

Intonational Aspects of Songs and Song Competence

Beatriz Raposo de Medeiros (Linguistics Department, University of São Paulo)
biarm@usp.br

This study proposes a comparison between spoken and singing utterances extracted from a Brazilian song with a focus on the intonational aspect of both speech and singing. The basic argument is that the capacity of composing songs is unique, in other words, musical and linguistic competence do not play separated roles, but rather are merged.

Other studies recently dealing with prosody in speech and singing (Patel & Daniele, 2003; Lehiste, 2004 and Patel et al., 2006) investigate the differences, similarities and even influences that exist between the two. Even speech-to-text systems may be improved with knowledge about prosody by considering different styles of speech and singing (Shih & Kochanski, 2001).

There are not any other known studies that deal specifically with song composition viewed as a human skill in which musical and linguistic competences are linked. The idea of competence within songs is found in Tatit (2002) who named this “competência cancional” [song competence]. Gosselin et al. (2006) discuss the ability to memorize songs, showing that melody and text can be processed separately by perception (although Crowde, Serafine & Repp, 1990 give evidence that musical and linguistic codes may be distinct but linked). Nevertheless, we did not find investigations from the perspective of production and competence. The purpose of our study is to start broadening the concept of song competence that originally (Tatit, 2002) has no demonstrable evidence. We recognize that it is still a first step and other aspects involving speech and song must be studied, as well as song prosodic facts that must be better explained.

Our investigation starts with a Brazilian popular song¹, previously unknown by the subjects, that should be read aloud by three subjects. We deliberately avoided a known song for the obvious reason that known rhythm and melody would mislead the speaker’s intonation. Readers were recorded in a sound proof room and the entire song text was read once by each subject (22 sentences)² and stored in a .wav file in order to be analyzed in PRAAT, a speech analysis software³.

In order to compare speech intonation with song intonation, fundamental frequency was measured in the following way: each sentence was segmented in syllables, and, in each syllable, the mean pitch was measured. This procedure allowed us to obtain an intonational contour, as the one in the graphic below. To represent and analyze the song intervals, a diagram, as in Tatit (2002)⁴, was used. To build the diagram, we annotated the different pitches according to the song key (G Major), as in the original recording. In the diagram, each line corresponds to a half tone. The initial note is a D2.

Three affirmative sentences

The diagram below (D.1) shows the song’s first three affirmative sentences: *Sonhei/ que estava dentro do seu sonho/ e não podia me expressar.*⁵

Among our three subjects R, B and L, R was the one who presented more F0 variation. The other two subjects were almost monotonic, although this fact would not restrict the emergence of prosodic rules. For this reason, the analysis below describes mostly intonational phenomena produced by R.

¹ *Sonhei* is the song title and it was composed and recorded by Luiz Tatit in his cd *O Meio* (Dabliú Discos, 2000).

² Among these 22 sentences, we chose 7 that would offer interesting prosodic phenomena to be analyzed. A full justification for this will be presented in the full paper.

³ The recording was made with a *Shure 57* microphone connected to an Audigy soundboard, with a sampling frequency of 44100 Hz. Recorded speech was analyzed with a sampling frequency of 22050 Hz.

⁴ This diagram has been used as a representation scheme within song semiotics as developed by Tatit. Two important characteristics must be emphasized: the intuitive aspect of pitch height reading for both musicians and non-musicians and the ability to organize this intuitive aspect, used in Brazilian popular song composing, without necessarily resorting to traditional western musical notation.

⁵ *I dreamed I was inside your dream and could not express myself.*

Figure 1 below presents F0 values of syllables or reconstructed syllabic portions (as in *ques* which becomes *ques*). The analyzed utterance is formed by three declarative sentences, thus there exists a declarative F0 falling contour, but with a relative rising after the end of the first sentence – and this is true for all subjects. The syllables of *so-nho* rise slightly, indicating the sentence has not finished yet; following them, the conjunction *e* and the syllable *po* present F0 peaks and there is another falling contour until the lowest F0 value in the whole sentence is reached.

D.1: Affirmative sentences: text and melody

C	
B	nhei que estava dentro do seu
Bb	
A	sonho e não podia me ex
G#	
G	pressar.
F#	
F	
E	
Eb	
D	So

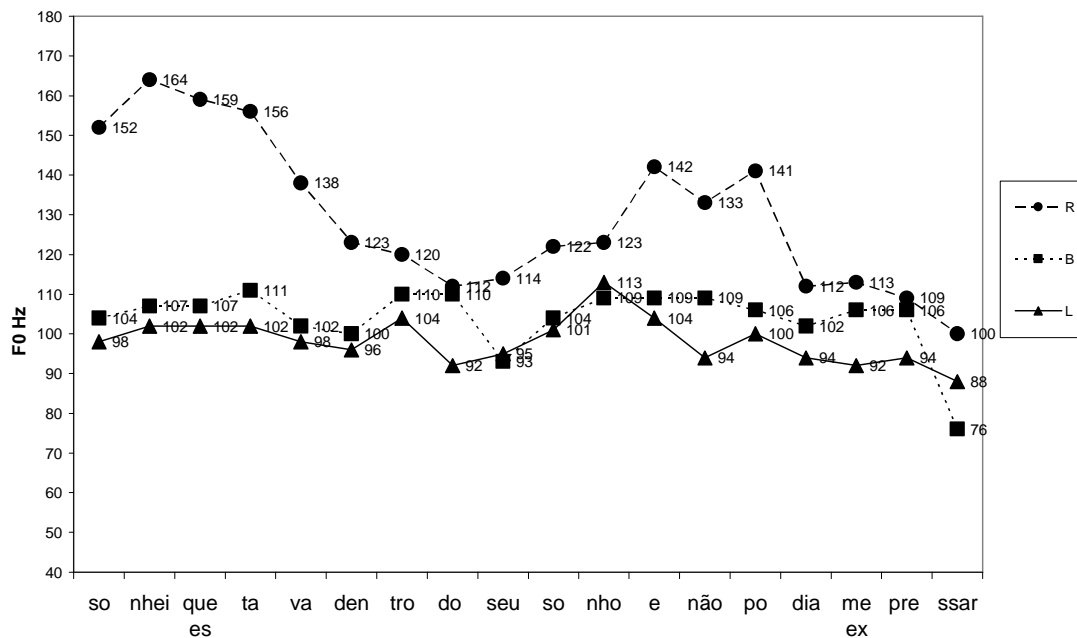


Figure 1. Affirmative sentences pitch contour of three subjects.

In general, the same pattern occurs with the song melodic contour, as there exists a descending contour. There is a rising interval of a sixth, from the first to the second syllable at the very beginning of the analyzed sentence. This can be compared to the speech initial rising, although this rise is of less amplitude (152 Hz – 164 Hz). In speech, this F0 rising is already expected because there is an unstressed syllable followed by a stressed syllable, where F0 peaks are frequently placed (Medeiros and Makino, 2001). This way, it seems that the composer reinforces a speech feature in the song. On the other hand, syllables that present a moderate rising at the end of the first sentence (*so-nho*) are exactly those that present a descending second interval in the song.

From these prosodic facts, a clear difference is established between the speech intonation and the song intonation. The song challenges speech unsteadiness: if in the latter the F0 varies from syllable to syllable, in the former, the composer keeps the same note (same F0) inside a rhythmic group (*nhei que estava dentro do seu*). This tone repetition is followed by another repetition, a second major lowering. The musical phrase is then: D (dominant), a rise to B, a descent to A and a

rise to G (tonic).

In spite of prosodic differences, other details indicate that there is a trade-off between the linguistic prosodic rules and the song melodic structure. The spoken sentence intonation varies from 100 Hz to 164 Hz. The tendency of F0 is to lower, as expected. A higher F0 located on the *po* syllable (in the word *podia*) indicates the beginning of a declarative sentence, although it is also part of the previous sentence, and thus it has a maximum F0 of 142 Hz, which is lower than the 164 Hz of the *nhei* syllable. Taking these speech intonational facts into account, we see that we are not dealing with two distinct and independent declarative sentences, but instead, their coordinative relation involves a hierarchy relation. In this sense, the song melodic contour also presents a descending pattern for both sentences, in which the highest F0 of the second one cannot be higher than the highest F0 of the first sentence. Although the song does not mirror the F0 variation details of speech, it remains faithful to the general trend of the latter.

The interrogative sentence

There is only one interrogative sentence (see D.2)⁶ in the song, but its melodic contour shows an interesting relation to the spoken interrogative. Both spoken and sung interrogatives analyzed in this study show the highest F0 at the end of the sentence. Syllables *lhar* (subject R) and *pra* (subjects B and L) get the maximum F0 of this typical interrogative pitch rising (Graphic 2). This was already expected linguistically, since there is a rule in Brazilian Portuguese that predicts an F0 peak on the stressed syllable immediately before a sentence final interrogative pronoun (Moraes, 1998)., Nevertheless, the songwriter choice is to shift this F0 peak to the pronoun, highlighting it melodically (see D.2), since all other previous syllables are maintained at the same phonation frequency.

D.2. Interrogative sentence: text and melody

F#	
F	
E	
Eb	quem ?
D	Você iria então olhar pra

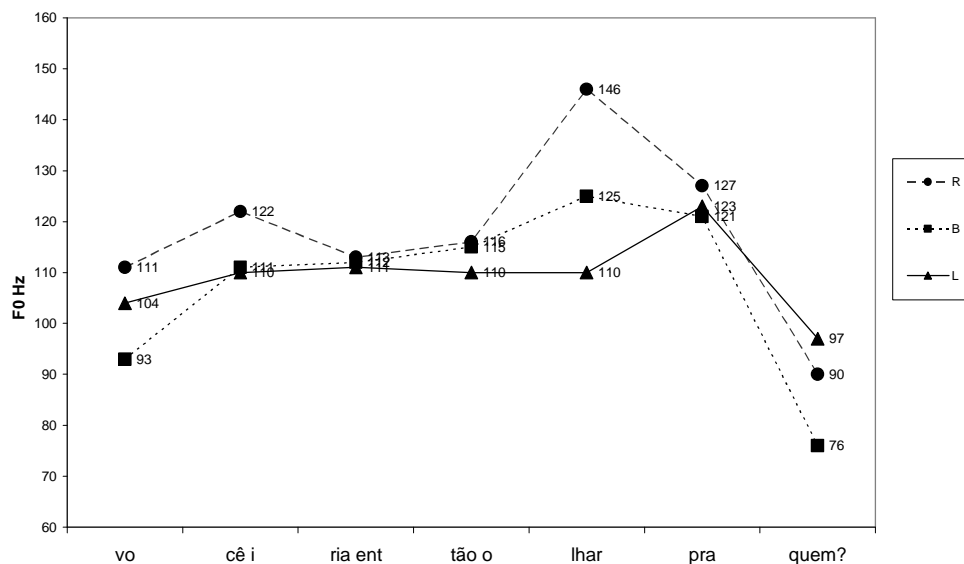


Figure 2: interrogative sentence pitch contour of three subjects

Main and subordinate clauses and the cadence of fifth⁷

Sonhei is a song with small melodic intervals, which gives us the impression of spoken

⁶ *Você iria então olhar para quem? To whom would you look then?*

⁷ Because of space limitation, we cannot show all diagrams and graphics that illustrate this relation between a melodic cadence and F0 lowering through consecutive spoken sentences.

singing, even a chant. However, a sudden octave ascending interval starts a cadence of fifth (G4-G5-C5-B4-A4-G4) in repetitive notes with a sentence formed by a main clause and its subordinate: *Sonhei que pressenti alguma coisa, que corri ao seu encontro, e por mais que eu corresse, chegaria atrasado.*⁸ Although there is only little evidence, we considered this descending cadence a possible influence of speech intonation for such a string of clauses. In speech, subjects R and B locate their maximum F0 (166 Hz and 122 Hz, respectively) in the main clause, and the minimum F0 in the last subordinate clause (92 Hz and 71 Hz, respectively).

Discussion

This work compared sung and spoken sentences in order to know how speech intonation emerges in singing. Affirmative sentences with different degrees of syntactic relation among them and an interrogative sentence were described in terms of pitch contour, revealing that at the intonational level the musical melody leads the pitch contour structure, trying to maintain a connection to speech intonation.

In his task, the composer is offered two ways – linguistic and musical - of saying one thing, and then he has to negotiate constraints of both codes. Musical constraints related to intonation require melodic unit and tuning. Linguistic constraints require specific intonational patterns in order to obtain distinct meanings. Thus, when the song composer chooses to repeat the same phonation frequency, or note, he is trying to stabilize the fundamental frequency variability of speech. However, when there are two different melodic groupings, in order to differentiate two distinct sentences, musical prosody is just reinforcing language prosody.

We conclude that the composer chooses to create (or to follow) prosodic rules that are typical of song competence. These rules do not cancel speech prosodic rules, but rather transform them, in order to guarantee a kind of symbiosis between speech prosody and musical constraints.

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⁸ *I dreamed I've got a premonition about something/ I have run to reach it/ and no matter how much I would run/ I would be late for it.*