LING 520 Introduction to Phonetics I
Fall 2008

Week 3

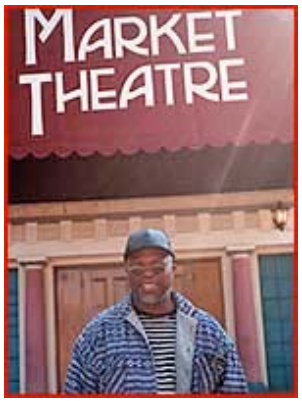
Sounds in other languages

Sep. 22, 2008

Languages in the world

- There are about 7,000 languages in the world today.
- Over half of them (52 percent) are spoken by fewer than 10,000 people; over a quarter of them (28 percent) are spoken by fewer than 1,000 people; at least 10 percent of them are spoken by fewer than 100 people.
- The pessimists reckon that in 100 years' time 90% of the world's languages will be gone, and that a couple of centuries from now the world may be left with only 200 tongues.
- Not everybody is pessimistic:

> Xhosa people have “colonised” English. English is spoken with a Xhosa accent and attitude. We have a slave called ‘English' and it serves us well. (John Kani)



[From BBC website]

Languages in the world

- Nearly half the people in the world (48 percent) speak one of the 10 most widely spoken languages:

Language	Number of speakers
1. Chinese, Mandarin	885,000,000
2. English	322,000,000
3. Spanish	266,000,000
4. Bengali	189,000,000
5. Hindi	182,000,000
6. Portuguese	170,000,000
6. Russian	170,000,000
8. Arabic (all forms)	161,000,000
9. Japanese	125,000,000
10. German	98,000,000

[From: Ladefoged 2005, *Vowels and Consonants*]

Consonants around the world

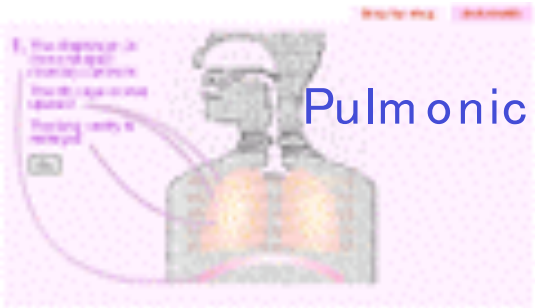
- In terms of the cross-product of relevant IPA dimensions and values, there are about 600 consonants in different languages.
- The 10 most widely spoken languages use about 100 different consonants, of which only 22 occur in English.
- About 98 percent of the world's languages have the three voiceless /p, t, k/, and every known languages has sounds similar to two of the three.
- Dimensions to be considered: Airstream mechanisms, states of the glottis, articulatory targets (places of articulation), and types of articulatory of gestures (manners of articulation).

Airstream mechanisms

- **Airstream mechanisms** refer to the means of initiating a speech sound, including pulmonic, glottalic, and velaric.
- **Pulmonic airstream mechanism**: The movement of lung air by the respiratory muscles. Most sounds are produced with a pulmonic airstream mechanism, but in case of stop consonants, two other airstream mechanisms may be involved.
- **Glottalic airstream mechanism**: The movement of pharynx air by the action of the glottis. An upward movement of the closed glottis will move the air out of the mouth; a downward movement of the closed glottis will cause air to be sucked into the mouth.
- **Velaric airstream mechanism**: The movement of mouth air by action of the tongue. There is a velar closure formed by raising the back of the tongue when using the velaric airstream mechanism.

Pulmonic airstream mechanism

- The movement of lung air by the respiratory muscles. Most sounds are produced with a pulmonic airstream mechanism.
- **Plosive**: A Stop made with an egressive, or outward-moving, pulmonic airstream.
- A stop made with an ingressive pulmonic airstream is possible, but NOT used in any known language.

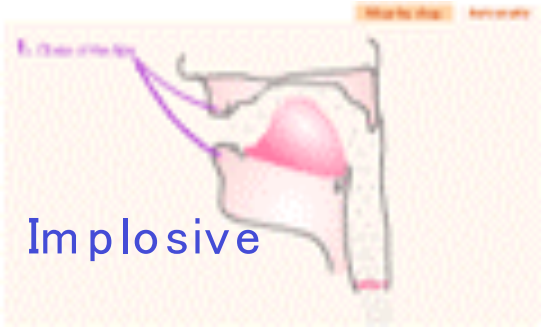


[From: City University of Hong Kong website]

http://www.ctlwmp.cityu.edu.hk/lingintro/english/sounds/phonetics/index-airstream.htm

Glottalic Airstream mechanism

- **Glottalic airstream mechanism**: Movement of pharynx air by the action of the glottis. Ejectives and implosives are produced with a glottalic airstream mechanism.
- **Ejective**: A stop made with an egressive glottalic airstream. It is transcribed as an apostrophe placed after a symbol, e.g. [k'].
- **Implosive**: A stop made with an ingressive glottalic airstream. It is transcribed as a small hook on the top of the regular symbol, e.g. [ɓ].



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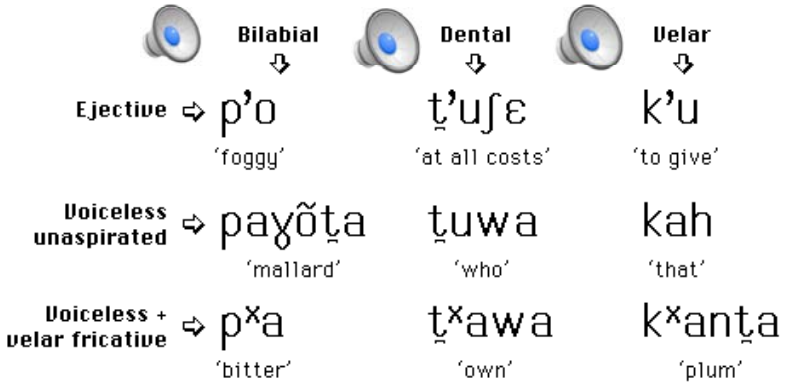
Ejectives

- Ejectives of different kind occur in a wide variety of languages, including American Indian languages, African languages, and languages spoken in the Caucasus.
- A trick to produce ejectives from MIT linguistics website:

  In order to practice making an ejective sound, start by holding your breath. Now, while you're still holding your breath, try to make a "k" sound; make the sound as loudly as you can, so that somebody sitting next to you can hear it. Now relax and breathe again. Congratulations! You've just made an ejective k'.
- Ejective stops in Lakhota (an American Indian language):



[From: Ladefoged 2005, *A course in phonetics*]

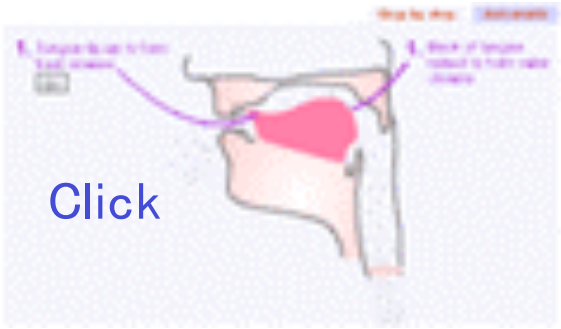
Implosives

- In the production of implosives, the down-ward moving larynx is not usually completely closed. The air in the lungs is still being pushed out, and some of it passes between the vocal folds, keeping them in motion so that the sound is voiced.
- In many languages, such as Sindhi (an Indo-Aryan language spoken in India and Pakistan) and several African and American Indian languages, implosives contrast with plosives.
- In some languages (for example, Vietnamese), implosives are simply variants (allophones) of voiced plosives and are not in contrast with those sounds. Implosives sometimes occur as allophones in English, particularly in emphatic articulations of bilabial stops, as in *absolutely **billions** and **billions***.
- Implosives in Sindhi:

ɓani 'field'		ɗinu 'festival'	ƒatu 'illiterate'	gˀanu 'handle'
banu 'forest'	daru 'door'	ɖoːru 'you run'	ʄatu 'illiterate' [variant]	gunu 'quality'
panu 'leaf'	taru 'bottom'	ʈanu 'ton'	caʈu 'to destroy'	kanu 'ear'

Velaric airstream mechanism

- **Velaric airstream mechanism**: Movement of mouth air by action of the tongue. Clicks are produced with a velaric airstream mechanism.
- **Click**: A stop made with an ingressive velaric airstream.
- A stop made with an egressive velaric airstream mechanism is possible, but NOT used in any known language.



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Clicks

- Clicks occur in words in several African languages, such as Zulu, Nama, and Xhosa.
- Clicks also occur in interjections or non-linguistic gestures in many languages, for example, the interjection expressing disapproval in English that novelists write *tut-tut* or *tsk-tsk*.
- IPA symbols for clicks: bilabial: [ʘ], dental: [ǀ], post-alveolar: [ǃ], palato-alveolar: [ǂ], alveolar lateral: [ǁ].
- The spelling system used in Zulu and Xhosa employs c, q, x for the dental, post-alveolar, and lateral clicks [ǀ, ǃ, ǁ]. The name of the language Xhosa should therefore be pronounced with a lateral click at the beginning. The "click song" is a famous example.
- An X-ray video of clicks being articulated: here.

Clicks

- Strictly speaking, the transcription of clicks always requires a symbol for both the click itself and for the activity associated with the velar closure.
- We transcribed the voiced click with a [g] plus the click symbol, the nasalized click with [ŋ] plus the click symbol, and the voiceless click with [k] plus the click symbol.
- Clicks in Nama:

Nama greetings

[From: Ladefoged 2005, *vowels and consonants*]

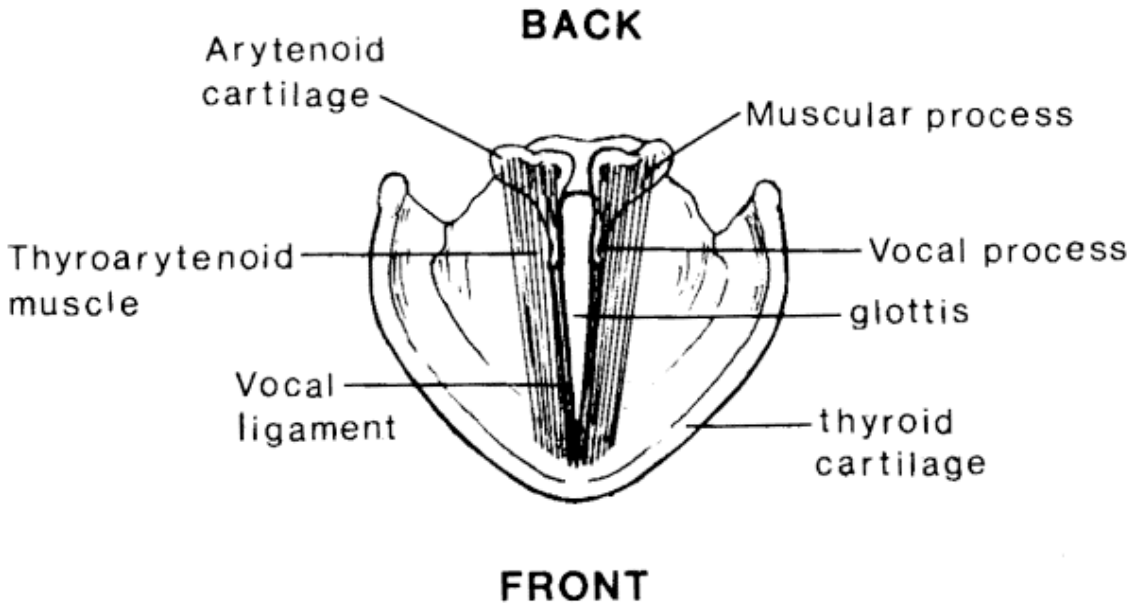
	DENTAL	ALVEOLAR	PALATAL	ALVEOLAR LATERAL
VOICELESS UNASPIRATED	**k͡oa** 'put into'	**k!oas** 'hollow'	**k‡ais** 'calling'	**k͡aros** 'writing'
VOICELESS ASPIRATED	**k͡ʰo** 'play music'	**k!ʰoas** 'belt'	**k‡ʰaris** 'small one'	**k͡ʰaos** 'strike'
VOICELESS NASAL	**ŋ̊ ͡ʰo** 'push into'	**ŋ̊ !ʰoas** 'narrating'	**ŋ̊ ‡ʰais** 'baboon's arse'	**ŋ̊ ͡ʰaos** 'cooking place'
VOICED NASAL	**ŋ͡o** 'measure'	**ŋ!oras** 'pluck maize'	**ŋ‡ais** 'turtle dove'	**ŋ͡aes** 'pointing'
GLOTTAL CLOSURE	**k͡ʔoa** 'sound'	**k!ʔoas** 'meeting'	**k‡ʔais** 'gold'	**k͡ʔaos** 'reject a present'

Airstream mechanisms: summary

Airstream mechanism	Direction	Name for stop consonant	Examples	Voiceless or voiced
Pulmonic	egressive	plosive	p t k b d g	Voiceless or voiced
Glottalic	egressive	ejective	p’ t’ k’	Voiceless
Glottalic	ingressive	implosive	ɓ ɗ ɠ	Usually voiced
Velaric	ingressive	click	ʘ ǀ ǃ ǁ	Voiceless or voiced

States of the glottis

- Glottis, which is defined as the space between the vocal folds, can be in different states (by the movements of the arytenoid cartilages) when speaking: **voiced** (modal voice), **voiceless**, **breathy voice** (murmur), **creaky voice**.



A view of the larynx from above

[From: UCL phonetics website]

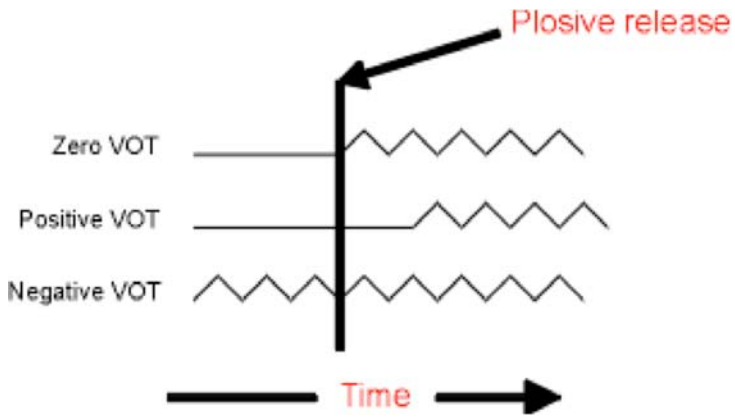
States of the glottis

- **Voiced (modal voice):** Regular vibrations of the vocal folds at a frequency within the speaker's normal range (here is an animation from UCLA phonetics website).
- **Voiceless:** No vibration of the vocal folds; the vocal folds are pulled apart.
- **Breathy Voice (Murmur):** Vocal folds vibrate while remaining apart.
- **Creaky Voice (Laryngealized):** Vocal folds vibrate at the anterior end, with the arytenoid cartilages pressed tightly together.
- States of the glottis are also called phonation types.

The video clips were made by John Clark and Robert Mannell by means of the fibrescope.

States of the glottis

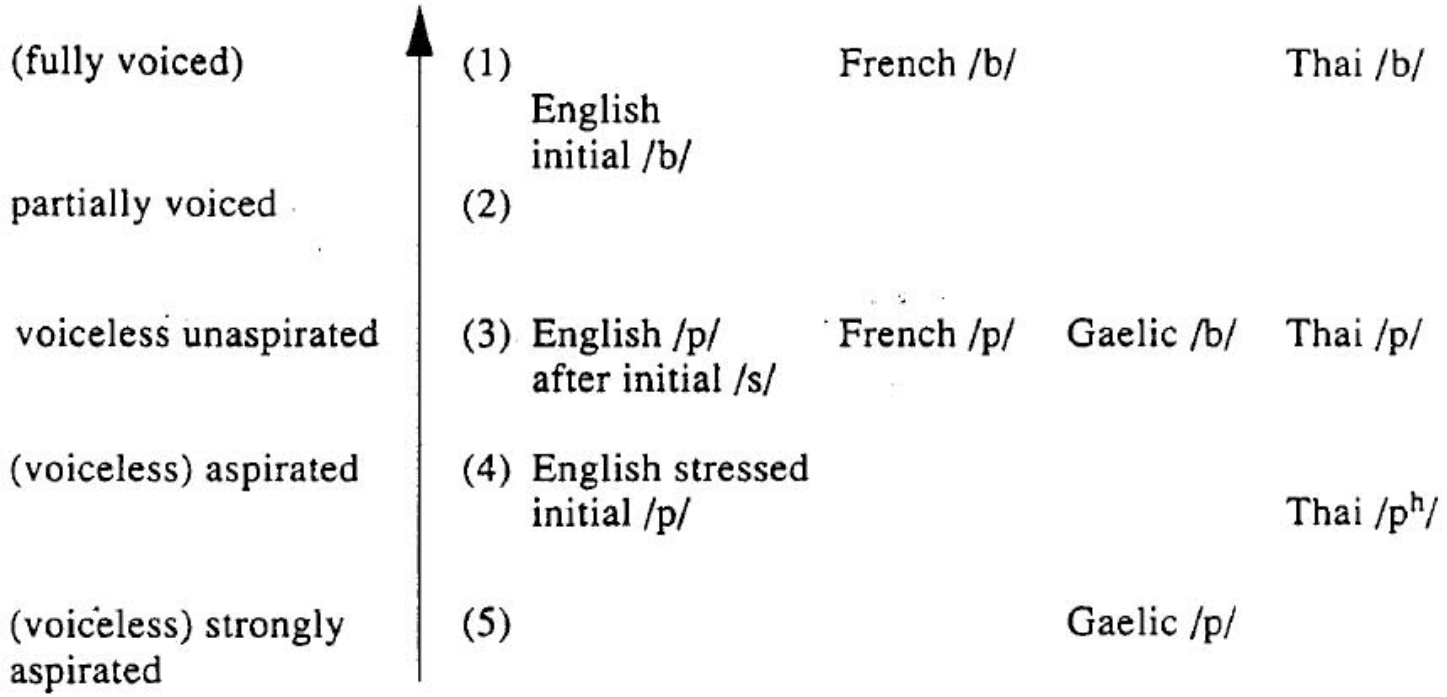
- To further distinguish voiced/voiceless and aspirated/unaspirated, we introduce **Voice Onset Time (VOT)**.
- **VOT** is the duration of the period of time between the release of a plosive and the beginning of vocal fold vibration. This period is usually measured in milliseconds (ms).
- It is useful to distinguish at least three types of VOT which are shown in the schematic diagram below:



[From: UCL phonetics website]

States of the glottis

- Different languages choose different points along the VOT continuum in forming oppositions among stop consonants.



[From: Ladefoged 1993, *A course in phonetics*]

States of the glottis

- Besides voiced, voiceless unaspirated, and voiceless aspirated stops, many languages spoken in India, such as Hindi and Sindhi, have a type of stops called **breathy voiced**.
- **breathy voiced**: after the release of the closure, there is a period of breathy voice (murmur) before the regular voicing starts. The breath voice release of these stops is indicated by [ʱ], a raised hooked letter *h*.
- Stops in Hindi:

	Voiceless unaspirated	Voiceless aspirated	Voiced	Breathy voice
Bilabial	pal 'take care of'	pʰal 'knife blade'	bal 'hair'	bʱal 'forehead'
Dental	t̪al 'beat'	t̪ʰal 'plate'	d̪al 'lentil'	d̪ʱar 'knife'
Retroflex	ʈal 'postpone'	ʈʰal 'wood shop'	ɖal 'branch'	ɖʱal 'shield'
Postalveolar affricate	t̪ʃʌl 'walk'	t̪ʃʰʌl 'deceit'	d̪ʒʌl 'water'	d̪ʒʱʌl 'glimmer'
Velar	kan 'ear'	kʰan 'mine'	gan 'song'	gʱan 'bundle'

[From: Ladefoged 2005, A course in phonetics]

More on places of articulation

- In some languages (for example, Ewe of West Africa), bilabial fricatives contrast with labiodental fricatives.
- Retroflex is a place (not a manner) of articulation. Retroflex stops, nasals, and fricatives occur in other languages.
- Uvular sounds are made by raising the back of the tongue toward the uvular:
- Uvular stops in Quechua:

ʈʃaka 'bridge'	kujuj 'to move'	qaʎu 'tongue'
ʈʃʰaka 'large ant'	kʰujuj 'to whistle'	qʰaʎu 'shawl'
ʈʃʼaka 'hoarse'	kʼujuj 'to twist'	qʼaʎu 'tomato sauce'

More on places of articulation

- Pharyngeal and epiglottal sounds involve pulling the root of the tongue or the epiglottis back toward the back wall of the pharynx.
- Pharyngeal and epiglottal sounds in Agul:

Agul
(Burkixan Dialect)

Voiced pharyngeal fricative	muʕˤ 'bridge'	muʕar 'bridges'
Voiceless pharyngeal fricative	muħ 'barn'	muħar 'barns'
Voiceless epiglottal fricative	mɛH 'whey'	mɛHɛr 'wheys'
Voiceless epiglottal stop	jaʔ 'center'	jaʔar 'centers'
	sɛʔ 'measure'	sɛʔɛr 'measures'

More on manners of articulation

- Tricks to produce a trill:

  1. follow the instruction in the textbook;

  2. trying to push the back of your tongue against your velum in order to relax the tongue enough so it can go into free vibration.

  3. rapidly reading a short sentence with words containing a tap, e.g. "I edited it".

  4. The best way to learn a **uvular trill** is by practicing **gargling**.

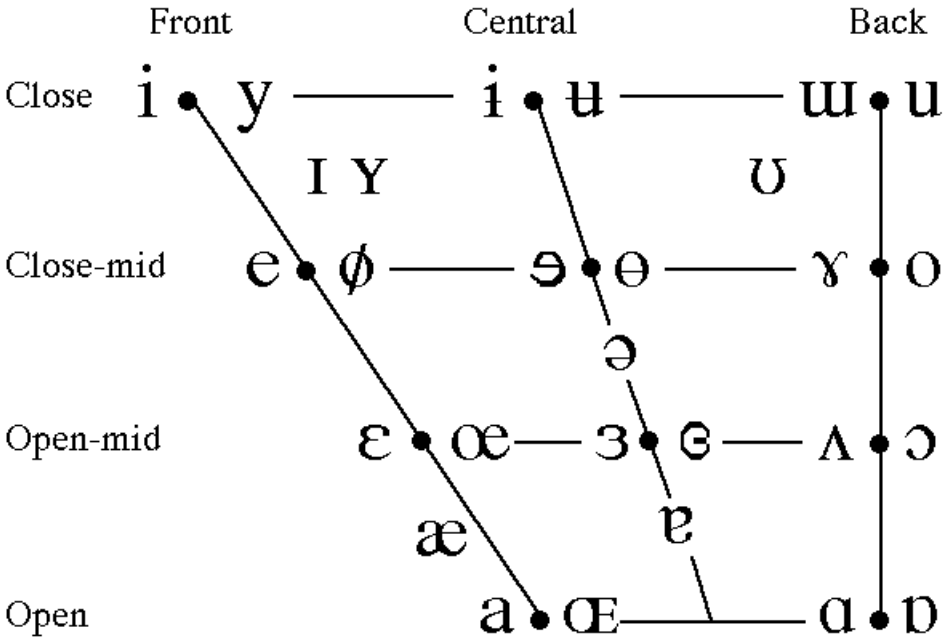
  [2-4 are from **Karen Chung's website]**

- Kele and Titan trills:

	KELE		TITAN	
BILABIAL	mʙuɐŋkei? 'fruit (species)'	mʙulim 'face'	mʙulei 'rat'	mʙutukei 'wooden plate'
ALVEOLAR	nruwin 'bone'	nrikei 'leg'	nruli? 'sandpiper'	nrakei?in 'girls'

More on vowels

- The whole vowel chart:



Where symbols appear in pairs, the one to the right represents a rounded vowel.

More on vowels

- It's VERY difficult to estimate how many vowels are there in the world's languages. There is a kind of continuous vowel space in which vowels can be described in terms of their formants or tongue and lip gestures. This space does not provide distinct categories like many of those used in descriptions of consonants.
- Languages differ greatly in the number of vowels that they use. Some languages, such as most of the aboriginal languages of Australia, have as few as three vowels.
- The record for the greatest number of vowels is probably held by the Dutch dialect of Weert, which has 28 different vowels sounds, 12 long, 10 short, and six diphthongs.
- About 20 percent of the world's languages have five contrasting vowels. There seems to be a slight preference for an odd number of vowels, perhaps because the vowel space is triangular.

[From: Ladefoged 2005, *Vowels and consonants*]

More on vowels

- In some languages, there are differences in vowel quality that cannot be described in height, backness, and lip rounding. They differ primarily in the size of the pharynx.
- **Advanced tongue root (+ATR) vowels**: the root of the tongue is drawn forward and the larynx is lowered, so that the part of the vocal tract in the pharynx is considerably enlarged.
- **-ATR vowels**: there is no advancement of the tongue root or lowering of the larynx.
- Akan vowels:

[+ATR]	[-ATR]	[+ATR]	[-ATR]
si̘ 'wash'	si̙ 'say'	bu̘ 'break'	bu̙ 'get drunk'
wabe̘tu 'pull it out'	se̙ 'to resemble'	o̘wia 'he steals'	o̙wia 'he crawls'
sa̙ 'to cure'			