

Towards a P_ToBI

Coordinators: Céu Viana & Sónia Frota. Participants: Isabel Falé, Flaviane Fernandes, Isabel Mascarenhas, Ana Isabel Mata, Helena Moniz & Marina Vigário

1. Introduction. The aim of this talk is to present a first attempt of a unified transcription for some aspects of Portuguese Intonation, bringing together the understanding of the intonational and prosodic grammar of the language built on the basis of studies conducted on laboratory speech databases (Viana 1987, Falé 2005, Fernandes 2007, Frota 2000, 2002, 2003, Frota et al. 2007, Vigário 2003, Vigário & Frota 2003), and on corpora collected with speech technology-oriented purposes, which contain large samples of read and spontaneous materials in a variety of communicative situations (Mata 1999, Viana et al. 2003). The topics covered include (i) nuclear contours and prenuclear accents in a wide variety of declarative sentences, narrow/contrastive focus sentences, wh-questions, yes-no questions, and yes-no questions with contrastive focus, (ii) post-nuclear accents/deaccenting in early focus utterances, (iii) sparse vs. rich distribution of accents within the intonational phrase, and (iv) levels of prosodic structure relevant to intonational phrasing. Data from different varieties of Portuguese will be discussed, including European Portuguese (standard variety SEP; northern variety NEP) and Brazilian Portuguese (BP, from São Paulo). The first part of the talk focuses on the subset of phenomena for which established analyses are available in previous research on prosodic and intonational phonology. The second part deals with experiments of multilevel annotation of speech corpora aiming both at data-driven linguistic studies of the prosody-segment and prosody-syntax interaction and at building statistical models for the development of speech applications.

2. Basic Tunes. Research on Portuguese intonation couched within the AM-theory is fairly recent (see Frota 2000:1.5 for an overview), and previous studies of Portuguese intonation were almost inexistent (with the exception of Morais Barbosa 1966). Since the early 1990s researchers have concentrated mostly on the description of declarative and question intonation in the Lisbon variety (hereafter Standard European Portuguese). The intonational analyses offered within this body of research are mainly based on laboratory speech and have specifically addressed issues like the typology of pitch accents and edge tones assumed to account for a given contour, or the details of association and alignment of tonal events with the segmental string. The relation between intonation and prosodic structure, as well as the relation between intonation, prosodic structure and meaning (e.g. expression of topic and focus, adverbial scope, PP attachment, parenthetical expressions) have been among the issues studied. More recently, the analyses were extended to include other varieties of Portuguese, such as the Northern variety spoken in Braga (NEP) and the Brazilian variety spoken in São Paulo (BP).

SEP has three basic nuclear accents: H+L* (a fall from a previous peak occurs within the accented syllable reaching a low target aligned with this syllable and that is usually near the bottom of the speaker's range), H*+L (a high target within the accented syllable is immediately followed by a fall that typically ends on the next syllable), and L*+H (a low target within the accented syllable is followed by a rise that starts late in the accented syllable and usually reaches its peak on the next syllable). In prenuclear position, besides L*+H, H+!H* (the accented syllable is

preceded by a peak on the immediately previous syllable, but the accented syllable is not low but around the mid range between the peak and the speaker's baseline), H* (the accented syllable is high and is not immediately preceded or followed by a fall) and L+H* (the accented syllable is high and is immediately preceded by a low pitch target that leads to a rise in the accented syllable) have been attested (although the latter accent is fairly infrequent). SEP shows both simple and complex intonational phrase-final boundary tones: L%, H%, LH% and HL%. L% marks a final low boundary tone on the last syllable; H% marks a high target on the boundary syllable; LH% marks a rise on the boundary syllable; HL% marks a fall on the boundary syllable. Optionally, an initial high boundary may occur, which is marked with a %H (the high target is realized on the first or second syllable in the phrase). The prosodic and intonational literature on SEP has differentiated two levels of intonational phrasing and equated both of them to the IP (intonational phrase) type: the major IP (or compound IP) and the minor IP (Frota 2000, extending ideas from Ladd 1992, 1996). These two levels show boundaries of different strength: the major IP boundary (which is the outer boundary) shows a wider pitch range and bigger final lengthening than the minor IP boundary (which is the inner boundary within the compound IP phrase). As the nuclear contours are essentially the same in either case, the tonal boundaries of both levels were marked by % tones. Crucially, in SEP there is no phrase accent affecting the pitch contour immediately after the last accentual target and determining the contour from this target until the end of the phrase (unlike in English or German, e.g. Beckman et al. 2005, Grice et al 2005). Consequently, we propose to mark minor IPs and major IPs with respectively break indices 3 and 4, and use – and % to directly code this boundary strength difference in the ToBI Tones-tier (and not the distinction between intonational and intermediate phrases).

Tonal transcriptions of commonly occurring SEP contours are given below. Examples illustrating each of these contours will be available online. *Neutral statement*: H+L* L% (most common initial accent in statements H* or L*+H; H+!H* is a fairly common prenuclear accent in statements); *narrow/contrastive focus statement*: H*+L L%; *statement initial or internal-IPs* (with continuation indicating that the listener should expect for more information, like with IPs before parentheticals, with initial topic phrases or long subjects: (%H) L*+H H%; *statement pre-final IPs* (as before a final topic phrase, or a final non-locally attached PP): H+L* H% or H+L* L%; *wh-question*: H+L* L%, optionally H+L* LH%; *neutral yes/no question*: H+L* LH%; *contrastive yes/no question*: L*+H LH% (early nucleus) and L*+H HL% (late nucleus). In narrow/contrastive statements with an early nucleus a final (post-nuclear) accentual fall with compressed pitch range occurs: !H+L*. Both in statement and question intonation, SEP is characterized by a sparse distribution of pitch accents within the IP: in neutral renditions, only the first and last PWs *must* be pitch accented.

NEP differs from SEP by showing L* (a local pitch minimum low in the accented syllable) as the main nuclear accent (in declaratives, wh- and yes-no questions). In NEP, the nuclear contour L+H* !H% (describing a sustained pitch configuration) alternates with L*+H H% (describing a continuation rise). In the former, the high level is sustained or slightly falls up to the boundary syllable (i.e. it is neither rising, as in H%, nor falling, as in L%).

Like in SEP, the declarative nuclear contour in BP is H+L* L% and narrow focus may be conveyed by H*+L. However, L*+H (which is the main prenuclear accent in

BP statements) followed by a low boundary also conveys narrow focus in BP. Differently from SEP and similarly to NEP, BP shows a rich pitch accent distribution where almost every PW is pitch accented. Sparse/rich distribution of accents in Portuguese may be accounted for along the lines of Hellmuth (2007), by means of variation in the level of the Prosodic Hierarchy that functions as the relevant domain for pitch accent distribution: the IP in SEP, the phonological phrase in NEP, the PW in BP.

3. Experiments with professional reading and spontaneous speech. Excerpts from professional and spontaneous speech corpora (e.g. HCRC Map Task for SEP, Broadcast News, and short spontaneous and prepared, non-scripted, presentations) have been progressively analyzed and annotated, using a ToBI-like system.

This work constitutes independent evidence for the tonal inventory and the tunes found in lab speech studies. In what the tonal inventory is concerned, the main difference found up to now is the frequent use of L+H*, which is virtually absent from lab speech. This pitch accent occurs in nuclear position and appears to be used to signal new information or to highlight given information that needs to be (re)activated. The evidence available suggests that this tone is not to be confounded with occurrences of ^H*, consistently used to better specify (or correct) given or inferable information.

As for tunes, only contrastive yes-no questions were not attested so far. Evidence from the Map Task dialogue corpus collected for SEP, suggests that at least some speakers may distinguish information seeking questions (QUERY-YN moves) from confirmation ones (CHECK moves). In queries, H+L* LH% is the most commonly used pattern; checks may be associated with a rising stepwise pattern, tentatively transcribed as %L H* H%. As for wh-questions, H+L* L% is the most frequent tune. As in lab speech, H+L* LH% can also be found, provided there is a non-devoiced posttonic vowel.

In order to account for most spontaneous speech phenomena and achieve reasonable inter-annotator consistency rates, much research is still needed concerning the phonetics and phonology of EP pitch accents and boundary tones, as well as the cues underlying spontaneous discourse structuring. Most of the work developed up to now, however, focused on phrasing and disfluencies and relied mostly on the information contained in the Break Index tier. Although the phonological analysis proposed for EP could justify a simplification of the phenomena annotated at this level, for speech processing this does not seem the best option. On the contrary, it would be worthwhile to discuss the possibility of using at least a level above break index 4 accounting for sentence-like chunks.

References

- Beckman, Mary, Hirschberg, Julia & Shattuck-Hufnagel, Stefanie (2005). The Original ToBI System and the Evolution of the ToBI Framework. In Sun-Ah Jun (ed.) *Prosodic Typology. The Phonology of Intonation and Phrasing*. Oxford: OUP, 9-54.
- Beckman, Mary, Díaz-Campos, Manuel, Tevis McGory, Julia, & Morgan, Terrell (2002). Intonation across Spanish in the Tones and Break Indices Framework. *Probus*, 14: 9-36.
- Falé, Isabel (2005). Percepção e reconhecimento da informação entoacional em português europeu. PhD. Diss. University of Lisbon.
- Fernandes, Flaviane (2007). Tonal association in neutral and subject narrow focus sentences in Brazilian Portuguese: a comparison with European Portuguese. *Journal of Portuguese Linguistics (special issue: Prosody in Ibero-Romance and Related Languages, Guest-edited by G. Elordieta & M. Vigário)*, 5.2/6.1: 91-115.
- Frota, Sónia (2000). *Prosody and focus in European Portuguese. Phonological phrasing and Intonation*. New York: Garland.
- Frota, Sónia (2002) Nuclear falls and rises in European Portuguese: A phonological analysis of declarative and question intonation. *Probus* 14, 113-146.
- Frota, Sónia (2003). The phonological status of initial peaks in European Portuguese. *Catalan Journal of Linguistics* 2, 133-152.
- Frota, S., D'Imperio, M., Elordieta, G., Prieto, P., Vigário, M. (2007). The phonetics and phonology of intonational phrasing in Romance. In P. Prieto, J. Mascaró & M.-J. Solé (eds.) *Segmental and Prosodic Issues in Romance Phonology*. John Benjamins: Amsterdam/Philadelphia.
- Grice, M., Baumann, S. & Benz Müller, R. (2005) German Intonation in Autosegmental-Metrical Phonology. In Sun-Ah Jun (ed.) *Prosodic Typology. The Phonology of Intonation and Phrasing*. Oxford: OUP, 55-83.
- Hellmuth, Sam (2007). The relationship between prosodic structure and pitch accent distribution: evidence from Egyptian Arabic. *The Linguistic Review* 24.2 (special issue: Prosodic Phrasing and Tunes, Guest-edited by S. Frota & P. Prieto).
- Hualde, José Ignacio (2002). Intonation in Spanish and the other Ibero-Romance Languages: overview and status quaestionis. In Carolina Wiltshire & Joaquim Camps (eds.). *Romance Phonology and Variation*. Amsterdam: Benjamins. 101-116.
- Ladd, D. Robert (1992). Compound Prosodic Domains. Ms., University of Edinburgh.
- Ladd, D. Robert. 1996. *Intonational Phonology*. Cambridge: CUP.
- Mata, Ana I. (1999). Para o Estudo da Entoação em Fala Espontânea e Preparada no Português Europeu: Metodologia, Resultados e Implicações Didáticas. PhD Diss. University of Lisbon.
- Viana, M. Céu (1987). Para a síntese da entoação do Português. Dissertação para acesso à categoria de Investigador Auxiliar. Lisboa: CLUL-INIC.
- Viana, M. C., Oliveira, L. C. & Mata, A. I. (2003). Prosodic Phrasing: Machine and Human Evaluation. *International Journal of Speech Technology* 6: 83-94.
- Vigário, Marina & Frota, Sónia (2003). The intonation of Standard and Northern European Portuguese. *Journal of Portuguese Linguistics* 2-2: 115-137.
- Vigário, Marina (2003). Prosody and sentence disambiguation in European Portuguese. *Catalan Journal of Linguistics* 2, 249-278.