LIGN 111 — Distinctive features

Phonological distinctive features have the following three characteristics:

A. *They should be able to properly characterize **natural classes***. Phonological rules make reference to natural classes of sounds, and not to other possible classes of sounds.

B. *They should be capable of describing all **segmental contrasts** in languages*. If a language has a contrast between two sounds, there must be at least one feature that expresses it.

C. *They are definable, if indirectly, in **phonetic terms***. It is commonly held that phonological features must have a phonetic (either articulatory or acoustic) definition. This is a hypothesis about the theory of phonology: phonology is grounded in phonetics.

I. The ***major class features*** distinguish large groups of sounds from one another; roughly, the following groups — vowels, glides, liquids, nasal stops, obstruents, and laryngeals ([h, ɦ, ʔ]).

1. **[±consonantal]** — [+cons] sounds have complete or narrow constriction along the center line in the vocal tract; not so for [–cons] sounds.

2. **[±syllabic]** — [+syll] sounds occupy the nucleus or core of the syllable; [-syll] occur in margins (onsets and codas) of syllables

3. **[±sonorant]** — [+son] sounds involve a constriction in the vocal tract that produces continuous, non-turbulent air flow and spontaneous voicing; not so for [–son] sounds.

4. **[±approximant]** — [+approx] sounds are those which have a constriction in the vocal tract which allows a free (frictionless) escape of air; not so for [–approx] sounds.

Major class features	**[±cons]**	**[±syll]**	**[±son]**	**[±approx]**
vowels	–	+	+	+
glides	–	–	+	+
liquids (laterals & rhotics)	+	–	+	+
nasal stops	+	–	+	–
obstruents	+	–	–	–
laryngeals ([h, ɦ, ʔ])	–	–	–	–

- Note: laryngeal [h] often patterns with voiceless fricatives and laryngeal [ʔ] with voiceless stops. The feature [-son] groups them together; however, in some feature systems laryngeals are classified as [+son] because they do not have constriction in the vocal tract; yet they also do not have spontaneous voicing.

II. The ***laryngeal features*** distinguish the different **phonation types** for sounds. They deal with the state of the glottis / vocal folds at the time the sound is produced.

5. **[±voice]** — [+voi] sounds have the vocal folds adducted (relatively closed) to cause vibration; [–voi] sounds have the vocal folds abducted (open), which causes no vibration, or tightly closed (e.g. in ejectives or [ʔ]).

6. **[±spread glottis]** — [+s.g.] sounds (aspiration, breathy voice, and [ɦ, h]) have a vocal fold configuration that produces glottal friction; not so for [–s.g.] sounds.

7. **[±constricted glottis]** — [+c.g.] sounds (creaky voice, ejectives, implosives, and [ʔ]) involve vocal folds that are tense and drawn together; not so for [–c.g.] sounds.

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Laryngeal features	**[±voi]**	**[±s.g.]**	**[±c.g.]**
plain pulmonic [t]	±	–	–
aspirated [t^h]	–	+	–
ejectives [t']	–	–	+
implosives [ɗ]	+	–	+
breathy voice [d^h]	+	+	–

III. The ***manner features*** describe the type of stricture for a given sound.

8. **[±continuant]** — [+cont] sounds (fricatives, glides, liquids, vowels) lack a central occlusion so that air air passes through the oral tract in a continuous stream; [–cont] sounds (stops, affricates, nasals) have such an occlusion.
   - Note: laterals are specified as [–cont] in some feature charts
   - Note: taps/flaps are difficult to classify. They are [+son] due to spontaneous voicing. Some charts treat them as [-cont]. However, the ballistic movement is too short to result in occlusion, and they are frequently the result of spirantization rules, so [+cont] is appropriate. Nevertheless, they need to be distinguished from trills.
9. **[±delayed release]** — release of burst is delayed, resulting in frication. Used to distinguish stops [-del.rel.] and affricates [+del. rel.].
10. **[±nasal]** — [+nas] sounds are produced with the velum lowered, allowing air to enter the nasal cavity. In [–nas] sounds the velum is raised, blocking entrance to the nasal cavity.
11. **[±lateral]** — [+lat] sounds (lateral approximants and fricatives; laterally-released stops) are produced with central tongue contact in the oral cavity but with one or both sides of the tongue being held away from the roof of the mouth, allowing air to escape along the sides. For [–lat] sounds, the tongue is not held away from the roof of the mouth in this way.
12. **[±strident]** — [+strid] sounds are produced with a complex constriction forcing the airstream to strike two surfaces, producing high-intensity fricative noise; [–strid] sounds are produced without such a constriction. (Note: this is an acoustically defined feature).

    Useful for distinguishing labial fricatives: [f v] are [+strident] and [ɸ, β] are [-strident]

1. The ***place features*** describe the place of the stricture within the vocal tract.

13. **[CORONAL]** sounds are produced with a raised tip/blade of the tongue.
    - **[±anterior]** — [+ant] sounds are produced at the alveolar ridge or somewhat further forward. [–ant] sounds are produced behind the alveolar ridge.
    - **[±distributed] —** [+dist] sounds are produced with tongue (tip and) blade extended for a considerable distance along direction of airflow; not so for [–dist] sounds

Coronal place features	**[±ant]**	**[±dist]**
dentals	+	+
alveolars	+	–
postalveolars, palatals	–	+
retroflexes	–	–

- Note: palatals are classified as CORONAL [-ant] in some feature systems, but as DORSAL [+high, -back] in others.

14. **[LABIAL]** sounds are produced with the lips as the primary articulators.
    - Note: an additional feature is needed to distinguish labiodental fricatives [f, v] from bilabial fricatives [ɸ, β]. [±strident] can be used (although there is some debate about whether [f, v] are strident in all languages).
15. **[DORSAL]** sounds are produced with a bunched tongue dorsum (back of the tongue).
    - **[±high]** — [+high] sounds have a raised dorsum, close to the roof of the mouth; not so for [–high] sounds (e.g. velars [+high] vs. uvulars [-high]).
    - **[±back]** — [+back] sounds have the dorsum positioned toward the back of the mouth; not so for [–back] sounds (e.g., palatals [-back] vs. velars [+back]).
    - **[±low]** — [+low] sounds have the bunched dorsum positioned low in the mouth; not so for [–low] sounds (e.g., velars/uvulars [-low] vs. pharyngeals [+low]).
- Note: there is another place feature **PHARYNGEAL**, primarily used for languages with uvulars and pharyngeals.

13. The vowel features overlap somewhat with those used with DORSAL
    - **[±high]** — [+high] sounds have a raised dorsum, close to the roof of the mouth; not so for [–high] sounds (e.g. high vowels vs. mid and low vowels)
    - **[±back]** — [+back] sounds have the dorsum positioned toward the back of the mouth; not so for [–back] sounds (e.g., back vowels vs. front and central vowels).
    - **[±low]** — [+low] sounds have the bunched dorsum positioned low in the mouth; not so for [–low] sounds (e.g., low vowels vs. mid and high vowels).
    - **[±front]** — [+front] sounds have the dorsum positioned toward the front of the mouth; not so for [–front] (e.g., front vowels vs. central and back vowels). This feature is not used in traditional systems, but it is useful for defining central vowels [-front, -back].
    - **[±tense]** — [+tense] sounds are produced with deliberate precise muscular tension; not so for [-tense] (e.g., tense vowels vs. lax vowels in English)
    - **[±ATR]** — [+ATR] sounds are produced with a relatively advanced tongue root and an expanded pharyngeal cavity, while [–ATR] sounds are produced with a relatively retracted (or non-advanced) tongue root. Found in many African languages

- Note: Similar transcriptions are used for [+tense] and [+ATR] vowels and [-tense] and [-ATR] vowels, but they are not the same articulatorily.

The theory of phonological features is a work in progress — we're still finding out what the relevant distinctions are and how rules can and can't manipulate them! Hence all the 'notes' added here.

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Pulmonic [–syllabic, +consonantal, –sonorant] sounds

	[LABIAL]			[CORONAL]									[DORSAL]						
[–voi]	p	ɸ	f	t̪	θ	t	ʦ	s	ʈ	ʂ	ʃ	ʧ	c	ç	k	x	q	χ	ħ
[+voi]	b	β	v	d̪	ð	d	ʣ	z	ɖ	ʐ	ʒ	ʤ	ɟ	ʝ	g	ɣ	ɢ	ʁ	ʕ
[±cont]	–	+	+	–	+	–	–	+	–	+	+	–	–	+	–	+	–	+	+
[±del. rel.]	–	+	+	–	+	–	+	+	–	+	+	+	–	+	–	+	–	+	+
[±ant]				+	+	+	+	+	–	–	–	–							
[±dist]				+	+	–	–	–	–	–	+	+							
[±strid]		–	+		–		+	+		+	+	+		–					
[±high]													+	+	+	+	–	–	–
[±low]													–	–	–	–	–	–	+
[±back]													–	–	+	+	+	+	+

Note: palatals are shown as DORSAL in these charts; [±] indicates language-specific choice

Pulmonic [–syllabic, +consonantal, +sonorant] sounds

	[LABIAL]				[CORONAL]									[DORSAL]					
[+voi]	m	ʙ	ɱ	ⱱ	ɳ̪	l̪	n	l	ɾ	r	ɳ	ɭ	ɽ	ɲ	ʎ	ŋ	ʟ	ɴ	ʀ
[±approx]	–	+	–	+	–	+	–	+	+	+	–	+	+	–	+	–	+	–	+
[±nas]	+	–	+	–	+	–	+	–	–	–	+	–	–	+	–	+	–	+	–
[±cont]	–	+	–	+	–	±	–	±	+	+	–	±	+	–	±	–	±	–	+
[±tap]	–	–	–	+	–	–	–	–	+	–	–	–	+	–	–	–	–	–	–
[±lat]	–	–	–	–	–	+	–	+	–	–	–	+	–	–	+	–	+	–	–
[±ant]					+	+	+	+	+	+	–	–	–						
[±dist]					+	+	–	–	–	–	–	–	–						
[±high]														+	+	+	–	–	–
[±low]														–	–	–	–	–	–
[±back]														–	–	+	+	+	+
[±front]														+	+	–	–	–	–

Pulmonic [–syllabic, –consonantal] sounds

	ʔ	h	ɦ	w	ʋ	ɹ	ɻ	j	ɥ
[±voi]	–	–	+	+	+	+	+	+	+
[±son]	–	–	–	+	+	+	+	+	+
[±approx]	–	–	–	+	+	+	+	+	+
[±cont]	–	+	+	+	+	+	+	+	+
[±s.g.]	–	+	+	–	–	–	–	–	–
[±c.g.]	+	–	–	–	–	–	–	–	–
[±round]				+				–	+
[±high]				+				+	+
[±back]				+				–	–

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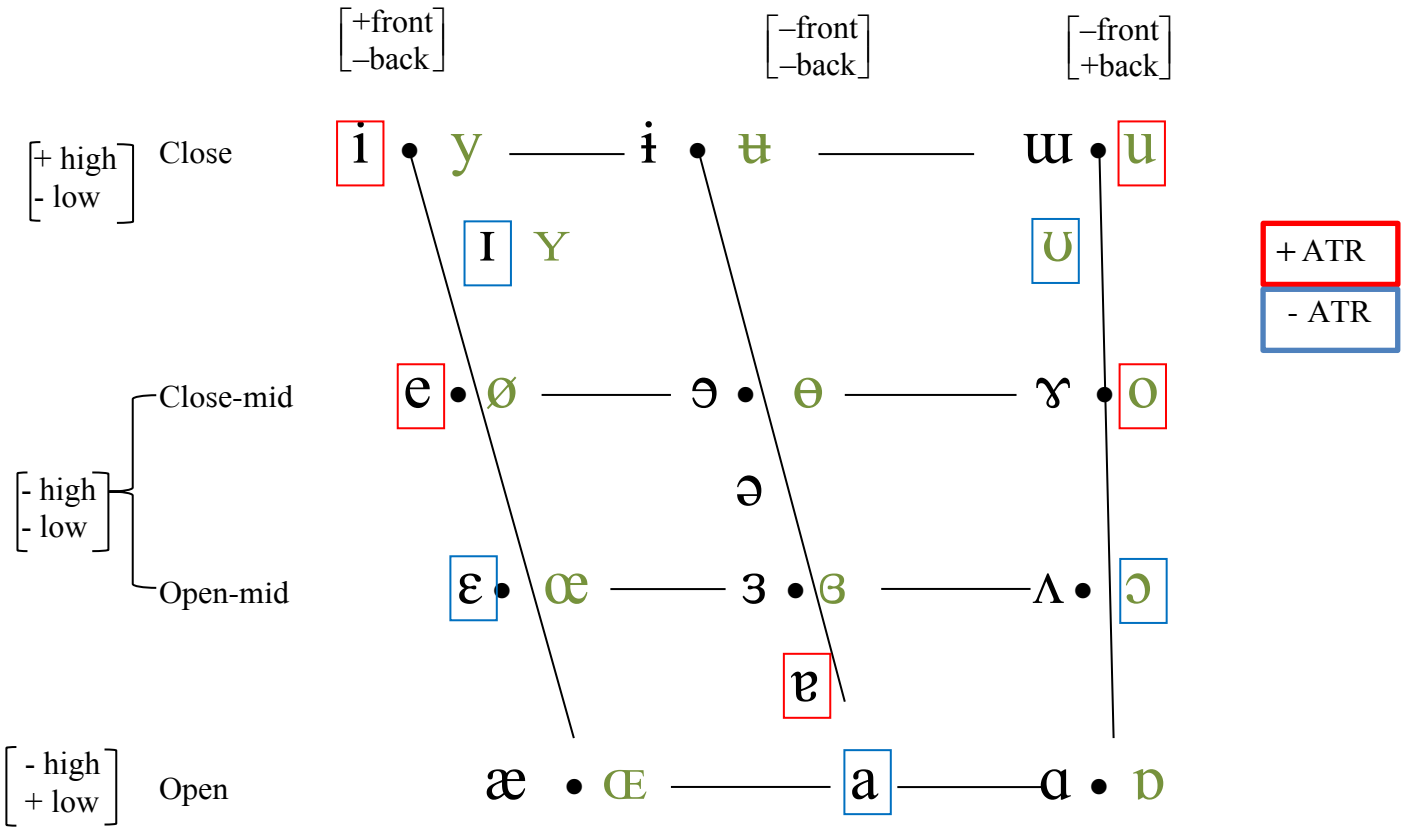

[+**round**] vowels are colored green

Some further considerations:

1. All vowels (and syllabic consonants) are [+syllabic].
2. The perceptible vowel space is not huge, so it's rare (but not absolutely impossible) for a language to distinguish all of the vowels along a particular featural dimension.
3. Vowels are difficult to pin down impressionistically (even instrumentally, sometimes!), and so transcriptions can vary even when people are trying to use the IPA. In particular, you'll rarely find anyone making all those mid-central distinctions; [ə] is often a catch-all.
4. Some typical non-IPA substitutions: [y] = [ü], [ø] = [ö], [a] = [æ], [ɑ] = [a].

   In particular, the [a] is indicated in this chart in the central position rather than as a front vowel, as in the IPA chart. This is the typical interpretation in phonology.
5. The main vowels distinguished by [ATR] are boxed in red and blue. These transcriptions are also used for languages that don't have [ATR] distinctions. In those cases, when distinguishing between [e] and [ɛ] or [o] and [ɔ], [tense] can be used.