

## Articles

# The intonation of Portuguese spoken in Maputo, Mozambique: A case study

## *A entoação do português falado em Maputo, Moçambique: Um estudo de caso*

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### ABSTRACT

*This case study of Portuguese as spoken in Maputo, the capital of Mozambique, describes the intonation of neutral declarative SVO sentences and neutral yes-no questions using the theory and methodological tools of Prosodic Phonology and Autosegmental-Metrical Intonational Phonology. In neutral declaratives, 1) prosodic phrasing of Subject and Predicate into independent (S)(VO) intonational phrases (IPs) predominated; 2) LH+L\* L% and H+L\* L% nuclear contours predominated in final IPs, while contours with high H% boundary were most frequent in medial IPs; 3) phrase accents frequently occurred between S and V, between V and O and even within S, separating the nucleus from its complements; and 4) an additional tone was possible in association with the pre-stressed syllables of long (5-syllable), mostly IP-initial, prosodic words. In neutral questions, the nucleus most often featured a rising-falling L+(<<sub>i</sub>)H\* L% movement.*

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*High tonal density was also found, with pitch accents associated with stressed syllables of all PWs in both declaratives and yes-no questions.*

**Keywords:** *intonation; prosodic phrasing; neutral declaratives and yes-no questions; Portuguese spoken in Maputo.*

## RESUMO

*Neste estudo de caso sobre o português de Maputo (capital de Moçambique), descrevemos a entoação de sentenças SVO declarativas neutras e de interrogativas totais neutras, utilizando o aporte teórico-metodológico da Fonologia Entoacional Autossegmental e Métrica e da Fonologia Prosódica. Os resultados para as declarativas revelam que 1) o fraseamento prosódico do Sujeito e do Predicado em sintagmas entoacionais (IPs) independentes (S)(VO) predomina; 2) os contornos nucleares LH+L\*L% e H+L\*L% são prevalentes em IP final, e contornos com fronteira H% são os mais frequentes em IP medial; 3) há uma presença significativa de acentos frasais localizados entre S e V, e entre V e O e ainda dentro do S, separando o núcleo de seus complementos; e 4) há a possibilidade de um tom adicional associado a sílabas pretônicas de palavras prosódicas longas (5 sílabas), majoritariamente em início de IP. Nas interrogativas, o movimento ascendente-descendente associado à porção nuclear é o mais frequente: L+(< j)H\*L%. Em termos de densidade tonal, a acentuação das PWs foi categórica tanto nas declarativas quanto nas interrogativas totais.*

**Palavras-chave:** *entoação; fraseamento prosódico; declarativas e interrogativas totais neutras; Português falado em Maputo.*

## 1. Introduction

The colonial system imposed in Africa produced the progressive suppression of local languages, as a result of which some are nearing extinction today. Meanwhile, the nativisation of European languages underwent – and still undergoes – the inevitable impact of the complex sociolinguistic situation in the widest variety of African territories. Multilingualism is most commonly the rule in these places, where African, Asian and European languages coexist. Regarding specifically

Mozambique, multilingualism is highly latent, because a very recent language policy project has spread Portuguese countrywide. As a result, although Portuguese is the only official language, it is not the most spoken in Mozambique.

On the assumption that 1) the prestige variety for Mozambicans is European Portuguese (EP) and 2) Portuguese coexists with a collection of local Bantu languages, which are tonal languages, this study examined the Portuguese spoken in Maputo (MP), the capital of Mozambique, and compared it with other African varieties of Portuguese and with EP<sup>3</sup>. The focus of inquiry was the intonation displayed in neutral declaratives and neutral yes-no questions in a data set of recorded controlled speech (reading task) by a young female speaker (case study), who was born in Maputo and is an L1 speaker of Portuguese. This paper has limitations in that it reports a case study, but its preliminary findings contribute to understanding intonation in varieties of Portuguese and to discussions of variation and change and contact linguistics.

## 2. Portuguese of/in Mozambique

Mozambique lies on the southeast coast of the African continent. Not until 25, June 1975 did it free itself from Portuguese domination and attain independence. As a consequence of colonisation, it inherited a European language and culture policy, while local languages and cultures were marginalised. In the process of decolonisation, the Mozambican government adopted the language policy of the coloniser, so as to generate the sentiment of (national) unity in diversity, popularise the Portuguese language and produce a feeling of belonging to the homeland amidst a very rich and heterogeneous linguistic environment (Firmino, 2008; Gonçalves, 2018; Macaringue, 2021; and others).

Mozambique underwent considerable population growth, of the order of 35% over the course of ten years; from 20.632,400 in 2007

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3. Although there is a substantial literature on the subject in question regarding Brazilian Portuguese, this study – primarily for reasons of space – considers the available findings only for the African Portuguese varieties of São Tomé (STP), Guinea-Bissau (GBP) and the Angolan municipality of Libolo (LBP), and for the EP varieties of Lisbon (SEP), the North (NEP), Alentejo (ALE) and the Algarve (ALG).

to nearly 28 million in 2017 (INE, 2017), distributed across its 10 provinces (Niassa, Cabo Delgado, Nampula, Tete, Zambézia, Sofola, Manica, Gaza, Inhambane, and Maputo). The *World population prospects: The 2017 revision, key findings and advance tables* (United Nations, Department of Economic and Social Affairs, Population Division, 2017) estimated the population of Mozambique at 135 million in 2100. Portuguese is still a bicentric language, given the linguistic primacy of Portugal and Brazil, which are still the two major production centres for linguistic standards. Intense population growth in Angola and Mozambique indicates, however, that the future of Portuguese will be pluricentric. There are thus strong indications of the progressive spread of an emerging standard Mozambican Portuguese.

Although Portuguese was imposed by the Europeans and has been present, to a greater or lesser degree, throughout Mozambique since colonisation began in 1498, the proportion of L1 Portuguese speakers is low to this day, because it was not until the late nineteenth and early twentieth centuries that the Portuguese government sought to strengthen its presence there (Firmino, 2008). Undermining the government's measures was the fact that, after independence in 1975, most of the colonists and their descendants living in Mozambique abandoned the country, thus reducing the numbers of L1 Portuguese speakers. In this way, Portuguese began to emerge in a context of few native speakers of the European variety and an overwhelming majority of users who had acquired it as a second language (L2) (Chimbutane, 2018).

Although studies do not converge as to the number of Bantu languages spoken in Mozambican territory, there are estimated at least 20 languages belonging to this family (Siteo & Ngunga, 2000). The 2007 Census found that the predominant local languages in Maputo were Tshwa, Rhona, Tonga, Copi and Changana. The latter, the most used, was spoken by 31.5% of the population, a lower rate than the percentage of the population preferentially using Portuguese in the capital (42.9%).

Recent comparative studies have shown that the Portuguese examined here differs from EP and has specific lexical, phonetic-phonological, morphosyntactic and pragmatic features of its own (Brandão & De Paula, 2018; Gomes, 2019; Gonçalves, 2015; Gonçalves & Chimbutane, 2004; Pissurno, 2018; Siteo, 1997; Timbane 2013;

Vicente, 2010; Vieira & Vieira, 2018). Analyses of various linguistic phenomena have revealed that: 1) the Portuguese of Mozambique is undergoing linguistic change strongly influenced by contact between languages and that speakers of Bantu languages as L1 have difficulty fixing the grammatical properties of Portuguese (Gonçalves & Siopa, 2005); 2) this variety displays greater variability in specific features of its grammar than found in languages acquired as L1 (Gonçalves, 2010); and 3) change is affecting not only Portuguese, but also languages such as Changana, which has changed in recent years at the lexical level through contact with Portuguese (Timbane & Berlinck, 2019).

### 3. Theoretical approaches and an overview of the literature

Prosodic Phonology Theory (Nespor & Vogel, 1986, 2007; Selkirk, 1984, 1986) posits that speech stream can be divided into hierarchically organised constituents: syllable ( $\sigma$ ) < foot ( $\Sigma$ ) < prosodic word (PW) < phonological phrase (PhP) < intonational phrase (IP) < phonological utterance (U). The study considered the right boundary of the PW, PhP and IP prosodic constituents (both internal and final within U), given their importance to observing tonal association, prosodic phrasing and tonal density. The algorithm for formation of the prosodic word assumes that this constituent has only one lexical accent (a prosodic word group has only one prominent element) (Vigário, 2003, 2007). A phonological phrase must be formed by a lexical head (heads of syntactic phrases whose nature is lexical, not functional), all the elements on the left side within the maximal projection of this head and also its non-branching complement on the right, containing only one PW (Frota, 2000; Tenani, 2002). Once the necessary conditions are met, a PhP must be constituted by more than one prosodic word, forming a single PhP with a non-branching complement. An intonational phrase must contain all sequences not structurally attached to the root sentence or all sequences of PhPs in a root sentence (Nespor & Vogel, 1986, 2007). IP formation is subject to conditions of prosodic length: long phrases (in number of syllables and prosodic words) tend to be split up, in the same way that short phrases tend to form a single IP with an adjacent IP, leading to the formation of phrases of even length (Frota, 2000; Serra, 2009, 2016).

On the Autosegmental Metrical Intonational Phonology (AM Model) approach (Beckman & Pierrehumbert, 1986; Ladd, 1996, 2008; Pierrehumbert, 1980), the contrastive elements of the intonational system that represent the melodic contours are pitch accents and tones related to the boundaries of prosodic constituents. Pitch accents (height levels: H = high tone and L = low tone) target the syllables bearing lexical accent and are formally followed by an asterisk (\*). Meanwhile, boundary-related tones are associated with boundaries of prosodic constituents rather than with syllables themselves. There are two types of boundary-related tones: (i) boundary tones, which are associated with the edges of an IP and are formally indexed by a (%) after H or L and (ii) phrase accents, associated with the edges of smaller constituents and indicated by a (–) after H or L.

The theoretical models of Prosodic Phonology and Intonational Phonology were important to this study, because they help annotate the melodic markings related to the boundaries of internal and final IPs (to inventorying the most frequent tonal events and the role of pauses in prosodic phrasing) and the occurrence of pitch accents by PW in each IP, highlighting tonal density trends in neutral sentences (declaratives and yes-no questions) in the variety of Portuguese investigated here; they also enable the findings to be compared with those of a set studies of other varieties of Portuguese and other Romance languages.

This study joints a tradition of research connected with the Romance Languages Database (RLD) project, which have investigated prosodic phrasing in Romance languages and their varieties (Avanzi et al., 2014; Braga, 2018; Cruz, 2013; Cruz & Frota, 2013; D’Imperio et al., 2005; Elordieta et al., 2003, 2005; Feldhausen, 2014; Feldhausen et al., 2010; Fernandes-Svartman et al., 2022; Frota et al., 2007; Frota & Vigário, 2007; Prieto, 2005; Rao, 2007, 2008; Santos, 2015, 2020; Vigário & Frota, 2003). These studies have shown that Catalan, French, Italian, Portuguese and Spanish display variation in prosodic phrasing of neutral declarative SVO (Subject-Verb-Object) sentences, where (SVO) and (S) (VO) are the most common patterns. Elordieta et al. (2003), comparing Catalan, Spanish and European Portuguese, found that length rather than syntactic complexity played a role in boundary placement.

Studies of EP have focused on the Lisbon (SEP), North (NEP), Alentejo (ALE) and Algarve (ALG) varieties, while studies of African

Portuguese have considered the varieties of São Tomé (STP), Guinea-Bissau (GBP) and the Angolan municipality of Libolo (LBP). In SEP and ALG, SVO sentences are produced preferentially as a single IP, resulting in longer phrases. In NEP and ALE, the pattern found most often is (S)(VO) (Cruz, 2013; Cruz & Frota, 2013; Frota & Vigário, 2007). In the African varieties, the preference is for phrasing the sentences in a single IP (SVO) (Braga, 2018; Fernandes-Svartman et al., 2018; Santos, 2015, 2020).

A number of studies of intonation in EP have shown that the nuclear contour of the neutral declarative found in the Lisbon variety (SEP) is H+L\* L% (Frota, 2000, 2002, 2003; Frota & Vigário, 2000, 2007; Viana, 1987; Vigário & Frota, 2003). However, other melodic patterns are found in Portugal; the monotonal L\* L% configuration is found in the NEP (Vigário & Frota, 2003) and ALE varieties, while (H)+L\* L% is found in the ALG variety (Cruz & Frota, 2011). Of the African varieties that have been studied, H+L\* L% and L\* L% patterns are also recurrent in GBP (Santos, 2015). Furthermore, in STP (Braga, 2018), there is a preference for the monotonal L\* L% configuration, followed by the bitonal H+L\* L%, while in LBP, H+L\* L% is used exclusively (Santos, 2020). In spontaneous speech in MP, Serra and Oliveira (2018) found that a falling final contour predominated in the declaratives, with the configuration most produced being H+L\* L%.

The melodic contour of the yes-no questions also varies with the variety of Portuguese. In EP, studies of the SEP variety point to the presence of an H+L\* LH% falling-rising movement in the nuclear portion (Frota, 2002; Frota et al., 2015; Vigário & Frota, 2003). In the ALE variety, a low monotonal pitch accent predominates, followed by an also low boundary (L\* L%) (Cruz & Frota, 2011; Frota, 2014). The same configuration is found in declaratives. Meanwhile, the NEP and ALG varieties are notable for a rising-falling nuclear contour and the following phonological configurations; L\* HL% in NEP (Vigário & Frota, 2003) and L\*+H HL% in ALG (Cruz & Frota, 2011). The pattern of neutral yes-no questions has been studied in three varieties of Portuguese: in STP, the rising-falling contour was used categorically, with the L\* +<sub>i</sub>H HL% configuration predominating (Braga, 2019); in GBP, (L+)H\* L% was used semi-categorically (89.2%) (Braga et al., this volume); and, in LBP, there was a balance between the rising-falling

L+H\* L% pattern (58.3%) and the rising L\* LH% pattern (41.7%) (Santos, 2020).

As regards tonal density in the African varieties, the percentages of PWs receiving pitch accent in both declaratives and questions were high in reading speech (Santos, 2015, 2020; Braga, 2018) and average in spontaneous speech (Serra & Oliveira, 2018). A high distribution of pitch accents has also been found in the European varieties NEP, ALE and ALG (Cruz & Frota, 2011; Vigário & Frota, 2003). At odds with the overall tendency, the Lisbon variety displays low (17%) tonal density (Frota & Vigário, 2000; Vigário & Frota, 2003).

This section closes with some information on intonation in Changada, the substrate language for the Portuguese speaker of this study and many other inhabitants of Maputo and other provinces of Mozambique. Ngunga and Simbine (2012), who describe the grammar of Changana, mention the complexity of this tonal language. It features quantity contrast (short and long syllables), with the long syllables receiving the complex tones (low-high and high-low). They thus argue that “tone is not a property of the syllable, but of mora, each of the components of the long syllable” (Ngunga & Simbine, 2012, p. 69), explaining also that Changana has long vowels in the penultimate syllable only, and that their occurrence is predictable. Changana also uses tone to provide grammatical information such as tense, mode, aspect, person, number and so on, adding a grammatical function to tone in addition to its lexical function. They exemplify the two tonal levels of the language – high tone indicated by the diacritic (´) and low tone, by the diacritic (˘) – as follows:

- (1) a) mávèlè ‘breasts’  
màvèlè ‘maize’  
b) nàlà ‘enemy’  
nàlá ‘palm’  
c) kámbà ‘peel or shell’  
kámhá ‘thief’  
d) músi ‘pestle’  
músí ‘smoke’  
e) wàjá ‘you eat’ 2<sup>nd</sup> pers. sing., present indicative, verb “to eat”  
wájá ‘he eats’ 3<sup>rd</sup> pers. sing., present indicative, verb “to eat”

(Ngunga & Simbine, 2012, p. 72)



## 4. Materials and methodology

The speech material analysed here is an adaptation of the reading task developed by the Romance Languages Database (RLD) project (see Section 3), which was incorporated into the Interactive Atlas of Portuguese Prosody (InAPoP) project (Frota, coord., 2012-2015), of which this study forms part.

The reading task was recorded in September 2019, at the Acoustic Phonetics Laboratory of the Faculdade de Letras, Universidade Federal do Rio de Janeiro (UFRJ), in a room with acoustic isolation, by way of a Powerpoint presentation containing the set of sentences to be read one by one. The speaker<sup>4</sup> (labelled here as MPFP) was female, 21 years old at the time the recording was made, born in the capital, Maputo, to parents also born there. She self-identified as a speaker of Portuguese as her mother tongue, and was also proficient in Changana, the language she used to talk to her maternal grandmother. At home with the family, she said she used Portuguese in interactions with her parents. At the time of recording, she had been on an exchange programme at the UFRJ for the prior year and a half.

Conducting a case study was not a choice, but a necessity imposed by the Covid-19 pandemic, although it would have been more advantageous in every way to examine data from a larger number of speakers<sup>5</sup>. That is also the reason for the imbalance between the numbers of declaratives and questions in the sample. As it proved impossible to obtain recordings of SVO declaratives from more participants in time, it was decided to incorporate the questions initially recorded as distraction sentences into the analysis.

The structure of all 76 neutral declarative sentences of the reading task was SVO. The internal complexity of the constituents was

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4. The participant signed a declaration of informed consent and the protocol for this study (recording) was submitted to the UFRJ research ethics committee and validated (Process 52275521.6.0000.5582).

5. At first, it was planned for one of the authors to visit Maputo to record the speech samples on the spot from 5 female speakers of similar sociolinguistic profile, but the trip – which was to take place in March 2020 – was cancelled because of the pandemic. Only very recently was it possible to make 3 further recordings online, which will serve as material for future studies.

controlled for number of syllables (short, three-syllable constituents and long, five-syllable constituents, including determiners and prepositions) (see examples 2 and 3). Regarding syntactic and prosodic branching of S and O, the stimuli contain: i) non-branching constituents containing one PW (see example 4); ii) branching constituents comprising two PWs (see example 5); and iii) double-branching S and O containing a nucleus and two PWs (see examples 6). The sample of neutral yes-no questions was smaller, comprising 11 sentences (see examples 7, 8 and 9). The 87 target sentences were interspersed with 61 distraction sentences. The speaker read the complete set three times, with brief intervals between stages. In all, 228 declaratives (76 sentences × 3 repetitions) and 33 yes-no questions (11 sentences × 3 repetitions) were collected from the speaker. However, 11 declaratives and 2 questions were discarded from the overall data for calculation, because they contained hesitations that clearly did not correspond to natural production.

- (2) [A.no.ra]<sub>S</sub> [mi.ma.va]<sub>V</sub> [a.noi.va]<sub>O</sub>  
[Short subject (3σ)] [Short verb (3σ)] [Short object (3σ)]  
'The daughter-in-law spoiled the bride'
- (3) [O.na.mo.ra.do]<sub>S</sub> [re.me.mo.ra.va]<sub>V</sub> [a.me.lo.di.a]<sub>O</sub>  
[Long subject (5σ)] [Long verb (5σ)] [Long object (5σ)]  
'The boyfriend remembered the melody'
- (4) [A libanesa]<sub>S</sub> [levava]<sub>V</sub> [a bananada]<sub>O</sub>  
[Non-branching Subject and Object]  
'The Lebanese woman took the banana sweet'
- (5) [A nora loira]<sub>S</sub> [levava]<sub>V</sub> [velhinhas lindas]<sub>O</sub>  
[Branching Subject and Object]  
'The blonde daughter-in-law took pretty old ladies'
- (6) [[A libanesa] [maravilhosa] [de Borborema]]<sub>S</sub> [memorizava]<sub>V</sub>  
[[a serenata] [maravilhosa] [da Madalena]]<sub>O</sub>  
[Double-branching Subject and Object]  
'The marvellous Lebanese woman from Borborema memorised Madalena's marvellous serenade'
- (7) A lição dez confundiu as alunas?  
'Did lesson ten confuse the pupils?'
- (8) Os rapazes compraram lâminas?  
'Did the boys buy blades?'
- (9) Ela foi ver a Marina?  
'Did she go to see Marina?'

Using Praat software (Boersma & Weenink, 2017), it was possible to identify and annotate the tonal events associated with the melodic contour and to measure pause durations in seconds. Prosodic boundaries in the process of phrasing were identified from perception and observation of the acoustic signal, considering pauses and a nuclear contour configuration (nuclear pitch accent + boundary tone) expressed by fundamental frequency ( $F_0$ ) modulation and/or the  $F_0$  reset on a different level after the boundary (Fernandes-Svartman et al., 2022; Frota & Vigário, 2007; Serra, 2009, 2016).

This analysis thus focused on the prosodic phrasing, occurrence and duration of silent pauses at the edges of constituents (for declarative sentences only), the nuclear contour configuration, pre-nuclear contour features and tonal density (for declaratives and yes-no questions). *Prosodic phrasing* is understood here as the important function of prosody of splitting the speech stream up into smaller units, generating well-formed constituents, as well as prosodic boundaries at the edges of these constituents. *Tonal density* was calculated by excluding the initial and final stressed syllables of the IP, because they necessarily received a pitch accent, and then counting the pitch accents associated with the PWs internal to the IPs.

## 5. Analysis of results, comparison between varieties, and discussion

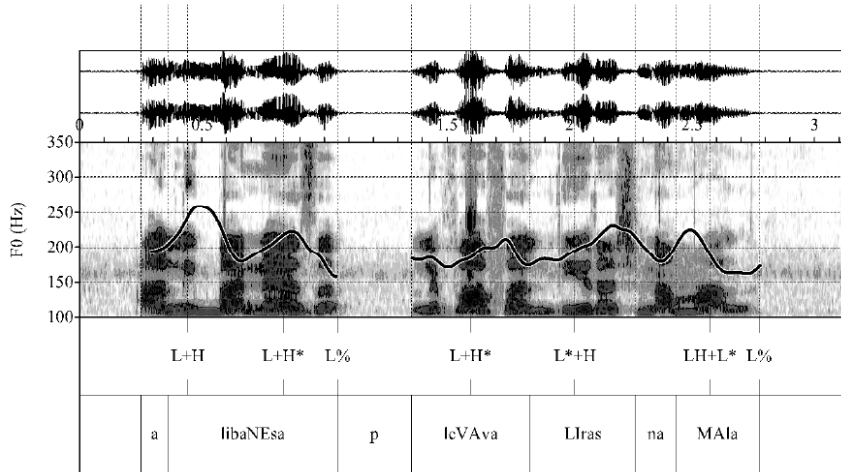
### *Neutral declaratives*

#### A) Prosodic phrasing

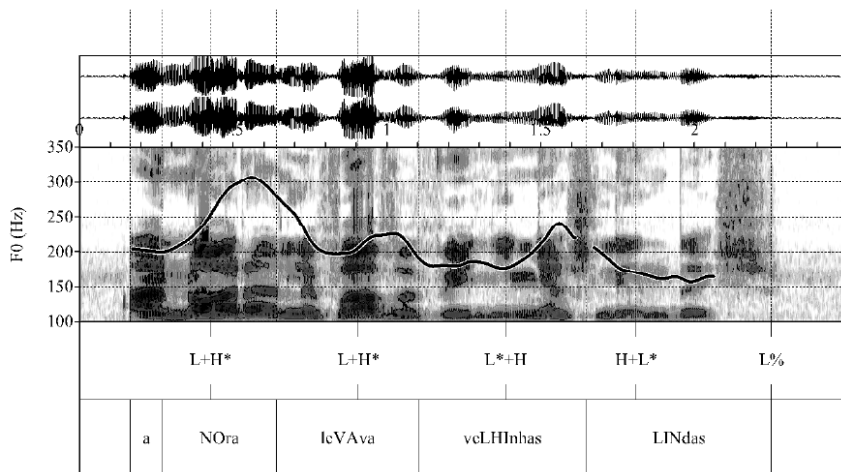
In absolute terms, the pattern found most frequently in the data was (S)(VO), followed by (SVO), with a quite considerable difference between the percentage of occurrences: respectively, 65% (141/217) and 28% (60/217) (see Figures 1 and 2). (SV)(O), (S)(V)(O) and other patterns with internal boundaries produced in specific conditions of size and branching were less productive (16/217 or 7% of tokens). There was thus found to be a strong tendency for this speaker to map Subjects and Predicates into separate IPs. That preliminary finding may point to the emergence of a variety of Portuguese different in phrasing from

the other African varieties, given that the (SVO) pattern is practically categorical in STP, GBP and LBP (Fernandes-Svartman et al., 2018; Santos, 2015).

**Figure 1** – Intonational contour of the neutral declarative [a libaNEsa]<sub>IP</sub> [leVAva liras na MAla<sup>6</sup>]<sub>IP</sub> (S)(VO) ‘The Lebanese woman had lire in the suitcase.’ (Sp. MPFP, R2)



**Figure 2** – Intonational contour of the neutral declarative [a NOra leVAva veLHInhas LINdas]<sub>IP</sub> (SVO) ‘The daughter-in-law took lovely little old ladies.’ (Sp. MPFP, R1)



Regarding branching, the findings from the Mozambican speaker revealed that with non-branching S, (SVO) and (S)(VO) patterns were found in similar percentages (47.3% and 46.1%, respectively); with branching S, however, (S)(VO) tokens increased considerably, to 78.6% against 13.5% (SVO). The role of the prosodic weight and S branching (number of syllables vs. number of words/branchingness) parameters in phrasing is shown by the data in Table 1.

**Table 1** – Phrasing patterns in neutral declaratives with short and long, branching and non-branching Subject

Pattern	Non-branching S				Branching S				Double Branching S			
	Short N		Long N		Short N + AP or PP*		Long N + AP or PP		Short N + AP + PP		Long N + AP + PP	
	Tkns**/total	%	Tkns/total	%	Tkns/total	%	Tkns/Total	%	Tkns/total	%	Tkns/total	%
(S)(VO)	26/44	59.1%	16/47	34%	35/48	73%	37/43	86%	13/18	72.2%	14/17	82.4%
(SVO)	17/44	38.6%	26/47	55.3%	10/48	20.8%	4/43	9.4%	2/18	11.1%	1/17	5.8%
(S)(V)(O)	-	-	2/47	4.3%	2/48	4.2%	1/43	2.3%	2/18	11.1%		
(SV)(O)	1/44	2.3%	-	-	1/48	2%						
(Others)	-	-	3/47	6.4%	-	-	1/43	2.3%	1/18	5.6%	2/17	11.8%

\* N: Nucleus; AP: Adjective Phrase; PP: Prepositional Phrase.

\*\* Tkns: tokens.

The (S)(VO) and (SVO) rows in Table 1 show that long constituents favour the occurrence of a boundary after S, regardless of whether the branching is single or double – with the exception of what happens with non-branching S, where the short constituent (59.1%) favours an IP boundary more than the long constituent (34%). Interestingly, if long, non-branching S (*a.li.ba.ne.sa* ‘the Lebanese woman’) and short, branching S (*a.no.ra.loi.ra* ‘the blond daughter-in-law’) are compared, although they comprise the same number of syllables (5), branching increases the likelihood of a boundary by 39% (from 34% to 73%). The same does not occur with long, branching S (*a.li.ba.ne.sa.ma.ra.vi.lho.sa* ‘the marvellous Lebanese woman’) or short, double-branching S (*a.no.ra.mo.re.na.da.velha* ‘the old woman’s brunette daughter-in-law’); although they contain similar number of syllables (10 and 9, respectively), a boundary is more likely after the S where

there is less complex branching (86% against 72.2%). In any case, the percentages are high and well in excess of average values for non-branching S (46.1%).

The concern here is with the effects of phonological weight, on the one hand, and of the number of PWs in the S constituent (or its syntactical branching), on the other. With an expanded sample, it will be possible to confirm or refute the tendency for an IP boundary to be produced after S with constituents of greater weight, but the same branching.

The presence of pauses functions as an important acoustic clue to the production of prosodic phrasing. This study also attested to their importance: of the 141 tokens of the (S)(VO) pattern, 126 (89.4%) were found to contain a pause between the IP that mapped the Subject and the IP grouping the Verb and Object. The pauses lasted from 0.049s to 0.602s, averaging 0.283s, with a standard deviation of 0.114s (the mean would be between 0.169s and 0.397s). Serra and Oliveira (2018) also note that pauses mark the right boundary of 68.3% of medial IPs in MP spontaneous speech, giving essential acoustic clues to the production of prosodic phrasing.

In addition to IP-related boundary tones in the speech of the Maputo speaker, this study found that it was also possible for phrase accents<sup>7</sup> to be associated (Table 2). Very often a phrase accent is associated with the right boundary of a minor phrase, and that accent may equally be L- or H-, depending on its scope, if it is between S and V and even within the S (L-), or if it is between V and O (H-) (see Table 3 and Figure 3), always after long PWs. Taken together, these properties differentiate the variety

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7. In the literature on Portuguese, phrase accent is referred to as a kind of less robust boundary related to the PhP constituent. In the data of this study, phrase accent also occurred at the PhP-internal PW boundary (Table 3), between the nucleus and its complement in the S – (N)(PP) and (N)(AP) – and also between the V and its non-branching complement. Accordingly, here it is referred to it as a minor phrase break, comprising PhP and PW, as contrasted with a major phrase break (IP). With regard to phrase accent in English, Beckman and Pierrehumbert (1986) suggest that it is linked not only to the right edge of the intermediate phrase, but also to the right edge of the nuclear word, as a right boundary tone for that word. For a discussion of the divergences as to size and type of units in the prosodic hierarchy that may serve as scope for phrase accent, see Grice et al. (2000). The task of determining the exact nature of these constituents demarcated by a minor phrase break must be left to future studies.

considered here from any other variety of Portuguese ever studied. If this boundary-marking tendency is confirmed from other speakers, MP may prompt interesting discussion on the interaction between syntax and intonation in indicating the Verb's external (Subject) and internal (Object) arguments.

**Table 2** – Boundary distribution in neutral declaratives

	Without boundary		IP boundary (major phrase breaks)		Phrase accent (minor phrase breaks)	
	Tkns/total	%	Tkns/total	%	Tkns/total	%
(S)(V)	18/217	8.3	153/217	70.5	46/217	21.2
(V)(O)	61/217	28.1	10/217	4.6	146/217	67.3

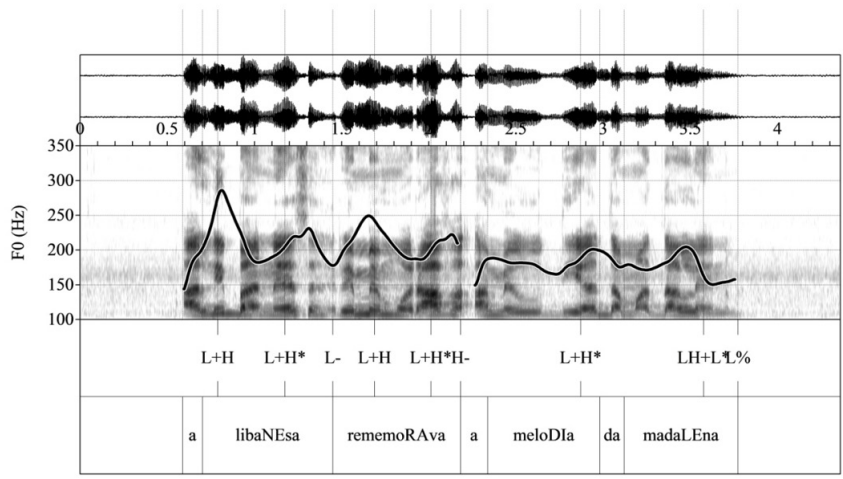
**Table 3** – Types of phrase accents in neutral declaratives

	L-		H-	
	Tkns/total	%	Tkns/total	%
(S)(V)	37/46	80.5	9/46	19.5
(V)(O)	15/143	10.5	128/143	89.5
Within the Subject (N)(AP+PP), (N)(PP) e (N) (AP)	52/52	100	-	-
Total	104/241	43	137/241	57

**Figure 3** – Intonational contour of the neutral declarative  
[(a libaNesa)<sub>PhP</sub> (rememoRAva)<sub>PhP</sub> (a meloDia da madaLEna)<sub>PhP</sub>]<sub>IP</sub> (Sp. MPFP, R2)<sup>8</sup>

L-                          H-

‘The Lebanese woman recalled the melody of the Magdalene.’



**B) Pre-nuclear pitch accent and additional tone**

One almost categorical in the declaratives was a rising tonal configuration associated with the first PW of the IP. Given that, in our data, the (S)(VO) phrasing pattern was the most frequent, we examined 217 final IPs, as well as 168 medial IPs (which result from the production of an IP boundary internal to the sentence), giving a total of 385 IPs. Of these, 52 comprised a single PW, such as the first IP of [[o namoRAdo]<sub>IP</sub> [maraviLHAva a NOra moREna da VELha]<sub>IP</sub>]<sub>U</sub> (‘The boyfriend amazed the old woman’s brunette daughter-in-law.’), and displayed no pre-nuclear pitch accent. In the remaining 333 IPs, the predominant pre-nuclear tonal configuration was L+H\* (267/333,

8. In all cases where the verb ended with the vowel [a] and was followed by the determinant [a] of the object, the speaker produced a creaky voice, leading to a discontinuity in the F<sub>0</sub> curve, making it difficult to visualise it. Nonetheless, the speaker maintained the high H- tone anchored in the post-stressed syllable of the verb, and always produced the two vowels, and thus avoiding vowel sandhi. In fact, observed together, these events contributed to identifying the existence of a boundary there that was not as robust as the IP boundary (to our ears, there was no pre-boundary lengthening nor pause, for example). In any case, it is our intention to undertake a quantitative description of the acoustics of all phrase boundaries, so as to determine these characteristics more precisely.



80.2%), followed by L\*+H (65/333, 19.5%) and only one H+L\* token (0.3%). A similar tendency was found in IP-internal PWs.

In a pilot study of spontaneous speech in the Mozambican variety, Serra and Oliveira (2018) also found a predominance of the bitonal L+H\* accent associated with the pre-nuclear portion of declaratives (90.2%). Close observation of the data of that study and of this one warranted the suggestion that the anchoring of the H pitch accent in the stressed and post-stressed syllables may constitute phonetic implementations of the same phonological pitch accent, which – by virtue of its frequency – is considered to be L+H\*. Whether in the style of spontaneous speech or reading, these still preliminary findings reveal a tendency to a complex rising initial contour to the IP, which would agree with what has been found in other African varieties of Portuguese studied previously: L\*+H in STP (70.3%) (Braga, 2018) and in GBP (77.2%) (Santos, 2015), and L+H\* (97.6%) in LBP (Santos, 2020), also in reading task data. In SEP, both H\* and L+H\* accents have been found and, in NEP, L\*+H was associated with an IP-initial pitch accent (Frota, 2003; Vigário & Frota, 2003).

In addition to the categorical tokens of pitch accents anchored in the stressed syllables of all PWs in the IP, there is also the possibility of an additional tone L+H associated with the pre-stressed syllables of long PWs.<sup>9</sup> Prosodic mapping of these tokens revealed that this extra tonal event is more frequent in the first PW in absolute IP-initial position, appearing in more than half (54.2%) of long S nuclei. Although an extra tone was less common in V (only 17.8%), in 14 of the 19 tokens recorded, the V was IP-initial as a result of (S)(VO) phrasing and, in the remaining 5 tokens, occurred after a phrase accent (Figure 3). In other constituents, this additional tone appeared in smaller percentages of the long words in these contexts (see Table 4).

9. The nature of this tonal event, whether it is a pitch accent associated with the secondary stress or an edge tone, is a topic to be addressed in future research.

**Table 4** – Location of long words and frequency of additional tone in neutral declaratives

Location of target word	Extra tone		No extra tone	
	Tkns/total	%	Tkns/total	%
S nucleus ( <i>a libaNEsa</i> ‘the Lebanese women’ and <i>o namoRAdo</i> ‘the boyfriend’)	58/107	54.2	49/107	45.8
V ( <i>maraviLHava</i> ‘marvelled’, <i>re<del>m</del>emoRAva</i> ‘remembered’, <i>manu<del>s</del>eAva</i> ‘handled’, and <i>memoriZAva</i> ‘memorised’)	19/107	17.8	88/107	82.2
O nucleus ( <i>a sereNata</i> ‘the serenade’ and <i>a/uma</i> <i>meloDla</i> ‘the/a melody’)	9/106	8.5	97/106	91.5
O AP ( <i>maraviLHOsa</i> ‘marvellous’)	5/37	13.5	32/37	86.5

An additional tone was also found in GBP by Santos (2015), but differed from what was observed in our data in both form and position in the sentence. Santos reported the H additional tone associated with long phonological words, but anchored to the word “*uma*” (feminine ‘one’) of the phonological word (*uma melodia* ‘a melody’)<sub>PW</sub> (15.2% of total tokens of the word), located in the O nucleus in his data. He explained that this tonal marking may relate to the fact that “*uma*” is disyllabic, containing a left-stressed foot. In our data, there was also an extra accent in “*uma*” of (*uma melodia* ‘a melody’)<sub>PW</sub>, but the frequency was low, as also in the syllable “*ra*” of the PW *maraviLHOsa* in (*a serenata maravilhosa* ‘the marvellous serenade’)<sub>PhP</sub> (8.5% and 13.5%, respectively).

### C) Nuclear pitch accent and boundary tone

Final and medial IPs were analysed separately (see Table 5), because a number of studies have now demonstrated that the melodic behaviour of these IPs tends to differ.

**Table 5** – Configuration of nuclear contours associated with final and medial IPs in neutral declaratives

Final IPs			Medial IPs		
Nuclear contours	Tkns/total	%	Nuclear contours	Tkns/total	%
LH+L* L%	129/217	59.4	L*+H H%	84/168	50
H+L* L%	87/217	40.1	L+H* L% (L+<H* L%)	59/168	35.1
H*+L L%	1/217	0.5	L+H* H%	14/168	8.3
			L*+H L%	8/168	4.8
			H*+L L% (H+L* L%)	2/168	1.2
			H+L* H%	1/168	0.6

In the 217 final IPs, a rising-falling nuclear accent predominated (59.4%), but a falling nuclear accent also occurred (40.6%), always followed by a low boundary tone (Figures 1 and 2). In some cases, the H+L\* pitch accent could be interpreted as a tritonal LH+L\* pitch accent.<sup>10</sup> However, either there was insufficient segmental material for the initial rising pitch to be expressed or it was phonetically too discreet. In a previous study, Serra and Oliveira (2018) observed that the falling final contour predominated in the declaratives, with the configuration most produced being H+L\* L% (60%). Re-examination of these tokens of spontaneous speech revealed that many cases of H+L\* L% could be re-interpreted as LH+L\* L%, although the initial rising movement preceding the fall was not all that substantial. As these were different speakers, it cannot be said whether this is a tendency in speech of Maputo or whether these are idiosyncratic tendencies. Whatever the case, however, the tritonal LH+L\* pitch accent was a very consistent occurrence in the reading tokens. In the other European and African varieties, as seen in Section 3, the H+L\* L% and L\* L% nuclear contours predominate in SVO declaratives.

Unlike what is observed in final IPs, there is greater variety in the nuclear contours associated with the 168 medial IPs, where rising, rising-falling and even falling movements occur. The nuclear

10. We thank one of the anonymous reviewers of the preliminary version of this paper for pointing out this possibility of analysis.

configurations most associated with these IPs in the data were L\*+H H% (50%) and L\*+H L% (35.1%). Focussing only on boundary tones, a high boundary (H%; 99/168, 59%) was more often associated with the right edge of the medial IPs than a low boundary (L%; 69/168, 41%).

In spontaneous speech, however, Serra and Oliveira (2018) found a preference for a falling H+L\* L% movement (60%) in medial IPs, although a significant number of rising final contours were also identified (33.3%). In GBP, Santos (2015) found a predominance of rising patterns in the nuclear configuration of medial IPs (L+H\* H%, L\*+H H% and L\* LH%), corresponding to 70.2% of total tokens.

These findings for medial IPs, produced by (S)(VO) phrasing, suggest that the suspensive movement indicating that the sentence has not been closed syntactically may be displayed in rising contours, but also in the falling contours that would normally indicate the closure of the overall SVO structure.

#### D) Tonal density

Of the total 1011 PWs found in the study data, 254 were internal and all received pitch accent. That finding, taken together with the possibility of an additional tone on pre-stressed syllables in long words, led to the conclusion that the neutral declaratives produced by the Mozambican speaker in reading style displayed high tonal density, in line with the tendency of the other African varieties. In spontaneous MP speech, however, 43.2% of tonal accents were associated with internal PWs (Serra & Oliveira, 2018), a considerably lower number than found in the sentence reading task in this study. It may be thought that the speakers behave differently, but also that the reading task offered clearer contexts for observing tonal density, because it involved controlled phrases which did not offer context for, for example, stress clashes between words.

#### *Neutral yes-no questions*

Despite the small number of yes-no questions (31), the results obtained here may perhaps indicate trends characterising this sentence

type. The phonological configuration of the first pitch accent in the IP was categorically L+H\*. The format of PW-internal pitch accents seems to vary with the constituents size and to be explained by the fact that some data displayed stress clash between words (*O gaLÃANda de carro?* ‘Does the ladies’ man drive?’). As a result, these internal (L\*+H and H\*) pitch accents are assumed, for the moment, to be phonetic variants of what can be represented phonologically as L+H\*. Accordingly, as regards the IP-initial or -internal prenuclear accent, there is no distinction between declaratives and yes-no questions.

As shown by other studies, what differentiates questions from declaratives is the nuclear portion of the IP. The nuclear contour of yes-no question from this MP speaker is mostly rising-falling (90.3%, 28 tokens) and only 3 tokens of the rising pattern (9.7%) were identified (see Table 6), which is rather similar to what is seen in various varieties of Portuguese, including STP, in which it is categorical (Braga, 2019). Three tokens were assigned the contour L+<<sub>i</sub>H\* L%, with the diacritic < preceding the H tone, indicating the onset of a melodic rise at the stressed vowel, although the F<sub>0</sub> peak aligned with the post-stressed syllable (late alignment). Whenever the H tone aligned with the centre or right edge of the stressed vowel and was followed by a melodic fall, the notation used was L+(<sub>i</sub>)H\* L%.

**Table 6** – Frequency of melodic configuration of nuclear contours of neutral yes-no questions

	Melodic configuration	Tkns/ total	%
Rising-falling (90.3%)	L+H* L% (L+ <sub>i</sub> H* L%)	22/31	70.9%
	L+< <sub>i</sub> H* L%	3/31	9.7%
	L*+H L%	3/31	9.7%
Rising (9.7%)	L+H* H% (L+ <sub>i</sub> H* H%)	3/31	9.7%

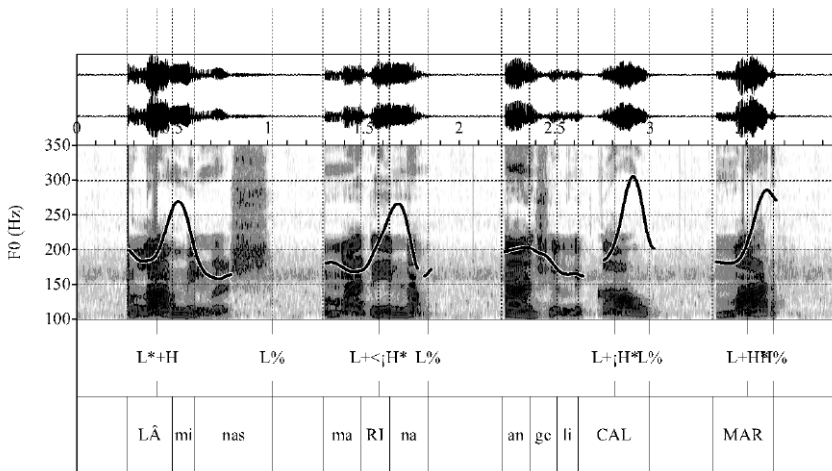
Regarding the final rising configuration, note that the 3 tokens identified corresponded to the same sentence [Ela FOI VER o MAR?]<sub>IP</sub> (Did she go to see the sea?), in which the final PW of the IP is a stressed monosyllable. Several authors (Frota et al., 2015; Grice et al., 2015) argue that languages such as Brazilian Portuguese and Italian opt for the strategy of truncation (reducing the number of pitch accents in the

absence of sufficient phonetic material) in cases like this where there is no post-stressed syllable to anchor the boundary tone. The rising-falling yes-no question configuration can then be produced by way of its variant, the rising contour.

In 9 tokens, F<sub>0</sub> attained the highest level in the nuclear contour. The notation L+<sub>i</sub>H\* was thus used to indicate this quite marked rise in the melodic contour, as compared with the amplitude of F<sub>0</sub> in the preceding pre-nuclear pitch accents. This is also a quite recurrent feature of STP (Braga, 2019), but not of GBP (Braga et al., this volume).

The possible accommodations of the L+H\* L% tonal event to different stress configurations of PWs in the nuclear region of the yes-no questions, after edition of the data, are shown in Figure 4.

**Figure 4** – Nuclear contour of the neutral yes-no questions [os raPAzes comPRA-ram LÂminas?]<sub>ip</sub> (Did the boys buy blades?) (Sp. MPFP, R1), [Ela FOI VER a maRIna?]<sub>ip</sub> (Did she go to see Marina?) (Sp. MPFP, R2), [o canTOR canTOU uma maNHÃ angeliCAL?]<sub>ip</sub> (Did the singer sing an angelical morning?) (Sp. MPFP, R3), [Ela FOI VER o MAR?]<sub>ip</sub> (Did she go to see the sea?) (Sp. MPFP, R2)



Lastly, high tonal density was also found in the yes-no questions, with the stressed syllables of all the 48 IP-internal PWs associated with a pitch accent. Similarly, studies of the other African varieties point to a high tonal density among yes-no questions in reading tasks, although

the indices – 61.8% in LBP (Santos, 2020), 80.4% in GBP (Braga et. al., this volume) and 87.3% in STP (Braga, 2019) – are smaller than among declaratives. Of the European varieties, only in SEP is the distribution of pitch accents internal to PWs sparser (Frota et al., 2015).

## 6. Overall balance and future research

This final section summarises the findings of this study and of those that preceded it and, from there, plots a course for future research. The results shown in Table 7 and 8 are comparable because they are the products of reading tasks. All available percentages are given. In only one case, precisely in MP, results are also shown for spontaneous speech. Empty cells indicate that no results are available in the prosodic aspect under consideration (first column of the tables), in the respective variety of Portuguese (first line of the tables).

**Table 7** – Neutral declaratives in European and African varieties of Portuguese

	MP Reading Task	MP Spontaneous Speech	STP	GBP	LbP	SEP	NEP	ALE	ALG
Prosodic phrasing	(S)(VO) 65%		(SVO) 100%	(SVO) 100%	(SVO) 96,8%	(SVO) 98%	(S)(VO) 53%	(S)(VO) 66%	(SVO) 65%
Pre-nuclear contour (Initial pitch accent)	L+H* L*+H 99.7%	L+H* 90.2%	L*+H 70.3%	L*+H 77.2%	L+H* 97.6%	H* L+H*	L*+H		
Additional tone	L+H			H					
Nuclear contour - Final IP	LH+L* L% 59.4 H+L* L% 40.1%	(L)H+L* L% 65% L* L% 25%	L* L% H+L* L%	H+L* L% L* L%	H+L* L% 100%	H+L* L%	L* L%	(H)+L* L%	H+L* L%
Nuclear contour - Medial IP	L*+H H% L+H* H% 58.3% L*+H L% L*+H L% 39.9%	H+L* L% 60% L+H* H% 33.3%		L+H* H% L*+H H% L* LH% 70.2%	L* H% L*+H H% L+H* L%	H+L* H% L*+H H%	L* H%		
Phrase accent	PhP/Pw <sub>L</sub> PhP/Pw <sub>H</sub>		PhP <sub>L</sub>	PhP <sub>L</sub>	PhP <sub>L</sub>			<sub>L</sub> PhP/IP]	
Tonal density	100%	43.2%	100%	94%	100%	17%	74%	83%	67%

**Table 8** – Neutral yes-no questions in European and African varieties of Portuguese

	MP Reading Task	STP	GBP	LBP	SEP	NEP	ALE	ALG
Pre-nuclear contour (Initial pitch accent)	L+H* 100%		L*+H H*	L+H*				
Nuclear contour - Final IP	L+(i)H* L% L+<H* L% L*+H L% 90.3%	L*+iH HL% 84,6%	(L+)H* L% 89.2%	L+H* L% 58.3% L* LH% 41.7%	H+L* LH%	L* HL%	L* L%	L*+H HL%
Tonal density	100%	87.3%	80.4%	61.8%	29%	43%	54%	50%

Firstly, regarding phrasing in the declarative sentences, MP was found to display primarily the (S)(VO) pattern, distancing itself from the other African varieties and also from the Lisbon speech that serves as its model. Differences were also found in MP in the nuclear contour of final IPs in these sentences, where LH+L\* L% was most frequent; this contour is not found in other varieties of Portuguese that have been studied. In medial IPs, there is more variation in all African varieties, although the rising nuclear contours also found in the SEP and NEP European varieties predominate. In the pre-nuclear position, the melodic contours common to the varieties appeared in varying frequency distributions, with the rising (L+H) contour predominating. However, another pre-nuclear tonal event distinguished MP from the other European and African varieties of Portuguese: an additional tone L+H was possible in association with pre-stressed syllables of long, particularly IP-initial, PWs. This extra tonal event also exists in GBP, but is infrequent and unrelated to the first PW in the IP.

As regards the occurrence of phrase accents, once again our findings differ from those of other studies, because the speech of the MP participant was peculiar both in displaying more frequent phrase accents and in their association with the right edge of not only the PhP, but also the PW, as well as the possible occurrence of H- or L-, depending on the syntactic constituent receiving that boundary. In STP, GBP and LBP, phrase accent is infrequent, always low (L-) and associated with the right boundary of non-final PhP. It is also more commonly associated with the Subject, although it may occur in the Predicate,



particularly in STP. In the ALE variety, low phrase accents also occur, but with very different characteristics: they are associated with the left boundary of the IP-final PhP. Overall, in production of boundaries (of IP and smaller constituents) and their type and position in the sentence, the results of this study show MP to be peculiar in prosodic phrasing and its syntactic and prosodic characteristics, not only in relation to other varieties of Portuguese, but also in relation to what is known of other Romance languages.

Regarding tonal density, in declaratives, it is the Portuguese spoken in Lisbon that differs from the speech of the other localities, but there are also differences in distribution when declaratives and yes-no questions are compared, because the latter display lower tonal density in most of the varieties of Portuguese considered here. In the MP data in this study, however, PWs necessarily receive one pitch accent.

The very few yes-no questions available to this study varied greatly in their internal structure, and were thus not analysed for prosodic phrasing nor for the occurrence of phrase accent, but non-systematic observation revealed the existence of both sentence-internal boundaries mapping S and VO in different IPs, and L- and H- phrase accents. The findings regarding pre-nuclear pitch accent in these sentences converge with those for other African varieties and, as regards nuclear contour, the rising-falling movement is the most found in all varieties, with some instability in alignment of the H tone of the nucleus. For this phrase type, only the Lisbon variety (SEP) differs from the others, in that it displays a falling-rising nuclear contour and low tonal density. In all the African varieties, tonal density is high and, in the data from the MP speaker, pitch accent is necessarily assigned to all PWs in the IP.

The hypothesis examined in this study is that the complexity revealed by the overall findings is yet another product of contact between Portuguese and the Changana language, which many studies of other components of the grammar have identified as participating in an emerging standard for Portuguese in Mozambique. If these findings are confirmed, one could argue for incorporation of the most salient features into the intonational system of MP.

The intention is for future stages of this research, in addition to expanding the samples of speech by including more speakers of

Mozambique Portuguese and more styles of speech (semi-spontaneous and spontaneous), to describe the intonational characteristics of Changana, the main Bantu language spoken in Maputo, on the basis of a text reading task already recorded by 3 speakers of the language. The hypothesis is that contact between an intonational language (Portuguese) and a tonal language (Changana) may have impact on how Portuguese is spoken by Mozambicans, even those with Portuguese as their L1. It will also be important to examine the situation of Portuguese (and contact languages) in each African context where the language was imposed, given that the African varieties of Portuguese are at very different formative stages in each country. The major challenge is to solve that jigsaw puzzle.

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## Conflict of interests

*The authors declare they have no conflict of interest.*

## Author Credits Statement

The authors, Carolina Serra and Ingrid Oliveira, hereby declare that they have no potential conflict of interest in this study. Both participated in the conceptualisation, methodology, design, formal data analysis, statistical data analysis, fundraising, project administration, project supervision, data collection, data generation, data validation, editing, content review and writing of this study.

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