

Distinctive features are used to describe sounds in a language, as generally as possible while still capturing all the relevant contrasts. If a language does not have a particular contrast (e.g., tense/lax for vowels), then the specific distinctive features that describe that contrast are usually not needed. The goal of distinctive feature theory is to describe all and only the possible natural classes of sounds, those sets of sounds which are phonetically similar and which pattern together cross-linguistically. Such a system is very difficult to achieve, but this is one of the main principles in phonology.

Prosodic skeleton: Vs and Cs are often used to indicate the nature of the sounds in a syllable, with V marking the syllable nucleus and C marking the syllable margins (onset and coda). For example, the syllable [kap] would be classified as a CVC syllable. This notation is potentially confusing, because consonants can also be a syllable nucleus, as in the English word *button*, which has a syllabic [n] in the final syllable. For this reason, some linguists use [±syllabic] instead of V and C. However, in most cases, V and C are fine, and they will be the standard in this handout.

V or [+syllabic] vowels, syllabic consonants
C or [−syllabic] everything else (non-syllabic consonants)

Under many analyses, vowels and glides (central approximants or semi-vowels) differ only in their syllabic position. For example, [i] and [j] are essentially identical, except that [i] is syllabic and [j] is not. Because of their similarity, vowels and glides are often classified together as vocoids.

Major class features: These features indicate how narrow or open the vocal tract is.

[±consonantal] This feature indicates whether the oral constriction is very narrow (as for most ordinary kinds of consonants) or not (as for vocoids). The primary constriction for laryngeal (glottal) sounds like [h] and [ʔ] occurs at the glottis, and there is some debate over whether a glottal constriction should count as an “oral” constriction or not. Cross-linguistically, laryngeals often pattern with vocoids, so many linguists classify them as not having a narrow oral constriction, although this classification is not without controversy.

[+cons] most ordinary consonants
[−cons] vocoids, laryngeals

[±approximant] The primary oral constriction for an approximant is wide enough to allow continuous airflow without significant turbulence in the oral cavity. Liquids (laterals, trills, taps, and flaps) have partially closed constrictions, but they are sufficiently open to prevent turbulent friction. Again, laryngeals’ glottal constriction is not considered to be “oral”.

[+approx] vocoids, laryngeals, liquids
[−approx] all other consonants

[±sonorant] A sonorant has a vocal tract configuration that allows for spontaneous voicing, while an obstruent does not. Despite having a complete oral closure, nasals have sufficient airflow into the nasal cavity that allows for spontaneous voicing. Note that laryngeals, because of their glottal configurations, do not spontaneously voice. Even though obstruents do not *spontaneously* voice, many of them can be voiced, so be careful not to interpret this feature as being synonymous with voicing.

[+son] sonorants (vocoids, liquids, and nasals)
[−son] obstruents (stops, fricatives, and affricates), laryngeals

In the following chart, the values for the three major class features are summarized for various classes of sounds, with examples of English sounds for each class.

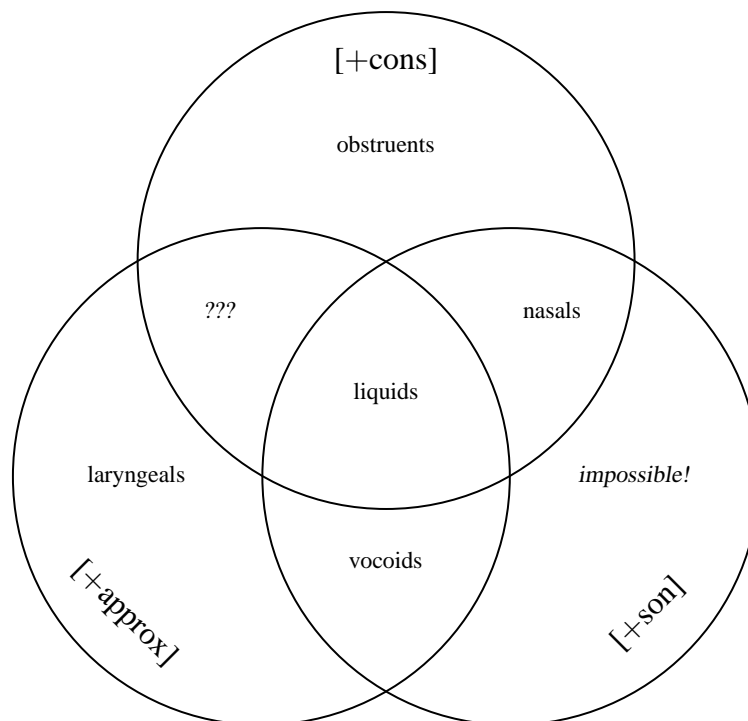
	[cons]	[approx]	[son]	English sounds
vocoids	–	+	+	i ɪ e ε æ a ɔ o ʊ u ʌ ə ɜ ʝ j w
liquids	+	+	+	l
nasals	+	–	+	m n ŋ
obstruents	+	–	–	p t k b d g f θ s ʃ tʃ v ð z ʒ dʒ
laryngeals	–	+	–	? h

All of the feature values for the laryngeal sounds are controversial. Not only is it questionable whether the glottal constriction is “oral” or not (and hence, what values to assign for [cons] and [approx]), but some linguists even argue that [son] should be redefined in such a way as to admit laryngeals, essentially treating them as vocoids. This is a fairly minority analysis however, and it will not be considered here, but we do adopt the analysis of laryngeals as having no oral constriction.

Also problematic is the sound [ɹ] in English. As a central approximant, it is phonetically similar to glides (it is the glide equivalent of the rhotic vowels [ɜ ɝ]), so by its phonetics, it should be classified as a vocoid. However, in English, it patterns more like [l] than a glide, so it could be classified as a liquid based on its phonology. This is one of many cases in which phonetics and phonology do not line up perfectly, forcing us to make difficult, sometimes unsatisfying, choices.

With three features having two values each, there are eight possible combinations, but only five are given above, leaving three missing combinations. Two of these have [–cons, –approx], which is an impossible combination, because these two feature values require conflicting kinds of constriction (relatively open for [–cons] and relatively narrow for [–approx]). The final missing combination is [+cons, +approx, –son], which we will leave as an unknown for now.

The following Venn diagram offers a more graphical representation of the relationship between groups of sounds based on the major class features. Note that the space outside all three circles is the impossible combination [–cons, –approx, –son].



Place features: These features indicate which part of the mouth is moved to make a sound. Note that the main place features do not have + and – values. Instead, they are privative: they are simply either present or absent. Thus, there is no feature like [–LAB] or [+COR]. Each place feature also has one or more dependent features which indicate how the part of the mouth is moved. The dependent features are only used if the main feature is used. For example, it is impossible for a sound to be [–hi] without also being [DOR].

[LABIAL] A labial sound is made by moving one or both lips. The lips can be rounded and/or protruded to make rounded sounds, or they can be pressed flat together and/or have the corners spread apart for unrounded sounds.

[+rd] round vocoids, rounded consonants
[–rd] bilabial and labiodental consonants, unrounded vowels

[CORONAL] A coronal sound is made by moving the front of the tongue. It can move either to an anterior position (at or in front of the alveolar ridge) or a posterior position, and it can be made with the tongue blade distributed over a relatively large area (laminal) or with the tongue tip (apical).

[+ant] anterior: dentals, alveolars
[–ant] posterior: post-alveolars, retroflexes, palatals
[+dist] laminal: dentals, post-alveolars, palatals
[–dist] apical: alveolars, retroflexes

[DORSAL] A dorsal sound is made by moving the tongue body. It can be raised high or not, lowered or not, and/or moved back towards the soft palate or not.

[+hi] high vowels, glides, palatals, velars
[–hi] mid and low vowels, uvulars
[+lo] low vowels
[–lo] high and mid vowels, glides, palatals, velars, uvulars
[+bk] central and back vowels, velars, uvulars
[–bk] front vowels, palatals

By definition, the feature combination [+hi, +lo] is impossible, since the tongue body cannot both raise and lower at the same time.

[PHARYNGEAL] A pharyngeal sound is made by moving the tongue root. It can be advanced to open the pharynx or retracted to narrow the pharynx.

[+ATR] tense vowels
[–ATR] lax vowels, pharyngeals

Aside from indicating primary place of articulation, the place features can also be used to indicate secondary places of articulation, as in palatalized sounds like [pʲ], in which case, the sound in question has all of the relevant features. Note that palatal sounds are both [COR] and [DOR], which means we do not have an easy way to make a three-way distinction between a palatalized coronal [tʲ], a palatalized dorsal [kʲ], and a pure palatal [c]. Some proposals have been made to accommodate such a distinction, often by marking certain place features as primary. However, it's not entirely conclusive that such a distinction needs to be made with features, so in this handout, if there are multiple place features in the same sound, there are treated as equals.

Manner features: These features indicate the manner in which air flows through the vocal tract.

[±continuant] A continuant has no significant interruption of airflow through the oral cavity.

[+cont] approximants, fricatives

[−cont] oral and nasal stops, affricates

[±lateral] Laterals are made with airflow down one or both sides of the tongue.

[+lat] all lateral sounds

[−lat] all other sounds

[±nasal] Sounds with nasal airflow are made by lowering the soft palate to open a passage from the oral cavity to the nasal cavity.

[+nas] all nasal and nasalized sounds

[−nas] all other sounds

[±strident] Strident sounds have very turbulent, high intensity, airflow. This feature is primarily used to distinguish fricatives and affricates that otherwise have the same features. The class of sibilants (alveolar, post-alveolar, and retroflex fricatives and affricates) are strident. In the standard analysis, only obstruents are allowed to have a value for this feature, so sonorants are neither [+strid] nor [−strid].

[+strid] labiodental and uvular fricatives and affricates, sibilants

[−strid] oral stops, all other fricatives and affricates

Laryngeal features: These features describe various states of the vocal cords.

[±voiced] Voiced sounds have slack vocal cords that are set into vibration by airflow through the glottis. Voiceless sounds have stiff vocal cords that cannot be vibrated by glottal airflow.

[+voi] all voiced, murmured, and creaky voiced sounds

[−voi] all voiceless sounds

[±aspirated] If the vocal cords are spread apart, airflow through the glottis will create white noise, as in aspiration. Voiceless continuants are often considered to be aspirated, because in order to get sufficient continuous airflow without triggering vocal cord vibration, the vocal cords must be spread apart. This analysis is somewhat controversial, but we will adopt it here.

[+asp] all aspirated and murmured sounds, voiceless continuants

[−asp] all other sounds

[±glottalized] The vocal cords may be drawn tightly together, creating a narrow glottal constriction found in many kinds of sounds.

[+glot] ejectives, implosives, glottal stop [ʔ], creaky voiced sounds,
all other glottalized sounds

[−glot] all other sounds

By definition, the feature combination [+asp, +glot] is impossible, since the vocal cords cannot be spread apart and drawn tightly together at the same time.

Distinctive features for vowels: The following chart gives the feature specifications for many different kinds of vowels. Recall that all vowels are [+V, -cons, +approx, +son, +cont, -lat] and as sonorants, have no value for [strid]. Some linguists consider high front vowels to be [+COR, -ant, +dist], but this is a controversial analysis and is not represented in the chart below. The symbol \circ is used to indicate the presence of the private place features ([LAB], [COR], etc.), since they do not have plus-minus values.

	i	\tilde{i}	\dot{i}	\dot{i}	\dot{i}	y	i/ɨ	ɯ/u	e	ø	ə/ʌ/ɤ	o	æ	œ	a/ɑ	ɒ
nas	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
voi	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+
asp	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-
glot	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
LAB	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ
rd	-	-	-	-	-	+	-	+	-	+	-	+	-	+	-	+
DOR	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ
hi	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-
lo	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+
bk	-	-	-	-	-	-	+	+	-	-	+	+	-	-	+	+

For languages that distinguish between tense and lax vowels, the feature [ATR] is typically used, with tense vowels being [+ATR] and lax vowels being [-ATR]. As with any distinctive feature, [ATR] should generally not be used for languages that do not have a contrast based on this feature. Low vowels are usually considered [-ATR] because the tongue root naturally moves backwards as the tongue body is lowered. If it is necessary to transcribe a tense low vowel in contrast with a lax one, a diacritic or an unused vowel symbol is usually employed.

	i	ɪ	y	ɣ	u	ʊ	e	ɛ	ø	œ	o	ɔ	ɤ	ʌ	ɑ	a
PHAR	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ
ATR	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-

Distinctive features for obstruents: The following charts give the feature specifications for many kinds of obstruents. Ordinary coronal fricatives and affricates are shown in the first chart, while the second chart gives a variety of coronal stops, including some with secondary articulations, different glottal states, etc. The third chart gives obstruents with other primary places of articulation.

Recall that all obstruents are [+cons, -approx, -son]. An obstruent may be either C or V depending on its syllabic role. Though the soft palate can be lowered while making an obstruent, the resulting sound is usually either far too weak to be an effective linguistic sound, or is acoustically indistinguishable from its oral counterpart, so obstruents are typically analyzed as being redundantly [-nas].

	θ	ð	s	z	ʃ	ʒ	ʂ	ʐ	ʧ	ʣ	ʈ	ʡ	ʧ̰	ʣ̰	ʨ̰	ʤ̰
cont	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-
lat	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-
strid	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
voi	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
asp	+	-	+	-	+	-	+	-	+	-	-	-	-	-	-	-
glot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
COR	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ	\circ
ant	+	+	+	+	-	-	-	-	+	+	+	+	-	-	-	-
dist	+	+	-	-	+	+	-	-	-	-	-	-	+	+	+	+

	t _n	d _n	t	d	t̥	d̥	t ^h	d ^h	tʰ	d̥/d̥	t ^w	d ^w	tʸ	dʸ	tʳ	dʳ
cont	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
lat	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
strid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
voi	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
asp	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-
glot	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-
LAB											o	o				
rd											+	+				
COR	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
ant	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+
dist	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DOR													o	o		
hi													+	+		
lo													-	-		
bk													+	+		
PHAR															o	o
ATR															-	-

	p	p ^w	p ^j	kp/p ^y	ϕ	f	c/k ^j	ç/ç	k	k ^w	x	q	ç	h/H
cont	-	-	-	-	+	+	-	+	-	-	+	-	+	+
lat	-	-	-	-	-	-	-	-	-	-	-	-	-	-
strid	-	-	-	-	-	+	-	-	-	-	-	-	+	-
voi	-	-	-	-	-	-	-	-	-	-	-	-	-	-
asp	-	-	-	-	+	+	-	+	-	-	+	-	+	+
glot	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LAB	o	o	o	o	o	o				o				
rd	-	+	-	-	-	-				+				
COR			o				o	o						
ant			-				-	-						
dist			+				+	+						
DOR			o	o			o	o	o	o	o	o	o	
hi			+	+			+	+	+	+	+	-	-	
lo			-	-			-	-	-	-	-	-	-	
bk			-	+			-	-	+	+	+	+	+	
PHAR														o
ATR														-

Distinctive features for laryngeals: Recall that laryngeals are somewhat controversially classified as [-cons, +approx, -son]. It doesn't seem possible for them to be syllabic nuclei, so they are always C, never V. They have no place features of any kind, because they do not involve the tongue or lips. It is impossible for ordinary humans to configure the vocal cords in such a way as to block central airflow while allowing lateral airflow, so laryngeals are always [-lat]. As with obstruents, nasal airflow is not compatible with laryngeals, so they are also always [-nas]. It also seems impossible to create strident airflow through the glottis, so all laryngeals are [-strid]. Thus, the only features that distinguish the laryngeals from each other are [cont] and, unsurprisingly, the laryngeal features.

	ʔ	h	fi
cont	-	+	+
voi	-	-	+
asp	-	+	+
glot	+	-	-

Distinctive features for sonorant consonants: Recall that sonorant consonants are all [+son] and have no value for [strid]. A sonorant consonant may be C or V depending on its syllabic role.

The first chart gives distinctive features for nasal stops and lateral approximants. The second chart gives distinctive features for taps, trills, and central approximants. Because they are continuants, voiceless sonorants are controversially classified as [+asp].

	m	\bar{n}	n	η	μ	η	N	l	$\underset{\cdot}{l}$	ʎ	ʎ	ʎ	L
cons	+	+	+	+	+	+	+	+	+	+	+	+	+
approx	-	-	-	-	-	-	-	+	+	+	+	+	+
cont	-	-	-	-	-	-	-	+	+	+	+	+	+
lat	-	-	-	-	-	-	-	+	+	+	+	+	+
nas	+	+	+	+	+	+	+	-	-	-	-	-	-
voi	+	+	+	+	+	+	+	+	-	+	+	+	+
asp	-	-	-	-	-	-	-	-	+	-	-	-	-
glot	-	-	-	-	-	-	-	-	-	-	-	-	-
LAB	o												
rd	-												
COR		o	o	o	o			o	o	o	o	o	
ant		+	+	-	-			+	+	-	-	-	
dist		+	-	-	+			-	-	-	+	-	
DOR					o	o	o				o	o	o
hi					+	+	-				+	+	+
lo					-	-	-				-	-	-
bk					-	+	+				-	+	+

	v	r	ʀ	B	r	R	J	ɹ	j	ɥ	ɥ	w	ʌ
cons	+	+	+	+	+	+	-	-	-	-	-	-	-
approx	+	+	+	+	+	+	+	+	+	+	+	+	+
cont	-	-	-	+	+	+	+	+	+	+	+	+	+
lat	-	-	-	-	-	-	-	-	-	-	-	-	-
nas	-	-	-	-	-	-	-	-	-	-	-	-	-
voi	+	+	+	+	+	+	+	+	+	+	+	+	-
asp	-	-	-	-	-	-	-	-	-	-	-	-	+
glot	-	-	-	-	-	-	-	-	-	-	-	-	-
LAB	o			o					o	o	o	o	o
rd	-			-					-	+	-	+	+
COR		o	o		o		o	o	o	o			
ant		+	-		+		+	-	-	-			
dist		-	-		-		-	-	+	+			
DOR						o			o	o	o	o	o
hi						-			+	+	+	+	+
lo						-			-	-	-	-	-
bk						+			-	-	+	+	+