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Date: January 2014  
Description: This file describes the organization of the dataset (wav files) and code for laugh synthesis.

- The top-level URL that hosts dataset and code is <https://ccrma.stanford.edu/~jieun5/laughter/>
- From this page, click on either "DATASET" OR "CODE" to access a drop-down menu for each category.

## I. DATASET

### - I.A. freely composed:

- Provides 10 wav files generated using our synthesis system's "score mode", used in the preliminary listener evaluation of our synthesis system. (Direct URL: [https://ccrma.stanford.edu/~jieun5/laughter/dataset/freely\\_composed/](https://ccrma.stanford.edu/~jieun5/laughter/dataset/freely_composed/))

### - I.B. template ###:

- Provides wav files generated using the stimulus generator version of our synthesis system.
- In the current implementation, the **3-digit template** number works as follows:
  - **100's place**: number of laugh-notes to be synthesized
  - **10's place**: inhalation intensity
  - **1's place**: default tempo
  - For example:
    - *template 202* comprises of 2 laugh-notes (2) with inaudible inhalation (0) and moderate tempo (2);
    - *template 430* comprises of 4 laugh-notes (4) with clearly audible inhalation (3) and very fast tempo (0); and
    - *template 501* comprises of 5 laugh-notes (4) with inaudible inhalation (0) and fast tempo (1).
- **file naming convention**:
  - The first 3-digit number is the template number
  - The remaining name is a chain of one or more feature ID number(s) and their value(s).
  - For example:
    - *202-1\_0.0000.wav* has been generated using template 202, where feature ID #1 has been specified (modified) to take the value of 0.0000;
    - *430-1\_40.0000-&-5\_32.0000-&-12\_-1.0000-&-13\_1.0000.wav* has been generated using template 430, where feature ID #1 takes value of 40.0000, feature ID #5 takes value of 32.0000, feature ID #12 takes value of -1.0000, and feature ID #13 takes value of 1.0000.

- Feature ID #s are defined in our implantation of our stimulus generator (<https://ccrma.stanford.edu/~jieun5/laughter/code/stimulusGenerator/>):

- feature ID #1: pitch bending (default value: 4.0)
- feature ID #2: initial note pitch multiplier (default value: 1.0)
- feature ID #3: f0 (default value: 400.0)
- feature ID #4: f0 fall rate (default value: 0.88)
- feature ID #5: initial note length multiplier (default value: 1.0)
- feature ID #6: inhale duration (default value: 100.0)
- feature ID #7: sustain duration (default value:  $0.0 + Tempo * 10.0$ ), where *Tempo* is specified in the template number (1's place)
- feature ID #8: inter onset interval (default value:  $10.0 + Tempo * 30.0$ ), where *Tempo* is specified in the template number (1's place)
- feature ID #9: intensity (default value: 3.0)
- feature ID #10: inhale intensity (default: *Inhale*), where *Inhale* is specified in the template number (10's place)
- feature ID #11: phrase decay rate (default value: 0.85)
- feature ID #12 (voice-timbre only): f1 (default value: 0.0)
- feature ID #13 (voice-timbre only): delta f1 (default value: 0.0)
- feature ID #14 (voice-timbre only): f2 (default value: 0.0)
- feature ID #15 (voice-timbre only): delta f2 (default value: 0.0)

### - timbre options:

- **I.B.1. SinOsc timbre**: wav files of laughter-like stimuli, generated using SinOsc UGen in ChuckK
- **I.B.2. FM timbre**: wav files of laughter-like stimuli, generated using FMVoices UGen in ChuckK
  - In the FM timbre mode, we also provide files for which pitch-bending has been *disabled* (i.e., feature ID #1 takes on value of 0.0)
- **I.B.3. Voice timbre**: wav files of original laughter stimuli, generated using a glottal waveform buffer and formant filters

- In addition, **stimulus sets used in our perception experiments** can be found through the following URL: <https://ccrma.stanford.edu/~jieun5/laughter/dataset/stimuli/>

## II. CODE

All code has been written using the ChuckK audio programming language: <http://chuck.stanford.edu/>

### - II.A Synthesis System

#### - mode of performance:

- **II.A.1. score mode** (<https://ccrma.stanford.edu/~jieun5/laughter/code/lolol-prototype/score/>)  
Provides example scores of laughter-music, to be used with lolol-score.ck
- **II.A.2. instrument mode** (<https://ccrma.stanford.edu/~jieun5/laughter/code/lolol-prototype/instrument/lolol-instrument.ck>)  
An interface for real-time laughter performance using keyboard and trackpad interactions.
- **II.A.3. agent mode** (<https://ccrma.stanford.edu/~jieun5/laughter/code/lolol-prototype/agent/>)  
Provides example code ("recipes") for semi-automatic generation of expressive laughter; In the given implementation, laughter is triggered by pressing a number (1-9) on the keyboard, representing laughter intensity.

### - II.B Stimulus Generator

#### - timbre options:

- **II.B.1. SinOsc timbre** (<https://ccrma.stanford.edu/~jieun5/laughter/code/stimulusGenerator/stimulusGenerator-SinOsc.ck>)  
Stimulus generator for synthesizing laughter-like sounds using SinOsc Ugen
- **II.B.2. FM timbre** (<https://ccrma.stanford.edu/~jieun5/laughter/code/stimulusGenerator/stimulusGenerator-FM.ck>)  
Stimulus generator for synthesizing laughter-like sounds using FMVoices UGen
- **II.B.3. Voice timbre** (<https://ccrma.stanford.edu/~jieun5/laughter/code/stimulusGenerator/stimulusGenerator-voice.ck>)  
Stimulus generator for synthesizing laughter sounds using a glottal waveform buffer and formant filters