

MSt/MPhil course: Phonetics and Phonology

Michaelmas Term 2018

John Coleman

NB Links to other documents relating to this course will be added incrementally as the course progresses. The plan below only sets out classes for 7 weeks, but in practice it tends to stretch out to take 8 weeks to deliver, so we'll see how it goes.

[Reading list](#)

Week 1: Why study phonetics? Respiration and airstream mechanisms

[Introduction to Phonetics](#)

[In this course ...](#)

[The International Phonetic Alphabet](#)

[Speech vs. Writing](#)

[Respiration and air-stream mechanisms](#)

[Airstream mechanism exercises](#)

Week 2: Phonation categories. Voice, tone, intonation, glottalization

[The vocal tract and larynx](#)

[Phonation exercises](#)

Week 3: [Prosody 1: Pitch, Tone and Intonation](#)

[Pitch examples](#)

Week 4: Articulation: [Vowels and consonants](#)

[Place of articulation](#)

[Stricture](#)

[Place and manner exercises](#)

Week *n*: Vowel classification in the IPA: [Cardinal Vowels](#)

Week *m*: Brain vs. mouth. [Coarticulation, multiple articulation, assimilation.](#)

[Exercises](#)

Week 8. [Prosody 2: Phonetic correlates of stress](#). "Everything is prosodic."

[Exercises: Length contrasts](#)

[Holiday homework](#)

MSt/MPhil Phonetics Reading List

Michaelmas Term 2018

Some useful books. Note that we won't be "following a coursebook", but items marked with an asterisk are especially recommended for purchase.

*International Phonetic Association (1999) *Handbook of the International Phonetic Association*. Cambridge University Press.

*Ladefoged, Peter (2001) *Vowels and Consonants: an introduction to the sounds of languages*. Blackwell.

Ladefoged, Peter and Ian Maddieson (1996) *The Sounds of the World's Languages*. Blackwell.

Laver, John (1994) *Principles of Phonetics*. Cambridge University Press.

Kelly, J. and J. Local (1989) *Doing Phonology*. Manchester University Press.

R. Jakobson, C. G. M. Fant, M. Halle (1952) *Preliminaries to Speech Analysis: the distinctive features and their correlates*. MIT Press.

Week 1: Breathing: more on respiration and airstream mechanisms

Draper, M. H., P. Ladefoged and D. Whitteridge (1959) Respiratory muscles in speech. *Journal of Speech and Hearing Research* **2**, 16-27.

Ohala, John J. (1990) Respiratory activity in speech. In W. J. Hardcastle and A. Marchal (eds.) *Speech Production and Speech Modelling*. Dordrecht: Kluwer. 25-53.

Lieberman, P., M. Sawashima, K. S. Harris and T. Gay (1970) The articulatory implementation of the breath-group and prominence: crico-thyroid muscular activity in intonation. *Language* **46** (2), 312-327. <http://www.jstor.org/stable/412281>

Eklund, Robert (2008) Pulmonic ingressive phonation: Diachronic and synchronic characteristics, distribution and function in animal and human sound production and in human speech. *Journal of the International Phonetic Association* **38** (3), 235-324. <http://dx.doi.org/10.1017/S0025100308003563>

Clements, G. N. and Sylvester Osu (2002) [Explosives, implosives, and nonexplosives: the linguistic function of air pressure differences in stops](http://nickclements.free.fr/publications/2002a.pdf). In Carlos Gussenhoven & Natasha Warner, eds., *Laboratory Phonology 7*, 299-350. Berlin: Mouton de Gruyter. (Preprint at <http://nickclements.free.fr/publications/2002a.pdf>)

Demolin, D. (1995) The phonetics and phonology of glottalized consonants in Lendu. In B. Connell and A. Arvaniti, eds. *Phonology and Phonetic Evidence: Papers in Laboratory Phonology IV*. Cambridge University Press. 368-385.

Ladefoged, P. and A. Traill (1984) Linguistic phonetic description of clicks. *Language* **60**, 1-20. <http://www.jstor.org/stable/414188>

Wright, Melissa (2007) [Clicks as markers of new sequences in English conversation](#). *Proceedings of ICPHS XVI*, Saarburcken, 1069-1072.

Simpson, Adrian (2007) [Acoustic and auditory correlates of non-pulmonic sound production in German](http://dx.doi.org/10.1017/S0025100307002927). *Journal of the International Phonetic Association* **37**, 173-182. <http://dx.doi.org/10.1017/S0025100307002927>

Drew, Paul, and Elizabeth Holt (1998) [Figures of Speech: Figurative Expressions and the Management of Topic Transition in Conversation](#). *Language in Society* **27** (4), 495-522. [A sociological (Conversation Analysis) paper dealing, *inter alia*, with the function of in-breaths in signaling a topic shift.]

Weeks 2 and 3: Phonation, voice, tone, glottalization, intonation

Hawkins, S. and N. Nguyen (2004) Influence of syllable-coda voicing on the acoustic properties of syllable-onset /l/ in English. *Journal of Phonetics* **32** (2), 199-31.
[http://dx.doi.org/10.1016/S0095-4470\(03\)00031-7](http://dx.doi.org/10.1016/S0095-4470(03)00031-7)

van den Berg, J. (1958) [Myoelastic-aerodynamic theory of voice production](#). *Journal of Speech and Hearing Research* 1, 227-244.

Lisker, L. and A. S. Abramson (1964) [A cross-language study of voicing in initial stops: acoustical measurements](#). *Word* **20**, 384-422.

Lisker, L. and A. S. Abramson (1970) The voicing dimension: some experiments in comparative phonetics. *Proceedings of the Sixth International Congress of Phonetic Sciences, Prague, 1967*, 536-567. Reprinted in J. L. Miller, R. D. Kent, and B. S. Atal, eds. *Papers in Speech Communication: Speech Perception*. Acoustical Society of America. 379-383.

Chen, M. (1970) Vowel length variation as a function of the voicing of the consonant environment. *Phonetica* **22**, 129-159.

Dinnsen, D. A. (1985) A re-examination of phonological neutralization. *Journal of Linguistics* **21**, 265-279.

Edmondson, Jerold A., & Esling, John H. (2006). The valves of the throat and their functioning in tone, vocal register, and stress: laryngoscopic case studies. *Phonology*, 23(2), 157-191.

Esling, J. (1984) Laryngographic study of phonation type and laryngeal configuration. *Journal of the International Phonetic Association* 14, 56-73.

Ganong III, W. F. (1980) Phonetic categorization in auditory word perception. *Journal of Experimental Psychology: Human Perception and Performance* **6**, 110-125.

Kuhl, P. K, and J. D. Miller (1975) Speech perception by the chinchilla: Voiced-voiceless distinction in alveolar plosive consonants. *Science*, 190, 69-72.

Ladd, D. R. and R. Morton (1997) The perception of intonational emphasis: continuous or categorical? *Journal of Phonetics* 25, 313-342.

John Local and John Kelly (1986) Projection and 'silences': notes on phonetic and conversational structure. *Human Studies* **9**, 185-204.

Week 4: Vowels, consonants, categories, the (un)realities of segments and phonemes

Cooper, F. S., P. C. Delattre, A. M. Liberman, J. M. Borst and L. J. Gerstman (1952) Some Experiments on the Perception of Synthetic Speech Sounds. *Journal of the Acoustical Society of America* 24 (6), 597-606.

Delattre, P. C., A. M. Liberman and F. S. Cooper (1955) Acoustic Loci and Transitional Cues for Consonants. *Journal of the Acoustical Society of America* 27 (4), 769-773.

Fry, D. B., A. S. Abramson, P. D. Eimas and A. M. Liberman (1962) The identification and

discrimination of synthetic vowels. *Language and Speech* **5**, 171-189.

Harshman, R., P. Ladefoged and L. Goldstein (1977) Factor analysis of tongue shapes. *Journal of the Acoustical Society of America* **62** (3), 693-707.

Hackett, J. A. (2004) Phoenician and Punic. In R. D. Woodard, ed. *The Cambridge Encyclopedia of the World's Ancient Languages*. 365-385.

Morais, José (1985) Literacy and awareness of the units of speech: implications for research on the units of perception. *Linguistics* **23**, 707-721.

Abercrombie, David (1949) What is a 'letter'? *Lingua* vol. II. Reprinted in *Studies in Phonetics and Linguistics*.

Week n: Vowel features and systems; synharmonism

Magen, H. S. (1997) The extent of vowel-to-vowel coarticulation in English. *Journal of Phonetics* **25**, 187-205.

Beeler, M. S. (1970) Sibilant harmony in Chumash. *International Journal of American Linguistics* **36**, 14-17.

Stewart, J. M. (1967) Tongue root position in Akan vowel harmony. *Phonetica* **16**, 185-204.

Tiede, M. K. (1996) An MRI-based study of pharyngeal volume contrasts in Akan and English. *Journal of Phonetics* **24**, 399-421.

Week m: Brain vs. mouth

Coarticulation, multiple articulation, assimilation

Lips and velum; distributed exponents of "voicing"

Öhman, S. E. G. (1966) Coarticulation in VCV utterances: spectrographic measurements. *Journal of the Acoustical Society of America* **39**, 151-168.

Mowrey, R. A. and I. R. A. MacKay (1990) Phonological primitives: Electromyographic speech error evidence. *Journal of the Acoustical Society of America* **88** (3), 1299-1312.

Nolan, F. (1992) The descriptive role of segments: evidence from assimilation. In G. J. Docherty and D. R. Ladd, *Papers in Laboratory Phonology II: Gesture, Segment, Prosody*. Cambridge University Press. 261-280.

Moll, K. L. and R. G. Daniloff (1971) Investigation of the timing of velar movements during speech. *Journal of the Acoustical Society of America* **50**, 678-684.

Lubker, J. and T. Gay (1982) Anticipatory labial coarticulation: Experimental, biological, and linguistic variables. *Journal of the Acoustical Society of America* **71** (2), 437-448.

Browman, C. P. and L. Goldstein (1990) Tiers in articulatory phonology, with some implications for casual speech. In J. Kingston and M. Beckman, eds. *Papers in Laboratory Phonology I: Between the Grammar and Physics of Speech*. Cambridge University Press. 341-376.

Fowler, C. A. (1980) Coarticulation and theories of extrinsic timing. *Journal of Phonetics* **8**, 113-133.

Keating, P. A. (1990) The window model of coarticulation: articulatory evidence. In J. Kingston and M. E. Beckman, eds. *Papers in Laboratory Phonology 1: Between the Grammar and Physics of Speech*. 451-470.

Whalen, D. H. (1990) Coarticulation is largely planned. *Journal of Phonetics* **18**, 3-35.

Introduction to Phonetics

1. What is phonetics? The (scientific?) study of speech. But why do we want to study speech?

2. The Primacy of Speech: speech is the primary way in which linguistic information is communicated between people. There are only two ways of linguistic communication that are natural (biological, independent of culture?): speech and sign (among the congenitally deaf and in some hunter-gatherer societies). Of these, speech is more widespread.

3. Naturalness of speech

1 In history: for most of human history, writing did not exist. Writing is a comparatively recent social invention.

2 In world society: languages with established writing systems are numerically a small minority. Most languages are unwritten (or were until this century).

3 In human development: children without disabilities acquire speech as a natural human function, e.g. like walking or eating. It does not require explicit instruction, is biologically pre-programmed, and is achieved to an equal degree of mastery by everyone (though some become more eloquent in what they have to say than others!)

4 In the development of literary languages: a literary language is a socially established form of what was, at an earlier stage, merely one spoken dialect among many.

5 In quantity of activity: most linguistic activity is in the spoken medium. Indeed, even among literate people, writing is a relatively rare activity.

4. The scope of the subject. The subject of phonetics covers all aspects of speech production, transmission, and reception, including:

1 Planning: How people plan how they are going to control their organs of speech in order to say what they want to say. Usually studied by neurological and psychological methods, such as observation of brain-injured patients, subjects in psycholinguistic-style experiments, and imaging of brain function ("brain scanning").

2 Articulatory phonetics: the organs of speech, the ways in which they may move and be coordinated with each other, and the possibilities for speech that this permits. These aspects can be observed to a certain extent by **proprioception**, assisted by training, as well as physiological and experimental studies.

3 Acoustic phonetics: how air is set in motion, made to vibrate and how speech waves are transmitted between speakers. In transmission, speech acoustics may be studied in incredible detail just by careful listening, or with instruments, such as the microphone, and a small computer.

4 Auditory phonetics and speech perception. Primarily based on psychological experiments and some physiological studies.

In this course (foundation course in phonetics) ...

... we shall study **general articulatory** phonetics.

General phonetics means that we shall study **all** the possible speech abilities that a speaker of any language might use in their speech. In other words, we shall not just study "the sounds" of individual languages. However, we shall consider various aspects of the phonetics of English and examples from many other languages where relevant during the course. You shall learn all of the symbols of the [International Phonetic Alphabet](#) (IPA), which is designed to be used in writing down the pronunciation of any language. We shall study various kinds of phonetic transcription, in various degrees of detail, for different purposes.

Articulatory phonetics means that we shall study the names and nature of the speaking organs and their role in speech. The symbols of the IPA are defined mostly in articulatory terms, and partly in acoustic terms.

After each lecture, you must **practise** the new sounds you have learned, by saying them aloud to yourself (in a private place, I suggest). By practising, you will become more sensitive to the position and motions of the organs of speech, including those which you are not normally used to using, and their auditory effects. If you do not practise, you will probably not get the hang of the IPA properly, which will only make the exam seem harder.

To help you practise, there are some **audio-visual resources**. There is a web-based guide to the sounds of the IPA at <http://web.uvic.ca/ling/resources/ipa/charts/IPAalab/IPAalab.htm>. The sound clips on that site are taken from a tape recording/CD made at UCL and available from that department by mail order (details at <http://www.phon.ucl.ac.uk/home/wells/cassette.htm>). A number of recordings of words in various languages are presented in my webpages/handouts for this course.

You cannot learn much about speech just from **books**: the practical training you will receive is essential in order to really understand the phonetics books.

THE INTERNATIONAL PHONETIC ALPHABET (revised to 2015)

CONSONANTS (PULMONIC)

© 2015 IPA

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Symbols to the right in a cell are voiced, to the left are voiceless. Shaded areas denote articulations judged impossible.

CONSONANTS (NON-PULMONIC)

Clicks	Voiced implosives	Ejectives
◌ ʘ Bilabial	ɓ Bilabial	ʼ Examples:
◌ ǀ Dental	ɗ Dental/alveolar	pʼ Bilabial
◌ ǃ (Post)alveolar	ɟ Palatal	tʼ Dental/alveolar
◌ ǁ Palatoalveolar	ɡ Velar	kʼ Velar
◌ ǁ Alveolar lateral	ɠ Uvular	sʼ Alveolar fricative

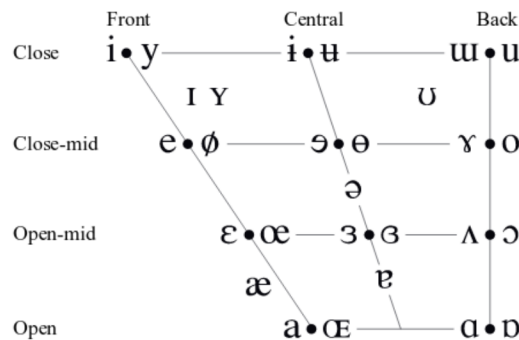
OTHER SYMBOLS

ʍ Voiceless labial-velar fricative	ɕ ʑ Alveolo-palatal fricatives
ʋ Voiced labial-velar approximant	ɺ Voiced alveolar lateral flap
ɥ Voiced labial-palatal approximant	ɥ Simultaneous ʃ and x
ħ Voiceless epiglottal fricative	Affricates and double articulations can be represented by two symbols joined by a tie bar if necessary.
ʕ Voiced epiglottal fricative	
ʡ Epiglottal plosive	

DIACRITICS Some diacritics may be placed above a symbol with a descender, e.g. ɲ̥̊

◌ ʰ Voiceless	◌ ̤ Breathy voiced	◌ ̥ Dental	◌ ̦
◌ ̥ Voiced	◌ ̜ Creaky voiced	◌ ̧ Apical	◌ ̨
◌ ʰ Aspirated	◌ ̚ Linguolabial	◌ ̩ Laminar	◌ ̪
◌ ʷ More rounded	◌ ʷ Labialized	◌ ̃ Nasalized	◌ ̂
◌ ̟ Less rounded	◌ ʲ Palatalized	◌ ̎ Nasal release	◌ ̏
◌ ̠ Advanced	◌ ʷ Velarized	◌ ˀ Lateral release	◌ ˁ
◌ ̡ Retracted	◌ ˤ Pharyngealized	◌ ˁ No audible release	◌ ˁ
◌ ̠ Centralized	◌ ̠ Velarized or pharyngealized		
◌ ̠ Mid-centralized	◌ ̠ Raised (ɹ̠ = voiced alveolar fricative)		
◌ ̠ Syllabic	◌ ̠ Lowered (β̠ = voiced bilabial approximant)		
◌ ̠ Non-syllabic	◌ ̠ Advanced Tongue Root		
◌ ̠ Rhoticity	◌ ̠ Retracted Tongue Root		

VOWELS



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

SUPRASEGMENTALS

ˈ Primary stress	ˌ Secondary stress
ː Long	ˑ Half-long
◌ ̥ Extra-short	◌ ̥ Minor (foot) group
◌ ̥ Major (intonation) group	◌ ̥ Syllable break
◌ ̥ Linking (absence of a break)	

TONES AND WORD ACCENTS

LEVEL	CONTOUR
◌ ̥ or ̥ Extra high	◌ ̥ or ̥ Rising
◌ ̥ High	◌ ̥ Falling
◌ ̥ Mid	◌ ̥ High rising
◌ ̥ Low	◌ ̥ Low rising
◌ ̥ Extra low	◌ ̥ Rising-falling
◌ ̥ Downstep	◌ ̥ Global rise
◌ ̥ Upstep	◌ ̥ Global fall

Respiration and air-stream mechanisms

1. Speech and air. Speech is a **disturbance of air pressure** which a speaker brings about by moving various parts of their body. (Speech is a kind of continuously controllable human sound. All sound is just disturbances of air pressure.)

- a) Take a deep breath and say "aaah!"
- b) Take another deep breath, hold your breath, and, *still holding your breath*, say "aaah!" again. (Impossible, see!)
- c) If you made a noise the second time, you were not really holding your breath (unless you have sprung a puncture).
- d) As you say "aaah", feel your chest "deflating". In order to speak, it is necessary to get the air in your body moving. This can be done just be breathing out.
- e) Can you say "aaah" while breathing in?
- f) As you say "aaah", feel your throat, around the area of the larynx ("Adam's apple"). Can you feel the vocal cords "buzzing".
- g) Now try *whispering* "aaah". Do the vocal cords buzz? The vocal cords modify the flow of air coming out of your lungs, but this modification is not necessary in order for you to hear "aaah". (Whispering is audible, after all.)
- h) Where does the air leave your body? Does it come out of your mouth? (Try holding your lips shut tight as you say "aaah!". Is it possible?) Try holding your nose shut? (Pinch the nostrils.) How does this affect the sound?
- i) Now say "bah!" a few times. Concentrate on the "b". Is there any air-flow out of your mouth and/or nose during the time in which your lips are closed for the "b"?
- j) Can you say "bah" while breathing in?

2. Respiration. There are not really any organs of speech as such: all of them originally evolved for other purposes, e.g. lungs for breathing, vocal cords for preventing choking, tongue for eating and tasting, nose for breathing and smelling, lips for eating. In the evolution of speech, we have adapted these organs for other purposes, namely in producing communicative noises.

3. Egressive and ingressive. The normal direction of airflow is called **egressive**. Speech produced by breathing in is called **ingressive**.

4. Some IPA symbols. The "aaah" sound is a **vowel**: in phonetics, the terms "vowel" and "consonant" refer to kinds of sound, not to letters. The IPA symbol

for the "aaah" sound is [ɑ]. Note that in the IPA, this is a distinct symbol from other "a"-like letters, such as [a]. "Baah" is written [bɑ]. "Daah" is written [dɑ], and "gaah" is written [gɑ]. Note the shape of IPA [g]. The normal printed form of this letter, "g", is not usually used in the IPA, though it is a recognised variant of [g].

5. Implosives. A kind of sound like [b], [d], and [g] can be produced by sucking air into the mouth. Implosive [b], for instance, is made by holding the breath, closing the lips as for [b], and then sucking. (Do not purse the lips or allow your cheeks to be sucked in.) The sucking is done by closing the vocal cords together and so that the mouth cavity is completely shut off from the lungs.

As you suck in, the larynx is pulled down (feel it!), enlarging the size of the mouth cavity, without changing the amount of air in the mouth. This makes the air pressure inside the mouth lower than the air pressure outside your body. When you open your lips as for [b], the air rushes in to your lips, making an unusual ingressive sound. The ingressive forms of [b], [d] and [g] are called *implosives*. There are special letters for implosives, formed by adding a hook to the usual plosive symbols. For example, the velar implosive is transcribed [ɟɑ]. These other symbols are on the [IPA chart](#), under "CONSONANTS (NON-PULMONIC)".

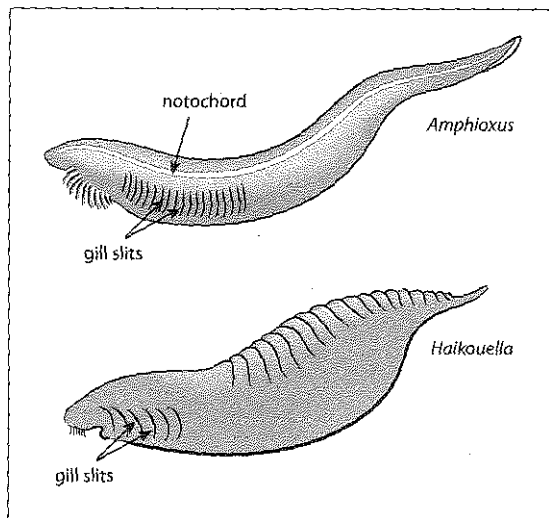
PRACTISE

i) Observe and note:

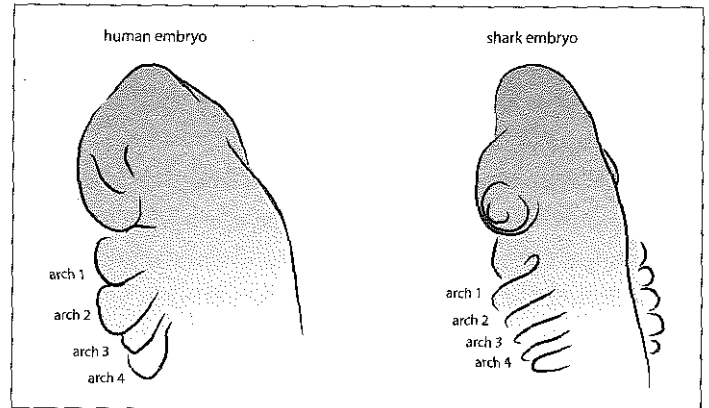
- audible inbreaths
- audible exhalations (*not* during speech)
- something you hear someone say that you would not expect to see written down
- something you *could not* write down
- if it occurs, someone speaking on an ingressive airstream

ii) Practise egressive and ingressive speech. [bɑ], [dɑ], [gɑ], [ɟɑ], etc. Try saying these with different vowels, e.g. [i] ("ee", as in "bee"), [u] ("oo" as in "boo!"). **Observe** yourself as you speak, by looking in a mirror. Note what it feels like as you breathe in and out, and as you speak using egressive and ingressive air.

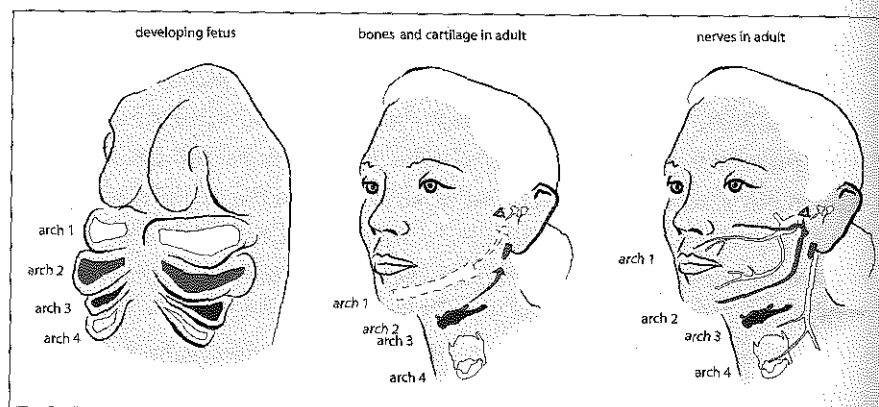
Neil Shubin (2007) *Your Inner Fish*. Penguin.



The closest relatives to animals with heads are worms with gill slits. Shown are *Amphioxus* and a reconstruction of a fossil worm (*Haikouella*) over 530 million years old. Both worms have a notochord, a nerve cord, and gill slits. The fossil worm is known from over three hundred individual specimens from southern China.



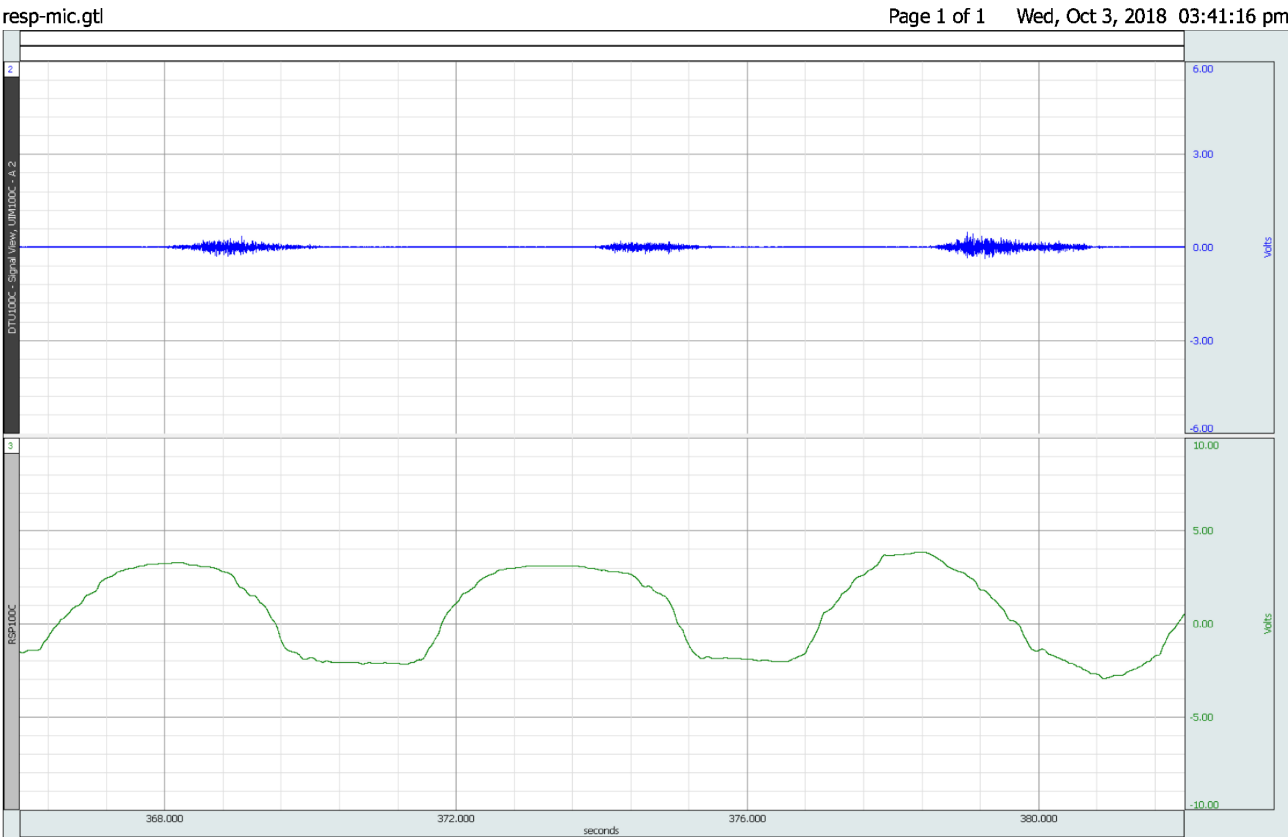
The gill region of a developing human and a developing shark look the same early on.



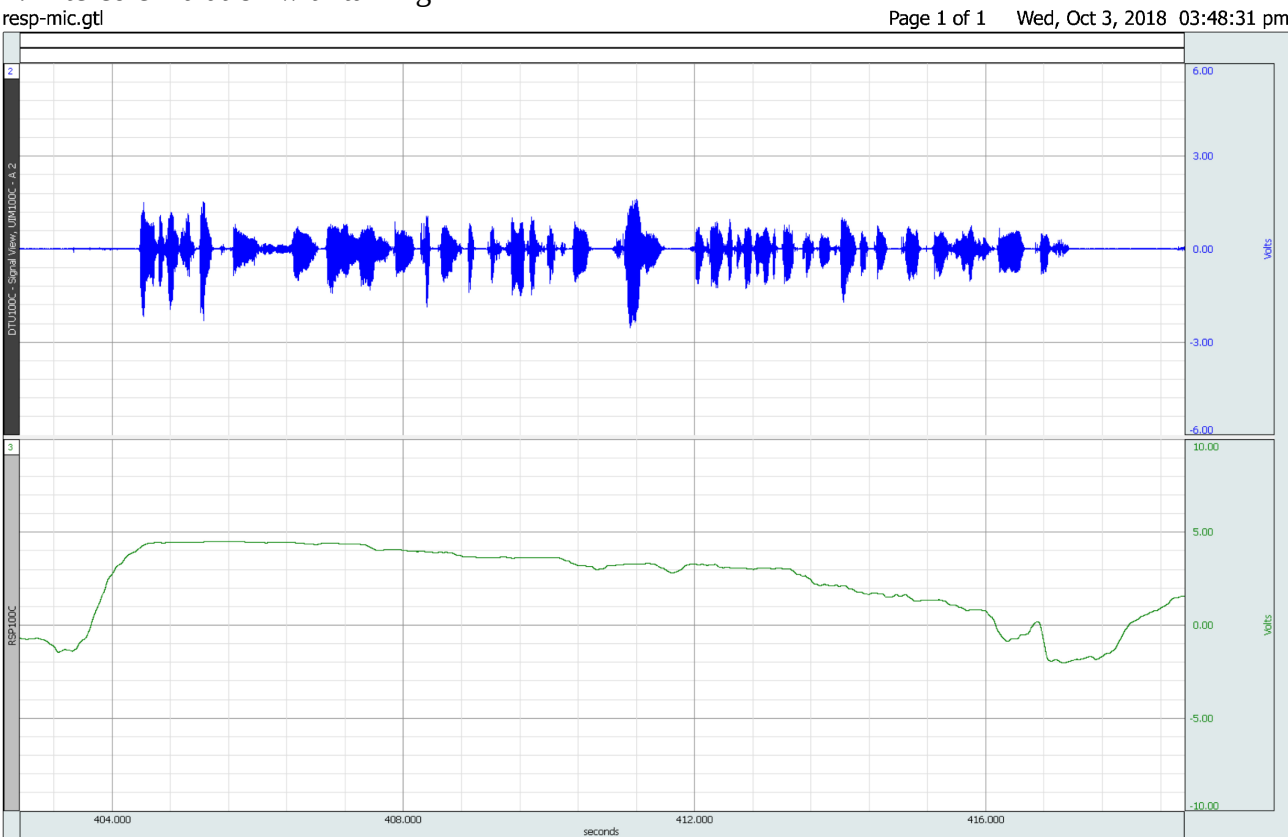
If we follow the gill arches from an embryo to an adult, we can trace the origins of jaws, ears, larynx, and throat. Bones, muscles, nerves, and arteries all develop inside these gill arches.

Lung recordings (above: microphone, below: respiratory band)

1. Quiet respiration, audible outbreaths sinus rhythm



2. Altered exhalation with talking



Air-stream mechanism exercises

1. Pulmonic egressive

English

In the following, pulmonic, egressive air produced for a vowel ([a], [ɑ] or [ə]) is stopped ([ʔ], [t]) or constricted ([h], [ʰ]) at the glottis ([ʔ], [h], [ʰ]) or by the tongue tip at the alveolar ridge ([t]). [ː] indicates length of the preceding sound.

at [ʔaʔ]
are [ʔɑː]
art [ʔɑːʔ] or [ʔɑːtʰ]
tar [tʰɑː]
heart [hɑːʔ]
uh-uh [ʔəʔə]
a-a [ʔaʔa]

2. Glottalic egressive (ejectives)

Amharic

p' [p'app'as]  'church patriarch'
t' [t'ut]  'breast'
k' [k'es]  'priest'
s' [s'om]  'fast' (n.)

Navajo

[t'áá] 'just' (adv.) [tooh] 'large body of water'
[k'aaʔ] 'arrow' [ké] 'shoe'
[ts'in] 'bone' [tsin sitā] 'mile'
[ts'aaʔ] 'basket' [tsah] 'needle'

3. Glottalic ingressive (implosives)

Sindhi

[ɸarʊ]  'child' [buʈʊ]  'shoes'
[ɸarʊ]  'crevice' [ɸunʊ]  'navel'
[g̊ero]  'heavy' [gano]  'song'

4. Velaric ingressive (clicks)

Non-linguistic vocal sounds in English

bilabial 'kiss kiss' [◡◡]
dental 'tut tut' [ʞ ʞ]
alveolar lateral 'gee up' [ʞʞ ʞʞ]
postalveolar 'tick tock' [ʞ! ʞ!]

Xhosa

[ukú|ola] 'to grind fine'
[ukú!o6a] 'to break stones'
[ú||olo] 'peace'
[ukú||ʰo6a] 'to arm oneself'