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Appendix

[Languages in the Appendix](#)

This appendix is based on the 1991 set of HyperCard stacks and additional material produced by members of the UCLA Phonetics Lab. In conjunction with the data cited in Vowels and Consonants and A Course in Phonetics it forms a database that includes several hundred of the estimated 800 possible speech sounds in the languages of the world. The aim is to present contrasting sounds so as to provide illustrations of the range of the linguistic phonetic abilities of mankind.

We are grateful to NSF for major support of this work. This material may be used in any way, provided that it is acknowledged. It should be cited as:

UCLA Linguistics Dept. 'Sounds of the World's Languages'. Web edition. 2001.

A CD with this material and other UCLA Phonetics programs is available from:

Phonetics Software, Linguistics Department, UCLA, Los Angeles, CA
90095-1543.

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Languages

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| Agul (Burkixan Dialect) | | |
|---|------------------|---------------------|
| Voiced pharyngeal fricative | muʕ 'bridge' | muʕar 'bridges' |
| Voiceless pharyngeal fricative | muħ 'barn' | muħar 'barns' |
| Voiceless epiglottal fricative | mäH 'whey' | mäHär 'wheys' |
| Voiceless epiglottal stop | jaʔ 'center' | jaʔar 'centers' |
| | säʔ 'measure' | säʔär 'measures' |

Agul is a Nakho-Dagestanian language (Samurian subgroup of the Lezgian family) of the northeast Caucasus. It is spoken by approximately 12,000 people in southern Dagestan, USSR. The language contrasts voiced and voiceless pharyngeal fricatives with voiceless epiglottal stops and fricatives. These contrasts are shown here in word-final and intervocalic position. The recordings were made by the Russian linguist S. Kodzasov of one female speaker of the Burkixan dialect. The transcription [ä] is taken directly from Kodzasov's notes and is used to denote a slightly fronted vowel.



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| Akan | | | |
|-------------------------|----------------------|----------------------|----------------------|
| [+ATR] | [-ATR] | [+ATR] | [-ATR] |
| sɪ̯ 'wash' | sɪ̥ 'say' | bɪ̯ 'break' | bɪ̥ 'get drunk' |
| wɒɛ̯tu 'pull it out' | sɛ̥ 'to resemble' | ɔwɪ̯a 'he steals' | ɔwɪ̥a 'he crawls' |
| sɑ̥ 'to cure' | | | |

Akan is a Kwa language of the Niger-Kordofanian family spoken by approximately 4.5 million people in Ghana. The major dialects include Fante, Asante and Akuapem; the latter two are called Twi. The relevant phonetic contrast illustrated here is between advanced tongue root [+ATR] vowels and their plain [-ATR] counterparts. These are transcribed as follows:

ɪ̯ = [+ATR] ɪ̥ = [-ATR]

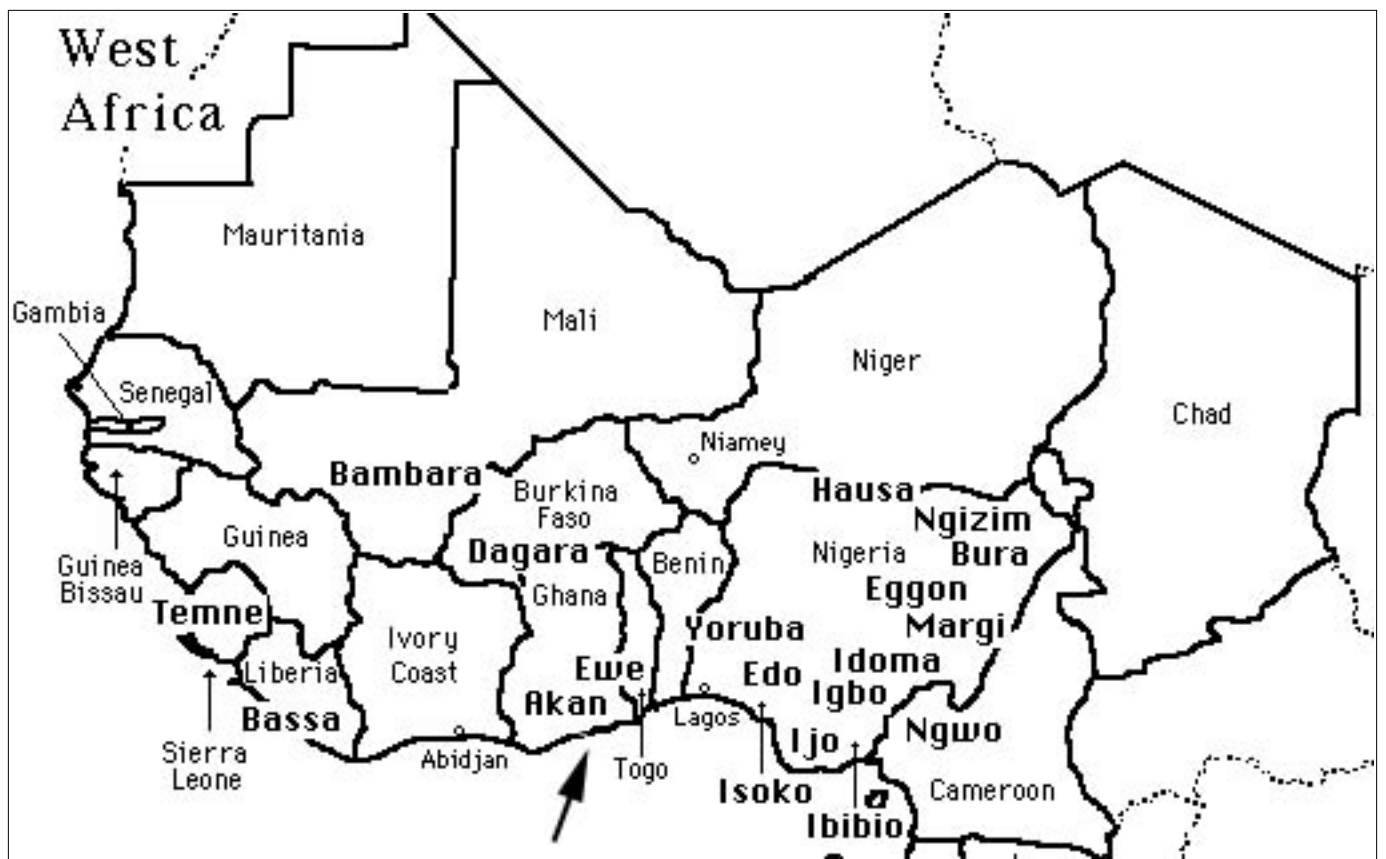
The contrast exists for the high and mid vowels. The low vowel [a] is [-ATR].

Two sets of X-rays accompany the sounds to illustrate tongue position of the contrasting vowels.

Xray 1 Xray 2

References

- Lindau, M. 1979. The feature expanded. *Journal of Phonetics* 7.163-76.
 Stewart, J.M. 1967. Tongue root position in Akan vowel harmony. *Phonetica* 16.185-204.



Angami (Khonoma dialect)

Voiced

me¹
mouth

ne¹
to push

ɲje³
thousand

ŋu²
to see

Voiceless

m̥e⁴
to blow

n̥e⁴
to blow the nose

ɲ̥je⁴
to plaster onto a wall

Voiceless (in frame)

a **m̥e**⁴ sishuto

a **n̥e**⁴ sishuto

a **ɲ̥je**⁴ sishuto

Angami (Khonoma dialect)

Angami is a Tibeto-Burman language spoken in the Naga Hills in the northeastern parts of India. There are several dialects, the most prominent being Chokri, Khonoma, and Kohima.

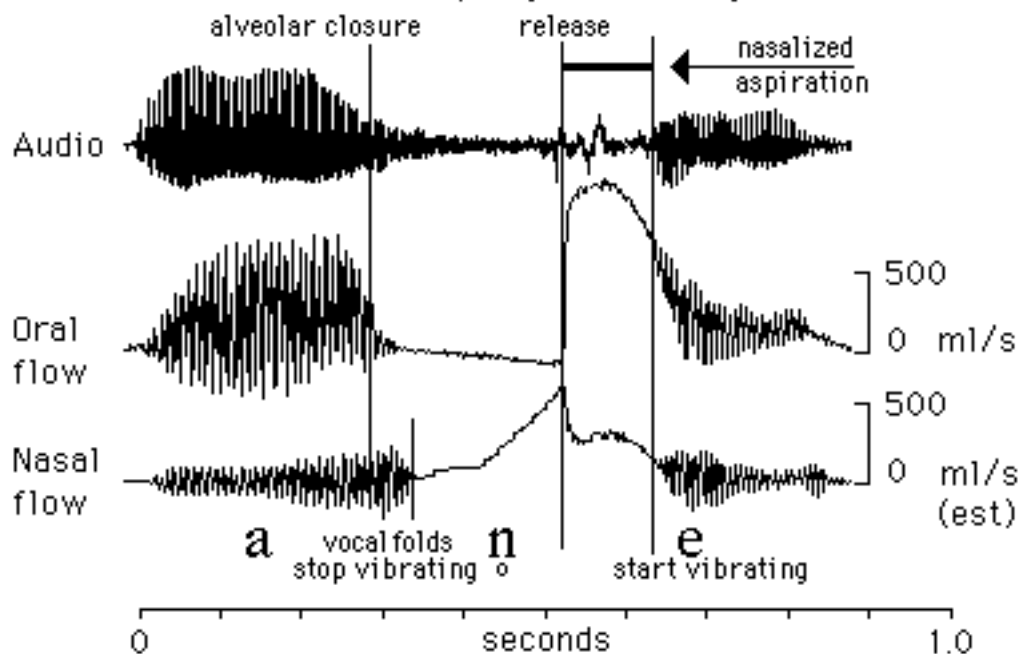
Nasals in Khonoma Angami are produced at four places of articulation, bilabial, alveolar, palatal, and velar. There is a contrast between voiced and voiceless nasals in the first three places of articulation. This is demonstrated in the first card. Aerodynamic records are available in the second card.

For further information, please see Blackenship, Barbara, Peter Ladefoged, Peri Bhaskararao, and Nichumeno Chase. 1993. Phonetic Structure of Khonoma Angami. *Linguistics of the Tibeto-Burman Area*. 16:2. 69-88.



Angami (Khonoma dialect)

velum at least partly lowered throughout



Arabic

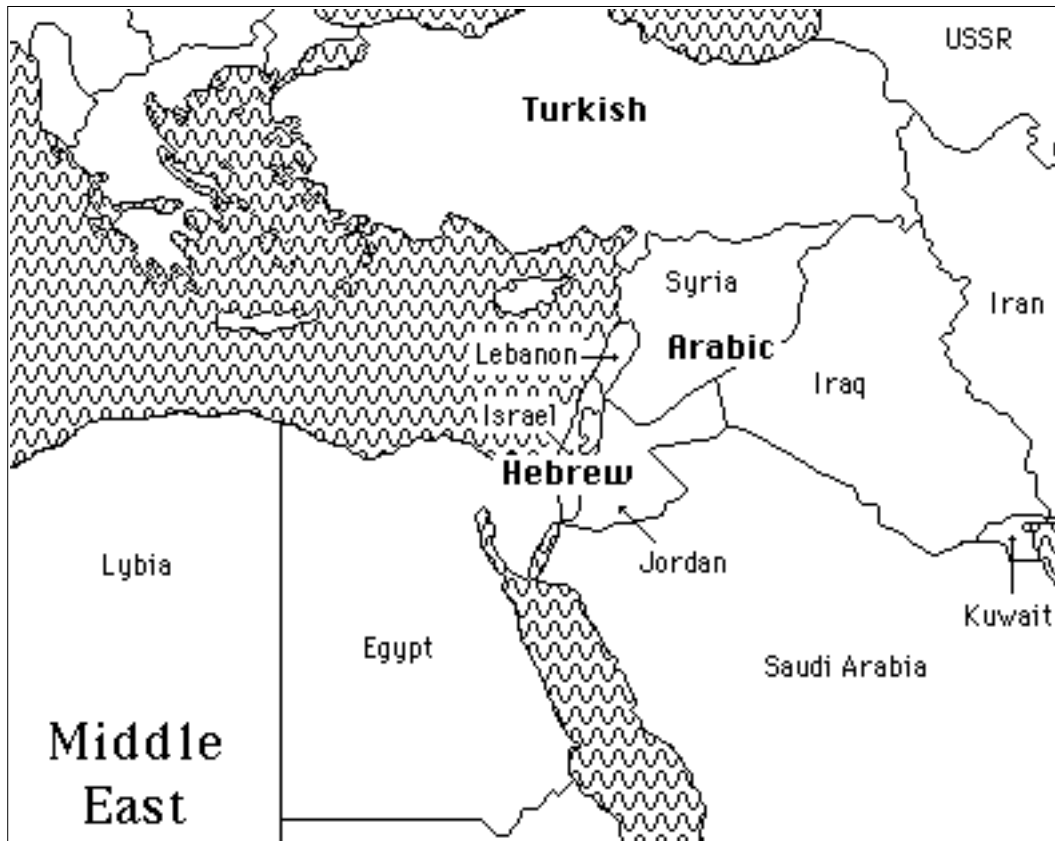
(Syrian dialect)

| Initial | | Medial | |
|---------|------------------|------------|------------------------|
| tɪːn | 'figs' | ʔatːal | 'he massacred' |
| tʰɪːn | 'mud' | ʔatʰːaf | 'he gathered' |
| dal | 'he pointed' | madːa | 'table cloth' |
| dʰal | 'he stayed' | madʰːa | 'he wasted' |
| suːs | 'licorice' | masːa | 'he said "good night"' |
| sʰuːsʰ | 'chick' | masʰːa | 'he sucked' |
| zat | 'he threw' | bazːaʔ | 'he spat hard' |
| ðʰabatʰ | 'he perfected' | naðʰːomlʰi | 'he organized neatly' |
| raːsʰi | 'he is anchored' | farːad | 'he separated' |
| rʰaːsʰi | 'my head' | harʰːab | 'he fought' |
| Final | | | |
| tal | 'hill' | dalːat | 'she pointed' |
| tʰalʰ | 'he peeped' | dʰalʰːat | 'she stayed' |

Arabic is an Afro-Asiatic language (Semitic branch) spoken by over 100

million people in the Middle East and Northern Africa. There are many dialects. The Northeastern variety spoken in Syria is illustrated here. Arabic contrasts plain and pharyngealized (“emphatic”) stops, fricatives, and liquids. Intervocally, contrasts involving geminates are also found. Note that in the Syrian dialect illustrated here, the pharyngealized counterpart to the voiced fricative

[z] is [ðˤ]



| Armenian (Eastern dialect) | | | | | |
|-------------------------------|----------------------------|--------------------------------|------------------------------|---------------------------|---------------------------|
| Voiced | ab (a month) | sard 'spider' | bardz 'pillow' | ʃurdz 'environs' | bag 'portion' |
| Voiceless un aspirated | kap 'bond' | mut 'entrance' | barts 'difficult' | surtʃ 'coffee' | bak 'porch' |
| Voiceless aspirated | kap ^h 'club' | mut ^h 'darkness' | barts ^h 'high' | votʃ ^h 'no' | tak ^h 'hot' |
| | | zart ^h 'jewel' | | | |

Armenian is an Indo-European language with approximately 5 million speakers. Eastern Armenian is spoken in Armenia, northern Iran, and Turkey.

Eastern Armenian has a three-way contrast between voiced, voiceless unaspirated, and voiceless aspirated stops and affricates. While this contrast occurs in many languages, it is unusual for it to be maintained in word-final position, as is the case in Eastern Armenian.

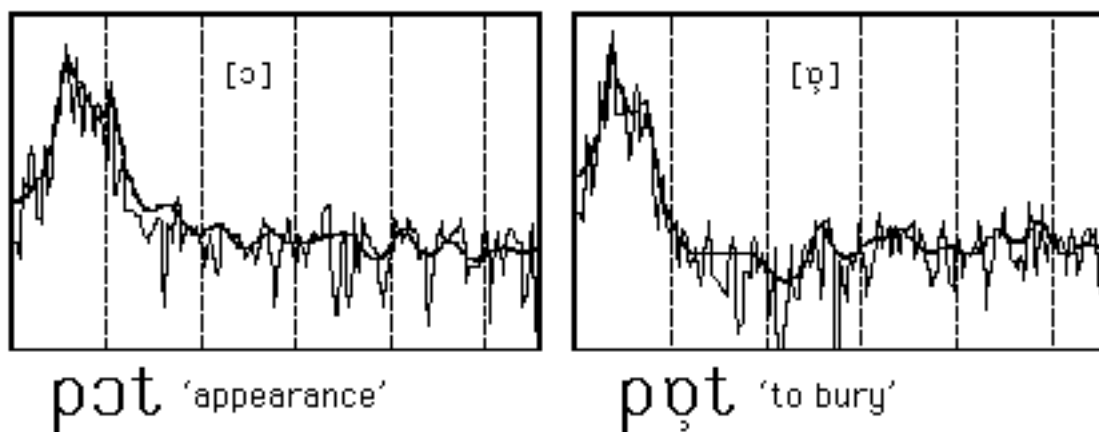


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| Assamese | |
|-----------------------|-------------------------|
| Front | Back |
| pit 'to beat' | puti 'having buried' |
| petu 'intestine' | poti (girl's name) |
| pɛt 'stomach' | pɔt 'appearance' |
| pat 'to establish' | pɔ̄t 'to bury' |

Assamese is an Indo-European language (Indo-Aryan branch) spoken by approximately 20 million people in India and Bangladesh.

Assamese has eight vowels. Of particular interest is the contrast between the lower-mid and low back vowels. Superimposed FFT-LPC spectra for these two vowels are included here for comparison.



The spectra show analyses of the two vowels [ɔ] and [ɔ̄]. The first is fairly similar to the IPA reference vowel [ɔ]; the second has a tongue position like that of [ɔ̄], but with a lip position more like that of [u]. The first and second formants are at slightly higher frequencies for [ɔ] – an unusual situation in that higher vowels normally have lower first formant frequencies. The considerable rounding in [ɔ̄] has caused both formants to be lower as well as a very sharp decrease in spectral energy immediately above the second



Badaga

Plain

iru

'to be'

beː

'mouth'

kaːsu

'coin'

kattu

'being aflame'

huː

'flower'

noː

'disease'

oːgu

'to go'

Half-retroflex

ɨ̌

'drag'

beː̌

'bangle'

haː̌su

'spread out'

kǎttu

'corner'

duː̌

'dust'

poː̌

'scar'

oː̌ge

'inside'

Full-retroflex

ɨ̌y̌u

'seven'

beː̌̌

'crop'

kǎːsu

'remove'

pǎːgu

'to get used to'

hǔ

'worm'

tǒː

'cattle pen'

kǒːga

'a certain measure'

Badaga is a Southern Dravidian language (Tamil-Kannada branch) spoken by approximately 250,000 people in the Nilgiri hills in Southern India. There are several dialects, only the most conservative having the complete set of contrasts illustrated here.

Badaga has five vowels /i e a o u/, all of which can be contrastively half and fully retroflexed.

Half-retroflexed vowels are indicated by the diacritic for rhoticity: [a̠], fully retroflexed vowels with a subscript dot [a̠̣]



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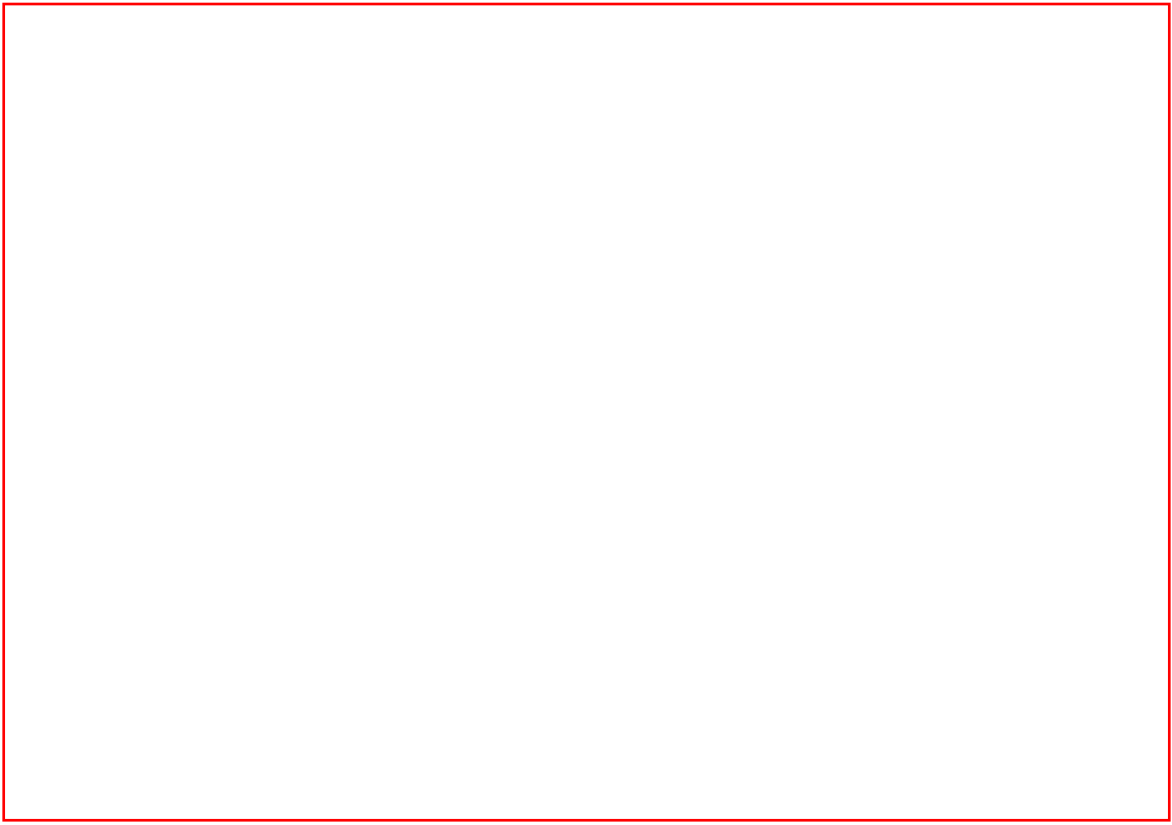
| Bruu (Western dialect) | |
|--|--|
| Stiff vocal cords Tense vocal tract walls | Slack vocal cords Non-tense vocal tract walls |
| k <u>i</u> ɬt 'fear of crowds' | kiɬt 'sharpen a knife' |
| t <u>e</u> h 'to split open' | teɬh 'leech' |
| t <u>a</u> h 'to throw away' | taɬh 'to slap' |
| k <u>a</u> iʔ 'to pluck' | kaɬiʔ 'to cross' |

Bruu is a member of the Katuic group of the Mon Khmer branch of the Austro-Asiatic family of languages. There are approximately 50,000 speakers in Laos and approximately 20,000 speakers in Thailand. The speaker in the recording here is from Buon Province, NE Thailand.

The interesting contrast here is one between slightly breathy and slightly laryngealized vowels. Vowels are articulated with stiff vocal cords and tense vocal tract walls (raised larynx) or with slack vocal cords and non-tense vocal tract walls (lowered larynx). The stiff vocal cord vowels are underlined with a solid line; slack vocal cord vowels are transcribed with a dotted line.

a = stiff vocal cords; tense vocal tract walls

a = slack vocal cords; non-tense vocal tract walls



Bura (Pela dialect)

Modal

wáskí

'each'

jà

'to give birth'

náká wáskí

'give one to each'

si(t)a já

'it is giving birth'

Laryngealized

?^wálá

'big'

?^jáhà

'doctor'

t^sa ?^wálá

'it is big'

t^sa ?^jáhà

'he is a doctor'

Labialization

bàrà

'to want'

?báɬà

'to dance'

màrà

'to carve'

gàm

'ram'

b^wà

'part'

?b^wá

'to beat'

m^wàntà

'to move'

g^wàr

'poison'

pàkà

'to search'

kálá

'to bite'

p^wàrà

'to escort'

k^wárá

'donkey'

| Laterals | | | | |
|------------------|-----------------------|--|---|--------------------|
| | | Alveolar | | Palatal |
| | | Approximant | Fricative | Approximant |
| Voiced | l _à | ɮ _á b ^w _á | | |
| | 'to build' | 'to beat' | | |
| Voiceless | | ɮ _á | ɮ _á l _á | |
| | | 'cow' | 'cucumber' | |

| Labial-velars | | | |
|----------------------|--|---|------------------|
| | | Approximant | Fricative |
| Voiced | w _á s _k í | w _à r w _á r | |
| | 'each' | 'throat' | |
| Voiceless | w _à d _á | | |
| | 'groundnuts' | | |

Bura is an Afro-Asiatic language of the Chadic family (Biu-Mandara branch), spoken by approximately 250,000 people in Nigeria. The two major dialects are Pela (Hill Bura) and Hyilhawul (Plain Bura).

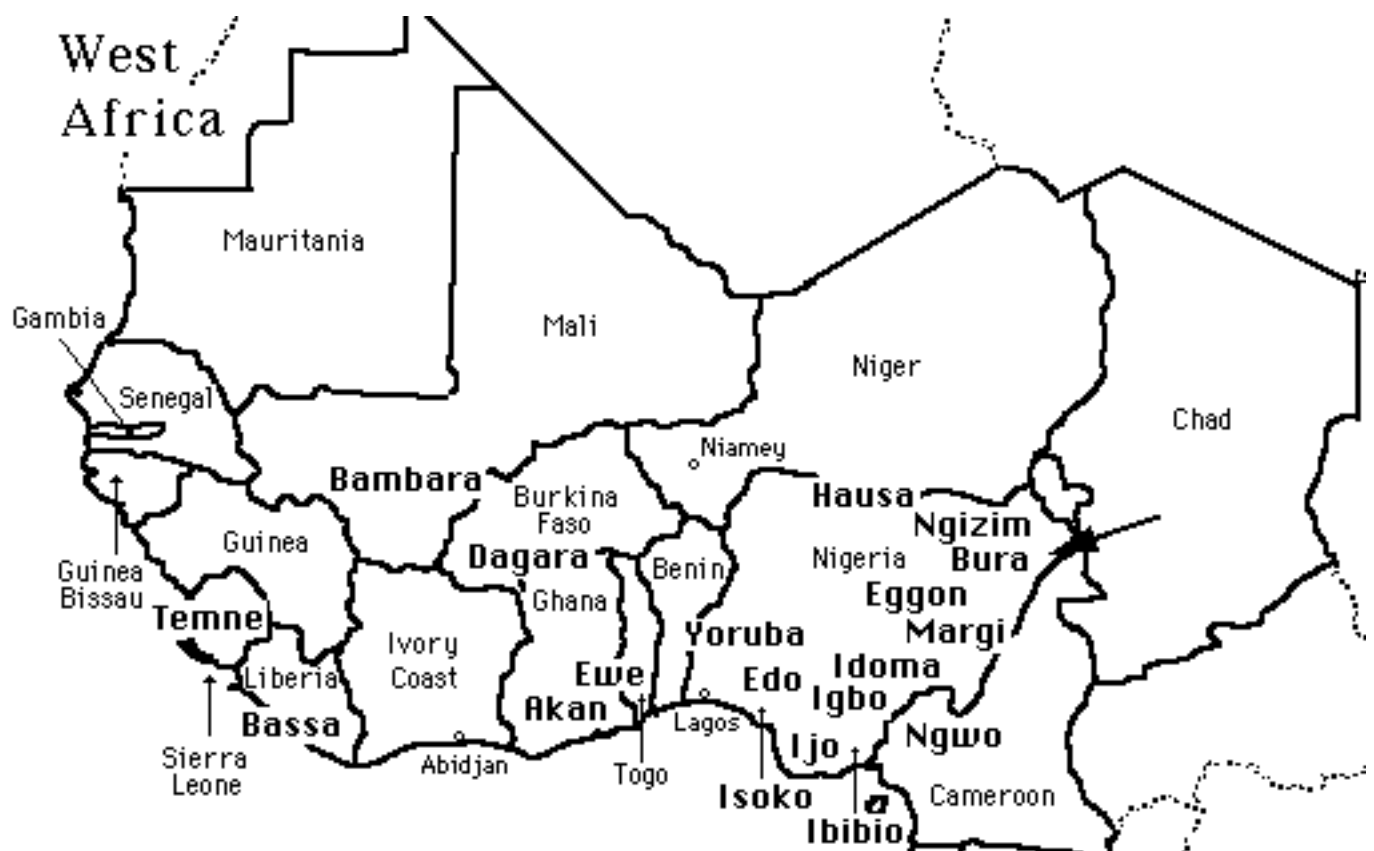
Bura is interesting for several reasons.

First, the language has what can be considered as either laryngealized semi-vowels or, as they are represented here, glottal stops with accompanying secondary articulations. These sounds are presented here in word-initial position as well as intervocally. Similar sounds also occur in other Chadic languages, including Hausa and Margi.

Bura also contrasts plain and labialized stops at the bilabial and velar places of articulation, including laryngealized bilabial stops and bilabial nasals.

Bura contrasts voiced and voiceless labial-velar approximants with a voiced labial-velar fricative.

Finally, Bura has five laterals: voiced alveolar approximant, voiced and voiceless alveolar fricatives, and voiced and voiceless palatal approximants. (Note: the voiced palatal approximant is not illustrated here.)

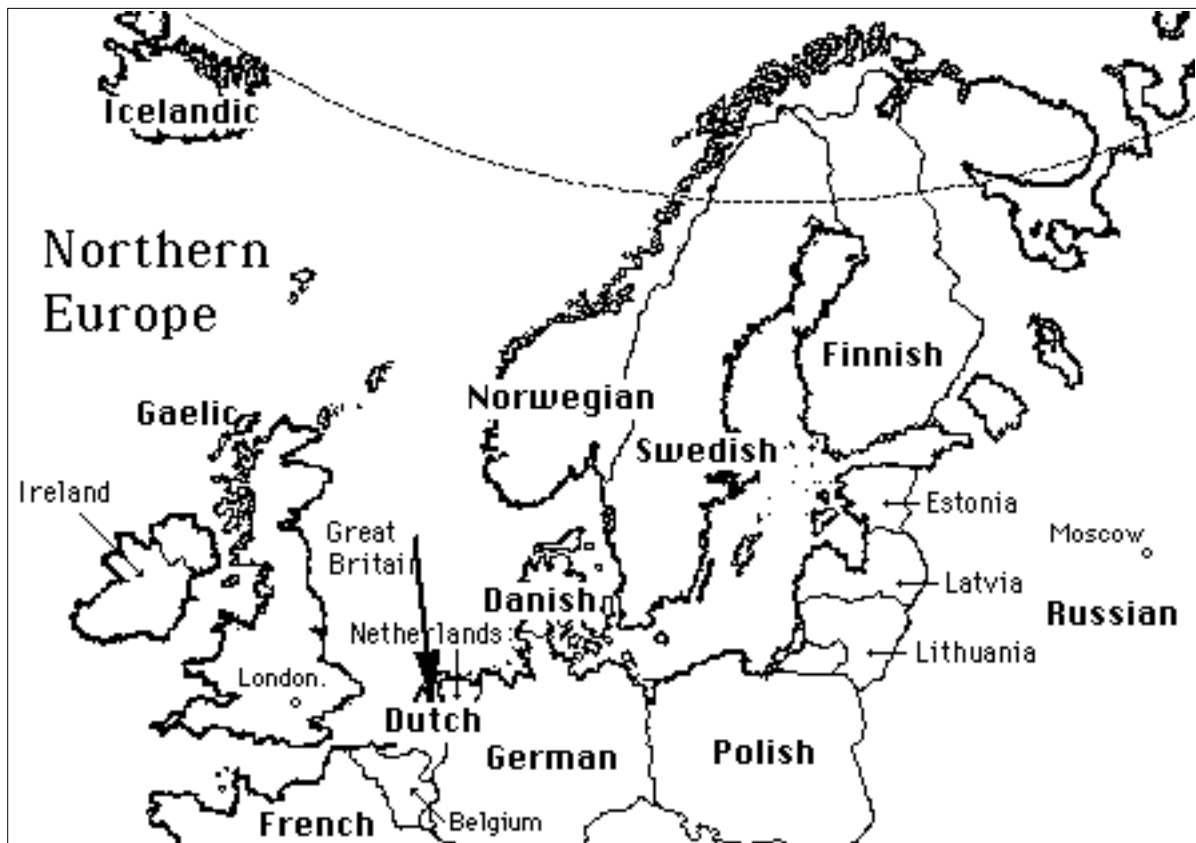


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| Dutch (West Coast dialect) | | |
|-------------------------------|------------------|--------------------------|
| Front | | Back |
| unrounded | rounded | |
| bit 'beet' | byt (game word) | but 'repent' [imper.] |
| bit 'bit' | | |
| bet 'bit' [pt.] | pøt 'turpentine' | bot 'boat' |
| bæt 'bed' | pæ̃t 'ditch' | bɔ̃t 'bone' |
| bat 'gain' | | bat 'bath' |
| <hr/> | | |
| bẽit 'bites' | bʌyt 'prey' | baut 'leg' |

Dutch is an Indo-European language (West Germanic branch) spoken by approximately 20 million people in the Netherlands and Belgium.

Dutch has 12 monophthongs and 3 diphthongs.

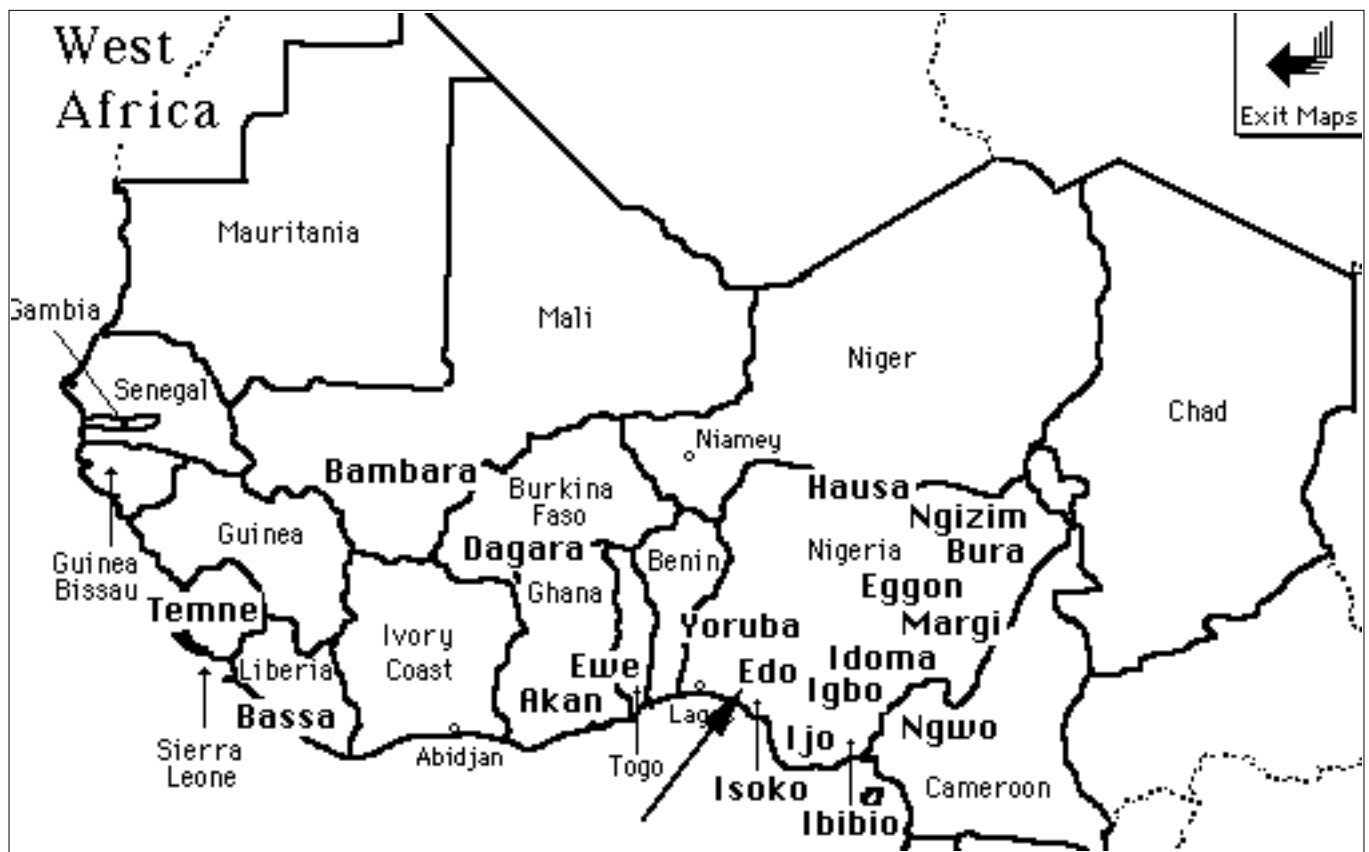


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| Èdo | | |
|---------------------------------------|-------|---------------------------|
| Alveolar lateral | álázi | (kind of monkey) |
| Voiced alveolar approximant | ájába | 'rubber' |
| Voiced alveolar fricative | aɟá | 'caterpillar' |
| Voiceless alveolar approximant | àɟà | (part of burial ceremony) |

Èdo is a Niger-Kordofanian language (Kwa group) spoken by approximately 1 million people in Bendel State, Nigeria. The language is also called Bini.

Èdo has a four-way contrast among alveolar liquids: voiced alveolar lateral, voiced alveolar approximant, voiced alveolar fricative, and voiceless alveolar approximant.



Finnish (Eastern dialect)

tule

'come' [imper.]

tule

'blow' [imper.]

tule

'maybe coming' [neg.]

tule

'maybe blowing' [neg.]

tule

'comes'

tule

'blows'

tule

'maybe comes'

tule

'maybe blows'

Short trill

puran

'I undo'

Long trill

purra

'to bite'

ympyræ

'circle'

ymmærræ

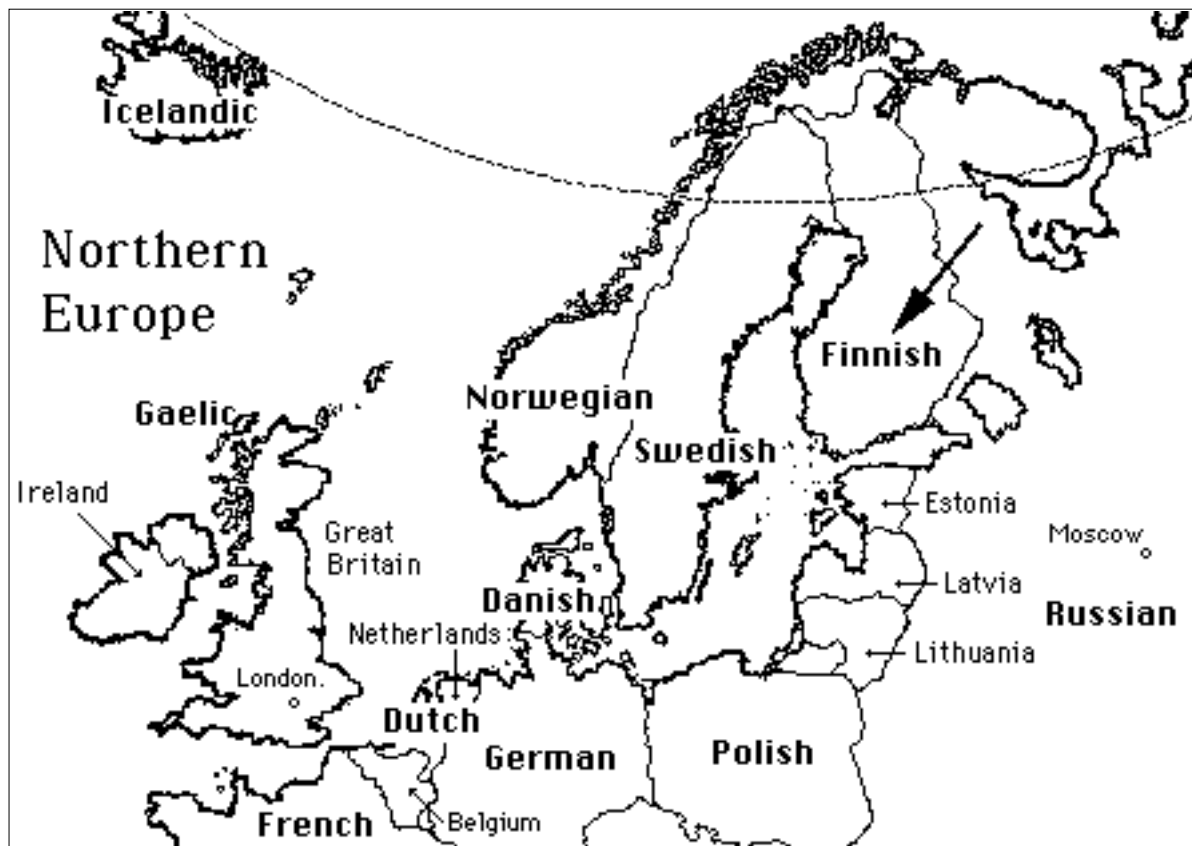
'understand' [neg.imp.]

Finnish is a Uralic language spoken primarily in Finland by approximately 5 million people.

Length is contrastive in Finnish both for consonants and vowels.

The set of disyllabic words given here illustrates the full range of possible combinations of short and long consonants and vowels.

Also illustrated here is short /r/ and long (geminate) /rr/. This contrast is unusual in that both /r/ and /rr/ can be trills. Short /r/ is usually realized as an alveolar trill with two taps (as illustrated in the examples here) or as a single tap. Long /rr/ is usually realized as an alveolar trill with three or four taps.



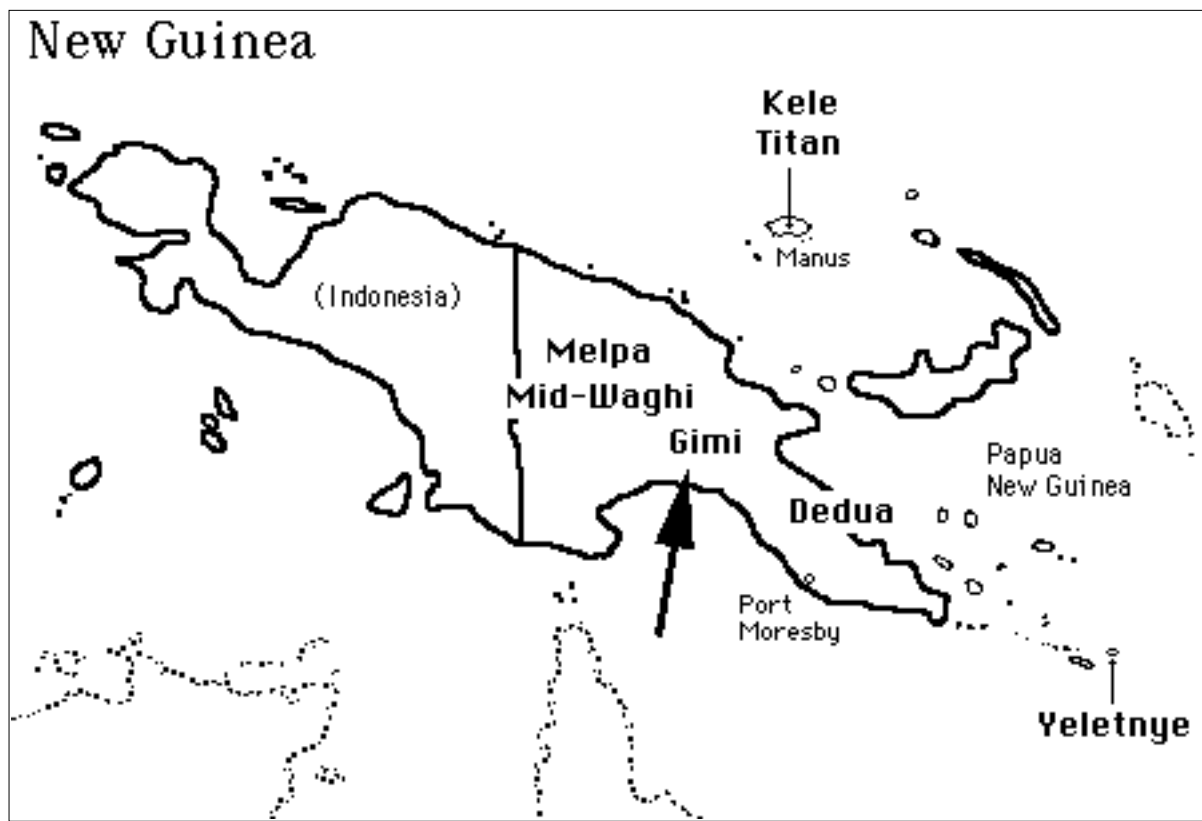
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| Gimi | | |
|------------------------------------|-------|---------|
| Voiceless glottal fricative | rahoʔ | ‘truly’ |
| Glottal stop | haʔo | ‘shut’ |
| Voiced glottal approximant | ha*oʔ | ‘many’ |
| (Vowel transition) | hao | ‘hit’ |

Gimi is an Indo-Pacific language (East New Guinea Highlands subbranch) spoken in Eastern Highlands province of Papua New Guinea. There are approximately 22,000 speakers.

The consonant system of Gimi includes a glottal stop and another segment (symbolized here by [*]) which functions phonologically as its voiced counterpart. Thus, it has been suggested that Gimi has a ‘voiced glottal stop’. Phonetically, [*] is indeed voiced and involves some glottal activity. It is, however, not a stop, but an approximant, as indicated by the diminution of energy between otherwise adjacent vowels.

Here, intervocalic /ʔ/ and /*/ are contrasted with intervocalic /h/ and an example of a vowel-to-vowel transition.



Greek

| | Voiceless | Voiced |
|---------------------|------------------|-----------------|
| Initial | θiki 'box' | ðiki 'trial' |
| Intervocalic | laθi 'errors' | laði 'oil' |

| | Palatal | Velar |
|------------------|-------------------|------------------|
| Voiceless | çeri 'hand' | xoma 'soil' |
| Voiced | jeri 'old men' | yoma 'eraser' |

Greek is an Indo-European language spoken by approximately 11 million people primarily in Greece.

Greek contrasts voiced and voiceless interdental fricatives /θ ð/.

It also contrasts voiced and voiceless back fricatives /x ç/, which are palatal [ç ç] before front vowels and velar [x ç] before back vowels. The voiced palatal allophone may lack noticeable turbulence, in which case it should be described as the palatal approximant [j].



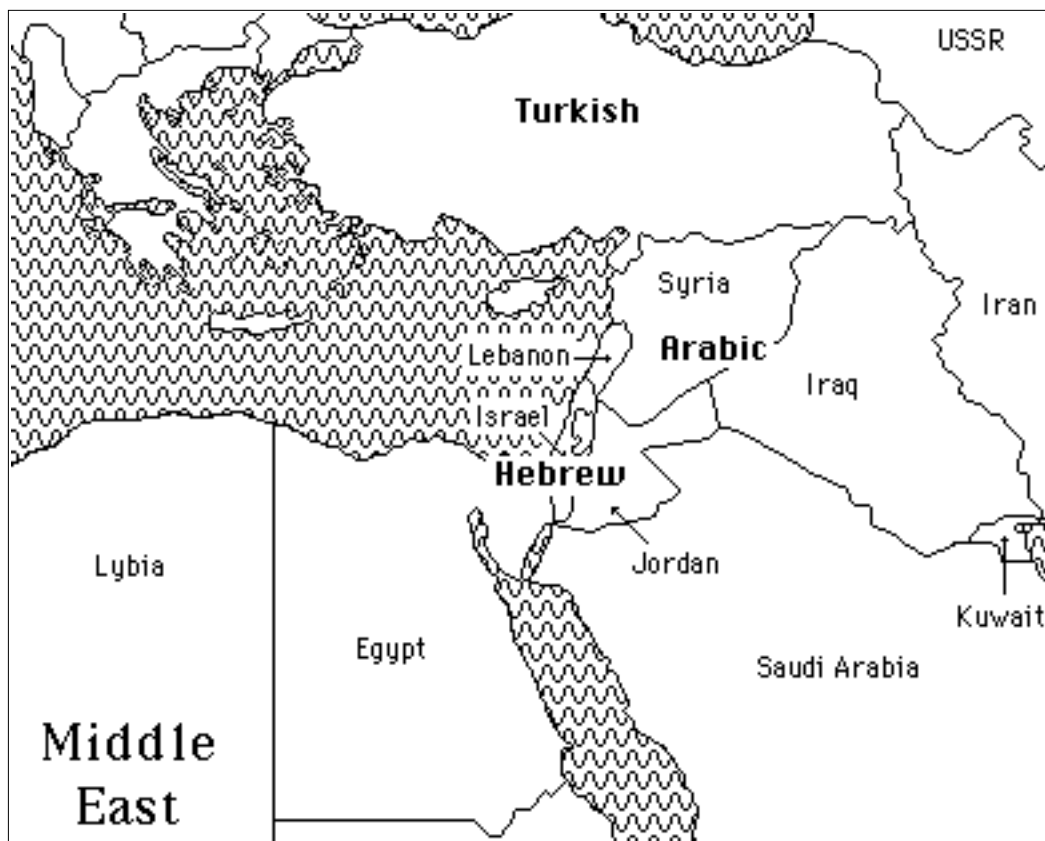
Hebrew (Oriental dialect)

| | Uvular | Pharyngeal | Glottal |
|----------------|------------------------------|---------------------------|---|
| Initial | · χ imia 'chemistry' | ħor 'hole' ʕor 'skin' | hem 'them' ʔor 'light' |
| | Medial | · maħar 'he sold' | naħar 'snored' naʕar 'made a donkey noise' |
| Final | | · laħ 'for you' [fem.] | laħ 'humid' naʕ 'moved' |

Hebrew is an Afro-Asiatic language (Central Semitic group) spoken by approximately 4 million people in Israel.

The Oriental dialect of Modern Hebrew contrasts seven back consonants, including two velar stops [k g], a uvular fricative [χ], a voiceless pharyngeal fricative [ħ], a voiced pharyngeal approximant [ʕ], a glottal stop [ʔ], and a glottal fricative [h]. Illustrated here are the uvular, pharyngeal, and glottal consonants.

Note that intervocalic [h] is voiced in the example [nahar].



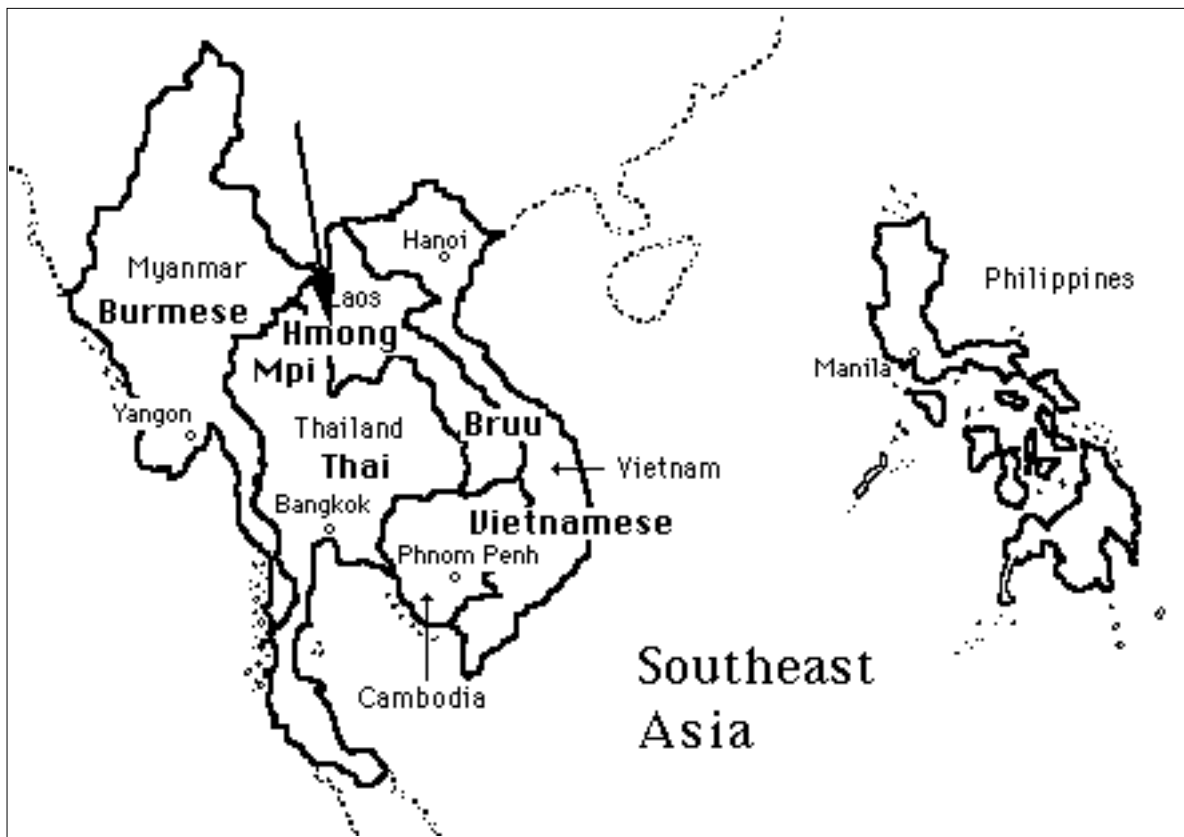
Hmong

(Daw [White Meo] dialect)

| | | | |
|-------------------|-----------------------------|---------------------|--|
| High level | ɣO 55 'ball-like' | High falling | ɣO 42 'female' |
| Mid level | ɣO 33 'pancreas' | Mid rising | ɣO 35 'to throw' |
| Low level | ɣO 22 'thorn' | Low breathy | ɣO 32 'paternal grandmother' |
| | | Checked | ɣOʔ 31 'to see' |

Hmong is an Sino-Tibetan language (Miao-Yao group) spoken in Thailand, Laos, and China by approximately 3 million people.

Hmong has seven tones. Three – high, mid, and low – are level tones spoken with normal phonation. Two – high falling and mid rising – are contour tones, also with normal phonation. The sixth tone is low with breathy phonation. The seventh is characterized by glottal stop termination, and may involve creaky voice.



Ibibio

**High tone
followed by**

**Low tone
followed by**

High

ákpá

'expanse of ocean'

àkpá

'first'

Falling

ákpân

'square woven basket'

àkpô

'rubber tree'

Low

ákù

'priest'

àkpà

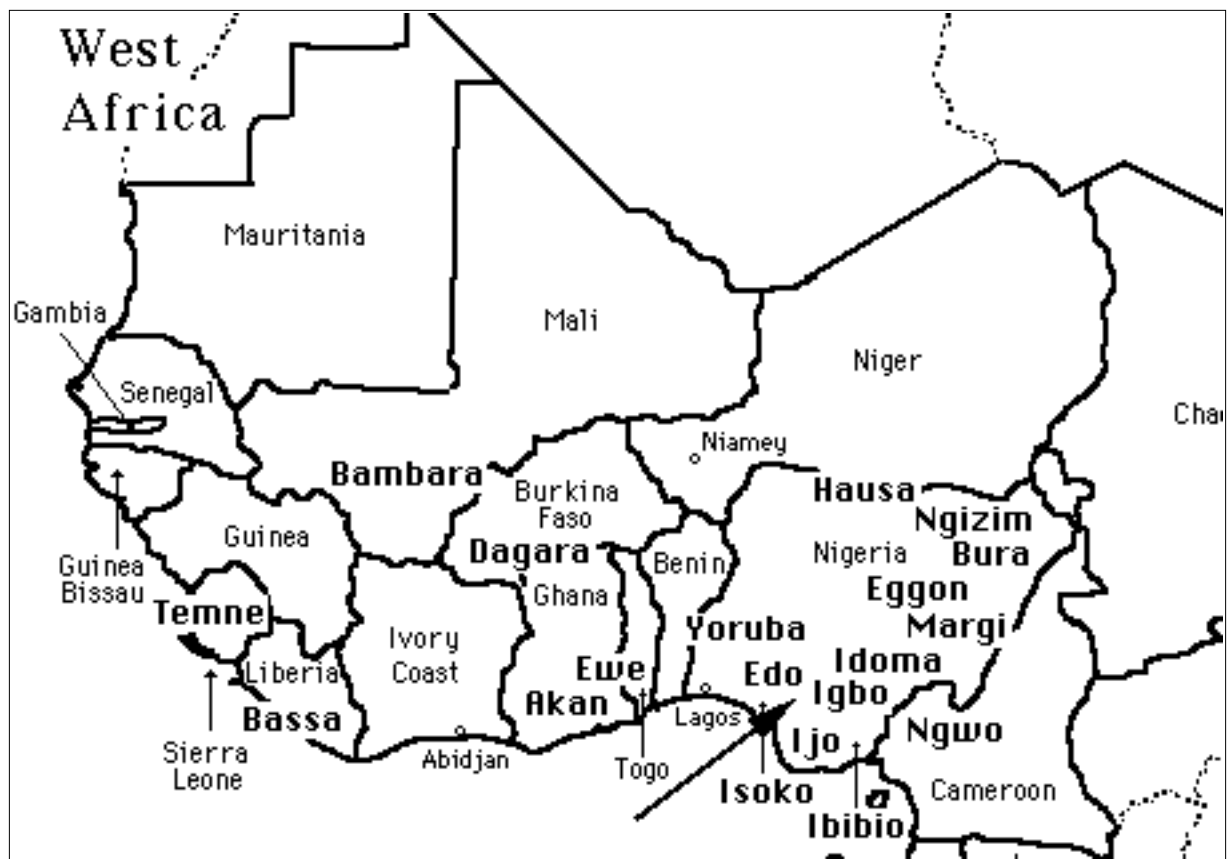
(small ant)

Idoma

| | | | |
|---------------------|------------------|--------------------|--------------------------------------|
| Labial | àpà 'lizard' | àbà 'palm nut' | áma 'bell' |
| Labial-velar | àkpà 'bridge' | àgbà 'jaw' | aŋmàa 'painted body marks' |
| Velar | àka 'wheel' | àga 'ax' | ɔŋáji 'Western rainbow' |
| Labialized | òkʷò (tree) | àgʷa 'swimming' | àŋʷà 'fortune-telling instrument' |

Idoma is Niger-Kordofanian language (Kwa subgroup) spoken by approximately 300,000 people in Benue State, Nigeria.

Idoma contrasts labial-velar oral and nasal stops with labial, velar, and labialized stops.



Icelandic (Southern dialect) Diphthongs

Long diphthongs

| | |
|---------|-------------------|
| hei:ʔ | 'hot' [fem.sg.] |
| læy:ʔs | 'free' [masc.sg.] |
| sai:ʔ | 'sweet' [fem.] |
| sau:ʔra | 'wound' [gen.pl.] |
| sou:ʔ | 'sod' |

Short diphthongs

| | |
|--------|-----------------------|
| heiht | 'hot' [neut.] |
| læyʔss | 'free' [masc.sg.gen.] |
| saiht | 'sweet' [neut.] |
| saurra | 'sore' [gen.pl.] |
| souht | 'fetched' |

Medial stops

| | | | |
|----------------------|------------------------|------------|---------------------|
| k ^h ɔhpar | mæhtir | pehkʲa | sahka |
| 'small pot' [n.pl.] | 'may' [2s.pt.sub.] | 'to know' | 'sinker' |
| k ^h ɔppar | mættir | lækkʲa | sakka |
| 'young seal' [n.pl.] | 'distressed' [m.n.pl.] | 'to lay' | 'dampness' [og.sg.] |
| k ^h o:par | mæ:ʔtir | pe:ʔkʲa | sɑ:ka |
| 'copper' | 'meet' [2s.pr.sub.] | 'to cover' | 'to blame' |
| | mæhtnir | | sahkna |
| | 'meet' [3p.pr.ind.] | | 'to regret' |
| | | | sakna |
| | | | 'saga' [g.pl.] |

Final stops

kʰahp
'zeal'

viht
'wide'

tøhk
'dark' [f.n.sg.]

kapp
'hoax'

vitt
'breadth'

tøkk
'dew'

ka:p
'opening'

pit
'bite' [1s.pr.]

tʰø:k
'grasps'

Fricatives

Labiodental

fau: 'to get'

Alveolar

θau: 'then'

Alveolar sibilant

sau: 'saw'

Palatal

çau: 'by, with'

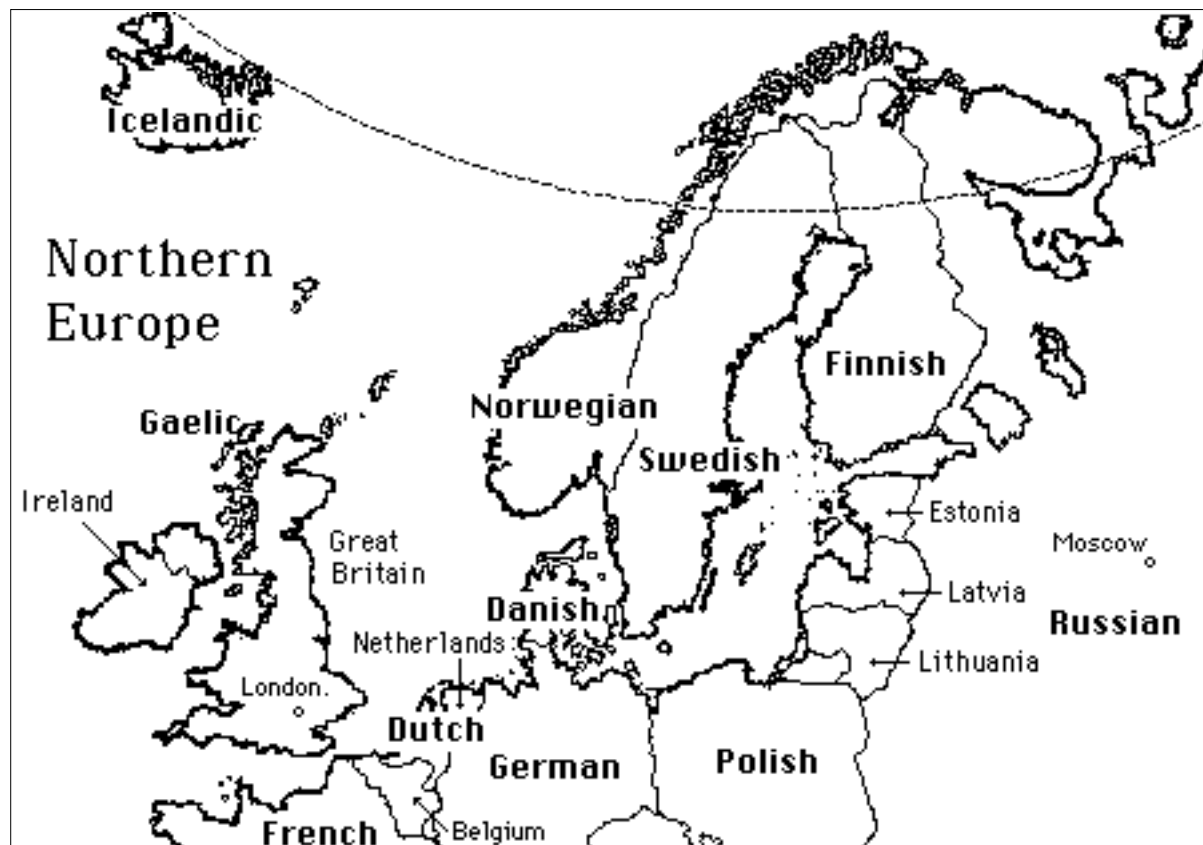
Icelandic is an Indo-European language (North Germanic branch) spoken primarily in Iceland by approximately 250,000 people. There are two dialects, Northern and Southern.

Icelandic has five diphthongs, which occur both long and short, depending on syllable structure. Diphthongs preceding 'pre-aspirated' or geminate consonants are short, while those preceding 'short' (nongeminate) consonants are long.

Icelandic also contrasts 'pre-aspirated', geminate, and 'short' stops in medial and final positions. Again, vowel length plays a part in the contrasts.

Also illustrated are the voiceless fricatives /f θ s ç/.

Note: [s] sometimes has a more back or rounded articulation and might be transcribed [ʂ].



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| | | +ATR | | -ATR | |
|------------------|-----------|----------|-----------|------------|-------------|
| Plain | sí | ɓuru | | firi | ɓuru |
| | 'twenty' | 'yam' | | 'work' | 'be rotten' |
| | jé | odo | | ékí | okó |
| | 'thing' | 'yellow' | áká | 'to peel' | 'so' |
| | | | 'tooth' | | |
| Nasalized | sĩ | sũ | | sĩ | fũ |
| | 'remove' | 'sing' | | 'tree' | 'salt' |
| | dzě | | ká | sěĩ | tó |
| | 'another' | | 'to tear' | 'to shave' | 'think' |

Ijo is a cluster of Niger-Kordofanian languages (Kwa group) spoken in Rivers State, Nigeria. Kalabari, spoken by approximately 300,000 people, is a dialect of Eastern Delta Ijo.

Ijo contrasts advance tongue root [+ATR] and retracted tongue root [-ATR] high and mid vowels. The low vowel [a] is neutral with regard to [ATR]. Vowels may also be either plain or nasalized.

High tones are marked with an acute accent.



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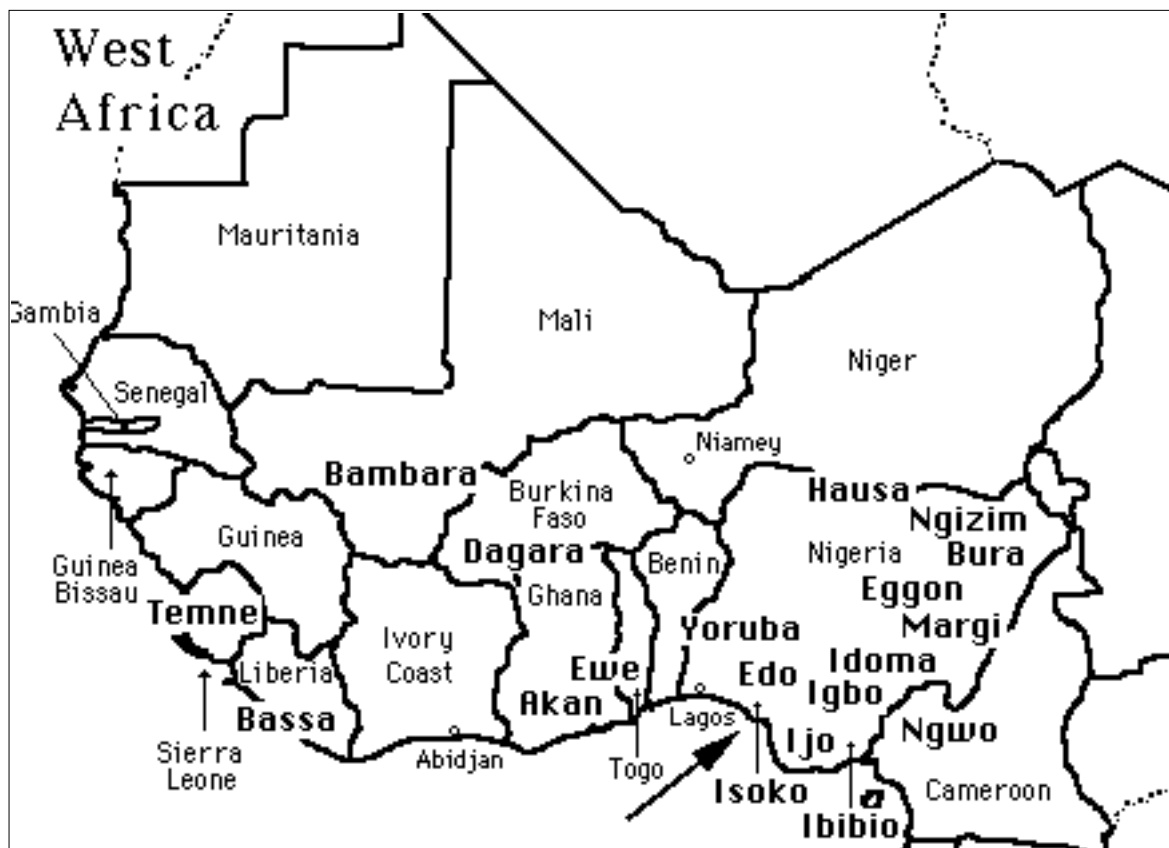
Isoko

| | Voiceless | Voiced |
|------------------------------------|------------------|-----------------|
| Labiodental fricative | òfÉ 'razor' | éVÉ 'how' |
| Labiodental approximant | | éVÉ 'breath' |
| Labial-velar | òMÉ 'laugh' | éWÉ 'hoe' |

Isoko is a Niger-Kordofanian language (Kwa group) spoken by approximately 300,000 people in Bendel State, Nigeria.

Isoko contrasts voiced labiodental fricative /v/ with voiced labiodental approximant /ʋ/.

The phonemic inventory of the language also includes voiceless labiodental and labial-velar fricatives /f ɱ/, and voiced labial-velar approximant /w/.



Javanese

Modal voice

| | |
|--------|----------|
| paku | 'nail' |
| tamu | 'guest' |
| tsariʔ | 'piece' |
| titiʔ | 'little' |
| kali | 'river' |

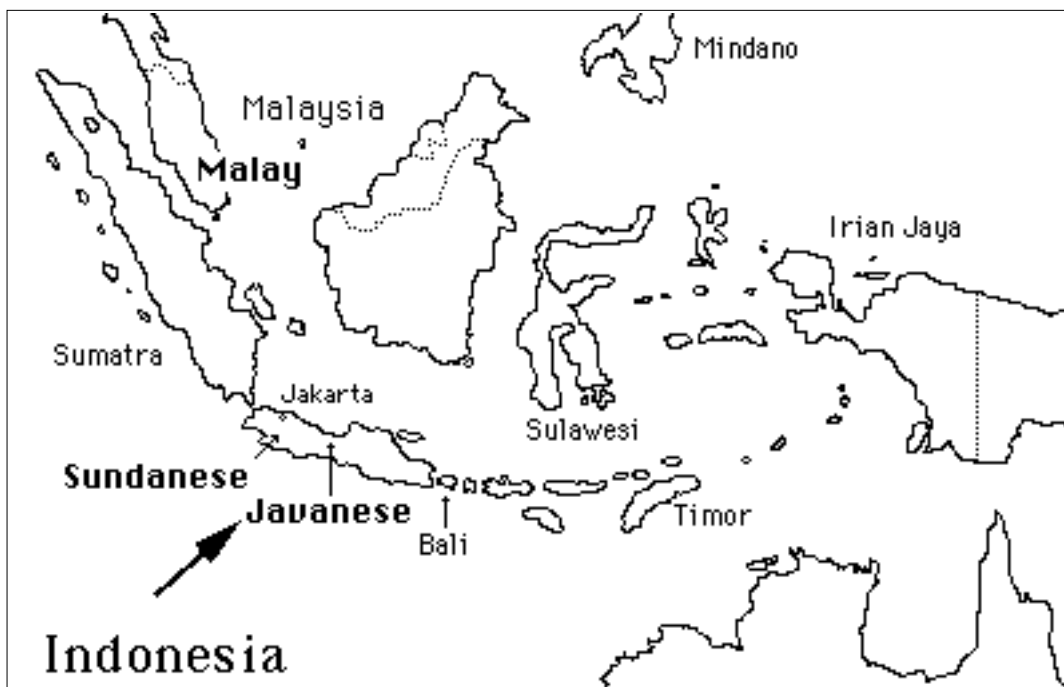
Slack voice

| | |
|--------|----------------------------|
| ɓaku | 'standard' |
| ɗamu | 'blow' |
| ɗzarit | (type of women's clothing) |
| ɗisiʔ | 'first' |
| gali | 'to dig' |

Javanese is an Austronesian language (Western Malayo-Polynesian branch) spoken by approximately 70 million people on the island of Java in Indonesia. The speaker of the words illustrated here comes from Surabaya, in East Java.

Javanese has contrasting pairs of modal and slack voice homorganic stops at the bilabial, dental, retroflex, and velar places of articulation. There is also an affricate pair.

Slack voice is represented here by the use of the standard voiced symbols with an added subscript [̚]. Note that in addition to a lowered F1 in stops with slack voice (which is due to larynx lowering), the phonation of the following vowel is affected, showing a more breathy quality.



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| K'ekchi | | |
|----------|--------------------|-----------------|
| | Velar | Uvular |
| Plain | ka 'grindstone' | qa 'our' |
| Ejective | k'a 'bitter' | q'a 'bridge' |

K'ekchi is a Mayan language (Eastern branch) spoken in Guatemala and in neighboring areas of Belize and El Salvador. There are approximately 280,000 speakers total.

The four words here are from recordings provided by Ava Berinstein.

K'ekchi contrasts velar plosives and ejectives with uvular plosives and ejectives.

Spectrograms of the four words illustrated show that the bursts occurring on the release of the stop closure are particularly clear for the ejective stops.

Of the 12 speakers that were recorded, all exhibited a much lower locus of energy concentration in the burst for the uvular stops than for the velar stops. However, F2 was lower at the onset of the vowel for only 9 out of the 12 speakers. For these 9 speakers there was also a noticeable lowering of F2 throughout most of the vowel.

There was no significant VOT difference for the plosives; the mean VOT was 52 ms for the velars and 56 ms for the uvulars.

Neither was there any significant difference in the length of the glottal closure after the release of the ejectives; these were measured as 97 ms for the velars and 92 ms for the uvulars.

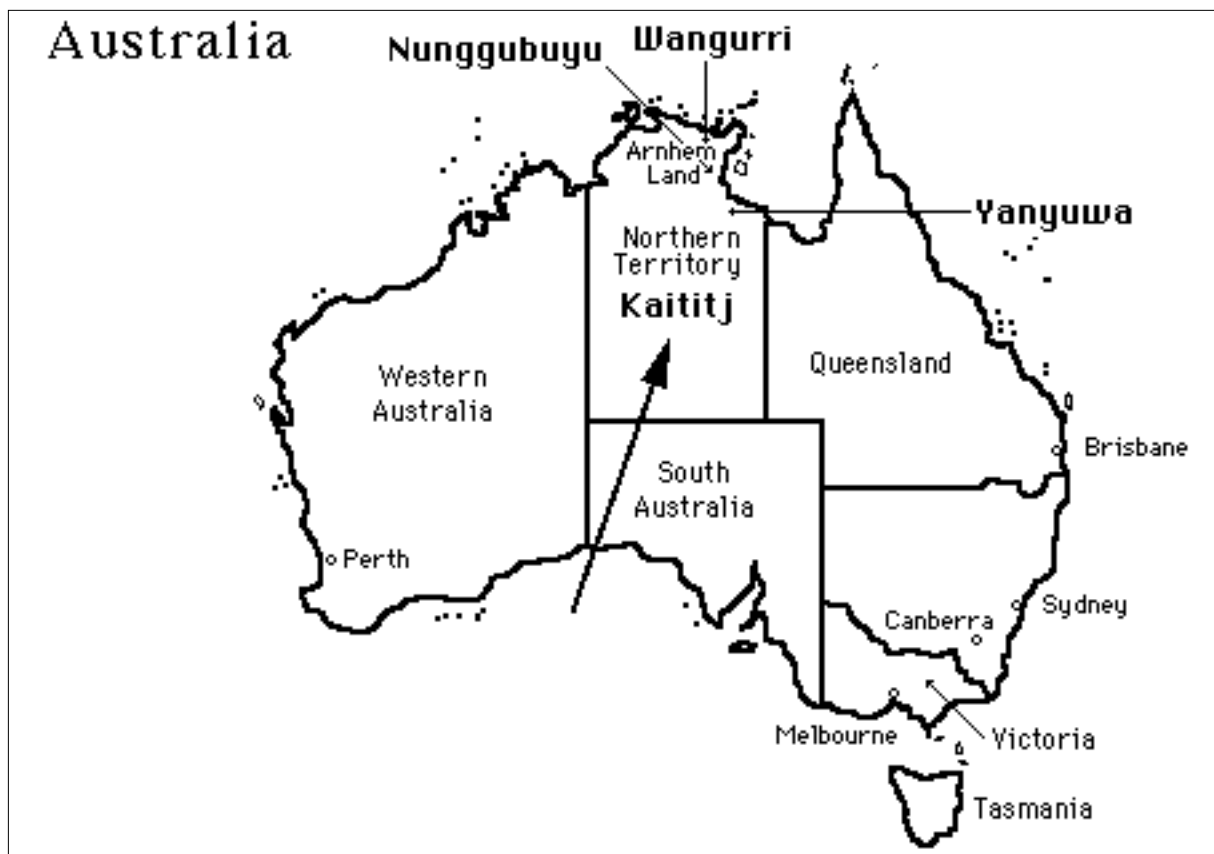


| Kaititj | | | |
|------------------------------|------------------|-------------------------|---------------------|
| | Initial | Medial | Final |
| Laminal dental | ḷinp 'armpit' | aḷuŋ 'burrow' | iḷbaḷ 'smoke' |
| Apical alveolar | ḷubiɻ 'thigh' | aḷuŋk 'chase' | irmal 'fire saw' |
| Apical post-alveolar | | kaḷat 'sacred board' | aldimaḷ 'west' |
| Laminal post-alveolar | | aḷilk 'smooth' | kuraḷ 'star' |

Kaititj is an Australian language (Arandic group of the Pama-Nyungan branch) spoken in Northern Territory, Australia, by fewer than 200 people.

Kaititj (like other Australian languages) contains a large number of contrasting simple voiced lateral approximants, with laminal dental, apical alveolar, apical post-alveolar, and laminal post-alveolar articulations.

(Note: the apical and laminal post-alveolars occur initially in words such as /ḷaɻiŋk/ 'hit' and /ḷukuŋk/ 'light (fire)', but were not recorded by the speaker.)



| Korean (Seoul dialect) | | |
|--|--------------------------------------|------------------------------|
| Unaspirated | Fortis | Aspirated |
| p <ul style="list-style-type: none">pul 'fire' | p [*] ul 'horn' | p ^h ul 'grass' |
| t <ul style="list-style-type: none">tal 'moon' | t [*] al 'daughter' | t ^h al 'mask' |
| k <ul style="list-style-type: none">kin 'weight of measure' | k [*] in 'rope' | k ^h in 'large' |
| t͡ʃ <ul style="list-style-type: none">t͡ʃa 'ruler' | t͡ʃ [*] a 'salty' | t͡ʃ ^h a 'tea' |
| s <ul style="list-style-type: none">sal 'flesh, fat' | s [*] al 'uncooked rice' | |

Korean is a language spoken chiefly on the Korean peninsula in east Asia. Its speakers number a total of over 65 million. Korean is often classified as a language isolate, but many scholars argue that it is related to the Altaic family. The recordings here are of the Seoul dialect.

Korean contrasts unaspirated, aspirated and fortis stops in the bilabial, dental and velar places of articulation. The palato-alveolar affricate [t͡ʃ] also contrasts this way. The sole fricative in the language, [s], also uses this feature distinctively.

| | | |
|--------------------|----------------|------------------|
| p | p [*] | p ^h |
| Unaspirated | Fortis | Aspirated |



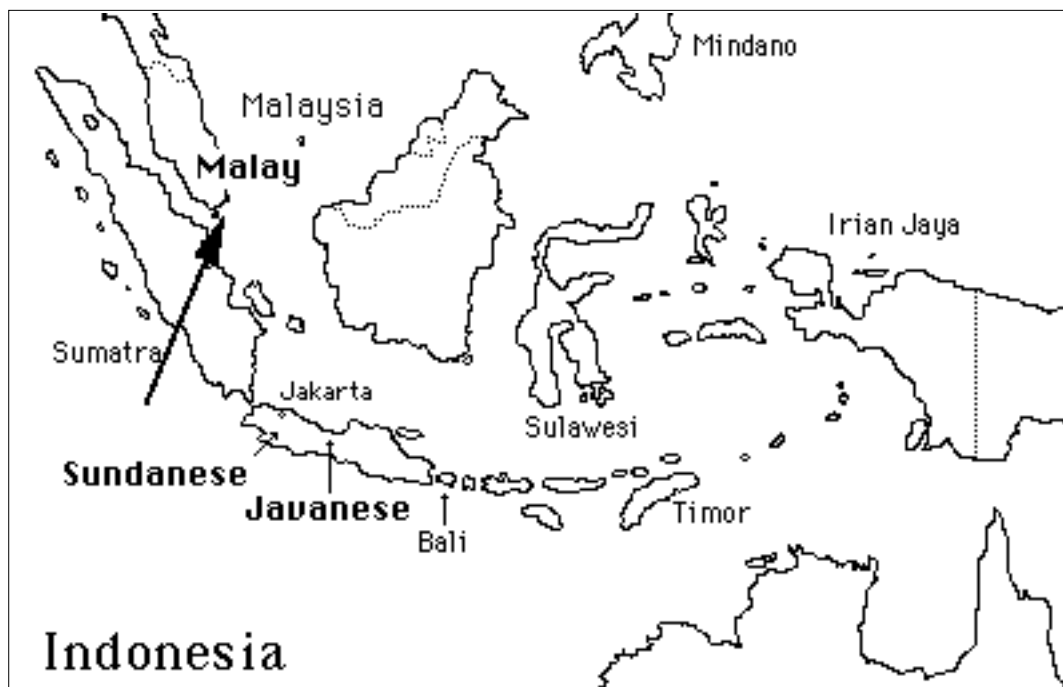
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| Malay (Pattani dialect) | | | |
|----------------------------|----------|--------|----------------|
| Short | | Long | |
| lamaʔ | 'late' | lɜamaʔ | 'to make late' |
| make | 'to eat' | mɜake | 'to be eaten' |
| siku | 'elbow' | sɜiku | 'hand tool' |
| butɔ | 'blind' | bɜutɔ | (kind of tree) |
| kitɔ | 'us' | kɜitɔ | 'to us' |

Malay is an Austronesian language (Sundic branch of Western-Malayo-Polynesian). The Pattani dialect is spoken in southern Thailand by approximately 1 million people. This dialect is quite different from Standard Malay, but similar to the Malay spoken in the Malaysian states of Kelantan and Trengganu.

Pattani Malay contrasts short and long consonants word-initially. Long voiced consonants are typically three times as long as their short counterparts. Voiceless unaspirated stops, which can exhibit a difference in duration only in running speech, may be distinguished instead by intensity of the burst, rate of formant transitions, F_0 perturbations, and greater amplitude of the following vowel.

These recordings were made by Arthur Abramson, and are described by him in: Abramson, A. (1986) 'The perception of word-initial consonant length: Pattani Malay. JIPA, 16: 8-16.



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Marathi

Modal nasal

maar

'beat'

Breathy nasal

m^haar

'a caste'

n^haan

'bath'

Marathi is an Indo-Aryan language spoken in Maharashtra, India, and in neighboring states by approximately 50 million people.

Marathi exhibits breathy voiced nasals. There are phonetic differences between different groups of languages in how this breathy voiced phonation type is realized. (Compare, for example, the breathy voiced sounds of Newari and Tsonga.)

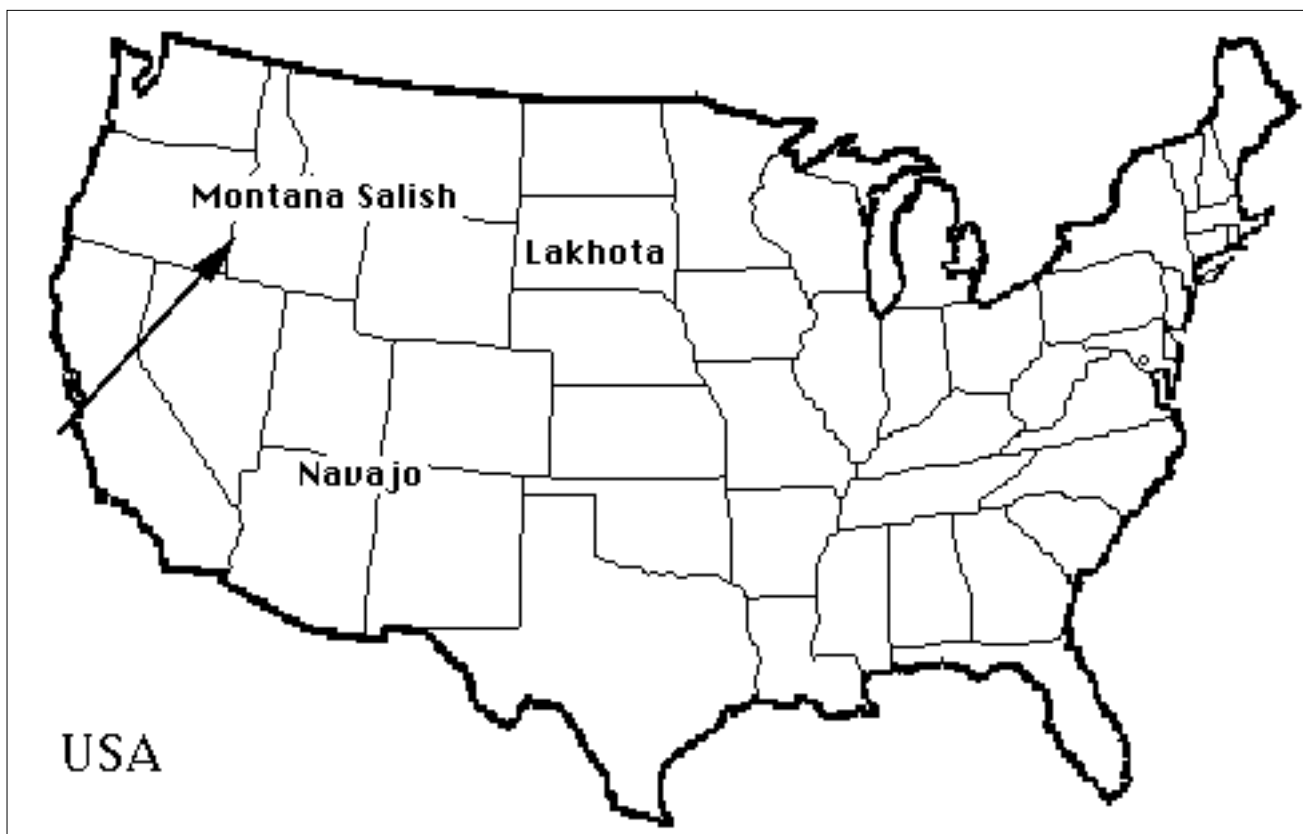


Montana Salish

| | | | |
|-----------------------|------------------|----------------------------|--------------|
| plain | | ejective | |
| páʕas | 'face is pale' | p' aʕáp | 'grass fire' |
| tám | 'it's wrong' | t' áq' ən | 'six' |
| tsáq ^w əlʃ | 'western larch' | ts' áłt | 'it's cold' |
| tʃájłqən | 'cut hair' | tʃ' áwən | 'I prayed' |
| k ^w áteʔ | 'quarter(money)' | k ^w ' áłtʃ' qən | 'lid,cover' |
| qáxeʔ | 'aunt' | q' áq' łuʔ | 'vein' |
| q ^w átsqən | 'hat' | q ^w ' ájəlqs | 'priest' |

Montana Salish, also called Flathead, is the only Salishan language spoken in Montana. There are now less than a hundred native speakers, but the language is being taught to younger members of the tribe.

Montana Salish has a number interesting consonant clusters and several ejectives! inloding a contrast between velar and uvular ejectives and plosives. There are also voiced and voiceless laterals



Newari

Modal voice

maa

'garland'

na

'take it'

naa

'it melts'

Breathy voice

ṃaa

'to be unwilling'

ṇa

'knead it'

ṇaa

'knead'

Newari is a Tibeto-Burman language (Tibetic subgroup) spoken by approximately 500,000 people, primarily in Nepal.

Newari has two series of nasals differing in phonation type. Recorded here are minimal pairs illustrating modally and breathy voiced bilabial and alveolar nasals.



Margi

Stop

cácíkà
'whooping cough'

ǰáʔdí
'hump'

kàngá
'drum'

gàlí
'spear'

Fricative

ǰámbál
'sword'

xá
'big water pot'

ɣàfú
'arrow'

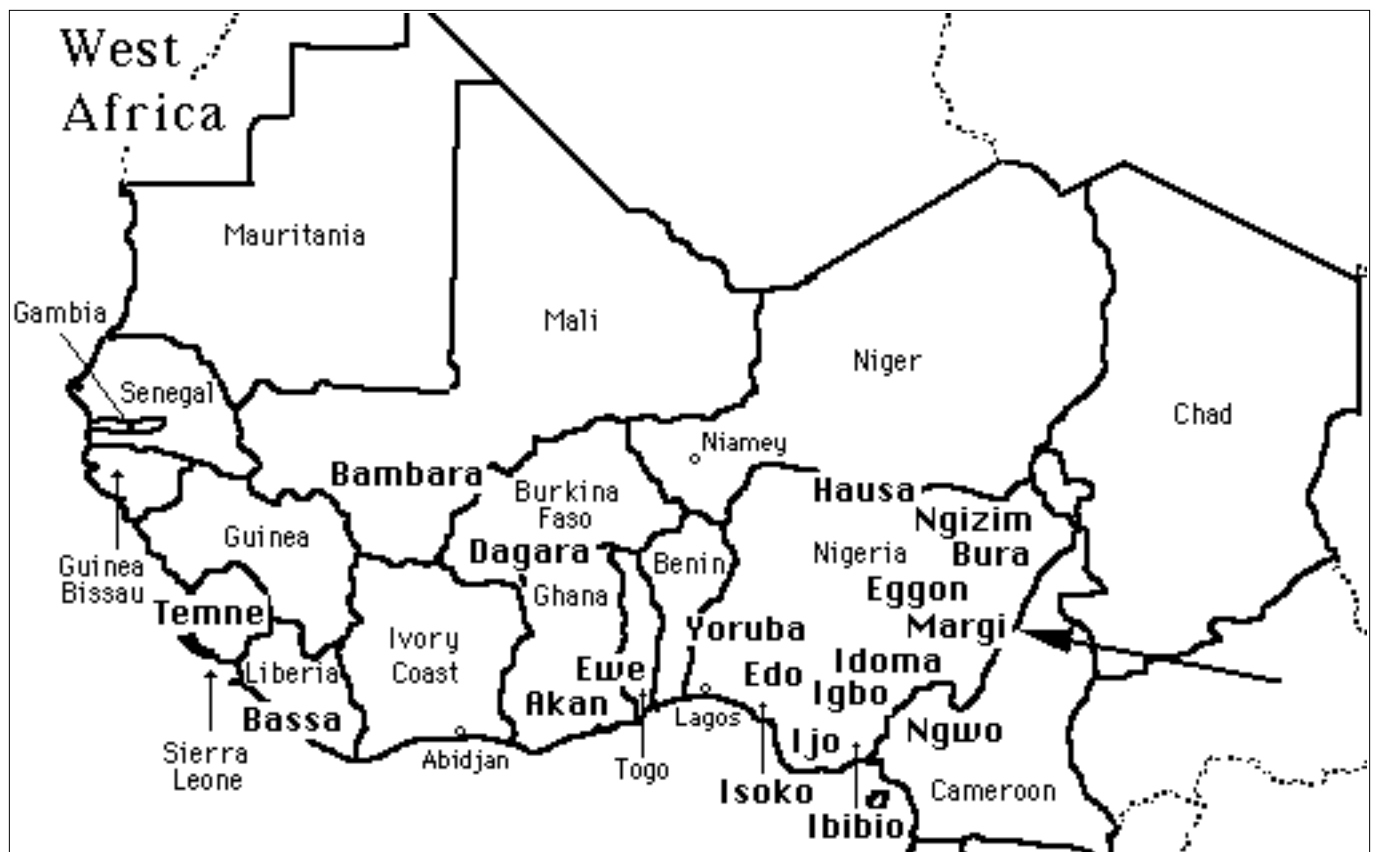
Approximant

ǰà
'give birth'

Margi is an Afro-Asiatic language (Chadic branch) spoken in Borno and Gongola states, Nigeria, by approximately 200,000 people.

Margi contrasts both palatal and velar stops and fricatives. The set of palatals is particularly interesting as the language also has a voiced palatal approximant.

(Note that the voiceless palatal fricative exists, but was not recorded adequately.)



Mazatec (Jalapa dialect)

| | | |
|----------------|--|---|
| Modal | ni ² ?ja ² 'house' | kã ² 'twenty' |
| Creaky | ja ² 'he carries' | kã ² 'alone' |
| Breathy | ka ² ma ² ŋa ² 'gather together' | ŋã ² 'mine' |
| Modal | t ^h æ ¹ 'seed' | nĩ ² mã ² 'bumble bee' |
| Creaky | ndæ ¹ 'buttocks' | kã ² 'dead' |
| Breathy | ndæ ¹ 'horse' | mã ² 'he wants' |

Mazatec is an Otomanguean language (Popolocan branch) spoken by approximately 8,000 people in Tuxtepec, Oaxaca, Mexico.

Mazatec distinguishes three different phonation types: modal, creaky, and breathy. In addition, vowels may be plain or nasalized, resulting in a six-way contrast for any particular vowel quality.

Note also that there are three tones in Mazatec, indicated here with superscript numerals: high (3), mid (2), and low (1).

For more information see:

Ladefoged, Peter; Ian Maddieson; Michel Jackson (1988). Investigating phonation types in different languages. In: *Vocal Physiology: Voice Production, Mechanisms and Functions*, ed. by O. Fujimura, New York: Raven Press, 297-317.



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Mid-Waghi

Laminal dental

al_la al_la

'again and again'

Apical alveolar

alala

'to speak improperly'

Velar

alale

'dizzy'

Mid-Waghi is an Indo-Pacific language spoken in the Western Highlands Province of Papua New Guinea by approximately 45,000 people.

Like Melpa, Mid-Waghi contrasts voiced laterals at three places of articulation: dental, alveolar, and velar. The dental lateral is laminal; the alveolar is apical.

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Nepali

| | |
|------|--------------|
| paɪ | 'rear' |
| pʰaɪ | 'throw away' |
| baɪ | 'burn' |
| bʰaɪ | 'forehead' |

Nepali is an Indo-Aryan language (East-Central subgroup) spoken by over 16 million people in Nepal, India, and Bhutan.

Breathy voice is used contrastively in Nepali, as it is in many other Indo-Aryan languages. This contrast is illustrated here with the bilabial voiced and voiceless stops.

This recording includes five male speakers and one female speaker.



Ngwo

**Laminal
dentalveolar**

èdzě

(dance)

**Laminal
palatoalveolar**

dʒé

(fruit)

Palatal

éjě

'postpone'

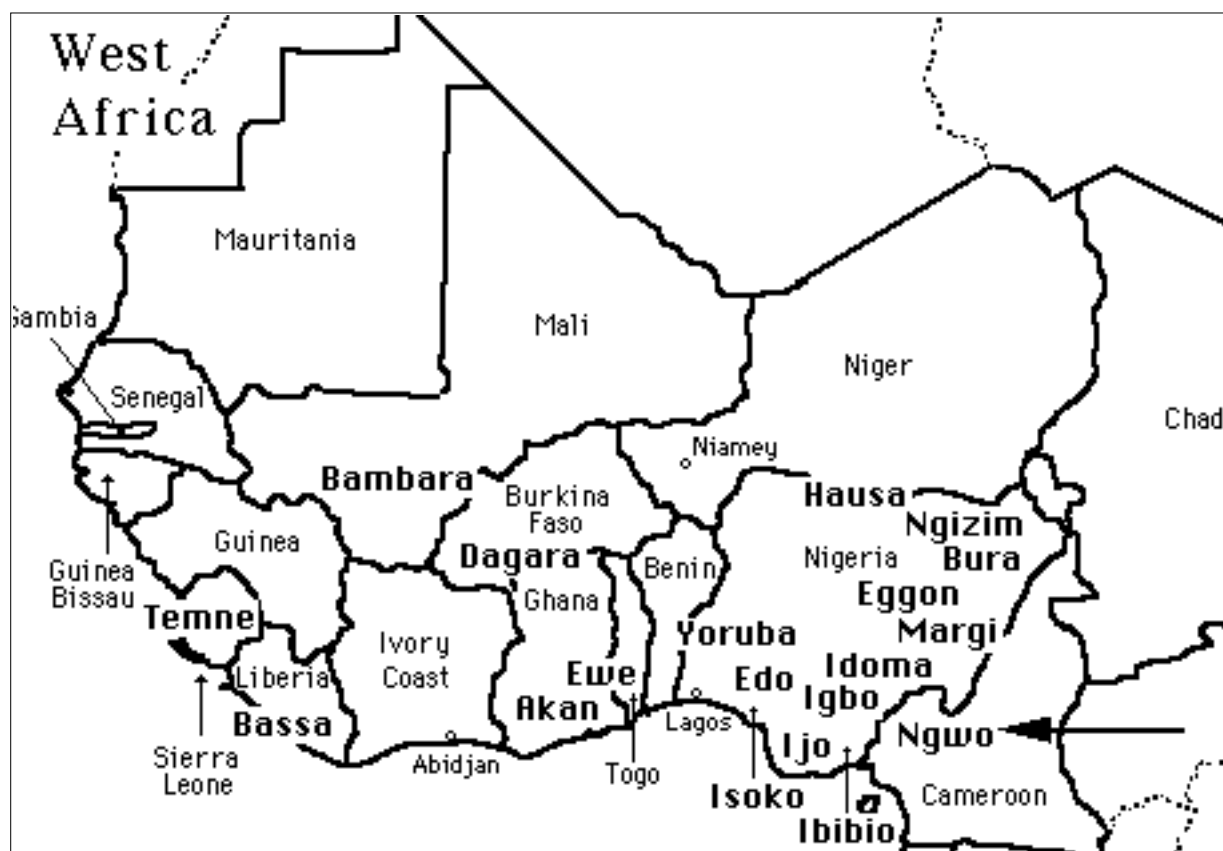
Velar

ēgě

'grass' [pl.]

Ngwo is a Bantu language (Mamfe group) spoken in central western Cameroon. There are approximately 30,000 speakers.

Ngwo has palatal stops and laminal postalveolar affricates in a stop system which includes [d], [dz], [dʒ], [ɟ], and [g]. The recordings here illustrate the laminal dentalveolar, laminal palatoalveolar, palatal, and velar stops.

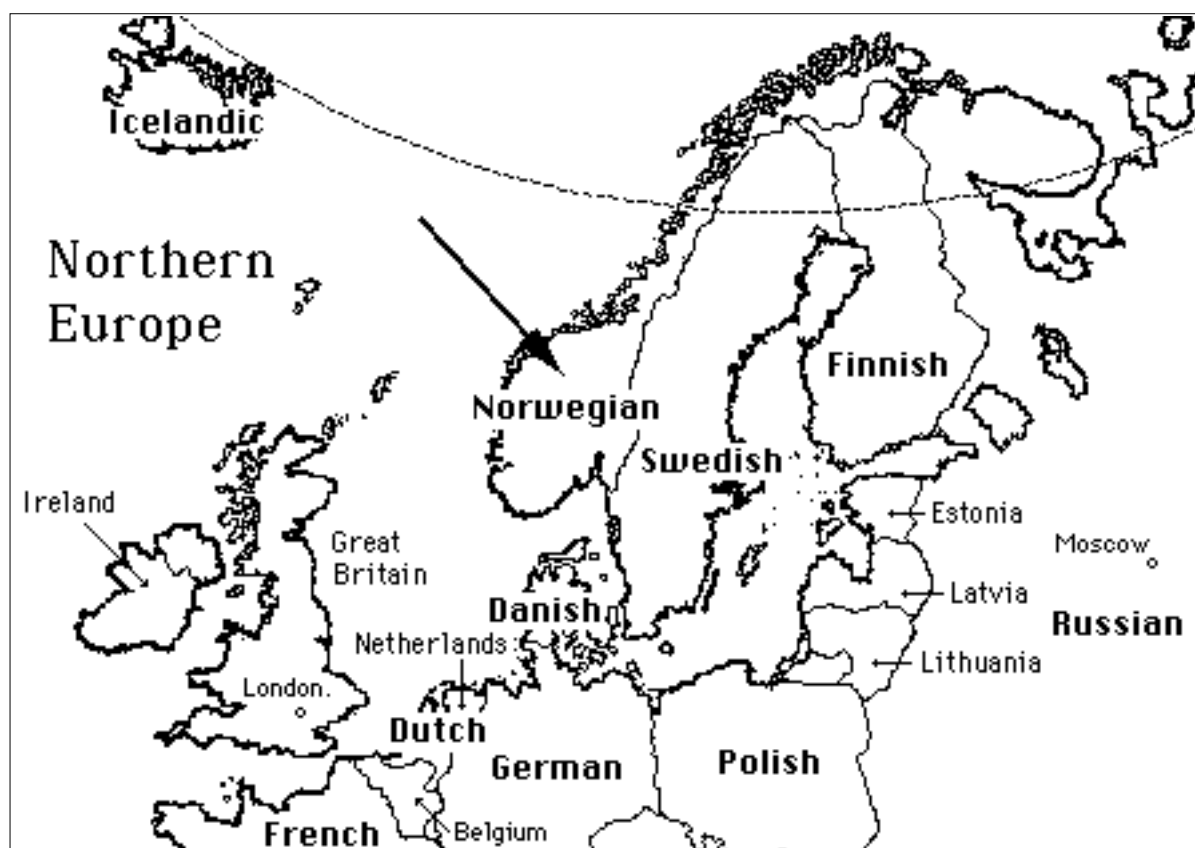


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| | Front | | Central | Back |
|-------------|--------------------|---------------|----------------|--------------------|
| | Unrounded | Rounded | Rounded | Rounded |
| High | bi: 'next to' | by: 'city' | bɛ: 'shack' | bu: 'live' |
| Mid | be: 'pray' | bø: 'farm' | | bɔ: 'open fire' |
| Low | bæ: (an insult) | | | bɔ: 'prayed' |

Norwegian is an Indo-European language (North Germanic branch) spoken by approximately 4 million people in Norway.

Norwegian has nine long vowels, including four high, three mid, and two low vowel phonemes. Especially notable is the three-way contrast among high rounded vowels in the front-back dimension.



Oro Win

| | |
|--------------|--------------------|
| t̪ɔt̪ɔk inan | I walk on logs |
| kɔt̪ɔk inan | I start a motor |
| kat̪ɔ na | it is an owl |
| t̪ɔnt̪ɔ na | it is a helicopter |
| t̪ɔm | small boy |

[The last item 'small boy' slowed down](#)

Oro Win is a Chapakuran language spoken in Brazil, and possibly in Bolivia. There are only four known speakers in Brazil. Oro Win has a bilabial trill, preceded by a dental stop, forming a single uniy. This sound is not known to occur in any other language except the related language Wari'. There are about 24 words in a dictionary of Wari' that have this sound, and probably about the same number in Oro Win. Some of these are new words, and are probably onomatopoeic, but others are not. (See: Ladefoged, P., & Everett, D. (1996). "The status of phonetic rarities." *Language*, 72(4), 794-800),



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| | | Polish | | |
|----------------|--|-----------------------|------------------------|-----------------------|
| | | Alveolar | Retroflex | Alveolopalatal |
| Initial | | sali 'room' [gen.] | ʂali 'scale' [gen.] | ɕali 'sown' |
| | | zalef 'bay' | ʐali 'complains' | ʑali 'gasped' |
| Medial | | kasa 'case' | kaʂa 'groats' | kaɕaʂ 'burglar' |
| | | skaza 'flaw' | gaʐa 'gauze' | kaʐa (name) [gen.] |

Polish is an Indo-European language (West Slavic branch) spoken in Poland by approximately 36 million people.

Polish contrasts six sibilants at three places of articulation: alveolar, retroflex, and alveolopalatal.

Retroflex [ʂ ʐ] are produced with the lips rounded and with a small sublingual cavity which results from the tongue being slightly retracted from the teeth (hence 'flat postalveolar').

Alveolopalatal [ɕ ʑ] are palatalized postalveolar, produced with slightly spread lips.

In addition, Polish contrasts the sequence stop plus fricative [tʂ] with the affricate [tʂ]. This contrast is illustrated here for word-initial position.

Also exhibited here are some of the additional consonant sequences possible in the language. Examples of words and phrases are given for clusters occurring initially, medially, and finally. In addition, several sequences across word boundaries (sandhi clusters) are illustrated.

Word-internal consonant clusters

uʂtʂkɲe

'he will nibble'

zastępmstɔ

'replacement'

vɨmsknɔɲtɕ

'sneak out'

zmawʂtʂci

'wrinkles'

kɔɲɔmbɨɲi

'unruly'

vestɕɲe

'he will sigh'

vɔɲtɲlɨvɨ

'dubious'

bɛzvzɲlɛɲɲi

'absolute'

Word-initial consonant clusters

| | | | |
|-----------------|------------|---------------|-----------------------|
| ḍẓḍẓɨ̄sṭɨ̄ | 'rainy' | ʂ̣ṭʂ̣faṇɨ̄ | 'cunning' |
| ṃṇɔ̄j̄ɨ̄ | 'multiple' | ḷɛ̄ṇɨ̄ṭɕ̣ | 'shimmer' |
| x̣ṭɕ̣ēṭɕ̣ | 'want' | p̣sṭʂ̣ɨ̄ṭɕ̣ | 'make gaudy' |
| ʂ̣ṭʂ̣eḳaṭɕ̣ | 'bark' | ṿzḍẉūj̄ | 'along' |
| ḅzḍūḅa | 'nonsense' | f̣sḳʂ̣ēɕ̣ | 'resurrect' [imp.sg.] |
| p̣ẉṭɕ̣ɔ̄v̄ɨ̄ | 'sexual' | ʒ̣ḍʒ̣ḅẉɔ̄ | 'blade (of grass)' |

Stop + Fricative

ṭʂ̣ɨ̄ 'three'

Affricate

ṭʂ̣ɨ̄ (question particle)

ṭʂ̣ṭʂ̣ɨ̄ 'idle'

Word-final consonant clusters

dɔjɕtɕ

'reach'

taɕm

'ribbon'
[gen.pl.]

pãjstf

'state, country'
[gen.pl.]

pɕestempstf

'transgression'
[gen.pl.]

Consonant clusters across word boundaries

zm^ɨɛɕx mɟlistɨ

'misty dusk'

vɔjsk ɖɖbwo

'a little bit of the army'

kunɕt vɖwuzaw

'the art prolonged'

tɛkst bɖdurnɨ

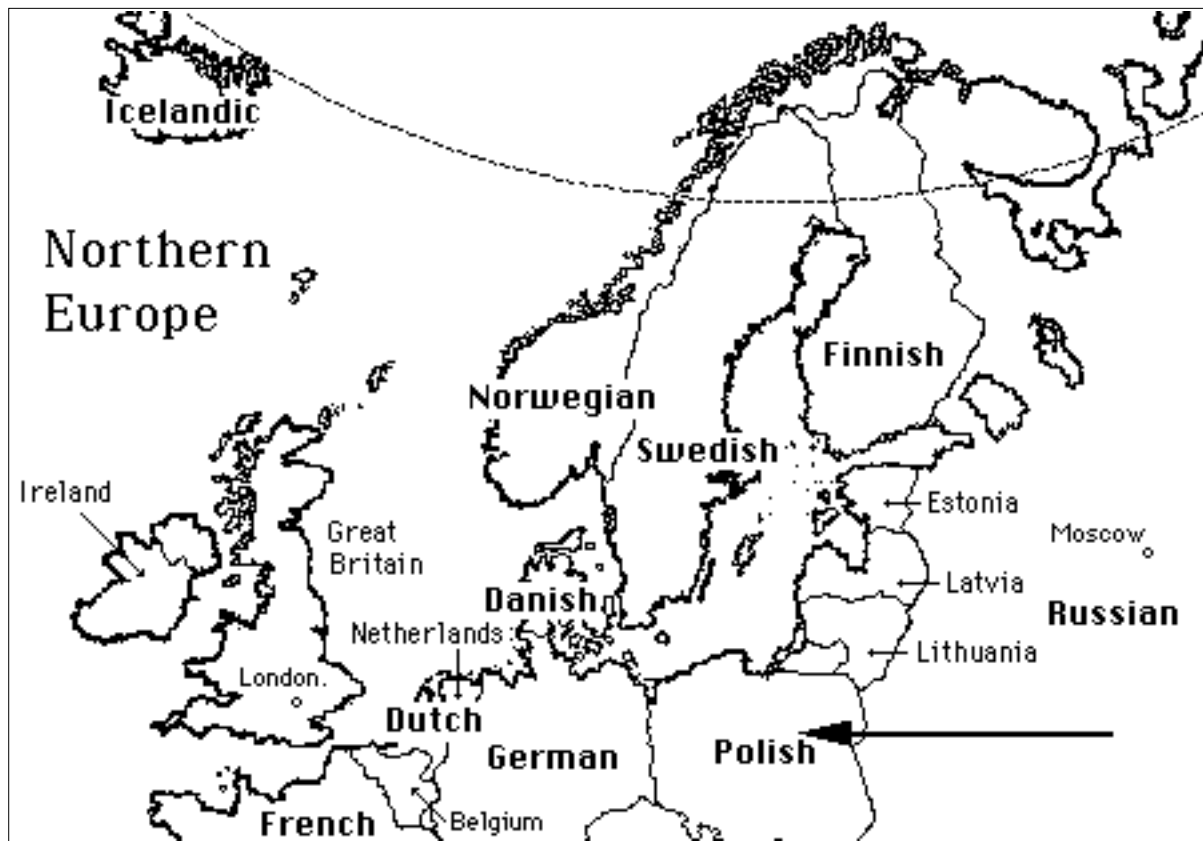
'silly text'

varstf pstrɨx

'gaudy layers' [genitive pl.]

m^ɨejsts vɖɟlendnɨx

'relative places' [genitive pl.]



Russian

| Plain | | Palatalized | |
|--------|-----------|-------------|---------------------|
| formə | 'form' | fʲermə | 'farm' |
| vitʲ | 'to howl' | vʲitʲ | 'to weave' |
| sok | 'juice' | sʲok | 'he lashed' |
| zof | 'call' | zʲof | 'yawn' |
| pakt | 'pact' | pʲatʲ | 'five' |
| bił | 'he was' | bʲil | 'to strike' |
| tot | 'that' | tʲotʲə | 'aunt' |
| domə | 'at home' | dʲomə | (name) |
| kufətʲ | 'to eat' | kʲuvʲetkə | 'dish' |
| mal | 'little' | mʲal | 'crumple' |
| nos | 'nose' | nʲos | 'he carried' |
| lof | 'catch' | lʲɛf | 'lion' |
| rasə | 'race' | rʲasə | 'priest's frock' |

<

Russian is an Indo-European language (Balto-Slavic branch) spoken in the former USSR by over 150 million people.

Russian contrasts plain and palatalized consonants. Contrasting pairs are illustrated here in word-initial position.



Sundanese

**No
nasalization**

pihak

'sides'

tuʔus

'dry'

**Nasal
spreading**

mĩhãk

'take sides' [act.]

nũʔũs

'dry' [act.]

ɲĩãr

'seek' [act.]

ɲãĩãñ

'wet' [act.]

**Nasal spreading
blocked**

ɲĩwat

'elope'

ɲũliat

'stretch' [act.]

ɲĩsər

'displace' [act.]

ɲãtur

'arrange' [act.]

Nasal spreading

ɲĩãr

'seek' [act.]

ɲãĩãñ

'wet' [act.]

**Infixation &
nasal spreading**

ɲãĩãr

'seek' [pl. act.]

ɲãrãĩãñ

'wet' [pl. act.]

**Nasal spreading
blocked**

ɲũliat

'stretch' [act.]

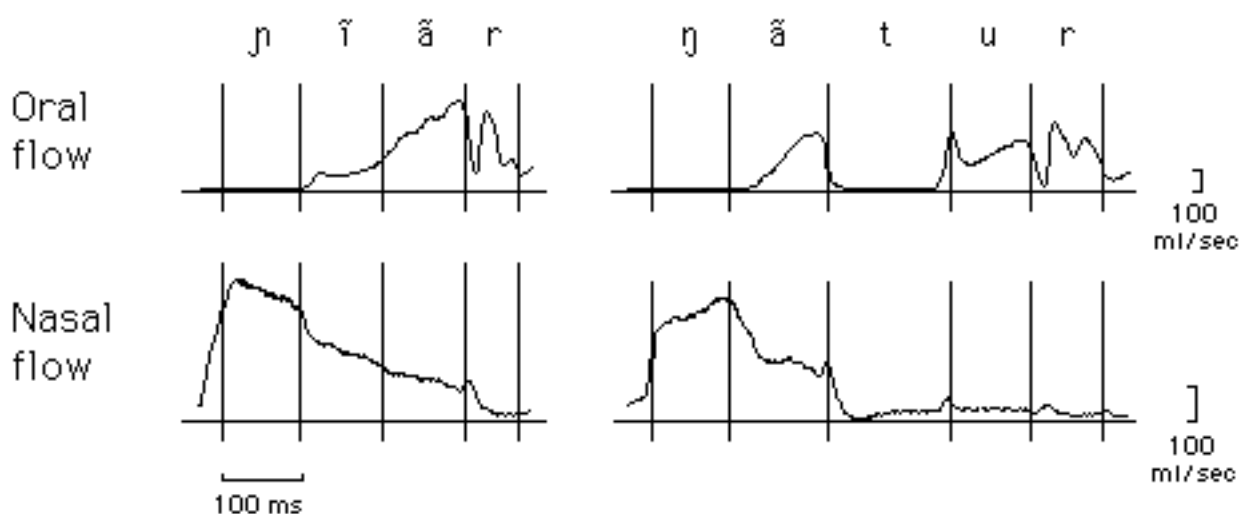
mãrios

'examine' [act.]

Sundanese is an Austronesian language (West Malayo-Polynesian branch) spoken by approximately 25 million people in eastern Java.

Nasalization in Sundanese is illustrated here. The language has a rule of 'nasal spread' whereby a sequence of vowels and nonsupralaryngeal consonants become nasalized when following a nasal consonant.

Flow traces for two words, one where nasalization spreads and one where it is blocked, are provided.



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Temne

Apical dental

t̪òr

'descend'

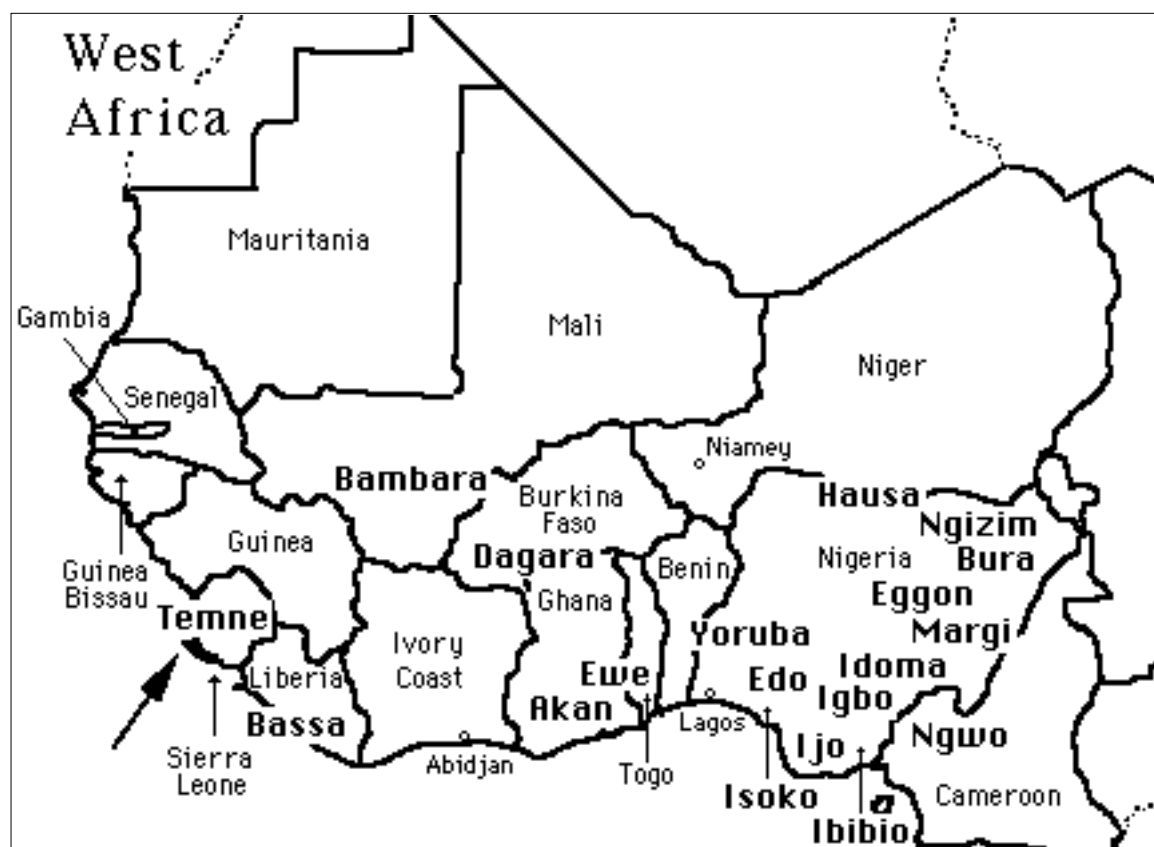
Laminal alveolar

t̪ʰó̯r

'farms'

Temne is Niger-Kordofanian language (West Atlantic group) spoken in central Sierra Leone. There are approximately 1 million speakers.

Temne contrasts stops in the dental/alveolar region. While dental stops are typically laminal in the world's languages, in Temne they are apical, with the alveolar stop being laminal. The laminal alveolar is affricated.



| | Toda | Fricatives |
|------------------------------------|-------|-------------|
| Labiodental | pɔf | 'swelling' |
| Dental | pɔθ | 'roof beam' |
| Dental sibilant | kɔʂ | 'money' |
| Velarized alveolar sibilant | pɔs̠ʰ | 'milk' |
| Postalveolar sibilant | pɔʃ | 'language' |
| Retroflex sibilant | pɔʂ | (clan name) |
| Velar | pɔx | 'blood' |

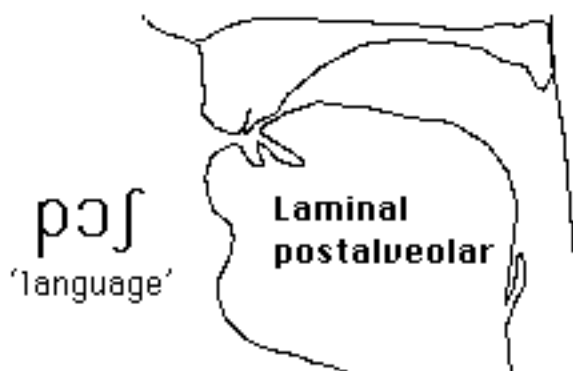
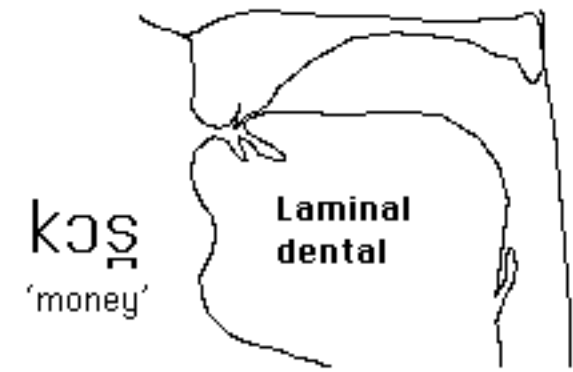
Toda is a Southern Dravidian language (Tamil-Kannada branch) spoken in India by approximately 1000 people.

Toda is interesting for several reasons. First of all, the language has (central) fricatives at seven places of articulation, including four sibilants. (Click on the button below to see midsagittal sections of estimated tongue positions for the sibilants.) The fricatives are illustrated in word-final position.

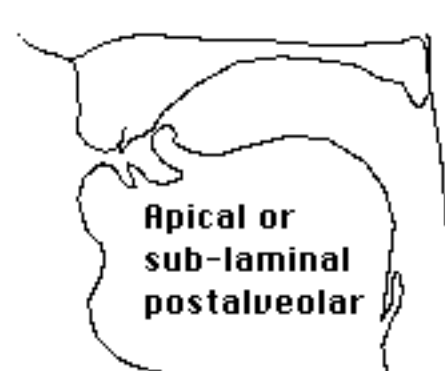
Toda has four laterals, two voiced, and two voiceless. Note that both the voiceless laterals are fricative.

Toda also has three rhotics, including dental and postalveolar trills. The third rhotic is sometimes trilled, sometimes flapped, but its exact description is undetermined.

Estimated tongue positions



Sibilants



Laterals

Dental

Retroflex

Voiced

kaɭ
'bead'

paɭ
'bangle'

Voiceless

kaɬ
'learn' [imper.]

aɭ̠
'rice in ghee'

Rhotics

Dental Trill

Postalveolar Trill

kar

'border'

kaṛ

'juice'

kaṛ

'calf pen'

tu:r

'knife'

tu:ṛ

'bunch of leaves'

puṛ

'beating'

e:r

'throw'

e:ṛ

'male buffalo'

meṛ

'lap'

par

'fate'

peṛ

'day after new moon'



Tsonga

Plain

màkálá

'embers'

ménó

'teeth'

nòngá

'tributary'

Breathy

ṁàká

'matter'

ṁéhó

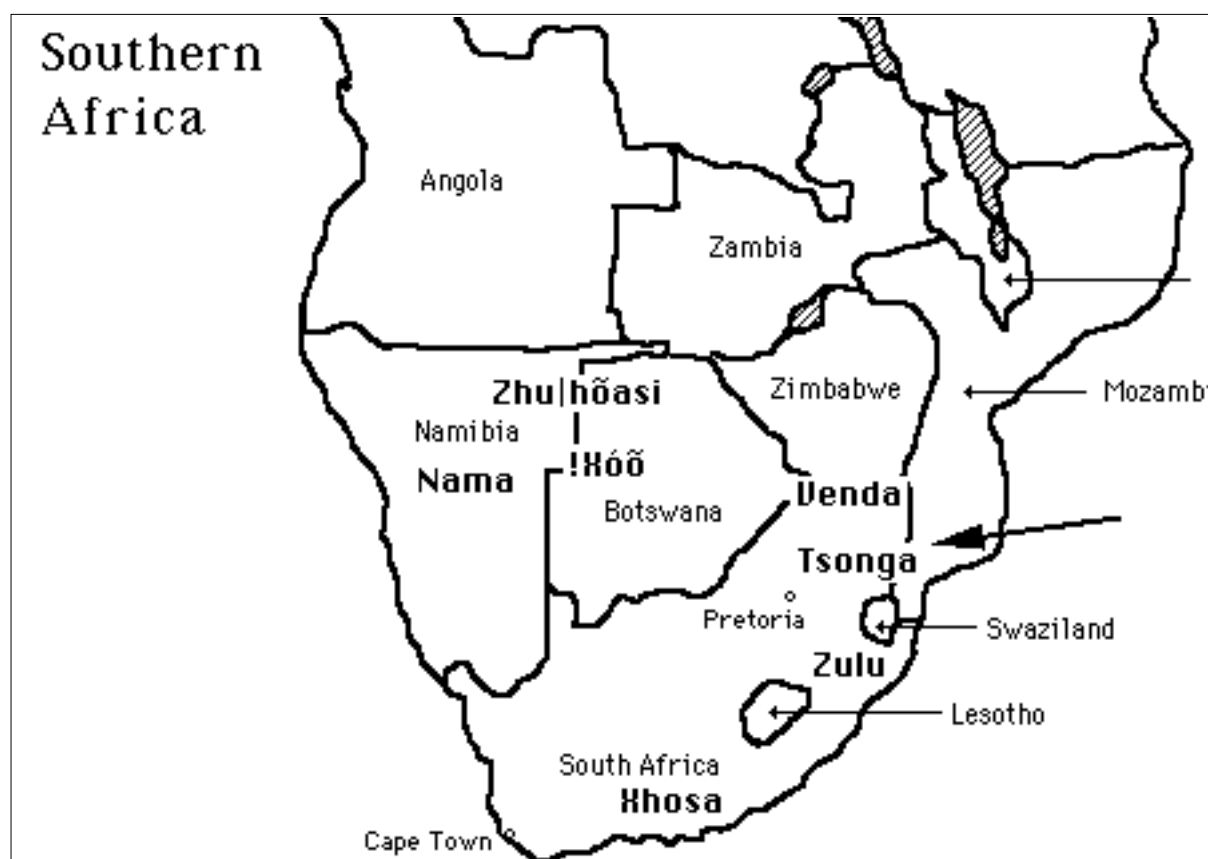
'wind'

ṁòngó

'antelope'

Tsonga is a Southern Bantu language spoken in Mozambique, South Africa, and Swaziland. There are two and a half million speakers in all.

Tsonga contrasts plain and breathy nasals. Note that the breathy voice nasal depresses the tone on the following vowel.



Tsou (Tfuea dialect)

fuxmɔja
'red'

fʔuhu
'back'

fʔtsuju
'egg'

hiβsi
'thin'

hʔisi
'ashes'

Tsou is an Austronesian language (Tsouic branch) spoken in southern Taiwan by approximately 3000 people. The speaker here is from the village of Punguu.



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Turkish (Istanbul dialect)

| | | | |
|----------------------------|-----------------------|--------------------------------|----------------------------|
| kis 'cyst' (colloq.) | kys 'sulky' | kws 'turn down' [imper.] | kus 'vomit' [imper.] |
| kes 'cut' | køs 'dumb looking' | | kos (island name) |
| | | kas 'muscle' | |

Turkish is an Altaic language (Southern Turkic group) spoken by approximately 56 million people in Turkey and surrounding countries. There is also a substantial Turkish-speaking population in Germany.

Turkish has eight vowels, which may be distinguished in the following way: four are high [i y u], four front [i y e ø], and four rounded [y ø u o].



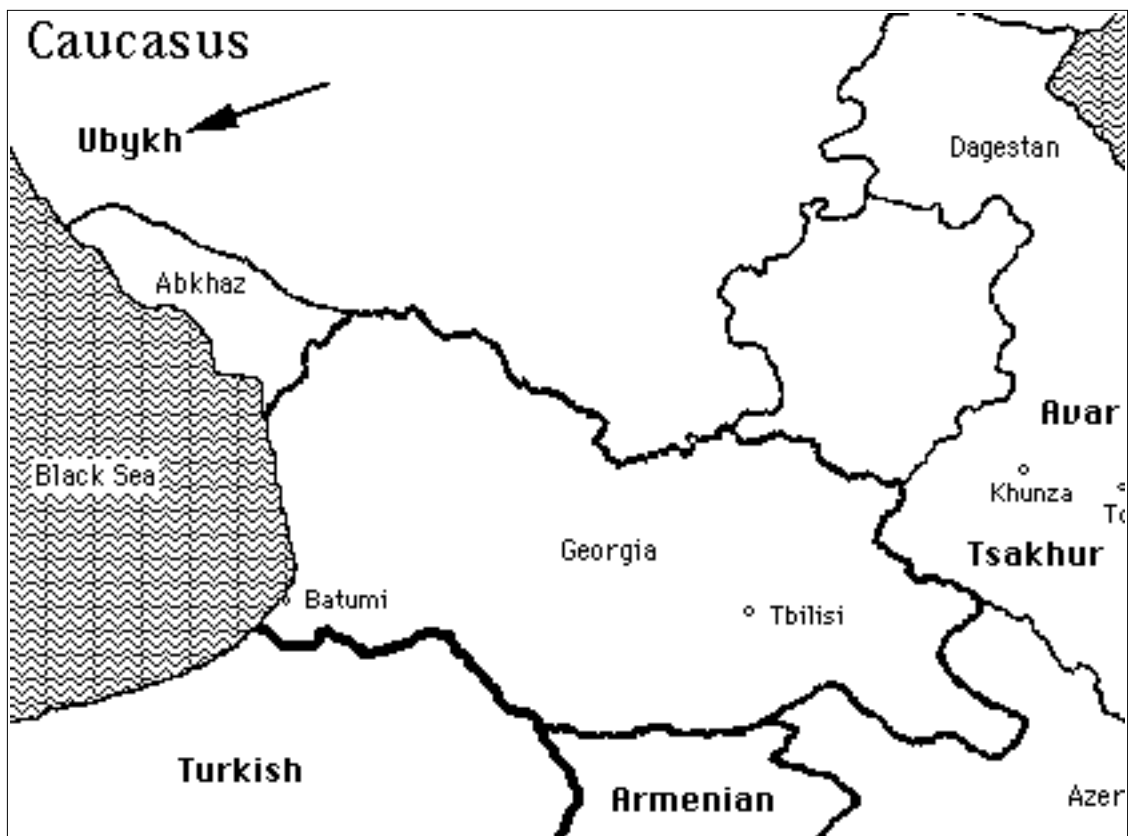
Ubykh

| | Denti- alveolar | Alveolar + postalveolar | Apico- postalveolar | Lamino- postalveolar |
|------------------------------|--------------------|----------------------------------|------------------------|-----------------------------------|
| Plain voiceless | s̺ba 'why' | ŝa 'three' | ʂa 'my head' | ʧaʧa 'mother-in-law' |
| Plain voiced | za 'one' | ʒaʒa 'kidney' | ʐa 'firewood' | ʐawa 'shadow, shade' |
| Rounded voiceless | | aŝ ^w a 'white' | | ʧ ^w a 'sea' |
| Rounded voiced | | aʒ ^w an 'it boils' | | aʐ ^w an 'it roasts' |

Ubykh is a North Caucasian language (Abkhazo-Adygan branch) formerly spoken in Circassia, in the northwest Caucasus. As of 1989, there is only one true native speaker left. The recording here is of this speaker, Tefvik Esenç, made by J. C. Catford.

Ubykh is well known for its large consonantal inventory (80 segments by some analyses). This inventory includes 12 sibilant fricatives, which exhibit a rare four-way system contrasting voiced and voiceless "hissing" dentalalveolar [s]; "hissing-hushing" [ŝ], with features both of alveolar and postalveolar sibilants; apical postalveolar [ʂ]; and laminal postalveolar [ʧ]. In addition, the "hissing-hushing" and laminal postalveolar sibilants may occur with a secondary, labialized articulation.

The sound [ŝ] resembles [ʂ] and [ʧ] in that it has a postalveolar articulation. Like alveolar [s], however, the characteristic sublingual cavity associated with [ʂ] and [ʧ] is absent in [ŝ].



Venda

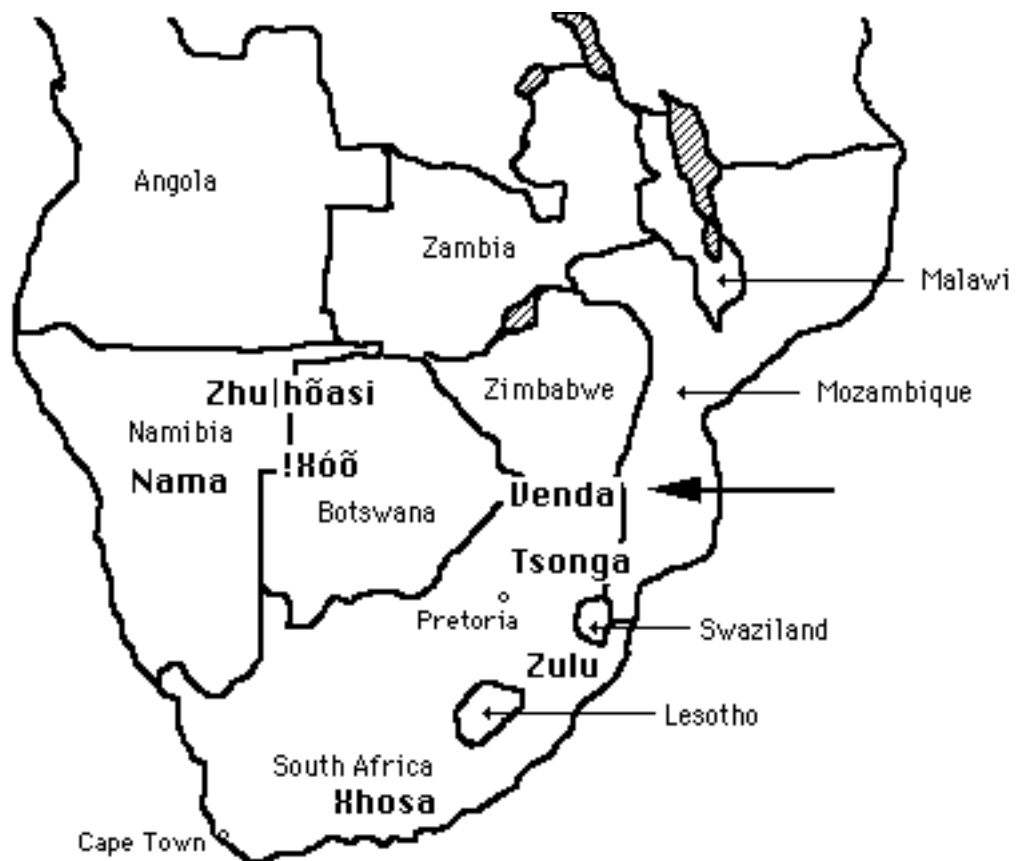
| | | | |
|--------|------------|--------|----------------|
| βingga | 'to marry' | viya | 'to slaughter' |
| βengga | 'to hate' | venngo | 'hatred' |
| βaJa | 'to read' | vaya | 'to scratch' |
| βona | 'to see' | vota | 'to burn' |
| βutu | 'humanity' | vuJa | 'to open' |

Venda is a Southern Bantu language spoken in South Africa and Zimbabwe. There are approximately 0.5 million speakers.

Venda exhibits a four-way contrast among labial fricatives involving the features [voice] and [place]. Contrasted here are the voiced bilabials and labiodentals, and the voiceless bilabials and labiodentals.

| | | | |
|--------|--------------|--------|----------------------|
| ϕima | 'measure' | fina | 'to fold a shirt' |
| ϕeJa | 'finish' | feJa | 'to die for' |
| ϕanza | 'to chop' | fara | 'to catch' |
| ϕoJa | 'be healed' | foJa | 'to stand in a line' |
| ϕungga | 'make noise' | fungga | 'to kindle, light' |

Southern Africa



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Wangurri

Bilabial

ŋamaʔ

‘mother’

Laminal dental

baŋa

‘over there’

Apical alveolar

gaŋaʔ

‘enough’

**Apical
postalveolar**

maŋa

‘shark’

**Laminal
postalveolar**



gaŋawu

(species of tree)

Velar

naŋa

‘see’

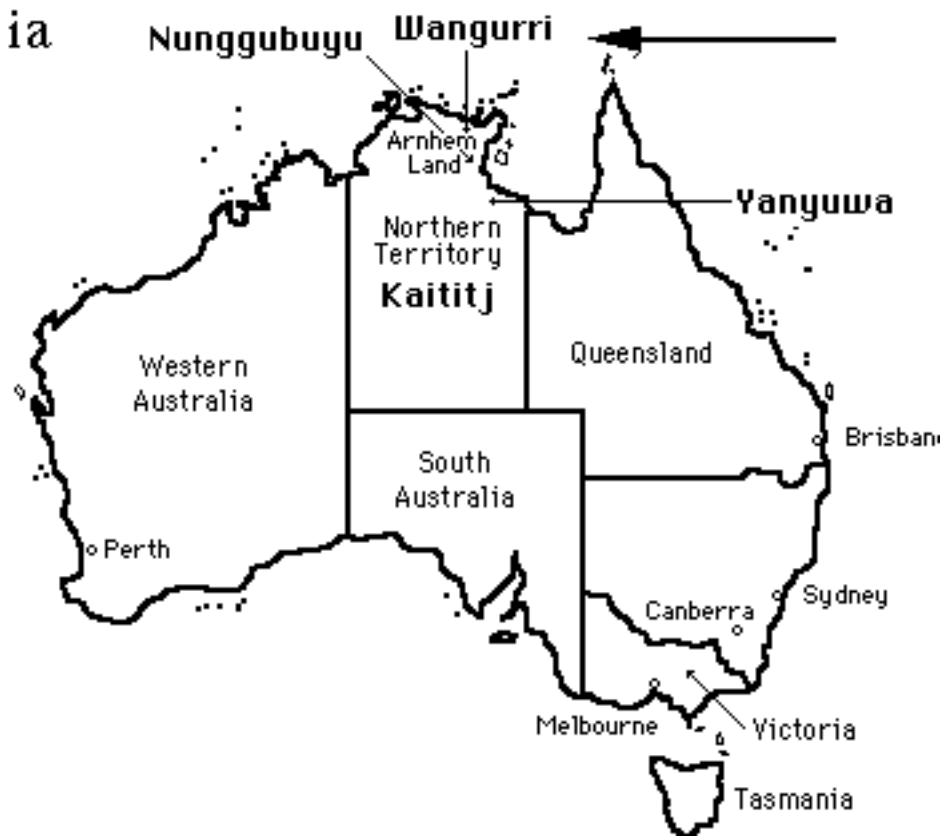
Click on  and  to hear these nasals in relative isolation

Wangurri is a dialect of Yolngu, an Australian language (Pama-Nyungan branch), spoken by 150 people in Wangurri, Eastern Arnhem Land.

Wangurri exhibits six contrastive places of articulation for nasals: bilabial, laminal dental (dentalveolar), apical alveolar, apical postalveolar (retroflex), laminal postalveolar (palatoalveolar), and velar.

Spectrograms show that the apical retroflex and the laminal postalveolar are clearly distinguished from all the others by the F2 and F3 transitions into the nasal. Incomplete data, however, prevents any further conclusions.

Australia



Yanyuwa

Oral stops

| | | |
|-------------------------|------------|--------------------------|
| Bilabial | wubuwingu | 'for a small female one' |
| Laminal dental | wuḍurumaya | 'laugh!' |
| Apical alveolar | wuduru | 'full of food' |
| Apical retroflex | wuḍuɭa | 'in the stomach' |
| Palatoalveolar | wuḍuɭa | 'into the grass' |
| Front velar | gugulu | 'sacred' |
| Back velar | wuḡuḡu | 'grandparent' |

Yanyuwa is an Australian language spoken by approximately 150 people in Borroloola, Northern Territory and Doomadgee, Queensland.

Yanyuwa exhibits seven places of articulation, including a contrast between front velar stops and both palatoalveolar (laminal postalveolar) and back velar stops. We illustrate here the contrasting oral and nasal stops in intervocalic position.

These recordings are from our own fieldwork in conjunction with Jean Kirton. The terms used here differ somewhat from those used by Kirton and Charlie (1978).

Most notable is our use of "laminal dental" in place of their "apical dental". While "apical dental" suggests contact between the tip of the tongue and the upper front teeth, we would also note the contact between the blade of the tongue and the front part of the alveolar ridge.

We have also used the term "front velar" in place of their term "palato-velar".

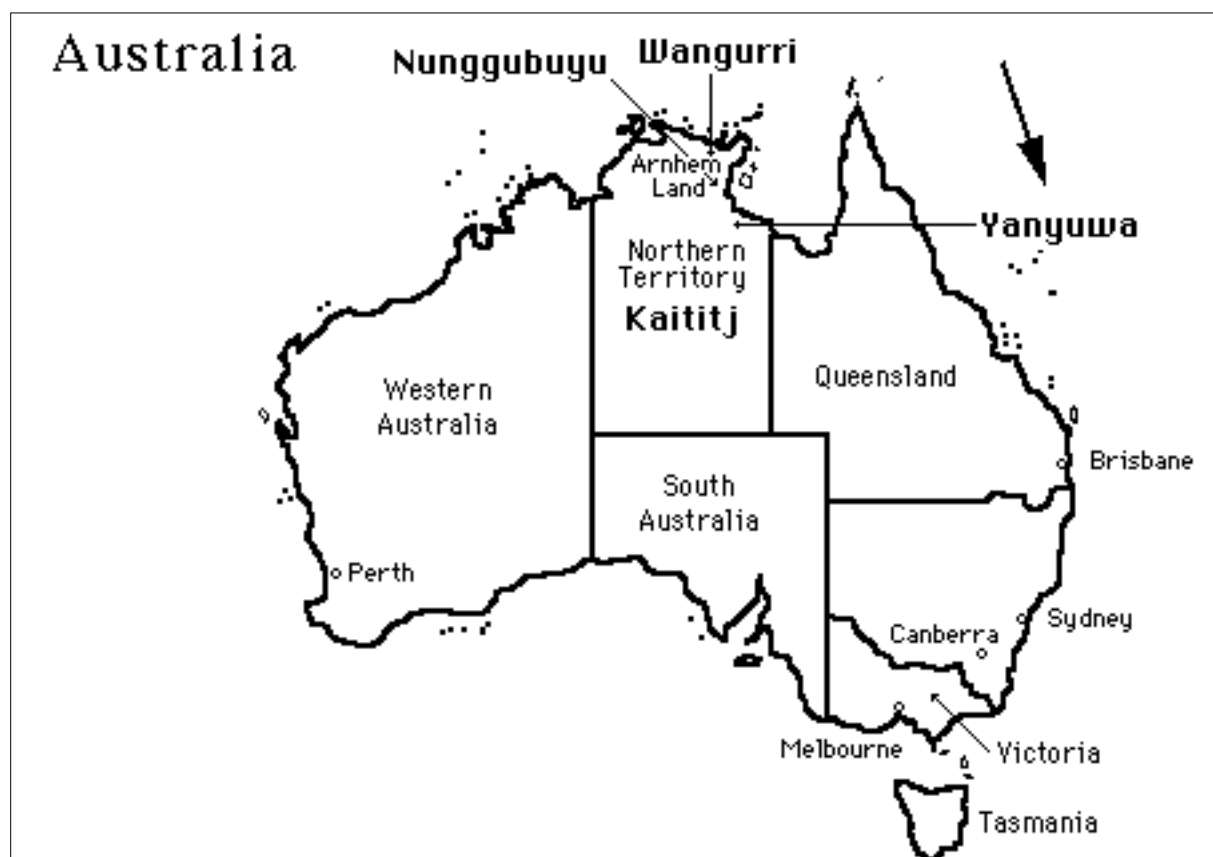
In addition, the velar stops appear to us to be made slightly further back than those in other languages although they are in no way equivalent to uvulars.

Reference

Kirton, J. & B. Charlie. 1979. Seven articulatory positions in Yanyuwa consonant. *Papers in Australian linguistics* 5. Canberra: Pacific Linguistics.

Nasals

| | | |
|-------------------------|--------------|-----------------------|
| Bilabial | umu(w)aq̣ala | 'in the canoe' |
| Laminal dental | wuṇuṇu | 'cooked' |
| Apical alveolar | wunala | 'kangaroo' |
| Apical retroflex | waṇura | 'white egret' |
| Palatoalveolar | ṇaṇalu | 'tea' |
| Front velar | luwaṇu | 'strip of turtle fat' |
| Back velar | waṇulu | 'adolescent boy' |

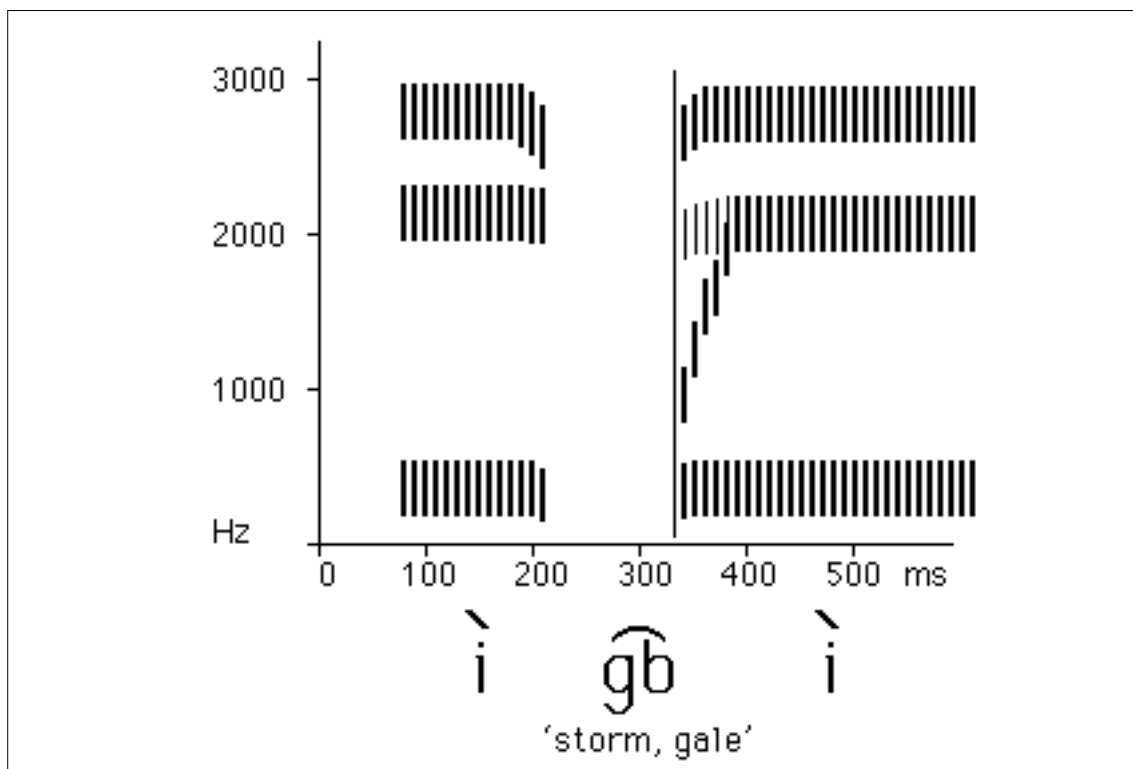


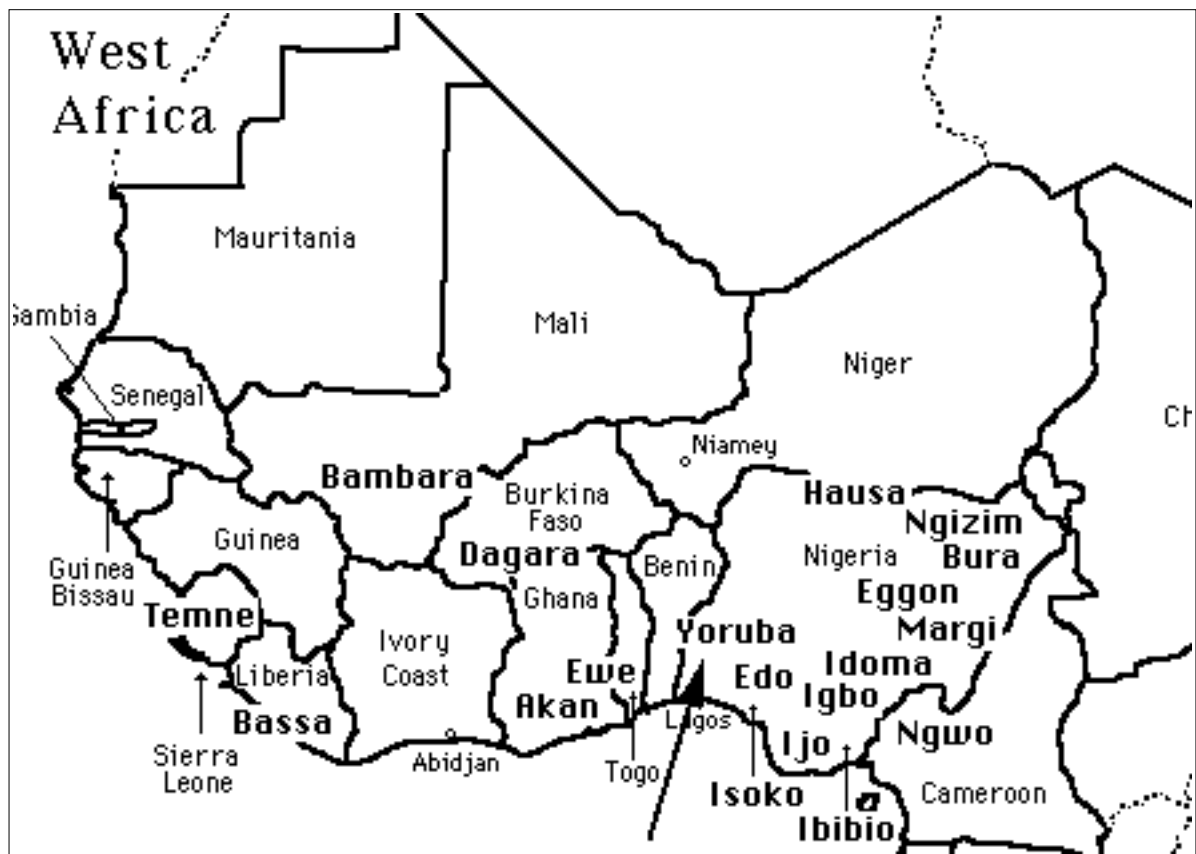
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Yoruba

Yoruba is a Niger-Kordofanian language (Kwa group) spoken principally in southwestern Nigeria. There are approximately 20 million speakers.

The sound illustrated here is a voiced labial-velar stop. The accompanying spectrogram demonstrates the different acoustic characteristics of the onset to and offset from this sound. The onset has similarities to a velar stop whereas the offset is similar to a bilabial release.





Zhulhõasi

Zhulhõasi is a Khoisan language (IXũ group) spoken in Northern Namibia.

Zhulhõasi contrasts dental, alveolar, alveolar lateral, and palatal clicks, each with up to 12 different accompaniments. The 12 alveolar clicks are illustrated here.

The last four of these 12 accompaniments contain voiced onsets followed by one of the voiceless onsets. (Note, though, that in the word for 'leopard' the usually voiced /g/ was not voiced on this occasion.)

Obstruent clusters with mixed voicing, that is, where the first segment is voiced and the second voiceless, are rare in the world's languages, but commonly occur in IXũ languages, not only on click accompaniments but also with other consonants.

Zhulhõasi also contrasts four series of stops at three places of articulation.

Along with voiced, voiceless unaspirated, and voiceless aspirated stops, the language also has a series best described as voiced plus voiceless aspirated.

(The voiced alveolar stop /d/ occurs in words such as /da/ 'skin', which were unfortunately not adequately recorded by any of our speakers .)

| | Bilabial | Alveolar | Velar |
|---|---|---------------------------------|------------------------------------|
| Voiced | ba 'father' | | gaba 'walk pigeon-toed' |
| Voiceless unaspirated | pabu 'puff adder' | ta 'wild orange' | kabi 'inspect a trap' |
| Aspirated | p ^h ep ^h e 'glutton' | t ^h a 'bee sting' | k ^h aba 'to descend' |
| Voiced + voiceless aspirated | bp ^h e 'to spit out' | dt ^h a 'blanket' | gk ^h aro 'bed' |

| | | |
|------------------------------|---------------------------------|---|
| Voicless un aspirated | tsam 'to stalk' | t̲fa 'to fetch' |
| Aspirated | ts ^h e 'week' | t̲fat̲fa 'to sprinkle' |
| Voiced + Aspirated | dtsh ^h au 'woman' | d̲ʃ ^h ii 'to carry straddled on shoulder' |
| Voicless ejective | ts'a 'sleep' | t̲ʃ'am (bird [coracias garrulus]) |
| Voiced + ejective | dtsh'oo 'hartebeest' | d̲t̲ʃ'i 'to be wet' |

| | | |
|---|---------------------|---------------------|
| Alveolar click with | | |
| Voiced velar stop | g!à | 'rain' |
| Voicless un aspirated velar stop | k!ábí | 'roll up a blanket' |
| Aspirated velar stop | k! ^h ání | 'palm tree' |
| Voiced velar nasal | ŋ!àmà | 'road' |
| Voicless aspirated velar nasal | ŋ! ^h ānà | 'walking stick' |
| Voicless velar plus glottal stop | k!ʔàbú | 'rifle' |

| | | |
|---|-----------------------|------------------------|
| Alveolar click with | | |
| Voiceless affricated velar stop | k! ^x árá | 'cough up from throat' |
| Affricated velar ejective | k! ^x 'ám | 'tighten a bowstring' |
| Voiced velar stop & aspirated velar stop | gk! ^h ání | 'tie' |
| Voiced velar stop & voiceless affricated stop | gk! ^x àré | 'cut open an animal' |
| Voiced velar stop, then affricated ejective | gk! ^x 'àrú | 'leopard' |
| Voiced velar nasal & voiceless aspirated nasal | ŋŋ! ^h ám | 'spider' |

