Voiceless vowels in Portuguese. A brief overview of the literature.

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Abstract. This study is a brief overview of the literature on Vowel Devoicing (VD) in Portuguese, particularly in the Brazilian Portuguese (BP) variety. There is a consensus that Portuguese, overall, has a tendency to phonetically reduce unstressed vowels, particularly so in poststressed, word-final positions, due to its stress-timed rhythm. Even though European Portuguese (EP) is well-known for greatly reducing or even deleting its vowels, BP is also more and more frequently applying VD in all word positions, but this feature goes unnoticed by most of the academic community. This leaves room for opposing perspectives: some consider that BP is ultimately deleting its vowel phones (elision, apocope, syncope etc.), while others repute that the vowels are still present, but partially or totally devoiced. We believe the latter is the most convincing one, meaning there is a spectrum of Vowel Devoicing that encompasses almost all of the occurrences attested. However, it is also probable that deletion might happen in some cases, and maybe it will become the norm in the future of BP, as Devoicing becomes so pervasive that speakers will gradually stop perceiving theses vowels altogether and, thus, will also stop pronouncing them—just like how EP reduces its vowels, and like the common elision processes that took place with the passage from Vulgar Latin to Old Portuguese.

1. Introduction

Unstressed vowels in Portuguese frequently undergo processes of reduction, mainly in European Portuguese (EP), and to a lesser extent in Brazilian Portuguese (BP). One of these processes consists of the loss of vocal chord vibration, which will be treated here as Vowel Devoicing (VD), an analysis that can elucidate various issues in Phonetics, Phonology, Applied Linguistics etc.

There is already a consistent literature on this subject, dealing with a number of languages around the world, such as Japanese, French and English (cf. the works of Han, 1962, Kondo, 2005, Tsuchida, 1994, 1997 for Japanese; Fagyal and Moisset, 1999, Smith, 2003, Torreira and Ernestus, 2010 for French), but Portuguese, and especially BP, still lack a more profound investigation. VD produces a diversity of interesting phenomena that seem to go unnoticed in BP [1, 2], and this process is analyzed in a variety of ways by researchers, including total deletion or elision (therefore no devoicing), and partial or total devoicing. Thus, this study aims to succinctly gather the most relevant literature on

voiceless vowels in Portuguese, focusing on BP (since it has been less studied on this matter than EP).

Vocalic sounds can be phonetically analyzed from different perspectives, of which the most well-known are the ones that comprehend anatomical articulation and acoustic or physical qualities of sounds (each one being a subfield of Phonetics). Articulatorily, vowels are characterized by a minimum amount of occlusion in the vocal tract (as opposed to consonants), and by the vibration of the vocal folds. Acoustically, they are defined by a consistent periodicity in the waveform, and by having clear formant frequencies ("notes" or pitches)—being f0 the fundamental frequency of the vocal chords, while f1, f2 and f3 are created by the vocal tracts resonance [3]. In this study, other subareas are left aside, since our main interest is on how the articulatory system produces Vowel Devoicing, and how to better classify it based on acoustic analyses. Phonology is not the focus here, despite some of the studies reviewed having important contributions to this field.

Vowel Devoicing is, articulatorily, the process of reducing activity in the vocal folds, while keeping all of the other characteristic vocal tract configurations of a vowel intact (namely, tongue height, lip (un)roundedness and little to no obstruction); and, acoustically, it is the lack of periodicity and of f0, while some trace of the other formants (f1, f2 and f3) is maintained in the audio signal [4]. It is more likely to occur in some environments, such as unstressed syllables (poststressed ones are even more likely), presence of adjacent voiceless consonants, and with high vowels [1].

Native speakers of both varieties usually state, in a cartoonish representation, that "Brazilians put vowels where they don't belong", while "the Portuguese 'eat' them all". As the literature demonstrates, it is a popular belief that is only partially true. Brazilian Portuguese does have epenthetic vowels (when comparing it to EP or to the standard orthography), but there is Vowel Devoicing in numerous environments, under some precise conditions, and this phenomenon is directly related to the language's rhythm [3, 5].

This is also what happens in European Portuguese, but to a higher degree, for this variety diachronically brought this stress-timed rhythm to more extreme consequences, as is observed nowadays in words like *vezes* [ˈvezʃ] "times", and ***despregar*** [dʒspɾˈgaɾ] "separate", where indeed weak vowels seem to leave no trace at all—a feature that makes EP greatly differ from BP [6, 7].

2. Methodology

In order to select and gather the literature to compose this brief review, three online academic platforms were used: Scopus, ResearchGate and Google Scholar. We picked the following keywords to find the most relevant papers: "voiceless vowels", "vowel devoicing", "vowel reduction", "epenthetic vowels", "[Brazilian/European] Portuguese". These keywords were searched both in Portuguese and in English, and in different combinations. The criteria for selection were: i) works available online and, if published in journals, Open Access; ii) published after 2000; and iii) approach Vowel Devoicing in European and/or Brazilian Portuguese dialects.

3. Literature Review

It is important to note that the most in-depth studies conducted on Vowel Devoicing in Brazilian Portuguese found for this review are those from Francisco Meneses, being their Master Thesis [4] a reference for some of the other works gathered here. Despite that, we were only able to find it via Google Scholar and its citation number is not high (22 citations, as of April 2024; their PhD Dissertation equally suffers, having only 7 citations on the same platform), which again indicates that VD in BP is still being ignored by a significant portion of the academic community [2].

The literature confirms that Vowel Devoicing is a common phenomenon in Brazilian Portuguese. Firstly, the works of Meneses [4, 9], where they have conducted a series of experimental research based on original informant interviews, in an attempt to contradict the major theory that BP is simply applying deletion (apocope). Meneses works from an integrated Phonetic-Phonological analysis, more specifically Gestural Phonology (or Articulatory Phonology). In this perspective, they propose that VD in poststressed word-final positions is caused by a simultaneous articulation of vowels and voiceless consonants, where the consonant superposes its gesture (open glottis) upon the vowel, causing it to become devoiced. Thus, they argue that these vowels are not deleted, but rather completely devoiced, and their traces can be found on the consonants acoustic cues (lenghthened fricatives, remnants of formants).

While studying emergent consonant patterns in BP, Silva [9] points out that clusters consisting of (alveolar plosive + sibilant) are possible thanks to the reduction of the epenthetic vowel [i]. They explain that this vowel frequently undergoes various degrees of devoicing and, ultimately, is completely deleted, which is what allows those clusters to occur. They also mention that [i], being deleted in almost every word-final position, allows for almost any consonant to occur at the end of a word, and that this is what indicates possible new patterns in BP's phonology.

The study from Meneses and Albano [1] is a continuation and a summary of Meneses' hypothesis of non-deletion of poststressed vowels. They bring a further contribution, by analyzing how speakers perceive totally devoiced poststressed vowels following sibilants (such as in the triad *passo-passe-paz*, respectively [ˈpasu], [ˈpasi] and [ˈpas]). They found that speakers were able to identify the correct vowels based solely on the sibilant signal, which differed slightly in terms of resonance and length. In line with other studies on vowel reduction, they also show unstressed vowels going through a process of centralization (they become closer to a schwa [ə], as in about [əˈbaʊt]).

As this is a limited and brief overview, these points are only tendencies that were observed, so there must be more recent studies looking for and attesting VD in BP in all word positions.

4. Discussion

As pointed out in the Review section, Meneses' works are focused on poststressed vowels in order to contradict the apocope theory. Because of that, a limitation arises, which is that they exclusively investigate VD in word-final positions, ignoring its impacts on non-final and/or prestressed syllables, despite not explicitly denying the occurrence of VD in these positions (see [1]).

On the work of Martinez, they observe a considerable amount of variation on behalf of the

native Brazilian speakers, showing that the informants had borrowed some of the phonetic tendencies of EP, and still retained a BP phonological structure, which is what caused them to produce epenthesis, for example, with a borrowed central vowel [ɨ] where no native EP speaker would. This points exactly to the fact that these BP speakers were not able to completely change their phonology, nor apply deletion effectively: Vowel Devoicing was already an allophonic feature of their system, and, overall, they simply applied it more frequently to try to imitate the Portuguese speakers (cf. [6] p. 113, Graph 6 "Duration of residence"), rarely deleting it phonetically, and never losing it phonologically.

It should also be said that the concept of "epenthetic vowels" is used when comparing two possible phonetic outcomes of a single value between two linguistic systems, be it synchronically or diachronically. It usually resides on the relationship of a word with its etymology and, consequently, its spelling (if conservative): the word *advogado* has a two-consonant cluster <dv> based on the Classical Latin orthography, which is not allowed in BP's phonology; therefore, when this word was borrowed into the language, it had to be pronounced with an aditional, epenthetic [i] (/e/ phoneme) to break the forbidden cluster, resulting in a new syllable. Its phonological structure thus becomes /adevogado/, allowing a range of pronunciations: [ˌadevoˈgadʊ], [ˌadʒivuˈgadʊ] (double prestressed vowel raising for /e/ and /o/), [ˌadʒvuˈgad̥ʊ̥] (for [i], superposition of the preceding consonant upon the vowel; and for [dʊ̥], word-final devoicing) and so on.

Although not a central argument of their paper, Silva [9] also mentions that this high front vowel [i] goes through various degrees of devoicing, however they explicitly state that this vowel is "totally deleted", which is quite rarely the case [1]. But from the perspective of emergent patterns, as Silva brings the concept of complex adaptive systems, it is reasonable to think that Brazilian Portuguese Phonology will eventually accept these patterns, since they are becoming extremely common (something that would, in a way, bring BP and EP closer). This is also what Meneses and Albano [1] suggest, adding that this change will gradually occur as speakers fail to perceive the presence of a voiceless vowel and stop producing it altogether, resulting in a new wave of elision, or more precisely, apocope, in the history of the Portuguese language. The authors mention that apocope was very productive during the passing of Vulgar Latin to early Portuguese, giving examples such as amare > amar "to love", and legale > leal "loyal".

At last, it must be noted that, as Meneses and Albano [1], Walker and Mendes [2] and Silva [9] suggest, the production of consonant clusters and consonants seemingly without a vowel nucleus is common, but they must still be considered allophones of certain phonemic patterns in free variation, i.e., linguistic change has not yet acted on BP's phonology. This means that no matter what phonetic process affects

vowels, these vowels will still exist phonologically, and that is why speakers can still "hear" them, when there's almost no trace of them at all, and still reproduce them in their speech.

Some studies in the general literature are inconsistent regarding this concept, maybe due to confusion between synchronic and diachronic analyses, but it should be clear, for example, that if a word like *advogado*, in EP, is given a phonological representation /advogado/, four syllables only, and with the /dv/ cluster, therefore the word *adivinhar* must also be represented as /advinhar/, the phonetic and phonological circumstances are the same, and speakers will not differentiate words based on technical etimologies (it only happens through analogy, which is synchronic), and only rarely and in careful speech do they (try to) respect orthography. This analysis is corroborated by Parlato-Oliveira's findings (see the Literature Review section).

5. Conclusion

This study was a brief overview of the literature on Vowel Devoicing (VD) in Portuguese, particularly in the Brazilian Portuguese (BP) variety. VD is becoming more and more frequent in BP. Some consider that the dialect is ultimately deleting its vowel phones, while others repute that the vowels are still present, but partially or totally devoiced.

The literature showed that VD is undeniably a feature of BP as a part of the vowel reduction tendency of the Portuguese language in general. There is still some uncertainty whether BP in fact deletes vowels, or is starting to do so as a consequece of devoicing. A limitation found on the literature is that no work was conducted on vowel reduction in word positions other than the final poststressed ones, which could indicate that VD only applies in that specific place, but we reiterate this is not the case. Through personal observation, we can attest VD in all word positions, and also in word boundaries, therefore it should be more well researched.

We did not aim at a vast representation of all the literature, and the study has a limited corpus size. Therefore, it is only a hint at what has been achieved and researched so far. It brings together and compares relevant discussions, perspectives and results, and should serve as an inspiration for other initiatives to further review and dwelve into this topic.

With this panorama, it can be concluded that VD studies in BP have not yet fully matured, or at least there's more work to be done in the sense of coherently bringing together what has already been made.

We would like to add some possible directions for future research. As stated before, a study on VD in all word positions is highly needed. A lot can be done on comparing Vowel Devoicing in BP and EP, for the

purposes of understanding, for instance, how it developed differently in both varieties, reasons for these divergences, and possible implications for the future. Also, more work must be conducted on studying the relationship between prosody and VD, given their intrinsic link.

Furthermore, studying VD can ellucidate issues in Applied Linguistics, by comparing how Portuguese and a foreign language deal with vowel reduction and devoicing (for instance, it would be of great interest to Brazilians learning Japanese to know that they already have the so-called voiceless vowels [i̥] and [u̥], which seem like unearthily concepts at first sight); and also in Dialectology, for VD and overall vowel reduction are most likely features that have been active in Portuguese at least since the late 18th century, helping determine the relatedness and origins of dialects.

6. References

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