= International Phonetic Alphabet =

The International Phonetic Alphabet (unofficially ? though commonly ? abbreviated IPA) is an alphabetic system of phonetic notation based primarily on the Latin alphabet . It was devised by the International Phonetic Association as a standardized representation of the sounds of oral language . The IPA is used by lexicographers , foreign language students and teachers , linguists , speech @-@ language pathologists , singers , actors , constructed language creators , and translators .

The IPA is designed to represent only those qualities of speech that are part of oral language : phones , phonemes , intonation , and the separation of words and syllables . To represent additional qualities of speech , such as tooth gnashing , lisping , and sounds made with a cleft palate , an extended set of symbols called the Extensions to the International Phonetic Alphabet may be used .

IPA symbols are composed of one or more elements of two basic types , letters and diacritics . For example , the sound of the English letter ? t ? may be transcribed in IPA with a single letter , [t] , or with a letter plus diacritics , [t ? ?] , depending on how precise one wishes to be . Often , slashes are used to signal broad or phonemic transcription ; thus , / t / is less specific than , and could refer to , either [t ? ?] or [t] , depending on the context and language .

Occasionally letters or diacritics are added , removed , or modified by the International Phonetic Association . As of the most recent change in 2005 , there are 107 letters , 52 diacritics , and four prosodic marks in the IPA . These are shown in the current IPA chart , posted below in this article and at the website of the IPA .

= = History = =

In 1886 , a group of French and British language teachers , led by the French linguist Paul Passy , formed what would come to be known from 1897 onwards as the International Phonetic Association (in French , l ? Association phonétique internationale) . Their original alphabet was based on a spelling reform for English known as the Romic alphabet , but in order to make it usable for other languages , the values of the symbols were allowed to vary from language to language . For example , the sound [?] (the sh in shoe) was originally represented with the letter ? c ? in English , but with the digraph ? ch ? in French . However , in 1888 , the alphabet was revised so as to be uniform across languages , thus providing the base for all future revisions . The idea of making the IPA was first suggested by Otto Jespersen in a letter to Paul Passy . It was developed by A.J. Ellis , Henry Sweet , Daniel Jones , and Passy .

Since its creation , the IPA has undergone a number of revisions . After major revisions and expansions in 1900 and 1932 , the IPA remained unchanged until the IPA Kiel Convention in 1989 . A minor revision took place in 1993 with the addition of four letters for mid @-@ central vowels and the removal of letters for voiceless implosives . The alphabet was last revised in May 2005 with the addition of a letter for a labiodental flap . Apart from the addition and removal of symbols , changes to the IPA have consisted largely in renaming symbols and categories and in modifying typefaces .

Extensions to the IPA for speech pathology were created in 1990 and officially adopted by the International Clinical Phonetics and Linguistics Association in 1994 .

= = Description = =

The general principle of the IPA is to provide one letter for each distinctive sound (speech segment) , although this practice is not followed if the sound itself is complex . This means that :

It does not normally use combinations of letters to represent single sounds , the way English does with ? sh ? , ? th ? and ? ng ? , or single letters to represent multiple sounds the way ? x ? represents / ks / or / ?z / in English .

There are no letters that have context @-@ dependent sound values , as do " hard " and " soft " ? c ? or ? g ? in several European languages .

Finally , the IPA does not usually have separate letters for two sounds if no known language makes a distinction between them , a property known as " selectiveness " .

Among the symbols of the IPA , 107 letters represent consonants and vowels , 31 diacritics are used to modify these , and 19 additional signs indicate suprasegmental qualities such as length , tone , stress , and intonation . These are organized into a chart ; the chart displayed here is the official chart as posted at the website of the IPA .

= = = Letter forms = = =

The letters chosen for the IPA are meant to harmonize with the Latin alphabet . For this reason , most letters are either Latin or Greek , or modifications thereof . Some letters are neither : for example , the letter denoting the glottal stop , ? ? ? , has the form of a dotless question mark , and derives originally from an apostrophe . A few letters , such as that of the voiced pharyngeal fricative , ? ? ? , were inspired by other writing systems (in this case , the Arabic letter ? ? ain) .

Despite its preference for harmonizing with the Latin script , the International Phonetic Association has occasionally admitted other letters . For example , before 1989 , the IPA letters for click consonants were ? ? ? , ? ? ? , ? ? ? , and ? ? ? , all of which were derived either from existing IPA letters , or from Latin and Greek letters . However , except for ? ? ? , none of these letters were widely used among Khoisanists or Bantuists , and as a result they were replaced by the more widespread symbols ? ? ? , ? ? ? , ? ? ? , ? ? ? , and ? ? ? at the IPA Kiel Convention in 1989 .

Although the IPA diacritics are fully featural , there is little systemicity in the letter forms . A retroflex articulation is consistently indicated with a right @-@ swinging tail , as in ? ? ? ? ? , and implosion by a top hook , ? ? ? ? ? , but other pseudo @-@ featural elements are due to haphazard derivation and coincidence . For example , all nasal consonants but uvular ? ? ? are based on the form ? n ? : ? m ? n ? ? ? ? . However , the similarity between ? m ? and ? n ? is a historical accident , ? ? ? and ? ? ? are derived from ligatures of gn and ng , and ? ? ? is an ad hoc imitation of ? ? ? .

Some of the new letters were ordinary Latin letters turned 180 degrees , such as ? ? ? ? ? ? ? ? ? ? ? (turned a c e f h m r t v w y) . This was easily done in the era of mechanical typesetting , and had the advantage of not requiring the casting of special type for IPA symbols .

= = = = Capital letters (wildcards , archiphonemes and voice quality symbols) = = = =

Full capital letters are not used as IPA symbols . They are , however , often used for archiphonemes and for natural classes of phonemes (that is , as wildcards) . Such usage is not part of the IPA or even standardized , and may be ambiguous between authors , but it is commonly used in conjunction with the IPA . (The extIPA chart , for example , uses one or two wildcards in its illustrations .) Capital letters are also basic to the Voice Quality Symbols sometimes used in conjunction with the IPA .

As wildcards , C for { consonant } and V for { vowel } are ubiquitous . Other common capital @-@ letter symbols are T for { tone } , N for { nasal } , F for { fricative } (also S for { voiceless fricative } and Z for { voiced fricative }) , G for { glide } or for { semivowel / liquid } , P for { plosive } (stop) (also T for { voiceless stop } and D for { voiced stop }) , S for { sibilant } , L for { liquid } (or R for { rhotic } and L for { lateral }) , # or ? for { click } , A for { low vowel } , U for { rounded vowel } and B , D , J or ? , K , Q , ? , H for { labial } , { alveolar } , { post @-@ alveolar } or { palatal } , { velar } , { uvular } , { pharyngeal } and { glottal } , respectively , and X for anything . For example , the possible syllable shapes of Mandarin can be abstracted as ranging from V (atonic vowel) to CVN? (consonant @-@ vowel @-@ nasal syllable with tone) . The letters can be modified with IPA diacritics , for e.g. C? for { ejective } , ? for { implosive } , N ? C or ?C for { prenasalized consonant } , ? for { nasal vowel } , S ? for { voiced sibilant } , N ? for { voiceless nasal } , P ? F or PF for { affricate } and D ? for { dental consonant } . In speech pathology , they may represent indeterminate sounds , and superscripted when weakly articulated : ? a weak indeterminate alveolar , ? a weak indeterminate velar , etc .

Typical examples of archiphonemic use of capital letters are I for the Turkish harmonic vowel set { i y ? u } and D for the conflated flapped middle consonant of American English writer and rider .

V , F and C have different meanings as Voice Quality Symbols , where they stand for ' voice ' , '

falsetto ' and ' creak ' . They may take diacritics that indicate what kind of voice quality an utterance has , and may be used to extract a suprasegmental feature that occurs on all susceptible segments in a stretch of IPA . For instance , the transcription of Scots Gaelic [k??u??t ? ?s ? ?] ' cat ' and [k?????t ? ??] ' cats ' (Islay dialect) can be made more economical by extracting the suprasegmental labialization of the words : V? [k?u?t ? s ?] and V? [k???t ? ?] .

= = = Typography and iconicity = = =

The International Phonetic Alphabet is based on the Latin alphabet , using as few non @-@ Latin forms as possible . The Association created the IPA so that the sound values of most consonant letters taken from the Latin alphabet would correspond to " international usage " . Hence , the letters ? b ? , ? d ? , ? f ? , (hard) ? ? ? , (non @-@ silent) ? h ? , (unaspirated) ? k ? , ? l ? , ? m ? , ? n ? , (unaspirated) ? p ? , (voiceless) ? s ? , (unaspirated) ? t ? , ? v ? , ? w ? , and ? z ? have the values used in English ; and the vowel letters from the Latin alphabet (? a ? , ? e ? , ? i ? , ? o ? , ? u ?) correspond to the (long) sound values of Latin : [i] is like the vowel in machine , [u] is as in rule , etc . Other letters may differ from English , but are used with these values in other European languages , such as ? j ? , ? r ? , and ? y ? .

This inventory was extended by using small @-@ capital and cursive forms , diacritics and rotation . There are also several symbols derived or taken from the Greek alphabet , though the sound values may differ . For example , ? ? ? is a vowel in Greek , but an only indirectly related consonant in the IPA . For most of these , subtly different glyph shapes have been devised for the IPA , namely ? ? ? , ? ? ? , ? ? ? , ? ? ? , ? ? ? , ? ? ? , and ? ? ? , which are encoded in Unicode separately from their parent Greek letters , though one of them ? ? ? ? ? is not , while Greek ? ? ? and ? ? ? are generally used for ? ? ? and ? ? ? .

The sound values of modified Latin letters can often be derived from those of the original letters . For example , letters with a rightward @-@ facing hook at the bottom represent retroflex consonants ; and small capital letters usually represent uvular consonants . Apart from the fact that certain kinds of modification to the shape of a letter generally correspond to certain kinds of modification to the sound represented , there is no way to deduce the sound represented by a symbol from its shape (as for example in Visible Speech) nor even any systematic relation between signs and the sounds they represent (as in Hangul) .

Beyond the letters themselves , there are a variety of secondary symbols which aid in transcription . Diacritic marks can be combined with IPA letters to transcribe modified phonetic values or secondary articulations . There are also special symbols for suprasegmental features such as stress and tone that are often employed .

= = = Types of transcription = = =

There are two principal types of brackets used to set off IPA transcriptions :

[square brackets] are used with phonetic notations , possibly including details of the pronunciation that may not be used for distinguishing words in the language being transcribed , but which the author nonetheless wishes to document .

/ slashes / are used for phonemic notations , which note only features that are distinctive in the language , without any extraneous detail .

For example , while the / p / sounds of pin and spin are pronounced slightly differently in English (and this difference would be meaningful in some languages) , the difference is not meaningful in English . Thus phonemically the words are / p?n / and / sp?n / , with the same / p / phoneme . However , to capture the difference between them (the allophones of / p /) , they can be transcribed phonetically as [p??n] and [sp?n] .

Other conventions are less commonly seen :

Double slashes / / ... / / , pipes | ... | , double pipes | | ... | | , or braces { ... } may be used around a word to denote its underlying structure , more abstract even than that of phonemes . See morphophonology for examples .

Double square brackets ? ... ? are used for extra @-@ precise transcription . They indicate that a letter has its cardinal IPA value . For example , ? a ? is a low front vowel , rather than the perhaps slightly different value (such as low central) that " [a] " may be used to transcribe in a particular language . Thus two vowels transcribed for easy legibility as ? [e] ? and ? [?] ? may be clarified as actually being ? e ? ? and ? e ? ; ? [ð] ? may be more precisely ? ð ? ? ? ? .

Angle brackets are used to clarify that the letters represent the original orthography of the language , or sometimes an exact transliteration of a non @-@ Latin script , not the IPA ; or , within the IPA , that the letters themselves are indicated , not the sound values that they carry . For example , ? pin ? and ? spin ? would be seen for those words , which do not contain the ee sound [i] of the IPA letter ? i ? . Italics are perhaps more commonly used for this purpose when full words are being written (as pin , spin above) , but may not be sufficiently clear for individual letters and digraphs .

{ Braces } are used for prosodic notation . See Extensions to the International Phonetic Alphabet for examples in that system .

(Parentheses) are used for indistinguishable utterances . They are also seen for silent articulation (mouthing) , where the expected phonetic transcription is derived from lip @-@ reading , and with periods to indicate silent pauses , for example (...) .

Double parentheses indicate obscured or unintelligible sound , as in ((2 syll .)) or ? 2 syll . ? , two audible but unidentifiable syllables .

= = = Handwritten forms = = =

IPA letters have handwritten forms designed for use in manuscripts and when taking field notes ; they are occasionally seen in publications when the printer did not have fonts that supported IPA , and the IPA was therefore filled in by hand .

= = Modifying the IPA chart = =

The International Phonetic Alphabet is occasionally modified by the Association . After each modification , the Association provides an updated simplified presentation of the alphabet in the form of a chart . (See History of the IPA .) Not all aspects of the alphabet can be accommodated in a chart of the size published by the IPA . The alveolo @-@ palatal and epiglottal consonants , for example , are not included in the consonant chart for reasons of space rather than of theory (two additional columns would be required , one between the retroflex and palatal columns and the other between the pharyngeal and glottal columns) , and the lateral flap would require an additional row for that single consonant , so they are listed instead under the catchall block of " other symbols " . The indefinitely large number of tone letters would make a full accounting impractical even on a larger page , and only a few examples are shown .

The procedure for modifying the alphabet or the chart is to propose the change in the Journal of the IPA . (See , for example , August 2008 on a low central vowel and August 2011 on central approximants .) Reactions to the proposal may be published in the same or subsequent issues of the Journal (as in August 2009 on the low central vowel) . A formal proposal is then put to the Council of the IPA ? which is elected by the membership ? for further discussion and a formal vote .

Only changes to the alphabet or chart that have been approved by the Council can be considered part of the official IPA . Nonetheless , many users of the alphabet , including the leadership of the Association itself , make personal changes or additions in their own practice , either for convenience in working on a particular language (see " Illustrations of the IPA " for individual languages in the Handbook , which for example may use ? c ? for [t?]) , or because they object to some aspect of the official version .

= = Usage = =

Although the IPA offers over 160 symbols for transcribing speech , only a relatively small subset of these will be used to transcribe any one language . It is possible to transcribe speech with various

levels of precision . A precise phonetic transcription , in which sounds are described in a great deal of detail , is known as a narrow transcription . A coarser transcription which ignores some of this detail is called a broad transcription . Both are relative terms , and both are generally enclosed in square brackets . Broad phonetic transcriptions may restrict themselves to easily heard details , or only to details that are relevant to the discussion at hand , and may differ little if at all from phonemic transcriptions , but they make no theoretical claim that all the distinctions transcribed are necessarily meaningful in the language .

For example , the English word little may be transcribed broadly using the IPA as [?l?t?l] , and this broad (imprecise) transcription is a more or less accurate description of many pronunciations . A narrower transcription may focus on individual or dialectical details : [?????] in General American , [?l??o] in Cockney , or [?????] in Southern US English .

It is customary to use simpler letters , without many diacritics , in phonemic transcriptions . The choice of IPA letters may reflect the theoretical claims of the author , or merely be a convenience for typesetting . For instance , in English , either the vowel of pick or the vowel of peak may be transcribed as / i / (for the pairs / pik , pi?k / or / p?k , pik /) , and neither is identical to the vowel of the French word pique which is also generally transcribed / i / . That is , letters between slashes do not have absolute values , something true of broader phonetic approximations as well . A narrow transcription may , however , be used to distinguish them : [p??k] , [p?i?k] , [pik?] .

= = = Linguists = = =

Although IPA is popular for transcription by linguists , American linguists often alternate use of the IPA with Americanist phonetic notation or use the IPA together with some nonstandard symbols , for reasons including reducing the error rate on reading handwritten transcriptions or avoiding perceived awkwardness of IPA in some situations . The exact practice may vary somewhat between languages and even individual researchers , so authors are generally encouraged to include a chart or other explanation of their choices .

= = = Language study = = =

Some language study programs use the IPA to teach pronunciation . For example , in Russia (and earlier in the Soviet Union) and mainland China , textbooks for children and adults for studying English and French consistently use the IPA . English teachers and textbooks in Taiwan tend to use the Kenyon and Knott system , a slight typographical variant of the IPA .

= = = Dictionaries = = =

= = = = English = = = =

Many British dictionaries , including the Oxford English Dictionary and some learner 's dictionaries such as the Oxford Advanced Learner 's Dictionary and the Cambridge Advanced Learner 's Dictionary , now use the International Phonetic Alphabet to represent the pronunciation of words . However , most American (and some British) volumes use one of a variety of pronunciation respelling systems , intended to be more comfortable for readers of English . For example , the respelling systems in many American dictionaries (such as Merriam @-@ Webster) use ? y ? for IPA [j] and ? sh ? for IPA [?] , reflecting common representations of those sounds in written English , using only letters of the English Roman alphabet and variations of them . (In IPA , [y] represents the sound of the French ? u ? (as in tu) , and [sh] represents the pair of sounds in grasshopper .)

= = = = Other languages = = = =

The IPA is also not universal among dictionaries in languages other than English . Monolingual dictionaries of languages with generally phonemic orthographies generally do not bother with indicating the pronunciation of most words , and tend to use respelling systems for words with unexpected pronunciations . Dictionaries produced in Israel use the IPA rarely and sometimes use the Hebrew script for transcription of foreign words . Monolingual Hebrew dictionaries use pronunciation respelling for words with unusual spelling ; for example , the Even @-@ Shoshan Dictionary respells ????????? as ?????????? because this word uses kamatz katan . Bilingual dictionaries that translate from foreign languages into Russian usually employ the IPA , but monolingual Russian dictionaries occasionally use pronunciation respelling for foreign words ; for example , Ozhegov 's dictionary adds ?? ? in brackets for the French word ?????? (pince @-@ nez) to indicate that the ? does not iotate the ? .

The IPA is more common in bilingual dictionaries , but there are exceptions here too . Mass @-@ market bilingual Czech dictionaries , for instance , tend to use the IPA only for sounds not found in the Czech language .

= = = Standard orthographies and case variants = = =

IPA letters have been incorporated into the alphabets of various languages , notably via the Africa Alphabet in many sub @-@ Saharan languages such as Hausa , Fula , Akan , Gbe languages , Manding languages , Lingala , etc . This has created the need for capital variants . For example , Kabiyè of northern Togo has ? ? , ? ? , ? ? , ? ? , ? ? , ? ? . These , and others , are supported by Unicode , but appear in Latin ranges other than the IPA extensions .

In the IPA itself , however , only lower @-@ case letters are used . The 1949 edition of the IPA handbook indicated that an asterisk ? * ? may be prefixed to indicate that a word is a proper name , but this convention has not been included in recent editions .

= = = Classical singing = = =

IPA has widespread use among classical singers for preparation , especially among English @-@ speaking singers who are expected to sing in a variety of foreign languages . Opera librettos are authoritatively transcribed in IPA , such as Nico Castel 's volumes and Timothy Cheek 's book Singing in Czech . Opera singers ' ability to read IPA was used by the site Visual Thesaurus , which employed several opera singers " to make recordings for the 150 @,@ 000 words and phrases in VT 's lexical database . ... for their vocal stamina , attention to the details of enunciation , and most of all , knowledge of IPA . "

= = Letters = =

The International Phonetic Association organizes the letters of the IPA into three categories : pulmonic consonants , non @-@ pulmonic consonants , and vowels .

Pulmonic consonant letters are arranged singly or in pairs of voiceless (tenuis) and voiced sounds , with these then grouped in columns from front (labial) sounds on the left to back (glottal) sounds on the right . In official publications by the IPA , two columns are omitted to save space , with the letters listed among ' other symbols ' , and with the remaining consonants arranged in rows from full closure (occlusives : stops and nasals) , to brief closure (vibrants : trills and taps) , to partial closure (fricatives) and minimal closure (approximants) , again with a row left out to save space . In the table below , a slightly different arrangement is made : All pulmonic consonants are included in the pulmonic @-@ consonant table , and the vibrants and laterals are separated out so that the rows reflect the common lenition pathway of stop ? fricative ? approximant , as well as the fact that several letters pull double duty as both fricative and approximant ; affricates may be created by joining stops and fricatives from adjacent cells . Shaded cells are judged to be implausible .

Vowel letters are also grouped in pairs ? of unrounded and rounded vowel sounds ? with these pairs also arranged from front on the left to back on the right , and from maximal closure at top to

minimal closure at bottom . No vowel letters are omitted from the chart , though in the past some of the mid central vowels were listed among the ' other symbols ' .

Each character is assigned a number , to prevent confusion between similar letters (such as ? and ? , ? and ? , or ? and ?) in such situations as the printing of manuscripts . The categories of sounds are assigned different ranges of numbers .

= = = Consonants = = =

= = = = Pulmonic consonants = = = =

A pulmonic consonant is a consonant made by obstructing the glottis (the space between the vocal cords) or oral cavity (the mouth) and either simultaneously or subsequently letting out air from the lungs . Pulmonic consonants make up the majority of consonants in the IPA , as well as in human language . All consonants in the English language fall into this category .

The pulmonic consonant table , which includes most consonants , is arranged in rows that designate manner of articulation , meaning how the consonant is produced , and columns that designate place of articulation , meaning where in the vocal tract the consonant is produced . The main chart includes only consonants with a single place of articulation .

Notes

In rows where some letters appear in pairs (the obstruents) , the letter to the right represents a voiced consonant (except breathy @-@ voiced [?]) . However , [?] cannot be voiced , and the voicing of [?] is ambiguous . In the other rows (the sonorants) , the single letter represents a voiced consonant .

Although there is a single letter for the coronal places of articulation for all consonants but fricatives , when dealing with a particular language , the letters may be treated as specifically dental , alveolar , or post @-@ alveolar , as appropriate for that language , without diacritics .

Shaded areas indicate articulations judged to be impossible .

The letters [? , ? , ?] represent either voiced fricatives or approximants .

In many languages , such as English , [h] and [?] are not actually glottal , fricatives , or approximants . Rather , they are bare phonation .

It is primarily the shape of the tongue rather than its position that distinguishes the fricatives [? ?] , [? ?] , and [? ?] .

Some listed phones are not known to exist as phonemes in any language .

= = = = Affricates and co @-@ articulated consonants = = = =

Co @-@ articulated consonants are sounds that involve two simultaneous places of articulation (are pronounced using two parts of the vocal tract) . In English , the [w] in " went " is a coarticulated consonant , being pronounced by rounding the lips and raising the back of the tongue . Similar sounds are [?] and [?] .

Affricates and doubly articulated stops are represented by two letters joined by a tie bar , either above or below the letters . The six most common affricates are optionally represented by ligatures , though this is no longer official IPA usage , because a great number of ligatures would be required to represent all affricates this way . Alternatively , a superscript notation for a consonant release is sometimes used to transcribe affricates , for example t? for t ? s , paralleling k? ~ k ? x . The letters for the palatal plosives c and ? , are often used as a convenience for t ? ? and d ? ? or similar affricates , even in official IPA publications , so they must be interpreted with care .

Note

On browsers that use Arial Unicode MS to display IPA characters , the following incorrectly formed sequences may look better due to a bug in that font : ts ? , t? ? , t? ? , dz ? , d? ? , d? ? , t? ? , kp ? , ?b ? , ?m ? .

[?] is described as a " simultaneous [?] and [x] " . However , this analysis is disputed . (See

voiceless palatal @-@ velar fricative for discussion .)

Multiple tie bars can be used : ? a ? b ? c ? or ? a ? b ? c ? . For instance , if a prenasalized stop is transcribed ? m ? b ? , and a doubly articulated stop ? ? ? b ? , then a prenasalized doubly articulated stop would be ? ? ? m ? ? ? b ?

= = = = Non @-@ pulmonic consonants = = = =

Non @-@ pulmonic consonants are sounds whose airflow is not dependent on the lungs . These include clicks (found in the Khoisan languages of Africa) , implosives (found in languages such as Sindhi , Saraiki , Swahili and Vietnamese) , and ejectives (found in many Amerindian and Caucasian languages) .

Notes

Clicks have traditionally been described as double articulation of a forward ' release ' and a rear ' accompaniment ' , with the click letters representing only the release . Therefore , all clicks require two letters for proper notation : ? k ? ? , ? ? ? , ? ? ? , q ? ? , ? ? ? , ? ? ? ? etc . , or ? ? ? k , ? ? ? , ? ? ? , ? ? q , ? ? ? , ? ? ? ? . When the dorsal articulation is omitted , a [k] may usually be assumed . However , recent research disputes the concept of ' accompaniment ' and the idea that clicks are doubly articulated , with the rear occlusion instead simply being part of the airstream mechanims . In these approaches , the click letter represents both articulations , with the different letters representing different click ' types ' , there is no velar @-@ uvular distinction , and the accompanying letter represents the manner , phonation , or airstream contour of the click : ? ? , ?? , ?? ? etc .

Letters for the voiceless implosives ? ? , ? , ? , ? , ? ? are no longer supported by the IPA , though they remain in Unicode . Instead , the IPA typically uses the voiced equivalent with a voiceless diacritic : ? ? ? , ? ? ? , etc ..

Although not confirmed as contrastive in any language , and therefore not explicitly recognized by the IPA , a letter for the retroflex implosive , ? ? ? , has been assigned an IPA number .

The ejective diacritic often stands in for a superscript glottal stop in glottalized but pulmonic sonorants , such as [m?] , [l?] , [w?] , [a?] . These may also be transcribed as creaky [m ?] , [l ?] , [w ?] , [a ?] .

= = = Vowels = = =

The IPA defines a vowel as a sound which occurs at a syllable center . Below is a chart depicting the vowels of the IPA . The IPA maps the vowels according to the position of the tongue .

The vertical axis of the chart is mapped by vowel height . Vowels pronounced with the tongue lowered are at the bottom , and vowels pronounced with the tongue raised are at the top . For example , [?] (the first vowel in father) is at the bottom because the tongue is lowered in this position . However , [i] (the vowel in " meet ") is at the top because the sound is said with the tongue raised to the roof of the mouth .

In a similar fashion , the horizontal axis of the chart is determined by vowel backness . Vowels with the tongue moved towards the front of the mouth (such as [?] , the vowel in " met ") are to the left in the chart , while those in which it is moved to the back (such as [?] , the vowel in " but ") are placed to the right in the chart .

In places where vowels are paired , the right represents a rounded vowel (in which the lips are rounded) while the left is its unrounded counterpart .

= = = = Diphthongs = = = =

Diphthongs are typically specified with a non @-@ syllabic diacritic , as in ? u? ? ? or ? u ? ? ? , or with a superscript for the on- or off @-@ glide , as in ? u? ? or ? ?? ? . Sometimes a tie bar is used , especially if it is difficult to tell if the diphthong is characterized by an on @-@ glide , an off @-@ glide or is variable : ? u ? ? ? .

Notes

? a ? officially represents a front vowel , but there is little distinction between front and central open vowels , and ? a ? is frequently used for an open central vowel . However , if disambiguation is required , the retraction diacritic or the centralized diacritic may be added to indicate an open central vowel , as in ? a ? ? or ? ä ? .

= = Diacritics and prosodic notation = =

Diacritics are used for phonetic detail . They are added to IPA letters to indicate a modification or specification of that letter 's normal pronunciation .

By being made superscript , any IPA letter may function as a diacritic , conferring elements of its articulation to the base letter . (See secondary articulation for a list of superscript IPA letters supported by Unicode .) Those superscript letters listed below are specifically provided for by the IPA ; others include ? t? ? ([t] with fricative release) , ? ?s ? ([s] with affricate onset) , ? ?d ? (prenasalized [d]) , ? b? ? ([b] with breathy voice) , ? m? ? (glottalized [m]) , ? s? ? ([s] with a flavor of [?]) , ? o? ? ([o] with diphthongization) , ? ?? ? (compressed [?]) . Superscript diacritics placed after a letter are ambiguous between simultaneous modification of the sound and phonetic detail at the end of the sound . For example , labialized ? k? ? may mean either simultaneous [k] and [w] or else [k] with a labialized release . Superscript diacritics placed before a letter , on the other hand , normally indicate a modification of the onset of the sound (? m? ? glottalized [m] , ? ?m ? [m] with a glottal onset) .

Notes

^ a With aspirated voiced consonants , the aspiration is usually also voiced (voiced aspirated ? but see aspirated voiced) . Many linguists prefer one of the diacritics dedicated to breathy voice over simple aspiration , such as ? b ? ? . Some linguists restrict this diacritic to sonorants , and transcribe obstruents as ? b? ? .

^ b The overstruck tilde is not recommended where it would be typographically unclear . It is also deprecated in Unicode , with precomposed letters preferred . (See pharyngealization for available combinations .)

Subdiacritics (diacritics normally placed below a letter) may be moved above a letter to avoid conflict with a descender , as in voiceless ? ? ? ? . The raising and lowering diacritics have optional forms ? ? ? , ? ? ? that avoid descenders .

The state of the glottis can be finely transcribed with diacritics . A series of alveolar plosives ranging from an open to a closed glottis phonation are :

Additional diacritics are provided by the Extensions to the IPA for speech pathology .

= = = Suprasegmentals = = =

These symbols describe the features of a language above the level of individual consonants and vowels , such as prosody , tone , length , and stress , which often operate on syllables , words , or phrases : that is , elements such as the intensity , pitch , and gemination of the sounds of a language , as well as the rhythm and intonation of speech . Although most of these symbols indicate distinctions that are phonemic at the word level , symbols also exist for intonation on a level greater than that of the word . Various ligatures of tone letters are used in the IPA Handbook despite not being found on the simplified official IPA chart .

Finer distinctions of tone may be indicated by combining the tone diacritics and tone letters shown above , though not all IPA fonts support this . The four additional rising and falling tones supported by diacritics are high / mid rising ? ? , ? ? ? , low rising ? ? , ? ? ? , high falling ? ? , ? ? ? , and low / mid falling ? ? , ? ? ? . That is , tone diacritics only support contour tones across three levels (high , mid , low) , despite supporting five levels for register tones . For other contour tones , tone letters must be used : ? ? ? , ? ? ? , etc . For more complex (peaking and dipping) tones , though it is theoretically possible to combine the three tone diacritics in any permutation , in practice only generic peaking ? ? and dipping ? ? combinations are used . For finer detail , tone letters are again

required (? ? ? ? , ? ? ? ? , ? ? ? ? , ? ? ? ? , etc .) The correspondence between tone diacritics and tone letters is therefore only approximate .

A work @-@ around for diacritics sometimes seen when a language has more than one rising or falling tone , and the author wishes to avoid the poorly legible diacritics ? ? , ? ? , ? ? , ? ? but does not wish to completely abandon the IPA , is to restrict generic rising ? ? and falling ? ? to the higher @-@ pitched of the rising and falling tones , say ? ? ? and ? ? ? , and to use the old (retired) IPA subscript diacritics ? ? and ? ? for the lower @-@ pitched rising and falling tones , say ? ? ? and ? ? ? . When a language has four or six level tones , the two mid tones are sometimes transcribed as high @-@ mid ? ? (non @-@ standard) and low @-@ mid ? ? .

A stress mark typically appears before the stressed syllable , and thus marks the syllable break as well as stress . Where the syllable onset is a geminate consonant , e.g. in Italian , the consonant is commonly split by the stress mark , which means that the length sign is not used for gemination . (Thus ? av?v?lse ? not * ? a?vv?lse ? , * ? a?v??lse ? , or * ? av???lse ? .) However , occasionally the stress mark is placed immediately before the stressed vowel , after any syllable onset (? avv??lse ? or ? av???lse ?) . In such transcriptions , the stress mark does not function as a mark of the syllable boundary .

Tone letters generally appear after each syllable , for a language with syllable tone (? a ? v? ? ? ?) , or after the phonological word , for a language with word tone (? av? ? ? ? ?) . However , in older versions of the IPA , ad hoc tone marks were placed before the syllable , the same position as used to mark stress , and this convention is still sometimes seen (? ? a ? ? v? ? , ? ? ? ? av? ?) .

= = = Comparative degree = = =

IPA diacritics may be doubled to indicate an extra degree of the feature indicated . This is a productive process , but apart from extra @-@ high and extra @-@ low tones ? ? ? , ? ? ? being marked by doubled high- and low @-@ tone diacritics , and the major prosodic break ? ? ? being marked as a double minor break ? | ? , it is not specifically regulated by the IPA . (Note that transcription marks are similar : double slashes indicate extra (morpho) -phonemic , double square brackets especially precise , and double parentheses especially unintelligible .)

For example , the stress mark may be doubled to indicate an extra degree of stress such prosodic stress in English . An example in French , with a single stress mark for normal prosodic stress at the end of each prosodic unit (marked as a minor prosodic break) , and a double stress mark for contrastive / emphatic stress : [??? ? ??tre | m??sjø | | ??vwala ma?dam | |] Entrez monsieur , voilà madame . Similarly , a doubled secondary stress mark ? ?? ? is commonly used for tertiary stress .

Length is commonly extended by repeating the length mark , as in English shhh ! [????] , or for " overlong " segments in Estonian :

vere / vere / ' blood [gen.sg.] ' , veere / ve?re / ' edge [gen.sg.] ' , veere / ve??re / ' roll [imp . 2nd sg .] '

lina / lin? / ' sheet ' , linna / lin?? / ' town [gen. sg .] ' , linna / lin??? / ' town [ine. sg .] '

(Normally additional degrees of length are handled by the extra @-@ short or half @-@ long diacritics , but in the Estonian examples , the first two cases are analyzed as simply short and long .)

Occasionally other diacritics are doubled :

Rhoticity in Badaga / be / " mouth " , / be ? / " bangle " , and / be ? ? / " crop " .

Aspiration , for example contrasting Korean mild aspiration [k?] with strong aspiration [k??] .

Nasalization , as in Palantla Chinantec / ? / vs / e ? / .

Weak vs strong ejectives , [k?] , [k ?]

Especially lowered , e.g. [t ? ?] for / t / as a weak fricative in some pronunciations of register .

Especially retracted (at least on a vowel) , e.g. [ø ? ?] , though , depending on the font , on a consonant this could be confused with alveolar or alveolarized notation from the extIPA .

The transcription of strident and harsh voice as extra @-@ creaky / a ? / may be motivated by the similarities of these phonations .

= = Obsolete and nonstandard symbols = =

The IPA once had parallel symbols from alternative proposals , but in most cases eventually settled on one for each sound . The rejected symbols are now considered obsolete . An example is the vowel letter ? ? ? , rejected in favor of ? ? ? . Letters for affricates and sounds with inherent secondary articulation have also been mostly rejected , with the idea that such features should be indicated with tie bars or diacritics : ? ? ? for [z?] is one . In addition , the rare voiceless implosives , ? ? ? ? ? ? ? , have been dropped and are now usually written ? ? ? ? ? ? ? ? ? ? ? . A retired set of click letters , ? ? , ? , ? ? , is still sometimes seen , as the official pipe letters ? ? , ? , ? ? may cause problems with legibility , especially when used with brackets ([ ] or / /) , the letter ? l ? , or the prosodic marks ? | , ? ? (for this reason , some publications which use the current IPA pipe letters disallow IPA brackets) .

Individual non @-@ IPA letters may find their way into publications that otherwise use the standard IPA . This is especially common with :

Affricates , such as the Americanist barred lambda ? ? ? for [t ? ?] or ? ? ? for [t ? ?] . Some authors find the tie bars displeasing but the lack of tie bars confusing (i.e. ? ? ? for / t ? ? / as distinct from / t? /) , while others simply prefer to have one letter for each segmental phoneme in a language .

Digits for tonal phonemes that have conventional numbers in a local tradition , such as the four tones of Chinese . This may be more convenient for comparison between languages and dialects than a phonetic transcription because tones often vary more than segmental phonemes do .

Digits for tone levels , though the lack of standardization can cause confusion (with e.g. " 1 " for high tone in some languages but for low tone in others) .

Iconic extensions of standard IPA letters that can be readily understood , such as retroflex ? ? ? and ? ? ? .

In addition , there are typewriter substitutions for when IPA support is not available , such as capital ? I , E , U , O , A ? for [? , ? , ? , ? , ?] .

= = IPA extensions = =

The " Extensions to the IPA " , often abbreviated as " extIPA " and sometimes called " Extended IPA " , are symbols whose original purpose was to accurately transcribe disordered speech . At the IPA Kiel Convention in 1989 , a group of linguists drew up the initial extensions , which were based on the previous work of the PRDS (Phonetic Representation of Disordered Speech) Group in the early 1980s . The extensions were first published in 1990 , then modified , and published again in 1994 in the Journal of the International Phonetic Association , when they were officially adopted by the ICPLA . While the original purpose was to transcribe disordered speech , linguists have used the extensions to designate a number of unique sounds within standard communication , such as hushing , gnashing teeth , and smacking lips . The extensions have also been used to record certain peculiarities in an individual 's voice , such as nasalized voicing .

The Extensions to the IPA do not include symbols used for voice quality (VoQS) , such as whispering .

= = Segments without letters = =

The remaining blank cells on the IPA chart can be filled without too much difficulty if the need arises . Some ad hoc letters have appeared in the literature for the retroflex lateral flap , the voiceless lateral fricatives , the epiglottal trill , and the labiodental plosives . (See the grey letters in the PDF chart .) Diacritics can supply much of the remainder . If a sound cannot be transcribed , an asterisk ? * ? may be used , either as a letter or as a diacritic (as in ? k * ? sometimes seen for the Korean ' fortis ' velar) .

= = = Consonants = = =

Representations of consonant sounds outside of the core set are created by adding diacritics to letters with similar sound values . The Spanish bilabial and dental approximants are commonly written as lowered fricatives , [? ?] and [ð ?] respectively . Similarly , voiced lateral fricatives would be written as raised lateral approximants , [? ? ? ? ? ?] . A few languages such as Banda have a bilabial flap as the preferred allophone of what is elsewhere a labiodental flap . It has been suggested that this be written with the labiodental flap letter and the advanced diacritic , [? ?] .

Similarly , a labiodental trill would be written [? ?] (bilabial trill and the dental sign) , and labiodental stops [p ? b ?] rather than with the ad hoc letters sometimes found in the literature . Other taps can be written as extra @-@ short plosives or laterals , e.g. [? ? ? ? / ? ? ? ?] , though in some cases the diacritic would need to be written below the letter . A retroflex trill can be written as a retracted [r ?] , just as retroflex fricatives sometimes are . The remaining consonants , the uvular laterals (? ? etc .) and the palatal trill , while not strictly impossible , are very difficult to pronounce and are unlikely to occur even as allophones in the world 's languages .

= = = Vowels = = =

The vowels are similarly manageable by using diacritics for raising , lowering , fronting , backing , centering , and mid @-@ centering . For example , the unrounded equivalent of [?] can be transcribed as mid @-@ centered [? ?] , and the rounded equivalent of [æ] as raised [? ?] or lowered [? ?] . True mid vowels are lowered [e ? ø ? ? ? ? ? ? ? o ?] or raised [? ? ? ? ? ? ? ? ? ? ? ? ?] , while centered [? ? ? ?] and [ä] (or , less commonly , [? ?]) are near @-@ close and open central vowels , respectively . The only known vowels that cannot be represented in this scheme are vowels with unexpected roundedness , which would require a dedicated diacritic , such as ? ?? ? and ? u? ? (or ? ?? ? and ? ?? ?) .

= = Symbol names = =

An IPA symbol is often distinguished from the sound it is intended to represent , since there is not necessarily a one @-@ to @-@ one correspondence between letter and sound in broad transcription , making articulatory descriptions such as ' mid front rounded vowel ' or ' voiced velar stop ' unreliable . While the Handbook of the International Phonetic Association states that no official names exist for its symbols , it admits the presence of one or two common names for each . The symbols also have nonce names in the Unicode standard . In some cases , the Unicode names and the IPA names do not agree . For example , IPA calls ? " epsilon " , but Unicode calls it " small letter open E " .

The traditional names of the Latin and Greek letters are usually used for unmodified letters . Letters which are not directly derived from these alphabets , such as [?] , may have a variety of names , sometimes based on the appearance of the symbol or on the sound that it represents . In Unicode , some of the letters of Greek origin have Latin forms for use in IPA ; the others use the letters from the Greek section .

For diacritics , there are two methods of naming . For traditional diacritics , the IPA notes the name in a well known language ; for example , é is acute , based on the name of the diacritic in English and French . Non @-@ traditional diacritics are often named after objects they resemble , so d ? is called bridge .

Pullum and Ladusaw list a variety of names in use for IPA symbols , both current and retired , in addition to names of many other non @-@ IPA phonetic symbols . Their collection is extensive enough that the Unicode Consortium used it in the development of Unicode .

= = Fonts = =

IPA font support is increasing , and is now included in several fonts such as the Times New Roman

versions that come with various recent computer operating systems . Diacritics are not always properly rendered , however . IPA fonts that are freely available online include Gentium , several from the SIL (such as Charis SIL , and Doulos SIL) , DejaVu Sans , and TITUS Cyberbit , which are all freely available ; as well as commercial typefaces such as Brill , available from Brill Publishers , and Lucida Sans Unicode and Arial Unicode MS , shipping with various Microsoft products . These all include several ranges of characters in addition to the IPA . Modern Web browsers generally do not need any configuration to display these symbols , provided that a font capable of doing so is available to the operating system .

= = ASCII and keyboard transliterations = =

Several systems have been developed that map the IPA symbols to ASCII characters . Notable systems include Kirshenbaum , Arpabet , SAMPA , and X @-@ SAMPA . The usage of mapping systems in on @-@ line text has to some extent been adopted in the context input methods , allowing convenient keying of IPA characters that would be otherwise unavailable on standard keyboard layouts .