

# ‘Aspiration’ & coarticulation

## About /h/ [h] & /Ch/ [Ch] (& Co.)

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1. What corresponds to /h/ [h] & /Ch/ [Ch]? Is it correct to represent the ‘aspirate’ /h/ as [h]? In fact, the *offIPA* current representation –/h/ [h]– is quite phonemic, but generally a satisfactory one, indeed.

The same is true for a general *canIPA* representation. As a matter of fact, even within *canIPA*, this is more than sufficient, due to normal automatic coarticulation. Of course, when the effect of coarticulation is stronger, *canIPA* shows it adequately (taking particular aims into consideration, as well), as we will see below, for more or less important nuances.

It would not be convenient to continuously notate expressly that we have (prevelar) [k] /k/ before front vowels. But –if we want to be realistic– we have to indicate a palatal [c] (or a pospalatal [c]) realization, when it realizes the (velar) /k/ phoneme, either before front vowels, or at the end of a word, as it happens in neutral French pronunciation: [ci, ‘mɛc] *qui, mec*. Of course, strictly speaking, a transcription like [ki] would not represent a natural /ki/ sequence in any real language. That is, a true *velar* stop, [k], would not be possible in any human language, in front of a true *palatal* vocoid like [i], because –by assimilation– the actual articulation of /k/ necessarily becomes prevelar, [k]. In fact, if we actually find something like [ki], the only possible natural phonemic sequence is /qi/, as in Arabic [qrʕʔɑːni] *qīšānī*, which would rather be [krʕʔɑːni]. But, again, even in *canIPA Natural Phonetics*, it is better to simply transcribe [qr], because assimilation does the rest properly.

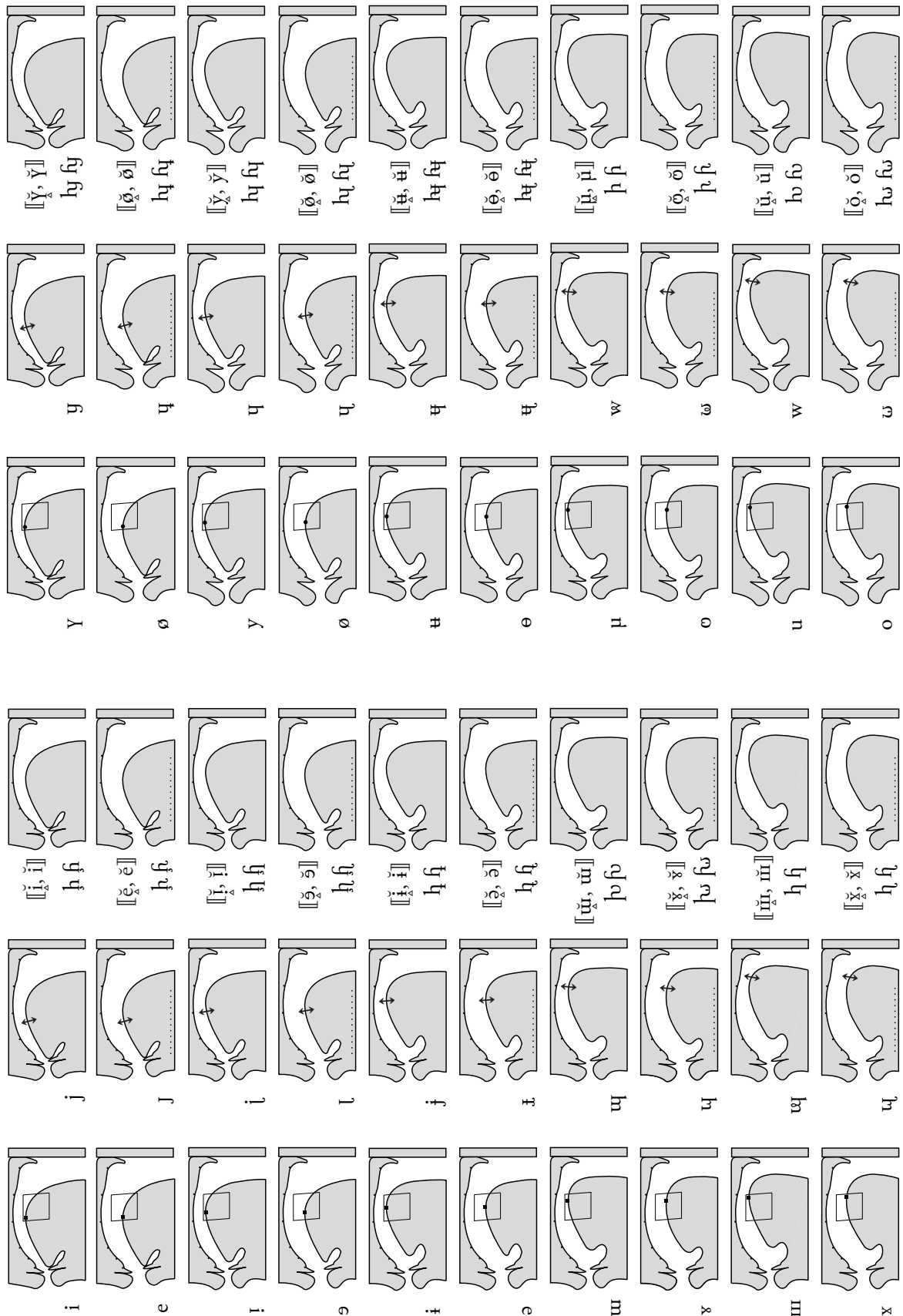
2. Going back to /hV/ sequences, we have (using examples for international-English pronunciation): [hiit] *heat*, [hit] *hit*, [hæt] *hat*, [hɛt] *hut*, [hɒt] *hot*, [huut] *hoot*, [hɜːt] *hurt*. These transcriptions are quite sufficient for any human being. However, they would not be enough for a talking machine, unless a suitable adaptation is used, simply to take account of (natural) assimilation. In fact, to be true, in any /hV/ sequence, /h/ is realized as a voiceless (non-intense, or ‘non-syllabic’, [C̥]) contoid, perfectly corresponding to the vocoid that follows /h/, [V̥]. These are all *canIPA* conventions that go far beyond poor *offIPA*.

This distinction between contoids and vocoids is fundamental, so the ‘proper’ *canIPA* transcription of the above examples would, then, be: [h̥iit̥, ‘hit̥, ‘h̥æt̥, ‘h̥ɛt̥, ‘h̥ɒt̥, ‘h̥uut̥, ‘h̥ɜːt̥] (or perhaps, by convention, [V̥]: [h̥iit̥, ‘hit̥, ‘h̥æt̥, ‘h̥ɛt̥, ‘h̥ɒt̥, ‘h̥uut̥, ‘h̥ɜːt̥]). And so on, for any further vocoids (and in any other languages). But it is perfectly clear that a notation like [h] is not only sufficient, but also remarkably simpler. In fact, otherwise, we should have further systematic symbols even for /hC/ sequences, like Burmese /hm, hn, hp, hŋ, hw, hl/ [hm, hn, hp, hŋ, hw, hl], ie [hm, hn, hp, hŋ, hw, hl].

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\* Unfortunately, *offIPA* is nothing more than a phonemic alphabet (in spite of its official name: ‘International Phonetic Alphabet’, with some vague and curious definitions, too. It only has two voiceless and voiced ‘fricative’ (meaning *approximant*) sounds, /h, f/ (beside oldfashioned, or provincial, ‘/ʌ/’ –ie [hʌw, hw]– mostly for English *wh*). In addition, let us notice that generally *offIPA* indicates any kind of ‘aspiration’ as /Ch/ – and also [Ch], even for voiced ‘aspiration’.

fig 1. Orograms of some vocoids and their corresponding dynamic &amp; (more) static approximants &amp; semi-approximants.



3. Furthermore, many languages have phonemic sequences like /Ch/, or at least phonetic ones, [Ch]. Let us see a few (international-English) examples: [ˈphliːrɪz] *please*, [ˈkʰɹuː] *crue*, [ˈtʰwaɪs] *twice*, which should be rendered as: [ˈp̥liːrɪz, ˈk̥ɹuː, ˈt̥waɪs] (and other more cumbersome combinations). Thus, it is very clear that the notation with [h] is the more convenient (and even *natural*) one: [hV, hC, Ch]. This is a serious problem only for talking machines, not for human speakers (and hearers).



a true constrictive laryngeal contoid), while, in completely unstressed syllables, we find /<sub>o</sub>ph/ [p], ie a non-aspirated taxophone for an 'aspirated' phoneme.

Other languages, mostly Indian ones, such as Hindi, can oppose voiceless /Ch/ sequences to voiced ones: /Ḍh, Ḍḥ/. On the other hand, in Mandarin Chinese, the 'aspirate' /h/ has three different 'normal' voiceless taxophones: [ʰ, ʰ̥, ʰ̹] (respectively: uvular semiconstrictive, uvular approximant, and velar approximant). In Korean, both /h/ and /Ch/ have [h] + /i, j/, [hv] + /u, w/, [h] + /w/. Guarani has tautosyllabic /Vh/ sequences as [iḥ, uḥ, uḥv].

5. Even without having to invent all possible ('un-diacritical') symbols for the assimilatory taxophones seen above (and their possible extensions), *canIPA* has a number of phones and symbols to adequately account both for coarticulation *assimilation* and for gradation *tension*.

In fact, not only the 'aspirate' /h/, but also 'aspirated' consonants (such as /kh, tʃh, sh/) can vary, first of all, because of differences in their tension. Thus, any /h/ (alone or in combinations) can range from true *constrictives* [h, ḥ] (and semi-constrictives [h̥, ḥ̥], formerly shown as [h̄, ḥ̄]) to true *approximants* [h, ḥ] (and semi-approximants [h̥, ḥ̥]) – including voicing lenition, with voiced phones (and semi-voiced ones, too).

Besides, in addition to plain laryngeal phones /h, ḥ/, a number of assimilatory coarticulations can be added to them, especially in correspondence to vocoidal phones. As a matter of fact, such coarticulations are quite peculiar, so that they are easily noticed (sometimes even by laymen). In particular, fig 1 shows 20 (and 20 further voiced) approximants (and semi-approximants), corresponding to as many high and higher-mid vocoids (and to their matching dynamic contoids, too). Their points of articulation are: *palatal*, *pospalatal*, *prevelar*, *provelar*, and *velar* (including bilabial rounding, too).

6. Frequently, however, this assimilatory strength derives not only from a *following* vocoid (or a sonant contoid). In fact, also a *preceding* vocoid can determine their (places of) articulation. fig 2 shows further contoidal orograms (including some approximants and semi-approximants already seen in fig 1). They belong to the four classes of (semi-)constrictives and (semi-)approximants, and can be used by several languages, both for /hV/ and /Ch/ sequences.

They can also represent the taxophonic realizations of other phonemes, such as Spanish /s/, mostly in /sC/ and /s<sup>#</sup>/ sequences (but also, in /s<sup>#</sup>V/ sequences; more rarely so for /VsV/). For instance, some accents of Spanish can have /s/ [h̥, h, ḥ, ḥ̥, hv], respectively, in sequences of /i, e, a, o, u/ + /sC/, depending on the preceding vowel; or they can have [ϕp, ʃt, ḥk], depending on the following consonant, and so on. Sometimes, they are even (unprecisely) represented as /hC/ (and defined as 'aspiration', too).