**Supplemental Material S1.**
MATLAB scripts for obtaining mean airflow and subglottic pressure estimates from PAS data.

PASdata.m

```
% This script is to extract data from txt output from PAS and convert them to
MATLAB vectors.
fid=fopen('a.txt');     %open the txt file from PAS
for i=1:17              %obtaining the data from the file
    aline=fgetl(fid);
end
nfid=fopen('na.txt','w');%write a temporary text file
while feof(fid)==0
    aline=fgetl(fid);
    fprintf(nfid, '%s\n', aline)
end
fclose('all');
fid=fopen('na.txt');
%obtaining the data as MATLAB vectors
pasmat=fscanf(fid,'     %f     %f     %f     %f     %f',[5, inf]);
fclose('all');
t=pasmat(1,:); % time vector
A=pasmat(4,:); % Airflow vector
S=pasmat(5,:); % Pressure vector
t=t';
A=A';
S=S';
clear fid ans i nfid pasmat aline
```

Airflow.m

```
%This script is to hand-select the stable middle portion of the airflow
signal.
%To select,
%1. first zoom in to the desired pa train and press enter.
%2. Only middle three /pa/s will be used.
%3. Click the start and end of the stable portions of all three /pa/s (total
of 6 clicks).
%4. When you are done selecting within this train, press enter.
%5. Repeat 1-4 twice to obtain total of 9 pas in three trains.
plot (t,A);
hold on
zoom on
pause ();
[x1,y1]=ginput;
zoom out
zoom on
pause ();
[x2,y2]=ginput;
zoom out
zoom on
pause ();
[x3,y3]=ginput;
zoom out
[Amean Astd]=AirflowMean(x1, x2, x3, t, A); %calculates mean airflow
clear x1 x2 x3 y1 y2 y3
```

AirflowMean.m

```
%This function is to calculate mean airflow from selected data points.
function [Amean Astd]=AirflowMeanfast(x1, x2, x3, t, A)
x=[x1' x2' x3']; %Combining selected points into one vector
for i=1:numel(x) %To obtain time points of each selected points
    val= x(i);
    [~,na(i)] = min(abs(t-val));
end
%Separating data points into each /pa/ train for better scripting
n(1,:)=na(1:6);   %First /pa/ train
n(2,:)=na(7:12);  %Second /pa/ train
n(3,:)=na(13:18); %Third /pa/ train

for j=1:3   %looping for three /pa/ train
    for i=1:3   %looping for four /pa/s
        Aval=A(n(j,2*i-1):n(j,2*i));  %Obtaining airflow value during /p/
        Atrim=Aval((length(Aval)/8):(length(Aval)*7/8));%Trim each 1/8 end
        Axmean=mean(Atrim); %averaging mean
        Ax(i)=Axmean;
    end
    Aall(1:3,j)=Ax';
end
%Averaging values all together to represent mean airflow
Amean=mean(mean(Aall));
Astd=std(std(Aall));
```

Subglottic.m

```
%This script is to hand-select the stable middle peak of the air pressure
signal.
%To select,
%1. first zoom in to the desired pa train and press enter.
%2. Only last four /pa/s will be used (no first /pa/).
%3. Click the start and end of the stable peaks of four /pa/s (total of 8
clicks).
%4. When you are done selecting within this train, press enter.
%5. Repeat 1-4 twice to obtain total of 12 pas in three trains.
plot (t,S);
hold on
zoom on
pause ();
[xs1,ys1]=ginput;
zoom out
zoom on
pause ();
[xs2,ys2]=ginput;
zoom out
zoom on
pause ();
[xs3,ys3]=ginput;
zoom out
%calculates mean subglottic pressure
[Pall Pest]=SubglotticMean(xs1,xs2,xs3,t,S) close all
clear x1 x2 x3 y1 y2 y3
```

SubglotticMean.m

```
%This function is to estimate mean subglottic pressure from data points.
function [Pall Pest]=SubglotticMean(xs1,xs2,xs3,t,S)
xs=[xs1' xs2' xs3']; %Combining selected points into one vector
for i=1:numel(xs) %To obtain time points of each selected points
    val= xs(i);
    [~,nsa(i)] = min(abs(t-val));
end
%Separating data points into each /pa/ train for better scripting
ns(1,:)=nsa(1:8);   %First /pa/ train
ns(2,:)=nsa(9:16);  %Second /pa/ train
ns(3,:)=nsa(17:24); %Third /pa/ train

for j=1:3   %looping for three /pa/ train
    for i=1:4   %looping for four /pa/s
        Pval=S(ns(j,2*i-1):ns(j,2*i));%Obtaining airpressure value during /p/
        Pmax=max(Pval); % finding the maximum value
        VP=1.96*std(Pval(find(Pval>0.95*Pmax))); %To calculated 5% variation
        Psub(i,:)=[Pmax VP];
    end
    Pall((j+3*(j-1)):4*j,:)=Psub;
end
%This step is to average two adjacent /p/s to interpolate subglottic pressure
during the vowel in between.
%Four /pa/ peak values estimate three subglottic pressure values for middle
three vowels in one train.
for k=1:length(Pall)-1
    if k<4
        Psubest(k)=mean(Pall(k:k+1,1));
    elseif k>4&&k<8
        Psubest(k)=mean(Pall(k:k+1,1));
    elseif k>8&&k<12
        Psubest(k)=mean(Pall(k:k+1,1));
    else
        Psubest(k)=[0];
    end
end
%averaging all the estimates to represent mean subglottic pressure
Pest=mean([mean(Psubest(1:3)) mean(Psubest(5:7)) mean(Psubest(9:11))]);
```