11. Phonic peculiarities

Intense (or 'syllabic') contoids

11.1. Particularly nasal, lateral, and trill contoids (but others, too) can often become *intense* (which does not mean 'double, long'). They are articulated with relatively greater muscular tension, articulatory energy, and expiratory pressure. This kind of intensity is denoted by placing a short vertical stroke below the symbol (or above, if there is little space below).

Such intense contoids can become nuclei for syllables in appropriate contexts – namely close to, or between, less perceptible contoids (according to the scale of syllabicity). After vocoids, instead, they do not form another syllable in any way (unless there is an increase in their stress prominence, as can happen with vocoids).

Traditionally, though, these (more) intense contoids –for want of a better term– are defined as 'syllabic' (even when they are not syllabic nuclei), just to emphasize that they are different from normal –or 'non-syllabic'– contoids.

We will now consider several examples. In (British & American) neutral English: *suddenly* [ˈsɐɖn̩li, ˈsʌ-], *dictionary* [ˈɖɪkʃn̩ɻ̩i, -əˌnɛɹi, -n̩ˌɛɹi]), *from there* [fɻ̩m̩ˈðɛˑɜ, fɹm̩ˈðɛˑɻ̩], *compel* [khɯmˈphɛɫː, khm̩-], *I can go* [aɔkŋ̍ˈɡɜˑɷ, -ʊˑɷ], *rifle* [ˈɻaɔfɫ̩, ˈɹ-], *till then* [ʈhɪɫˈðɛnː, ʈhɫ̩-], *temporary* [ˈʈhɛmpɻ̩əɻ̩i, -pɻ̩ɻ̩i, ˈʈhɛmpəˌɹɛɹi, -pɻ̩ˌɹɛɹi], *literal* [ˈlɪʈəɻ̩ɫ̩, ˈlɪʈɻ̩ɫ̩, ˈlɪɾəɹɫ̩, ˈlɪʈɹɫ̩].

And: *that was me* [ˈðæp wz̩ˈmɪˑi], *a cup of tea* [ɯˈkhɐp v̩ˈʈhɪˑi, -ʌp]; German: *kommen* [ˈkhɔmm̩], *reisen* [ˈʁaezn̩], *fliegen* [ˈfliːɡŋ̍], *Esel* [ˈʔeːzl̩], *Mutter* [ˈmʊtʀ̩]; Czech: *osm* [ˈʔʊsm̩, -sum], *vlk* [ˈvɫ̩k], *prst* [ˈpr̩st]; Dutch: *zonder* [ˈʐondɽ̩, -dɽ̩]; Mandarin Chinese: *shí/shi̋* [˧ʂʐ̩] (less frequent a variant than [˧ʂɯ˞]); Japanese: *gen'an* [ˍɡɛŋ̍ˑɐŋ̍].

It is possible, and more advisable, to use intense consonants in phonemic transcriptions as well. Among other reasons, they are more clear, and less ambiguous, than transcriptions such as '/ˈsʌdn, ˈlɪtl/', to indicate /ˈsɐɖn̩, ˈlɪʈɫ̩, -ɫ̩/ *sudden*, *little*.

Coarticulation

11.2. The 'speech chain', or in other words, actual speech, *ie* spoken language, is not constituted by disconnected single phones, as might be deduced from seeing the individual symbols making up a sentence or a rhythm group. To be true, there is no interruption or pause even between words, although they are separated by spaces in writing (and in old-style phonemic/phonetic transcriptions).

While speaking, the articulatory organs are continually in movement, and they pass from one position to another. As it happens, there are never *positions*, or *moments* when the articulators are entirely static – this can be seen in *x*-ray films as well. Even during the articulation of long phones, there are differences in the positioning of the articulators, in muscular tension, and in direction, so that movement is present here, as well.

The movement from one sound to another is by the shortest path, dulling a bit the characteristics of the two sounds which are most in contrast with each other. Moreover, in part for reasons of inertia and elasticity, the characteristics of the preceding phone are preserved. At the same time, for reasons of adaptation, the characteristics of the following phone are anticipated. This important cohesion between the different elements, in fact, constantly delays and anticipates information regarding the structure of the phones surrounding each other phone in the speech chain. This phenomenon, which (at the beginning) is not immediately obvious, is called COARTICULATION.

The articulatory movements necessary to produce a particular phone in isolation can be considered a *target* to be reached. In the speech chain, the different targets follow one another. The targets exert influences on each other, according to the speed and length of the utterance, as well as the characteristics of each single target. In fact, the more the targets are different and independent from each other, the more the articulators are, on the one hand, free to move on their own, and on the other, required to take up positions not unduly distant from each other.

Modifications

11.3. In order to articulate *p*, *b*, *m*, for example, the tongue has no precise role. It is therefore free to move into position for any phone which follows, such as for example [pr, pɾ, pɹ, pɻ, pʀ, pʁ, pʀ̆, pl, pj, pw, pi, pa, pu]. In fact, each one of these [p]'s, strictly speaking, could be shown (although –definitely– not in transcriptions for descriptive and teaching purposes) with a *subscript*: ⟦p$_{\text{r}}$r, p$_{\text{ɾ}}$ɾ, p$_{\text{ɹ}}$ɹ, p$_{\text{ɻ}}$ɻ, p$_{\text{ʀ}}$ʀ, p$_{\text{ʁ}}$ʁ, p$_{\text{ʀ̆}}$ʀ̆, p$_{\text{l}}$l, p$_{\text{j}}$j, p$_{\text{w}}$w, p$_{\text{i}}$i, p$_{\text{a}}$a, p$_{\text{u}}$u⟧ (*fig* 11.1 gives several frequent coarticulations).

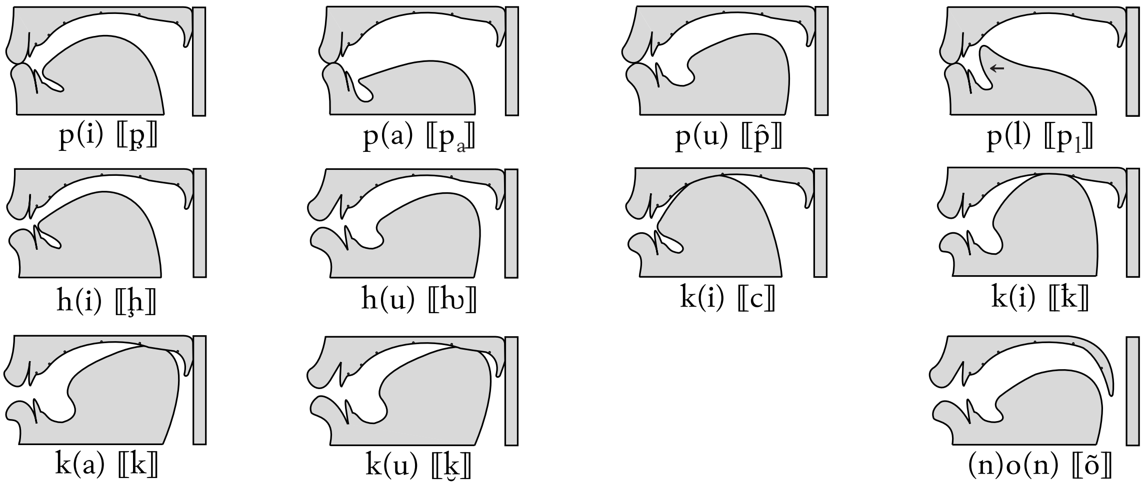
In the same way, the lips have no specific role in most contoids. Therefore, they can freely move into the position for the lip shape of the following vocoids, such as *rounded* or *spread*: [bu, ba, bi; su, sa, si; nu, na, ni; lu, la, li; ku, ka, ki]. Here, as well, we show the labial coarticulation anticipating the following phones through subscripts, in order to focus attention on the phenomenon: ⟦b$_{\text{u}}$u, b$_{\text{a}}$a, b$_{\text{i}}$i; s$_{\text{u}}$u, s$_{\text{a}}$a, s$_{\text{i}}$i; n$_{\text{u}}$u, n$_{\text{a}}$a, n$_{\text{i}}$i; l$_{\text{u}}$u, l$_{\text{a}}$a, l$_{\text{i}}$i; k$_{\text{u}}$u, k$_{\text{a}}$a, k$_{\text{i}}$i⟧.

Clearly, the subscript ⟦u⟧ refers, by anticipation, both to lip rounding and to lifting the back of the tongue towards the velum (or soft palate), to a greater or lesser degree according to the level of independence of the articulators involved. By the same token, ⟦i⟧ refers to spreading of the lips and the corners of the mouth, and to lifting the back of the tongue towards the (hard) palate. The subscript ⟦a⟧ has a coarticulatory component as well, which consists in a neutral lip position (neither rounded, nor spread) and in a much greater opening of the jaw than what takes place in ⟦i⟧ or in ⟦u⟧. It has neither the front or back tongue movement of these last two, given that it is low central.

In the case of [h], which is laryngeal, the coarticulatory possibilities are even more abundant and common, because the tongue and the lips are both completely independent of the articulation. In fact, in sequences of the form [hV], we actually have ⟦ᵛ̥V⟧, where the first symbol placed in *superscript* stands for a plain 'non-syllabic' and voiceless vocoid, corresponding in position to the (voiced) vocoid which follows. Thus, the tongue and the lips have the same position, while the articulation is that of a contoid, since it is less static than that of a vocoid. This is the same relationship we encounter between [i, u] and [j, w] (approximants) or better yet, [ȷ, ɯ] (semiapproximants) seen in *fig* 5.1.

Therefore, we have: [hi, he, hɛ, ha, hɔ, ho, hu] ⟦h$_{\text{i}}$i, h$_{\text{e}}$e, h$_{\varepsilon}$ɛ, h$_{\text{a}}$a, h$_{ɔ}$ɔ, h$_{\text{o}}$o, h$_{\text{u}}$u⟧, and similarly: [hæ, hɒ, hə; hm, hɹ, hɾ, hl] ⟦h$_{æ}$æ, h$_{ɒ}$ɒ, h$_{ə}$ə; h$_{\text{m}}$m, h$_{ɹ}$ɹ, h$_{ɾ}$ɾ, h$_{\text{l}}$l⟧. The same goes, often, for [Vh] – it corresponds to ⟦Vᵛ̥⟧: [ih, eh, ɛh, ah, ɔh, oh, uh] ⟦ih$_{\text{i}}$, eh$_{\text{e}}$, ɛh$_{\varepsilon}$, ah$_{\text{a}}$, ɔh$_{ɔ}$, oh$_{\text{o}}$, uh$_{\text{u}}$⟧...

fig 11.1. Automatic coarticulations, which are more or less marked according to languages.



In conclusion, the lips are always subject to coarticulation, within a syllable. Therefore, in words like the following we will actually have almost (with ^{a} = *American*, and ^{b} = *British* neutral accents) *whole/hole* ⟦ˈh̯ɵ·ɷɫ̯^{b}, ˈh̯ɤ·ɷɫ̯^{a}⟧, *holy* ⟦ˈhɜɷ-li^{b}, ˈh̯ɤɷ-li^{a}⟧, *wholly* ⟦ˈh̯oɷɫ̯-li^{b}, ˈh̯ɤɷɫ̯-li^{a}⟧, *follow* ⟦ˈf̯ɒl̯-ɜɷ^{b}, ˈfɑl-ɤɷ^{a}⟧, *fall* ⟦ˈf̯ɤːɫ̯^{b}, ˈf̯ɔːɫ̯^{a}⟧, *law* ⟦ˈl̯ɤː^{b}, ˈl̯ɔː^{a}⟧.

[ʃ], which has intrinsic lip protrusion (being *protruded*), naturally has less protrusion before [ɪi, ɩ, ᴇ, æ, ɐ/ʌ, ɜɷ, ᴇɪ, aɘ, aɵ, ə, ɜː]. Instead, when preceding [µu/ʊu, ɷ, ɤː/ɔː, ɒ, ɤɷ, ɤɘ], there is a bit more protrusion, even though it does not reach the point of [ʃ̹]; just as before non-rounded *V* it does not become [ʃ̜].

In the case of consonant articulations which are simply *bilabialized*, with bilabialization (not rounding, nor protrusion), there is a similar, but less obvious mechanism. In fact, in the case of Japanese, /s/ followed by /i, jV/ is pronounced as [ɕ], [ɕi, ɕjV], not [ʂ̡i, ʂ̡jV], since the lips are not spread, with the corners of the mouth pulled back (as happens with Slavonic languages), but are rather neutral, for reasons of coarticulatory compensation and adjustment.

In any case, if these coarticulations are automatic, they should normally not be marked except in points where they are explained while describing systematically the phonic structure of a language. Therefore, coarticulation is not marked in front of rounded *V*, unless it is of a stronger or additional level. A case of this sort occurs in Mandarin Chinese, in the case of *mǒ* [ˌm̂ɔ̣ɔ̣], but not in *mǔ* [ˌmụụ] (*cf* English *more* [ˈmɔː/ˈmɔːɹ], *moo* [ˈmµ·u/ˈmʊ·u]).

11.4. Given that, as we have indicated, these phenomena are automatic, once they have been fully understood, it is better not to mark them in any way – neither with superscripts, nor with diacritics. It would rather be important to mark the contrary, that is when the coarticulation does *not* occur, even when the elements which normally cause it are present; or instead, if the coarticulation should reach *excessive* levels.

When [k] is followed by [j, i, ɪi, ɩ], it is not articulated as a velar, but rather as a *prevelar*, as in *queue*, *sticky*, *key*, *kit* [ˈkhjµ·u/-ʊ·u, ˈsƫɩki, ˈkhɪ·i, ˈkhɩƫ]. This is also true in the case of checked (especially final) syllables, when preceded by [ɪi, ɩ]: *antique*, *tick* [ænˈƫhɪik, ˈƫhɩk]. However, given that this fact is predictable and automatic, there is no real need to use a special symbol (which would be ⟦k̇⟧).

On the other hand, if one should actually hear (or produce) a sequence of a true velar stop and a high front vocoid, ⟦ki⟧, it is quite likely that we have a realization of [q], fronted due to coarticulation. In such cases, the sequence can therefore be transcribed without problems as [qi]. This is a practical solution, because there are a great number of nuances involved in the fronting of [q, k] followed by phones which are progressively fronter and higher. Three symbols ([q, k, k̇]) would be insufficient to be fully accurate regarding phenomena which, in any case, do not require undue attention (once their frequency and normality have been understood adequately). It is only appropriate to be particularly rigorous on this point in the preliminary phase of analyzing a new (oral) text, in an unknown language. On the other hand, if the stop is articulated in a fronter (palatal or postpalatal) place in front of [i], then this fact should be indicated in the transcription: [ci, c̈i], even if there is no phonemic relevance or importance.

Along the same lines, if the stop is (post)palatal in final position: [c, c̈], instead of velar: [k], then this fact should be marked. This is in fact less 'normal' and less predictable, respect to most languages, as a realization of the velar stop (even though in French, Swedish, and Persian –for instance– we do have palatals (or postpalatals) in this context: French *flic* [ˈflic], *mec* [ˈmɛc], *qui* [ˈci], *quai* [ˈce; ˈcɛ]; Swedish *bruk* [ˈbrʉyc]; Persian *yak* [ˈjʌ·c]).

Variations

11.5. A good transcription will not note explicitly anything which is normal (and inevitable), just as it does not, in fact, mark the normal levels of stress (*ie* weak), of tone (*ie* middle), and of length (*ie* short). Instead, it will show all of the other, less universal characteristics, even if a large number of languages is an agreement on particular matters. Phonetic transcriptions, in order to be useful, should represent the differences of sound belonging to different phones, even if these are similar and near, and not actually distinctive, phonemic.

From a phonetic point of view, even small nuances which are perceptible, perhaps mostly unconsciously, are important for good descriptions and for teaching and learning good pronunciation. These nuances include many of those elements which determine the nature of a regional or foreign accent. Therefore, all taxophonic (*ie* combinatory allophonic) differences, which occur in practice, and are not automatic and predictable for *non-native* speakers, should be transcribed.

Let us consider some examples: English: *dried* [ˈɖɻaˑəɖ̥] (British), *width* [ˈwɩɖ̥θ], *has to* [ˈhæsʈʉ], *has she* [ˈhæʒ̊ʃi, -ʃʃi]; Italian: *banco* [ˈbaŋːko], *lancio* [ˈlaɲ̟ːtʃo], *un pane* [umˈpaːne], *gonfio* [ˈgoɱːfjo].

Contoids with particular offsets

11.6. The production of phones occurs in three concatenated phases: the onset, the hold, and the offset (these concepts could even be indicated by more complex terminology as well, although this would be decidedly less useful). The *onset* is naturally the start of the phone. It forms the prelude to the *hold*, the central and usually most characteristic phase. From here, we have the *offset*, which moves into the production of another phone, with its own three phases.

The OFFSET of a contoid can occur without being audible. In fact, if phonation ends after the HOLD, the offset ends up coinciding with the silence of a pause. By the same token, if during the hold of a contoid, the organs move into position directly for the next contoid, the articulation passes from one hold to another, while leaving out the interruption due to the offset of the first contoid and the onset of the second. This phenomenon is particularly evident when the contoids are stops – in fact, the first of the two stops then has an incomplete (and silent) offset. To consider the point, *fig* 11.2 could be useful; there the phenomenon is shown applied to the English sequences [p̚ʈ, k̚ʈ], where there is an intermediate phase with an articulation with two occlusions.

Geminate articulations ('doubled' consonant) are of this type, and are also homorganic – they have the same place and manner of articulation, and the same phonation type, as well. Therefore, geminate consonants are realized as geminate contoids without an offset (whether articulatory or auditory). To be rigorous, these articulations could be shown with the diacritic [̚], as in: *bookcase* ⟦ˈbʊk̚-ˌkhɛɪs⟧, *big girl* ⟦ˈbɪˑɡ̚ ˈɡɜːɫ, ˈɡɻ̟ːɫ, ˈɡɻ̟ˑɫ̟⟧); and in taxophonic geminates as well: *good girl* ⟦ˈɡʊˑɡ̚ ˈɡɜːɫ, ˈɡɻ̟ːɫ, ˈɡɻ̟ˑɫ̟⟧). In Italian we have: *ecco* 'here/there' ⟦ˈɛkː̚ko⟧, *fatto* 'done/made' ⟦ˈfatː̚to⟧, *carro* 'cart' ⟦ˈkarː̚ro⟧, which are different from *eco* 'echo' [ˈɛːko], *fato* 'fate' [ˈfaːto], *caro* 'dear/expensive' [ˈkaːro].

In any case, in English (and in other languages) we have *unexploded* stops (*ie* with *inaudible release*) even when followed by a stop of another place of articulation: *walked* ⟦ˈwɑˑk̚ʈ, ˈwɔˑk̚ʈ⟧, *robbed* ⟦ˈɻɒˑb̚ɖ̥ ˈɹɑˑb̚ɖ̥⟧. In English, normally, stops are unexploded in final position as well (except in cases of precision or emphasis): *rob* ⟦ˈɻɒˑb̥̚, ˈɹɑˑb̥̚⟧, *Bob Dylan* ⟦ˈbɒˑb̚ ˈɖɪl-ən, [ˈbɑˑb̚⟧.

The same is true of stopstrictives in Italian, as well: *faccia* ⟦ˈfatʃː̚tʃa⟧, *mezzo* ⟦ˈmɛdzː̚dzo⟧ (*cf* § 9.15). However, in English things are different. In fact, there stopstrictives are always exploded (also because they are in combinations and always belong to different lexemes): *Dutch cheese* ⟦ˈɖɐtʃ⁎ ˈtʃhrˑiz̥, ˈɖʌtʃ⁎⟧, *judge Jones* ⟦ˈʤɐˑʤ⁎ ˈʤɜˑɷnz̥, ˈʤʌˑʤ⁎ ˈʤʊˑɷnz̥⟧, *a large channel* ⟦əˈlɑːʤ̥⁎ ˈtʃhænɫ̩, əˈlɑːɹʤ⁎⟧; finally, *switched* ⟦ˈswɩtʃ⁎ʈ⟧, *judged* ⟦ˈʤɐˑʤ̥⁎ɖ, ˈʤʌˑ-⟧.

With other geminate contoids, even continuous ones, the situation remains the same, too. In fact, in completely rigorous transcriptions all of the Italian geminates would be marked with the diacritic showing lack of explosion: *sanno* ⟦ˈsanː̚no⟧, *ballo* ⟦ˈbalː̚lo⟧, *passo* ⟦ˈpasː̚so⟧; including cases like the borrowing from English *status symbol* ⟦sˈtaˑtus̚ ˈsimːbʊl⟧, which would sound quite strange if pronounced '⟦sˈtaˑtus⁎ ˈsimːbʊl⟧' (with offset between the two [s]'s).

In Korean, the final contoids of words have inaudible offsets, since phonation ends before releasing the hold phase, and expiratory air is blocked during the articulation: *nat* [ˈnat̚] (which is also the pronunciation of *nath, nas, nac, nach*, words of different meaning, and distinguished in the morphonological orthography, in spite of their actual phonemic neutralization). Instead, in Vietnamese and other oriental languages, final [p̚, t̚, k̚, ʨ̚] &c are maintained different, although they are unexploded.

fig 11.2. Unexploded stops in sequences, with juxtaposition of the articulations.

11.7. An interesting case occurs when a stop is followed by a nasal or lateral contoid, especially when the combination is homorganic. In fact, without releasing the contact between the articulators, a *nasal* or *lateral explosion*, respectively, is produced (*cf fig* 11.3).

In a NASAL EXPLOSION, the velum is simply lowered while maintaining the occlusion in the mouth. The result is a nasal contoid, whether a normal one or an intense one, as in: *cotton* ⟦ˈkhɒɽ̚n̩, ˈkhɑɽ̚n̩, ˈkhɑʔn̩⟧, *beatnik* ⟦ˈbɪiɽ̚nɩk⟧; in German: *sieben* ⟦ˈziːb̚m̩⟧, *bitten* ⟦ˈb̥ɪʈ̚n̩⟧, *sagen* ⟦ˈzaːgŋ̍⟧; in Italian: *etnico* ⟦ˈɛtː̚niko⟧. There should be no break in the contact between the tongue and the palatal vault (or between the lips).

In a LATERAL EXPLOSION, the tongue passes from the position of the stop to that of the lateral contoid by simply contracting the tongue body. In this way, expiratory air is allowed to pass along the sides of the tongue, producing a lateral, all without breaking the contact with the middle part of the tongue (in our examples, the tip of the tongue is against the alveolar ridge or the upper teeth): *little* ⟦ˈlɩɽ̚ɫ̩, ˈlɩɹɫ̩⟧, *lately* ⟦ˈlɛɪɽ̚li⟧, *medal* ⟦ˈmɛɖ̚ɫ̩⟧; German: *Mantel* ⟦ˈmanʈ̚l̩⟧; Italian: *atlante* ⟦aˈt̚lanːte⟧.

It is not indispensable to mark *nasal* or *lateral* explosion with the diacritic shown. It is enough to know exactly how and when it happens, and to learn and be able to teach the correct pronunciation. It would be more useful to mark cases where the transition might not be so (immediate) and direct, thus creating a true separation between the elements. In this case, the phenomenon will be denoted generically by [C⁎] (*ie open transition*), or with more details, according to the possibilities, with ⟦Cə, Cᵊ, Cə̥, Ch, Cɭ̊, Cɸ⟧…

For example, in *non-neutral* Italian pronunciation, instead of [ˌlopsiˈkɔːlogo, ˈsubːdolσ, opˈʦjoːne, ˈtɛkːniko, segˈmenːto], *lo psicologo*, *subdolo*, *opzione, tecnico*, *segmento*, we can find sequences with heterosyllabic stops with audible explosions: [ˌlop⁎siˈkɔːlogo, ˈsub⁎dolσ, op⁎ˈʦjoːne, ˈtɛkː⁎niko, seg⁎ˈmenːto], with ⟦Cᵊ⟧.

While in *regional* pronunciations, there can be full actual vocoids: [ˌlopəssiˈkɔːlogo, ˈsubːbədoˌlσ, ˌoppəʦˈʦjoˑʊnᴇ, ˈtɛkːkəniˌko, ˌseggəˈmenːd̥σ] (Upper South), [lσˌpɪssɪˈkσːlσgσ, ˈsʊbːbɪdσˌlσ, ˌσppɪʦˈʦjσːnᴇ, ˈtᴇkːkɪnɪˌkσ, ˌsᴇgːgɪˈmᴇnːtσ] (Lower South), [ˌloᴘᴘi̥ˢˢiᵏˈkɔˑˡloᵍᵍo, ˈsubᵇu̥ᵈᵈoˡˡo, ˌoᴘᴘo̥ᵗᵗsiˈɔˑnⁿe, ˈtekᵏi̥ⁿⁿiᵏᵏo, ˌsᴇᵍᵍᴇ̥ᵐˈmɛnto] (Sardinia).

Or they can be assimilated: [ˌlossiˈkɔːlogo, ˈsudːdolσ, oʦˈʦjoːne, ˈtɛnːniko, semˈmenːtσ] (Center). The same happens, in a typical Italian pronunciation of English, to forms such as: *cab*, *good*, *look*, *rubbed*, *offset*, *with me* [ˈkɛbː⁎, ˈgudː⁎, ˈlukː⁎, ˈrabː⁎d⁎, ˈɔfː⁎sᴇt⁎, wid⁎ˈmi], instead of [ˈkhæˑb̥˺; ˈgɷˑd̥˺; ˈlɷk˺; ˈɻɐb˺d̥, ˈɹʌb˺d̥; ˈɒfˌsᴇʈ, ˈɔˑfˌsᴇʈ; ˈwɩðmi, wɩðˈˈmɪˑi].

fig 11.3. Lateral and nasal explosions (respectively on the left/right).

Prenasalization

11.8. Certain languages, particularly in Africa, use contoids (and consonant phonemes) whose manner of articulation is modified by a particular type (of articulation): [˜b, ˜d, ˜g, ˜ʤ, ˜z, ˜j, ˜r, ˜ɾ]. We have here single segments, which, even when occurring between two syllabic nuclei, belong entirely to a single one of the two syllables (usually beginning the second). Their length is comparable to that of other common segments (or only slightly longer).

Their articulation (*cf fig* 11.14) is characterized by the lowering of the velum during the onset, and possibly even during the first part of the hold (the different possibilities give impressions of more or less nasality). During the second part of the hold and the offset, instead, the velum is raised, thus excluding resonance from the nasal cavity. The second phase has therefore the articulation and timbre of the basic contoid in question.

Generally, prenasalized contoids are voiced, and –most commonly– stops; but also stopstrictives, constrictives, and approximants (without excluding other man-

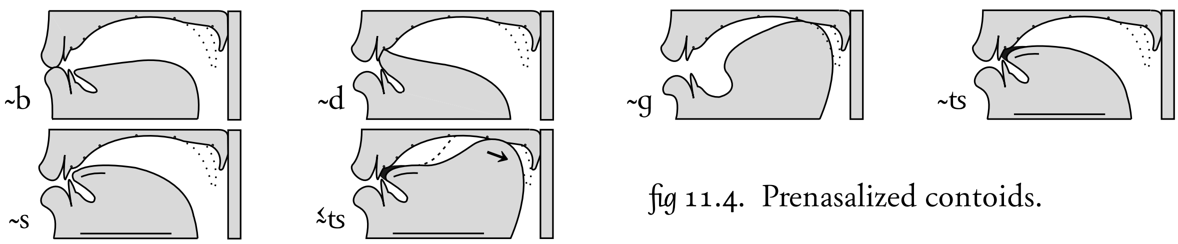


fig 11.4. Prenasalized contoids.

ners, such as trills and taps). Examples from Swahili: *nenda* [ˈnᴇˑ~ɖa], *mwenzi* [ˈmɯᴇˑ~zi], *mbuzi* [ˈ~buˑzi], *mvinyo* [ˈ~viˑɲɔ], *njia* [ˈ~ʤia], *ngoma* [ˈ~gɔˑma].

'Aspiration' (*cf* § 10.13, as well)

11.9. Many languages use 'aspirated' contoids in ways which are, to a greater or lesser extent, distinctive. In other words, sometimes the aspiration is the only feature (and is therefore essential, *ie* phonemic), at other times it works together with others (then it is redundant, *ie* phonetic); *cf fig* 11.5. More commonly stops, but also stopstrictives and constrictives, can involve various levels of 'aspiration'. The aspiration can, in fact, be sometimes more audible, and sometimes less. The normal level consists of a voiceless phone followed by the voiceless lenis laryngeal approximant: [ph, kh, ʧh, sh] (this last, naturally, has nothing to do with the English digraph *sh*, which represents /ʃ/ [ʃ]; just as the first sequence, [ph], is not related to *ph* /f/ [f]; the same is true of *th* /θ, ð/ [θ, ð]).

If 'aspiration' is more strongly audible, it typically involves sequences with a voiceless laryngeal *constrictive* as a second element, [pħ], or possibly a *non-laryngeal approximant*, such as [pɧ, pɸ]... (all of the possibilities should be analyzed, listening carefully). If followed by front vocoids (or velar rounded ones), this stronger 'aspiration' can consist in the voiceless palatal or velar rounded approximants, respectively: [pʝ̊, pʋ̊]. With a voiced (or intermediate) phone, 'aspiration' generally involves the voiced (lenis) laryngeal approximant: [bɦ, b̥ɦ].

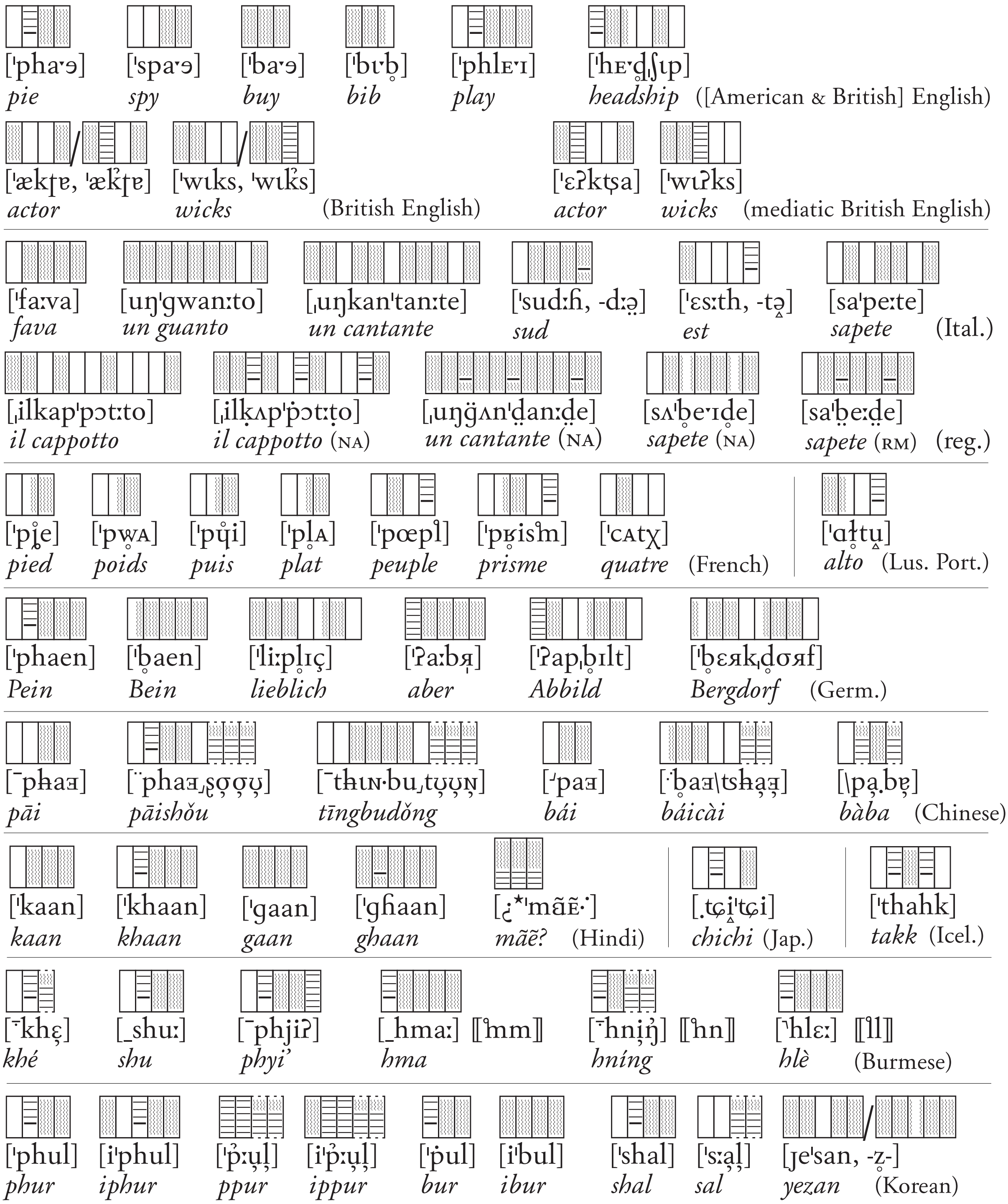
'Aspiration' can be phonetic, as in English: *pin* /ˈpɪn/ [ˈphɪnː], and German: *zehn* /ˈʦeːn/ [ˈʦheːn]; or it can be phonological, as in (Mandarin) Chinese: *cā* /¯ʦha/ [¯ʦħa] 'to rub' (*cf zā* /¯ʦa/ [¯ʦa] 'to tie'), Hindi: *paṅkh* /ˈpɐnkh/ [ˈpɐŋkh] 'wing' (*cf paṅk* /ˈpɐnk/ [ˈpɐŋk] 'mud'), *ghaal* /ˈɡhaal/ [ˈɡɦaal] 'confusion' (*cf gaal* /ˈɡaal/ [ˈɡaal] 'cheek').

As can be seen from the transcriptions above, it is appropriate to treat the two types of 'aspiration' as sequences, either exclusively phonetic ones, or phonetic and phonemic as well, respectively, composed of [C] + [h] and /C/ + /h/. This is the reason why we have put the term 'aspiration' in quotation marks, since, logically, it is not different in any way from other consonant sequences such as: [C] + [j, w, l] or /C/ + /j, w, l/...

We have already eliminated the useless formalistic complication of VOT. Similarly, 'preaspiration' is simply the preceding sequence, taken in backwards order. It occurs in some languages, including Icelandic: *þetta* [ˈθᴇhta], *takk* [ˈthahk] (in the last example we have both types of 'aspiration' together).

In regional variants of Spanish, we have the improperly so-called 'aspiration' of /sC, s#/, which we represent here generically as [hC, h#] (but for variations, see the part on Spanish in *HPr*, Ch 6): *estas casas* /estasˈkasas/ [ˌehtahˈkaˑsah] (*cf* the neutral pronunciation of Spain [ˌe̺sta̺s̺ˈkaˑs̺as̺], or American Spanish [ˌestasˈkaˑsas]).

In § 4.1.7-12, and in *fig* 4.4, we have seen the positions of the glottis for the different phonation types, including the paraphonic ones. Let us consider now the examples of *fig* 11.5, using the same icons already shown in *fig* 4.4. The differences *fig* 11.5. Different phonation types exemplified by some languages: American & British *English* (with mediatic British variants); *Italian* (with two regional variants: Naples & Rome); *French*; (Lusitanian) *Portuguese*; *German*; (Mandarin) *Chinese*; *Hindi*; *Japanese*; *Icelandic*; *Burmese*; *Korean*.



between voiceless ([f, s, ħ] ▯) and voiced ([v, z, ɦ, m, a] ▯), phones are fairly evident, even in the case of the voiceless lenis type ([f̹, s̹, h, h̃, a̰] ▯), or the voiced lenis ([v̤, z̤, ɦ, a̤] ▯). We also have the mixed (or 'intermediate', [v̥, z̥, ɦ̊, m̥, ḁ]) phonation, which contains a voiceless part at the beginning ([ˈv̥a] ▯), or in the middle ([aˈv̥a] ▯), or at the end ([ˈav̥] ▯).

There is, moreover, the glottal stop, by itself ([ʔ]), or simultaneously pronounced with a voiceless stop or stopstrictive ([p̉, ʧ̉]). Additionally, we have the creaky type of phonation, frequently used for voiced phones in various Eastern languages, such as Chinese ([m̰, a̰]), and falsetto, used at least on entire syllables, as in Hindi ([*ma]) – *cf* the relative chapters in *HPr*.

Non-pulmonic consonants

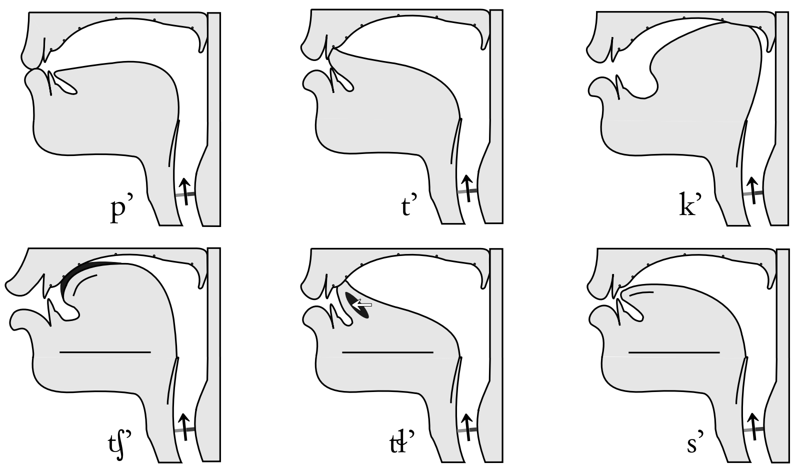
11.10. All of the consonant (and vowel) articulations encountered so far are 'normal', in the sense that it is expiratory air (originating in the lungs, and passing through the trachea) which makes them possible. For this reason, they can be called PULMONIC articulations. We will now, instead, see three consonant groups which are produced through the aid of a NON-PULMONIC source of air (even if possibly more limited).

Ejective consonants

11.11. EJECTIVE (sometimes also called 'egressive', or 'explosive') consonants are the combination of normal consonant articulations with raising of the closed larynx (*cf fig* 11.16). The existence of this movement can be verified by observing the upward movement of the 'Adam's apple'. Besides raising the larynx with the glottis closed, the degree of jaw opening is diminished too, as the lower jaw is raised.

All of these actions compress the air contained between the closed larynx and the point of the mouth where the occlusion or constriction occurs. For this reason, the offset of the contoid is accompanied and characterized by a fairly brusque and perceptible explosion. The glottis is then immediately opened, and the articulation moves on the next phone or to a pause.

fig 11.6. Ejective contoids.



The more extensive and energetic the movements of the larynx, the lower jaw, and the tongue are, the more perceptible will be the characteristic explosion (and vice versa). Generally, ejective contoids are voiceless, and more often they are stops or stopstrictives, although they can be ordinary constrictives, as well. (If they are 'voiced', they are almost always devoiced stops.) They are especially used distinctively, as phonemes, in African, Asian, and American languages. They are denoted by an apostrophe placed after the symbol in question: [p’, t’; ʦ’, ʧ’; s’].

Here are some examples – Hausa: *kasà* /k’ạsa/ [ˈk’ɐ̣sa], *tsahì* /s’ạhi/ [ˈs’ɐ̣ɦi, ˈʦ’ɐ-] (stress is marked only in phonetic transcriptions, since this is a language with ton[em]es, in which the phonetic stress is generally on syllables with non-low tonemes); Quechua: *k’asa* /ˈk’asa/ [ˈk’aˑsa]; Georgian: *q’op* /ˈq’op/ [ˈq’σp].

Injective consonants

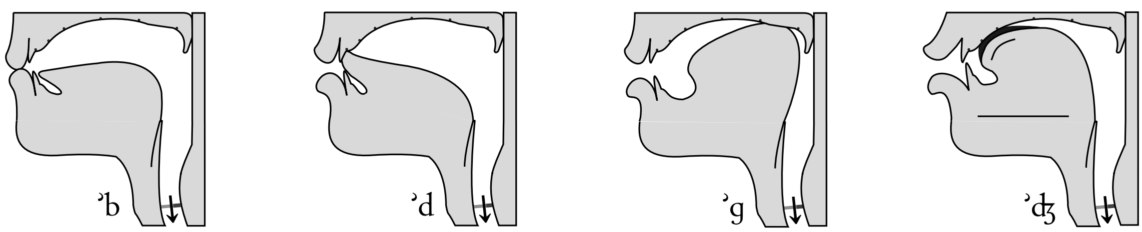
11.12. INJECTIVE (also called 'ingressive', or 'implosive') consonants are the combination of normal consonant articulations with the lowering of the larynx. The larynx is closed, but less tightly than in the case of ejective consonants (*cf fig* 11.7). With respect to the ejectives, there is also a corresponding difference in the direction of the movement of the 'Adam's apple', since the larynx is lowered, as is the lower jaw. Due to these actions, the air contained in the oral cavity becomes rarefied.

Consequently, during the offset of the contoid, a certain amount of external air enters, for an instant, into the mouth. The result is an implosion, and thereby an attenuation of energy, compared with normal phones. The auditory effect is opposite to that of ejective contoids. Injectives are mainly stops and stopstrictives.

In the various languages which use them distinctively (*ie* African, Asian, Oceanic, and American) the voiced ones are more common. In voiced injectives, voicing is produced because while the larynx is lowered, the glottis (the space between the vocal folds) is not tightly closed, and so the vocal folds can vibrate. We denote injectives by preceding the symbols by a (vertically) *flipped* apostrophe: [ʼb, ʼd, ʼg; ʼʤ]. In fact, we have here (as with the ejectives) an additional mechanism which occurs in combination with normal articulations. If the vocal folds vibrate only during the offset of the phone, the voicing is not complete, but rather only partial: [ʼb̥, ʼd̥, ʼg̊; ʼʤ̥].

The official *IPA* notation uses, instead, rather special symbols: '[ɓ, ɗ, ɠ; ʄ]', derived from a phonetically-based alphabet which was devised intentionally to write

fig 11.7. Injective contoids.



African languages which lacked a preceding writing tradition. However, this alphabet was never fully used, and in any case was restricted to certain particular languages. For these reasons, people have often thought it more 'practical' to return to the normal letters of the traditional Latin alphabet, with diacritics and digrams added when necessary.

Some examples – Swahili (the variants given are international and traditional, respectively): *bwana* [ˈʾbʊa·na, ˈʾbʊɑ·nɐ], *dege* [ˈʾdᴇ·ʾɡᴇ, ˈʾɖᴇ·ʾɡe], *jiko* [ˈʾʤi·kɔ, ˈʾʄi·ko]; Hausa: *ɓaràà* [ˈʾbɐ.ɾaː], *ɗafà* [ˈʾdɐ.fa]; Vietnamese: *bà* [_ʾbaa], *đực* [_ʾdɯ̣k̚].

Dejective consonants (or 'clicks')

11.13. DEJECTIVES (or *clicks*) are the 'strangest' new type, and they are produced with non-pulmonic air which has been drawn into the oral cavity from outside. These contoids contain, first of all, a *characterizing* occlusion, formed in some place between the lips or the palate (with contact of the tongue tip or blade). At the same time, there is another occlusion, the *activating* one (which is so called because it activates the *dejective mechanism*, *cf fig* 11.8), produced between the back of the tongue and the prevelum. Dejectives are appropriately indicated by placing the symbol [ʿ] in front of the relevant articulatory symbol, as will be seen in the following sections.

The back of the tongue moves rapidly backwards, while staying in contact with the palatal vault (this fact is shown by using broken lines in the orograms), and it is lowered further in the center (in the case of articulations formed with the front part of the tongue). Consequentially, there comes to be greater space between the two occlusions, and the intervening air becomes therefore rarefied.

In the meantime, the tongue slides back farther still, until reaching the velar place, and the mediumdorsum is lowered farther, too. At this point, we have the offset of the front articulation (the *characterizing* one), and external air comes into the mouth, producing a sharp snap. Finally, the postdorsal occlusion (the *activating* one) is released. In the case of a bilabial characterizing articulation, the expanded oral space extends from the lips to the (pre)velum.

We will give some examples from Zulu, after introducing all the characteristics of dejectives. Among these characteristics, the most complicated ones are the accompaniments (which will be treated at the end of § 11.16).

11.14. In many languages, certain dejective contoids are used phonostylistically. For example, when children throw a *kiss*, or when an actress does the same to the audience, this is nothing other than a bilabial dejective (*ie* voiceless bilabial rounded stopstrictive), [ʿpɸ̂]. The same movement is produced when we drink a liquid through a straw. When we wish to express *disappointment*, or *impatience*, we may produce a dental dejective (*ie* voiceless [slit] stopstrictive), [ʿtθ]. We may communicate *disapproval* if we repeat the sound twice (perhaps shaking our heads, as well): [ʿtθˈʿtθ] or [ʿtθ̮ˈʿtθ̮].

The peoples of southwestern Europe (and Africa) often express *negation* by using this dental dejective contoid as a phonosymbol, accompanied by raising one's head (or with horizontal shaking, singly or repeatedly; or without any shaking, as one moves northwards). The postalveolar dejective (*ie* voiceless stop), [˂ʈ], is often used to express *appreciation* for a beverage, such as a good wine. The noise of a *horse's hooves* is usually imitated by repeating continually the apicopalatal dejective (*ie* voiceless stop), [˂ʈ̢].

To *get a horse moving*, wagoners and horsemen often use an alveolar dejective (*ie* voiceless lateral stopstrictive) [˂tɬ], which children associate with the image of a horse, even when they are very young. In order to *call a cat*, we often repeat sequences of two dejectives [˂pɸ̂ˈ˂pɸ̂, ˂tθˈ˂tθ] (already mentioned), or the prepalatal (*ie* voiceless stop), [˂ţˈ˂ţ].

On the other hand, in order to get someone's attention, without causing too much notice (among many people, or in places where there is silence), we do not produce a dejective. Here the normal sound is a voiceless bilabial stop, possibly either normal (pulmonic) or ejective, completed as follows: [ˈpʂ̩, ˈpʂ̩tʼ, ˈpʼʂ̩, ˈpʼʂ̩s].

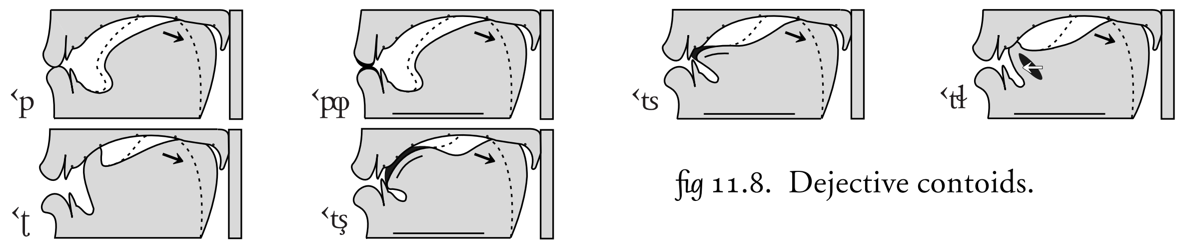


fig 11.8. Dejective contoids.

11.15. Only languages of southern Africa (such as Nama/Hottentot, Zulu, Xhosa, and southern Sotho, which can be seen in the phonosyntheses of Ch 18 in *NPT*) use dejective contoids distinctively (*ie* as true consonant phonemes). In these languages, they are generally at the beginning of syllables, and they occur combined fluently with other phones which are produced with pulmonic air.

The basic *phonation* type is voiceless; however *voicing* can also occur (through vocal fold vibration; the voicing can be complete or partial), &/or *nasalization* (through lowering the velum).

The *manners* of articulation used are *stops* and *stopstrictives* (including *lateral stopstrictives* as well), naturally together with the dejective mechanism, which is shown by simply adding the diacritic [˂] in front of the current symbol. If the contoid is nasalized, we use [˂̃], thus avoiding the necessity of introducing new nasal symbols for stopstrictives as well, which would be used only for dejectives. In fact, the diacritic [˂̃] implies both the dejective mechanism ([˂]) –activated by the back of the tongue against the (pre)velum– together with lowering of the velum itself, which characterizes nasalized ([Ṽ]) and prenasalized articulations ([˜C]).

There are four *areas* of articulation which can be used phonemically for dejectives: *labial* and (referring here to the lower articulation) *coronal*, *apical*, and *predorsal*. The number of actual *places* of articulation is definitely much greater: sixteen (16), including labialization in many cases, which combined with the manners mentioned, give twenty-six different basic types (26). With voicing and nasalization taken into account, we have about a hundred (±100), still without counting the accompaniments and other combinations, which produce others with different functionality (as will be seen shortly).

We have, therefore, the following – *bilabial*: [˂p, ≲p, ˂b, ≲b], [˂pɸ, ≲pɸ, ˂bβ, ≲bβ] (and *bilabial rounded*: [˂p̂, ≲p̂, ˂b̯, ≲b̯], [˂pɸ̂, ≲pɸ̂, ˂bβ̯, ≲bβ̯]), *labiodental*: [˂pf, ≲pf, ˂bv, ≲bv]; *dental* (with lowered or raised tip, respectively: [˂tθ̞, ≲tθ̞, ˂dð̞, ≲dð̞] or [˂tθ, ≲tθ, ˂dð, ≲dð]), grooved *dental*:[˂ts, ≲ts, ˂dz, ≲dz] (and grooved *dental rounded*: [˂tŝ, ≲tŝ, ˂dẑ, ≲dẑ]), grooved *labiodentalized dental*:[˂tś, ≲tś, ˂dź, ≲dź] (also *dental–bilabial*: [˂tp, ≲tp, ˂db, ≲db]).

Moreover – *alveolar*: [˂ƫ, ≲ƫ, ˂ɖ, ≲ɖ], [˂tɬ, ≲tɬ, ˂dɮ, ≲dɮ], *postalveolar*: [˂ʈ, ≲ʈ, ˂ɖ, ≲ɖ], [˂tʂ, ≲tʂ, ˂dʐ, ≲dʐ], [˂tɭ̊, ≲tɭ̊, ˂dɭ, ≲dɭ]; *apico-palatal*: [˂ʈ̥, ≲ʈ̥, ˂ɖ̥, ≲ɖ̥] (with five rounded variants: [˂ƫ̂, ≲ƫ̂, ˂ɖ̂, ≲ɖ̂], [˂tɬ̯, ≲tɬ̯, ˂dɮ̯, ≲dɮ̯], [˂ʈ̂, ≲ʈ̂, ˂ɖ̂, ≲ɖ̂], [˂tʂ̂, ≲tʂ̂, ˂dʐ̂, ≲dʐ̂], [˂ʈ̥̂, ≲ʈ̥̂, ˂ɖ̥̂, ≲ɖ̥̂]; *cf* the following section, on additional characteristics); *prepalatal*:[˂ţ, ≲ţ, ˂ḑ, ≲ḑ], [˂tş, ≲tş, ˂dz̧, ≲dz̧], [˂tɬ̧, ≲tɬ̧, ˂dɮ̧, ≲dɮ̧] (and *prepalatal rounded*: [˂tɕ, ≲tɕ, ˂dʑ, ≲dʑ]).

11.16. After the release (or offset) of the front occlusion, instead of passing directly to the following vocoid, there can be a segmental 'back' accompaniment (in the actual languages which use dejectives phonologically). This segment can be velar, uvular, or laryngeal, and can be furthermore combined with labialization.

The *accompaniments* can be constituted by stop, stopstrictive, constrictive, approximant, or nasal manners of articulations (while their phonation can range from voiceless to voiced, with intermediate degrees possible: lenis or mixed). The voiceless stops, stopstrictives, and constrictives can also be ejective ([C']); while the voiced ones can be prenasalized ([~C]), and the voiced approximants can be labialized.

The possible accompaniments for dejective phon(em)es are the following: *velar* [ŋ̊, ŋ; k, k', g, ~g; kx, kx', gɣ, ~gɣ; x, x', ɣ; ɥ̊, ɰ]; *uvular* [ɴ̊, ɴ; q, q', ɢ, ~ɢ; kχ, kχ', gʁ, ~gʁ; kʀ̥, kʀ̥', gʀ, ~gʀ; χ, χ', ʁ, ~ʁ; ʀ̥, ʀ̥', ~ʀ, ʀ; ʁ̞, ʁ̞]; *laryngeal* [ʔ; ħ, ɦ̵; h, ɦ]. All of these can also have *rounded* variants, shown by adding [̯]; while for the velar approximants, the symbols [ʍ, w] are used. For example, in the case of /˂tθw, ˂ʈw/, the primary articulation is [tθ̯, ʈ̂], because here there is not only lip rounding, but also velarization, which is perceptible in the moment of the velar offset, because the back of the tongue remains raised, as happens during velarization.

The official IPA symbols generically indicate four areas with '[ʘ]' (bilabial), '[ǀ]' (dental), '[ǃ]' ([post]alveolar), '[ǂ]' ('palatoalveolar', for *prepalatal*), and the lateral manner with '[ǁ]'. These symbols are then preceded by '[k, g, ŋ]' (to indicate voicelessness, voicing, and nasality, respectively), but also by other symbols for sequences with uvulars or laryngeals, and followed by –still other– symbols for the accompaniments.

Leaving aside the disharmony and insufficiency of these five symbols ('[ʘ, ǀ, ǃ, ǂ, ǁ]' – much more appropriately used, if ever, for prosodic values than for articulatory ones), we find it more logical to use the diacritic ([˂]) to represent the *mechanism* (with [≲] for supplementary nasality), but to maintain the regular symbols (distinguishing voiceless and voiced, too) for the twenty-six types of articulations found. These conventions make for a more realistic description, to which the accompaniments mentioned above can be added when necessary.

In this way, we avoid masking phonic reality and losing the relationships with the pulmonic articulations. In fact, notwithstanding the particular mechanism (involving the postdorsum of the tongue), the characterizing articulations remain fundamental throughout. For this reason, using 'special' symbols is completely out of place, especially considering that these symbols have nothing in common with the others.

Let us now see some examples from Zulu: *icicì* /iˈ˂ti.˂ti/ [ɪˈ˂ʦθiˑɪ.˂ʦθɪ], *qinà* /ˈ˂ʈi.na/ [ˈ˂ʈ̥iˑɪ.na], *uxâmù* /uˈ˂ʦ̶a.mu/ [ʊˈ˂ʦ̶aˑa.mʊ], *chàchà* /_˂tha.˂tha/ [_˂ʦθhaˑa.˂ʦθha], *qhàqhà* /_˂ʈha.˂ʈha/ [_˂ʈ̥haˑa.˂ʈ̥ha], *xhûmà* /ˎ˂ʦ̶hu.ma/ [ˎ˂ʦ̶huˑʊ.ma], *gcìnà* /_˂di.na/ [_˂dðiˑɪ.na], *gqùmà* /_˂ɖu.ma/ [_˂ɖ̥uˑʊ.ma], *gxìlà* /_˂dɫi.la/ [_˂dɫiˑɪ.la], *kancanè* /kaˈ˂̃da.ne/ [kaˈ˂̃dðaˑa.nɐ], *nqênà* /ˎ˂̃ɖe.na/ [ˎ˂̃ɖ̥ɐˑɐ.na].

Nasalization of vocoids

11.17.1. Most vocoids are produced orally. By this we mean that the air comes out through the mouth (after passing through the articulatory channel, formed by the tongue, the palatal vault, and the pharynx), since the velum is raised. Instead, in order to produce nasal(ized) vocoids, air has to come out through the nasal cavity as well. Phones like [a, b] are oral, while [ã, m] are nasal(ized). When producing [m], air comes out through the nose *only*; for [ã], the air comes out of the mouth *as well* (*cf fig* 11.9, which contrasts [i, a, u] and [ĩ, ã, ũ]). Therefore [m] is a *nasal* phone, but, rigorously, [ã] is merely *nasalized*. Should it become important to denote semi-nasalized vowels, this would be possible by writing [a̰]; on the other hand, however, a transcription like [ɦ̰, β̰] would only indicate a nasalized *C* (for *C*'s, nasalization is without a doubt less important and not phonemic, unless we are dealing with actual nasal contoids). In these examples, the diacritic was placed below the symbol exclusively because there is no room to put it on top of the symbol. Let us note, however, that in official *IPA* practice [̰] is –unfortunately– used to indicate creaky voice, while [˜] –of course– indicates nasalization.

11.17.2. Here we take a look at the four French phonemes /ɛ̃, œ̃, ɒ̃, õ/, and we will also consider the taxophones which are stress-dependent (for details, even in cases where a single symbol is used, *cf Ch* 4 of *HPr*): *bien* /ˈbjɛ̃/ [ˈbj̥ɐ̃], *bientôt* /bjɛ̃ˈto/ [bj̥ɜ̃ˈtɷ], *brun* /ˈbʀœ̃/ [ˈbʁœ̃], *lundi* /lœ̃ˈdi/ [lɷ̃ˈɖ̧i], *bonbon* /bõˈbõ/ [bõˈbõ], *pendant* /pɒ̃ˈdɒ̃/ [pɒ̃ˈdɒ̃]; in Parisian and mediatic pronunciation, we have: [ˈbj̥ᴀ̃, bj̥ᴀ̃ˈtɷ, ˈbʁᴀ̃, lᴀ̃ˈɖ̧i, bɵ̃ˈbɵ̃, pɒ̃ˈdɘ̃].

In the Parisian pronunciation of the *banlieues*, the 'suburbs' (outlying areas): [ˈbj̥ã, bj̥ãˈtɷ, ˈbʁã, lãˈɖ̧i, bõˈbõ, pɵ̃ˈdɘ̃]; in 'refined' Parisian pronunciation: [ˈbj̥æ̃, bj̥æ̃ˈto, ˈbʁæ̃, læ̃ˈɖ̧i, bõˈbõ, pɒ̃ˈdɒ̃]; in Canadian neutral pronunciation (*fig* 4.15-15 of *HPr* give further more or less marked variants, which are not shown here): [ˈbj̥ᴇ̃ẽ, bj̥ᴇ̃ẽˈto, ˈbɾɷ̃ø̃, lɷ̃ø̃ˈʣi, bɔ̃ɵ̃ˈbɔ̃ɵ̃, pãɐ̃ˈdãɐ̃].

There is a practical and effective way to check whether the reader has succeeded in producing true nasalized vowels, instead of sequences of vocoids followed by nasal contoids.

First, pronounce a very long [mːː]; while continuing to pronounce the [mːː], block the passage of air through the nose by lightly squeezing the nostrils shut with the thumb and index finger. Immediately the production of sound is interrupted, since in nasal contoids, the only place where air escapes is through the nose. Try with [nːː] as well – the result is the same.

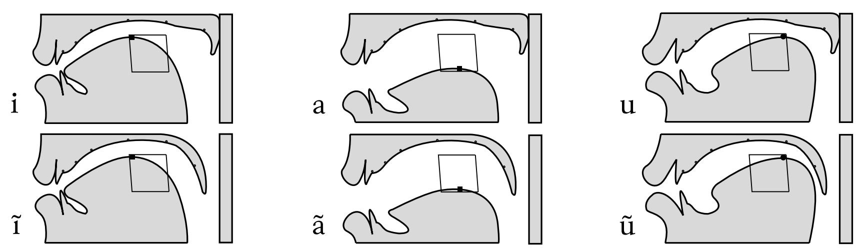
Now, pronounce the French word *on* /õ/ [õ], drawing it out more than normal: [õːː], and repeating it as well. Squeeze on the nostrils, and if the sound continues without any interruption, that means the reader is actually producing [õ] (at least, in terms of the mechanism; as for the exact quality of the vocoid, it will be necessary to check with the vocogram and by listening carefully).

However, if while squeezing the nostrils, the same thing happens that happened with [mːː, nːː] – namely, if (at a certain point) the sound and flow of air become blocked, then this means that, instead of [õ], the reader is actually producing [on], or [oŋ], or at most, [õn], or [õŋ].

Therefore, it is necessary to learn to pronounce the sound so that it does not become interrupted, and so that it remains at all times with the same timbre. The reader could possibly begin by closing the nose and trying to produce any vocoid, not to mention [õ]! But it is important to make sure that the result is not simply [o]. The first thing to remember is that the timbre of nasalized vocoids is always darker (than corresponding non-nasalized vocoids), because –in cases like [õ]– the resonator of the nasal cavity comes into play, modifying the sound wave. Moreover, while pronouncing voiced nasal phones, such as [m, n], or voiced nasalized ones, such as [õ, ã], the outer walls of the nostrils vibrate, as can be felt by touching the nostrils with the fingers (naturally, without blocking the passage of air through them, as in the preceding exercise).

This vibration is considerably reduced in the case of non-nasal phones, since then the velum is raised, thereby cutting off the nasal cavity from being an active resonator. If we compare [õːː] (or also [nːː]) with [oːː], the fingers manage to perceive a noticeable difference.

fig 11.9. Vocoid nasalization.



11.17.3. Moreover, there are still other possible tests. If, while producing [o, a], we close our lips (by bringing them together, or by putting a hand over our mouth), the resulting sound is [b̚] – or else possibly something paraphonic, representable by ⟨[ʔ̰̚]⟩. Instead, if we are truly producing [õ, ã], then when we intentionally close our lips, we produce [m̂] (or [m̶], for [õ]; and [m] for [ã]; or else, if we put a hand over our mouth, [m̩]). Therefore, the sound continues in this case, passing out through the nose (even though the timbre is modified by the operation of the lips or the hand).

Devoicing vocoids

11.18. In certain languages, some vocoids can be partially devoiced, phonetically, [i̥, ḁ, u̥], or totally devoiced, [i̭, a̭, ṷ], as will be seen in several chapters of *HPr* (especially [*cf fig* 11.5] in Japanese, but also in Lusitanian Portuguese, French, and Russian). Very few languages have been described with voiceless vowel *phonemes*, among which Comanche (USA, Oklahoma), and Ik (Western Africa). In these cases, it is always possible to analyze the voiceless vowels phonologically as sequences of the form /hV, Vh/. Here is an example from Comanche (Shoshone): *noribakiki'u'* [ˈnσɾiˌβakiˌkiʔuʔ] 'he came to pack his bags' and *noribakik̊i'u'* [ˈnσɾiˌβaki̭ˌkiʔuʔ] 'he packed his bags and came'. This example could be interpreted as /-kiki-/ *vs* /-khiki-/ or /-kihki-/.

Vocoids in unstressed syllables

11.19. In unstressed syllables, it is natural that the phonetic space of the vocoids is somewhat reduced in size, given that there is less (general and, particularly, articulatory) tension present. Therefore even languages such as Spanish or Italian, which do not reduce their unstressed *V*, have an inevitable tendency towards 'reduction'. On the vocogram, this reduction corresponds, more or less, to what is seen in *fig* 11.10, namely /i, e, ɛ, a, ɔ, o, u/ [i, e, ᴇ, a, σ, o, u] 'tend to move towards' [ɪ̣, ɘ, ɜ, ɐ, ɒ, ɷ, µ], without however reaching them. In fact, this 'movement' is rather fictitious, in the sense that what actually happens is that in unstressed syllables, there is reduction mainly in the degree of jaw opening (and somewhat in the movement of the back of the tongue in a front–back direction, too). However, the relationship between the elements remains exactly the same as what it was before (just as if one spoke with a mouth of smaller dimensions, even without reaching the difference between the mouth of a child and one of an adult).

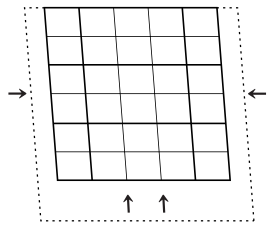
The ear automatically compensates for these small and inevitable differences, without letting itself be fooled. In this respect, it is different from machines, which 'obtusely' (in a manner characteristic only of machines) computes physical differences. These physical measurements are given as simple numbers, out of context, without any means for calibrating and reinterpreting the data. Thus the machine tends to fail in reassigning the new realizations to the appropriate phonemes and phones. We see clearly here the difference between *natural phonetics* (*ie* auditory/articulatory and functional), and *artificial phonetics* (*ie* acoustic).

Naturally, other languages, among which even English and certain regional pronunciations of Italian (and dialects of Italy), can have true reductions and even neutralizations of vocoids in unstressed syllables. These reductions can actually reach the points [ɪ̣, ɘ, ɜ, ɐ, ɒ, ɷ, µ], and even arrive at [ə, ɜ, ɐ]. However, these realizations are noted immediately as being different, and, as was mentioned above, they make up an element of certain regional accents and dialects, as well as certain languages. In such cases, but only in such cases, these realizations should be marked appropriately in transcriptions, as of course happens in English with /ə/: *about* [əˈbaɒʈ], *again* [ɯˈgᴇnː] (near velars), *sofa* [ˈsɜɷfɐ/ˈsσɷfʌ] (prepausal).

The supremacy of the ear (a well-trained one, or one of a native speaker which responds to relevant phonological oppositions) is still more obvious when comparing *different voices*, belonging to people with phonoarticulatory apparatuses of different dimensions and shapes. Even using the *bark* acoustic measurements it is (still) not possible to rival the incredible work of the human ear, which is capable of normalizing (phonetically and phonologically) the utterances of different people, and also of a single person, in *different types* of speech, with respect to variables such as speed, precision, and spontaneity.

The possibility of making seriously useful acoustic comparisons is complicated further by the fact that acoustic analyses depend dramatically on the skill of the analyst, on the quality of the apparatuses and computer programs employed, and also on the specific way the research is organized. Measurements, unfortunately, are subject to the evident limits of certain programs and the ways these are used, as well as the choice of questions considered, without mentioning differences in aims and hypotheses. For these reasons, any comparison with the acoustic data of someone else (with different informants) is a very risky undertaking, which can lead to surprising and misleading conclusions. The important thing is not to take as gospel truth everything which 'science' offers us (given all the limits and weaknesses to which we have briefly but incompletely referred).

fig 11.10.
Reduction in the size of the articulatory space for vocoids in unstressed syllables.



Vocoids in singing

11.20. First of all, it is necessary to point out that 'normal' language, from a phonetic point of view, is *spoken language*, such as what can be heard on the radio or television. Instead, while singing –and particularly in opera singing– the physical structuring of the phonoarticulatory apparatus becomes modified. The change is particularly important for vowels, which are central to the syllables in words (within phrases and sentences).

In fact, the oral cavity is usually more open during singing than in normal speech. This occurs for fairly evident reasons of professional technique: in order to obtain more impressive results, and in a way which is physio-pathologically less risky (above all, to avoid serious damage to the vocal folds).

In fact, the *operatic position* involves a deformation of the vocogram in the following ways (whether advisably or not): (1) the mouth is generally more open, given that the jaw is lower; (2) the lips are consequently never spread for [i, ɪ, e, ᴇ, ɛ, æ], even though they are still at least somewhat rounded for the back vocoids [u, ʊ, o, ɷ, ɔ, ɒ]; (3) the tongue is correspondingly raised, in order to compensate for the lowering of the jaw (thus bringing the dimensions almost back to those of speech, but with a slight lowering, thus moving down and back by one box in the vocogram), as can be seen in comparison with the original vocogram; (4) the vocogram is therefore not so much 'deformed' as lowered and drawn back, with regard to the original.

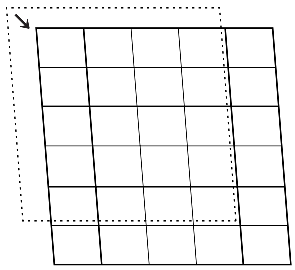
fig 11.11 gives the 'opera' vocogram, together with its boxes, placed in relationship with the normal vocogram of speech. There, it is easy to see how the 'opera' vocogram is slid downwards and backwards, and slightly enlarged.

Considering the figure attentively, we see that the column of front *vocoids* such as [i, ɪ, e, ᴇ, ɛ, æ], coincides in practice with the next column, whose phones would be represented, rigorously by the symbols [ɪ̣, ɩ, ɘ, ɜ, ɑ, ᴀ]. Actually, they are those vocoids, but in a square which is relatively lower and farther back, within the mouth.

The important thing is to remember that the lips can never be spread – it is in fact physiologically impossible, given the four differences mentioned above. Therefore, a more realistic representation would show this absence of spreading, by at least using a dot placed underneath the 'normal' symbols (as a mnemonic diacritic): [ị, ɪ̣, ẹ, ᴇ̣, ɛ̣, æ̣].

As it happens, it is a fact that this position is typically surpassed, while singing, moving past the spread position (of speaking) [i, ɪ, e, ᴇ, ɛ, æ], and the neutral one (now seen) [ị, ɪ̣, ẹ, ᴇ̣, ɛ̣, æ̣], to reach a half-rounded position [i̫, ɪ̫, e̫, ᴇ̫, ɛ̫, æ̫] (which could be considered halfway between [i, ɪ, e, ᴇ, ɛ, æ] and [y, ʏ, ø, ɵ, œ, ɶ], of French and German, &c). The reasons are, as before, technical ones having to do with the necessities of maintaining an appropriate sound for a greater length of time. This characteristic is undoubtedly paraphonic (*cf* § 14.1-2), and it is denoted by ⟨♩⟩, added to the normal symbols: ⟨♩ [i, ɪ, e, ᴇ, ɛ, æ]⟩; or (although not necessarily) it can be added to symbols with the diacritic: ⟨♩ [i̫, ɪ̫, e̫, ᴇ̫, ɛ̫, æ̫]⟩ (since ⟨♩⟩ is enough by itself to imply the particular articulatory differences seen here).

fig 11.11.
Difference in production of vocoids between speaking and singing.



Abolition of the term (and concept of) 'retroflection'

11.21. Natural Phonetics excludes any so-called 'retroflex(ed)' contoids; while, contoids such as [ɳ; ʈ, ɖ; ʂ, ʐ; ɽ] are postalveolar by nature (and [ɻ] is slightly rounded as well); in addition, [ɳ̫; ʈ̫, ɖ̫; ʂ̫, ʐ̫; ɽ̫] are (sub)apico-palatal (*cf fig* 10.2.1 & 10.3.1 & 10.5.3 & 10.6.1 & 10.6.5).

The concept and term of 'retroflection' are highly misleading, since they can neither explain anything, nor can they describe any phonic reality.

Furthermore, if they are applied to vocoids, they are even more misleading. As a matter of fact, the device which is used for what is incorrectly defined as 'retroflex(ed) vocoids' is not real *postalveolarization* (as it is called in more correct terms). Instead, it is lateral contraction of the body of the tongue, with a simultaneous –and unavoidable– retraction of the lamina (of the tongue), near the postalveolar zone, but with no actual (nor intentional) approaching. On the contrary, the lateral contraction (of the body of the tongue) with no retraction of the lamina, produces semi-lateralized approximants, such as [ɭ, ɫ] (*cf fig* 10.8.5).

The space in the mouth where the supposed 'retroflex vocoids' (that is *laterally contracted* ones) can be produced is very limited. Actually, it corresponds to the space of the following intense ('syllabic') contoids [ɹ̩, ɹ̩̞] (prevelar), [ɹ̴̩, ɹ̴̩̞] (uvularized velar, *cf fig* 10.6.6 for both pairs, respectively approximant and semi-approximant in each pair), with more or less marked lip-rounding. Less often, that space corresponds to the intense postalveolar contoids, [ɻ̩, ɻ̩̞], or to the velarized postalveolar ones, [ɻ̴̩, ɻ̴̩̞] (with or without rounding, *cf fig* 10.6.5 – the second element of each pair is unrounded), or even to [ʐ̩] (*cf fig* 10.6.1) as in Mandarin Chinese: *shī/shī̄* /¯ʂɻ̩/ [¯ʂʐ̩].

In addition to these intense contoids, which can form syllabic nuclei, we also find sequences of *V* + some of these contoids (either intense or not). We will only give the following examples *fur*, *fear*, *far*, from neutral American English, [ˈfɹ̩ː, ˈfɪ˔ɹ̩, ˈfɑːɹ], mediatic American English, [ˈfɹ̴̩ː, ˈfɪ˔ɹ̴̩, ˈfɑːɹ̴], and International English, [ˈfɹ̩̞ː, ˈfɪ˔ɹ̩̞, ˈfɑːɹ̞]; all of them are diaphonemically /ˈfəːɹ̣, ˈfɪəɹ̣, ˈfɑːɹ̣/.

Generic symbols (for phonic categories)

11.22. It might prove useful, sooner or later, to have symbols available which do not directly represent particular segments, but rather whole phonic categories. For this task, phonetic and phonemic formulae can be used, and the resulting symbols can be employed, for example, on the edges of vocograms or tables. We therefore provide a list of appropriate symbols of this type.

fig 11.12 gives a schematic presentation of the *seven* fundamental manners of articulation, for contoids. Also given are useful groupings and subdivisions, including the distinction between *obstruents* and *sonants* (however, the *mixed* manners of articulation, typical of approximants, and even more of trills and laterals, are not included).

The category of *obstruent* contoids includes *stops* (but not nasals, even though these could technically be considered stops with added nasalization), *stopstrictives*, *constrictives* (including constrictive trills and constrictive laterals), and *approximants* (only the peripheral ones). The *sonants* (or *sonorants*) comprise, on the other hand, central and lateralized *approximants*, besides *nasals* and *trills* (together with *taps* and *flaps*), and *laterals* (including *uni*laterals and lateral taps).

In various languages, for any manner of articulation (rarely trills, taps and flaps), phonetically *semi-*… articulations are possible (*ie* less tense – with no full contact, for nasals, stops, stopstrictives and laterals, as well).

fig 11.12.
Groupings of the fundamental manners of articulation.

C
K KΣ Σ J R L N
KX KS X S Φ Ω Λ
Γ И

V vocoid/vowel
ᵛ reduced *V* (in duration: ≡ V̆)
V̆ shortened *V*
Ṽ nasalized *V*
V̥ devoiced *V*
V̤ voiced lenis *V*
V̭ voiceless lenis *V*
V̰ half-nasalized *V*
V̬ rounded *V*
V̱ unrounded *V*
V̟ advanced *V*
V̠ retracted *V*
V̞ lowered *V*
V̝ raised *V*
Ṿ normal *V* – or under other conventions
V̦ creaky *V* (or laryngealized)
C contoid/consonant
ᶜ reduced *C* (in duration: ≡ Č)
C̆ shortened *C*
C̓ glottalized voiceless *C*, with simultaneous [ʔ]
C̩ intense ('syllabic') *C*
C̥ devoiced *C*
C̣ voiceless lenis *C* – or under other conventions, especially diaphonemic
C̤ voiced lenis *C*
C̭ voiceless *C*
C̬ voiced *C*
C̮ rounded *C*
C̱ unrounded *C*
Ç palatalized *C*
C̴ velarized/uvularized *C*
C̟ advanced *C*
C̠ retracted *C*
C̝ tenser/closer *C*
C̞ less tense/close *C*
C̦ creaky/laryngealized voiced *C*
L lateral *C*
Ł constrictive lateral *C*
L̊ voiceless lateral *C*
⅃ lateral tap *C*
ℒ unilateral *C*
ᴸ semilateral *C*
Λ lateral &/or trill/tap *C*
Λ̩ intense ('syllabic') lateral &/or trill/tap *C*
Λ̊ voiceless lateral &/or trill/tap *C*
N nasal *C*
N̩ intense ('syllabic') nasal *C*
N̊ voiceless nasal *C*
И sonant (or sonorant) *C*
И̩ intense ('syllabic') sonant *C*
И̊ voiceless sonant *C*
R trill (or trill & tap) *C*
R̊ voiceless trill (or trill & tap) *C*
Ɽ constrictive trill *C*
Я tap *C*
ЯL lateralized tap *C*
Я̡ flap *C*
ЯL̡ lateralized flap *C*
Ω median approximant *C*
J approximant *C*
ᴶ semi-approximant *C*
⌊ lateralized approximant *C*
ˡ lateralized semiapproximant *C*
Φ peripheral approximant *C*
Γ obstruent (K, KΣ, Σ) *C*, in diphonic pairs
H laryngeal approximant *C*
Ħ laryngeal constrictive *C*
K stop *C*
ᴷ semi-stop *C*
X (slit) constrictive *C*
ˣ (slit) semi-constrictive *C*
S grooved constrictive *C*
ˢ grooved semi-constrictive *C*
Σ (generic) constrictive *C*
$^{\Sigma}$ (generic) semi-constrictive *C*
KX (slit) stop-strictive *C*
K^{X} (slit) stop-semi-strictive *C*
^{K}X (slit) semi-stop-strictive *C*
KS grooved stop-strictive *C*
K^{S} grooved stop-semi-strictive *C*
^{K}S grooved semi-stop-strictive *C*
KΣ (generic) stop-strictive *C*
K$^{\Sigma}$ (generic) stop-semi-strictive *C*
$^{K}\Sigma$ (generic) semi-stop-strictive *C*
KŁ lateral stop-strictive *C*

ꝀR trill(ed)/tap(ped) stop-strictive *C*
Π lexeme
π grammeme
Ψ rhythm group
ψ reduced rhythm group
$ phono-syllable
$ reduced phono-syllable
$ 'light' syllable
$ 'heavy' syllable
∅ 'zero' phone/phoneme
^{v} indicates proximity to V – ^{v}C, $^{v}C^{v}$, C^{v}
^{c} indicates proximity to C – ^{c}V, $^{c}V^{c}$, V^{c}
C_{*} *C* with audible explosion
C˺ *C* with inaudible explosion
C^{h} = /C̭/ ≠ /C̭h/
$C^{ɦ}$ = /C̬/ ≠ /C̬h/
C' ejective *C*
ʼC injective *C*
ʻC dejective/click *C*
ⁿʻC prenasalized dejective *C*
~C prenasalized *C*
ˈV stressed *V* (with strong/primary stress)
ˌV half-stressed *V* (with mid/medium/secondary/half-strong stress)
$_{\circ}V$ unstressed *V* (with weak stress)
°V destressed *V* (with reduced stress, up to weak; starting from ˈV)
"V over-stressed *V* (with extrastrong stress)
Vː long *V*
Vˑ half-long *V*
V꞉ less than long *V*
V˒ less than half-long *V*
V| utterance-final *V*
|V after a pause or silence *V*
$V^{\#}$ word-final *V*
$^{\#}V$ word-initial *V*
$V^{\#}$ syllable-final *V*

-V- *V* within a word, word-internal *V*
| pause
⁞ potential pause
‖ longer pause
⌊ ⌋ (low) parenthesis
˫ ˧ (mid) parenthesis
⌈ ⌉ quotation
. *emic* conclusive intoneme
? *emic* interrogative intoneme
; *emic* suspensive intoneme
, *emic* continuative intoneme
normal preintoneme (*no sign*)
¿ interrogative preintoneme
¡ imperative preintoneme
¡̂ emphatic preintoneme
ʖ supplementary interrogative preintoneme (in French)
¯ (¯ ˈ ˍ _) tone with strong stress, *cf* § 12.17
¨ (ˌ ‥) tone with mid stress, *cf* § 12.17
˙ (· .) tone with weak stress, *cf* § 12.17
= (⁼ " ₌ ₌) tone with extrastrong stress, *cf* § 12.17
˵ (ˋ ˙˙ ˵ ˎ ..) falling tone, *cf* § 12.18
˶ (ˊ ˙˙ ˶ ˏ ..) rising tone, *cf* § 12.18
ˡ Japanese *akusento* (distinctive pitch lowering, *cf* § 12.3.2.1-4 of *HPr*)
˫ (˧ ˥ ˩ ˂ ˃ ˄ ˅) shift diacritic, *cf* § 8.11, 9.5
⟨ ⟩ paraphonic element (*cf* § 14.3-5) – or grapheme
[ ] phonetic transcription
/ / phonemic transcription
⟦ ⟧ *hyper*phonetic transcription
// // *hyper*phonemic transcription
( ) symbol/phon(em)e which can fall (or be lacking)
(( )) potential symbol/phon(em)e, which can be used, as in *fig* 8.8-9.