

# WHY TUNE OR TEXT? THE ROLE OF LANGUAGE PHONOLOGICAL PROFILE IN THE CHOICE OF STRATEGIES FOR TUNE-TEXT ADJUSTMENT

Marina Vigário, Marisa Cruz & Sónia Frota

University of Lisbon

mvgario@campus.ul.pt, marisac@campus.ul.pt, sfrota@campus.ul.pt

## ABSTRACT

Languages exhibit various strategies to deal with tune-text conflicts, arising when voiced segments are insufficient for the realization of complex tones. In languages with consistent prosodic or metrical anchors for tones, it has been observed that selected strategies tend to be either tune preservation strategies (TPS) or segment preservation strategies (SPS). However, to our knowledge no explanation has yet been suggested for the attested cross-linguistic variation. In this study we aim to understand what regulates the type of strategies to deal with tune-text conflicts. We examined the productive phonology of Brazilian Portuguese and several varieties of European Portuguese, previously shown to vary their tune-text adjustments. We concluded that the choice between TPS and SPS may be correlated with the language/variety *phonological profile*: languages that organize their productive phonology predominantly around lower phonological levels tend to select SPS; languages whose phonology is predominantly organized around higher levels tend to select TPS.

**Keywords:** tune-text association, epenthesis, phonological profile, vowel split, tune truncation.

## 1. INTRODUCTION

In order to build a sentence, speakers select words on the basis of factors other than the tonal context in which those words will appear. Tune-selection is also blind to the exact words that will be instantiated in particular tone-landing positions (e.g. [21]). Tonal categories are typically associated with reference to prominent metrical positions and to the boundaries of prosodic domains. In addition, both pitch accents and boundary tones may be formed of more than one tone (e.g. [21, 11]), and the tonal categories, with their respective tonal complexity, seem to be chosen irrespective of the details of segmental or metrical context. Therefore, in many languages it is possible to find words with a phonological make-up that is not ideal for tune association, lacking the necessary voiced segments

for the realization of complex tones or tonal movements in crucial tone-landing positions. For example, in Bari Italian yes-no questions are often assigned a rise-fall-rise contour, i.e. a LH\* associated to the head of the IP followed by a L-H% boundary tone sequence ([18, 20]). This means that in sentences ending in words like *ma* ‘mum’, the last syllable is the tone bearing unit (TBU) of three tones showing opposed pitch movement.

When number and type of segments and tones do not allow for an optimal association, several strategies are available across languages that allow to resolve the emerging conflict. Although it seems clear that some of the strategies selected may depend on phonological factors such as particular (types of) tonal events (e.g. [16, 27]), and that some languages seem to prefer strategies that preserve the tune, while others appear to privilege the text instead ([15, 20]), to our knowledge there has been no attempt to explain why languages may show a preference for tune or text preservation.

In this study we investigate the reasons for cross-linguistic variation in the choice of strategies to resolve tune-text conflicts (TTC). We will first look at the kinds of strategies available and their distribution across languages (section 2). We will then propose an explanation for the specific combination of processes selected by various languages, grounded on the phonological profile of two pairs of very closely-related varieties or dialects of Portuguese (section 3). We conclude in section 4 with a brief discussion and a few final remarks.

## 2. AVAILABLE STRATEGIES AND DISTRIBUTION ACROSS LANGUAGES

Languages employ various sorts of strategies to deal with TTC, as amply illustrated in the literature ([1, 2, 7, 8, 11, 15-17, 19, 20, 25]), namely: (i) *tune truncation* (i.e. tonal targets are not realized); (ii) *undershooting* (i.e. tonal targets are only partially realized); (iii) *re-alignment* (i.e. tonal targets shift leftwards); (iv) *tune compression* (i.e. tonal movements are realized faster); (v) *lengthening* (i.e. segments are realized with increased length); (vi) *segment split* (i.e. 1 vowel splits into 2 vowels);

(vii) *segment epenthesis* (i.e. vowels are inserted for tune preservation); (viii) *blocking or application of existing processes* (i.e. processes that exist independently of tunes are either blocked or applied more frequently, resulting in enough segmental space for tune realization).

Strategies such as tune truncation, undershooting, re-alignment, and tune compression allow for the preservation of the segmental material, but always at the expense of tonal changes - from hereon we will call this type of strategies *Segment Preserving Strategies* (SPS). By contrast, strategies like vowel split and epenthesis operating in order to preserve the tune originate categorical changes in segments – we will call this kind of strategies *Tune Preserving Strategies* (TPS).

In addition to these two classes of strategies, there is a third kind, whereby existing segmental phenomena may be used *opportunistically* for tune-preservation purposes. In this case, there is little or no change in one dimension (tune or text) in order to preserve the other (text or tune, respectively). This may be in part the case of lengthening, since the contexts where tune-text conflicts arise are often IP-final, and it is well-known that this is a domain for final lengthening across languages, irrespective of TTC (e.g. [21, 11]). Blocking of vowel deletion and semivocalization is also a way of preserving the tune not implying adding or changing segmental material. Finally, vowel epenthesis may serve purposes other than tune preservation, as in Bari Italian, where vowel epenthesis applies at the end of consonant final loanwords that violate syllable constraints ([20]). In [20], it is shown that, although vowel epenthesis increases in TTC contexts, it is found in other contexts as well (e.g. there is 71% of epenthesis in questions with a rise-fall-rise vs 53% in declaratives with a low-fall). Schwa epenthesis has also been documented in Tashlhiyt Berber. However, again, according to our understanding of the data in [19, 29], it is not possible to state that in this language schwas are inserted as a specific resort for tune realization, given the variability of schwa distribution, also appearing in contexts that do not interact with tones. We will return to Tashlhiyt in the last section, leaving it out of our discussion for the time being.

In this study, we will concentrate on the strategies that are triggered exclusively by TTC.

Table 1 summarises the strategies found in different languages/varieties, according to the literature. As it can be seen particular languages may use more than one strategy. In addition, each language only seems to employ strategies of TPS or SPS type, but not both. Finally, TPS strategies, that

is, those that are exclusively employed to preserve the tune and that alter the segmental tier, have been documented in varieties of European Portuguese: Standard European Portuguese (SEP) and European Portuguese spoken in Algarve (EP-ALG) and in Funchal.

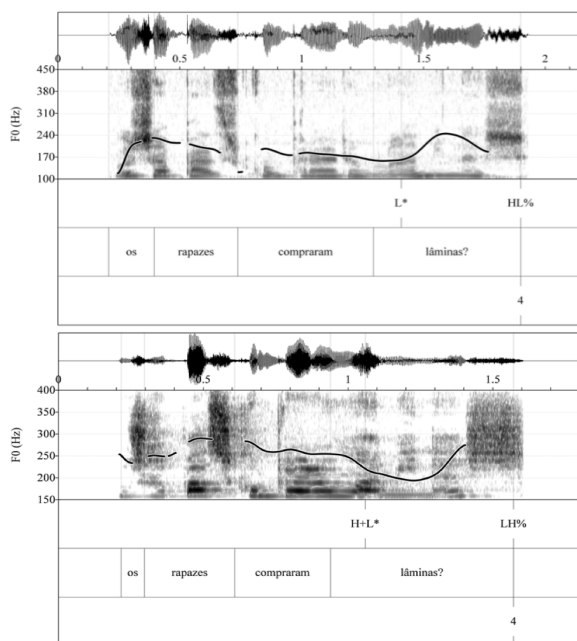
**Table 1:** Tune-text accommodation strategies ([1, 2, 7, 8, 11, 15-17, 19, 20, 25], and references therein).

Accommodation strategies	Selected languages/ language varieties
<i>Tune truncation</i>	Swedish; Northern Standard German; Palermo and Bari Italian; Friulian; Brazilian Portuguese – Atlantic Coast; European Portuguese – BRA; Leeds and Belfast English; Moldavian Romanian; Catalan; Russian; Seoul Korean
<i>Undershooting</i>	Northern Standard German; Dutch; Seoul Korean; Catalan;
<i>Compression</i>	Swedish; Southern Standard British English; Northern Standard German; Catalan; Cambridge and Newcastle English; Seoul Korean; Russian
<i>Re-alignment</i>	Neapolitan Italian; Dutch; German; Russian
<i>Lengthening</i>	Bari Italian; Standard European Portuguese
<i>Split</i>	Standard European Portuguese; European Portuguese – Funchal
<i>Epenthesis</i>	Standard European Portuguese; European Portuguese – ALE; European Portuguese – ALG;
<i>Use of existing processes</i>	Standard European Portuguese; European Portuguese – ALG;
<i>. blocking of deletion</i>	European Portuguese – Funchal
<i>/semivocalization</i>	
<i>. epenthesis</i>	Bari Italian

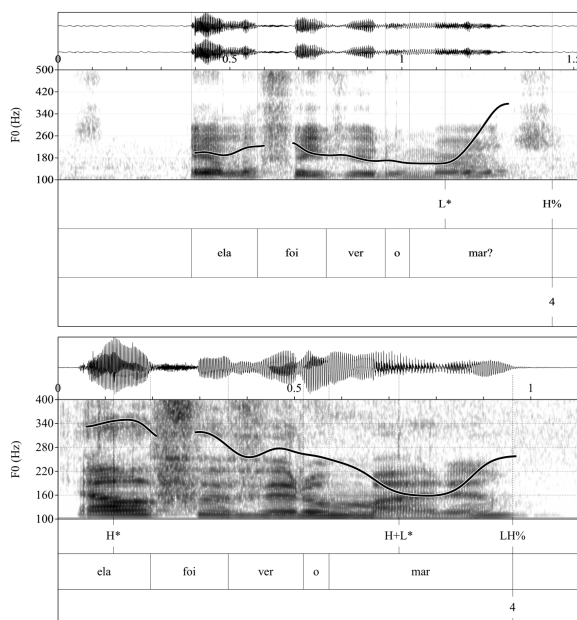
Importantly, Table 1 also contains varieties of Portuguese that select SPS, namely Brazilian Portuguese (BP) and European Portuguese – Braga (EP-BRA), which exhibit tune truncation.

Figures 1-2, and corresponding audiofiles, illustrate the relevant data. Figure 1 shows a yes-no question ending in a proparoxytone word, with enough TBU for the realization of L\* HL% in BP, and H+L\* LH% in SEP; Figure 2 illustrates tune truncation in BP and vowel insertion in SEP, when the last word of the sentence is oxytone.

**Figure 1:** Yes-no question contour in Southern BP (top, [6]) and SEP (bottom, [14]), without tune-text conflicts. *Os rapazes compraram lâminas?* (*Did the boys buy slides?*).



**Figure 2:** Yes-no question contour in Southern BP (top, [14]) and SEP (bottom, [10]), with tune-text conflicts. *Ela foi ver o mar?* (*Did she go to see the sea?*).



Having observed that (i) there is great cross-linguistic and dialectal variation in the strategies used for resolving TTC, but (ii) languages seem to tend to select either SPS or TPS, but not both, we may put forth the hypothesis that the selection of the type of strategy in each language is principled. We develop this idea in section 3.

### 3. THE ROLE OF LANGUAGE PHONOLOGICAL PROFILE

A look at the distribution of strategies across languages in Table 1 indicates that constructs such as *rhythmic class* are unable to explain the language groupings obtained. Within the group of SPS, we find both languages that have been classified as stress-timed and as syllable-timed, like English and Catalan, respectively, or as having mixed rhythm, like BP (syllable- and mora timing) and Seoul Korean (stress- and syllable timing) ([26, 12, 23]); and Seoul Korean has been found to show the same kind of mixed rhythm as SEP ([12]), a TPS variety.

Specific tonal sequences do not seem to explain the selection of strategies either. In Friulian in TTC contexts the last L of a L+;H\* L% tune is truncated ([30]), whereas in SEP, in similar contexts the tune of questions with final narrow focus (L+H\* HL%) is fully realized, showing vowel split or schwa epenthesis instead ([9]); and while in English L+H\* L-H% is pronounced with compression in TTC contexts ([21]) and in Seoul Korean the canonical melody of the Accentual Phrase (LHLH) is truncated or compressed ([3]), in SEP the melody L\*+H LH% ([9]) displays vowel split or epenthesis.

Here, we will explore the hypothesis that cross-linguistic variation in the selection of SPS or TPS follows from the language broad *phonological profile*. Under this hypothesis, in languages where productive phonology clusters predominantly around lower domains, the text (segments, syllables, foot) is more important than the tune, and thus these languages will select SPS; by contrast, in languages where productive phonology reveals less care for segments, syllables and feet, privileging more higher-level phonology, the tune is more important, and thus these languages will select TPS strategies.

We will test this hypothesis looking at the productive phonology of two closely related varieties of Portuguese (plus two less well studied dialects). The underlying structure and lexical phonology of the two pairs of varieties is very similar while the kind of productive phonological processes varies. Thus, these varieties provide good testing ground for our hypothesis, limiting the set of possible explanations for cross-linguistic variation.

#### 3.1. Brazilian Portuguese phonological profile

BP is a well-studied variety of Portuguese (e.g. [22, 33, 32] and references therein). Major productive phonologic processes show the importance of lower prosodic domains, including: (i) systematic vowel epenthesis to fulfil well-formedness constraints at

the syllable level (e.g. the consonant cluster *tm* in *ritmo* triggers vowel epenthesis: ['xitʃimu], instead of ['xitmu], 'rhythm'); (ii) binary rhythmic stress; (iii) foot-related clipping phenomena (e.g. *professor* > *prófi* 'teacher'); (iv) nearly one pitch accent per word, and frequent word internal tones dependent on words' number of syllables.

### 3.2. Standard European Portuguese phonological profile

In contrast with BP, in SEP productive phonological processes tend to involve higher domains and phenomena that span phrasal domains, changing the segmentals. These include: (i) massive unstressed vowel deletion across the board, creating sequences of 6 and more consonants (e.g. *desprevenido* [dʃprv'nidu] 'unaware', leading to enhancement of word stress, but also to the unclear status of the syllable postlexically - [4] put forth the hypothesis that consonant sequences resulting from these deletions may remain unsyllabified; (ii) monophthongisation of /ow/; (iii) no evidence for the foot domain - in normal speech no rhythmic stress; no foot-related clipping; (iv) lower prosodic levels do not bear pitch accent, only the head of IP is obligatorily assigned a pitch accent, resulting in sparse tonal distribution, and enhanced marking of the IP head ([22, 10, 33, 32], a.o.); (v) long prosodic phrases ([13]).

### 3.3. Braga European Portuguese phonological profile

Some facts (especially in less educated speakers and more informal speech), indicate that in EP-BRA segments and well-formed syllables are more important than in SEP and EP-ALG ([28, 31, 24]), including: (i) diphthongization (or place feature spreading to preceding Onset) of (at least) labial stressed vowels - this allows enhancing word stress without deleting vowels; (ii) less deletion of unstressed [i] and [u] in word internal position than in SEP ([28]); (iii) rather frequent realization of [i] or [ej] in words starting with palatal fricative+C, as in *escola* 'school' [iʃ'kɔlə] ([ʃ'kɔlə] in SEP) ([28, 22]); (iv) absence of /ow/ monophthongization; (v) shorter prosodic phrases ([13]). According to [24], furthermore, EP Northern dialects show preference for V1 semivocalization (or vowel preservation) rather than deletion of unstressed round vowels as a strategy for across-word hiatus resolution.

### 3.4. Southern European Portuguese phonological profile

This variety is less investigated. Nevertheless, a few facts also distinguish EP-ALG from BRA,

namely, (i) monophthongization of /ow/ and /ej/ ([31]); (ii) no diphthongization of stressed vowels; (iii) preference for V1 back vowel deletion for hiatus resolution across words, instead of V1 semivocalization ([24]); (iv) long prosodic phrases ([5]). So, ALG patterns in relevant aspects as SEP.

## 4. DISCUSSION AND CONCLUSION

The data surveyed here indicate that languages employ processes to specifically deal with TTC that either preserve the segmental string but change tunes (SPS), or preserve tunes but impact on segments (TPS). It seems that languages tend to choose either TPS or SPS strategies. According to our proposal, the broad phonological profile of a language is at the origin of the choice of one group of strategies or the other: languages with productive phonology predominantly clustering around lower domains select SPS, while languages with predominant phonology at higher levels select TPS.

Tashlyit Berber (TB) was not discussed in this paper. TB (arguably) lacks word stress, allows words with no vowels and voiced segments, exhibits quite variable schwa epenthesis, shows more extreme tonal shifts, and allows for tones to remain unrealized altogether ([19, 29]). TB thus differs greatly from the other languages studied so far with respect to TTC resolution, which, unlike TB, all show consistent metrical or prosodic anchoring. We do not exclude the possibility that TB may represent a third type of language.

Our proposal seems to account for the distribution of type of TTC strategies found across languages. Nevertheless, the notion of *phonological profile* requires further elaboration, and more research is needed on the distribution of strategies for TTC resolution across a larger set of languages with different phonological profiles.

## 5. ACKNOWLEDGEMENTS

This work was partially funded by FCT – Portuguese Science Foundation (UID/LIN/00214/2019).

## 6. REFERENCES

- [1] Bruce, G. 1977. Swedish accents in sentence perspective. *Working Papers in Linguistics* 12(1).
- [2] Caspers, J., van Heuven, V. J. 1993. Effects of time pressure on the phonetic realization of the Dutch accent-lending pitch rise and fall. *Phonetica* 50(3), 161–171.
- [3] Cho, H., Flemming, E. 2015. Compression and truncation: The case of Seoul Korean accentual phrase. *Studies in Phonetics, Phonology and Morphology* 21(2), 359–382.

- [4] Collischonn, G., Wetzels, W. L. 2016. Syllable Structure. In: Wetzels, L., Menuzzi, S., Costa, J. (eds.), *The Handbook of Portuguese Linguistics*. Oxford: Wiley-Blackwell, 86–106.
- [5] Cruz, M., Frota, S. 2013. On the relation between intonational phrasing and pitch accent distribution. Evidence from European Portuguese varieties. *Proceedings of the 14th Annual Conference of the International Speech Communication Association (ISCA) - Interspeech 2013*, 300-304.
- [6] Cruz, M., Crespo-Sendra, V., Castelo, J., Frota, S. Accepted. Asking questions across Portuguese varieties. In: Cruz, M., Frota, S. (eds.), *Prosodic variation (with)in languages: Intonation, phrasing and segments* (series *Studies in Phonetics and Phonology*, edited by M. J. Ball and P. van Lieshout). United Kingdom: Equinox Publishing.
- [7] D'Imperio, M. 2001. Focus and tonal structure in Neapolitan Italian. *Speech Communication* 33(4), 339–356.
- [8] Frota, S. 2002. Tonal association and target alignment in European Portuguese nuclear falls. In: Gussenhoven, C., Warner, N. (eds.), *Laboratory Phonology 7*. Berlin: Mouton de Gruyter, 387–418.
- [9] Frota, S. 2002. Nuclear falls and rises in European Portuguese: A phonological analysis of declarative and question intonation. *Probus* 14(1) (Special Issue on *Intonation in Romance*, ed. by J. I. Hualde), 113–146.
- [10] Frota, S. 2014. The intonational phonology of European Portuguese. In: Jun, S.-A. (ed.), *Prosodic Typology II*. Oxford: Oxford University Press, 6–42.
- [11] Frota, S., Prieto, P. 2015. *Intonation in Romance*. Oxford: Oxford University Press.
- [12] Frota, S., Vigário, M. 2001. On the correlates of rhythmic distinctions: The European Portuguese/Brazilian Portuguese case. *Probus* 13(2), 247–275.
- [13] Frota, S., Vigário, M. 2007. Intonational Phrasing in two varieties of European Portuguese. In: Riad, T., Gussenhoven, C. (eds.), *Tones and Tunes*. Vol. I. Berlin: Mouton de Gruyter, 265–291.
- [14] Frota, S., Castelo, J., Cruz, M., Crespo-Sendra, V., Barros, N., Silvestre, A., Vigário, M. 2015. Melodia ou Texto? Estratégias de acomodação entre melodia e texto em Português. Invited paper published in *Diadorim* 17(2), 12–33.
- [15] Frota, S., Cruz, M., Castelo, J., Barros, N., Crespo-Sendra, V., Vigário, M. 2016. Tune or Text? Tune-text accommodation strategies in Portuguese. *Proc. of Speech Prosody 2016*. Boston: Boston University.
- [16] Grabe, E. 1998. Pitch accent realization in English and German. *J. Phonetics* 26(2), 129–143.
- [17] Grabe, E., Post, B., Nolan, F., Farrar, K. 2000. Pitch Accent Realization in Four Varieties of British English. *J. Phonetics* 28, 161–185.
- [18] Grice, M., D'Imperio, M., Savino, M., Avesani, C. 2005. Strategies for Intonation Labelling across Varieties of Italian. In: Jun, S.-A. (ed.), *Prosodic Typology: The Phonology of Intonation and Phrasing*. Oxford: Oxford University Press, 362–389.
- [19] Grice, M., Roettger, T.B., Ridouane, R. 2015. Tonal association in Tashlhiyt Berber. Evidence from polar questions and contrastive statements. *Phonology* 32(2), 241–266.
- [20] Grice, M., Savino, M., Caffo, A., Roettger, T. B. 2015. The tune drives the text: schwa in consonant-final loan words in Italian. *Proc. of the 20th ICPHS, Glasgow* Glasgow, UK.
- [21] Ladd, D. R. 1996/2008, *Intonational Phonology*. Cambridge: Cambridge University Press (2nd ed., 2008).
- [22] Mateus, M. H., d'Andrade, E. 2000. *The Phonology of Portuguese*. Oxford: Oxford University Press.
- [23] Mok, P., Lee, S. I. 2008. Korean speech rhythm using rhythmic measures. *Proc. of the 18th Intern. Congress of Linguists (CIL18)*, Seoul, Korea.
- [24] Paulino, N., Oliveira, P., Vigário, M. Accepted. Hiatus resolution across words in European Portuguese dialects. In: Cruz, M., Frota, S. (eds.), *Prosodic variation (with)in languages: Intonation, phrasing and segments* (series *Studies in Phonetics and Phonology*, edited by M. J. Ball and P. van Lieshout). United Kingdom: Equinox Publishing.
- [25] Prieto, P., Ortega-Llebaria, M. 2009. Do complex pitch gestures induce syllable lengthening in Catalan and Spanish? In: Vigário, M., Frota, S., Freitas, M. J. (eds.), *Phonetics and Phonology: Interactions and Interrelations*. Amsterdam/Philadelphia: John Benjamins, 51–70.
- [26] Ramus, F., Nespor, M., Mehler, J. 1999. Correlates of linguistic rhythm in the speech signal. *Cognition* 73, 265–292.
- [27] Rattcke, T. 2016. How Truncating Are ‘Truncating Languages’? Evidence from Russian and German. *Phonetica* 73, 194–228.
- [28] Rodrigues, C. 2003. *Lisboa e Braga: Fonologia e variação*. Lisboa: FCG/FCT.
- [29] Roettger, T.B. 2017. *Tonal placement in Tashlhiyt*. Berlin: Language Science Press.
- [30] Roseano, P., Vanrell, M. D. M., Prieto, P. 2015. Intonational phonology of Friulian and its dialects. In: Frota, S., Prieto, P. (eds.), *Intonation in Romance*. Oxford: Oxford University Press, 101–139.
- [31] Segura, L. 2013. Variedades dialectais do Português Europeu. In: Raposo, E. P., Nascimento, M. F. B., Mota, M. A., Segura, L., Mendes, A. (eds.), *Gramática do Português*. Lisboa: Fundação Calouste Gulbenkian, 85–142.
- [32] Vigário, M. To appear. Phonetics and phonology of Portuguese. In: Gabriel, C., Gess, R., Meisenburg, T. (eds.), *Manual of Romance phonetics and phonology*. Berlin/New York: De Gruyter.
- [33] Wetzels, L., Menuzzi, S., Costa, J. (eds.), *The Handbook of Portuguese Linguistics*. Oxford: Wiley-Blackwell.