

The sound inventory of Polish

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1. The Polish sounds

The Polish alphabet consists of 32 letters, 9 of these vowels and 23 consonants:

a, ą, b, c, ć, d, e, ę, f, g, h, i, j, k, l, ł, m, n, ó, o, ó, p, r, s, ś, t, u, w, y, z, ź, ż

Following two letter combinations represent a single sounds: ch, cz, dz, dź, dż, rz, sz

The letters q, v and x also exist, but only appear in loan words.

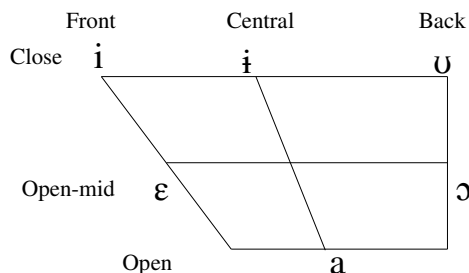
1.1 Consonants

Active articulator		Lower lip		Tip and blade of the tongue			Back of the tongue		Vocal cords	
Passive articulator	Upper lip	Upper teeth		Alveolar ridge		Hard palate	Velum	Uvula		
Names of sounds		bilabial	labio-dental	dental	alveolar	palato-alveolar	palatal	velar	uvular	laryngeal
Plosives		p		t̪				k		voiceless
		b		ɖ				g		voiced
Fricatives			f	s̪	ʃ	ç		x		voiceless
			v	z̪	ʒ	ʒ̥				voiced
Affricates				t̪s̪	t̪ʃ	t̪ç				voiceless
				ɖz̪	ɖʒ	ɖʒ̥				voiced
Nasals		m		ɳ̪			ɲ	ŋ		
Liquids	Laterals				l					voiced
	Rhotics				r					
Glides		(w)					j	w		

Remarks: Some literature as [Swa2002] and [Jagod] describes s, z, ts and dz as dental, [Rub84] states that they are alveolar. Thus, in [Swa2002] and other literature, all palatal and palato-alveolar fricatives and affricates move one step to the left, in [Rub84], they are at the positions they have in German. We decided to follow [Swan2002] but, for the sake of brevity, consider sounds that merely switched their place of articulation not as “extra sounds”. Also, the transcription of the alveolar and palato-alveolar fricatives and affricates varies, here we use the symbols that are also used in German and English.

1.2 Vowels

All Polish vowels are equally short, long vowels do not exist.
The letters u and ó are the same sound [u].



Polish also has the two nasal vowels *ą*, which is always pronounced [ɔ̃] + <nasal consonant> and *ę*, which is always pronounced [ɛ̃] + <nasal consonant>. The type of the nasal consonant depends on the context:

- before a bilabial, it is [m]
- before a dental stop, it is [n]
- before a velar stop, it is [ŋ]

The rules will be explained and expanded in the upcoming MP about phonological rules.

2. Differences between the German and the Polish sound inventory

2.1. Polish has the following sounds not present in German:

- the nasalized vowels *ą* and *ę*
- the velar glide [w], written as *ł*
- the voiced dental affricate [dʒ]
- the voiced alveolar fricative [ʒ]
- both voiceless and voiced palato-alveolar (or prepalatal) fricatives [ç] and [ʒ]
- both voiceless and voiced palato-alveolar (or prepalatal) affricates [tʃ] and [dʒ]
- the palatal nasal [ɲ]

2.3. German has following sounds Polish lacks:

- the tense vowels [e], [u], and [o]
- the tense and the lax version of the vowel *ü*, [y] and [ʏ]
- the tense and the lax version of the vowel *ö*, [ø] and [œ]
- the lanryngal fricative [h]
- the voiceless labio-dental affricate [pf]
- the uvular rhotic [ʁ]

3. Word examples for “extra sounds”

<i>Letter</i>	<i>Example</i>	<i>Transcription</i>	<i>Translation</i>
<i>ą</i>	trąba	[trɔmba]	trumpet
	kąt	[kɔnt]	angle
<i>ę</i>	sęp	[sɛmp]	vulture
	peczęk	[pɛntʃɛk]	bunch

<i>Letter</i>	<i>Example</i>	<i>Transcription</i>	<i>Translation</i>
dz	cudzy	[tsudzi]	foreign
ż	żaba	[ʒaba]	frog
dź	dżdżownica	[ɟʒɔvnitsa]	earthworm
ś, si-	kwaśny	[kvaɕni]	sour
ć, ci-	choć	[xɔɕ]	although
ź, zi-	ziarno	[ʒarno]	grain
dź, dzi-	dziadek	[ɟʒadɛk]	grandfather
ł	nagły	[nagwi]	abrupt
ń	słoń	[swɔɲ]	elephant

4. Pronunciation

[ʒ] / [ɕ]: The process involved in the articulation of these sounds is called palatalization. It involves the raising of the flat blade of the tongue (also referred to as laminal) toward a position that is similar to that of [j]. The lips are spread and the air escapes through the narrow channel between the post-alveolar region, directing the jet of air downward to strike the teeth and thus produce a sibilant sound. Both sounds are alveolo-palatal (closer to palatal than to alveolar) median laminal fricatives and are articulated further forward as the true palatal [ɕ] or [j] and not as far forward as the palato-alveolar [ʃ] and [ʒ]. [ʒ] uses voicing whereas [ɕ] is voiceless.

The affricates [ɟʒ] and [tɕ] combine [ʒ] and [ɕ] with the plosives [t] and [d] so that their articulation is preceded by a full closure due to moving the tip of the tongue to the post-alveolar region causing air pressure building up in the oral tract. The air then releases into the articulation of the sibilant fricatives whereas the plosives assimilate to the voicing/non-voicing of the following [ʒ] or [ɕ].

[ɲ]: This voiced palatal nasal is produced due to the body of the tongue touching the hard palate as in Italian *signore* or French *agneau*. This sound differs from [ŋ] which also occurs in German and English in that it is not articulated at the velum but moving the place of the active as well as the passive articulator further front.

[w]: This velar glide (also called velar approximant) is equivalent to the English sound written as *w* as in *wow*. Its articulation is done by rounding the lips closely together, even more closely than in [u]. The back of the tongue is raised toward the soft palate (velum). The air flows freely out of the mouth.

[ʒ]: This palato-alveolar fricative is the voiced equivalent to the voiceless [ʃ] which also exists in the German inventory. For articulation, the teeth are closely together and the lips are typically rounded (unlike in Russian, where there is an unrounded version of the sound as well). The tongue is domed and creates a constriction in the post-alveolar region. The jet of air directs downward and strikes the teeth, making [ʒ] a sibilant. Just as in [ɟʒ] and [tɕ], does this fricative have an affricate [ɟʒ] version as well, combining it with a preceding full closure that releases the air into the fricative articulation (see above).

The voiced initial dental fricative [z], which similarly exists as an alveolar version in German (e.g. in "Sack") can combine with the voiced plosive [d] to an affricate in Polish. [d] is produced just as in the affricates mentioned before, though the air is released to be led to the teeth. The sibilant is dentalized in that it is articulated in the alveolar region but with the blade of the tongue being very close to the inner part of the upper teeth.

Literature:

1. [Jagod]: Grzegorz Jagodziński, "Grammar of the Polish Language", <http://grzegorz.w.interia.pl/gram/isoen/gram1.html>
2. [Swa2002]: Oscar E. Swan, "Grammar of Contemporary Polish", Bloomington 2002 (available at <http://polish.slavic.pitt.edu/>)
3. [Rub84]: Jerzy Rubach, "Cyclic and lexical phonology: The structure of polish", Dordrecht 1984
4. [Pul86]: Pullum "Phonetic Symbol Guide" 2nd Edition, Chicago 1986
5. [Lad96]: Ladefoged / Maddieson "The Sound of the World's Languages", Blackwell 1996
6. [Kud68]: Kudela (1968), cited in [Lad96]