Orthographic effects on the production of stop + sibilant clusters by Brazilian speakers of English

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Objectives

- Investigate plural formation in English by Brazilian speakers in regards to **(1)** epenthesis ([parks] ~ *[ˈpar.kis]) and **(2)** accurate voicing of the final sibilant ([begz] ~ *[begs]).
- Identify possible effects of (1) cluster type, (2) orthographic pattern, (3) word, (4) subject and (5) task.

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Can different orthographic patterns trigger different pronunciations for Brazilian L2 learners of English?

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However...

Sound Change	
[dʒis.ˈta.kis] [e.ˈki.pis] [ˈpah.kis]	[dʒis.'taks] [e.kips] [pahks]

Orthography vs Sound Change

Word-final consonant cluster	English Orthographic Patterns		Brazilian Portuguese Orthographic Pattern
	Cs	Ces	Ces
[ps]	*cups*	*grapes*	*crepes*
[ts]	*cats*	*gates*	*potes*
[ks]	*ducks*	*cakes*	*cheques*
[bz]	*jobs*	*tubes*	*clubes*
[dz]	*beds*	*sides*	*tardes*
[gz]	*eggs*	---	*jegues*

BP also presents the **Cs** orthographical pattern on some exceptional cases, such as *bíce**ps*** [ˈbi.seps], *force**ps*** [ˈfɔr.seps] and *vol**ts*** [voʊts] (SOARES, 2016).

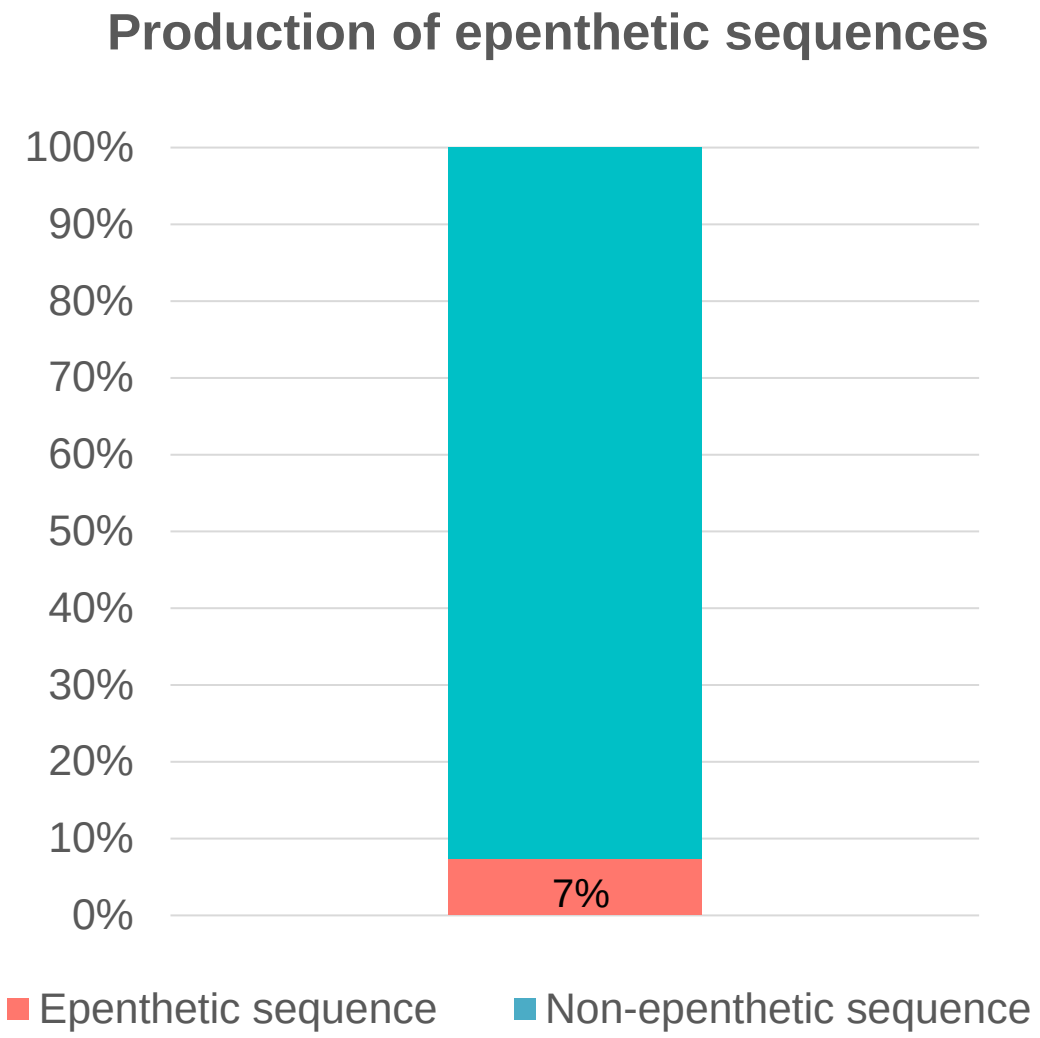
Theoretical Background

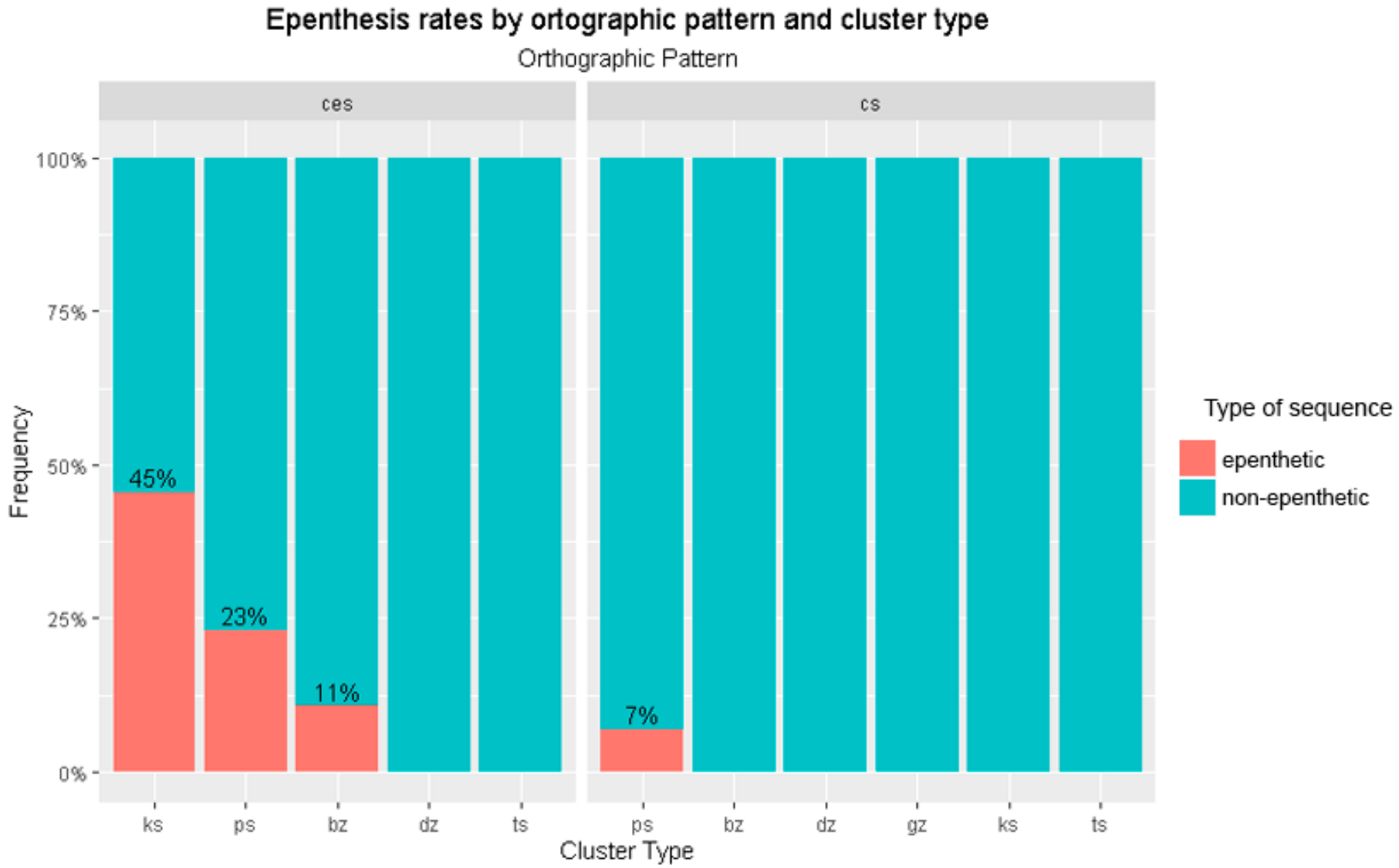
- Exemplar Theory (JOHNSON, MULLENIX, 1997; PIERREHUMBERT, 2003)
- Speech Learning Model (FLEGE, 2005)
- Ongoing sound change (KIM, 2012)
- L2 orthography (COLANTONI *et al.*, 2016)

Methodology

- Material consists of recordings of High-School students in a picture-naming task and in the reading of controlled sentences.
- 08 subjects and 22 words were selected, resulting in 352 tokens.
- For the study of epenthesis, tokens were classified into either (0) epenthetic or (1) non-epenthetic production.
- For the study of voicing, tokens were classified into displaying either (0) accurate voicing of the final sibilant or (1) inaccurate voicing of the final sibilant.
- Acoustic analysis was carried out with Praat (BOERSMA; WEENINK, 2020).

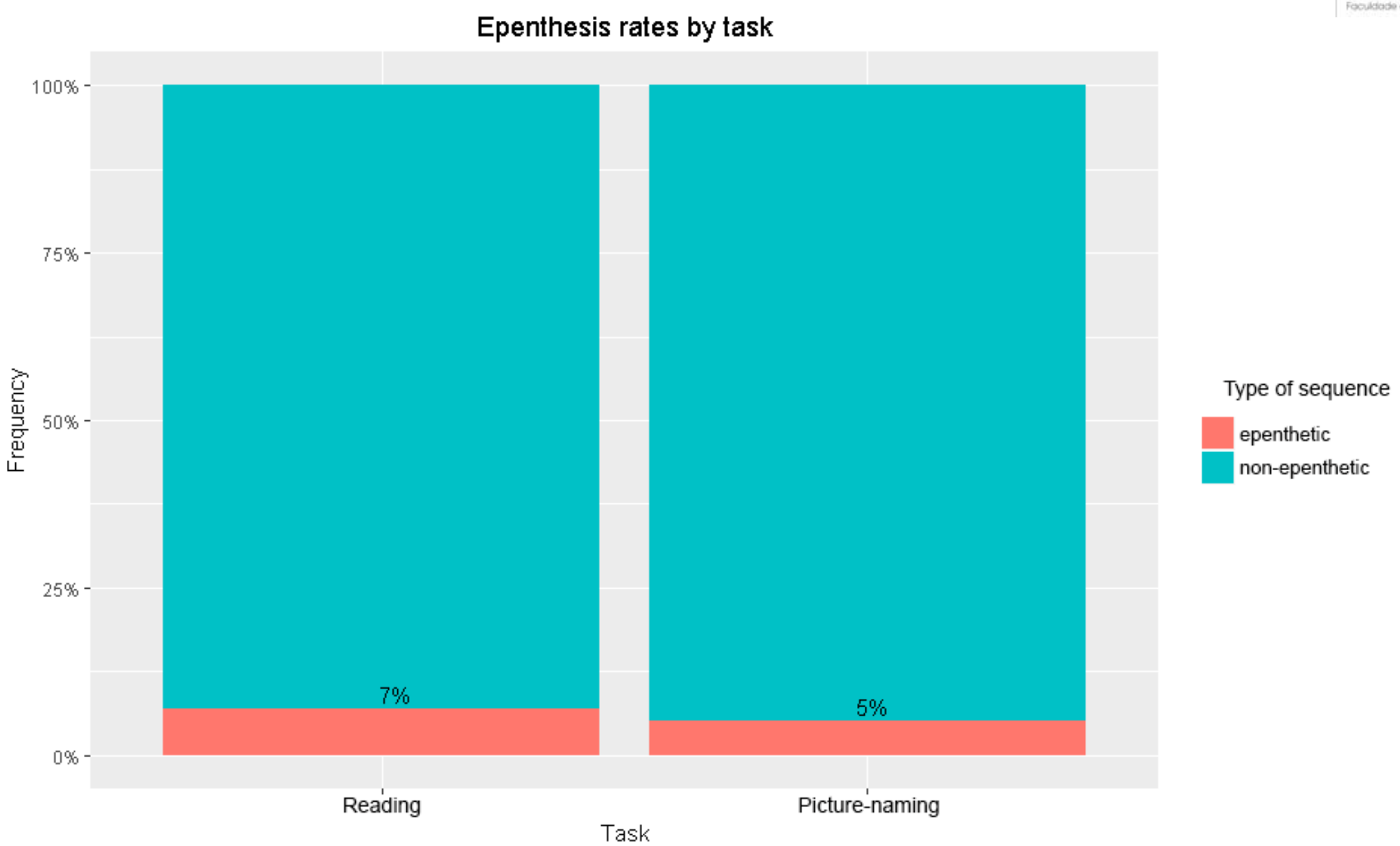
Research Findings



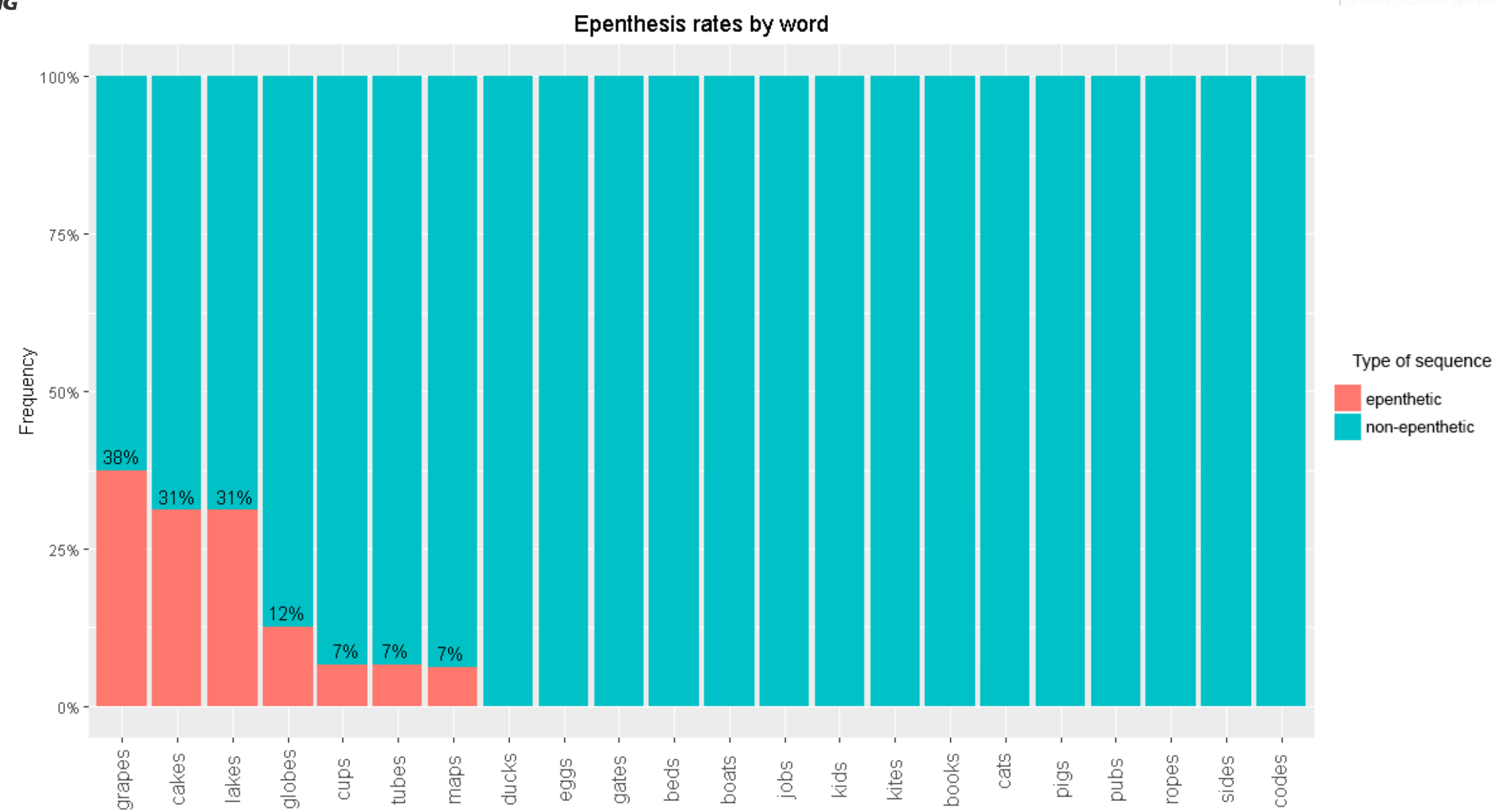


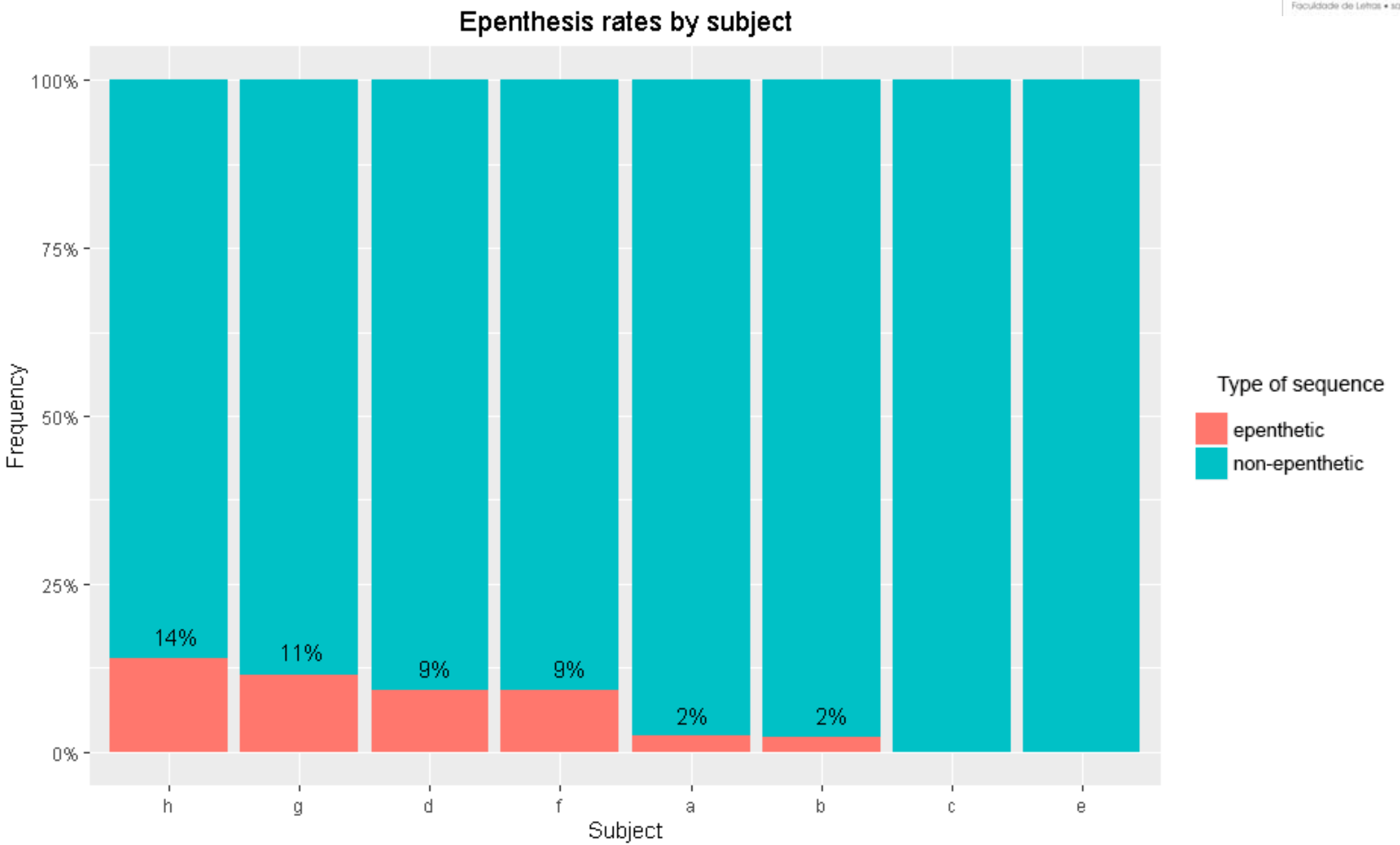
X-squared = 16.461, df = 1, p-value = 4.966e-05

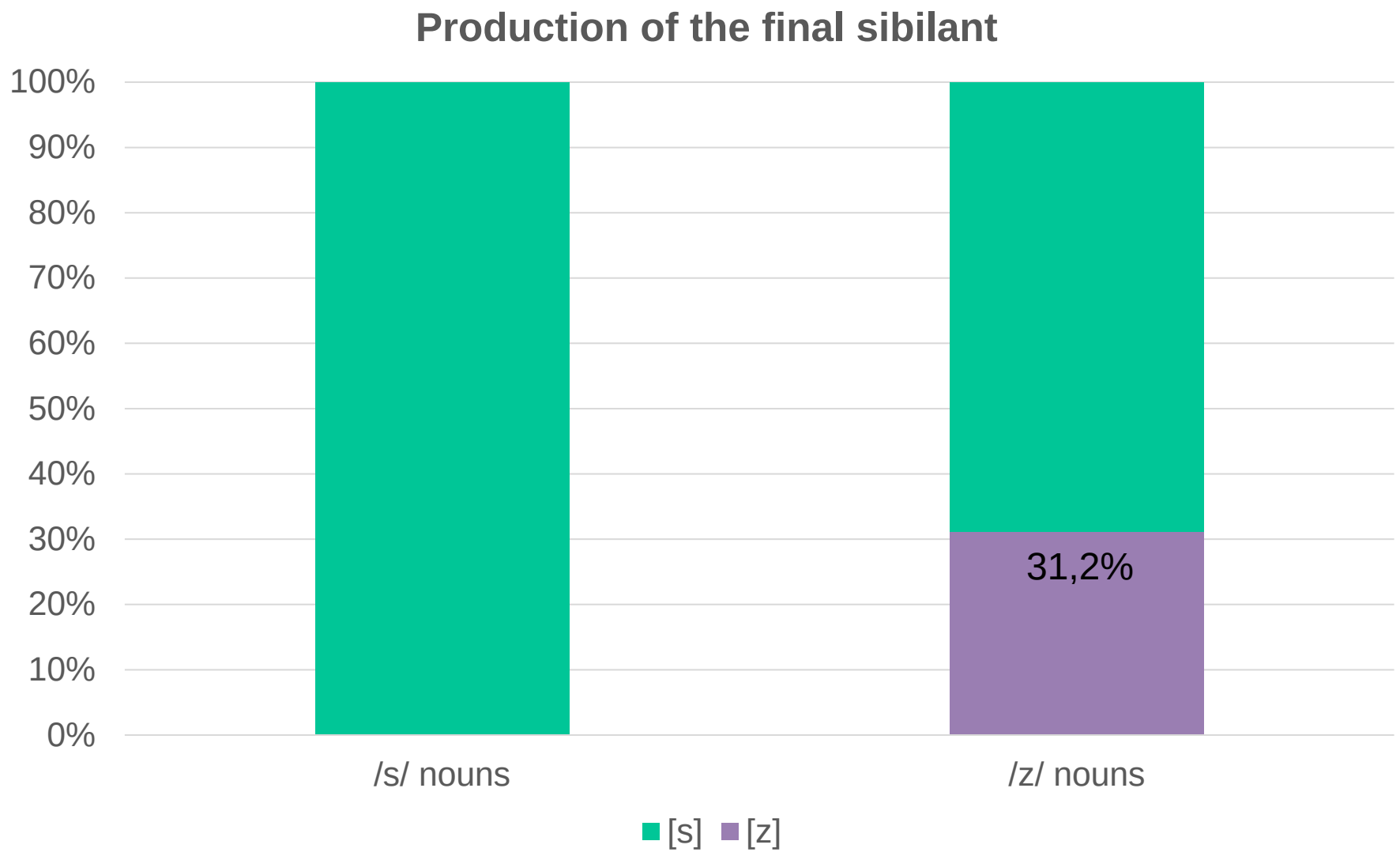
X-squared = 25.416, df = 5, p-value = 0.0001158



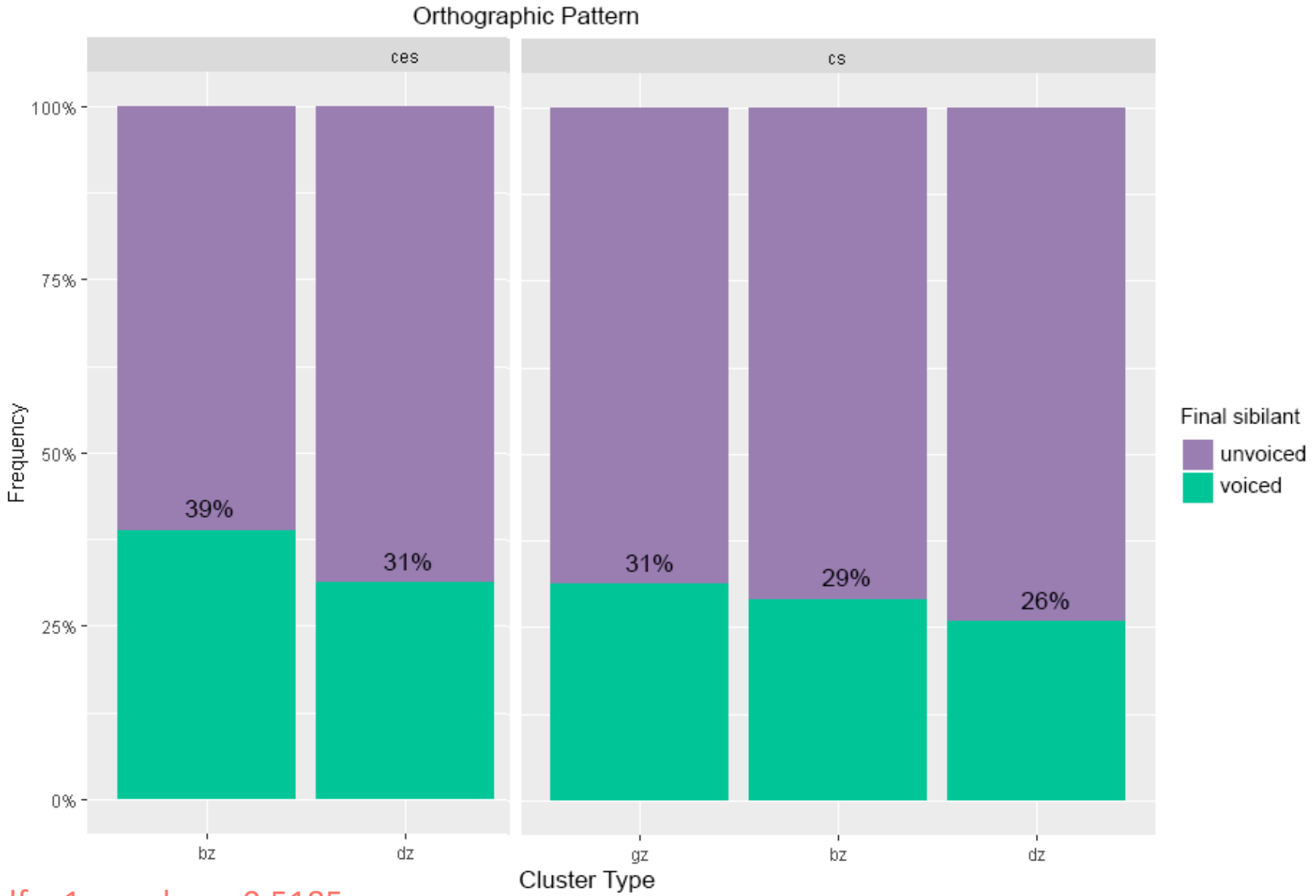
X-squared = 0.25504, df = 1, p-value = 0.6136


Epenthesis rates by word
Frequency
100%
75%
50%
25%
0%
38%
31%
31%
12%
7%
7%
7%
grapes
cakes
lakes
globes
cups
tubes
maps
ducks
eggs
gates
beds
boats
jobs
kids
kites
books
cats
pigs
pubs
ropes
sides
codes
Type of sequence
epenthetic
non-epenthetic


Epenthesis rates by subject
100%
75%
50%
25%
0%
Frequency
14%
11%
9%
9%
2%
2%
h
g
d
f
a
b
c
e
Subject
Type of sequence
epenthetic
non-epenthetic


Production of the final sibilant
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
31,2%
/s/ nouns
/z/ nouns
[s]
[z]

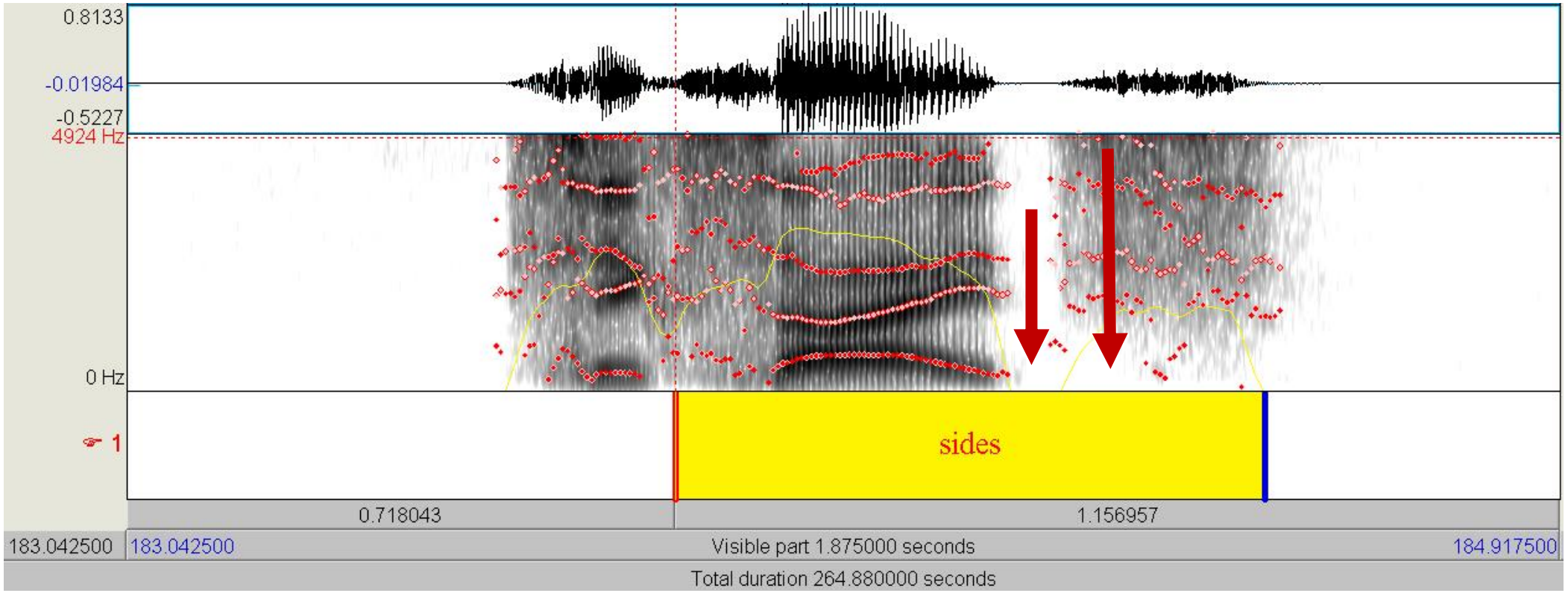
Voicing rates by orthographic pattern and cluster type



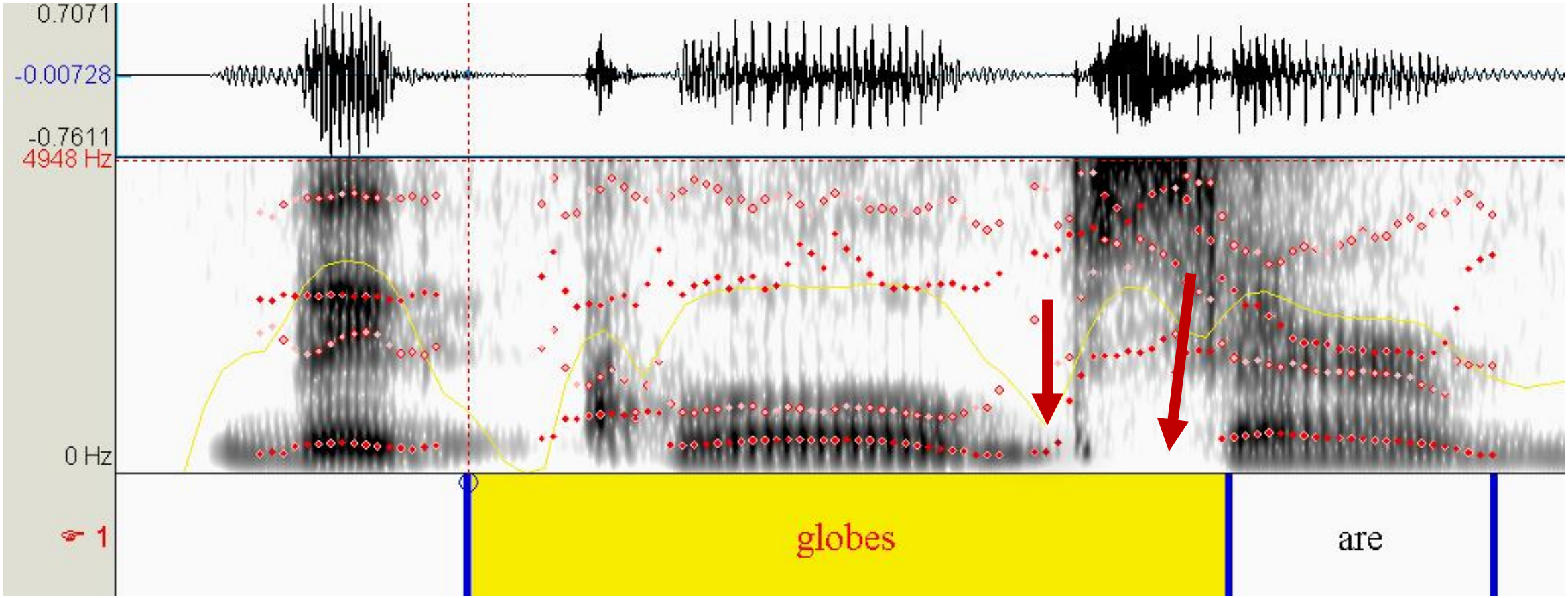
X-squared = 0.41697, df = 1, p-value = 0.5185

X-squared = 0.4088, df = 2, p-value = 0.8151

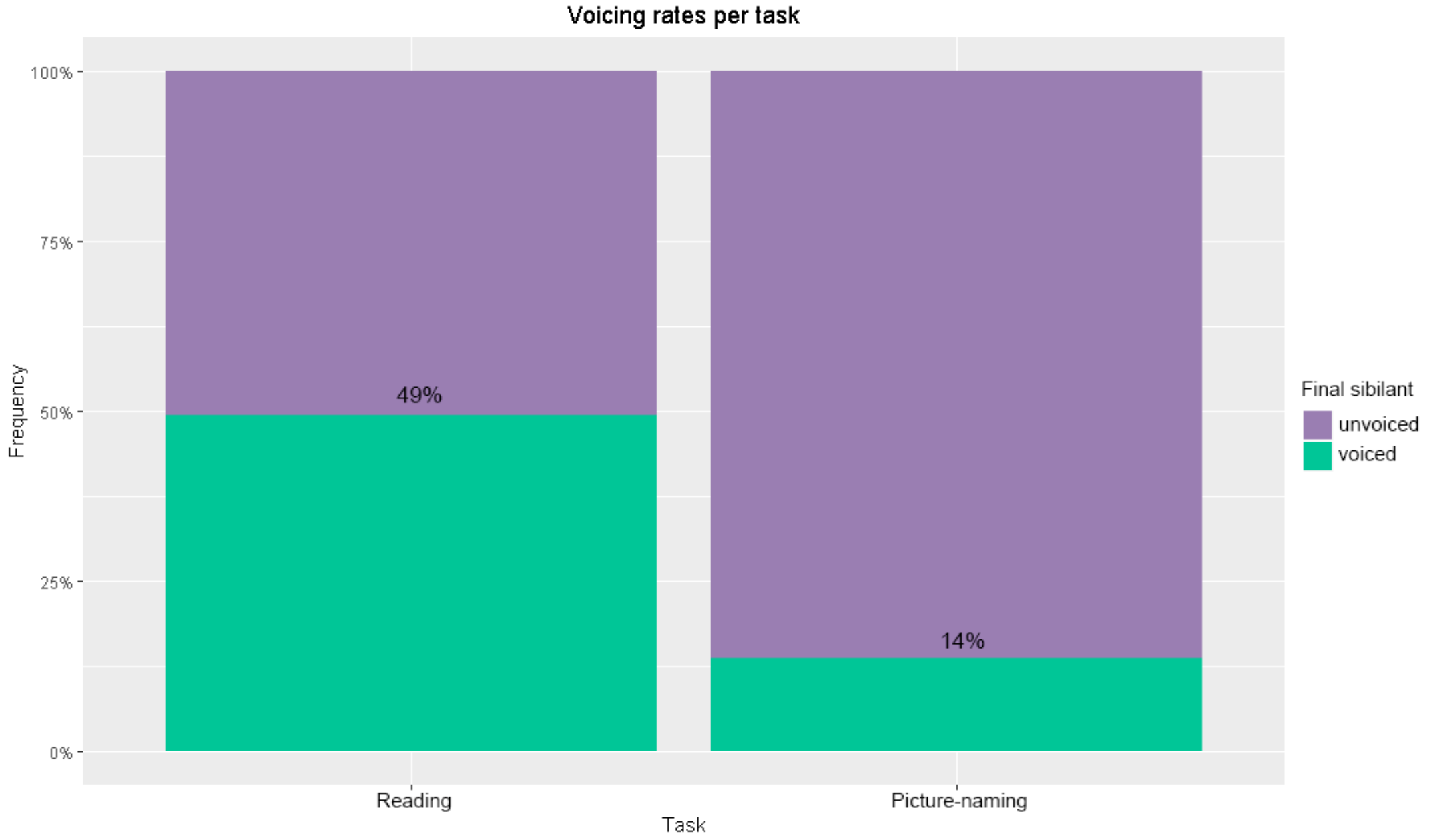
Sites or sides?



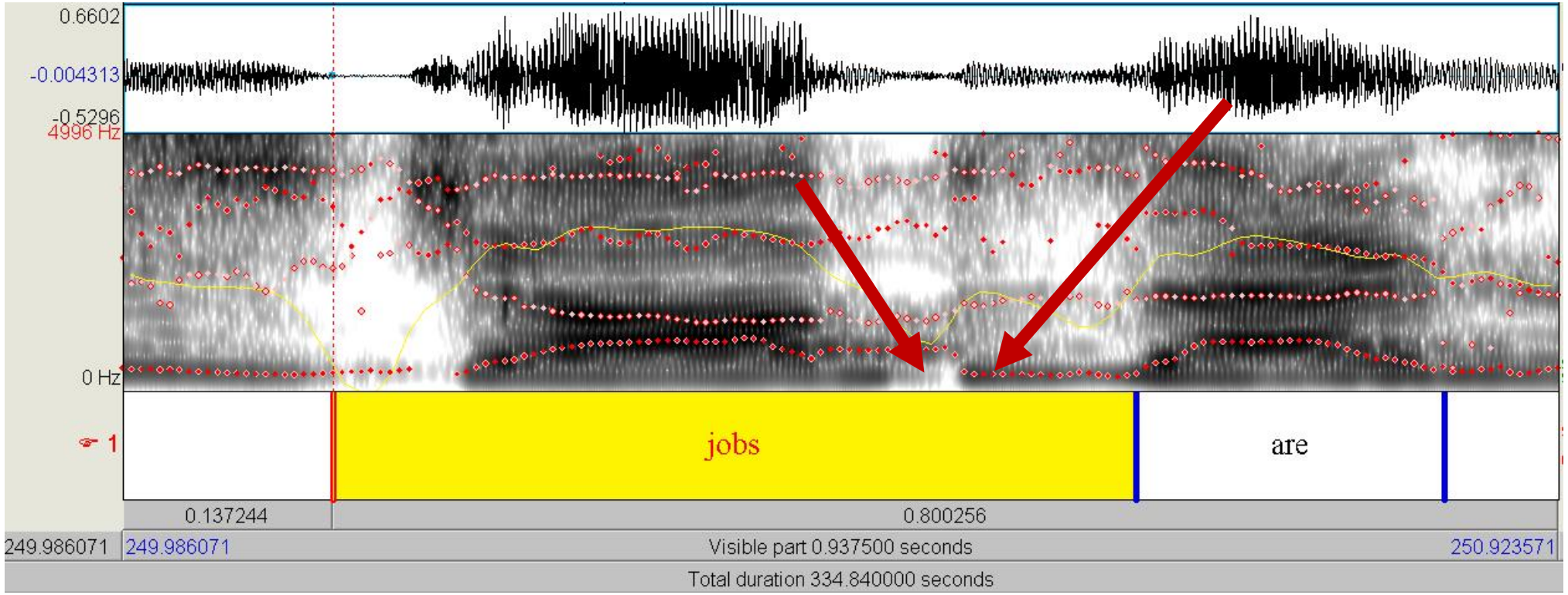
Some BP learners not only tend to produce a voiceless sibilant but also a voiceless stop in the final cluster



Most learners tend to produce a <u>voiced</u> stop followed by a <u>voiceless</u> sibilant

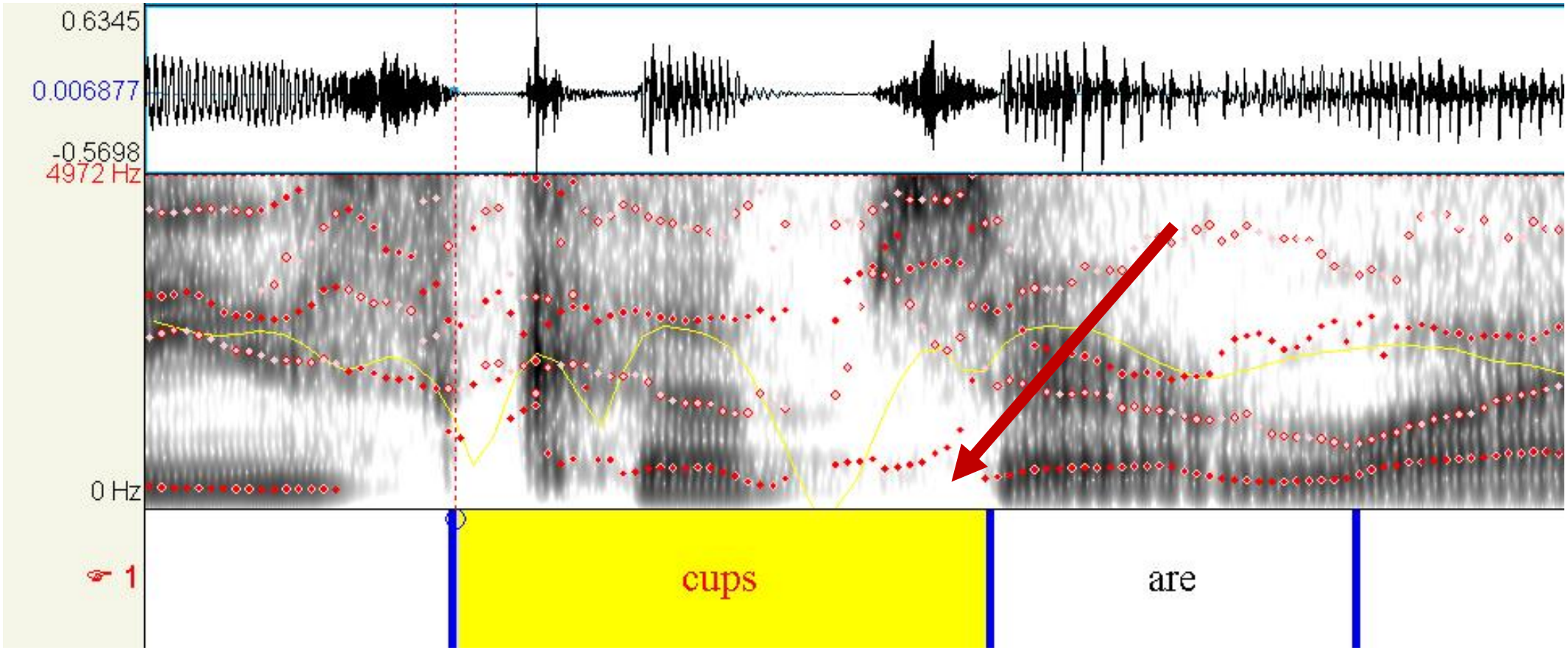


X-squared = 21.533, df = 1, p-value = 3.477e-06



It's likely that [z] has been voiced because it's followed by a voiced segment word-initially

In BP, *paz* might be pronounced as **[pas]** BUT *paz e amor* surfaces as **[pazjamoh]**
Clubes is usually pronounced **[klubs]** BUT *clubes grandes* might surface as **[klubzgrãds]**



However, voiceless clusters mantain their voiceless property even when followed by voiced segments

Conclusions

- BP learners of L2 English display minimum rates of epenthesis when dealing with plural nouns.
- When epenthesis takes place, it seems to be triggered by orthographical input.
- BP learners of L2 English tend to pronounce -s as [s] even when the suffix should be pronounced [z].
- L2 devoicing seems to be spreading from the final sibilant to the preceding stop. It's worth checking if this phenomenon is also recurrent in Brazilian Portuguese.
- Some L2 phonological representations are equaled to pre-existing L1 phonological categories (FLEGE, 2003; NEVINS, BRAUN, 2009).
- It's also possible that ongoing sound changes in the L1 affect phonological representations in the L2(KIM, 2012).

References:

- COLANTONI, Laura et al. *Second language speech*. Cambridge University Press, 2015.
- FLEGE, James E. Origins and development of the Speech Learning Model. *Retrieved December*, v. 13, p. 2005, 2005.
- JOHNSON, K.; MULLENNIX, J. *Talker variability in speech processing*. Morgan Kaufmann Publishers, 1997.
- KIM, Mi-Ryoung. L1-L2 Transfer in VOT and f0 Production by Korean English Learners: L1 Sound Change and L2 Stop Production. 말소리와 음성과학, v. 4, n. 3, p. 31-41, 2012.
- PIERREHUMBERT, Janet B. Phonetic diversity, statistical learning, and acquisition of phonology. *Language and speech*, v. 46, n. 2-3, p. 115-154, 2003.