Issues and tools for creating and annotating a corpus of sociolinguistic field data

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Motivation

- **Ad hoc system motivated by sheer laziness.**
- **Goal is to support a study is to characterize the phonology of a Regional Italian variety (Aquilano) under the influence of not only Standard Italian but also two local dialects.**
- **Focal Question: Is the phonological variation observed better modeled as a small number of varieties with inherent variation or a larger number of invariant varieties?**
- **Overlap with this workshop**
  - **empirical analysis of recorded interview data from**
  - **live informants speaking in a linguistic variety whose**
  - **underlying grammatical structure is not fully known &**
  - **need for infrastructure to support analysis and collaboration**

Definitions

- **Corpus - a body of (raw) data collected and annotated for a specific purpose**
  - **Raw Data - naturally occurring data resulting from some linguistic performance**
  - **Annotation - any process of adding value to a corpus**
- **For data originally written, the written text is the raw data. For speech, only the audio is raw data**
- **Annotation encodes either human judgement or automatic processing based on either raw data or on previous layers of annotation.**
- **Transcription and segmentation are special kinds of annotation**
  - **transcription encodes subtle human judgements about what was said**
  - **segmentation defines the granularity of future annotations**

Components

- 80 subjects stratified for age, gender, socioeconomic background
- Interviewers both native and non-native; subjects typically interviewed in pairs
- Attempt to capture multiple “styles”; examine style as a function of time in the interview
- Objective and subjective analyses:
  - vowels system, intervocalic /v/, /c/ before high vowels
- Need for tools and formats to
  - collect and
  - annotate data
  - manage layers of analysis
  - summarize and
  - share results

Before

- Listen to tape for interesting tokens
- Digitize individual tokens
- Code tokens (using software where appropriate)
- Mark tokens on score sheet
- Reformat data for statistical analysis

- Problems
  - slow, labor intensive
  - high risk of missed tokens
  - tokens typically unbalanced, representation of styles poor
  - time measured poorly
  - effort for reanalysis nearly equal to effort for original
  - only limited opportunities for re-use

After

- Digitize entire interview & check audio quality.
- Transcribe, segment & check format.
- Query system for items of possible interest.
- Where appropriate, preprocess for segmental analysis.
- Label and analyze segments of interest.
- Summarize.

- Advantages
  - fewer misses
  - balanced coverage
  - time measured accurately
  - re-use & reanalysis profits from previous preparation

Digitization

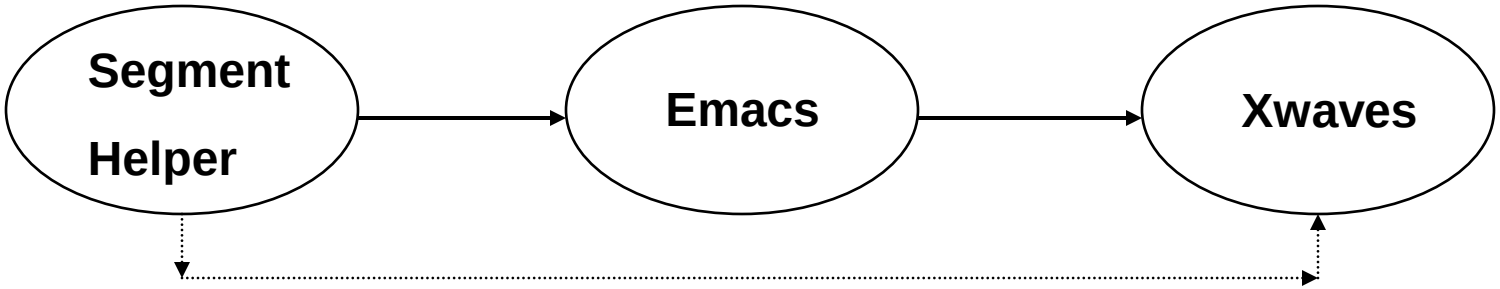
- Interviews recorded on audio cassette using Sony Walkman Professional stereo recorder and a pair of lavalier microphones.
  - each subject on separate mike
  - interviewer typically off-mike
- Digitized as two channel, 16 bit, 32KHz files via a Sony DAT recorder; down-sampled to 16KHz and transferred to computer via a Townshend DAT Link (narecord) Saved in Entropic's .sd format
  - .wav and .sph formats also possible
- Beginning & ending silence trimmed, files demuxed, empty channels removed.
- Need to incorporate automatic checking of signal quality (sample min/max & long periods of low energy)

Transcription & Segmentation

- Orthographic transcription with interesting items & features transcribed phonetically
- Time aligned to audio file via segmentation at the speaker turn level
- Segmentation defines/refines domain of analysis
  - utterance level, word level, segment level (for vowels)
- Initial Segmentation
  - at each speaker turn
  - within long turns at ~8 seconds
  - segmented into breath groups where possible -- though not guaranteed
- Format
  - start, stop, channel, speaker, situation, utterance

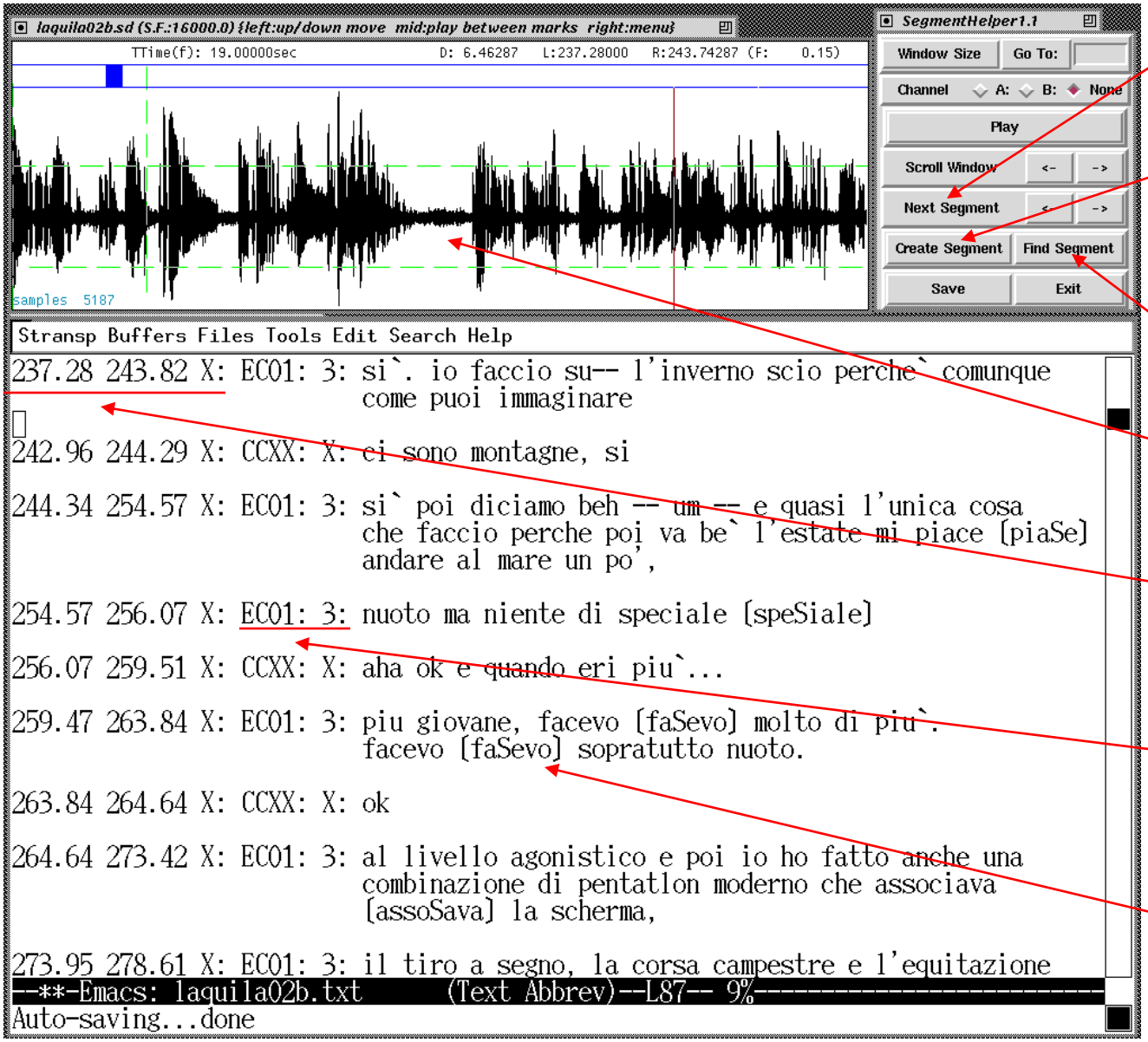
Tools

- **Strans**
  - **Emacs with menus modified and macros added to support transcription talking to Xwaves through “send_xwaves”**
- **Segment Helper**
  - **Emacs running in server mode**
  - **Client writes all commands to stdout where Emacs either acts on them immediately or passes them onto Xwaves.**



  - **Segment Helper & all utilities hereafter written in PerlTK -- free, available on Unix and NT, merges the TK GUI capacity with Perl’s flexibility and flow control.**

Strans +



- **Next Segment - shifts display so that 10% of last segment shows**
- **Create Segment polls Xwaves for left, right cursor positions and writes those as time stamps with channel marker in text**
- **Find Segment finds position in waveform of segment defined in text**
- **Monoaural recording with subject on single mike; interviewer off mike.**
- **Segment defined by start & stop times plus channel marker and written by software based on cursor positions.**
- **Speaker ID written by human and later normalized. Situtation code written semiautomatically and checked by human.**
- **Interesting feature transcribed phonetically.**

Interaction

- **Some transcription done initially on foot pedal controlled transcription machine**
  - **files subsequently segmented with Strans**
- **Many files segmented initially at speaker turn, pause or breath with the segments transcribed subsequently.**
- **As an experiment some files transcribed with help of ASR System**
  - **native speaker trained Dragon *Naturally Speaking* Italian**
  - **listened to tapes via foot-pedal controlled device**
  - **repeated each utterance to Naturally Speaking & corrected its mistakes**

	ASR	Manual
Experiment 1	13.1xRT	13.4xRT
Experiment 2	11xRT	7.8xRT

Quality Checking

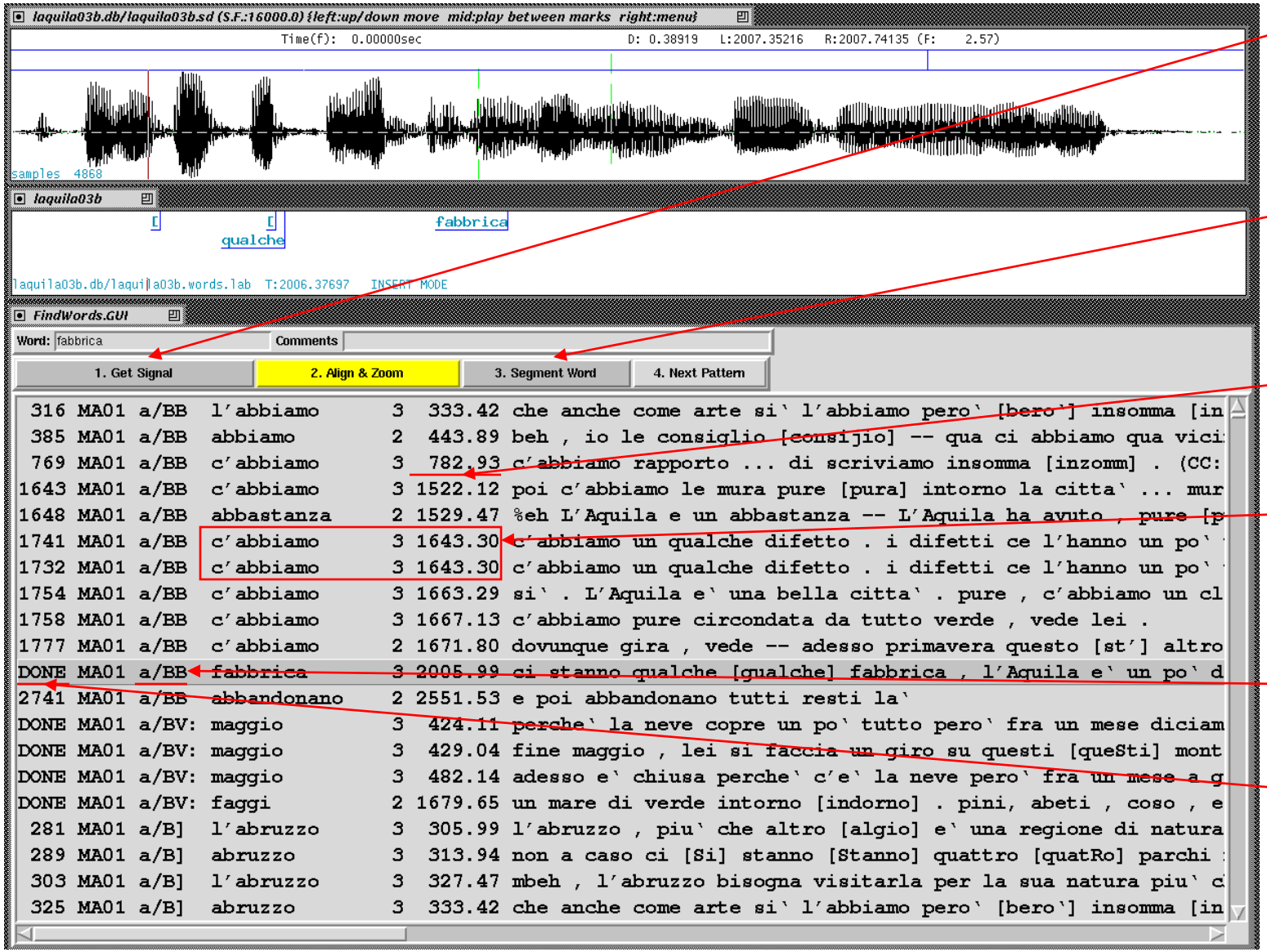
- After Segmentation and Transcription, files are checked by a second transcriptionist for
  - bad segmentation
    - » too much or too little included in the transcript
    - » gap between segments too large
  - inaccurate transcription
  - inaccurate situation code
  - misspellings
  - inaccurate phonetic transcription
- and by automatic process for
  - segments too long
  - time stamps out of order or internally inconsistent
  - impossible channel marker, speaker ID or situation code
- QC catches human formatting errors.
- System controls all subsequent processing.

Word Selection

- FindWord searches reformatted transcript, identifies and numbers any words matching the query. Each hit word is presented to user in context as text and audio
- Software guesses location of word in utterance based on simple assumption that all syllables are of roughly equal length -- does surprisingly well
- Linguist adjusts word boundaries in waveform display, zooms and iterates until satisfied.
- Results saved in new file in SGML format.

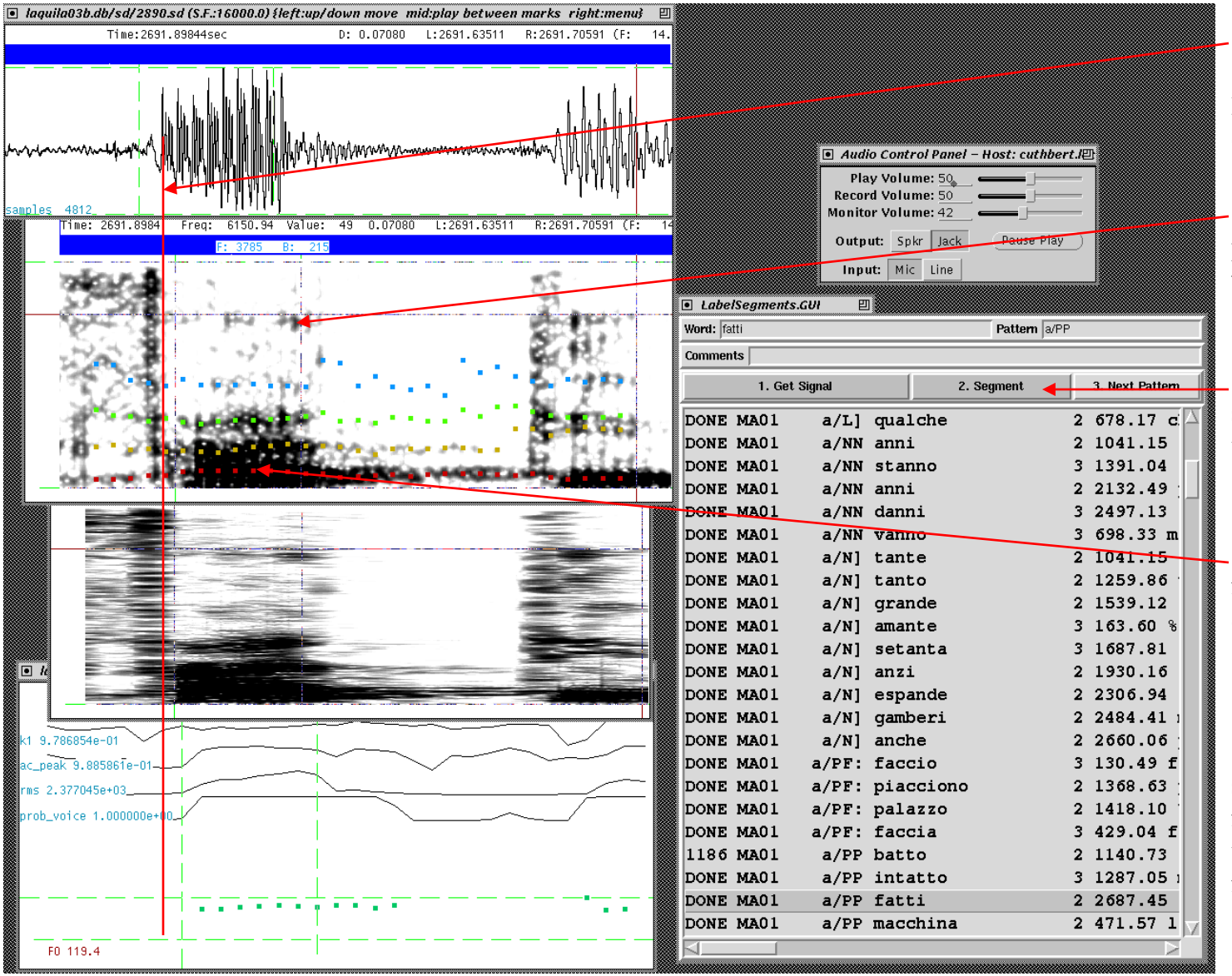
```
< hitnum=3     pattern=o/PP word=vent'otto uttnum=1
  speaker=EC01 situation=3 channel=X
  ustart=76.85 ustop=79.39
  utterance=nel vent'otto aprile [abrile] mille
  novecento [noveSento] sessanta
>
```

FindWords



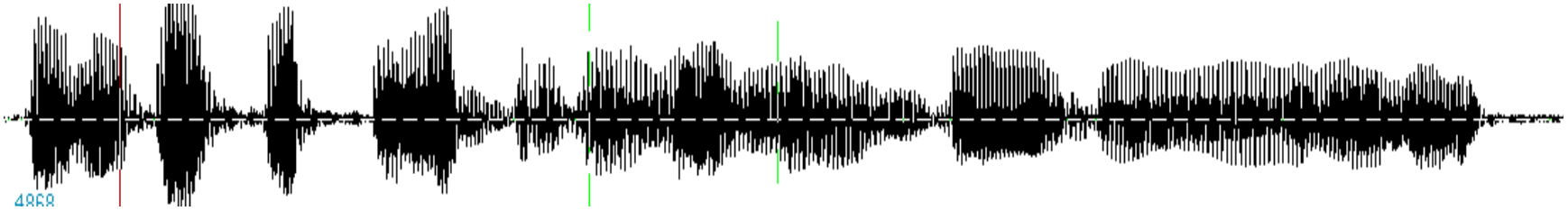
- **GetSignal locates and plays utterance, guesses word position and sets cursors**
- **SegmentWord writes segmentation to new file and marks hit as done.**
- **Retaining times allows user to balance samples over corpus**
- **Lexical Item matching search. May be more than one per utterance**
- **Abstract Label for Search Pattern**
- **Unique Hit Number**

SegmentVowels



- **Time Aligned displays of waveform, WB and NB spectrogram and F0 characteristics**
- **Software guesses position of segment within word.**
- **User adjusts segmentation and saves to file.**
- **Software estimates formant values automatically**
- **All sound files, spectrograms, and F0 files processed ahead of time in batch and saved for later redisplay.**

Annotations



U1	U2	U3						U6	U7
		U4: una donna bella					U5		
				H1: bella					
					S1:E				
					F123				

Relationships

		Hit		Segment	Analysis
		Hit # →		Hit # →	Hit #
	Utterance	Pattern		Segment	F1
	Utterance # ←	Utterance #	Lexicon	S Start Time	F2
	U Start Time	Word →	Word	S Stop Time	F3
	U Stop Time	W Start Time	Expected Pron		
Subject	Channel	W Stop Time			
Speaker ←	Speaker	Actual Pron			
Age	Situation				
Sex					
Ed Level					
Profession					
Region					
Location					