



Intonation of French Songs: From Text to Tune

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Abstract

Classically, singing maintains a strict conformity (congruence) between the prosodic structure induced by the text and the musical and rhythmic structures defined by the staff. However, careful acoustical analysis of some contemporary French songs interpreted by renowned artists reveal various strategies to define a singer style which will to some extent incorporate melodic gestures pertaining to speech and not to music. In this study, we examine a few samples of these strategies, showing various cases between the total dominance of the musical structure over the speech prosodic structure to its total independence.

1. Introduction

Traditionally, singing is considered as maintaining a strict conformity (congruence) between the prosodic structure induced by the text and the musical and rhythmic structures defined by the staff. Singing voice is characterized by vocal fold frequencies defined by the melody and not by sentence intonation.

However, in classical singing proceeds with other variations such as overshoot, vibrato and preparation [7]. Furthermore, vowels are usually much longer than in natural speech in order to better encode the melodic sequences of the song [2], [9]. Accordingly, text written to preexisting music should align stressed syllables with musical beat, and conversely, music composed to accompany text should align beat with the rhythmic structure of speech, as defined by the sequence of unstressed and stressed vowels.

Careful acoustical analysis of some contemporary French songs interpreted by renowned artists reveal various strategies to define a singer style which will, to some extent, incorporate melodic gestures pertaining to speech and not to music. In this study, we examine a few examples of these strategies, sampled from a larger corpus, and showing various cases located on a scale mapping between the total dominance of the musical structure over the speech prosodic structure to its total independence.

2. Some definitions

2.1. Musical structure

We define musical structure (MS) as a hierarchical organization of musical units on the time scale, involving grouping of notes in beats, each beat containing one strong note. The musical structure projected on the time scale defines

a rhythmic structure (RS), which is thus a sub component of the melodic structure [4].

2.2. Prosodic structure

The prosodic structure (PS) is defined as a hierarchical organization of the speech sentence, distinct from the syntactic structure, and revealed (in French) by specific melodic contours located on stress group last syllables. These contours contrast in melodic slope with the contour located on the right to indicate the grouping of stress groups in a hierarchy: a falling melodic contour indicates a dependency relation with the group ending with a rising contour, a rising contour signals a dependency towards a group ending with a falling contour. This system uses also contrasts in stressed syllable lengths and amplitude of melodic movement [6].

This is illustrated in the following example (chosen with enough syllables in each stress group to avoid de stressing of stressed syllable, characteristic of the French accentuation system):

Les hippopotames de Nabuchodonosor se sont organisés en associations.

[Nabuchodonosor hippos organized themselves in unions]

Stress levels, notes on a decreasing scale, 0 being the strongest are [1]:

Les hippopotames de Nabuchodonosor se sont organisés en syndicats.
2 1 2 0

The melodic contours encoding these stress levels appear as follows (the dashed arrow denotes a possibly neutralized contour, with a flat or falling melodic movement):

Les hippopotames de Nabuchodonosor se sont organisés en syndicats.
2 1 2 0

This sequence of melodic events located on stressed syllables indicates a two levels prosodic structure, grouping [*Les hippopotames de Nabuchodonosor*] and [*se sont organisés en syndicats*] at a first level, and the whole sentence at the second level:

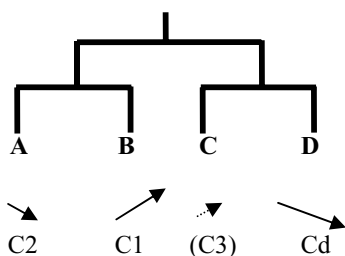


Figure 1: Theoretical sequence of prosodic contours encoding a prosodic structure [[A B] [C D]].

2.3. Vibrato

Voice vibrato is produced by variations of the laryngeal frequency around a target frequency (the musical note to maintain), which corresponds to the frequency perceived by listeners [8]. These frequency fluctuations can exceed a half tone value, but are globally perceived as a singer vowel quality feature [2]. Vibrato is also part of the singer strategy to acoustically dominate the intensity level of the orchestra, along with the use of a “singing format” in the 2000 – 4000 Hz zone (a frequency zone not used by most of the musical instruments). Pop singers however do not use this vocal mode (generated by reinforcing corresponding harmonics, a skill obtained after a long practice), and use mainly vibrato, together with other voice features as glissando to differentiate their voice from the surrounding instruments.

3. Experimental procedure

We made the following selection of popular « classic » French singers: Charles Aznavour, Georges Brassens, Jacques Brel, Jean Ferrat, Léo Ferré, Juliette Greco, Françoise Hardy, Edith Piaf, Serge Reggiani, Alain Souchon, and Charles Trenet. These artists belong to different periods of popular song productions, and are reasonable representative of what is commonly referred to as “la chanson française”. Text of the corpus was transcribed or directly copied from the “ABC de la Chanson Francophone” web site [11].

Alignment of transcribed text and song was performed with WinPitchPro assisted alignment functions, to establish a bidirectional link between each group of the lyrics and the music structure [10]. This alignment allows a very efficient navigation through the corpus, as clicking on any part of text automatically display the corresponding spectrographic and prosodic analysis.

The acoustical analysis produced Fo and intensity curves, as well as narrow band spectrograms, useful to verify the validity of the Fo curves. As the singer voice is most of the time accompanied by musical instruments, the spectral comb is particularly well adapted to obtain melodic curves of good quality despite the presence of the important background noise of the accompanying musical instruments (often making the signal to noise – or voice to music – ratio negative).

Sometimes however, the fundamental analyzer would fail locally, and correct Fo values could be obtained by visual inspection of the accompanying narrow band spectrogram.

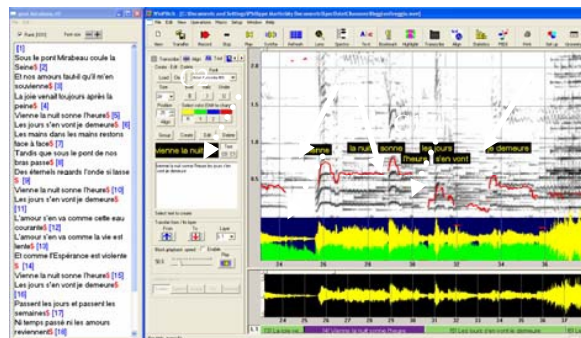


Figure 2: Screen of WinPitchPro, the tool used for acoustical analysis of the data [9]. Left window displays the text, top right window shows the spectrogram and pitch curves, bottom right windows is used to navigate through the sound file. Clicking on any part of text on the left window will automatically display the corresponding spectrographic and prosodic analysis.

4. Observations

In this preliminary study, we will present some typical cases felt as representative of the various strategies used by singers of French songs. These cases involve Charles Aznavour, Charles Trenet, Edith Piaf and Serge Reggiani.

4.1. Charles Aznavour

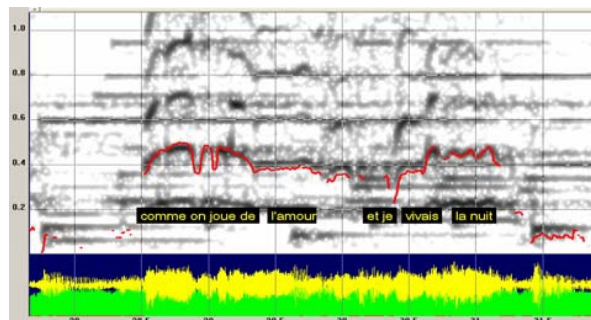


Figure 3: Charles Aznavour, (from « Hier encore », Lyrics and music by Charles Aznavour).

In this Aznavour’s song we observe a case of musical structure dominance: the stressed vowels are static (with vibrato) and unstressed vowels have a melodic slope. Contrast in stress level is here encoded by the vibrato amplitude, larger on *nuit* than on *amour*.

Comme on joue de l'amour et je vivais la nuit
 2 1 stress level
 narrow vibrato large vibrato
 [as we play with love and I lived during the night]

No contrast in melodic slope appears on stressed vowels.

4.2. Charles Trenet

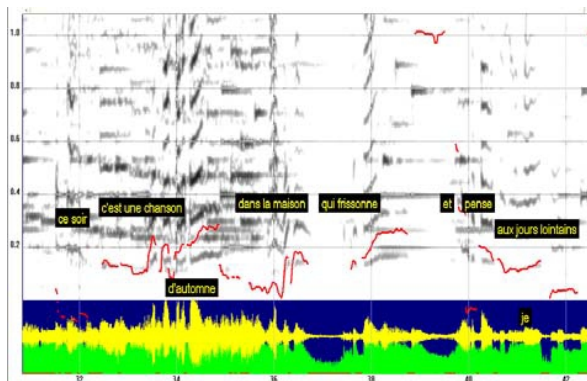
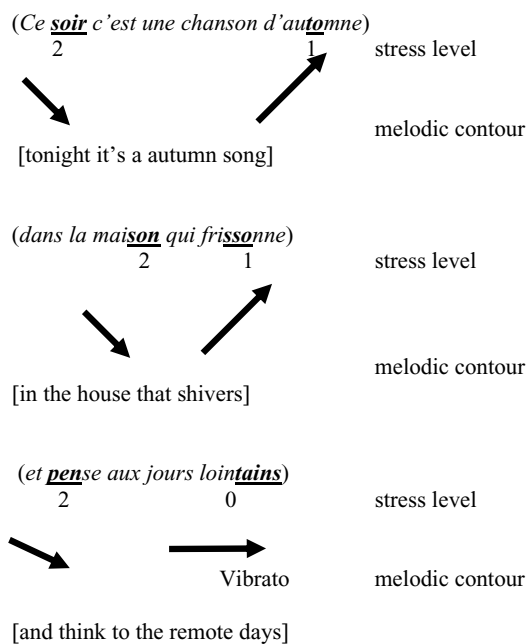


Figure 4 : Charles Trenet, excerpt from « Que reste-t-il de nos amours » (Lyrics: Charles Trenet. Music: Léo Chauliac, 1942)

Trenet's example is opposite of Aznavour's: here the dominance is given to the speech prosodic structure, revealed by the contrast in melodic slope between stressed vowels:



4.3. Edith Piaf

With this performer, all stressed vowels are performed with vibrato (which is clearly characteristic of Piaf's style), but with a clear contrast of slope. Note the contrast in the realization of the first stressed *moi* (vibrato) with the following *moi*, unstressed, with almost no vibrato.

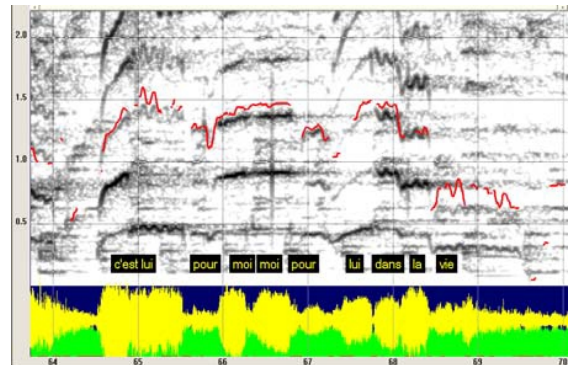
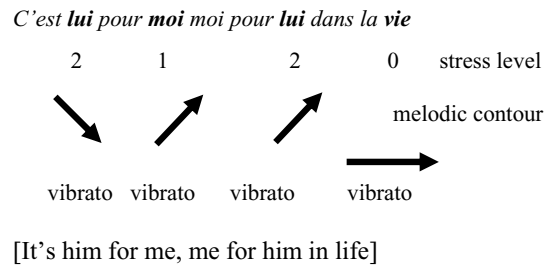


Figure 5: Edith Piaf, from « La Vie en rose » (Lyrics: Edith Piaf, Music: Louiguy, 1942)

4.4. Serge Reggiani

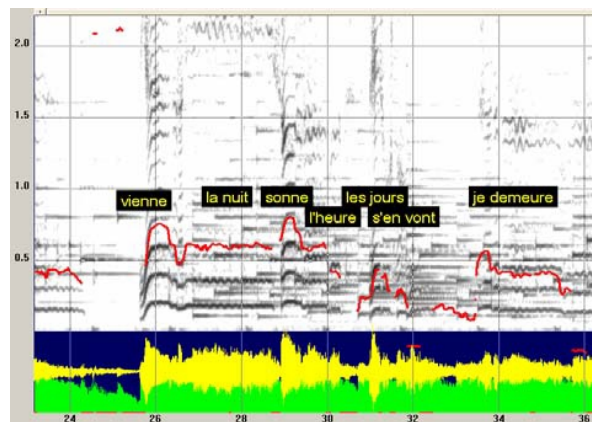


Figure 6: Serge Reggiani, sample from « Le Pont Mirabeau » (from a poem by Guillaume Apollinaire, Alcools, 1913).

This Reggiani's segment shows the use of emphatic stress on the first syllable of stress groups, as another manifestation of natural speech prosody.

Vienne la nuit sonne l'heure les jours s'en vont je demeure
 emph 2 emph 1 emph 2 emph 0

Emphasis is encoded here by a sharp melodic rise on the first syllable, a process used frequently in speech in French.

