

## Phonetic encoding of phonological representation of hiatus in Romanian: a study of durational patterns

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**Context.** This study investigates duration patterns of hiatus with the aim of highlighting the differences between canonical (phonological) representations of VV-sequences vs. phonetic actualization in continuous speech as portrayed by two speaking styles in Romanian. It is commonly known that connected speech entails systematic variability with respect to various reduction processes ([1]), meaning that hiatus is shorter in spontaneous speech than in careful speech. In order to get insight into the acoustic patterns that underlie the different realizations of hiatus, we compared duration patterns of internal (IntH – within the word) and external hiatus (ExtH – across word-boundaries) in spontaneous (SS) and read speech (RS).

**Data and methodology.** In this presentation we focus on data of one Romanian speaker extracted from a larger database of nine subjects representative of the Southern dialect of Muntenia. Each participant had to perform two tasks. For the *monologue task*, the subjects were required to talk about their previous summer activities (approximately 40 min per speaker). For the *reading task*, all vocalic sequences of IntH and ExtH were extracted from the previous experiment, the tokens were placed in carrier-sentences, and three repetitions were elicited. The selected male speaker produced 40 min of SS, and 100 min of RS. The total number of vocalic pairs analyzed was 53 (1244 tokens), out of which 21 IntH (420 tokens), and 32 ExtH (824 tokens), showcasing different vocalic qualities. The recordings were forced aligned with an automatic speech transcription system described in [2] (annotated corpora have proven to be of high relevance in acoustic analysis, testing various linguistic hypothesis and exploring sound change and variation [3]; [4]). The automatic extraction was manually checked. We looked at the global duration of hiatus, measured from the onset of F1 in the first vowel until the offset of F2 in the second vowel. The temporal differences of VV-sequences in the two speaking styles were analysed according to stress position, distribution in the word, number of syllables, vowel height, and place of articulation (variables added manually to the forced aligned output) [5]. In this article we draw attention on the overall duration of IntH and ExtH as portrayed in different duration intervals.

**Results.** Previous work has focused mainly on hiatus-diphthong distinction ([6]; for a monographic outline of hiatus in Romanian, see [7]). The novelty of the present account consists in capturing the dynamics behind different repair mechanisms by proposing **5 duration intervals** (based on data distribution): *very short* (20–70ms), *short* (80–130ms), *medium* (140–220ms), *long* (230–340ms), and *very long* (350–500ms) see Figure 1. In this interpretation of avoidance strategies, (very) short duration intervals favor elision, while (very) long intervals highlight epenthesis, and possibly hesitation (especially for ExtH). Medium duration intervals can entail hiatus maintenance (when analyzing variation in vowel sequences in five Romance varieties [8], the authors concluded that Romanian presents the most robust hiatus-diphthong contrast). Our data show that ExtH is shorter than IntH ( $p < 0.001$ ) independent of speech context. Moreover, based on number of intervals, we can infer that ExtH has a higher degree of variability than IntH, meaning it attracts more repair strategies (eg. ExtH /u.a/ can be avoided by epenthesis, diphthongization or elision – explaining why ExtH has a very short duration interval, while IntH /u.a/ is resolved by epenthesis and/or diphthongization). The results are summarized in Table 1. Due to unbalanced data and heterogeneity of variance, a Brown-Forsythe and Welch test were conducted, followed by a Games-Howel post-hoc test, showing that all levels of analysis are statistically representative. We conclude that there is a gradient acoustic continuum (i.e.

gradient phonetic outputs with respect to categorical phonological categories [8]) between hiatus in SS and RS. The results will be complemented by gathering additional data. This analysis opens up discussion in relation to modelling gradient phonetic and phonological distinctions between IntH and ExtH. By employing duration intervals we can gain a better understanding of the dynamics behind hiatus resolution strategies with valuable implications in language variation ([9]).

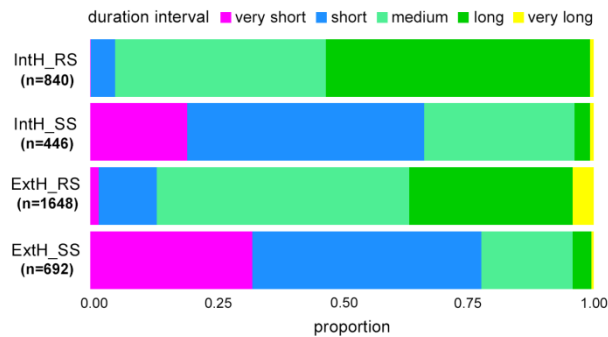


Figure 1. Duration intervals of internal and external hiatus in spontaneous and read speech.

	DURATION INTERVALS				
	very short	short	medium	long	very long
SS	27.2% (n = 309)	46.1% (n = 525)	22.7% (n = 258)	3.5% (n = 40)	0.5% (n = 6)
IntH in SS	19.3% (n = 86)	47.1% (n = 210)	29.8% (n = 133)	3.1% (n = 14)	0.7% (n = 3)
ExtH in SS	32.2% (n = 223)	45.5% (n = 315)	18.1% (n = 125)	3.8% (n = 26)	0.4% (n = 3)
RS	1.2% (n = 29)	9.3% (n = 231)	47.3% (n = 1178)	39.2% (n = 976)	3% (n = 74)
ExtH in RS	1.7% (n = 28)	11.5% (n = 190)	50.2% (n = 827)	32.5% (n = 535)	4.1% (n = 68)
ExtH in SS	32.2% (n = 223)	45.5% (n = 315)	18.1% (n = 125)	3.8% (n = 26)	0.4% (n = 3)

Table 1. Statistics and n° of occurrences of duration intervals in six contexts: (1) spontaneous speech, (2) internal hiatus in spontaneous speech, (3) external hiatus in spontaneous speech (in SS, IntH has less very short and short intervals than ExtH, and more medium duration intervals), (4) read speech, (5) internal hiatus in read speech, (6) external hiatus in read speech (in RS, IntH has less short intervals than ExtH, and more long intervals)

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