

# THE PERCEPTION AND PRODUCTION OF THE BRAZILIAN PORTUGUESE OPEN AND CLOSE MID VOWELS BY NATIVE RUSSIAN SPEAKERS

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**Resumo:** *A aquisição de sons do Português Brasileiro por estrangeiros tem sido pouco explorada. Este trabalho vem dar uma contribuição para preencher essa lacuna ao investigar a percepção e produção de dois pares mínimos vocálicos: as vogais médias altas e baixas anteriores e posteriores. Um teste perceptivo, contendo os pares mínimos de vogais médias, foi construído e aplicado a 97 russos que moram no Brasil. Também foram gravadas as produções de dois grupos de falantes. Um dos grupos era formado por 15 sujeitos, falantes nativos da língua russa e o outro por 13 sujeitos, falantes nativos da língua portuguesa. Um questionário sociolinguístico foi construído e aplicado aos sujeitos de pesquisa de nacionalidade russa para obter, entre outras, informações sobre o tempo de residência no Brasil e o tipo de instrução que tiveram em língua portuguesa. Os achados indicam que os russos têm bastante dificuldade em diferenciar perceptivamente os pares de vogais médias (em média, somente 68% de respostas corretas) e não conseguem diferenciar as vogais em suas produções de fala. Não foi constatada correlação entre o índice de acerto e o tempo de residência no Brasil ou o tipo de instrução recebida.*

**Palavras-Chave:** *Português Brasileiro como L2; Russo como L1; Fonética Perceptiva; Fonética Acústica; Sons Vocálicos Médios do Português Brasileiro.*

**Abstract:** *The acquisition of Brazilian Portuguese (BP) sounds by foreigners has been poorly explored. This work contributes to filling this gap by investigating the perception and production of two Brazilian Portuguese minimal vowel pairs: the mid high and low front vowels; and the mid high and low back BP vowels. A perceptual test containing stimuli words with these minimal pairs was designed and applied to 97 native Russian speakers living in Brazil. Furthermore, two groups of subjects had their vowel productions recorded and acoustically measured (F1 and F2 formants). One of the groups was formed by 15 native Russian speakers and the other by 13 Brazilian native speakers. A sociolinguistic questionnaire was built and applied to the native Russian volunteers, both listeners and speakers, to gather information about their residence time and their type of language instruction. Findings indicate that Russians do not differentiate the minimal pairs in perception tests very well (the mean percentage of right answers was 68%) and do not differentiate the minimal pairs at all at the production level. No correlation was found between the number of right answers and either residence time in Brazil or type of language instruction.*

**Keywords:** *Brazilian Portuguese as L2; Russian as L1; Perceptual Phonetics; Acoustic Phonetics, Mid Brazilian Portuguese vowel sounds.*

## 1 Introduction

Brazil is one of the most important immigration destinations in Latin America. From 2010 to 2017, the Federal Police registered 449,174 immigrants entering Brazil for long term residence and 245,110 for short term residence (Cavalcanti et al., 2018). São Paulo, the most economically developed state, received 350 thousands officially registered immigrants from 2000 to 2015 (Baeninger & Fernandes, 2017). However, the field of the acquisition of Brazilian Portuguese (BP) by foreigners has been poorly explored even considering a great number of studies on acquisition of various foreign languages by Brazilians. The field of phonetics presents a special interest when combined to sociolinguistics approaches: recent studies of non-native accented speech in English language have showed that a foreign accent could largely influence the perception of personal qualities of speakers (Fuse et al., 2018).

Our current project is focused on native Russian speakers living in Brazil, especially in São Paulo. Russians are among 15 nationalities who get the greater number of work permits in Brazil (Quintino & Tonhati, 2017). Furthermore, a lot of Russian speakers come to Brazil due to study interests, family and personal reasons. Our pilot study showed that the perception of speakers' characteristics by Brazilians is influenced by Russian accented speech characteristics

and is related to its degree (Smirnova Henriques et al., 2019). These findings claim for the development of a detailed phonetic characterization of the Russian accent. The preliminary results concerning the perceived Russian-accented features showed three main characteristics: (1) no distinction between open and close medial vowels, (2) devoicing of voiced consonants; (3) misproduction of nasalization features (Vitoriano de Almeida et al., 2018).

Our aims at the present work are to investigate the perception and production of BP open and close mid vowels by native Russian speakers living in Brazil, who have acquired BP in informal and formal instructional settings.

## 2 Material and results

### 2.1 Perception of the BP open and close vowels by native Russian speakers

Our preliminary perceptual analysis and thematic interviews with some of our research Russian volunteers indicated that native Russian speakers have difficulty in recognizing and producing the pairs [ɔ] - [o] and [ɛ] - [e]. This finding prompted us to develop an online perception test to investigate the perception of these vowels by Russian speakers living in Brazil.

The stimuli for the perception test were produced by a native speaker of BP. The test included three parts: (1) an identification task requiring listeners to select a figure corresponding to the audio stimulus presented to them. This task included eight figures, illustrating pairs such as “avó /avô”, “posso/poço”, “mel-meu”, “a pé/apê”; (2) a vowel identification task from four audio stimuli (“pelo”, “posso”, “sede”, “chopp”); (3) a discrimination test (odd one out) requiring the listeners to point out the non-repeated word in 3-word sequences. It included 18 combinations of six open and close medial vowel word pairs (such as “posso-posso-poço”, “avó-avó-avô”). The 30 tasks were expected to be realized in 10-15 minutes. The test is available online as a Google form at the link <https://docs.google.com/forms/d/16C3Ektdf3cPIIkQnnTK6FIsWrmUY6Jd3YOs1wZfdyI/edit?usp=sharing>.

We obtained data from 97 native Russian speakers living in Brazil, 28 of them from São Paulo. Their mean residence time in Brazil was 6 years, varying from half-year to 21 years. The mean percentage of right answers was 68% (Table 1), varying from 20 to 100%. Only 14% volunteers obtained more than 80% right answers, and only three of them were 100% successful. There was no correlation between the number of right answers and residence time in Brazil (Spearman’s correlation coefficient  $r=0.0$ ). The way they have learned Portuguese had no importance too. All the 11 Brazilians tested performed the test 100% successfully.

**Table 1:** Percentage of right answers in the perception test of the BP open and close vowels according to the way of learning Portuguese by native Russian speakers

The way to learn Portuguese	Number of volunteers	Percentage of right answers, mean $\pm$ SD, %
Brazilian language school	7	72 $\pm$ 17
Alone after moving to Brazil	53	67 $\pm$ 13
With Brazilian private teacher	10	66 $\pm$ 9
With not-Brazilian private teacher	4	63 $\pm$ 16
A language school in home country	9	69 $\pm$ 11
Along while in home country	11	71 $\pm$ 19
No response	3	
Total	97	68 $\pm$ 14

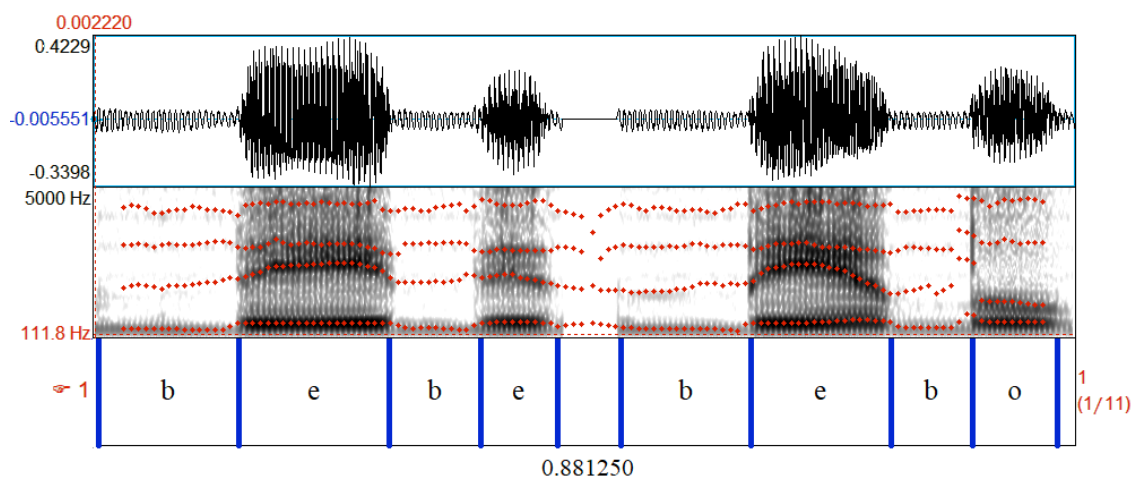
## 2.2 Production of the BP open and close vowels by native Russian speakers

There are four medial vowels in the Portuguese language phonemic inventory: the mid high front vowel /e/; the mid low front vowel /ɛ/; the mid high back vowel /o/; and the mid high low vowel /ɔ/ (Barbosa and Madureira, 2015). In the Russian language phonemic inventory, the distinction between these mid high and mid low vowels is not found. We have measured F1 and F2 of two contrastive mid front BP vowels in the productions of “bebo” and “bebe” and two contrastive mid back BP vowels in the productions of “poço” and “posso”, the recording were collected from 15 native Russian speakers (4 males and 11 females) and 13 Brazilians (3 males and 10 females) in a sound-isolated cabin (Table 2).

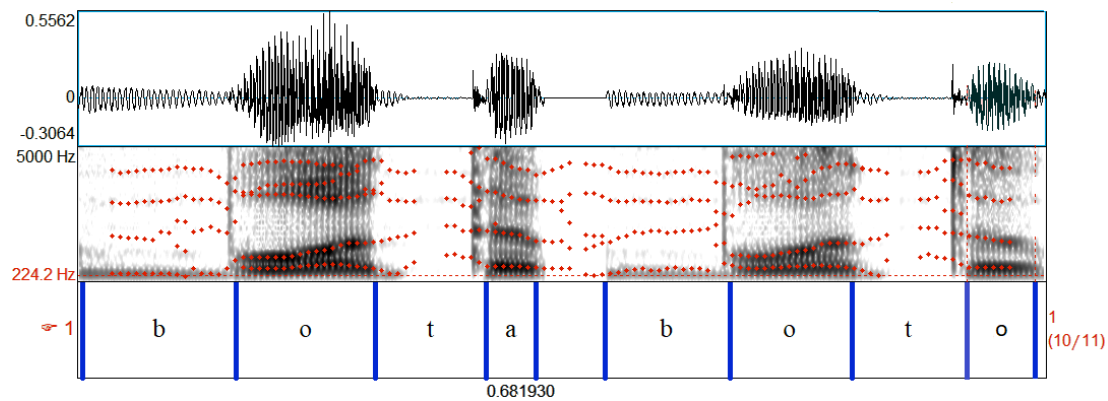
**Table 2:** Measurements of F1 and F2 for the contrastive mid front and mid back vowels

Word	Sex	Brazilians		Russian speakers	
		F1, mean ± SD, Hz	F2, mean ± SD, Hz	F1, mean ± SD, Hz	F2, mean ± SD, Hz
poço	male	469 ± 9	768 ± 143	494 ± 70	801 ± 90
	female	474 ± 54	898 ± 92	540 ± 43	888 ± 99
posso	male	606 ± 69	891 ± 20	478 ± 51	814 ± 47
	female	652 ± 68	1026 ± 78	535 ± 50	944 ± 156
bebo	male	400 ± 21	1917 ± 71	438 ± 17	1788 ± 116
	female	426 ± 31	2207 ± 188	521 ± 71	2096 ± 338
bebe	male	505 ± 84	1763 ± 161	448 ± 27	1835 ± 94
	female	559,4 ± 104	2094 ± 188	516 ± 77	2189 ± 144

The formant measurements showed that no differences were found between mid high and mid low vowels in the recordings of native Russian speakers, while Brazilians correctly differentiated the vowels as expected. The Figures 1 and 2 illustrate these results showing wideband spectrograms of a native Russian speaker production of BP words. These results accord with Flège observations (1995) about assimilation of the contrastive pair of sounds in L2 to one sound in L1. If assimilation occurs, it affects both production and perception.



**Figure 1:** Waveforms, wideband spectrograms and orthographic transcriptions of the words “bebe” and “bebo” as produced by a Russian female speaker. The two mid front vowel sounds are not differentiated.



**Figure 2:** Waveforms, wideband spectrograms and orthographic transcriptions of the words “bota” and “boto” as produced by a Russian female speaker. The two mid back vowel sounds are not differentiated.

### 3 Conclusions

Testing the perception of the BP mid high and mid low vowels by native Russian speakers, we observed that the mean percentage of right answers was just 68% (SD = 14%). No correlation was found between the percentage of right answers and residence time or type of language instruction. Measuring the formants in the production test, we observed that the Russians’ productions of the same BP mid high and mid low vowels were undifferentiated even for two speakers who have lived in Brazil for 17 years. This points out to the problem of difficult access to materials about the BP phonetics for foreigners: even studying BP in the language schools in Brazil does not help to improve performance.

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