

# ORAL PRODUCTION OF INTERVOCALIC RHOTICS IN PRINCIPENSE PORTUGUESE

**PRODUÇÃO ORAL DOS RÓTICOS INTERVOCÁLICOS NO PORTUGUÊS PRINCIPENSE**

**LA PRODUCCIÓN ORAL DE ROTICS INTERVOCÁLICOS EN PORTUGUÉS PRINCIPENSE**

**Maiara Casal Mendes\***

**Ana Lívia Agostinho\*\***

Universidade Federal de Santa Catarina

**ABSTRACT:** This study describes and analyzes intervocalic rhotics in Príncipe Portuguese (PP), spoken on Príncipe Island, São Tomé and Príncipe (STP). Portuguese in STP, with 98.4% of speakers (INE, 2012), is theoretically governed by the European standard in the formal domains of the state, media, and education and coexists with four other African creole languages. The study found that 46.4% of realizations differ from standard Brazilian Portuguese (BP) and European Portuguese (EP), with a predominance of the tap [ɾ] (61.7%) and both inter- and intra-individual variation. The findings support previous hypotheses that PP has only one rhotic phoneme due to a merger of the two rhotics found in EP, driven by i) linguistic contact in the region and ii) the low functional load of rhotics in Portuguese. Thus, PP exhibits a phonological system distinct from standard BP/EP in terms of rhotics (cf. Agostinho, 2016, 2017; Agostinho, Soares, & Mendes, 2020a, 2020b).

**KEYWORDS:** Rhotics. Principense Portuguese. Phonology. Phonetics. Linguistic contact.

**RESUMO:** Este estudo descreve e analisa os róticos intervocálicos no português principense (PP), falado na Ilha do Príncipe, de São Tomé e Príncipe (STP). O português em STP, com 98,4% de falantes (INE, 2012), é teoricamente regido pela norma europeia nos âmbitos formais do Estado, mídia e educação e convive com outras quatro línguas crioulas africanas. Verificou-se 46,4% de realizações distintas do português brasileiro (PB) e português europeu (PE) padrão, predominio de *tap* [ɾ] (61,7%) e variação inter e intraindividual. Corrobora-se hipóteses anteriores de que em PP há um só fonema rótico, devido a uma fusão dos dois róticos de PE, motivada i) pelo contato linguístico na região e ii) pela baixa carga funcional dos róticos em português. Dessa forma, PP exibe um sistema fonológico diferente do de PB/PE padrão quanto aos róticos (cf. Agostinho, 2016, 2017; Agostinho; Soares; Mendes, 2020a, 2020b).

**PALAVRAS-CHAVE:** Róticos. Português principense. Fonologia. Fonética. Contato linguístico.

\* Mestranda em Teoria e Análise Linguística (UFSC), em Florianópolis, SC, Brasil. Bacharela e licenciada em Letras – Língua Portuguesa e Literaturas pela mesma universidade. E-mail: mendes.maiarac@gmail.com.

\*\* Professora de Linguística do Departamento de Língua e Literatura Vernáculas e do Programa de Pós-Graduação em Linguística da UFSC, na área Teoria e Análise Linguística. Doutora em Filologia e Língua Portuguesa (USP) e graduada em Letras – Linguística pela mesma universidade. E-mail: a.agostinho@ufsc.br.

**RESUMEN:** Este estudio describe y analiza las róticas intervocálicas en portugués principense (PP), hablado en la Isla Príncipe, Santo Tomé y Príncipe (STP). El portugués en Santo Tomé y Príncipe, con un 98,4% de hablantes (INE, 2012), está teóricamente regido por la norma europea en los ámbitos formales del Estado, los medios de comunicación y la educación, y convive con otras cuatro lenguas criollas africanas. Fue verificado 46,4% de diferentes realizaciones de do portugués brasileiro (PB) y portugués europeo (PE) estándar, predominio de *tap [r]* (61,7%) y variación inter e intraindividual. Se corroboran hipótesis anteriores de que en PP hay un solo fonema rótico, debido a una fusión de los dos róticos del EP, motivado i) por el contacto lingüístico en la región y ii) por la baja carga funcional de los róticos en portugués. Así, PP exhibe un sistema fonológico diferente al estándar BP/EP en términos de róticas (Agostinho, 2016; 2017; Agostinho; Soares; Mendes, 2020a, 2020b).

**PALABRAS CLAVE:** Róticos. Portugués principense. Fonología. Fonética. Contacto lingüístico.

## 1 INTRODUCTION

This paper<sup>1</sup> aims to describe and analyze the oral production of intervocalic rhotics in Principense Portuguese (PP), a variety spoken on Príncipe Island, in São Tomé and Príncipe. The research was carried out through acoustic analysis and oral data of six PP-speaking informants from a list of 69 words with intervocalic rhotics. The list included nine minimal pairs of “weak r” vs. “strong R” in standard Brazilian Portuguese (BP) and European (EP) Portuguese, as in *caro* vs. *carro*. The proposal is to determine the intervocalic rhotic variants in PP and compare the rhotic phonological status and position in the syllabic with standard BP/EP.

The two main São Tomé and Príncipe islands, with their various islets, compound the Democratic Republic of São Tomé and Príncipe (STP). They are located in the Gulf of Guinea, on the West African coast, with a population of 210,240 inhabitants according to the 2018 Census. STP was uninhabited until its colonization by the Portuguese, other Europeans, and enslaved Africans from the fifteenth century onwards.

The country comprises a complex linguistic ecology, which was established at the time of its colonization, resulting from situations of linguistic contact (Agostinho, 2015). According to the 2012 Census, 98.4% of the population speak Portuguese, a language that has greater prestige compared to indigenous languages and which is used in the formal spheres of the State, media, and education.

In addition to Portuguese, there are the creole languages Santomense (or Forro) and Angolar, spoken mostly in São Tomé by 36.2% and 6.6% of the population, respectively, and Lung’Ie (or Principense) and Kabuverdianu, spoken mostly in Príncipe, by 1% and 8.5% of the population, respectively, according to the 2012 Census. Kabuverdianu is transplanted from Cape Verde, and the others are genetically related, coming from the Proto-Creole of the Gulf of Guinea (PGG), a creole language with a Portuguese lexical base that emerged from contact between the islands’ first inhabitants during the colonial period (Bandeira, 2017; Ferraz; 1978; Hagemeijer, 2009).

It is generally assumed that the first inhabitants arrived on the STP islands between 1470 and 1471 (Agostinho, 2015; Hagemeijer; Rocha, 2019; Seibert, 2014). According to Seibert (2015), the objectives of Portuguese colonization were the establishment of a European settlement colony, sugar production, the installation of a warehouse for maritime navigation to Asia, and the spread of Christianity.

As stated by Hagemeijer (2009), the STP colonial history is composed of two distinct periods: the phase related to housing in the fifteenth and sixteenth centuries, corresponding to the settlement of São Tomé and the sugar economy, and the phase referring to the cultivation of cocoa and coffee, between the nineteenth and twentieth centuries.

The first phase comprises sugar production in the plantation model, based on monoculture, large-scale production, exports, and slave labor (Seibert, 2015). Hagemeijer (2009) affirms that this earlier phase was very conducive to creolization, which resulted in

<sup>1</sup>Parts of this text were based on Mendes (2021).

the PGG emergence. The phase ended with the decline of the sugar economy at the end of the sixteenth century due to attacks by other European peoples and rebellions by escaped slaves (Maurer, 2009).

The STP recolonization began in the second half of the nineteenth century. During this period, the Portuguese colonizers implemented coffee and cocoa production, whose plantations were called *roças*, with slave labor (Seibert, 2015). As said by Nascimento (2008 qt. in Seibert, 2015), from 1855 to 1972, the number of enslaved people increased from 4,580 (37% of the population) to 8,575 (40% of the population).

In 1900, Príncipe Island was affected by sleeping sickness, which caused a high mortality rate among the native inhabitants, with only about 300 surviving out of around 3,000 people (Günther, 1973 qt. in Maurer, 2009). This historical fact also implied Lung'le's decline. The lack of manpower for work led the colonial authorities to hire new workers from other African regions, especially from Cape Verde (Maurer, 2009), contributing to the emergence of a new linguistic plurality in STP.

As reported by Gonçalves and Hagemeijer (2015), STP starts presenting a new linguistic panorama from the second phase of colonization. The authors argue that creole languages were predominantly used at least until the end of the nineteenth century, and Portuguese was spoken only within the colonial regime. However, during the *Estado Novo*, the use of creole languages was repressed (Gonçalves; Hagemeijer, 2015). Thus, according to these authors, those languages – mostly used by the population – were left behind, and Portuguese became the First Language (L1). This process was accentuated after the STP independence, when Portuguese was chosen as the only official language, also considering urbanization, the massification of schooling in Portuguese, the media, and increased social mobility (Araujo, 2020; Gonçalves; Hagemeijer, 2015). Moreover, as stated by Balduino (2018), Portuguese has been a language of high social status since the period of the Portuguese colony due to its European colonial origin and long and stable written tradition.

According to Santiago and Agostinho (2020), both PP and Santomean Portuguese (SP) are distinct varieties from standard BP/EP as a result of the use and contact with other local languages, as will be seen later.

From a phonetic-phonological investigation and the perspective of linguistic contact, the purpose of this research is to verify the hypothesis that PP is a distinct Portuguese variety in relation to other varieties of Portuguese, such as standard BP/EP, in terms of the intervocalic rhotics (see Agostinho, 2016, 2017; Agostinho; Mendes, 2020; Agostinho; Soares; Mendes, 2020a, 2020b; Mendes, 2021).

Thus, the analysis proves to be relevant for the recognition of PP as a linguistic variety, as well as for a better understanding of its phonetics and phonology, given that the literature addresses PP in a limited manner. In this sense, this analysis will also be able to deepen the understanding of São Tomé and Príncipe Portuguese (STPP) macro variety, as well as about Portuguese in general. In addition, it will contribute to the study of phonetics and phonology of languages in contact situations. It should also be added that the subject of rhotic consonants in PP is also little discussed, although this variety has characteristics that make it different from other varieties of Portuguese (see Agostinho, 2016, 2017; Agostinho; Soares; Mendes, 2020a, 2020b).

This article is organized into six sections. In this first section, the objectives and importance of this study are presented, as well as STP socio-historical context and linguistic ecology. The second section describes the literature on rhotics in Portuguese regarding the BP, EP, Santomean Portuguese (SP), and PP varieties. Next, the third section presents the research methodology. The fourth section focuses on the study results, with the acoustic description of the phonetic productions in its subsection. The fifth section, in sequence, presents the discussion about the research results. Finally, the sixth section presents the study's conclusion.

## 2 RHOtics IN PORTUGUESE

There are several studies in the literature about rhotic consonants in BP and EP. As for the theme of this work, there are two theoretical positions concerning the rhotics in the intervocalic context due to the intermediate contrast in this category (see Hall,

2013; Hualde, 2004). One of them defends the existence of only one rhotic phoneme in BP and EP (see Abaurre; Sandalo, 2003; Camara Jr., 1949; Mateus, D'Andrade, 2000) and the other defends the existence of two rhotic phonemes in these varieties (Bisol, 2014; Camara Jr., 1977; Massini-Cagliari; Cagliari; Redenbarger, 2016; Teyssier, 2014).

Camara Jr. (1949 *apud* Callou; Leite, 1990) assumes that there is only one rhotic phoneme in BP, the “strong R”, represented by the voiced alveolar trill /r/, which would have the “weak r” – (tap) [r] – as a weakened positional allophone between vowels, and the velar fricative [x], in free variation. Abaurre and Sandalo (2003) point in the same direction, corroborating the hypothesis of Camara Jr. (1949) of only one rhotic phoneme in BP, represented by the underlying voiced alveolar /r/, which becomes weak between vowels. According to the authors, the phoneme, in this context, loses its trace of continuity, becoming an alveolar tap [r]. Concerning BP and EP, Mateus and d'Andrade (2000) also argue that there is only one rhotic phoneme in these varieties, that is, flap /ɾ/. The authors postulate that the intervocalic [r] occurs because of the existence of two underlying rhotics, one /r/ in the coda of the previous syllable and another at the beginning of the second syllable, such as /'karo/ and /'karro/ [expensive/car]. In this way, the /r/ of the second syllable would lead to the production of “strong R” and the first /r/ would be deleted.

In his work originally published in 1977, Camara Jr. (2017) starts considering two rhotic phonemes in Portuguese, the “weak r” and “strong R,” through which one distinguishes *caro:carro* [expensive/car], for example, with neutralization in other contexts. Bisol (2014) points in the same direction<sup>2</sup> when assuming two rhotic phonemes in BP, “weak r” and “strong R.” Teyssier (2014, p. 54),<sup>3</sup> a study on EP also argues that there is phonological opposition in an intervocalic context between “weak r” (one tap/vibration) and “strong R” (several taps/vibrations). Following this line, Massini-Cagliari, Cagliari, and Redenbarger (2016) understand that there are two rhotic phonemes in BP, with the production of [r] for “weak r” and [h, x] (the most frequent) for “strong R,” which contrast in intervocalic position and are complementarily distributed in the other contexts.

While the Brazilian and European varieties have been subject to considerable description and linguistic analysis, investigations that address the African varieties of Portuguese are scarce to date (Santiago; Agostinho, 2020; Hagemeijer, 2016). Even so, the literature on STPP has highlighted the distinction of this variety in relation to other Portuguese varieties, such as standard BP/EP (Agostinho, 2016, 2017; Agostinho; Mendes, 2020; Agostinho; Soares; Mendes, 2020a, 2020b; Bouchard, 2017; Brandão *et al.*, 2017; Balduino, 2018; Mendes, 2021, among others).

Regarding this distinction, Agostinho (2016) argued that there is no phonological opposition between “weak r” and “strong R” in PP and SP. Posterior works, such as those by Agostinho (2017), Bouchard (2017), Brandão *et al.* (2017), Pereira, Hagemeijer, and Freitas (2018), Agostinho and Mendes (2020), and Agostinho, Soares, and Mendes (2020a, 2020b) start from this assumption.

Serra<sup>4</sup> verified, in PP data written by high school students, the use of the digraph <rr> instead of the single <r>. According to Serra (qt. in Agostinho; Mendes, 2020), this variation has a “random” [sic] character and it is a “confusion” [sic], which arises due to the influence of creole languages and their role as a substrate when acquiring Portuguese.

Agostinho (2016, 2017) verified that the rhotics in onset position in PP and SP, tap [r], uvular fricative [χ], and voiced alveolar [r] vary and that the meaning of the words is apprehended by the speech context. According to the researcher, this variation is due to the absence of the phonological distinction between “weak r” and “strong R,” phonemes of the BP/EP linguistic norm, due to the influence of linguistic contact in the region.

Agostinho, Soares, and Mendes (2020a, 2020b) found that in PP, there is no distinction between “weak r” and “strong R” and that the meaning of words is apprehended by the speech context. Specifically on the written production data, the authors identified 69% of spelling deviation of <rr> (such as ‘*fora*’ instead of ‘*forra*’) and 19% of <r> (like ‘*ferre*’ instead of ‘*fere*’) in single words. In the case of

<sup>2</sup>Originally published in 1996.

<sup>3</sup>Originally published in 1980.

<sup>4</sup>SERRA, Aníbal. *Português na Ilha do Príncipe*: apresentação de desvios linguísticos na expressão escrita de alunos do ensino secundário. Universidade de Évora, Évora. [2015?]. Unpublished.

the sentences, there was a 70% spelling deviation of <rr> and 30% of <r>, the predominance of “weak r” was verified. Analyzing the functional load of rhotics in standard Portuguese, the researchers observed a low functional load of the two rhotic phonemes (374), second only to /ʌ, l/ (360) and /f, v/ (327). Based on this, they argue that “weak r” and “strong R” cannot be distinguished in PP due to the fusion of the two rhotic phonemes, and are in line with Agostinho, Soares, and Mendes (2016, 2017) on the influence of linguistic contact of PP with the creole languages in the region. Agostinho, Soares, and Mendes (2020a, 2020b) assume that phonemes with low functional load, that is, with low ability to distinguish words in a language, tend to merge in contact situations (see Hall, 2013; Hualde, 2004; Wedel; Kaplan; Jackson, 2013). According to Agostinho and Mendes (2020), this variable production of rhotics in the intervocalic context in PP spelling is also verifiable in spelling studies on BP varieties that have contact with languages with only one rhotic phoneme (see MARTINS, 2013; SILVA; 2015).

Veloso (2015) pointed out that there are no flaps in SP and that these go through the fortification process, becoming uvular (voiced). Regarding the intervocalic position of “weak r” and “strong R” in SP, Bouchard (2017) verified 33.9% of “strong R” and 31% of “weak r.” According to the author, SP does not present a robust phonological distinction between “weak r” and “strong R” as there would be in standard BP/EP, so these two categories would be overlapping or partially merged. It should be noted that Bouchard (2017) considers an underlying phonological distinction for SP, unlike the affirmation by Agostinho (2016) related to PP and SP that states that PP and SP do not distinguish “weak r” and “strong R” as they only present a rhotic phoneme in the underlay.

Brandão *et al.* (2017), in a study on SP rhotics, state that, in the intervocalic context, where in standard BP/EP there is a phonological contrast between “weak r” and “strong R,” “in SP, such contrast is not clear” (p. 300). Their results demonstrated that “strong R” of standard BP/EP can occur as tap (fe[r]amenta [tootl]) (58.4% of cases), as voiced alveolar (co[r]er [run]) (35%), and as uvular fricative or other variants (a[ʁ]umar [organize]/ciga[ʁ]o [cigarette], (6.1%). In the “weak r” position of standard BP/EP, such as ‘barato’ [cheap], one verifies 92.3% of tap, 3.4% of uvular fricative or other variants, 2.7% of deletion, and 1.6% of voiced alveolar. Given this, Brandão *et al.* (2017) suggest that there is no distinction between “weak r” and “strong R” in SP: “The phonological opposition R [+ant] versus R [-ant] in an intervocalic context does not seem to be part of the SP phonological framework” (p. 132). The authors propose that this variation arises as a result of contact with the Forro, which did not have rhotics in its system, and that it is associated with a “defective” [sic] learning process of EP norms.

Also on SP, Pereira, Hagemeijer, and Freitas (2018) verified “neutralization” [sic] of “weak r” and “strong R” in this variety, noting the predominance of uvular fricative in the data of younger speakers. For the “weak r” context of standard BP/EP, there was 11% (164 occurrences) of tap, followed by 9% (138 occurrences) of uvular fricative, 0% (6 occurrences) of the deletions, 0% (2 occurrences) of the voiced alveolar, in addition to other variants. For the “strong R” context of standard BP/EP, there was 3% (46 occurrences) of voiced alveolar, followed by 2% (40 occurrences) of uvular fricative, and 2% (24 occurrences) of tap, in addition to other variants. The authors also found a significant interindividual variation, which may be related to sociolinguistic factors. A 32.4% overall rate of neutralization between “weak r” and “strong R” was found, but with a high amplitude, between 0% and 77%. The authors justify the difference in the results from the study by Brandão *et al.* (2017), in which tap was preferred, stating that the speakers analyzed by Brandão *et al.* (2017) were from a higher age group.

### 3 METHODOLOGY

The research was developed from a corpus collected on Príncipe Island in 2016 (Agostinho; Balduino, 2016)<sup>5</sup>. The data analyzed here come from recordings of interviews with controlled and spontaneous speech production in PP from a list of 48 previously selected words, including nine minimal pairs in standard BP/EP, which will be the object of analysis of this research. Each word in the list was then pronounced by the researcher and, afterward, pronounced by the informant three times in the carrier sentence “Eu digo X baixinho” [I say X softly], and the “X” was replaced by the target word. For example: “Eu digo carinho baixinho” [I say affection softly]. In cases where the word formed a minimal pair in standard BP/EP after the carrier sentences were repeated by the informant,

<sup>5</sup>The pieces of equipment used in the experiment were Tascam DR-100 MKII and Shure WH20 digital recorders, and the audio files were recorded in WAV format.

the researcher asked the meanings of the target word, which were expressed in spontaneous speech by the informants. Using this method was justified by the fact that not all informants were literate or familiar with reading.

Furthermore, it was considered that if the informants were asked to read the word list, the spelling of <r> and <rr> could influence the informants' pronunciation. It should be added that, for the interview, the words were arranged in such a way that the minimal pairs were not next to each other so that this order would not also interfere with their pronunciation either. However, the list of words was adapted for this study data analysis, where one arranged the minimal pairs next to each other and in alphabetical order, making reading and data comparison easier.

As for the informants' profile, considering this to be a description and initial analysis, the sex – female – was selected as an independent and extralinguistic variable since this variable was not controlled in the analysis –, in addition to nationality, Príncipe Island, part of STP. Thus, 6 PP-speaking women<sup>6</sup> of varying ages and schooling participated in the research, as shown in the table below.

	Sex	Age	Schooling	Nationality
<b>Informant 1</b>	Female	40	Complete primary education	Príncipe
<b>Informant 2</b>	Female	54	Incomplete primary education	Príncipe
<b>Informant 3</b>	Female	24	High school completion	Príncipe
<b>Informant 4</b>	Female	28	Complete secondary education	Príncipe
<b>Informant 5</b>	Female	18	Complete secondary education	Príncipe
<b>Informant 6</b>	Female	24	Complete secondary education	Príncipe

**Table 1:** Description of informants' profiles

**Source:** Agostinho and Balduíno (2016)

Praat software was used for verification and acoustic analysis of the rhotic variants used by the informants. In addition to the hearing, special attention was given to the analysis of the waves and spectrogram of the segments, given that tap or voiced alveolar identification only by hearing may occasionally not be accurate.

Taking into account the fact that this is a preliminary description, the difficulty of acoustic detection of posterior rhotic fricatives [x, ɣ, ʁ, h, f̪] (see LADEFOGED; MADDIESON, 1996), and the predominance of the uvular (voiced) fricative [ʁ] in research on PP and SP, this rhotic was used to represent the variations within the category of posterior fricatives, since the uvular (voiced) fricative is the most common in research on PP and SP concerning rhotics (Agostinho, 2016, 2017; Bouchard, 2017; Brandão *et al.*, 2017; Pereira; Hagemeijer; Freitas, 2018). Therefore, variation within the class of posterior rhotic fricatives will be irrelevant in our description and discussion.

Then, based on the phonetic results, a framework was prepared for phonological classification between "weak r" and "strong R" of the intervocalic rhotics of the minimal pairs analyzed in PP. It is noteworthy that the designations of "weak r" and "strong R" refer only to standard BP/EP and that they were used only for procedural purposes of comparison and data analysis since this study is in

<sup>6</sup> The low number of informants is due to the limitations of the fieldwork.

line with Agostinho (2016, 2017), Agostinho and Mendes (2020), and Agostinho, Soares, and Mendes (2020a, 2020b), who argue that PP has a single rhotic phoneme. Three hundred and twenty-one minimal pairs tokens were analyzed, with 1239 tokens in the total corpus, including the other words in the list. In addition, given the observation of intra and interindividual variation in the data obtained, this study also includes the analysis and discussion of these instances.

#### 4 RESULTS

The objective of this section is to present and discuss the results obtained in the research. Initially, the phonetic productions found will be demonstrated by the spectrogram concerning the corpus researched will be analyzed, and the phonological status of rhotics in PP will be explored.

Table 2 below was obtained with the six PP-speaking informants' phonetic productions.

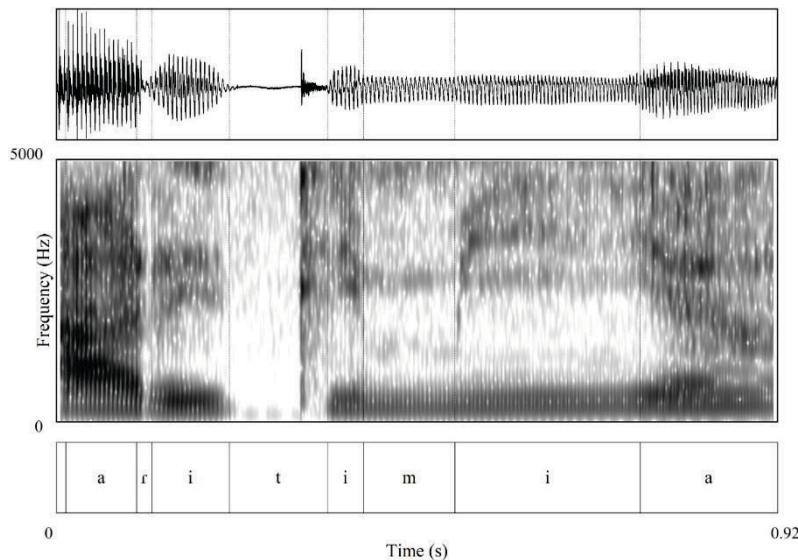
Inputs	Inf. 1			Inf. 2			Inf. 3			Inf. 4			Inf. 5			Inf. 6		
	P 1	P 2	P 3															
<b>carinho</b>	f	f	v	f	f	f	f	f	f	v	v	v	f	f	f	v	v	v
<b>carrinho</b>	f	f	f	f	f	f	f	f	f	v	v	v	f	f	f	v	f	v
<b>caro</b>	r	f	r	f	f	f	f	f	f	v	f	f	f	f	f	v	v	v
<b>carro</b>	f	f	r	f	f	f	f	f	f	v	v	v	f	f	f	v	v	v
<b>coro</b>	f	f	f	f	f	f	f	f	f	f	f	f	v	f	f	f	f	f
<b>corro</b>	v	v	v	f	f	f	v	f	f	v	f	v	v	v	v	v	v	v
<b>era</b>	f	f	f	f	f	f	f	f	f	v	v	v	f	v	v	v	v	v
<b>erra</b>	f	f	v	f	f	f	f	f	f	v	v	v	f	f	f	v	v	v
<b>fera</b>	f	f	f	f	f	f				v	v	v	f	f	f	v	v	v
<b>ferra</b>	f	f	f	f	f	f	f	f	f	v	v	v	f	f	f	v	v	v
<b>fere</b>	f	f	f	f	f	f	f	f	f	v	v	v	f	f	f	v	v	v
<b>ferre</b>	f	f	f	f	f	f	f	f	f	v	v	v	f	f	f	v	v	v
<b>fora</b>	r	r	r	f	f	f	f	f	f	v	v	v	f	f	f	v	v	v
<b>forra</b>	r	r	f	f	f	f	f	f	f	f	v	v	f	f	f	v	v	v
<b>muro</b>	v	r	f	f	f	f	f	f	f	f	f	f	v	f	f	f	f	f
<b>murro</b>	r	r	f	f	f	f	f	f	f	r	v	f	f	v	v	v	v	v
<b>varia</b>	v	f	v	f	f	f	f	v	v	v	v	v	f	f	f	f	v	v
<b>varria</b>	v	f	f	f	f	f	f	f	f	v	v	v	f	f	f	v	v	v

**Table 2 :** Intervocalic rhotic phonetic variants of minimal pairs in PP per informant

**Source:** The authors (2024)

It is possible to observe in Table 2 that there are productions of tap [r], uvular (voiced) fricative [ʁ] and voiced alveolar [r]. Next, the intervocalic rhotic phonetic productions verified in the PP data will be presented, with a representation of their waveforms and spectrograms.

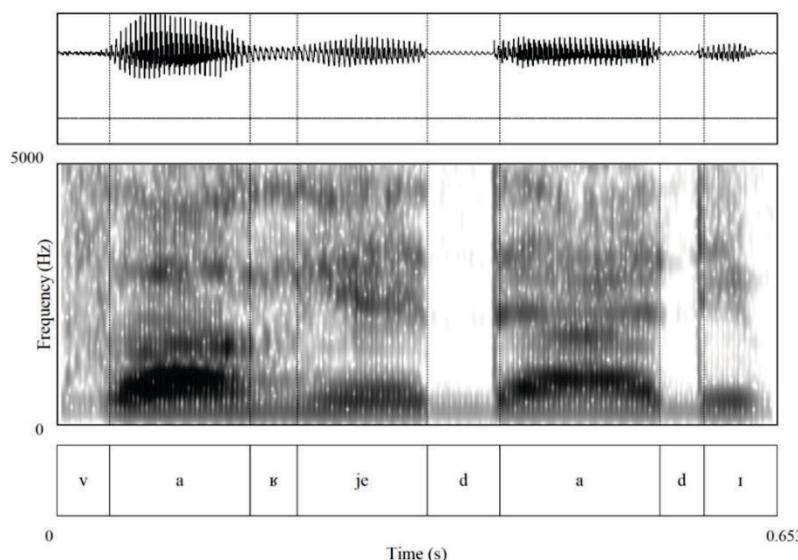
In Figure 1 below, it is possible to observe the waveform and spectrogram of the word '*arritmia*' [arrhythmia], produced with tap [r] in PP. Production refers to Informant 1. In standard BP/EP, fricative or voiced rhotic variants would be produced in this word.



**Figure 1:** Waveform and spectrogram of the word '*arritmia*' in PP

**Source:** The authors (2024)

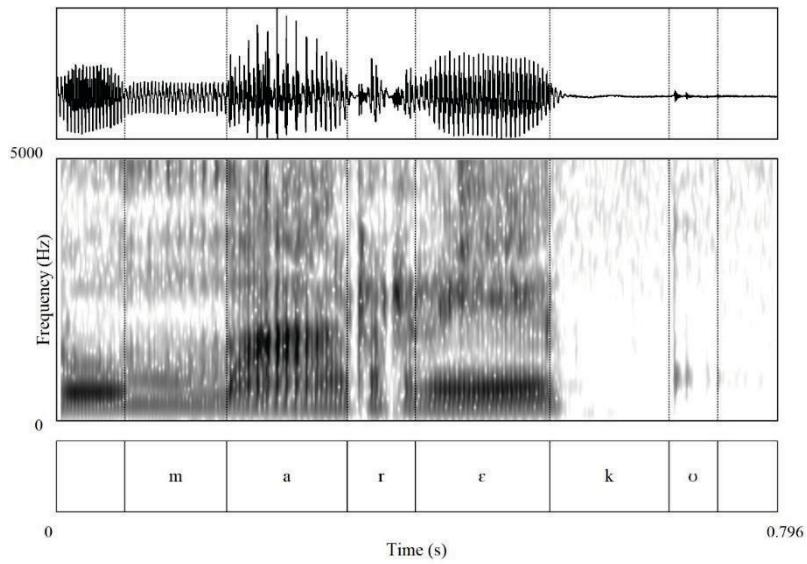
Figure 2 represents the waveform and spectrogram of the word '*variedade*' [variety], produced with uvular (voiced) fricative [ʁ] in PP. Production refers to Informant 4. In standard BP/EP, this word would be produced with tap [r].



**Figure 2:** Waveform and spectrogram of the word '*variedade*' in PP

**Source:** The authors (2024)

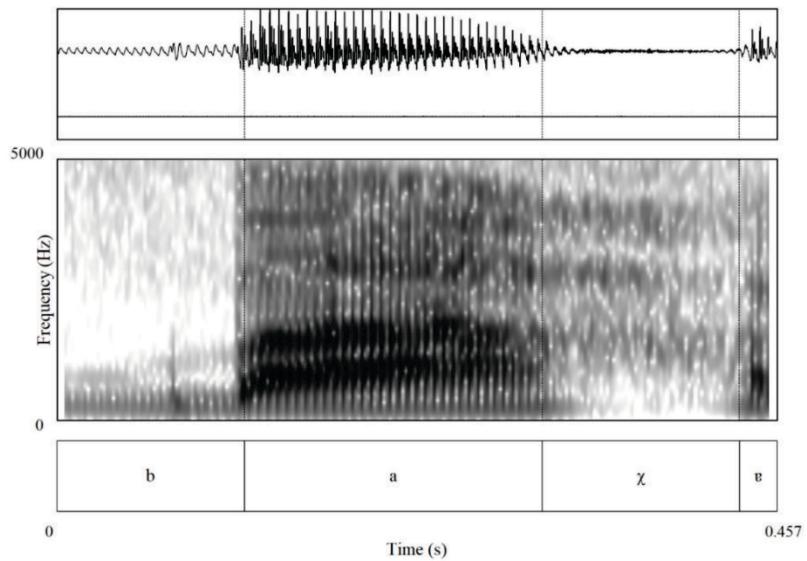
Figure 3 shows the waveform and spectrogram of the word 'marreco' [widgeon], produced with voiced alveolar [r] in PP. Production refers to Informant 1. In standard BP/EP, this word could also be produced with voiced alveolar or with other variants corresponding to the "strong R" of BP/EP.



**Figure 3:** Waveform and spectrogram of the word 'marreco' in PP

**Source:** The authors (2024)

Figure 4 shows the waveform and spectrogram of the word 'barra' [bar], produced with uvular (voiced) fricative [χ] in PP. Production refers to Informant 1. In standard BP/EP, this word could also be produced with this variant, as well as with other voiced fricative rhotic variants.



**Figure 4:** Waveform and spectrogram of the word 'barra' in PP

**Source:** The authors (2024)

The most frequent intervocalic rhotic in the analyzed data was tap, with 198 productions (61.7%), followed by the uvular fricative, with 111 productions (34.6%). The voiced alveolar variant was minimally used by the informants, registering 12 productions (3.7%), as shown in Table 3.

	<i>tap [r]</i>	<i>uvular fricative [r̪]</i>	<i>Voiced alveolar [r]</i>
<b>Absolute number</b>	198	111	12
<b>Percentage</b>	61.7%	34.6%	3.7%

**Table 3:** Productions of intervocalic rhotics of minimal pairs in PP**Source:** The authors (2024)

Table 4 presents the distribution of intervocalic rhotic variants per informant for inter and intra-individual analysis of the frequency of use of each variant.

Variables	Inf. 1	Inf. 2	Inf. 3	Inf. 4	Inf. 5	Inf. 6	Total
	Abs. No./%						
<b>Tap [r]</b>	34/63%	54/100%	47/92.1%	10/18.5%	45/83.3%	8/14.8%	198/61.7%
<b>Uvular fricative [r̪]</b>	9/16.6%	0/0%	3/5.9%	44/81.5%	9/16.7%	46/85.2%	111/34.6%
<b>Voiced alveolar [r]</b>	11/20.4%	0/0%	½%	0/0%	0/0%	0/0%	12/3.7%

**Table 4:** Productions of rhotics of standard BP/EP minimal pairs in PP per informant**Source:** The authors (2024)

Based on Table 4, the intense phonetic variation for the intervocalic rhotics in PP is notable, which occurs both in interindividual and intra-individual manner. In other words, there is variation in the use of tap, uvular fricative, and voiced alveolar among all informants, as well as in the results of each informant individually, except for Informant 2, who uses tap categorically.

As for the interindividual phonetic variation, there was a predominance of tap in the data of Informants 2, 3, and 5, and the use of the uvular fricative predominated in the data of Informants 4 and 6. More specifically, Informant 2 used tap in 100% of the cases, Informant 3 in 92.1%, and Informant 5 in 83.3% of the cases. In turn, Informants 4 and 6 used uvular fricative in 81.5 and 85.2%, respectively.

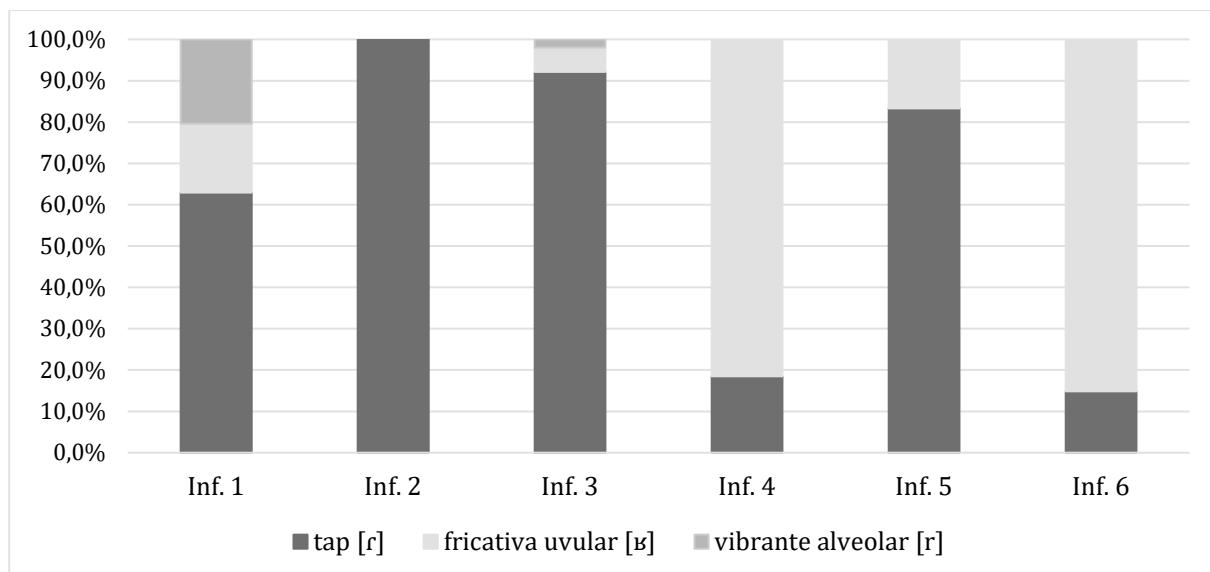
When examining the intra-individual variation, one verifies that Informant 2 was the only one who did not present this type of variation in relation to the use of rhotic variants, presenting 100% of tap productions. Informant 1 presented marked variation, using tap – more frequently – (63%), voiced alveolar (20.4%), and uvular fricative (16.6%). The intra-individual variation is also found in the data of Informants 3, 4, 5, and 6. Informant 3 used the three variants, namely – in order of greater occurrence: tap (92.1%), uvular fricative (5.9%), and voiced alveolar (2%). In turn, Informants 4, 5, and 6 used tap and uvular fricative. The uvular fricative is the most preferred variant by Informants 4 and 6, with 81.5 % and 85.2% of productions, respectively, while Informant 5 has a greater preference for tap, with 83.3% of productions.

Regarding the analysis of the extralinguistic variables age and schooling, it was observed that the age and schooling variables did not provide parameters for the categorization of informants concerning the use of phonetic variants in PP. For the schooling variable, Informants 1 and 2 – who were the ones in the corpus with only primary education (complete and incomplete, respectively) – used tap the most. It should be noted, however, that the rate of tap production by Informant 1 was not as high as that of the other informants, with 63% of tap productions for “weak r” of standard BP/EP and 16.6% and 20.4% of uvular fricative and voiced alveolar, respectively, totaling 37% of productions of variants equivalent to “strong R” of standard BP/EP. Moreover, Informants 1 and 2 are the oldest ones, with 40 and 54 years old, respectively.

Still, regarding age, Informants 3 and 5, aged 24 and 18, respectively, also adhered to tap in most cases. It is noteworthy that Informant 5 is the youngest in the corpus. Informants 4 and 6 were those who produced “strong R” more frequently, using uvular fricative as the variant of this standard BP/EP position. Nevertheless, it should be noted that Informant 5, 18 years old, is younger than Informants 4 and 6, and both Informant 3 and Informant 6 are 24 years old. This variation in the use of tap or uvular fricative in the data of young informants means that there may be other extralinguistic factors implicating the rhotic usually produced by them.

Despite this unequal behavior of Informants 3, 4, 5, and 6 in terms of schooling and age, it is noted that the tap variant was more associated with speakers in the older age group, that is, Informants 1 and 2, aged 40 and 54 years old, and who had elementary education, either complete or incomplete. Thus, based on this analysis, it is possible to suggest that the use of tap may be associated with the older age group. Furthermore, the use of this variant can be associated with the fact that Informants 1 and 2 are also speakers of Lung’Ie, a creole language spoken on Príncipe Island that has only one rhotic phoneme, which can be performed as tap or voiced alveolar (Agostinho, 2015; Bandeira, 2017). This also explains the preference of Informant 1 for the voiced alveolar, unlike the other informants who mostly used uvular fricative, equivalent to “strong R” of standard BP/EP. However, the importance of a larger sample of informants is highlighted so that such hypotheses can be better verified.

The frequency of use of each rhotic variant in an intervocalic context of PP per informant is illustrated in Figure 4 below, which allows better visualization and comparison of inter and intra-individual variations.



**Figure 4:** Productions of intervocalic rhotics in minimal pairs of PP per informant

**Source:** The authors (2024)

From the study data, it was possible to obtain the production rates of “weak r” and “strong R” in PP. The use of “weak r,” which is produced through tap [r] in PP, is predominant in the results, representing 61.7% of the productions. “Strong R,” produced through the uvular fricative [r̪] and the voiced alveolar [r̥] in PP, is used less frequently in 38.3% of the cases. Thus, one can see that the most frequent phonetic production in PP is “weak r,” regardless of the standard BP/EP position, whether “weak r” or “strong R,” representing almost 2/3 of the total of the productions. In other words, there is a preference for the production of “weak r” in words such as ‘*carinho*’ [affection] instead of ‘*carrinho*’ [cart] and ‘*caro*’ [expensive] instead of ‘*carro*’ [car], for example. These data can be seen in Table 5, with the total of intervocalic rhotic phonetic productions in PP that correspond to “weak r” and “strong R” of standard BP/EP.

“weak r”	“strong R”	Total
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<b>Absolute number</b>	198	123	321
<b>Percentage</b>	61.7%	38.3%	100%

**Table 5:** Total of intervocalic rhotic phonetic productions in PP for “weak r” and “strong R” of standard BP/EP

**Source:** The authors (2024)

Regarding the results of productions according to standard BP/EP and different from standard BP/EP in PP for each phonological position of “weak r” and “strong R,” 34.6% of occurrences different from standard BP/EP were obtained for “weak r,” and 58% of productions different from standard BP/EP were obtained for “strong R,” as shown in Table 6.

	<b>Productions according to standard BP/EP</b>	<b>Productions different from standard BP/EP</b>
<b>Absolute number</b>	172	149
<b>Percentage</b>	53.6%	46.4%

**Table 6:** Intervocalic rhotic phonetic productions according to and different from standard BP/EP in PP

**Source:** The authors (2024)

In Table 7, PP presents 46.4% of rhotic phonetic productions that would be different from other Portuguese varieties, such as standard BP/EP, totaling 149 cases. Productions, according to standard BP/EP, totaled 172 cases, which is equivalent to 53.6%. These data indicate the linguistic variation in relation to PP and the Portuguese linguistic norm used in formal spheres in SP regarding the use of rhotics, demonstrating that PP presents a phonological system different from other Portuguese language systems, such as standard BP/EP.

	“weak r”	“strong R”	Total
	Abs. No./%	Abs. No./%	Abs. No./%
<b>Productions according to standard BP/EP</b>	104/65.4%	68/42%	172/53.6%
<b>Productions different from standard BP/EP</b>	55/34.6%	94/58%	149/46.4%

**Table 7:** Total of intervocalic rhotic phonetic productions according to and different from standard BP/EP in “weak r” and “strong R” positions of standard BP/EP

**Source:** The authors (2024)

Table 8 demonstrates the rhotics occurrences according to and different from standard BP and EP per informant. The table shows that all informants presented productions different from standard BP/EP, data that varied between 39% and 53%.

	Inf. 1	Inf. 2	Inf. 3	Inf. 4	Inf. 5	Inf. 6
<b>Productions according to standard BP/EP</b>	50%	50%	47%	54%	59%	61%
<b>Productions different from standard BP/EP</b>	50%	50%	53%	46%	41%	39%

**Table 8:** Intervocalic rhotic phonetic productions according to and different from standard BP/EP per informant

**Source:** The authors (2024)

The next section will discuss the data, with a comparative analysis with previous studies on PP and SP, which compound the STPP macro variety.

## 5 DISCUSSION

The results of this research indicated inter and intra-individual variation in the use of rhotics in the intervocalic context in PP, with a predominance of tap. Thus, one corroborates previous studies on the variation of the two rhotic intervocalic phonemes of standard BP/EP in PP and SP (see Agostinho, 2016, 2017; Agostinho; Mendes, 2020; Agostinho; Soares; Mendes, 2020a, 2020b; Bouchard, 2017; Brandão *et al.*, 2017; Mendes, 2021; Pereira; Hagemeijer; Freitas, 2018), which together compound the STPP macro variety.

In this sense, for PP, there is corroboration of the hypothesis of Agostinho (2016, 2017) and Agostinho, Soares, and Mendes (2020a, 2020b) that there is only one rhotic phoneme in this variety, which emerged from the fusion of the two EP phonemes in PP, due to i) linguistic contact with the creole languages of the region, and ii) the low functional load of rhotics in Portuguese. In addition, the realization of “strong R” in the second position of complex onset in PP is another argument that corroborates the hypothesis that there is only one phoneme in this variety (see Mendes, in preparation).

Regarding the rhotics of the creole languages spoken in STP, Lung’le has only one rhotic phoneme, which can be produced as tap [r] or voiced alveolar [r] (Agostinho, 2015; Bandeira, 2017), and Forro and Angolar do not have a rhotic phoneme (Agostinho; Bandeira; Freitas, 2021; Bandeira, 2017; Ferraz, 1978). Kabuverdianu, spoken on Santiago Island in Cape Verde, has only one rhotic phoneme (Läng, 2002). There is no phonological analysis of Kabuverdianu spoken in STP, but phonetic data point to the same path (Freitas; Bandeira; Agostinho, 2021).

Furthermore, the analysis corroborates the finding of intervocalic rhotic variation in writing data from Serra,<sup>7</sup> who verified productions of <rr> in the “weak r” position of standard BP/EP, and in Agostinho and Mendes (2020), who verified <rr> where the standard spelling is <r> and vice versa. However, this study differs from Serra insofar as the author argues that spelling deviations have a “random” [sic] character and that appear in PP due to a “confusion” [sic] of rhotic variants caused by influence from the Creole languages of the region (see Agostinho; Mendes, 2020). On the contrary, this research recognizes the variation as an indication that these varieties have only one rhotic phoneme and, therefore, have a phonological system different from standard BP/EP (see Agostinho, 2016, 2017; Agostinho; Mendes, 2020; Agostinho; Soares; Mendes, 2020a, 2020b; Mendes, 2021).

Regarding SP, in the research of Bouchard (2017), there were 33.9% of productions of variants equivalent to “strong R” in the “r weak” position of standard BP/EP and 68.7% in the “r weak” position of standard BP/EP. By contrast, in this study, in PP, in the “weak r” position of standard BP/EP, there were 34.6% of variants equivalent to the “strong R” of standard BP/EP, and in the “strong R” position, there were 42% equivalent variants to “strong R” of standard BP/EP. Thus, although the same methodologies were not used in both studies, it is noted that the results of this research and those of Bouchard (2017) are similar, although it is possible to note a higher frequency of use of variants equivalent to “strong R” in SP than in PP for the “strong R” position. The higher frequency of “weak r” (tap) in PP and the higher frequency of “strong R” (uvular fricative) in SP may indicate a dialectal difference between PP and SP, as proposed by previous studies (Agostinho, 2016, 2017; Agostinho; Soares; Mendes, 2020a, 2020b; Mendes, 2021).

Nevertheless, Bouchard (2017) proposes an underlying distinction between “weak r” and “strong R” in SP, departing from the phonological system of EP. On the contrary, this study assumes that in PP, as well as in SP, there is only one rhotic phoneme (Agostinho, 2016, 2017, among others). Thus, there would be no phonological distinction between rhotic phonemes in these varieties.

As Bouchard (2017) points out for SP, in general, regarding the “strong R” category of standard BP/EP, fricatives were the most common phonetic productions, with 18.5% of fricatives (uvular, velar, and glottal) and 4.9% of voiced (alveolar, uvular), with,

<sup>7</sup> SERRA, Aníbal. *Português na Ilha do Príncipe*: apresentação de desvios linguísticos na expressão escrita de alunos do ensino secundário. Universidade de Évora, Évora. Unpublished.

according to the author, a higher frequency of uvular fricative production. In the data from this author's work, especially for the "weak r" position, there was 86.5% of fricative productions, and for the "strong R" position of standard B/EP, 61.9% of productions, compared to voiced productions. Based on data from Bouchard (2017), the uvular fricative is more used among younger SP speakers as a variant that marks the difference between younger and older generations.

Pereira, Hagemeijer, and Freitas (2018) made an observation similar to that of Bouchard (2017) for SP. The authors found that, among all the analyzed syllabic positions, there was "neutralization" [sic] in 32.4% of cases, and uvular fricative is predominant in SP in the general data. Nevertheless, neutralization does not seem to be the case, given that the phonological neutralization hypothesis assumes the existence of two phonemes in another syllabic context. Thus, we support the proposal by Agostinho (2016, 2017) and Agostinho, Soares, and Mendes (2020a, 2020b) that this variation is due to a process of phonological fusion of EP phonemes in SP, resulting in a single rhotic, as well as in PP.

Unlike the results of Bouchard (2017) and Pereira, Hagemeijer, and Freitas (2018), who demonstrated a higher frequency of uvular fricative in the speech of the young, equivalent to "strong R" in standard BP/EP, in the research by Brandão *et al.* (2017), also on SP, "weak r" – tap – is the most common in the intervocalic context. It is worth noting that data from Bouchard (2017) are more recent than those from Brandão *et al.* (2017), which were collected in 2009. And, as Pereira, Hagemeijer, and Freitas (2018) argue, although the corpus of these authors and that of Brandão *et al.* (2017) are the same, the study by Brandão *et al.* (2017) worked with older-generation informants.

According to Brandão *et al.* (2017), SP presented 92.3% and 58.4% of tap in "weak r" and "strong R" phonological positions of standard BP/EP, respectively. Bearing this in mind, the authors suggest that there is no phonological distinction between "weak r" and "strong R" in SP and point out that this occurs due to the use of the *santome* and a "defective" [sic] learning of EP linguistic norm by the informants. On the contrary, this research disagrees with this relationship between the variation of rhotics and the learning of EP by defending the assumption of Agostinho (2016, 2017) and Agostinho, Soares, and Mendes (2020a, 2020b) that there is only one rhotic phoneme in SP, as well as in PP, due to linguistic contact in the region and the low functional load of rhotics in the Portuguese system.

Another explanation for the process of variation of rhotics in PP, as well as in SP, would be that there is only one rhotic phoneme in the Portuguese system, corroborating Camara Jr. (1949), Abaurre and Sandalo (2003), and Mateus and d'Andrade (2000). These authors propose an analysis similar to what is proposed here for PP, in which the intermediate distinction (see Hall, 2013) of rhotics in Portuguese does not configure a phonological distinction between two distinct phonemes. However, if this proposal is considered, it would not be possible to argue that PP and SP present a phonological fusion of two different phonemes, but the argumentation should be that there is a fusion of a sequence of two identical phonemes.

## 6 CONCLUSION

The results of this work corroborate the hypothesis that in PP, there is no phonological distinction in intervocalic context, as there is in standard BP/EP (see Abaurre; Sandalo, 2013; Bisol, 2014; Camara Jr., 1949, 1977; Massini-Cagliari; Cagliari; Redenbarger, 2016; Mateus, D'Andrade, 2000; Teyssier, 2014).

It is suggested that this phenomenon is associated with a fusion of the two rhotics of EP in PP due to the linguistic contact with the creole languages of the region, which have only one rhotic phoneme, and the "quasi-phoneme" behavior of the rhotics in Portuguese, given its low functional load (see Agostinho; Mendes, 2020; Agostinho; Soares; Mendes, 2020a, 2020b; Hall, 2013; Hualde, 2004; Wedel; Kaplan; Jackson, 2013). Realizations equivalent to "strong R" of standard BP/EP in PP in the second position of complex onset endorse the single rhotic phoneme hypothesis (see Mendes, in preparation).

There were 53.6% of productions according to standard BP/EP and 46.4% of productions different from standard BP/EP in PP. "Strong R" was the phonological position with the highest number of productions different from standard BP/EP, with 58% of

productions equivalent to “weak r,” in contrast to the “weak r” position, which presented 34.6 % of productions equivalent to “strong R”.

Thus, tap [r] was the predominant intervocalic rhotic phonetic variant in the data of this research, which corresponds to the “weak r” phoneme in standard BP/EP. Overall, there were 61.7% of occurrences of tap [r], 34.6% of uvular fricative [ʁ], and 3.7% of voiced alveolar trill [r]. It is noteworthy that, considering the difficulty of detecting posterior rhotic fricatives (Ladefoged; Maddieson, 1996) and the assumption that uvular fricative is the most common posterior rhotic fricative variant in STPP (see Bouchard, 2017; Brandão *et al.*, 2017; Pereira; Hagemeijer; Freitas, 2018), the other eventual posterior fricatives were included in the category of uvular fricative.

It was verified that the phonetic variation is constant, both in the interindividual and intra-individual scopes. All informants presented unexpected productions of “weak r” and “strong R” in variation where there is a phonological distinction in BP/EP.

While the tap was the rhotic most used by Informants 2, 3, 5, and 1, with 100%, 92.1%, 83.3%, and 63% of cases, respectively, Informants 4 and 6 produced uvular fricative, with 81.5% and 85.2% of use frequency, respectively. On the other hand, voiced alveolar presented little use by the informants, and Informant 1 was the one that most produced it, with 20.4% of cases. So there was categorical adherence to “weak r” by Informant 1 and great adherence to “strong R” (92%) by Informant 3.

On the other hand, voiced alveolar presented little use by the informants, and Informant 1 was the one that most produced it, with 20.4% of cases. The four informants under 28 years of age mostly used both tap and uvular fricative, and the two older informants, over 40 years old – Informants 1 and 2 – used tap more frequently. Informant 2 presented the most expressive tap rate (100%). The tap rate for Informant 1, however, was not as expressive (63%). The same Informant presented the highest rate of voiced alveolar among all informants (16.6%). These results may be associated with the fact that Informants 1 and 2 also speak Lung’Ie, which has only one rhotic phoneme and can be produced as tap or voiced alveolar (Agostinho, 2015; Bandeira, 2017). It should also be noted that both had the same production rate according to standard BP/EP and different from standard BP/EP, with 50% for “weak r” and “strong R.”

Thus, it was found that this variety does not distinguish “weak r” and “strong R,” such as standard BP/EP. So this work corroborates Agostinho (2016, 2017), Agostinho, Soares, and Mendes (2020a, 2020b), Agostinho and Mendes (2020), and Mendes (2021) in showing that there is only one phonological rhotic in PP due to phonological fusion of EP rhotic phonemes caused by linguistic contact with the languages of the region, as well as the low functional load of rhotics in Portuguese (see Hall, 2013; Hualde, 2004; Wedel; Kaplan; Jackson, 2013). The assumption is that there is a dialectal difference between the PP and SP varieties, with a predominance of tap (“weak r” of standard BP/EP) in PP and uvular fricative (“strong R” in standard BP/EP) in STPP (see Agostinho, 2016, 2017; Agostinho; Soares; Mendes, 2020a, 2020b; Bouchard, 2017; Pereira; Hagemeijer; Freitas, 2018).

Furthermore, an analysis that takes social variables into account is necessary for a better understanding of the /r/ variation in PP. In this sense, Mendes (in preparation) investigates PP rhotics in female and male speakers.

## ABBREVIATIONS

BP	Brazilian Portuguese
EP	European Portuguese
PGG	Proto-creole of the Gulf of Guinea
PP	Principense Portuguese
SP	Santomean Portuguese
STP	São Tomé and Príncipe
STPP	São Tomé and Príncipe Portuguese

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