# Melody in Music

Patel ch. 4.3

# Introduction

- Patel:  General definition of melody:
  - "An organized sequence of pitches that conveys a rich variety of information to a listener."
- So what is melody in music?
  - [Theme and variations](#).
- How does it compare to intonation in language?
  - Does intonation involve patterns within a system of stable pitch <u>intervals</u>?
  - Does intonation involve patterns of up and down <u>contour</u> relations?

# Differences between musical and linguistic melody

- Musical melodies are built around a stable set of pitch intervals.
  - This allows for use of a tonal center, a focal pitch that serves as a perceptual center of gravity for the melody.
- Intonation exhibits "declination".
  - A gradual lowering of the baseline pitch and narrowing of pitch range over the course of an utterance.
- Musical tone-deafness does not affect intonation.
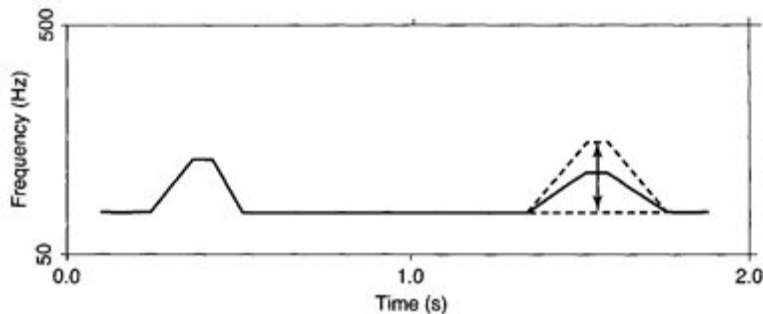
# Terkin 1991



Figure 4.1 Schematic diagram of intonation contours used by Terken, 1991. See text for details.

- Synthethized /mamámamamamamáma/
- Listeners were asked to adjust the height of the second pitch movement so that it had the same *prominence* as the first.
- They made the peak lower, as if adjusting for declination.
- They did this to a lesser extent when asked to make the *pitches* the same.

# Factors affecting and affected by melody

1. Grouping structure.
2. Beat and meter.
3. Melodic contour.
4. Intervallic implications.
5. Motivic similarity.
6. Tonality relations: Pitch hierarchies.
7. Tonality relations: Event hierarchies.
8. Tonality relations: Implied harmony.
9. Meta-relations.

# K0016

- Grouping structure
    - H%, L% (H-, L-):  Pitch movements indicate edges of phrases
    - K0016: Phrases 3 and 4 end with tones that are relatively long and low.
    - French accentual phrases tend to end high, unlike English intermediate phrases.
    - (La femme)(du pharmacien)(va bientôt sortir)(faire son marché).
    - Fant and colleagues synthesized French intonation on an English sentence.  Example.
        - "Along three of the walls there was a stage of rough wooden boards covered with straw"
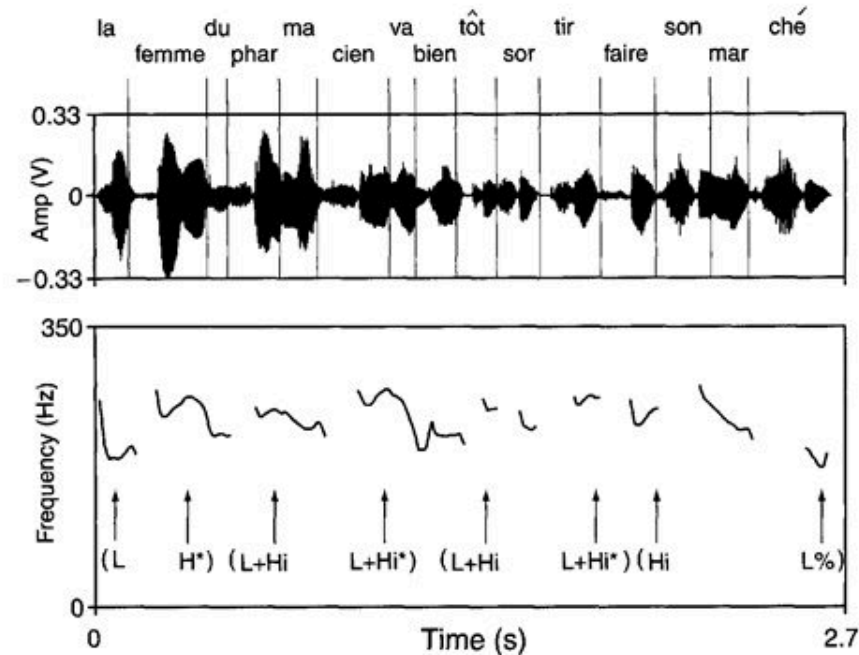
# A French sentence



Figure 4.6 A sentence of French spoken by a female speaker. Top: Waveform with syllable boundaries marked by thin vertical lines. Bottom: F0 contour with phonological tones, according to an AM-style model of French intonation (Jun & Fougeron, 2002). Tone alignment points are marked as in Figure 4.3. Parentheses indicate accentual phrases (APs). The initial tone or tones of each AP (L or L+Hi) are phrase tones, whereas the final tones (H* or L+H*) are pitch accent tones. L% indicates the boundary tone at the end of the intonational phrase.
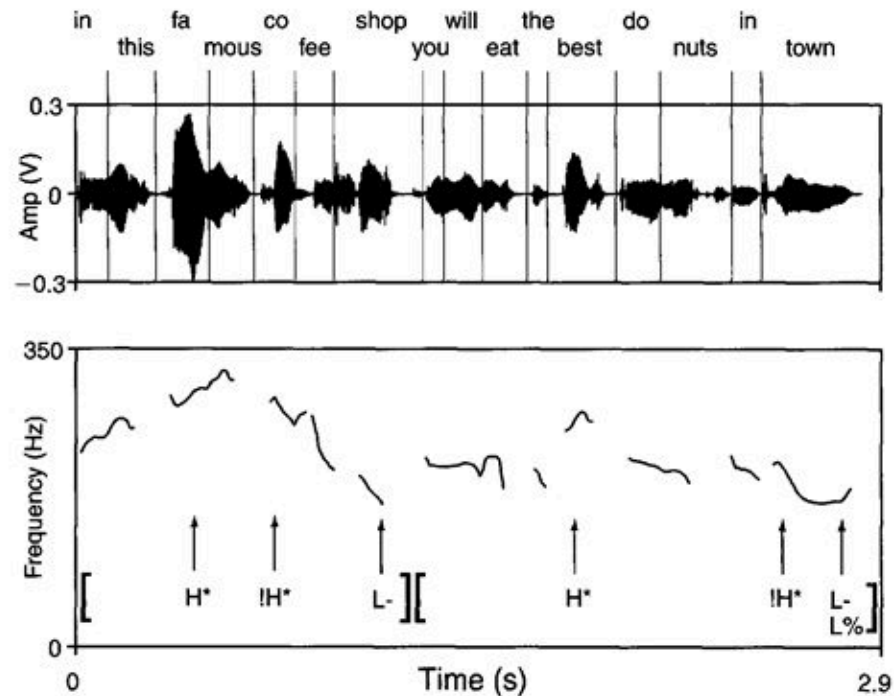
# An English sentence



Figure 4.5 A sentence of British English spoken by a female speaker. Top: Waveform with syllable boundaries marked by thin vertical lines. Bottom: F0 contour with ToBI tones, as in Figure 4.3. Brackets indicate intermediate phrases according to an AM analysis of the sentence. L- indicates a low edge tone (phrase accent) at the end of each intermediate phrase, and L% indicates a boundary tone at the end of the full intonational phrase.

- Beat and meter
  - Contour peaks are perceptually accented points in musical melodies: P4 in K0016.
  - In the intonation of English, salient pitch accents occur on a subset of the stressed syllables, thus marking out a second layer of temporal structure over and above the patterning of stressed syllables.
  - Pitch accents in speech contribute to the sense of rhythm.

- # Melodic contour
  - Dowling experiments show that contour is perceived before interval structure.
  - Infants discriminate contour before they learn their culture's interval system.
  - Contour discrimination perhaps originates in intonation perception.
  - Infants in many cultures are exposed to infant directed speech or "motherese", which exaggerates intonational contours to arouse or sooth infants and to convey approval, disapproval, etc.
  - Listeners must learn to identify distinctive intonation contours in the absence of specific intervals.

- Intervallic implications
  - When a musical melody is stopped, listeners have expectations for what note will be next, even when the melody is unfamiliar.
  - Expectations reflect universal Gestalt principles of auditory processing.
  - Pitch proximity
    - Listeners expect a subsequent tone to be close in pitch to the last pitch they heard.
  - Pitch reversal
    - Listeners expect that after a large interval, the following tone will reverse in direction.
  - Diana Deutsch's Mysterious Melody illusion.
  - Schellenberg et al. 2002. Pitch proximity was a good predictor of expectancy for both children and adults, but pitch reversal was only a good predictor for adults.

- Motivic similarity
  - The first and last phrase of K0016 are identical, leading to a sense of closure.
  - Listeners can perceive similarity as well as identity of motives.
  - A language may have only a limited number of distinctive intonation contours.
  - 't Hart el al. 1990: Dutch listeners recognize six basic intonational patterns in their language, based on specific types of rises and falls that occur within pitch contours.

- Tonality relations: Pitch hierarchies
    - Psychological relations between tone resulting from the systematic ways in which tones are employed in relation to each other.
    - Western tonal melodies typically adhere to a music scale based 7 out of 12 possible pitches per octave.
    - Some pitches are structurally more central or stable than others.
    - Stable tones within a scale are often flanked by unstable tones.
    - Krumhansl & Kessler 1982. Listeners heard a short chord sequence within a key and then rated how well a note fit into or went with the preceding material.
    - The tension between closeness of neighboring tones in frequency but farness in terms of tonal space may be one of the forces that animates musical melodies.

Figure 4.7 (A) K0016 with scale degree of each tone marked. Note that −5 corresponds to scale degree 5 in the lower octave. (B) Harmonization of K0016. The letters below the staff give the chords in the key of C major, whereas the Roman numerals above the staff indicate chord functions (I = tonic, IV = subdominant, V = dominant). For readers unfamiliar with these harmonic terms, they are defined in Chapter 5.
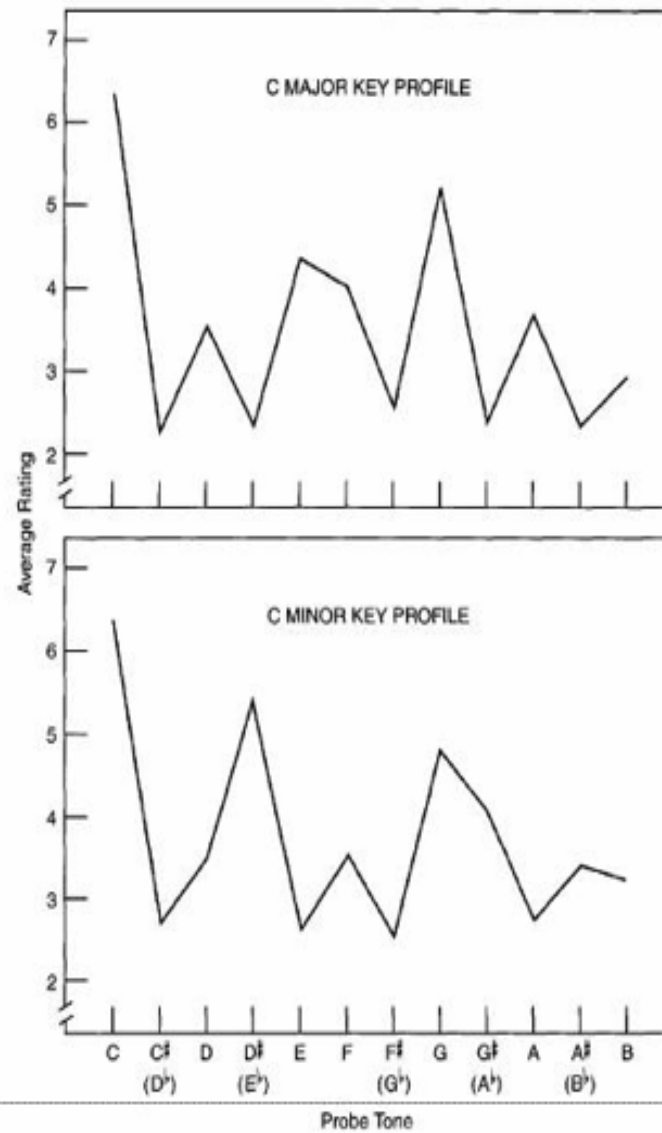
Figure 4.8 Probe tone profiles, indicating listeners' judgments of how well a given tone fits with a preceding musical context. From Krumhansl & Kessler, 1982.
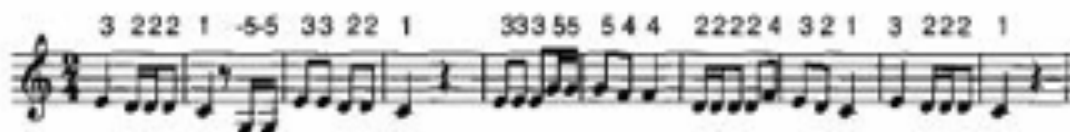
- Bigand 1997
  - Demonstration of the stability of the tonic in ending a melody.
  - [Sound example](#)
- Salience of a "sour note"
  - [Sound example](#)

- Huron 2006
  - "In a given context, a tone will sound stable, complete and pleasant. In another context, that exact same tone will sound unstable, incomplete and irritating,"

- There is no sense in which some intonational tones in speech are more stable or central than others.

- Tonality relations: Event hierarchies
  - The hierarchical stability relations just discussed are atemporal schema derived from experience with musical melodic patterns.
  - Musical melodies also have pitch hierarchies concerning temporal relations between pitches in individual sequences
  - Some pitches in a melody act as its structural elements.
  - Others serve to elaborate or comment on this skeleton
  - Recognition of one melody as a variant of another.
  - More in chapter 5, when we examine Lerdahl & Jackendoff 1983's "time span reduction".
  - In intonation, the pitch accents form the skeleton.

- Tonality relations: Implied harmony
  - Melodies in Western tonal music typically have implied harmony, a background chord progression from which important tones of the melody are drawn.
  - Thus there is a hierarchical level of pitch organization beneath the tones of the melody, with its own principles of combination and patterning.
  - Sloboda & Parker 1985 had listeners sing back unfamiliar melodies presented on a piano. An analysis of their errors of recall showed they preserved the overall contour of the melody and the background harmonic progression.

- [K0016](#) harmonized.



Figure 4.7 (A) K0016 with scale degree of each tone marked. Note that −5 corresponds to scale degree 5 in the lower octave. (B) Harmonization of K0016. The letters below the staff give the chords in the key of C major, whereas the Roman numerals above the staff indicate chord functions (I = tonic, IV = subdominant, V = dominant). For readers unfamiliar with these harmonic terms, they are defined in Chapter 5.

- Meta-relations
    - The above perceptual relations engendered by melody can also be related to each other.
    - Misalignment of grouping and beat can add rhythmic energy to a melody.
        - E.g. anacrusis, P2 of K0016.
    - Tonal relations can interact with grouping structure:
        - Melodies with tonic tones occurring at the ends of phrases are easily remembered.
    - Joint accent structure:  Salient points in the pitch pattern of a melody can align with salient points in the temporal pattern (lengthened tones).
        - Influences memory for the melody (Jones & Ralston 1991) and how people synchronize tapping (Jones & Pfordresher 1997).
    - This type of alignment seems to occur in French intonation.

# Sound example



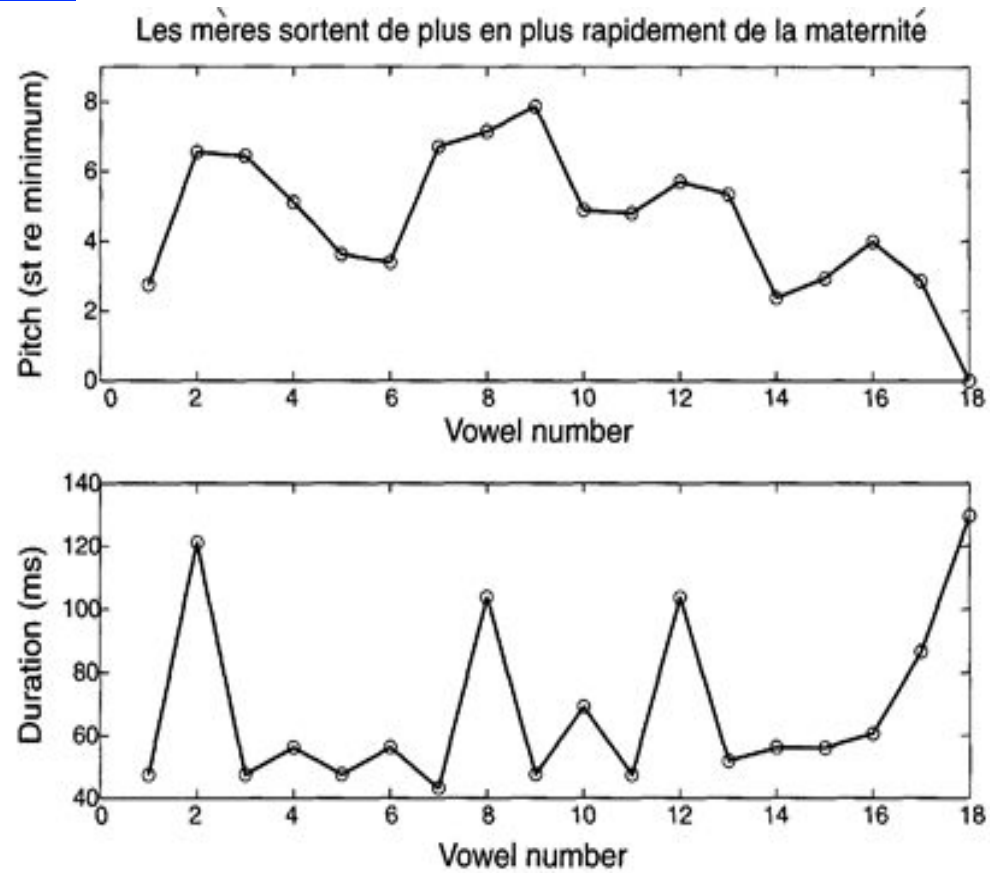Les mères sortent de plus en plus rapidement de la maternité

Figure 4.9 The pitch and duration of each vowel in a sentence of French: "Les mères sortent de plus en plus rapidement de la maternité" as spoken by a femal speaker. Top: Pitch values as computed from a prosogram, shown as semitones from the vowel with the lowest pitch. Bottom: Duration of each vowel in ms.