03.06.17
B. Story
University of Arizona

TubeTalker Parameter Listing

1. Listing of most of the parameters in the **"q"** structure
    a. **x02r** = right vocal fold adduction, if made larger voice will get breathier
    b. **x02r** = left vocal fold adduction, if made larger voice will get breathier
    c. **xibr** = right vocal fold bulging, can vary from 0.01 to 0.2
    d. **xibl** = left vocal fold bulging, can vary from 0.01 to 0.2
    e. **npr & npl** = Nodal pt (right and left): point on the vocal folds around which vibration pivots
    f. **aepi** = Epilaryngeal entry area: x-sect area of the vocal tract near the glottis
    g. **lepi** = Epi loc.: location within the epi-laryngeal part of the vocal tract to impose the Epi Area. If set to be 0, this parameter (and aepi become irrelevant).
    h. **pgap** = Post. Gap.: Posterior glottal gap. Probably best to just leave at zero for now.
    i. **asym** = degree of right versus left vocal fold asymmetry. Leave set to 0 for symmetric vibration, or 1 for asymmetry
    j. **phi0R and phi0L**: leave at 0
    k. **areas** = matrix of area vectors that can used to simulate an utterance. "areas" must have at least one row with 45 elements. Elements 1-44 are x-sect areas, element 45 is the nasal coupling. If there is only one row, then a simulation will be run with only that area vector (i.e., a static VT configuration). Can be empty.
    l. **nqf** = time-dependent mode coefficients. Can be empty.
    m. **mod_m** = a vector that modifies the neutral vocal tract shape. It must be a row vector with 44 elements.
    n. **td** = duration of the simulated utterance in seconds. Can be set to any thing up to 9 seconds (however, this would require a lot of computation time).
    o. **PL** = Pressure: Tracheal pressure in dyn/cm2
    p. **F0contour** = can be set to 0, 1, 2, … 0 creates a monotone – F0 will be exactly constant over the duration of the simulation. 1 creates an F0 contour as a statement, not sure about the others.
    q. **FMext** = FM Mod Ext.: Extent of the modulation. Enter as a number less than 1. 0.05 is a good place to start (i.e. 5% extent). If set to zero, no modulation will be imposed.
    r. **FMfreq** = FM Mod Freq. (F0): Creates modulation of F0. Can be set to any number between 1-10 Hz
    s. **AMext** = AM Mod. Ext.: Extent of AM. Enter the same way as FM ext
    t. **AMfreq** = AM Mod. Freq (PL): Amplitude modulation freq. This modulates the tracheal pressure. Can be set to a number between 1-10 Hz

u. **vow1**: first vowel in a vowel-vowel transition. Vowel code- 1=/i/, 2=/I/, 3=/E/, 4=/ae/, 5=/uh/, 6=/a/, 7=/aw/, 8=/o/, 9=/U/, and 10=/u/
v. **vow2**: second vowel in a vowel-vowel transition. If vow1=vow2 then a static vowel is produced.
w. **dxnew**: length of each section in a vocal tract area function. There are 44 sections in an area function so the default length of 0.396826 produces a total VT length of 17.46 cm. This can be made smaller or larger to shorten or lengthen the vocal tract.
x. **fotarg** = F0 target: The fundamental frequency of vocal fold vibration.
y. **fotargR =** F0 target for the right vocal fold (this is only relevant if asym ~= 0)
z. **np** = time-dependent nasal coupling
aa. **mc** = time-dependent activation functions for the constrictive gestures
bb. **rc** = range of the constriction along the vocal tract length (specified in number of sections)
cc. **ac** = cross-sectional area to be achieved by a constrictive gesture
dd. **lc** = location along the vocal tract length at which a constrictive gesture will be imposed (given as a section number i.e., number between 1 and 44)
ee. **sc** = skewing of the constrictive gesture
ff. **gc** = time-dependent vocal fold abduction
gg. **pc** = time-dependent change in tracheal pressure
hh. **stat** = vocal tract model on which the simulation will be based.
ii. piri = coupling area (cm2) of the piriform sinuses to main tract
jj. yw = yielding walls (when equal to 1) or hard walls if set to 0
kk. $\mathbf{L_o}$ **=** rest length of vocal folds (usually 1.6 cm for adult male)
ll. $\mathbf{T_o}$ **=** rest thickness (vertical) of vocal folds (usually 0.3 cm for adult male)

2. Listing of most of the signals in the output structure **"r"**
    a. **ug** = glottal flow
    b. **ga** = glottal area
    c. **ps** = subglottal pressure
    d. **pout** = radiated acoustic pressure (output sound)
    e. **ca** = vocal fold contact area (analogous to an EGG signal)
3. To run a simulation with a **"q"** structure:
    a. At the Matlab prompt type (or paste)

```
>> [audn,ugn,t,r,tv,areas,lgths,fo,p,vareas,Csim,tractindex] = SmallTalkerAsym(q);
```

The "audn" variable is the output audio signal sampled at 44100 Hz. To listen to it:

```
>>soundsc(audn,44100);
```

*Note that the call to the main function is "SmallTalkerAsym" – this is a shell function which includes the vocal tract shaping model called "TubeTalker"