

# MEETING 1 — OVERVIEW

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- Introduction
- Overview of a ToBI transcription
- Categorical vs. non-categorical aspects of intonation
- “Reading” pitch tracks and waveforms
- Segmental perturbations

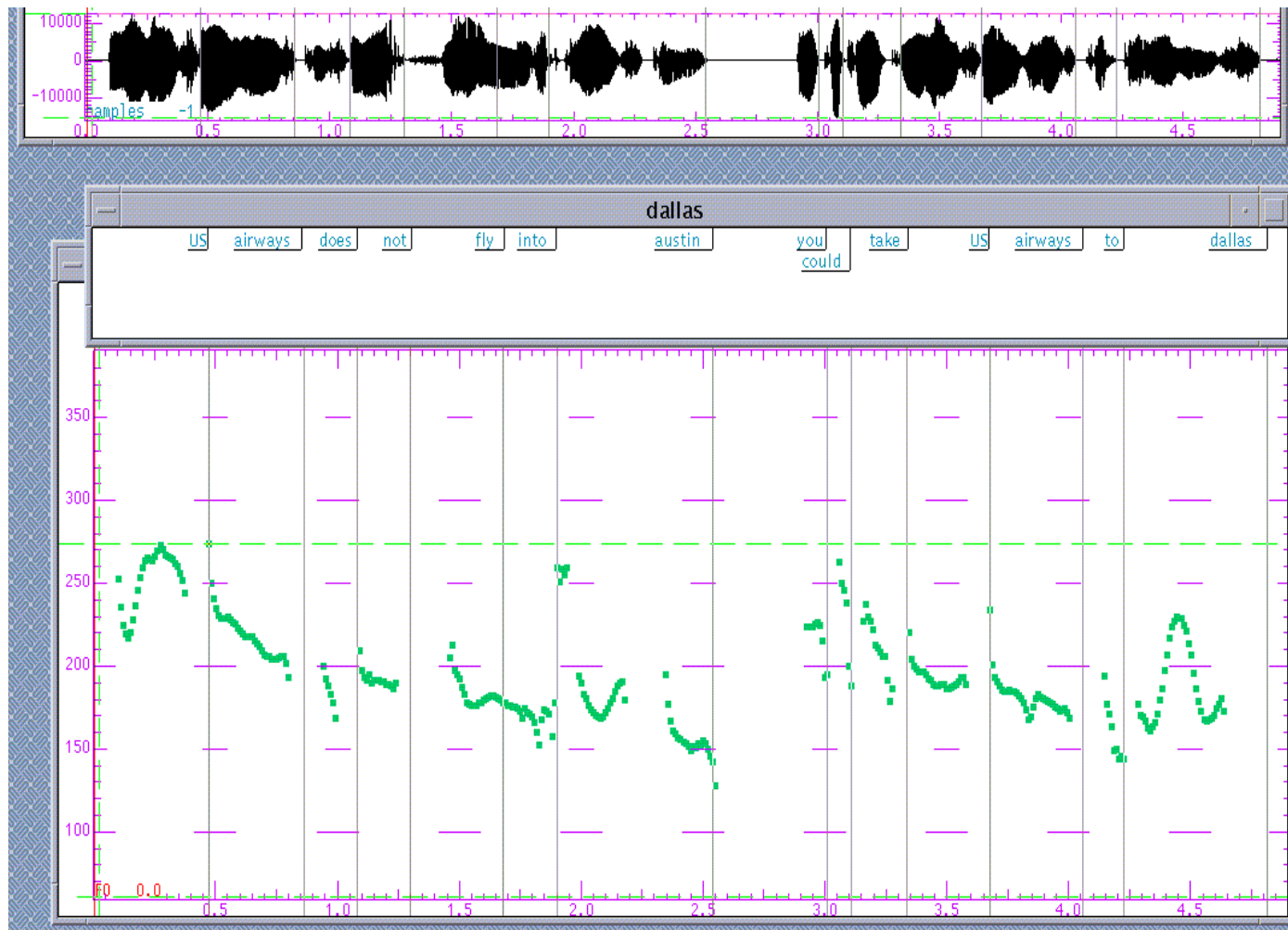


Figure 1: How can we characterize the difference in intonation on *Austin* vs. *Dallas*? — This is one of the goals of this tutorial.

# INTRODUCTION: “READING” ToBI NOTATION

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The class is cancelled.

H\*      !H\*      L- L%

The class is cancelled.

L\*      H- H%

The class is cancelled.

L\*      H\*      L- L%

The class is cancelled.

H\*      H- L%

The class is cancelled.

H\*      H+!H\*      L- L%

The class isn't cancelled.

%H      L\*      L\*      L- H%

- READ MORE about intonational meaning:  
Pierrehumbert & Hirschberg (1990).

# A ToBI (Tones and Break Indices) TRANSCRIPTION

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- A ToBI transcription must include:
  - acoustic waveform (sound record)
  - fundamental frequency (F0) contour (pitch record)
  - label “tiers” containing symbolic tags:
    1. tones
    2. break indices
    3. orthography
    4. miscellaneous

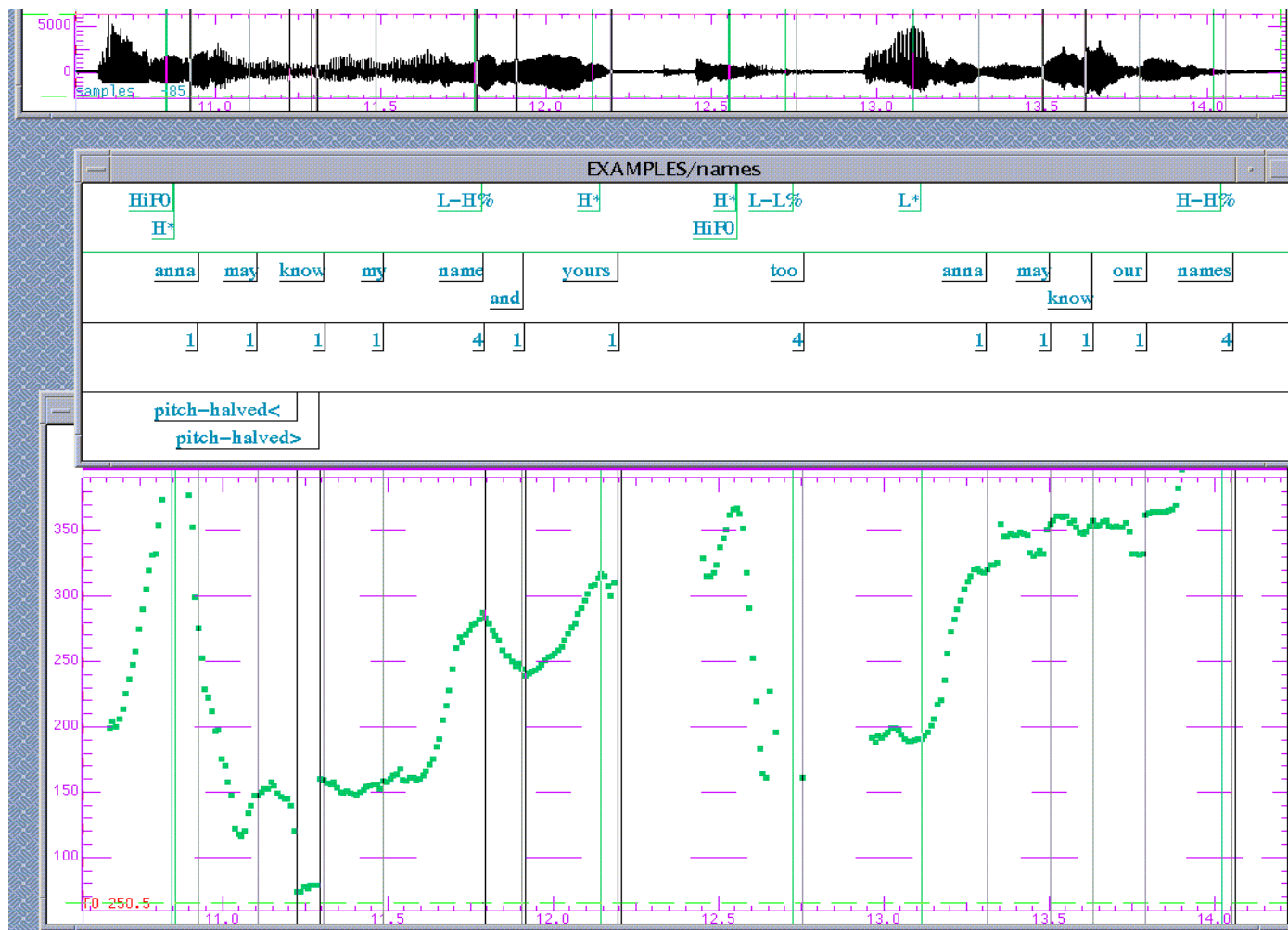


Figure 2: Example of a ToBI-transcribed utterance.

# CORE ToBI TIERS: BREAKS AND TONES

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- TONES: Symbolic labels representing a phonological analysis of the intonation pattern of an utterance. Labeled on this tier are: pitch accents marked on “prominent” words, phrase and boundary tones marked at prosodic phrase edges. [READ MORE: Pierrehumbert (1980), Liberman & Pierrehumbert (1984), Beckman & Pierrehumbert (1986)]
- BREAK INDICES (BI): Symbolic labels marking the degree of perceived disjuncture between adjacent words on the orthographic tier. Along with tones, break indices are indicators of prosodic grouping. [READ MORE: Price et al. (1991)]

# WHAT ASPECTS OF THE INTONATION ARE DESCRIBED / TRANSCRIBED BY ToBI?

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- Categorically distinct prosodic units and intonation patterns.

**PROSODIC STRUCTURE:** The rhythm of more/less stressed words in an utterance and the grouping of these words into constituents.

**INTONATION PATTERN:** The sequence of contrastive pitch accents, phrase tones, and boundary tones.

- Events not predictable from other tools or resources.

(e.g. stressed/unstressed syllables in words can be easily determined by consulting the dictionary entry.)

- Aspects of intonation most amenable to quantitative description are not transcribed.

(e.g. speech rate, pitch range, other acoustic variation.)

# MULTILINGUAL ToBI ???

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- English ToBI can describe the intonation of general American, standard Australian, and southern British English. Other varieties may require modification.
- English ToBI cannot be used directly to describe intonation of other languages, but the general framework can be adapted — German, Japanese, Serbo-Croatian, Cantonese, Korean, Mayali, Chickasaw, Greek, French, Swedish, Italian, Mandarin, Hindi, Spanish ...  
[READ MORE: Jun, ed. (forthcoming)]



# SOME ACOUSTIC PHONETICS

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## WAVEFORM:

- The acoustic waveform is a phonetic record of the air pressure fluctuations hitting the microphone due to sound waves. The greater the airflow out of the mouth/nose while speaking, the larger the negative/positive fluctuations (amplitude) shown in the waveform.

## F0 CONTOUR:

- Physically manipulating the frequency of vibration of the vocal cords (fundamental frequency = F0) results in the psychological percept of differences in PITCH.
- The computer-generated F0 contour, or “pitch track” used in a ToBI transcription is the phonetic record of such changes in frequency of vibration across the utterance.

# SEGMENTAL PERTURBATIONS

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- F0 is not defined in voiceless regions (voiceless stops, voiceless fricatives, voiceless vowels, etc.).
- In addition, all **obstruents** can cause perturbations in the F0 track observed immediately before/after the consonantal region:
  - voi obstruents: p, t, k, s, sh, h, glottal stop, etc.
  - +voi obstruents: b, d, g, z, j, flap, etc.
- Note the ACTUAL voicing of the segment, as produced by the speaker. “Voiced” obstruents are often voiceless, /t/ is often realized as a flap in unstressed syllables, /h/ is often voiced intervocalically.
- As much as possible, use **sonorants** in experimental materials!
- READ MORE: ToBI Guide section 2.1, van Santen & Hirschberg (1994).



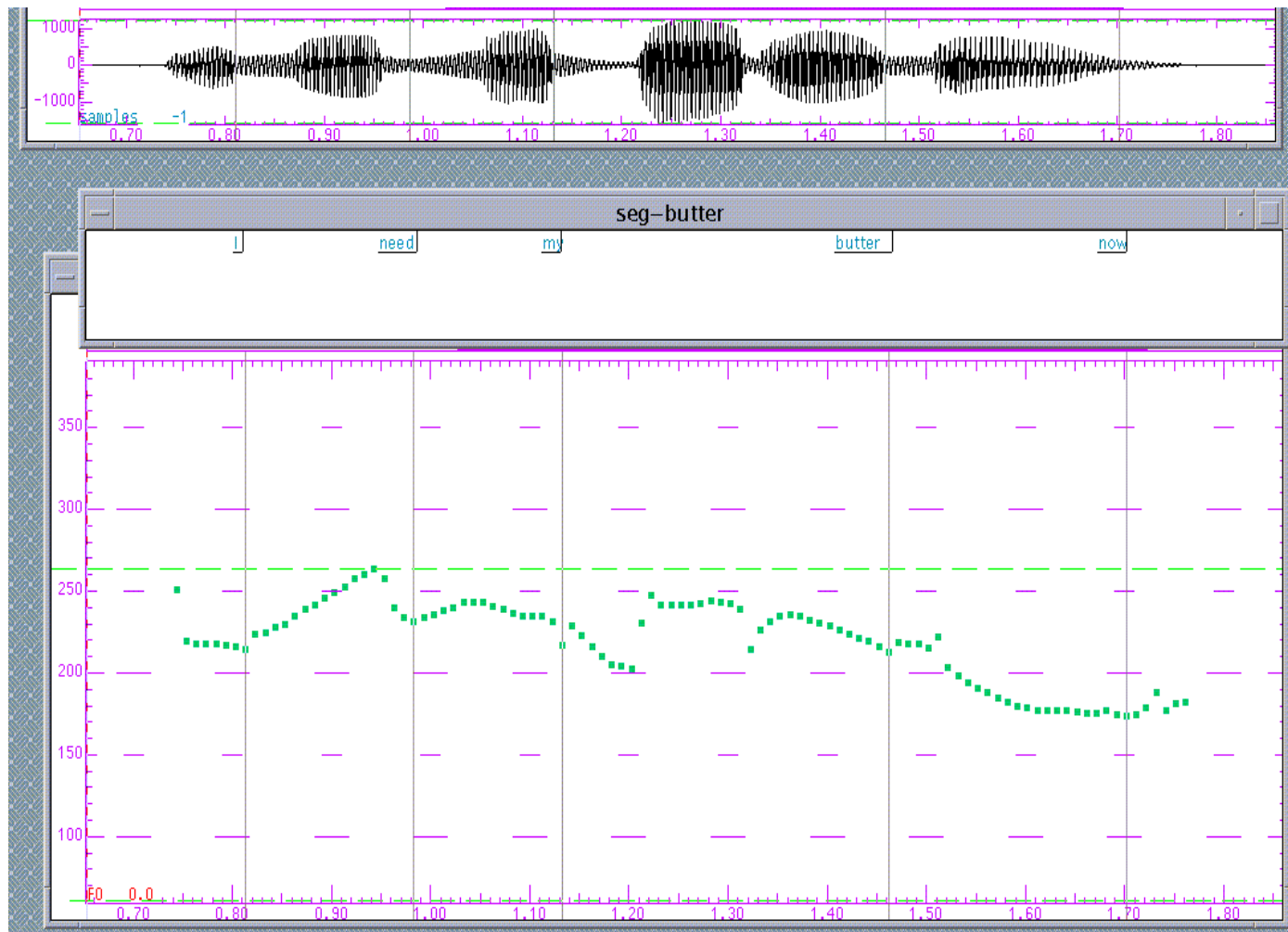


Figure 4: Segmental perturbations of /d/ in *need*, and /b/ and flap in *butter*.

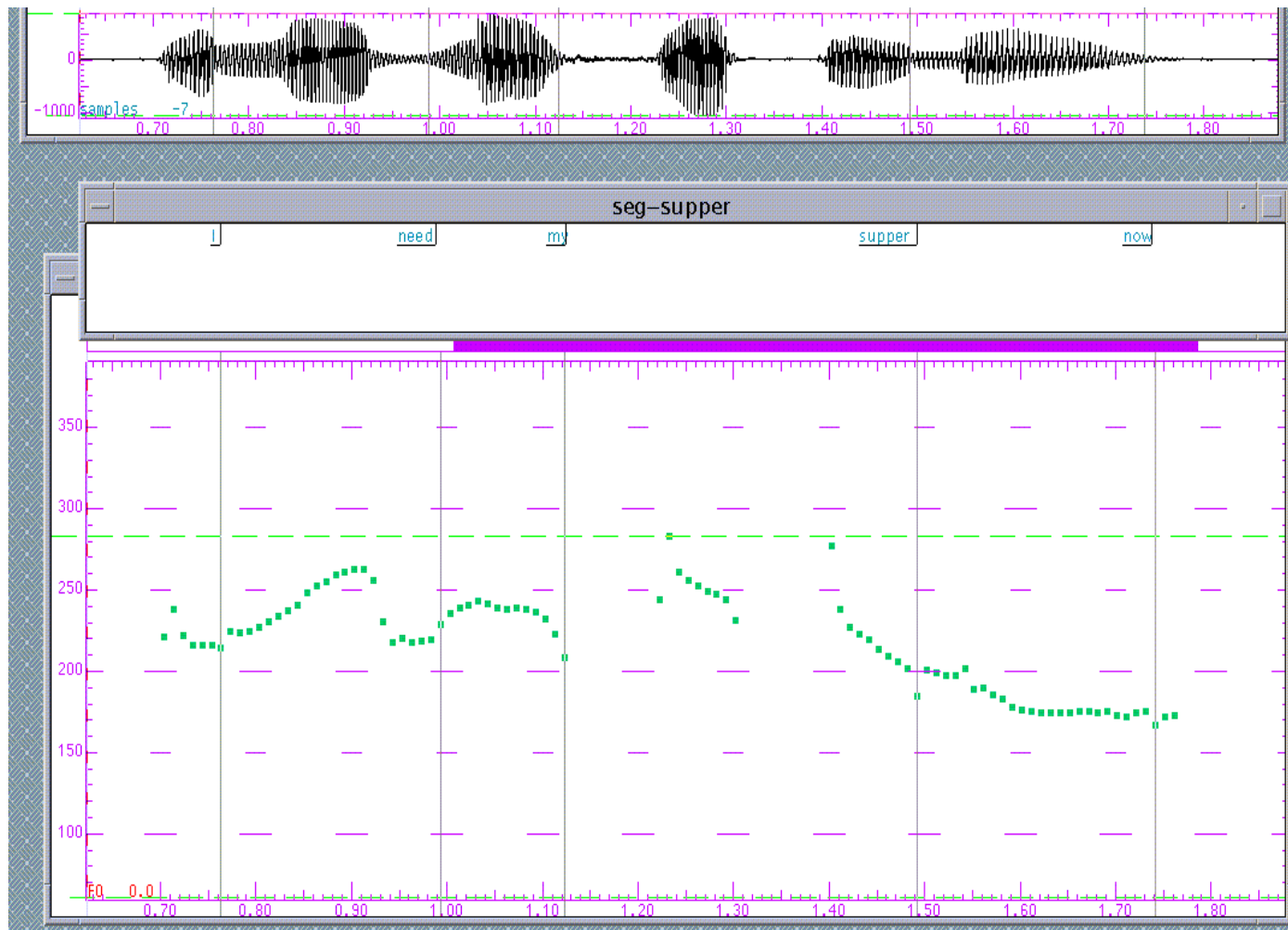


Figure 5: Segmental perturbations of /d/ in *need*, and /s/ and /p/ in *supper*.

# F0 MISTRACKING

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- Pitch tracking algorithms can fail. Breathy or creaky voice regions are notoriously difficult.
- It is common to break into creaky voice in regions of low F0 (e.g. utterance-finally). Also, glottalization (often found at the beginning of vowel-initial words) causes problems in F0 tracking.
- Inappropriate assumptions made by the pitch tracking algorithm can cause pitch-halving or pitch-doubling.
- The ultimate judge is your ear. Do you hear a high/low pitch? Do you hear the pitch rising/falling?
- READ MORE: ToBI Guide section 2.1.