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Diphthongs

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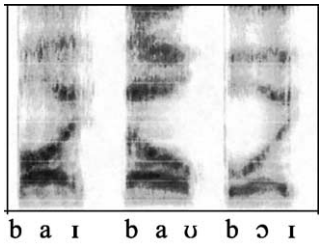
A diphthong is two vowel-like sounds within the rhyme of a single syllable, such as English *buy* [baɪ], *bough* [baʊ], *boy* [bɔɪ]:

(1) American English diphthongs

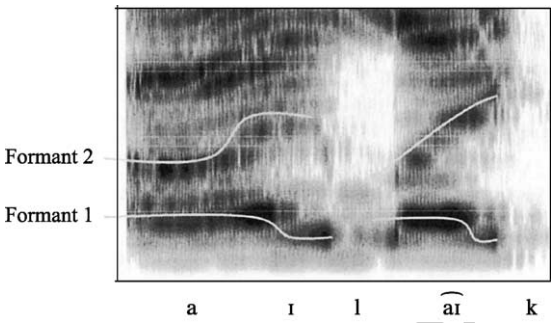


We ignore here sequences of vowels in separate syllables, so that *boing* [bɔɪŋ] has a diphthong but *Boeing* [bo.ɪŋ] does not. We ignore as well purely orthographic diphthongs like those in *guest* [gɛst], *laugh* [læf], and *thought* [θɔːt], which are monophthongs spelled as diphthongs.

At least one member of a diphthong is a vowel and there is often disagreement as to whether the other sound is a vowel in the nucleus of the syllable [aɪ, aʊ, ɔɪ] or a consonant in the coda [aj, aw, ɔj]. Because the exact degree of stricture of the second element may vary considerably, [ɪ, i, j] or [ʊ, u, w], and because there is no agreed-upon relation between the stricture of a sound and the phonetic symbol used to represent it, the decision to treat a given diphthong as *vowel-vowel* or as *vowel-glide* is often decided phonologically, by how the sounds pattern, rather than phonetically, by specifics of their articulation or acoustics. Languages rarely if ever contrast *vowel-vowel* diphthongs with *vowel-glide* diphthongs, so the question is probably moot as far as distinguishing differences in meaning is concerned. About a third of the world's languages have diphthongs, most (such as French) have only monophthongs [a, i], and a few reportedly have triphthongs [uaɪ, uiu]. No language is reported to have tetraphthongs, pentaphthongs, or the like.

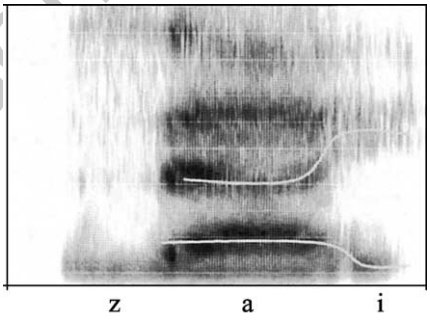
Acoustically, diphthongs involve a trajectory across the vowel space, shown most clearly in the first two formants (yellow lines below). This trajectory is what distinguishes diphthongs from long vowels such as [iː] and [uː]. The percentage of a diphthong devoted to transition between the two vowels may be relatively small, so that the vowels appear fairly distinct [aɪ], or relatively large, so that the vowels seem to coalesce into a single trajectory [a͡ɪ]:

(2) American English 'I like Holita'



This degree of coarticulation varies within speakers (as here) and across languages so that the transition period in Arabic [ai, au] is only about 20% of the diphthong (like [aɪ] above), while the transition period in English can be as high as 75% of the diphthong (like [a͡ɪ] above). This is apparent if we superimpose the F1 and F2 lines from above on Arabic [ai]:

(3) Palestinian Arabic (South Levantine Spoken Arabic) zai 'letter z'



No language, however, contrasts such diphthongs: there seems to be no language in which [ba͡ɪ] means one thing, with its vowels coarticulated, and [bai] means another, with its vowels relatively distinct. The articulatory and acoustic targets of a diphthong's endpoints may be undershot, so that /ai/ is realized as [aɪ, ae, əɪ] or the like. In terms of the relative sonority of the two sounds involved, diphthongs may fall [ai, ao], rise [ia, oa], or plateau [iu, oe]. Some languages have centering diphthongs that move from the edges of the vowel space towards the center, such as RP English, where /ir/ and /ur/ are pronounced with a diphthong that ends in the central vowel [ə]: 'beer' [biə], 'poor' [puə].

Most languages have fewer diphthongs than monophthongs. The Maastricht dialect of Dutch, for instance has 21 monophthongs but only three diphthongs (Gussenhoven & Aarts, 1999). It seems that no language has all the diphthongs one could get by pairing each of the vowels of the language with all others, i.e., no language with five monophthongs

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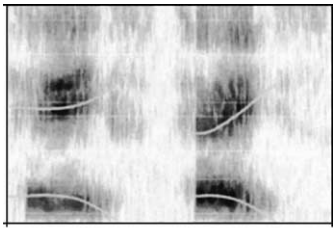
(a, e, i, o, u) has 20 diphthongs (ai, ei, oi, ui, ea, ei, eo, eu, etc.). Brazilian Portuguese (Cagliari, 1977) has more diphthongs (13, not counting nasal diphthongs) than it has short stressed monophthongs (seven) but still far fewer than if every vowel occurred with every other vowel in a diphthong (42).

(4) Brazilian Portuguese: diphthongs ending in [ɪ]

xeɪs	'kings'	xɛɪs	'cents'
boɪ	'bull'	dɔɪ	'it hurts'
paɪ	'father'	fuɪ	'I went'

Of particular interest here are pairs [xeɪs, xɛɪs] and [boɪ, dɔɪ], which differ primarily in the backness of the first half of the diphthong:

(5) Brazilian Portuguese



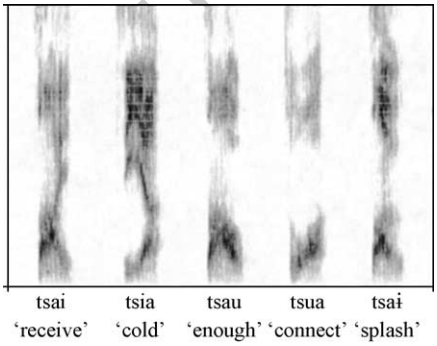
Similarly delicate contrasts are found with diphthongs ending in [ʊ]:

(6) Brazilian Portuguese: diphthongs ending in [ʊ]

seʊ	'yours'	sɛʊ	'sky'
soʊ	'I am'	sɔʊ	'sun'
saʊ	'salt'	suʊ	'south'
viʊ	's/he saw'		

Many languages have both rising (ia, ua) and falling (ai, au) diphthongs, despite occasional published claims to the contrary. Thus Hmong Daw (White Hmong) has three rising diphthongs (ai, au, aɨ) and two falling (ia, ua):

(7) Hmong Daw: falling and rising diphthongs



Diphthongs behave like two vowels in most languages with respect to height (ei/ie contrast), rounding/backness (oe/eo contrast), stress (diphthongs attract it if long vowels do), and tones (diphthongs can carry two tones if long vowels do). Diphthongs behave like one vowel with respect to phonation type (a̰ɪ/aɪ̰ do not contrast, a̤ɪ/aɪ̤ do not contrast), nasalization (ãɪ/aĩ do not contrast), and tenseness/laxness (eɪ/ɛi do not contrast). Note that the Brazilian Portuguese contrast between [xeɪs] 'kings' and [xɛɪs] 'cents' hinges on whether the centering that distinguishes [ɛ] from [e] occurs only in the first half of the zdiphthong 'kings' or throughout 'cents'; it does not hinge on whether the feature is in the first half or the second, which does not seem to contrast in any language.

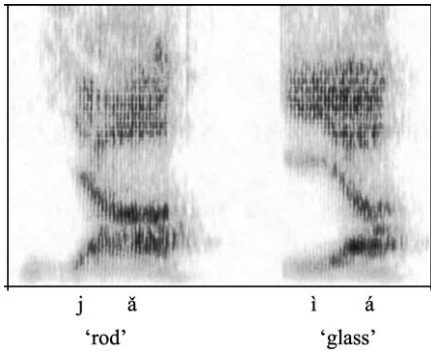
Diphthongs count as long in most languages, though some languages such as Ancient Greek had contrasting short and long diphthongs, such that short [oi] behaved like a short vowel and long [oi] behaved like a long vowel. Certain dialects of Mixe have a three-way length contrast among diphthongs (Suárez, 1983):

(8) San José El Paraiso Mixe

[ʔoi]	'although'
[ʔoːi]	'he went'
[ʔoːːi]	'very'

Some vowel sequences that appear to be diphthongs are actually spread across the onset and nucleus of a syllable and should not be confused with the real thing. Thus, Romanian contrasts glide-vowel sequences (ja, wa) with acoustically very similar vowel-vowel sequences (ea, oa), but the former have the glide (j, w) in the onset, while the latter are fully contained in the nucleus (Chitoran, 2002). Similarly for Hmong Daw, which contrasts a glide + vowel sequence [jă] with a real diphthong [ìá]:

(9) Hmong Daw: fake and real diphthongs



The property of being a diphthong never spreads to nearby vowels, suggesting that it is not a feature of vowels in the same way that height and backness are. In many languages, the vowels within a root, stem, or word must agree in height, backness, rounding, nasality, or tongue root features, but nothing like this occurs with diphthongs. We find no

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language in which polysyllabic roots, stems, or words contain *either* monophthongs or diphthongs but not both. This suggests that the trajectory within a diphthong is not a distinctive and transferable property of diphthongs but a result of the co-articulation of two vowels within the same syllable nucleus.

Diphthongs often arise from monophthongs, as during the Great Vowel Shift, when long high vowels (iː, uː) became diphthongs (aɪ, aʊ) in English:

(10)	Middle English	Modern English	
	wiːf, liːf, striːf	waɪf, laɪf, straɪf	'wife, life, strife'
	huːs, muːs, luːs	haʊs, maʊs, laʊs	'house, mouse, louse'

Conversely, monophthongs may arise from diphthongs: in many dialects of the American south, [aɪ] has monophthongized into [aː] in words like *tide* [t^{h}aːd] and *tie* [t^{h}aː].

Despite the fact that diphthongs are relatively marked sounds in the languages of the world, some children acquire them very early on. Stoel-Gammon and Dunn (1985) reported on a number of English-speaking children whose first words included the diphthongs [aɪ] or [aʊ]:

(11)		
	Daniel (12 months)	
	[nænæ]	'banana'
	[(d)ai]	'light'
	[ʔʌʔoʔ]	'uh-oh'
	[wəsæ]	'what's that?'
	Sarah (11 months)	
	[bebi]	'baby'
	[baɪbaɪ]	'bye-bye'
	[dɔgi]	'doggie'
	[dus]	'juice'
	[mama]	'mama'
	Will (12 months)	
	[(d)ada]	'all-done'
	[dæ, dʌ, dau]	'down'
	[di]	'light'
	[tsis, θiz]	'shoes'
	[ʌʔo, hʌho]	'uh-oh'

From out of the mouths of babes like these comes evidence that diphthongs are a natural part of human languages, more so than their relative scarcity in languages might otherwise suggest.

See also: Phoneme; Complex Segments.

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Direct Reference

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What Is Direct Reference?

Let us begin with a brief introduction to some essential terms. A *singular term* is an expression whose role is to specify a particular individual – proper names (e.g., 'John') and pronouns (e.g., 'she') are paradigm cases. A *proposition* is the meaning expressed by a sentence. A sentence whose subject-expression is a singular term (e.g., 'John is tall,' 'She is happy') expresses a *singular proposition*. (In contrast, a sentence whose subject-expression is a general term expresses a general proposition [e.g., 'Tigers are mammals'].)

Direct reference is a contrastive term; the contrasting view is 'mediated' or 'indirect' reference. (For brevity, I'll use the labels 'DR' for the former and 'IR' for the latter.) The classic IR position is developed by Frege (1892). On Frege's view, terms express a