has formants.
- At formant part [j] approximant has high intensity as compared to fricative part where intensity falls and then again rises gradually when the vowel starts.
- Duration is more than 0.100ms.
- The formants of [j] approximant is similar to the formants of [i] vowel.

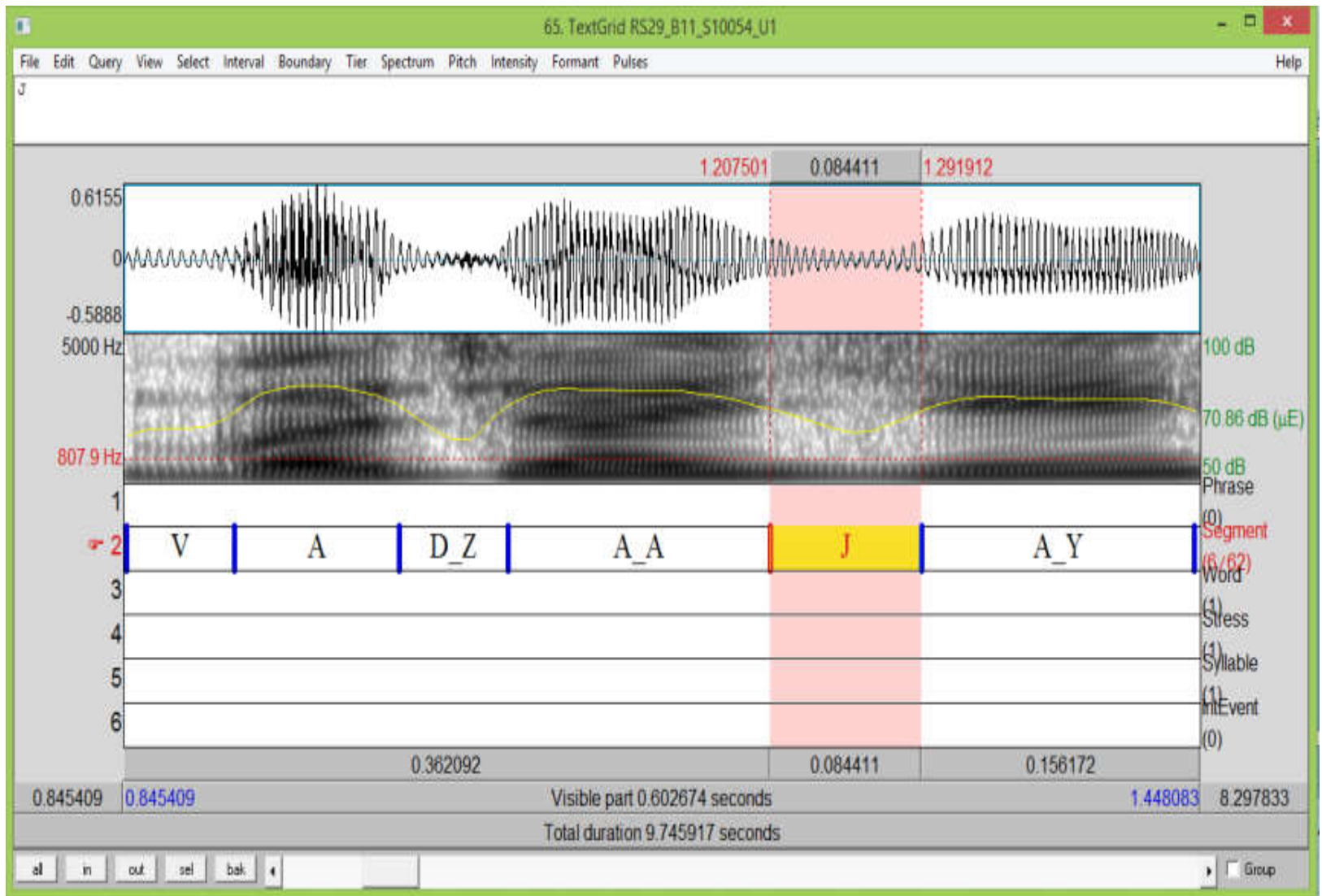
Example



Without Pause

- When [j] approximant comes at word initially but does not preceded with pause then
- It has the features of fricatives. There is frication but like fricatives intensity does not fall completely.
- Formants of [j] approximants vanished completely.
- Duration ranges from 0.070ms to 0.090ms.

Example



Word Medially

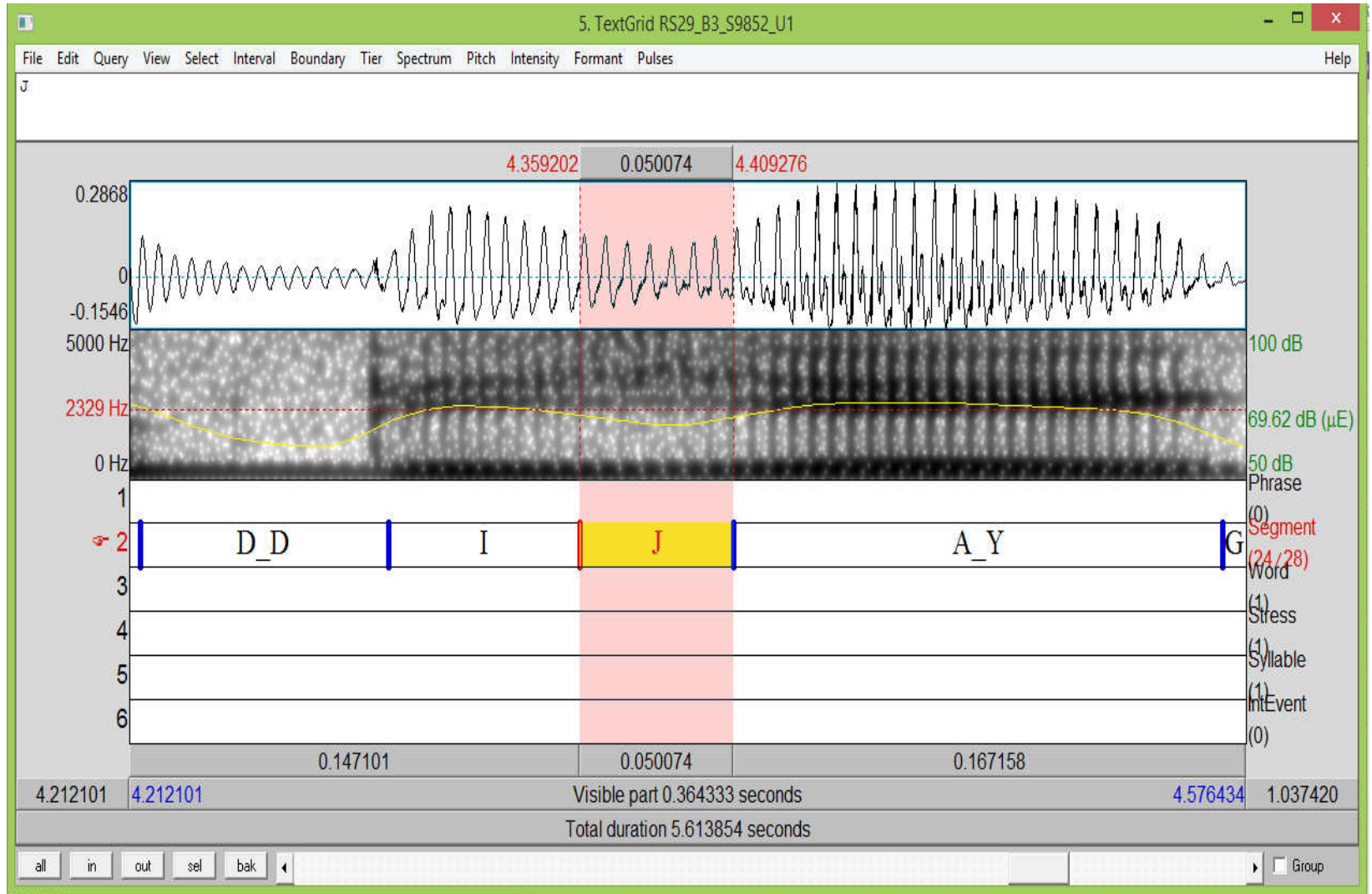
- [j] approximant in Urdu language comes only at one position i.e. between two vowels.

Between Two Vowels

- When it comes between two vowels then:
- Intensity falls
- Wave form also changes and
- The formants of [j] approximant also become lighter as compared to the succeeded and preceding vowels.
- Duration range is from 0.025ms to 0.100ms.

Approximants in Urdu Language

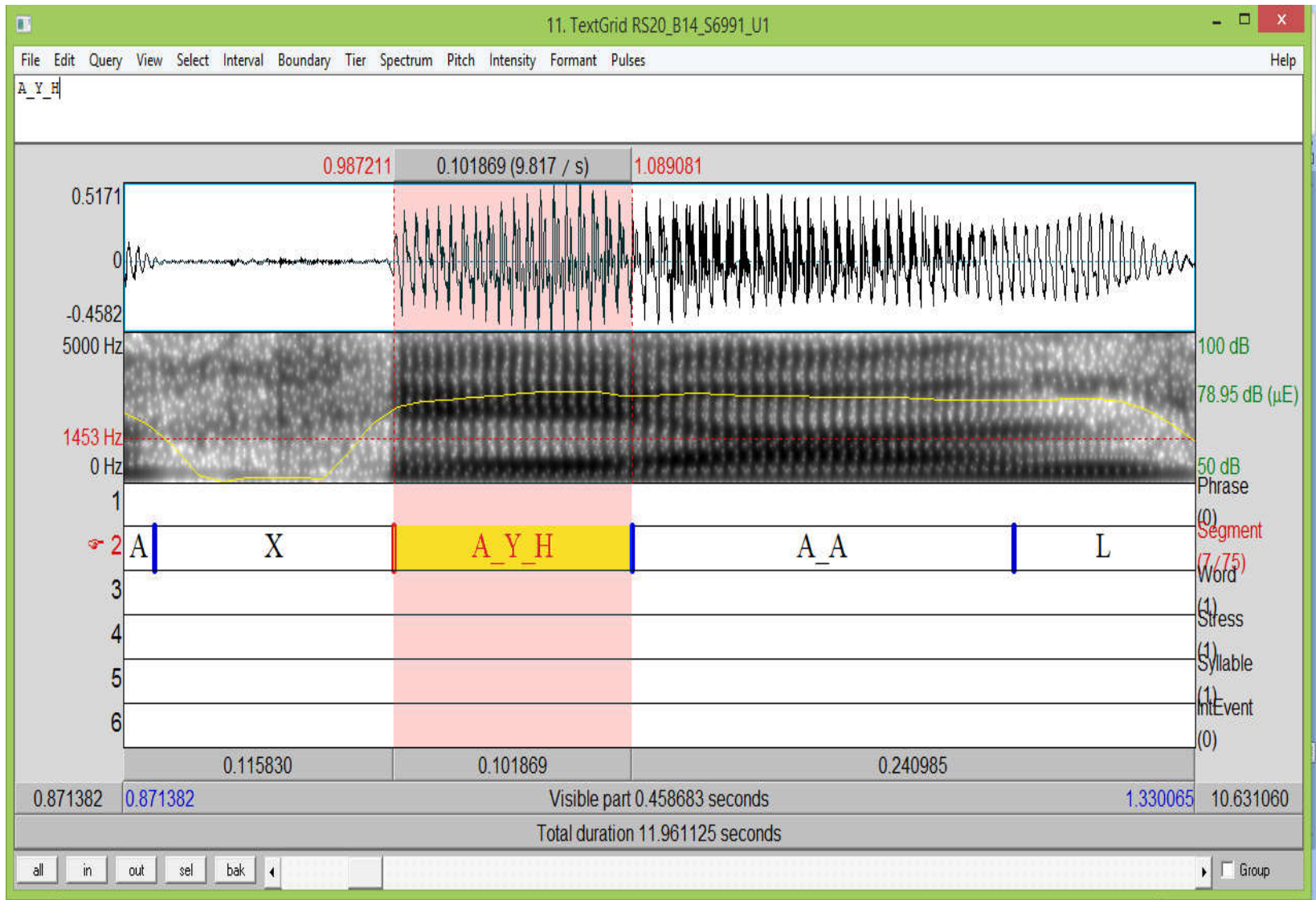
Example



Exceptions of [j] approximant

- Sometimes when [j] approximant comes at word medially and at syllable boundary then
- This [j] is deleted.
- The preceded short vowel [ɪ], if present, will change into medial vowel i.e. [ɪ] (A_Y_H).
- It has dark formants.
- Intensity is also high and duration is from 0.050ms to 0.105ms.

Example



List of words

Correct Pronunciation	Deleted [J]
D_DARJA_AFAT_D /d̪ərjɑ:f̪t̪õː/	D_DARA_Y_HA_AFAT_D
D_DARJA_A /d̪ərjɑː/	D_DARA_Y_HA_A
BUNJA_AD_D /b̪ʊnjɑːd̪/	BUNA_Y_HA_AD_D
SIJA_ASAT_D /s̪iʝɑːsət̪/	SA_Y_HA_ASAT_D
NAFSIJA_AT_D /nəfs̪iʝɑːt̪/	NAFSA_Y_HA_AT_D

References

- A. Keerio, L.D. Dhomeja, A.A. Shaikh, Y.A. Malkani, Signal & Image Processing : An International Journal (SIPIJ) Vol.2, No.4, December 2011 DOI : 10.5121/sipij.2011.2409 109
- Carol Y. Espy-Wilson (1992), Acoustic Measures For Linguistic Features Distinguishing The Semivowels/Wj R l/In American English, Electrical, Computer and Systems Engineering Department, Boston University.
- Claire-A. Forel & Genoveva Puskás, 1986, PHONETICS AND PHONOLOGY Reader for First Year English Linguistics University of Oldenburg
- Delattre, P., and Freeman, D. (1968). "A Dialect Study of American R's by X-ray Motion Picture," Language 44, 29-68.
- Espy-Wilson, C.Y. (1989). "The Influence of Selected Acoustic Cues on the Perception of /l/ and /w/," J. Acoust. Soc. Am. Suppl. 1 86, S49.
- Espy-Wilson, C.Y. (1991). "Consistency in /r/ Trajectories in American English," Proc. 12th Int. Cong. Phon. Sei. 4, 370-373.
- Kent, R., Carney, P., and Severcid, L. (1974). "Velar Movement and Timing: Evaluation of a Model for Binary Control," J. Speech Hear. Res. 17, 470-488.

Contd...

- Ladefoge ,P. & Maddieson .I (1996) The sounds' of World Languages. Oxford, UK, Blackwell.
- Ladefoge ,P. (2001) Vowels and consonants :An Introductin to the sounds of Languages. Oxford's IK. Blackwell.
- Lehiste, I. (1962). "Acoustical Characteristics of Selected English Consonants," Reix,rt No. 9, University of Michigan, Communication Sciences Laboratory, Ann Arbor, MI.
- M.R.Kimand A.J.Lotto (2004) Acoustic Measurement of Korean Approximants, University of Georgia.
- Nauman, K. (2002) Center for Research in Urdu Language Processing, Fast University, Pakistan
- Sohn, H.M (1999) the Korean Languages, Cambridge, UK Cambridge University.
- Suleman, M. Center for Research in Urdu Language Processing, Fast University, Pakistan



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FOR
YOUR
ATTENTION
ANY QUESTION ?