

## -English consonants and vowels

				1	2							
p	pie	pea		lowercase p	i	i	heed	he	bead	heat	keyed	lowercase i
t	tie	tea		lowercase t	ɪ	ɪ	hid		bid	hit	kid	small capital i
k	kye	key		lowercase k	eɪ	eɪ	hayed	hay	bayed	hate	Cade	lowercase e
b	by	bee		lowercase b	ɛ	ɛ	head		bed			epsilon
d	dye	D		lowercase d	æ	æ	had		bad	hat	cad	ash
g	guy			lowercase g	ɑ	ɑ	hard		bard	heart	card	script a
m	my	me	ram	lowercase m	ɑ	ɒ	hod		bod	hot	cod	turned script a
n	nigh	knee	ran	lowercase n	ɔ	ɔ	hawed	haw	bawd		cawed	open o
ŋ			rang	eng (or angm)	u	u	hood				could	upsilon
f	fie	fee		lowercase f	θ	θ	hoed	hoe	bode		code	lowercase o
v	vie	V		theta	u	u	who'd	who	booed	hoot	cood	lowercase u
θ	thigh			eth	ʌ	ʌ	Hudd		bud	hut	cud	turned v
ð	thy	thee		lowercase s	ʒ	ʒ	herd	her	bird	hurt	curd	reversed epsilon
s	sigh	sea	listen	lowercase z	ai	ai	hide	high	bide	height		lowercase a (+l)
z		Z	mizzen	esh (or long s)	au	au		how	bowed		cowed	(as noted above)
ʃ (š)	shy	she	mission	long z (or yog)	ɔɪ	ɔɪ		(a)hoy	Boyd			(as noted above)
ʒ (ž)			vision	lowercase l	ɪr	ɪə		here	beard			(as noted above)
l	lie	lee		lowercase w	ɛr	ɛə		hair	bared		cared	(as noted above)
w	why	we		lowercase r	aɪr	aə	hired	hire				(as noted above)
r	rye			lowercase j								
j (y)	high	he		lowercase h								
h												

Note also the following:

tʃ (tš)	chi(me)	chea(p)
dʒ (dž)	ji(ve)	G

Note also:

ju	ju	hued	hue	Bude	cued	(as noted above)
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-Phonetics: a study on speech

1. Articulatory phonetics(from mouth): how to produce speech
2. Acoustic phonetics(through air): how to transmit speech
3. Auditory phonetics(to ear):how to hear speech

-upper vocal tract: Lip, teeth, alveolar ridge, hard palate, soft palate(velum), uvular, pharynx wall, larynx

-lower vocal tract: lip, tongue tip, blade, front, center, back, root, epiglottis(음식이 기도로 가는것을 막음)

-larynx

1. Voiced: vibration- 성대가 붙어있을 때
2. Voiceless:no vibration-성대가 떨어져 있을 때

-velum lowered: nasal, breathing

-constriction

1.Constriction location

- 1) Lips-bilabial, labiodental
- 2) tongue body- palatal, velar cf)모든 모음은 tongue body를 사용
- 3) tongue tip- (inter)dental, alveolar, retroflex, palato-alveolar

2.Constriction degree

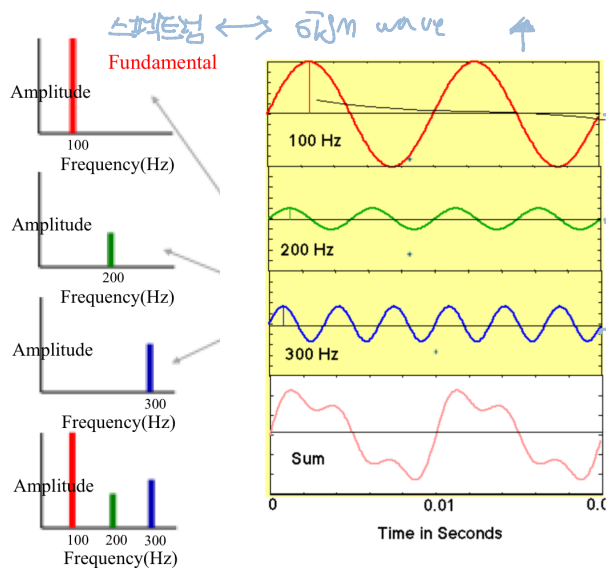
Stops>fricative>approximants>vowel

-phonemes: individual sounds that form words

## \* Spectrum

모든 소리는 spectrum으로 이루어져 있음.

time x value (frequency)



simplex (Pure) tone

Complex tone

: Simplex tones을 합성한 결과.

다) Phasor 기전용

Spectrum: 숫자 입력.

또는 sine wave

frequency x amplitude (magnitude)

(주파수 x 그 주파수의 크기)

## \* Source (목구멍에서만 나옴)

- Human voice source consists of **harmonics** 배열 증가
- A complex tone = sum of pure tones at integer multiples of the lowest pure tone
- the lowest pure tone
  - Fundamental frequency (F0) = Pitch
  - rate of vibration of the larynx
  - the number of opening-closing cycles of the larynx per second (보통 인의 진동수)
- Amplitude of pure tones gradually decreases

## \* Filter

- Compare spectrums between audio and EGG

- EGG: gradual decreasing

- audio: peaks/mountains and valleys

harmonics인 것 그대로이나, amplitude가 gradual decrease가 아님

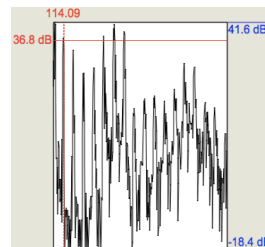
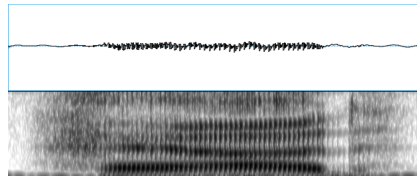
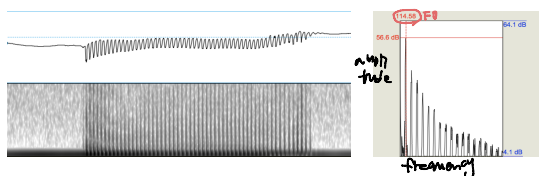
- Because it is filtered by the vocal tract (VT)

- peaks/mountains: frequencies VT likes = formants

- valleys: frequencies VT does NOT like

소리를 줄이는 거.

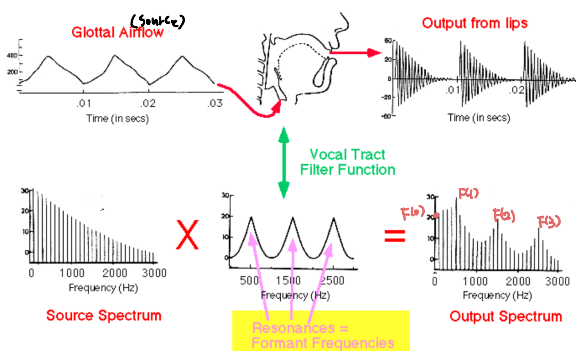
다) 여 F0 ↑ → 등압등성  
남 F0 ↓ → 팽팽함



## \* Synthesizing Source

- convert to mono → 직접에 sine wave와 주기 맞춰, 높이도 직접에 것만 비슷.
- 무한대로 가면, pulse train.

## \* Source-filter theory



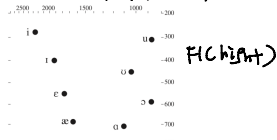
Formants: Peaks의 frequency.

## \* Spectrogram

- Dark band: mountains = Formants

## \* F1, F2만으로 모음구분 및

F0 (back-front)



코딩 = 자용재 (ex. 폰에있는 프로그램들)

언어 ~~의~~

사람의 언어 [ 단어 : 정보 (단어는 정보를 담는 그릇)  
= 문법

컴퓨터 언어 [ 변수 : 정보 ex) 숫자, 문자...  
= 문법

① 변수에 정보를 assign

② 조건 (if)

③ 반복 (for)

★ ④ 함수 : 입력 → 출력

$x = y$  ← y를 x로 assign. ex)  $a = 1$  / **Run** (단축키: Shift + enter)

들어갔는지 확인 : print(a)

셀 앞부분을 클릭하고 파란바드이면 (a : 위에 열거했 / select ⓧ X = delete.  
b : 아래에 "

문자 입력 : ' ' ~~의~~

• love = 2    b = love    print(b) = 2

•  $\begin{matrix} a=1 \\ b=1 \\ c=3 \\ c \\ // \end{matrix}$  → run → 3    *마지막 하나는 print하셈.*

$a=1; b=2; c=3;$

• 한 변수에 여러개 넣는법 → 대괄호 ex)  $a = [1, 2, 3, 5]$   
(list)    *괄호 안은 ok*

• type(변수) → 어떤 type 인지 ex) int, list, float, str  
(숫자)    (문자)

•  $a = [1, 'love', [1, 'bye']]$

•  $a = \{ 'a' : 'apple', 'b' : 'banana' \}$     *표제어! 설명.*

↳ type : dict (dictionary)