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Influence of stress and sequence position on vowel sandhi in Brazilian Portuguese

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1. Background

Prior studies (Abaurre, 1996; Bisol, 2003, 2013, Silva, 2012) propose that sequences with stressed vowels across word boundaries are more likely to maintain hiatus;

Also, some studies also consider the main stressed accent of the IP – from Intonational Phrase, according to Nespor & Vogel (1986) as a variable influencing these processes (Abaurre, 1996; Bisol, 2002, 2013; Tenani, 2004, Oliveira & Santos, 2018).

2. Research question

How do stress and the position of vowel sequences influence the behavior of vowels across word boundaries in speech?

3. Hypothesis

Vowel contraction is more common to occur when both vowels are unstressed, as suggested by previous studies. In sequences where at least one of the vowels is stressed, the likelihood of contraction depends on whether the sequence does not carry the primary stress of the intonational phrase and if the sequence is not positioned at the boundary of the IP. On the other hand, if the sequence carries the primary accent of the IP and is located at the right boundary of the IP, the likelihood of maintaining the hiatus increases.

5. Results

Word stress: Sandhi occurs more frequently in Brazilian Portuguese when both vowels are unstressed or when the first vowel is unstressed and the second is stressed.

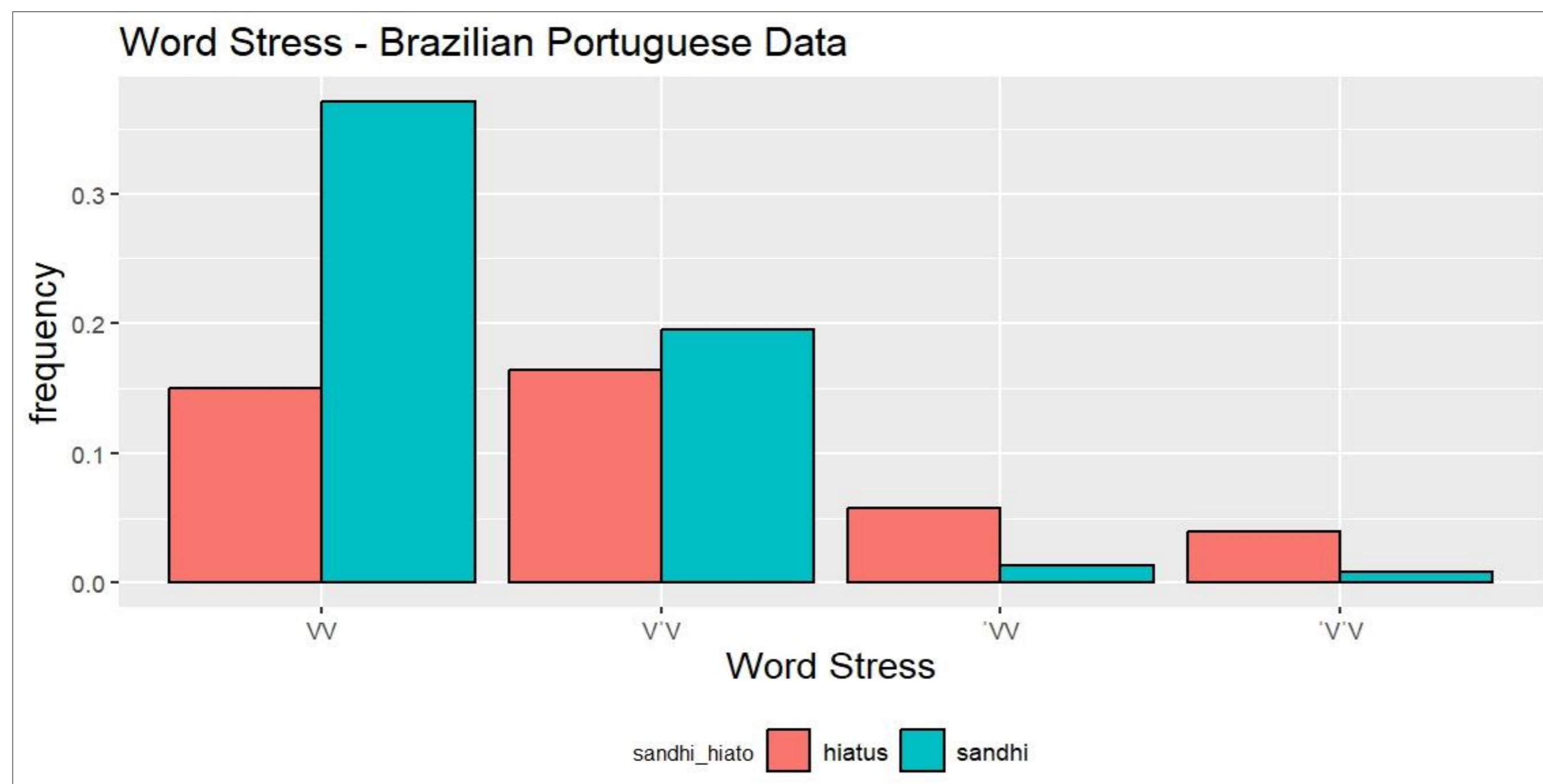


Figure 1: Relative frequency of Brazilian Portuguese data grouped by word stress.

Effects of IP stress and sequence position: Word stress may affect the occurrence of a sandhi process or the maintenance of the hiatus, but that will also depend on whether the vowel sequence carries the primary stressed accent of the intonational phrase (as, for example, in "então no próximo ano") and whether it is at the limit of the phrase at the right (as in "pois isso que é"). The results of the regression model indicate that the tendency for a sandhi to occur is higher in contexts in which at least the first vowel is unstressed, both vowels do not receive the primary stressed accent of the IP, and both vowels are not at the limit of the phrase.

Sandhi

Predictors	Log-odds	CI	p
(Intercept)	0.99	0.63 – 1.34	<0.001
word_stress [V'V]	-0.42	-0.68 – -0.17	0.001
word_stress [VV]	-2.52	-3.05 – -1.99	<0.001
word_stress [V'V']	-2.24	-2.90 – -1.58	<0.001
IP [yes]	-2.30	-2.97 – -1.61	<0.001
phraseboundary[yes]	-0.73	-1.71 – -0.25	0.145

Table 1: Relative frequency of Brazilian Portuguese data grouped by the presence/absence of the primary stress of the intonational phrase.

4. Method

Data: Participants: 10 native speakers of Recife, Brazil. Interviews from 20-25 minutes.

Acoustic Analysis: 1. Praat: a) F1 and F2 (formant values measured in three points: 15%, 50% and 85% of the total duration of the sequences); b) stress; c) duration. 2. phonTools package (wave and spectrogram plotted with this R package).

Statistical Analysis: Mixed effects logistic regression model. This model combines elements of logistic regression, which is used to model relationships between binary or categorical variables, with the inclusion of random effects that consider the repeated structure of the data (Sonderegger et al., 2018).

Response variable: "sandhi" (with a value of 1 in the binary sandhi/hiatus relationship) and "no sandhi" (with a value of 0).

Fixed effects: word stress; IP primary accent (yes/no); sequence at the limit of the IP (yes/no).

Random effects: participants.

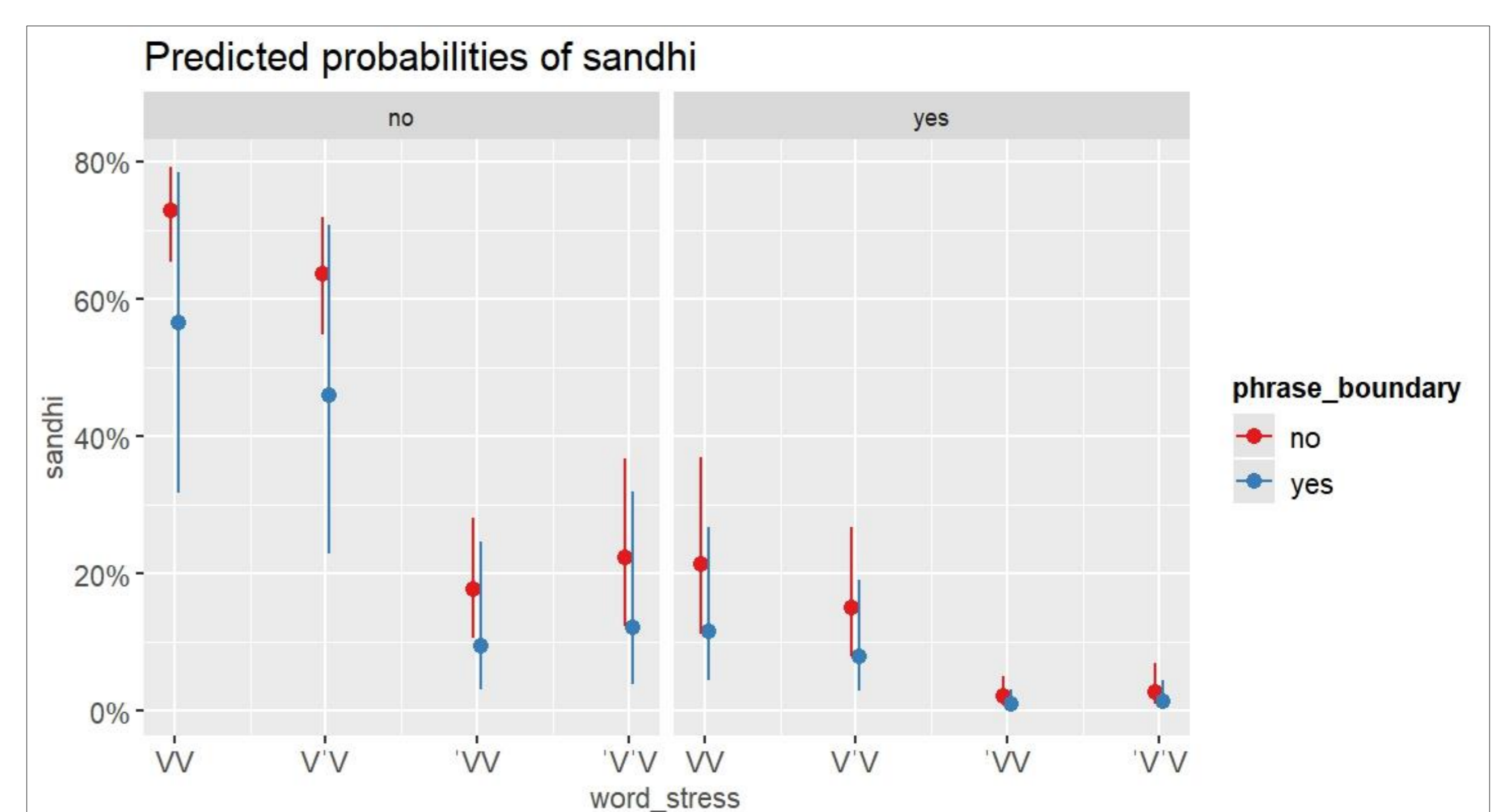


Figure 2: Predicted probabilities of sandhi in Brazilian Portuguese data, based on word stress, intonational phrase stress, and phrase boundary.

6. Conclusions

In addition to stress, our study highlights the significance of the primary stressed accent within the intonational phrase (IP) and the position of the vowel sequence within the utterance in influencing sandhi processes in Brazilian Portuguese. The results underscore the nuanced nature of sandhi phenomena, particularly regarding the resistance to contraction observed in sequences containing stressed vowels. This resistance appears to be contingent upon the alignment of stressed syllables within the sequence with the primary stress of the IP. When this alignment is absent, contraction processes at the vowel boundary become more prevalent, suggesting a dynamic interaction between stress patterns and phonological processes in shaping speech patterns.

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