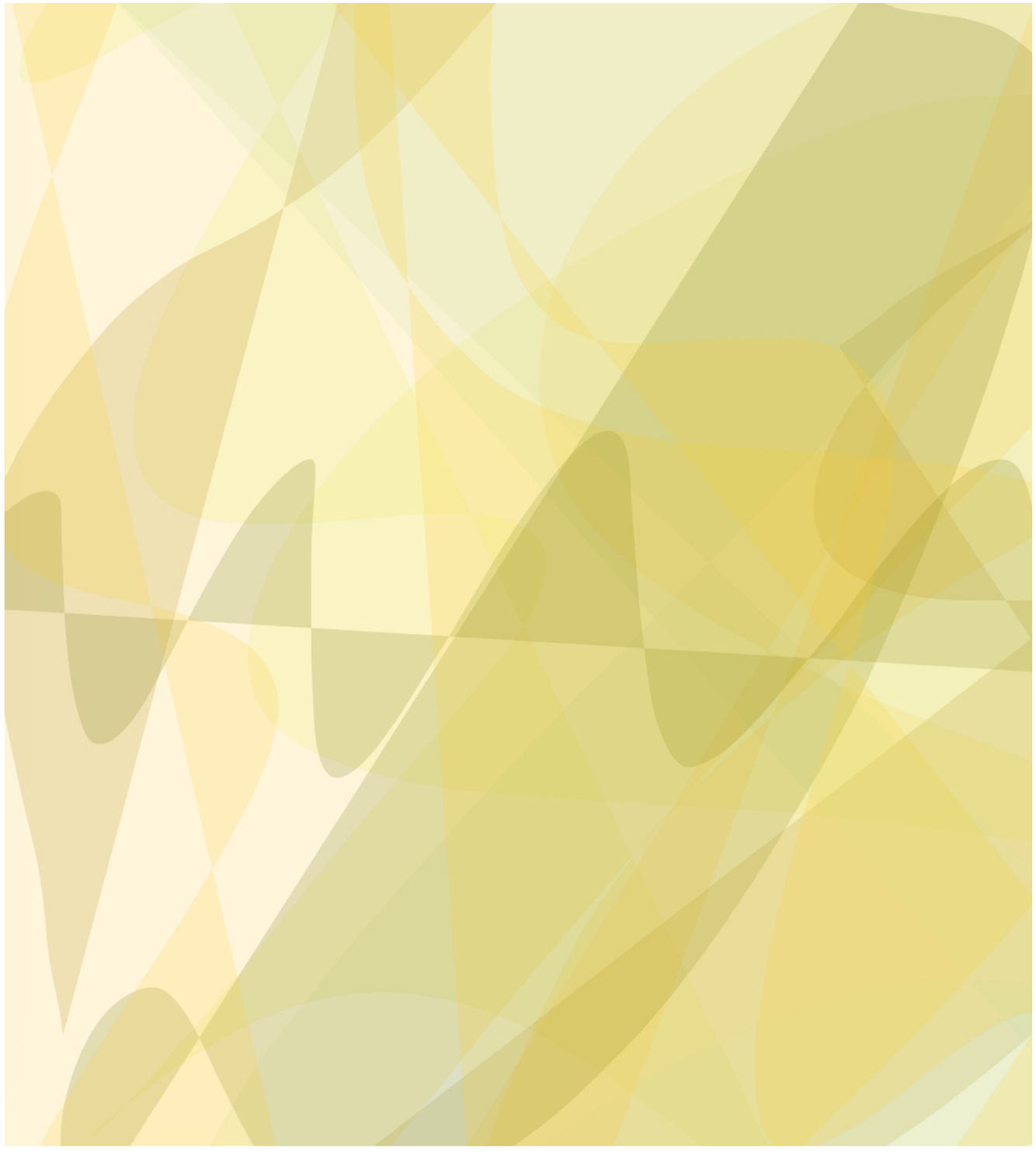
EKPA

A feature-based *fonetık* alphabet



Introduction

EKPA is a newly proposed phonologically oriented phonetic alphabet. Its aim is to provide a set of easily typeable symbols to represent phonologically relevant information. It consists of twelve binary features, and all segments are represented as a bundle of features.

This version of EKPA is the third major release (2.0) and the first release with English documentation. EKPA started small and the original version (0.1) of it was centered around Seoul Korean ("Korean"). It was considered particularly important that the key phonological contrasts of Korean, Tokyo Japanese ("Japanese"), and General American ("English") could be adequately represented. It was therefore called *the Extended Korean Phonetic Alphabet*. Inspired by the Americanist Phonetic Notation, it was designed so that a small number of phonetic symbols could be used with some flexibility to accommodate the different contrasts of different languages.

The second major version (1.0) adopted a slightly modified version of McCawley's (1968) binary feature system, which was itself a version of Jakobsonian (Jakobson 1956, Jakobson et al. 1961) features. With this adoption, EKPA was then a fully feature-based, strictly binary system. It included symbols representing the positive and negative values of each feature, as well as segmental symbols representing bundles of particular features. However, it still lacked some important features to capture several classes of phones observed in the world's languages, and attention remained largely focused on Korean, Japanese and, English.

The current version is a reorganization of it and is more complete. With twelve features designed to form cross-cutting categories with each other, it is both more economical and more comprehensive. It is as versatile as the IPA; EKPA can now account for most of what the IPA does, while also covering some phone classes that the IPA largely ignores, including the "tense" series of Korean plosives. As this makes the specific mention of Korean in its name feel irrelevant, it is now officially called EKPA, not as an acronym, but as its full name.

Since EKPA is by nature a phonological theory, this documentation has the nature of a proposal rather than just a collection of arbitrary rules for the use of the alphabet. While the present proposal should be taken as a provisional standard, the system as a theory can and should be tested and challenged in the usual scientific practice.

Note: this PDF file includes hyperlinks, some of which serve as in-text citations.

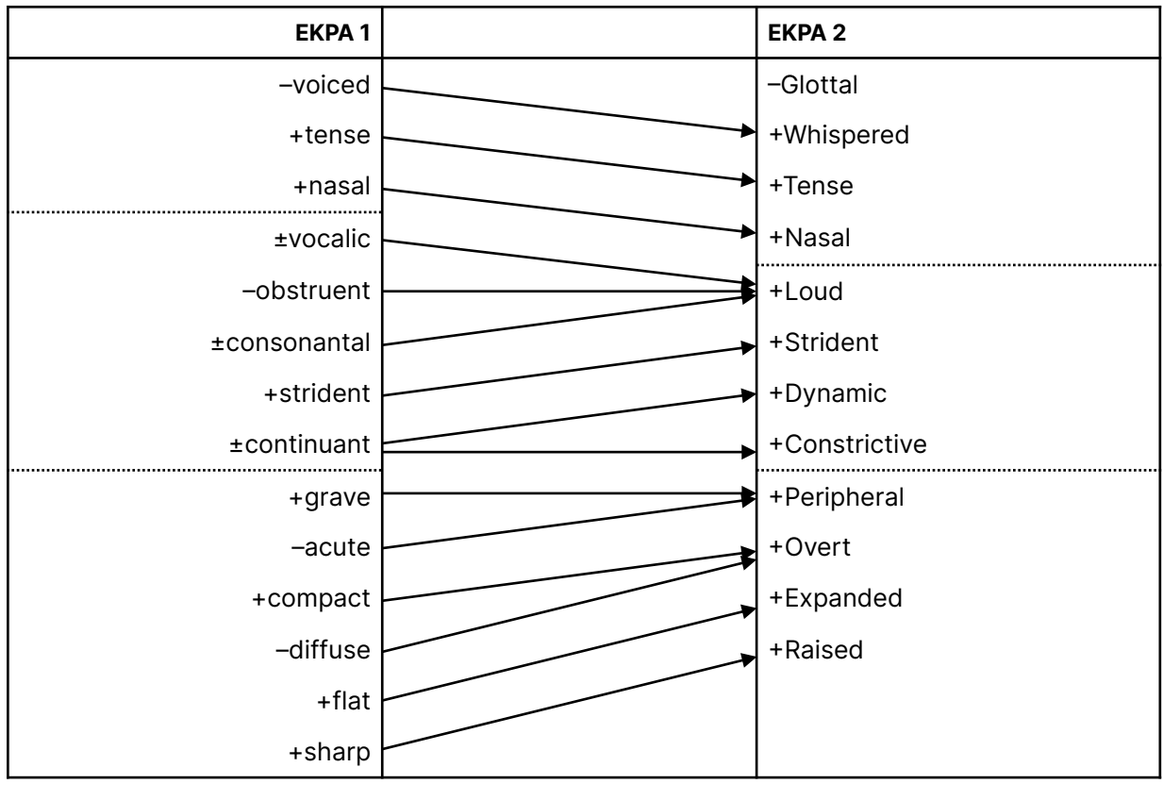
Cited in this chapter:

- Chomsky and Halle (1968) The Sound Pattern of English
- Jakobson, Roman (1956) The Fundamentals of Language
- Jakobson, Roman, Gunnar Fant & Morris Halle (1961) Preliminary to Speech Analysis
- James D. McCawley (1968) The Phonological Component of a Gramma of Japanese
- Peter Ladefoged & Keith Jonson (2014) A Course in Phonetics, 7th ed.

Overview of the feature system

EKPA is fully feature-based. Each phonetic segment is represented as a complex of twelve binary feature values. Every feature is strictly binary. *n* features contain exactly *n* bits of data. Any use of features in which a single feature conveys ternary or greater information is prohibited. This implies that the only valid values for a feature are positive (+) or negative (–), and features are never privative. "Unspecified" is never a value that can be referenced by the grammar. In EKPA, if a segment is underspecified or unspecified for a feature, it can only mean that "it doesn't matter" because the feature value can be positive or negative and the grammar generates the correct surface forms in either case or that the value of the feature remains implicit because it is irrelevant to the topic.

Rough correspondences between the EKPA 1 and 2 features



Arrows are given only to the more noticeable correspondences, and the absence of an arrow does not imply that they do not have a correlation. The prefix ± is given when there is no simple correspondence between the left and the right values, although neither + nor – indicates a perfect one-to-one correspondence between the old and new features.

The current feature system is a reorganization of the previous EKPA features, which were essentially McCawley's (1968) system with the addition of ±acute and ±tense so that three instead of two levels of vowel backness can be represented. Modifications include:

- The ±Glottal feature is added. This accounts for glottal and glottalized segments, segments with nonpulmonic airstream including implosives and ejectives, and segments with nonmodal (creaky or breathy) voicing. The previous version of EKPA simply ignored these types of sounds.

- The major class features are now ±Loud only, which corresponds well to ±obstruent with reversed specifications (+Loud is mostly -obstruent, and vice versa.) +Loud sounds are perceptually loud and include vowels, glides, taps and flaps, and liquids, but they do not include nasal stops.

- +Strident includes laterals and trills. The strident feature conventionally denotes segments with rapid airflow directed at an obstacle—the front teeth or the uvula—and EKPA 2 counts molars and the active articulator repeatedly comes back to close the airflow path as members of the obstacle.

- ±Dynamic and ±Constrictive replace ±continuant, whose plus value separated fricatives from stops, including affricates. In EKPA 2, +Constrictive separates fricatives and affricates from nonaffricate stops, and +Dynamic separates affricates from fricatives and nonaffricate stops.

- ±acute and ±diffuse are now obsolete, and the main plane of the vowel space is divided into eight (instead of nine) with ±Peripheral (almost identical to ±grave), ±Expanded (±flat), and +Over (+compact). High vowels are +Constrictive instead of +diffuse. Vowel roundness is not distinguished from backness, and the F2 axis of the vowel space is divided into four.

Features may be indicated by a single capital letter (±G for ±Glottal).

In a textual or verbal form of communication, the following opposing terms may be used in place of the prefixed notation (in parentheses are the terms used as feature labels when prefixed and capitalized): modal (glottal), voiced (whispered), lax (tense), oral (nasal), quiet (loud), mellow (strident), static (dynamic), loose (constrictive), medial (peripheral), covert (overt), shrunk (expanded), lowered (raised).

Some possible IPA correlates of the Manner and Place feature complexes (the modal plane)

					Labial				Dental				Palatal				Dorsal			
				Peripheral	+	+	+	+	–	–	–	–	–	–	–	–	+	+	+	+
				Overt	–	–	–	–	–	–	–	–	+	+	+	+	+	+	+	+
				Expanded	–	–	+	+	–	–	+	+	–	–	+	+	–	–	+	+
				Raised	–	+	–	+	–	+	–	+	–	+	–	+	–	+	–	+
Loud	**Strident**	**Dynamic**	**Constrictive**																	
–	–	–	–	**Static stops**	b				d				ɟ		ɖ		g		ɢ	
–	–	–	+	**Mellow fricative**	β				ð					ʝ			ɣ			
–	–	+	–	**Dynamic stops**	b		gb		d		db								gb	
–	–	+	+	**Mellow affricate**	bβ				dð					ʄʝ			gɣ			
–	+	–	–	**Lateral fricative**					ɮ											
–	+	–	+	**Strident fricative**	v				z				ʒ	ʑ	ʐ			ʑ	ʁ	
–	+	+	–	**Lateral affricate**					dɮ								ɢʟ			
–	+	+	+	**Strident affricate**	bv				dz				dʒ	dʑ					ɢʁ	
+	–	–	–	**Loose vowels**	ʌ		ɔ		ɛ		œ		a				ɑ		ɒ	
+	–	–	+	**Constrictive vowels**			ʊ		ɪ		ʏ		ɝ							
+	–	+	–	**Loose glides**																
+	–	+	+	**Constrictive glides**	ʊ		w			j	ɹ	ɥ	ɾ	j	ɻ	ɥ	ɯ̯	j	w	ɥ
+	+	–	–	**Lateral liquids**					l				ʎ		ɭ		ʟ			
+	+	–	+	**Static trills**	ʙ								ɾ						ʀ	
+	+	+	–	**Flaps**	ⱱ				ɺ						ɽ					
+	+	+	+	**Dynamic trills**																

The absent feature values are: –Glottal, –Whispered, –Tense, –Nasal. The joining overarch, or the combining double inverted breve, is omitted. IPA symbols with diacritics are not shown. A blank cell however does not imply that there is not an appropriate atomic symbol that fits in there or otherwise.

On the "modal" plane, which is: [–Glottal –Whispered –Tense –Nasal], the feature ±Loud separates sonorants (+) and obstruents (–). Unlike the SPE usage or the other conventional usages of the label "strident," the EKPA ±Strident are cross-cutting categories with ±Loud. [–Loud –Strident] represents mellow obstruents as opposed to strident obstruents or [–Loud +Strident]. By the same token, sonorants are divided into two categories, with one strident and the other mellow. Loud and mellow segments include vowels, glides, and some taps and flaps (taps and flaps in this category are not distinguished and are called "taps" for simplicity). Loud and strident are laterals, trills, and some flaps (the term "flap" is reserved for those in this category to avoid confusion). The place features (±Peripheral ±Overt ±Expanded ±Raised) remain largely identical in usage with the previous version of EKPA.

Some possible IPA correlates of the Exterior and Manner feature complexes (the "crossmodal" plain)

Loud	Strident	Dynamic	Constrictive																
				Glottal	−	−	−	−	−	−	−	−	+	+	+	+	+	+	+	+
				Whispered	−	−	−	−	+	+	+	+	−	−	−	−	+	+	+	+
				Tense	−	−	+	+	−	−	+	+	−	−	+	+	−	−	+	+
				Nasal	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+
−	−	−	−	**Static stops**	d	n	t*		t	n̥	t^h		t/ʔ				d̤ʱ			
−	−	−	+	**Mellow fricative**																
−	−	+	−	**Dynamic stops**	d	d̃	dt^h		t				d̰/ɗ				t'/ɭ			
−	−	+	+	**Mellow affricate**																
−	+	−	−	**Lateral fricative**																
−	+	−	+	**Strident fricative**																
−	+	+	−	**Lateral affricate**																
−	+	+	+	**Strident affricate**																
+	−	−	−	**Loose vowels**	ə				ə̥				ə̰				ə̤			
+	−	−	+	**Constrictive vowels**																
+	−	+	−	**Loose glides**	ə̂				h				ə̰ˀ/ʔ				ɦ			
+	−	+	+	**Constrictive glides**																
+	+	−	−	**Lateral liquids**																
+	+	−	+	**Static trills**																
+	+	+	−	**Flaps**																
+	+	+	+	**Dynamic trills**																

[t*] represents the Korean "tense" stop, which receives the same feature specifications as the previous version of EKPA. [t] is a tenuous or weakly aspirated plosive as opposed to the more strongly aspirated [t^h]. The ejectives are shrunk and the clicks are expanded.

The table above summarizes how the exterior features (left) work with the manner features (above). The different glottal settings are represented by the ±Glottal and ±Whispered features, and correspond to the four basic categories of phonation: modal voice (modal voiced), modal voiceless (modal whispered), breathy voice (glottal whispered), and creaky voice (glottal voiced). The "glottal fricative" [h] is considered a modal whispered glide because it is acoustically voiceless, vowel-like, and patterns like a glide or a consonant. The same oppositions correspond to different types of consonants, as shown in the table, with some being dynamic and others static. Implosive and creaky-voiced stops are given the same feature values since they do not contrast in any known language (Lagefode et al. 2014, p. 184). Clicks are expanded because they involve multiple closures in the oral cavity, as [gb] does, unlike ejectives, which are shrunk (see the previous table).

Prefix notation

Spaces are not inserted between the prefix and the feature label but are inserted between adjacent prefixed features or chunks (see below) of features. If multiple features are mentioned for the same segments, the uppercase letters of the features with the same prefixes can be concatenated under a prefix. For example, a segment with the values +G and +W can be represented as +GW.

The prefix '+' indicates "all of them are positively specified". Therefore, [+G +W +T +N], +GWTN, and ++GW +TN are all equivalent. As shown, when a label or chunk of labels takes multiple prefixes, it is understood the same way as in Polish notation: the extra prefix takes in its scope, in addition to the one it's attached to, the already prefixed label or chunk of labels to its right. For example, a segment [+GW –T] can be abbreviated to ++GW –T, and [–G +W –T] can be "abbreviated" to ++–G +W –T. For the time being, however, it is recommended that the use of trailing prefixes is kept minimal so that the notation will not become too complicated. Other prefixes and their meaning are listed below.

For readability, it is recommended that the feature labels be arranged in the order: ±GWTNLSDCPOER. However, the "odd ones" can be taken to the right for fewer prefixes. For example, a segment [+GW –T +N] can alternatively be written [+GWN –T] or ++GWN –T. Features can be separated if they are important in the context. For example, a segment +GWTN can be written [+TN +GW] if ±GW needs special attention.

When dealing with a sequence of segments, the exclamation mark prefix may be useful. The IPA [tʷɻ̥ʷɑɪ̯] (for English <try>) can be featurally spelled out as simply as:

```
!WTE !WLDCOE !TLPO !LDC
```

This however necessitates mentioning all twelve features ('!' means that all other features are negative). To avoid mentioning features irrelevant to the discussion, the dollar sign prefix can be used (±GER are implicit):

```
$WTnlsdcpo $WtnLsDCpO $wTnLsdcPO $wtnLsDCpo
```

The featural prefixes

	Meaning	Example	Unicode name
+	All of them are positive	++G –WTN means [+G –W –T –N] or "glottal, voiced, lax, and oral"	PLUS SIGN
–	All of them are negative	–+G –WTN means [–G +W +T +N] or "modal, whispered, tense, and nasal"	EN DASH
=	All of them are equal	=GWTN means 'either [+GWTN] or [–GWTN]'	EQUALS SIGN
≠	Not all of them are equal	≠GWTN means 'neither [+GWTN] or [–GWTN]'	NOT EQUAL TO
!	All of and only them are positive	!GWTN means ++GWTN –LSDCPOER or [+GWTN –LSDCPOER]	EXCLAMATION MARK
¡	All of and only them are negative	¡GWTN means +–GWTN +LSDCPOER or [–GWTN +LSDCPOER]	INVERTED EXCLAMATION MARK
?	At least one of them is positive	?GWTN means —GWTN or 'not [–G –W –T –N]'	QUESTION MARK
¿	At least one of them is negative	¿GWTN means –+GWTN or 'not [+G +W +T +N]'	INVERTED QUESTION MARK
±	No specific values	"In this language, ±W is contrastive" (Used to mention features without specifying their values.)	PLUS-MINUS SIGN
$	Uppercase are '+', lowercase are '–'	$gWtnlsdcPoer means ++WP –TNLSDCOER	

Shorthands and featural diacritics

Both phonological features and phonetic symbols are used in EKPA. As in the previous version of EKPA, the segment symbols are called *shorthands*. The idea is that a segment symbol is only used to represent a complex of feature values, and it is always possible to represent a segment in a "long" way, i.e. to write out the relevant feature values of the segment one by one, as I have done in the forms ±LSDC, or even longer, ±Loud, ±Strident, ±Dynamic, and ±Constrictive.

Typical Latin-based characters, occasionally with a dot below, are used to represent shorthands. The characters used as shorthands have been chosen so that they can all be typed directly from the ABC - Extended keyboard, a keyboard layout available by default on all currently available Apple devices with a physical QWERTY keyboard. This is so that EKPA can be typed without using the character pad. (For the same reason, only typeable diacritics are used for all featural diacritics).

Each shorthand is defined for a specific set of features. The large group of shorthands defined for the manner (±LSDC) and two of the place features (±PO) are called the cavity shorthands.

The cavity shorthands

				P	+	−	−	+
				O	−	−	+	+
L	**S**	**D**	**C**		**Labial**	**Dental**	**Palatal**	**Dorsal**
−	−	−	−	**Stop**	*p b*	*t d*	*ṭ ḍ*	*k g*
−	−	−	+	**Mellow fricative**	*x̣ ɣ̣*	*þ ð*	*þ̣ ð̣*	*x ɣ*
−	−	+	−	**Complex stops**				
−	−	+	+	**Mellow affricate**				
−	+	−	−	**Lateral fricative**				
−	+	−	+	**Strident fricative**	*f v*	*s z*	*ṣ ẓ*	*f̣ ṿ*
−	+	+	−	**Lateral affricate**				
−	+	+	+	**Strident affricate**		*c ʒ*	*c̣ ʒ̣*	
+	−	−	−	**Loose vowels**				
+	−	−	+	**Constrictive vowels**				
+	−	+	−	**Loose glides**				
+	−	+	+	**Constrictive glides**		*r̲*	*r*	
+	+	−	−	**Lateral liquids**	*ɬ̣*	*l*	*ḷ*	*ɬ*
+	+	−	+	**Static trill**	*p*			*p̣*
+	+	+	−	**Lateral flap**				
+	+	+	+	**Dynamic trill**				

Where two symbols are in the same cell, the one on the left is +W and the right –W. Otherwise, –W. As they were in the previous version of EKPA, any shorthand can be combined with featural diacritics.

The constrictive glide shorthands (++LDC –S)

E	+	−	−	+
R	+	+	−	−
	Labiopalatal	**Palatal**	**Velar**	**Labiovelar**
Onglides	*y̲*	*y*	*ẉ*	*w*

The vowel shorthands (++L –SD)

		P	−	−	+	+
		E	−	+	−	+
O	**C**		**Front**	**Near front**	**Near back**	**Back**
−	+	**High**	*ɪ*	*ɪ̣*	*ʊ̣*	*ʊ*
−	−	**Mid**	*e*	*ẹ*	*ọ*	*o*
+	−	**Low**	*æ*	*æ̣*	*ɔ̣*	*ɔ*
+	+	**Rhotic**	*ɛ*	*ɛ̣*	*ʌ̣*	*ʌ*

The backness is based on the F2 values instead of the physiological backness or roundedness and should be relative to the other vowels in the same category in the given language.

The nasal shorthands (+–LSC +N)

	P	+	–	–	+
	O	–	–	+	+
D		labial	dental	palatal	dorsal
–	static nasal	*m*	*n*	*ɲ*	*ŋ*
+	dynamic nasal	*m̤*	*n̤*	*ɲ̤*	*ŋ̤*

The dynamic nasals can be those that are called obstruent nasals, which are prenasalized or postnasalized stops.

Other groups of shorthands are the *vowel* shorthands, all of which are ++L –SD and each of which is defined for ±COPE, the *constrictive glide* shorthands, all of which are ++LDC –S and each of which are defined for ±ER, the *nasal* shorthands, all of which are +–LSC +N and each of which is defined for ±DPO, and the placeless shorthands, which do not share any feature specification but are commonly undefined for the place features.

The placeless shorthands

		G	W	T	N	L	S	D	C
Voiceless loose glide	*h*	–	+	0	0	+	–	+	–
Voiced loose glide	*ḥ*	–	–	0	0	+	–	+	–
Breathy loose glide	*ɦ*	+	+	0	0	+	–	+	–
Creaky loose glide	*ɦ̰*	+	–	0	0	+	–	+	–
Glottalized stop	*ʔ*	+	–	0	0	–	–	–	–
Vowel	*ə*	0	0	0	0	+	–	–	0
Glide	*ə̤*	0	0	0	0	+	–	+	0
Vocoid	*a*	0	0	0	0	+	–	0	0
Liquid or flap	*a̤*	0	0	0	0	+	+	0	0
Mellow obstruent	*q*	0	0	0	0	–	–	0	0
Strident obstruent	*q̤*	0	0	0	0	–	+	0	0
Segment	*ß*	0	0	0	0	0	0	0	0

They are commonly undefined for the place features (±POER). The features that are irrelevant are marked with a zero.

The featural diacritics

		ABC – Extended	Unicode names
+Glottal	*ß̉*	Shift + Option + z	COMBINING HOOK ABOVE
+Whispered	*ß̊*	Shift + Option + k	COMBINING RING ABOVE
+Tense	*ß̄*	Shift + Option + a	COMBINING MACRON
+Nasal	*ß̃*	Shift + Option + n	COMBINING TILDE
+Loud	*ß̇*	Shift + Option + w	COMBINING DOT ABOVE
+Strident	*ß̌*	Shift + Option + v	COMBINING CARON
+Dynamic	*ß̆*	Shift + Option + b	COMBINING BREVE
+Constrictive	*ß́*	Shift + Option + j	COMBINING DOUBLE ACUTE ACCENT
+Peripheral	*ß̀*	Shift + Option + `	COMBINING GRAVE ACCENT
+Overt	*ß̈*	Shift + Option + u	COMBINING DIAERESIS
+Expanded	*ß̂*	Shift + Option + 6	COMBINING CIRCUMFLEX ACCENT
+Raised	*ß́*	Shift + Option + e	COMBINING ACUTE ACCENT

Feature specifications that are not part of the definition of the shorthand can be left implicit or be expressed by *featural diacritics*. A featural diacritic overwrites a feature specification that the shorthand is defined or not defined for. For example, *d* is defined as –WLSDCPO, and when it is combined with the +Nasal diacritic and becomes *d̃*, it now represents +–WLSDCPO +N, which can be [n] in the IPA. The shorthand *s* is ++SC –LDPO, but when the +Loud diacritic is added, it becomes *ṡ*, which is ++LSC –DPO and possibly [r̥] in the IPA.

Any shorthand can be combined with featural diacritics. In the chart, the featural diacritics are combined with the eszett symbol, *ß*, a shorthand defined only to the extent that it is a segment and undefined for all EKPA features.

How the features work

Segments are represented as a combination of binary values of the following features: ±Glottal, ±Tense, ±Whispered, ±Nasal, ±Loud, ±Strident, ±Dynamic, ±Constrictive, ±Peripheral, ±Overt, ±Expanded, ±Raised. These features are indicated with the first capital letter of each unless full labels are necessary for any reason: ±G, ±W, ±T, ±N, ±L, ±S, ±D, ±C, ±P, ±O, ±E, ±R.

For illustrative purposes, these twelve features are grouped into three quartets: the exterior features: ±G, ±W, ±T, ±N; the manner features: ±L, ±S, ±D, ±C; the place features: ±P, ±O, ±E, ±R.

The exterior features deal with configurations related to the outside of the oral cavity. ±G and ±W specify the laryngeal configurations. ±T specifies the muscular activity configurations around the oral cavity. ±N specifies nasality.

The manner features concern the articulatory gestures in the oral cavity. ±L specifies if the segment is produced with or without a significant obstruction of the airstream in the oral cavity. Loud segments are relatively "loud" or "sonorous" sound, which is closely related to those features or qualities conventionally called "syllabic," "vocalic," and "sonorant." ±S specifies that the air stream is directed rapidly at an extra obstacle, which is the teeth including the molars, uvula, or the active articulator itself in the case of labial and rhotic trills. ±D specifies that the articulatory gesture is complex or transitional as it is for affricates, glides, taps, flaps, and plosives with two closures in the oral cavity. ±C specifies that the central path of the air is not completely blocked but constricted in the oral cavity as it is for fricatives, affricates, high vowels, rhotic vowels, and onglides.

The place features specify the major and minor places of articulation. ±P specifies that the major place of articulation is labial or dorsal for consonants and back for vowels. ±O specifies that the major place of articulation is the back part in the oral cavity (palatal or dorsal) for consonants and low for vowels. ±E is essentially ±flat (with slight modifications) as it specifies lip rounding or retracting the tongue to the velar-uvular region (velarization) or toward the pharynx (pharyngealization). ±R specifies that the segment is produced with a palatalized or laminal articulation or advanced tongue root.

Cited in this chapter:

- Chomsky, N., & Halle, M. (1968). The Sound Pattern of English.
- Kim, C.-W. (1968). The Vowel System of Korean. Language, 44(3), 516–527. https://doi.org/10.2307/411719
- Peter Ladefoged & Keith Jonson (2014) A Course in Phonetics, 7th ed.

The place features

The features ±Peripheral, ±Overt, ±Expanded, and ±Raised are similar to the Jakobsonian grave, compact, flat, and sharp.

Consonant places

		P	+	+	−	−	−	−	+	+
		O	−	−	−	−	+	+	+	+
		E	−	+	−	+	−	+	−	+
		R	− +	− +	− +	− +	− +	− +	− +	− +
S	**C**		**Labial**		**Dental**		**Palatal**		**Dorsal**	
−	−	**Stops**	p pʲ	pʷ pʷʲ	t̪ d̪	t̪ʷ d̪ʷ	c̱ ɟ	c̱ʷ ɟʷ	k g	q qʲ
−	+	**Mellow fricatives**	ɸ ɸʲ	ɸʷ ɸʷʲ	θ θʲ	θʷ θʷʲ	ç	çʷ	x ɣ	
+	−	**Lateral fricatives**			ɬ ɬʲ	ɬˠ ɬˠʲ				
+	+	**Strident fricatives**	f fʲ	fʷ fʷʲ	s sʲ	sʷ sʷʲ	ʃ ʑ	ʂ ʃʷ	ʔ ʑ	χ χʲ

±Peripheral is associated with labial and dorsal (+) consonants as opposed to dental and palatal (–) and with back vowels (+) as opposed to front vowels (–). ±Overt is associated with palatal and dorsal (+) consonants as opposed to labial and dental (–) and with low and rhotic vowels (+) as opposed to mid and high vowels (–). +Expanded is associated with labialization or retraction of the tongue body and with lower F2 values of vowels (Not necessarily rounded). +Raised is associated with palatalized or laminal consonants (this may be a problem if in any language palatalization and laminality are both contrastive in the same context) and ATR (marked with a lower F1) vowels.

"Palatal" includes postalveolar (the American "palatal") and the anterior part of the IPA palatal, but not the posterior part, which can be transcribed as a palatalized or fronted velar or palatal in IPA and belongs to the "dorsal" category in EKPA. By dividing the medial area in this way, EKPA reflects that palatalization is a dorsal gesture and thus implies fronting in dorsal contexts (Chomsky & Halle 1968) while maintaining the opposition between palatalized or fronted velars and original palatals that is necessary for some languages.

The vowel space is broadly divided in eight by ±Peripheral (back (+) or front (–)), ±Overt (low (+) or nonlow (+)), and ±Constrictive (high and rhotic (+) or otherwise (–)). The backness axis is subdivided by ±Expanded, which as a result yields four levels of vowel backness (See the bottom chart). Four instead of six levels of backness/roundness reflect that it is arguably unlikely that the human language is sensitive to all six categories of backness and roundness. It also accounts for the affinity between labials and round vowels. In a language where three levels of backness ([i, ɨ, u]) contrast, /ɨ/ can be near front (–P +E), which becomes [u] (+PE) when it becomes +P. ±Raised distinguishes ATR (+) and RTR (–), and it is possibly responsible for some of the Slavic hard-soft allophonies.

Vowel space

						Higher F2 ←			**Lower F2** →
					P	−	−	+	+
					E	−	+	−	+
	C	**O**	**R**			**Front**	**Near front**	**Near back**	**Back**
Lower F1	+	−	+	**High**		i	y	ɯ	u
↑	+	−	−			ɪ	ʏ		ʊ
	−	−	+	**Mid**		e	ø	ɤ	o
	−	−	−			ɛ	œ	ʌ	ɔ
↓	−	+	+	**Low**		æ			
Higher F1	−	+	−			a		ɑ	ɒ
	+	+	+	**Rhotic**			ɝ		
	+	+	−						

The canonical glides [ɥ, w, j, ɥ] are available as versions of [ɥ] (+LDCPO –S –ER), though I find no reason to exclude other places of articulation. For example, the labiovelar glide [w] can be expanded labial instead of expanded dorsal depending on the language. Nevertheless, ±ER seems more consistent ([w] is +E regardless of whether it is labial or dorsal). (See §Language-dependent phonetics.)

Canonical glides

	−R	+R
−E	ɥ	j
+E	w	ɥ

Typical correlates of vowel backness

Higher F2 ←	−P	−P	+P	+P	**Lower F2** →
	−E	+E	−E	+E	
	e	ɵ	ɤ		
		ø	ɵ	o	
	Front	**Near front**	**Near back**	**Back**	

The manner features

The most significant change in the EKPA revision, and perhaps the most controversial, is in the manner features. The following table describes how the manner features categorize segments.

Impressionistic description of the categories defined by the Manner features

Airflow control	Consistency of the nature of the segment	S	D	L	C	Degree of obstruction in the central path of the air: Complete closure ←		→ No obstruction
				–	–	–	+	+
				–	+	+	+	–
Straight central airflow	consistent	–	–			d	ð	i	e
	mixed	–	+				dð	j	e̞
Concentrated and directed at an obstacle	mixed	+	+			dɮ	dz	ɾ̞	ɻ
	consistent	+	–			ɮ	z	r	l

The feature ±Loud divides segments into two major classes. As shown, it has to do with the degree of obstruction in the oral cavity, but more impressionistically, +Loud sounds are louder and mostly sonorants, whereas –Loud sounds are quieter and mostly obstruents.

The ±Loud and ±Strident features form some familiar natural classes: in the upper right corner are vowels and glides, right below are liquids, and on the left are obstruents.

The remaining two features, ±Dynamic and ±Constrictive, "occupy the middle" of opposing categories. The dynamic version of the fricative [z] is the affricate [dz], and the dynamic version of the lateral approximant [l] is the lateral flap [ɺ]. The constrictive versions of vowels are high vowels, and the constrictive versions of stops are fricatives.

More specifically, +LS are liquids and flaps, and +–L +S are strident obstruents such as [s, ts, ʂ, tʂ]. +Dynamic segments are affricates, glides, and taps. +Constrictive segments are fricatives, affricates, and high and rhotic vocoids.

+Dynamic segments are produced with transitional gestures within the limits of a segment: affricates (+) as opposed to fricatives (–), glides and taps (+) as opposed to vowels (–), fricative trills (+) as opposed to regular trills (–), lateral flaps (+) as opposed to lateral approximants (–), doubly articulated plosives (+) as opposed to plosives with a secondary constriction (–), and obstruent nasals (+) from plain nasals (–).

+Constrictive segments are produced with a narrowed central path of the air: central fricatives and affricates (+) as opposed to stops and laterals (–), high or rhotic vocoids (+) as opposed to nonhigh nonrhotic vocoids (–), and trills as opposed to lateral approximants. Perhaps this feature could have been alternatively called “central constriction” or “lateral closure” because all +C sounds as opposed to the –C sounds involve closing the lateral path of the air while leaving the narrowed central path open in the oral cavity.

Laterals are considered +Strident because they involve directing the airstream at the molar, as is the case with conventional strident sounds such as [f, s] (at the front teeth) and [χ] (at the uvula). In the case of trills, it is the active articulator. This is a departure from the conventional usage of the term "strident", but it makes the overall feature system more economical (essentially eliminating the need for ±lateral) and accounts for the affinity between affricates and laterals seen in some languages (see §Illustrations). Note also that with this change, vocoids (vowels and glides) are grouped as –LS.

The assignment of these features is economical, while also fitting well with observations of the phonological behavior of some languages. In Japanese, the dental plosive /t/ at the end of a verb stem becomes an affricate [tɕ] or [ts] (+C) when followed by a high vowel [i] or [ɨ] (+C). In English, when a dental plosive [t, d] is followed by the palatal glide [j] (+DC) over a word boundary, the plosive is optionally realized as an affricate [tʃ, dʒ] (+DC), e.g., the /t+j/ part of <don't you> is often pronounced [tʃ]. Affrication of dental stops is optional when [t, d] is followed by an approximant [ɹ] (+DC) in words such as <dragon> [dɹægən]~[dʒɹægən] or <tree> [tɹi]~[tʃɹi].

The exterior features

Phonations

	–W	+W
–G	ə	ə̥
+G	ə̬	ə̤

Different settings of the glottis are represented with the features ±Glottal and ±Whispered and correspond to the basic four categories of phonation: modal voice (–GW), modal voiceless (–G +W), breathy voice (+G –W), and creaky voice (+GW). The "glottal fricative" [h] is considered to be a modal voiceless glide as it is perceptually similar to voiceless vowels and patterns like a glide or a consonant. The same oppositions correspond to different types of consonants. Implosive stops and creaky voiced stops receive the same feature values (+GD –WLSC) as it is accepted that they contrast in no known languages (Ladeged et al. 2014). Clicks are +E since they involve multiple closures in the oral cavity as [gb] does as opposed to ejectives which are –E. Note that these nonpulmonic consonants are considered dynamic (+D).

Tenseness-moraicity correlation

	–T	+T
Onset	Nonmoraic	Monomoraic
Nucleus	Monomoraic	Bimoraic
Coda	Monomoraic	

The placements of [ʔ] may be controversial. See §Language-dependent phonetics for more details.

±Tense is primarily responsible for the moraicity (including gemination) of a segment at different positions in a syllable. In the context where an all-lax CVC structure would have a nonmoraic onset and a monomoraic nucleus and a monomoraic coda, a tense onset, and a tense nucleus would be one mora longer (or heavier) than the lax counterpart. The number of moras of a +T coda is not proposed at this time. The phonetic realization of moraicity varies greatly from language to language. (Although not discussed here, the phonetic realization of moraicity is usually covered under the topic of isochrony.)

Tense segments are typically articulated with more effort than the corresponding lax segments. In many languages including English and Korean, +Tense vowels are more peripheral. +Tense consonants tend to be longer and to have a greater VOT value than the –Tense counterparts. +TW tends to be strongly aspirated, and + +T –W tends to be devoided and unaspirated. Korean is a notable example of a language with a ±W contrast of +T consonants (Kim 1968).

Korean plosives

	–T	+T
–W	d	t*
+W	t	t^h

Manners of articulations modulated to different settings of the Exterior features

		L	–	–	–	–	+	+	+	+
		D	–	–	+	+	–	–	+	+
		E	–	+	–	+	–	+	–	+
G W T N			Simple stops		Complex stops		Vowels		Glides	
– – – –	**Modal voiced**		d	d^w	d	db	e	ø	e̬	ø̬
– – – +	**Voiced nasal**		n	n^w	d̃	nm	ẽ	ø̃	ẽ̬	ø̬̃
– – + –			t*	t^{*w}	dt^h		eː	øː	e̬ː	ø̬ː
– – + +							ẽː	øːˀ	ẽ̬ː	ø̬̃ː
– + – –	**Modal voiceless**		t	t^w	t	tp	e̥	ø̥	h	
– + – +	**Voiceless nasal**		n̥	$n̥^w$	t̃	n̥m̥	ẽ̥	ø̥̃	h̃	
– + + –	**Modal aspirates**		t^h	t^{wh}	t^{wh}	tp^h	e̥ː	ø̥ː	hː	
– + + +							ẽ̥ː	ø̥̃ː	h̃ː	
+ – – –	**Creaky or implosive**		t / ʔ		d̰ / ɗ	d̰b̰	ḛ	ø̰	ʔ / ḛ	ʔ / ø̰
+ – – +	**Creaky nasal**				n̰	n̰m̰	ḛ̃	ø̰̃	ḛ̃	ø̰̃
+ – + –							ḛː	ø̰ː	ḛː	ø̰ː
+ – + +							ḛ̃ː	ø̰̃ː	ḛ̃ː	ø̰̃ː
+ + – –	**Breathy, ejective, click**		d̤ʰ	d̤^{wh}	d'	ǀ	e̤	ø̤	ɦ	
+ + – +	**Nasal breathy, click**		n̤	n̤^{w}	n̤	nǀ	ẽ̤	ø̤̃	ɦ̃	
+ + + –							e̤ː	ø̤ː	ɦː	
+ + + +							ẽ̤ː	ø̤̃ː	ɦ̃ː	

Some symbols in the chart are rather theoretical as I have not checked all of the phonetic values having been attested in at least one language. In real languages, we may find quite different phonetic properties in the segments. Regardless, the symbols are presented for illustration purposes.

Language dependent phonetics

Since EKPA defines segments in terms of phonological features, some language-specific variations of the same feature specifications must be taken into account.

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Glottal and pharyngeal phones

The glottal fricative [h] or glottal approximant is a voiceless segment that is produced without constriction in the oral cavity or the pharynx. Phonetically, it is similar to a voiceless vowel. For this reason, this type of segment can be represented in EKPA as a whispered loose covert glide such as +−GTNSCO +WLD. It is covert or −O because an overt (+O) vowel, which is a low vowel, implies that the tongue root is retracted to decrease the size of the pharyngeal cavity (pharyngeal approximant), which may not be a problem when the language does not show a contrast between pharyngeal and glottal sounds.

When a loose covert glide is produced with a breathy voice, it is called a voiced glottal fricative ɦ. In EKPA, it is just a glottal version of a whispered covert glide: +−TNSCO +GWLD.

When a loose covert glide (++LD −SCO) is creaky (++G −W), it is called the creaky-voiced glottal approximant [ʔ̤]. Impressionistically, this sound is somewhat similar to the glottal stop, where the vocal folds are more tightly put together and released more abruptly. The glottal stop (and the creaky-voiced glottal approximant) seem to fit with what the feature specifications +−WTNSCO +GLD describes, which is that the segment is produced with the glottal folds brought tightly together (+G −W) and without constriction or a closure in the oral cavity (+L −SC) or the pharynx (−O).

Thus, the glottal stop [ʔ] can be represented as a creaky loose covert glide for those languages where the phonological behavior suggests it. This includes Japanese, where the glottal stop behaves more like a glide than a consonant (it is inserted utterance-initially when the word begins with a vowel, but not with a glide). In some languages, including English, the glottal stop is a variation of a glottalized regular stop in certain phonological contexts. A glottalized oral stop may or may not be distinguishable from a regular glottal stop, depending on the timing of different gestures in the larynx and above (see Ladefoged (2014) p. 66 for some examples). While this suggests that ++G −WLD may be a glottal stop in some languages, it does not conflict with the assumption that a creaky loose covert glide may be a glottal stop in the same language.

In Hindustani (Ohara 1994) and probably some other languages, the same feature specifications can be realized as a tenuous (unaspirated) voiceless stop. Hindustani has four series of plosives: voiceless aspirated, voiced unaspirated, breathy aspirated, and voiceless unaspirated (tenuous). Since the first two series are modal, the latter two should be +Glottal, and since one of the two is breathy, which is +GW, the other glottal series must be ++G −W.

The featural representations of the two contrasting glottals of Gimi remain unclear. The available description seems to suggest the contrast is of voicing or tenseness while Wikipedia (I haven't obtained the source cited, which is Ladefoged & Maddieson 1996) suggests it is of continuance. If it is a voicing contrast, one of the two will be +GW, which is the specification for breathiness and far from glottal closure or creakiness. Tenseness seems possible, but the rest of the consonant system seems to lack tenseness contrast. Gimi allows continuant allophones for voiced stop series, so the consonant system may seem to be one of continuance, but EKPA lacks a feature that directly corresponds to continuance; a glide differs from a stop in dynamicy (±D), while a fricative differs in constriction (±C), which makes it seems like the opposition may be between +++G −WNTD −C and +++G −WNTD +C.

A remaining problem is the rare contrasts of pharyngeal and epiglottal consonants found in Agul. Since pharyngeal and epiglottal fricatives differ in the degree of tongue root retraction, this could be understood as the degree of pharyngealization or the ATR-RTR contrast, which is ±Expanded or ±Raised in EKPA. Feature space seems to be sufficient. Plausible feature specifications of phones should be explored in the context of the phonology of the language in question.

Some language-dependent realizations of contrasts in relation to +G segments

G	−	−	−	−	−	−	−	−	−	+	+	+	+
W	−	−	−	−	+	+	+	+	+	+	−	+	−
L	−	+	+	+	−	+	+	+	+	+	+	−	−
D	−	−	−	+	−	−	−	+	+	+	+	−	−
O		−	+	+		−	+	−	+	−			
Idealized	d	ə	ä	ʕ	tʰ	ə̰	a̰	h	ħ	ɦ	ʔ̤	d̤ʰ	tʔ
Korean	d		ä		t			h		ɦ	ʔ		
Japanese	d		ä		t			h		ɦ	ʔ		
English	d	ə	ä		tʰ			h		ɦ	ʔ		ʔ
Hindustani	d	ə	ä		tʰ							d̤ʰ	t

Ambiguities on the ++LDC –S plane

Since EKPA accommodates both nonsyllabic high or rhotic vowels and taps and approximants as loud mellow dynamic constrictive segments (+LDC –S), a segment on this plane can allow multiple interpretations (as a nonsyllabic vowel, as a canonical glide, and as one of the other kinds of approximants) at the same time. For example, theoretically, a loud mellow dynamic constrictive peripheral overt segment (+LDCPO –S) can be realized as a velar approximant or a nonsyllabic rhotic near back vowel.

The table below illustrates some ambiguities of this type. The more vowel-like interpretation is on the left, and the more consonant-like interpretation is on the right.

Some theoretically possible realizations of the plane ++LDC –S

	P	–	–	+	+
	E	–	+	–	+
O	R				
–	+	i̯ / j	ɪ̯ʲ / j	ɣ̯ / ɥ	ɻʲ / ɥ	ɯ̯ / ɯ	ʊʲ / ɥ	u̯ / w	ʊʷʲ / ɥ
–	–	ɪ̯	ɪ̯	ɣ̯	ɹ		ʊ	ʊ̯	ʊʷ
+	+	æ̯	ɪ̯ʲ / j	ø̯	ɻʲ / ɥ		j		ɥ
+	–	a̯	ɹ̯	œ̯	ɻ	ɑ̯	ɯ	ɒ̯	w

The ambiguities are, as far as I can tell, rather theoretical. I have no evidence of any real language in which any pair of feature-identical segments necessarily contrast. If any of the world's languages has a segmental contrast that EKPA cannot accommodate, then the feature system as a phonological theory will need to be revised. However, the system—as a system of phonetic symbols and phonological features—may remain useful if the partial deficiency does not hinder the phonological description of the target languages. Whether this proves to be a practical problem depends on the language being described, but the problem is probably not as great as it may seem.

First, the vowel-like interpretations of the raised high pairs are not a problem. [i̯] and [j], [ɯ̯] and [ɯ], and [u̯] and [w] are phonetically equivalent or at least nearly indistinguishable. They can easily be seen as notational variants. (Hence, this is an advantage rather than a problem.) For the same reason, [y̯] and [ɥ] may be seen as equivalent (which then means we assume [ɪ̯] and [ɥ] can be equivalent as well).

Things may be more complicated with consonant-like interpretations. For example, the distinction between the palatalized alveolar approximant and the labiopalatal approximant is at least conceivable. However, if in any language all [ɹ, ɹʲ, ɥ] contrast, then [ɥ] is available with quite a few other feature specifications. In addition, [ɹ] (palatalized or not) can be variants of the retroflex approximant [ɻ] (as is the case in English) if they do not contrast at the same time.

For every pair of segments whose feature specifications are identical, at least one of the pair is quite rare or perceptually very similar to a segment with different specifications, and all members of the canonical glides—which I assume are extremely common—are available with multiple feature specifications.

The present proposal is not to exclude any of the theoretically possible realizations a priori. However, I propose the following as "some typical realizations".

Proposed typical realizations of the plane ++LDC –S

	P	–	–	+	+
	E	–	+	–	+
O	R				
–	+	j	ɥ	ɥ	ɥ
–	–	ɪ̯	ɹ	ʊ	ʊ̯
+	+	j	ɥ	j	ɥ
+	–	ɾ	ɻ	ɯ	w

Illustrations

Conventions and clarifications:

- EKPA shorthands are italicized where possible. EKPA shorthands are capitalized when they are meant to be more phonological (fewer features are specified, more rules are later applied), and uncapitalized when they are meant to be more phonetic (more features are specified, fewer rules are later applied). Other phonetic symbols are the IPA unless otherwise noted.

- When a list of segments is presented for a language, it is not intended to be a complete list of phones or phonemes of the language. The segments included in the list are chosen arbitrarily, to the extent that they can serve the discussion in the section.

Other points details of which could have been included in this section but omitted:

- The fricative trills (Šimáčková, et al. 2012) found in Czech are represented as + +LSDC –P.

- Typically, retroflex consonants are expanded, but in languages where rounded and unrounded retroflexes contrast such as Arrernte (Topintzi, N. et al. 2017), the unrounded retroflexes can be represented as ++CO –PRE or constrictive medial overt lowered shrunk segments.

- The Kelabit (Blust 2016) true voiced aspirated plosives are represented as +– GWNLSC +TD thereby accounting for the phenomenon where the geminate (+T) of a voiced plosive, which in turn is arguably +–GWTNL S +D, is realized as the said voiced aspirated plosive. (The point is that there must be some pair where the +T member is a voiced aspirated and the –T member is a superficially regular voiced plosive.)

- A vowel length contrast that cannot be captured by tenseness can be captured by ±D, where '+' is associated with short vowels, i.e., assuming that [j] and [ĭ] are the same. If a glide, a corresponding short vowel, and its non-short counterpart contrast (e.g., if [ja], [ĭa], and [ia] contrast), this measure is not available. The writer-rider problem may be an applicable situation for this measure.

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Seoul Korean

The dynamic nasals (*m̥, n̥, ɲ̊*) are poststopped instead of prestopped. These are considered to be phrase-initial allophones of static nasals (*m, n, ɲ*) (The velar nasal *ŋ* never appears phrase-initially).

These phones can be derived from a much smaller inventory of sixteen underlying segments (my own analysis). Notably, tenseness, nasality, and whispering are contextually determined, glides (*W, Ṡ, Ẋ*) become quiet (*p, t, k*) before consonants. Vowels (*O, Į, Æ, Ɔ̣*) are fronted (*we (ę), i, e, e*) before *Y*, which is then deleted (Kim 1968).

The lax whispered plosives are aspirated syllable-initially, but not as strong as the tense whispered series. Phrase-initially, however, the distinction between the two series seems to be becoming one of the pitch instead of aspiration. It has been suggested that this may be an ongoing process of tonogenesis (Kang 2014).

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Seoul Korean — underlying inventory

		P	+	−	−	+
		O	−	−	+	+
L	**W**		**Labial**	**Dental**	**Palatal**	**Dorsal**
−	+		*P*	*T*	*Ç*	*K*
−	−		*B*	*D*	*Ʒ*	*G*
+	+		*W*	*Ṡ*	*Y*	*Ẋ*
+	−		*O*	*Į*	*Æ*	*Ɔ̣*

Seoul Korean — an inventory of some important segments on the surface

	d	*b*	*g*	*ʒ̣*	*e*	*æ̣*	*o*	*ɔ̣*	*ɪ*	*ɪ̣*	*u*	*r*	*y*	*w*	*l*	*l̥*	*n*	*ɲ*	*m*	*ŋ*	*n̥*	*ɲ̊*	*m̥*	*b̄*	*d̄*	*ḡ*	*ʒ̄*	*t*	*p*	*k*	*s*	*ṣ*	*ç*	*h*	*t̄*	*p̄*	*k̄*	*s̄*	*ç̄*	*ɦ*
G	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+
W	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+	+	+	+	+	+	+	+	+	+	+	+
T	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+	+	+	−	−	−	−	−	−	−	+	+	+	+	+	−
N	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+	+	+	+	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
L	−	−	−	−	+	+	+	+	+	+	+	+	+	+	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	−	−	−	−	−	+
S	−	−	−	+	−	−	−	−	−	−	−	−	−	−	+	+	−	−	−	−	−	−	−	−	−	−	−	+	−	−	−	+	+	+	−	−	−	+	+	−
D	−	−	−	+	−	−	−	−	−	−	−	+	+	+	−	−	−	−	−	−	+	+	+	−	−	−	+	−	−	−	−	−	+	+	−	−	−	−	+	+
C	−	−	−	+	−	−	−	−	+	+	+	+	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+	+	−	−	−	−	+	−	−
P	−	+	+	−	−	−	+	+	−	−	+	−	0	0	−	−	−	−	+	+	−	−	+	+	−	+	−	−	+	+	−	−	−	0	−	+	+	−	−	0
O	−	−	+	+	−	+	−	+	−	−	−	0	0	0	−	+	−	+	−	+	−	+	−	−	−	+	+	−	−	+	−	+	+	0	−	−	+	−	+	0
E	−	−	−	−	−	+	+	−	−	+	+	−	−	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	0	−	−	−	−	−	0
R	0	0	0	0	0	0	0	0	0	0	0	−	+	−	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Jalapa Mazatec

Jalapa Mazatec provides additional evidence that the setting ++G –WTNLSDC can be realized as an unaspirated voiceless plosive. In Jalapa Mazatec, vowels, glides, and nasal stops are contrasted in phonation in three ways: voiceless, voiced, and creaky. At the same time, the plosive series are voiceless aspirated, voiceless unaspirated, and voiced (prenasalized). The parallelism is obvious: the creaky setting of the vocoids corresponds to the tenuous setting of the plosives.

With the tenuous plosives, creaky glides, and a glottal stop, the feature space is quite exploited. Nevertheless, EKPA seems to accommodate them just fine.

Jalapa Mazatec is an example of a language where ±Raised is realized as a palatalization contrast instead of apical-laminal.

References:

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The phonation contrast of Jalapa Mazatec

					G	–	–	+
					W	–	+	–
N	**L**	**D**	**C**			**Voiced**	**Voiceless**	**Creaky**
–	–	–	–	**Stops**			t^h	t
–	–	+	+	**Affricates**			ts^h	ts
–	+	+	–	**Loose glides**			h	ʔ
–	+	+	+	**Constrictive glides**		w	w̥	w̰
+	–	–	–	**Nasal stops**		n	n̥	n̰
+	–	+	–	**Prenasalized stops**		d̃		
+	–	+	+	**Prenasalized affricates**		d̃z		

The consonant system of Jalapa Mazatec

	y	*w*	*ɳ*	*m̩*	*ɲ̆*	*ɲ̣̆*	*ŋ̣*	*n*	*ɲ*	*m*	*t*	*p*	*k*	*s*	*ʂ*	*c*	*ɕ*	*h*	*y̰*	*w̰*	*n̰*	*ɲ̰*	*m̰*	*d̰*	*b̰*	*g̰*	*ʒ̰*	*ʒ̰̣*	*w̰*	*y̰*	*m̰*	*n̰*	*ɲ̰*	*ɦ̣*
G	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	+	+	+	+	+	+	+	+	+	+	+
W	–	–	–	–	–	–	–	–	–	–	+	+	+	+	+	+	+	+	+	+	+	+	+	–	–	–	–	–	–	–	–	–	–	+
T	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
N	–	–	+	+	+	+	+	+	+	+	–	–	–	–	–	–	–	–	–	–	+	+	+	–	–	–	–	–	–	–	+	+	+	–
L	+	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	+	+	+	–	–	–	–	–	–	–	–	+	+	–	–	–	+
S	–	–	–	–	+	+	–	–	–	–	–	–	–	+	+	+	+	–	–	–	–	–	–	–	–	–	+	+	–	–	–	–	–	–
D	+	+	+	+	+	+	+	–	–	–	–	–	–	–	–	+	+	+	+	+	–	–	–	–	–	–	+	+	+	+	–	–	–	+
C	+	+	–	–	+	+	–	–	–	–	–	–	–	+	+	+	+	–	+	+	–	–	–	–	–	–	+	+	+	+	–	–	–	–
P	0	0	–	+	–	–	+	–	–	+	–	+	+	–	–	–	–	0	0	0	–	–	+	–	+	+	–	–	0	0	+	–	–	0
O	0	0	–	–	–	+	+	–	+	–	–	–	+	–	+	–	+	0	0	0	–	+	–	–	–	+	–	+	0	0	–	–	+	0
E	–	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	–	+	0	0	0	0	0	0	0	0	+	–	0	0	0	0
R	+	–	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	–	0	0	0	0	0	0	0	0	–	+	0	0	0	0

Mee

The consonant system of Mee

	d	*b*	*ǧ*	*ɣ̊*	*y*	*w*	*n*	*m*	*p*	*t*	*k*
G	–	–	–	–	–	–	–	–	–	–	–
W	–	–	–	–	–	–	–	–	+	+	+
T	–	–	–	–	–	–	–	–	–	–	–
N	–	–	–	–	–	–	+	+	–	–	–
L	–	–	–	–	+	+	–	–	–	–	–
S	–	–	+	+	–	–	–	–	–	–	–
D	–	–	+	+	+	+	–	–	–	–	–
C	–	–	–	+	+	+	–	–	–	–	–
P	–	+	+	+	0	0	–	+	+	–	+
O	–	–	+	+	0	0	–	–	–	–	+
E	0	0	–	+	–	–	0	0	0	0	0
R	0	0	–	–	–	+	0	0	0	0	0

Mee is a language spoken in the province of Papua, Indonesia. Mee has a typologically rare laterally released velar stop, which has an allophony between the uvular affricate: the segment is released laterally before back vowels and centrally before front vowels.

This allophony is captured intuitively in EKPA. Both uvular affricates and velar lateral affricates are quiet strident dynamic lowered segments, with the only differences being the ±Constrictive and ±Expanded features.

Since Mee distinguishes only two levels of backness in vowels, the difference in ±Expanded can be captured as a simple assimilation—back vowels and uvulars are +Expanded and front vowels and velars are –Expanded.

(–L +SD –R)

	E	–	+
C		**Velar**	**Uvular**
+	**Central**	?	ʁ
–	**Lateral**	gʟ	?

The ±Constrictive issue may not be a problem at all. As the chart shows, there are no obvious candidates that fit into the ++C –E cell and the +–C +E cells in the ++–L +SD –R plane. A velar segment cannot be strident unless it opts to be lateral (if +Raised, it could be an alveolopalatal), and contrastive laterally released uvular plosives are arguably unlikely enough, given that laterally released velar plosives are already rare.

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