Week 1 2018130841 손윤지

There are a majority of English sounds. They can be classified as consonants and vowels, as large. In terms of sounds, we can have a study on sounds, and this one is named as phonetics. Phonetics is a study that figures out how speech is described. To be specific, there are three types of phonetics: articulatory phonetics, acoustic phonetics, and auditory phonetics. First of all, articulatory phonetics is the study about the production of speech. This is the most primitive step of speech. The very first step of articulation is to release air from lung to vocal tract. Vocal tract is composed of larynx, pharynx, nasal tract and vocal tract. To take a closer look, vocal tract is organized by upper side and lower side. Upper vocal tract includes upper lip, upper teeth, alveolar ridge, hard palate, soft palate(velum), uvula and pharynx wall, from the front. In addition, lower vocal tract constitutes lower lip, tongue, and epiglottis, also from the front.

Now again about the speech process, there are 5 speech organs, which are constrictors, also articulators, that make the actual sound during the speech. They are lips, tongue tip, tongue body, velum, and larynx. Phonation process occurs in larynx. Every sound appears through the larynx. Also, the sound from larynx can be divided by voiced sound and voiceless sound. Voiced sound is the sound that occurs by the vibration of vocal cords, and the examples are b, m, v and so on.

Oral-nasal process happens by the position of velum. When nasal sounds are made, velum goes downward so as to make the air go through the nose. Otherwise, velum goes downward, when it is oral sounds. Articulatory process is created in lips, tongue tip and tongue body.

Moreover, each constrictor can be specified by constriction location and constriction degree. By the touch of lips, tongue body and tongue tip, the air flow is constricted at such location, and then it appears as different sounds. Constriction degree is about how much constrictions are made. The very much constriction made, we call it stops. The order goes as fricatives, approximants, vowels, from the most. Therefore, phonemes are produced by specifying constrictors, constriction location, and constriction degree.

Phonemes are individual sounds that form words. Also, phonemes can be defined as a combination of speech organs' actions. At lips, p, b, m, f, v, and w sounds are made. By tongue tip, ɵ, ð, ʒ, t, d, s, z, ʃ, l, and r sounds are made. By tongue body, k, g, j, ŋ and vowels are made. By velum, m, and ŋ sounds are made. By larynx, ɵ, ʃ, p, f, t, s, k and h sounds are made.

We can figure out acoustic process in Praat. We can check duration, pitch, formant and intensity in Praat. To verify voewl acoustics, we can measure pitch using Praat. By the number of occurrences of a reapeating event per second, we can find out the Hz. Then the repeating event shows the vibration of vocal folds, and the repeating parts show us a sine wave.

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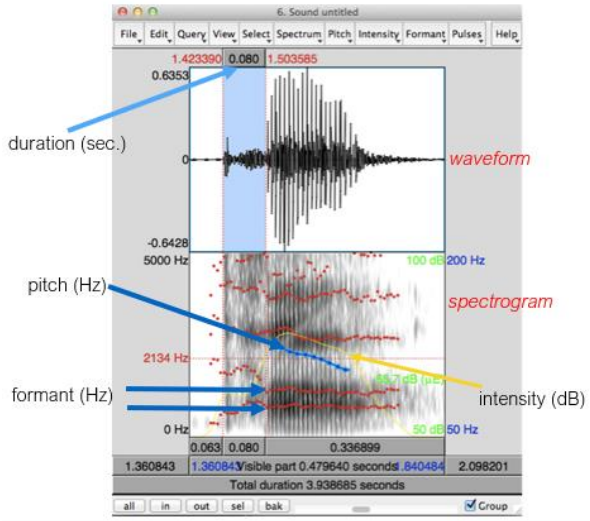
Acoustic process in English. We can find out acoustic process by using Praat program.



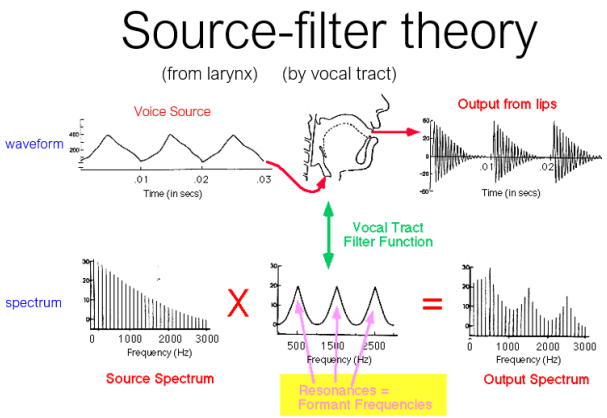
By Praat, we can figure out the waveform, spectrogram and other more information. To be specific, intensity shows the decibel, pitch shows the hertz. Formant is the darkest line of spectrogram. Also, spectrogram is the one that turns spectrum in to time line. Now, having a closer look at the vowel acoustics, all of us have different pitch, so the sine wave(pure tone) of our sound looks different.

If we listen to a sentence, we can notice that it is not a pure or simplex tone. Thus, the sound we perceive through the mouth is complex tone. In addition, how sound like differs depending on our vocal tract. Listening to the source of the sound, there are just sound and pitch. According to sign wave, x-axis describes time line and y-axis describes the value. Moreover, you can turn the sine wave into the spectrum. Spectrum shows frequency by x-axis, and amplitude by y-axis. Simple tone of 100hz is a fundamental frequency, which we will call it as F0.. By synthesizing all simple tones, harmonics are made, and we call it complex tone. In terms of complex tone, the frequency of complex tone is same as that of fundamental frequency.

Human voice source consists of harmonics. Harmonics are composed of harmonic overtone. As usual, female has less harmonic overtone than male. After that, if filtered by vocal tract, the organization of harmonic overtone is same but magnitude differs from that of simplex tone. In other words, peaks and valleys appear in the complex tone.

In conclusion, the lowest pure tone is fundamental frequency, the rate of vibration of the larynx and the number of opening-closing cycles of the larynx per second. Amplitude of pure tones gradually decreases. On the other hand, if the sound is filtered by the vocal tract, spectrogram shows formants which is the peaks that frequencies vocal tract likes.

By means of Praat, we can synthesize source ourselves. As we create one lowest pure tone and make its harmonic overtone, we can make harmonics. In spectrum, there is a mountain from the beginning and we call it F1 and F2 in order. In spectrogram it appears as formants. Each vowel has distinguishable formants and that why we can classify each vowel. Also, if we put F1 as y-axis and F2 as x-axis, we can watch vowel space.



Week 3 2018130841 손윤지

Computer program also has a language. We call it coding as usual. There are four important aspects of coding. First, there are variables which are same as the words of language. We need a function that makes system to work on, which is called 'if conditioning'. Next, for loops are needed for the repetitive act of program. Lastly, only number and characters could be the information in computer program.

By using 'anaconda prompt' we can figure out the way to test the function and programming. First of all, turn on the 'anaconda prompt', type 'jupyter notebook' on the black monitor. Then the program leads us to the jupyter notebook program. Then, now we are ready to practice to use the program.

The thing located on right is the information, and the one on the left is the variable. In the case of making a=1, 1 belongs to information and a to the variable. Then, put the function of 'print ()', which make the variable print out its information, the result would be 1. If we make new command such as 'a=2', the result of 'print' would be '2'. Thus, what we have to focus on is the number between the square brackets. After clicking 'in' at the left side, we can make new line below with tapping 'b' on the keyboard, make new line up above with tapping 'a' on the keyboard, and delete the line with tapping 'x'. Also, you can make the result by clicking 'run' box, or by tapping shift+enter.

Every character just used in the program are perceived as a variable, so to make it as a literal word of English, we need to put quotation marks such as 'love'. In addition, if you put any variable twice, especially for the last variable, when just typing variable without function, it makes same function as print function.

In the case of matching more than one information to one variable, you can put those information inside '[]'. After having type function, the result is 'list'. When there is just one information which belongs to one variable, the result of type function is 'int'. On the other hand, information of prime number and the word make the result of 'float'. When there are the word that

meets the variable, the result is the ‘dictionary’.

There could be both number and letters in the 'list'. Dictionary need more than two pairs of variable and information. Also, it is allowed only to use {}, while using dictionary. Int appears when it's natural number, and float appears when decimal. When the letter information is included, it is called as a string. Tuple is the one similar to list, but the difference is that tuple uses [] can be used when access to the information inside, such as for order. So, when it is written as 'a[2]', it means the third order of the letter. It's because the thing that comes first is regulated as '0'.

```
a = '123'  a = list(a); print(type(a)); print(a); print(a[2])
```

```
<class 'list'>
['1', '2', '3']
3
```

If it becomes as a formation of dictionary, the index becomes the variable itself, instead of using the order. Function of string is similar to that of list. In the case of order written in minus, you can think of it as a vertical line. Thus, [-1] always means the letter of the last index, and [0] always means the first. Moreover ':' shows the range of the information.

```
s = 'abcdef'
print(s[0], s[5], s[-1], s[-6]); print(s[1:3], s[1:], s[:3], s[:])
```

```
a f f a
bc bcdef abc abcdef
```

Function 'len()' shows the length of the information. You can compound the results by using plus or *. Using period after the variable and writing upper makes the information becomes upper case.

```
s = ' this is a house built this year.\n'
s
```

```
' this is a house built this year. ₩n'
```

```
result = s.find('house')
result
```

```
11
```

```
result = s. rindex('this')
result
```

```
23
```

*rindex means to find the information at the right side.

s = s.strip () s
'this is a house built this year.'

*strip: wipe out all the inaccurate factors of the sentence.

Tokens = s. split (' ') tokens
'this', 'is', 'a', 'house', 'built', 'this', 'year'

*split: split the sentence by following order in the '()'

```
s = ' '.join(tokens)
s
```

'this is a house built this year.'

*join: put up the words into a sentence using the factor between '()'

s = s. replace('this', 'that') s
'that is a house built that year.'

One of the important processes of programming is 'for loop' process. The way to make for loop process is writing down 'for_ in _ :' in 뒤에 있는 것을 하나씩 돌려서 in 앞에 있는 것이 받아서 계속 동작을 반복하라는 것이다.

```
a = [1, 2, 3, 4]
for i in a:
    print(i)
```

1
2
3
4

Range 함수는 range 뒤에 어떤 숫자가 나오면 몇 개의 index를 만들라는 것.

```
a = [1, 2, 3, 4] #index 를 4개를 i 에 넣어라.
 for i in range(4):
       print(a[i]) #print (i) 의 결과는 0 1 2 3임.
```

1
2
3
4

Len () 함수는 길이를 의미. Len (a) = 4

```
a = ["red", "green", "blue", "purple"]
b = [0.2, 0.3, 0.1, 0.4]
```

```
for i, s in enumerate(a): #i가 번호고(0, 1, 2, 3) s는 자기 자신.
    Print (a[i])
```

```
Red
Green
Blue
Purple
```

Enumerate: 번호를 추가로 매겨라.

```
a = ["red", "green", "blue", "purple"]
b = [0.2, 0.3, 0.1, 0.4]
for i, s in enumerate(a): #zip 은 페어로 4 개가 됨.
   print("{}: {}%".format(s, b[i]*100)) #왼쪽과 같은 형태로 적고 싶을 때.
Format 뒤에 두개가 왼쪽과 같이 적힌다는 것.
```

```
red: 20.0%
green: 30.0%
blue: 10.0%
purple: 40.0%
```

```
a = 0
if a == 0:
   print(a)#두개 써야 진짜 equal 사인
else:
   print(a+1) #if a != 0 > !가 0 이 아니면 이라는 뜻.
```

```
0
```

```
for i in range(1, 3):
     for j in range(3, 5):
          print(i*j)
```

```
3
4
6
8
```