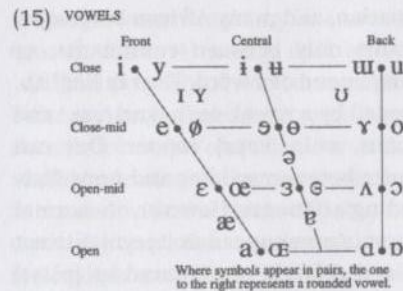


This does not mean that it is impossible to lower the velum and make a complete pharyngeal constriction at the same time. It means that the air will not flow through the nose, which is a defining property of a nasal consonant, so you could not tell from the sound itself whether it is nasalized.

plete obstruction at a given point of articulation and also requires air to flow through the velum. In order to make a pharyngeal nasal, it would be necessary to make a complete constriction at the pharynx. But since the pharynx lies below the velum, no air can flow through the nasal passages if the pharynx is totally constricted. However a nasalized pharyngeal continuant, i.e. the consonant [ŋ̃] produced with simultaneous nasal airflow, would not be a physical impossibility, since that consonant does not require complete constriction of the pharynx. In other cases, the gap indicates that no such sound has been found, but there is no immutable physical reason for such a sound not to exist. Thus bilabial affricates do not seem to be attested, nor do plain nonaffricated alveopalatal stops, nor do nasalized pharyngeal fricatives. Similarly, while pharyngealized consonants exist, and rounded consonants exist, there are apparently no cases of consonants which are both rounded and pharyngealized, though such segments are not logically impossible. These lacunae may be an indication of a deeper constraint on sound systems; however, it is also possible that these segments do exist in some language which has not been studied yet, since there are many languages in the world which remain uninvestigated.

## 2.3 IPA symbols

The main difference between the preceding system of transcription and the International Phonetic Alphabet (IPA) lies in differences in the symbols used to transcribe vowels. The IPA system for transcribing vowels can be described in terms of the following chart (when vowels are presented in pairs, the first vowel in the pair is unrounded and the second is rounded).



The most important differences between the vowels of the two systems are the following.

(16)	IPA	APA	
	ø	ö	mid front rounded vowel
	œ	œ or ɔ̃	open-mid front rounded vowel (in APA, œ tends to imply a low vowel whereas ɔ̃ represents a lax mid vowel)
	ɤ	ü or ʏ	lax front rounded vowel
	y	ü	front round vowel

where IPA treats the members of the following sets as different vowels, APA usage tends to treat these as notational variants of a single vowel. If a distinction needs to be made in some language between nonback unrounded vowels or low vowels, the appropriate IPA symbol will be called upon. APA usage tends to treat [u], [i] and [i̠] as graphic variants, whereas in IPA they have distinct interpretations.

- (17) u = high back unrounded  
 i̠ = high central unrounded  
 i̠̞ = high centralized unrounded (between i and i̠)

Where IPA systematically distinguishes the use of the symbols [æ a ɐ ɑ ɒ], APA usage typically only distinguishes front [æ] and nonfront [a].

- (18) æ = not fully open front unrounded  
 a = low front unrounded  
 ɐ = not fully open central unrounded  
 ɑ = low back unrounded  
 ɒ = low back rounded vowel  
 (usually all of these are represented as [a] in American usage  
 except for [æ] which represents front low unrounded vowels)

Another more significant difference between the two systems is the difference in terminology for classifying vowels: note that a three-way division into high, mid and low vowels is assumed in the American system, with subdivisions into tense and lax sets, whereas in the IPA, a basic four-way division into close, close-mid, open-mid and open vowels is adopted, where the distinction between close-mid [e] and open-mid [ɛ] is treated as being on a par with the distinction between high [i] and close-mid [e]. High lax vowels are not treated as having a distinct descriptive category, but are treated as being variants within the category of high vowels.

**IPA consonant symbols.** The following IPA symbols, which are the most important differences between IPA and APA symbols for consonants, should be noted:

(19)	IPA	APA	
	j	y	palatal glide
	ɥ	ɥ̃	front rounded glide
	dʒ	ʝ	voiced alveopalatal affricate; <j> is also used
	tʃ	ç	voiceless alveopalatal affricate
	ʃ	š	voiceless alveopalatal fricative
	ʒ	ž	voiced alveopalatal fricative
	ɲ	ɲ̃	palatal nasal
	ʂ, ʐ, ʈ, ʡ, ɽ, ɳ, ɖ, ɗ	ʂ, ʐ, ʈ, ʡ, ɽ, ɳ, ɖ, ɗ	retroflex s, z, r, l, n, d, t
	ɾ	ɾ, ɽ	voiced alveolar flap

IPA requires close adherence to the graphic design of letters. The IPA symbol for a voiced velar stop is specifically [g] not [g̃], and the voiced velar fricative is [ɣ] not [ɣ̃]. Such fine distinctions in letter shape are irrelevant in APA tradition.

ɬ	ɬ, ʈ	voiceless lateral fricative
ɮ	ɮ, ɮ̥	velarized l
c	k <sup>y</sup>	voiceless palatal stop
ç	x <sup>y</sup>	voiceless palatal fricative
dl	ɮ	voiced lateral affricate
tl	ɮ̥	voiceless lateral affricate

This represents the current IPA standard. The IPA has developed over a period of more than a hundred years, and has been subject to numerous revisions. For example, in the 1900 version of the IPA, the symbols <ü, ö, ë, ð, ä> indicated central vowels, as opposed to their contemporary counterparts <u, i, o, ə, ɜ, ɐ> (the diacritic [̥] is still used to represent a vowel variant that is closer to the center). The letters [r] and [v] were used for the voiceless and voiced bilabial fricatives, in contrast to contemporary [ɸ] and [β] (or [ɸ] and [β], using the officially sanctioned letter shapes). In the 1914 version, the fricative trill (found in Czech) was transcribed as [ř], in 1947 this was replaced with [r], and in contemporary usage, [r̥] is used. The high lax vowels have been transcribed with the symbols <ɪ, ɪ> and <ʊ, ʊ, ɔ> in the history of the IPA. In reading older works with phonetic transcriptions, the student may thus encounter unfamiliar symbols or unfamiliar uses of familiar symbols. The best solution to uncertainty regarding symbols is to consult a reference source such as Pullum and Ladusaw 1986.

## 2.4 Illustrations with English transcription

To further illustrate these symbols, we consider the transcription of some words of English, using a broad phonetic transcription, that is, one which does not include a lot of predictable phonetic detail – the issue of predictable features of speech will be taken up in more detail in subsequent chapters. Consider first the transcription of the words [kʌt] *cut*, [siys] *cease* and [sɪk] *sick*. These examples show that phonetic [s] may be spelled in a number of ways, and that the letter <c> in spelling may have a number of phonetic realizations. The example [baks] *box* further makes the point that one has to be careful of not inadvertently importing English orthography into phonetic transcriptions. A transcription such as [bax] might be appropriate for the name of the composer *Bach* (since many people do pronounce the name with a velar fricative, as it is pronounced in German), but otherwise (barring careful transcriptions of casual speech where *k* is actually pronounced as the fricative [x] in some contexts), [x] does not occur in (standard American) English – it would be appropriate for transcribing Scots *Loch* [lɔx].

Examples like [sɪŋ] *sing*, [sɪŋgɪəlɹ] *singular*, [ʌŋgluwd] *unglued*, [sɪŋk] *sink* and [dɪŋgɪ] *dinky* show that <ng> may represent a single segment [ŋ] or a sequence [ŋg] or [ŋg], and that [ŋ] need not be spelled <ng>. In the word [fɒnɛtɪk] *phonetic*, there may be some temptation to transcribe the word with the full vowel [ɒ] in the first syllable. This is (almost always) a spelling pronunciation – the first unstressed vowel is pronounced as schwa ([ə]) in American English.

The vowel [e] in words such as *same* in English is noticeably different from the pronunciation of [e] in French, Spanish, Italian, or German. In English, the “pure” vowels [e], [o], [i] and [u] do not exist by themselves, and are always combined with a glide of similar phonetic quality, forming what is referred to as a *diphthong*. Thus the transcriptions [seɪm] *same*, [təʊn] *tone*, [tiɪm] *team* and [tuɪn] *tune* are more phonetically accurate characterizations of the pronunciations of these words. These diphthongs are sometimes also written as [ei], [ou], or [eɪ], [ou]. The glide element is also frequently omitted, since it can be predicted by a rule, and thus these words might also be transcribed as [sem], [ton], [tim], and [tun]. However, in [tæʊn] (or [tawn], depending on which dialect you speak) *town*, [təɪm] *time* and [toɪl] *toil*, the glide element of the diphthong is not predictable by rule and must be included in any transcription.

In the words [riɪdɪŋ] *reading* and [skeɪdɪŋ] *skating*, both orthographic <t> and <d> are pronounced the same, with the flap [ɾ]. Some dialects of English maintain a phonetic difference between *riding* and *writing*, either via a difference in vowel length ([raɪdɪŋ] *riding* vs. [raɪdɪŋ] *writing*) and/or by a vowel quality difference ([raɪdɪŋ] *riding* vs. [raɪdɪŋ] *writing*).

The word [hɜɪt] *hurt* has a “vowel” – a syllable peak – which is essentially equivalent to the consonant [r]. Sonorant consonants can function as vowels, thus this “vowel” is referred to as “syllabic r,” as indicated by a tick under the consonant. The IPA provides a separate symbol for this particular sound: [ɹ̥]. Similarly, English has syllabic [l] as in [pæd̩l] *paddle*, syllabic [ŋ] as in [bʌʔŋ] *button*, and syllabic [ŋ] as in [skɪzŋ] *schism* (which have no separate IPA symbols). Sometimes the syllabic sonorants are transcribed as the combination of schwa plus a consonant, as in [hɜɪt̩], [pæd̩l̩], [bʌʔŋ̩] and [skɪz̩]. It is possible that there are some dialects of English where these words are actually pronounced with a real schwa followed by a sonorant, but in most dialects of American English, they are not pronounced in this way (this is particularly clear if you compare the pronunciation of such English words with that of other languages which do have clear phonetic [ə], [ɜ] sequences). In addition, as we will discover when we discuss the rule for glottal stop in English, the presence of glottal stop in [bʌʔŋ] can only be explained if there is no schwa before the sonorant.

## Summary

Because phonology views speech sounds symbolically, knowledge of a system of symbols for representing speech is a prerequisite to phonological analysis. It is also vital to know the phonetic parameters for describing the sounds of human languages which have been used here. The main characteristics of vowels involve fronting of the tongue (front, central and back), rounding, and vowel height (high, mid and lax variants of high and mid vowels). Other properties include stress, tone (including *downstep* and *upstep*) and the phonation types creaky and breathy voice. Primary consonantal places of articulation include bilabial, labiodental, dental, alveolar, alveopalatal, retroflex, palatal, velar, uvular, pharyngeal and laryngeal. These may be sup-

by vowel-like secondary articulations including palatalization, velarization, pharyngealization and rounding. Consonants may be produced with a number of constriction and release types, and may be stops, fricatives or nasals, and stop consonants may be unreleased or released, the latter type allowing plain versus affricate release. Differences in the laryngeal component for consonants include voicing and aspiration, and the distinction between ejectives and implosives. Vowels and consonants may also exploit differences in nasalization and length.

## Appendix 1: Phonetic symbols (APA)

### Vowels

tense	i	ɨ	ɯ	high
lax	ɪ			
tense	e	ə	ɤ	mid
lax	ɛ	ʌ	ɑ	low
	æ	a, ʊ		
	Front unrounded	Central unrounded	Back unrounded	

tense	ü	u	u	high
lax	ʊ		ɯ	
tense	ö	ø	o	mid
lax	ɔ̃		ɔ	low
	œ	ɔ̄	ɔ̄	
	Front rounded	Central rounded	Back rounded	

### Vowel diacritics

ā	nasalized	ā, á	mid tone	á	high tone
Ḃ	creaky	a:	long	à	low tone
á, 'a	primary stress	Ḃ	breathy	ã	superlow tone
ã	superhigh tone	ã, a	secondary stress		

### Consonants

	vcls stop	vcls affricate	vcls fricative	vcd stop	vcd affricate	vcd fricative	nasal
bilabial	p	(p <sup>ɸ</sup> )	ɸ	b	(b <sup>β</sup> )	β	m
labiodental		p <sup>f</sup>	f		b <sup>v</sup>	v	ɱ
dental	t	t <sup>θ</sup>	θ	ɖ	d <sup>ð</sup>	ð	ɳ
alveolar		t <sup>s</sup>	s	d	d <sup>z</sup>	z	n
alveopalatal		č	š		ǰ	ž	ɲ
retroflex	ɖ	t <sup>ʂ</sup>	ʂ	ɖ	d <sup>ʐ</sup>	ʐ	ɻ
palatal	c	(c <sup>ç</sup> )	ç	ɟ	(ɟ <sup>ʝ</sup> )	ʝ	ɥ
velar	k	k <sup>x</sup>	x	g	g <sup>ɣ</sup>	ɣ	ŋ
uvular	q	q <sup>x</sup>	χ	G	G <sup>ʁ</sup> , G <sup>ʁ̥</sup>	ʁ, ʁ̥	ɴ, N
pharyngeal			ħ			ʕ	
laryngeal	ʔ		h			ɦ	

lateral ≠ postalveolar

implosives: ɓ ɗ ɠ

liquids: r trill or tap r, ɖ flap ɹ approximant  
 ɭ voiceless lateral ɮ voiced lateral ɭ lateral  
 spirant spirant approximant  
 ʎ palatal lateral λ lateral affricate

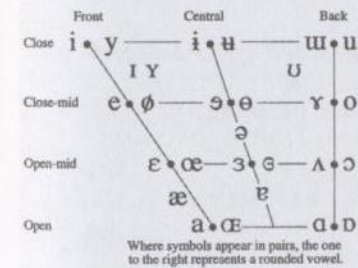
glides: w labiovelar y palatal ɥ labiopalatal

### Consonant diacritics

p <sup>y</sup>	palatalized	p <sup>w</sup>	rounded
p <sup>ɰ</sup>	velarized	p <sup>ɣ</sup>	pharyngealized
p <sup>w</sup>	rounded and fronted	ɖ	retroflex
p <sup>h</sup>	aspirated voiceless	b <sup>h</sup> -b <sup>fi</sup>	aspirated voiced
p <sup>ʔ</sup>	ejective	p <sup>ˀ</sup>	unreleased
ɱ	syllabic	ɱ	voiceless

## Appendix 2: IPA symbols

### Vowels



### Consonants

	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				r					ʀ		
Tap or Flap				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		ɥ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.