

# Problems in the classification of *approximants*

Eugenio Martínez-Celdrán  
Universitat de Barcelona (Spain)  
martinezceldran@ub.edu

## 1. Introduction

Ladefoged (1964) was the first to use the term “approximant” in his *Phonetic Study of West African Languages*. He defined it as a “sound that belongs to the phonetic class vocoid or central resonant oral, and simultaneously to the phonological class consonant in that it occurs in the same phonotactic patterns as stops, fricatives and nasals.” Catford (1977), reflecting on this usage, gives a different definition: “An articulation in which one articulator is close to another but without the vocal tract being narrowed to such an extent that a turbulent airstream is produced”. The IPA usage in the *Handbook* follows this description. Trask (1996) in *Dictionary of Phonetics and Phonology* defines it as “A segment [...] articulated with a constriction which is typically greater than that required for a vowel but not radical enough to produce turbulent air flow and hence friction noise, at least when voiced...”. This definition delimits a segment articulated between two boundaries: on the one hand, vowels, with no constriction, and on the other, fricatives, whose constriction is tight enough to produce turbulent noise. This is the general consensus. From this point on, disagreement starts – when it is time to decide which segments are included in this category. Vowels, or at least high vowels, have been dismissed, but Catford (1977) includes them, and Ladefoged (1975) gives the same definition as Catford, abandoning the phonological part of his previous definition. However, in this work and in later work (Ladefoged 2001:52) he comments only on the segments that coincide with the English sounds [w, j, l, r], omitting the possibility of classifying high vowels as approximants. Another element of disagreement is [h], also included in this category by some researchers (Catford, 1977; Laver, 1994).

## 2. Approximants in the IPA

The IPA (*Handbook...*,1999) includes [v ɹ ɻ j ɰ] in the pulmonic consonant table under this denomination, [w ɰ] in “other symbols”, and, finally, points out that the special openness diacritic [̚] can be used for other segments such as the voiced bilabial approximant: [β̚]. Furthermore, in the pulmonic consonants table, a full line is included for lateral approximants, different from lateral fricatives, that is [l̚ ʎ̚ ʟ̚]. Thus it is clear that the category “approximant” comprises a series of subcategories, and it is not a unitary category. The different classifications lead to at least three subcategorical distinctions:

- a) Laterals: [l̚ ʎ̚ ʟ̚].
- b) Non-laterals (or centrals): [v ɹ ɻ] and [β̚].
- c) Semi-vowels: [j ɰ w ɰ].

Even in section (b) the so-called rhotics [ɹ ɻ] could be separated from the rest. Certainly, the diacritic (tiny-T) allows us to classify many other sounds that suit the definition of an approximant, as we have suggested above.

### 3. The usage of phoneticians

The usage of some authors still confuses some of these subcategories and does not explain this inclusion relationship: “approximant” is a superordinate term including other subordinate categories. For instance, semi-vowels (or else glides or semi-consonants) are part of diphthongs and, thus, are phonetically closely related to the respective high vowels [i-j u-ɥ u-w y-ɥ]. Not admitting this leads to confusions in the use of symbols, e.g.: [ɥ]. The same happens to [ɥ], which is the semi-vowel corresponding to vowel [y], as is made evident in the French word *lu* “read” (past participle), pronounced [ly], and *huit* “eight”, pronounced [ɥit], which is considered to be a diphthong. We have to consider [ɥ] as a semi-vowel connected to the vowel [u], as seems to be the case in the Korean word [ʌ:lun] “seniors” and [ʌ:ɥiza] “doctor”.

In the previous paragraph, the relationship vowel - semi-vowel (or semi-consonant) is obvious for the aforesaid languages. Besides, it must be taken into account that if [y] is a high, front, rounded vowel, the corresponding semi-vowel [ɥ] will also be high, front and rounded. Similarly, if the vowel [u] is high, back and unrounded, the corresponding semi-vowel [ɥ] is also high, back and unrounded. Furthermore, we can also state that [u]-[w] are both rounded, whereas [i]-[j] are unrounded. This can be perfectly exemplified in Spanish: *nube* [nuβe] “cloud”, *nueve* [nweβe] “nine” on the one hand and *vine* [ʌ:βine] “I came”, *viene* [ʌ:βjene] “he comes” on the other.

As for the symbol [ɥ], it is quite evidently inappropriate for it to represent the Spanish voiced velar approximant consonant. Many authors have pointed out the fact that [ɥ] is not rounded; e.g.: Pullum and Ladusaw (1986:98) state that “the sound in question can be described as a semi-vowel (glide) with the properties “high”, “back”, and “unrounded”. They even establish an interesting parallelism: “the sound can be regarded as an unrounded [w]”. In consequence, it is evident that it is not an adequate symbol for Spanish. First of all, because it has never been taken into consideration that there is a diphthong in cases like *paga* “pay”, *vago* “lazy”, *lego* “lay”, etc., and, secondly, because this sound is rounded when it precedes rounded vowels. Besides, it would be utterly wrong to transcribe the word *jugo* “juice” with [ɥ] \*[χuɥo], because the pronunciation of that consonant between two rounded vowels is completely rounded whereas [ɥ] is not. I brought this argument to the attention of Francis Nolan, who, as Secretary of the IPA, was seeing the *Handbook* through the press. I had noticed this when the IPA sent its associates the *Journal of the IPA* in 1995, with the “Preview of the IPA Handbook”, in which [ɥ] appears on page 18 and its sound is exemplified by saying “Spanish variant of [ɣ] in *paga* [paɣa] (pay)”. In the final *Handbook* (1999) this allusion to Spanish disappeared and the semi-vowel was exemplified through Turkish and Korean: both languages have the vowel [u].

The symbol I have always proposed is the correlate to the other central approximants in Spanish [β, ð], thus [ɣ] (E. Martínez-Celdrán 1991 and 1996:47). This coincides with Ball and Rahilly (1999:90) whose example for the three approximants is the Spanish word *abogado* “lawyer” (see figure 1). Moreover, they also criticise in a footnote the confusion between these symbols: “The difference between an approximant version of the voiced velar fricative [ɣ], and the velar semi-vowel [ɥ] is that the latter requires spread lips, and must have a slightly more open articulatory channel so that it becomes [u] if prolonged”. The inconsistencies in the use of the symbol [ɥ] led Ball and Rahilly (1999) to take a wrong example from Galician. They transcribe *algo* “something” as [ʌ:ɥo]. However, in that particular word this is utterly incorrect, since

in a normal pronunciation that sound is rounded. If in a very narrow transcription it is wished to indicate that rounding, it is necessary to use the correct diacritic [ʷ]: [aɫɣ<sup>ʷ</sup>o]. In principle, since it is an automatic co-articulatory matter, it is not necessary to be transcribed. It must be pointed out that these authors establish the same classification we have put forward in section 2.

Ball and Rahilly divide central approximants into two classes: rhotic and “weak fricatives”. I do not share the opinion of those who still keep a close connection between the approximants [β̞ ɸ̞ ɣ̞] and the voiced fricatives with the same place of articulation. In fact, traditional Spanish phonetics (Navarro Tomás 1918) has classified them as fricatives, although they do not have “a turbulent airstream” (Ladefoged & Maddieson 1996:137), which is required for any fricative. Therefore, I would not refer to them as “weak fricatives”.

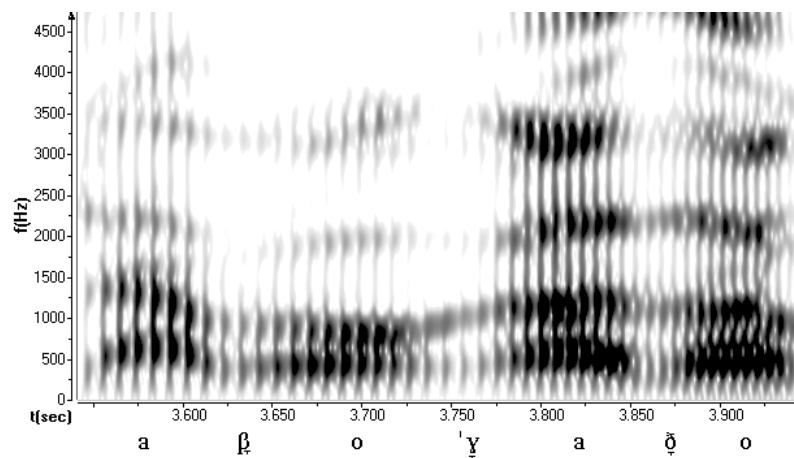


Figure 1. Spectrogram of *abogado*, exemplifying the three approximants of Spanish mentioned above. There is no noise at all in the spectrogram (not even in the frequencies above 4000 Hz). The relevant features are short duration and weakened glottal pulses between vowels. There is also no noise at all perceptually.

This naming (i.e. ‘weak fricatives’) can lead to a further confusion. The segments integrating this group have been traditionally classified as fricatives because this category was basically defined in an opposite way to plosives: “the contact of organs is incomplete and a wider or tighter constriction is produced between them; the air rubs through this constriction, which does not interrupt its way out of the mouth (Gili Gaya 1950:73). This is why the term continuant started to spread: “the stops have complete closure followed by opening. The constrictives have incomplete closure...” (Jakobson; Fant & Halle 1952 :22).

Nowadays, it is emphasized that fricatives must have a turbulent airstream, so the idea that a fricative is an intermediate segment between a plosive and a vowel has been abandoned. Furthermore, we must add another characteristic to the existence of turbulent airstream – for noise to be produced there must be a higher degree of articulatory precision than that required for plosives (Ladefoged & Maddieson 1996).

The group of non-rhotic central approximants [β̞ ɸ̞ ɣ̞] do not generally have either of both characteristics – they do not have turbulent airstream and their degree of articulatory precision is even lower than that of plosives.

The phonologies of Spanish, Catalan, Galician, etc. demonstrate that these approximant allophones are variants of their respective voiced stops. The openness of voiced stops does not involve any friction, since the phenomenon taking place here is a

relaxation of the occlusion, and this relaxation renders unnecessary the maintenance of the articulatory precision needed for the production of a fricative, because, as Ladefoged and Maddieson (1996:137) indicate “the gesture forming the constriction in many fricatives has a greater degree of articulatory precision than that required in stops and nasals”. In other words, stops are actually less precise than fricatives, and central approximants have an even lower degree of articulatory precision than stops. This concept is very important since there are more open variants, similar to vowels (figure 2) and more close variants, similar to plosives (Quilis 1981) that do not have turbulent airstream (figure 3); regarding the latter, Romero (1995:130) asserts that “there is no reliable difference in constriction degree between fricatives and approximants ([β̞ ǝ̞ ɥ̞])”. This would indicate that for this class of approximant sounds to exist what matters is, rather than the openness of organs, the lack of articulatory tension that Martinet (1980-81) indicates, or the degree of articulatory precision that Ladefoged and Maddieson (1996) state. This has some implications regarding the definition of this approximant category.

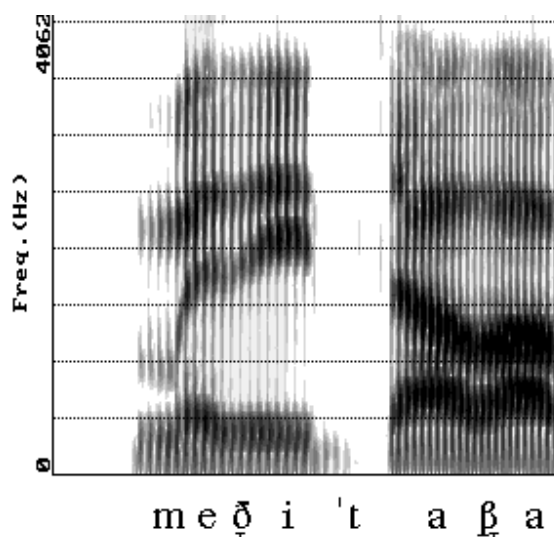


Figure 2. Open variants of the approximant segments in the word *meditaba*, “s/he meditated”.

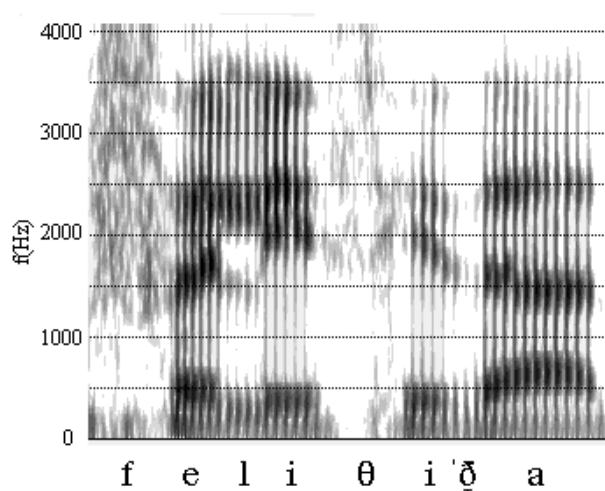


Figure 3. Close variant of the approximant segments in the word *felicidad*, “happiness”.

If a label is required for this type of approximants, my proposal is to use Martinet's terminology (1956:24): "Il est indiqué de distinguer entre les articulations relâchées (type du *d* d'esp. *ocupado*), qui tendent vers une ouverture de type vocalique, pour lesquelles on réservera le terme de spirantes, et de consonnes d'articulation ferme, nettement caractérisées pour le frottement de l'air, qui sont proprement de fricatives (type du *th* d'angl. *father*)" ("It is appropriate to distinguish between relaxed articulations (like Spanish *d* in *ocupado*), that tend to a vowel-like openness, for which we will keep the term spirants, and strong articulation consonants, clearly characterized by the airstream rub, which are properly fricatives (like English *th* in *father*).") Even though the label "spirant" used to be considered as a synonym of fricative, nowadays this term is out of use and is, thus, available for this sound sub-class: non-rhotic central approximants.

#### 4. Phonetic differences between two subcategories of approximants: spirants and semi-vowels – the case of Spanish palatal sounds.

In Spanish we have to make a difference between two close segments that have a phonemic distinction. Wells (1975:54) already indicated that traditional Spanish phonetics and phonology had pointed out something relevant: "In fact, it appears that the difference between the [voiced palatal] fricative and the [voiced palatal] approximant is phonemically distinctive in various languages: e. g. [...] Spanish...". His aim was to establish two different symbols for these two segments, so Wells himself proposes [j̥] for the first one and maintains [j] for the second one. But Wells is aware of the traditional Spanish texts that called fricative those consonant segments that were not plosive, not taking into account whether they had friction or noise or whether, on the contrary, they lacked it. Today we know that the segment that Wells classifies here as fricative is in fact approximant on most occasions, as it lacks the turbulence noise characteristic of any fricative. Thus we have to clearly present what the difference between both is.

- (1) [j̥]: palatal approximant consonant, e.g. [laz.ˈj̥erβas] *las hierbas* "the grass"
- (2) [j]: palatal approximant semi-vowel, e.g. [la.ˈsjerβas] *las siervas* "the slaves"

In (1) [j̥] appears in syllable onset, there is no diphthong, the preceding *s* is voiced through a rule of voicing before any voiced consonant. Orthographic *h* is not pronounced. In figure 4 we can see an example of this realization in the sequence [ˈbiːj̥o], which can be found in a sentence like "Vi yo' ese animal fantástico" ("It was me who saw that fantastic animal").

In (2) [j] does not appear in syllable onset, but in the syllable nucleus as a marginal element that accompanies the vowel in the nucleus of the syllable – it is a diphthong. In Spanish, diphthongs are always diphonemic. Both *s* are simplified into one, becoming the onset of the second syllable. On the other hand, Spanish does not admit consonant groups in syllable onset, except for those formed by a stop or [f] plus {l,r}, so [sj] cannot be a syllable onset group. See figure 5 for the vowel vs. figure 6 for the semi-vowel, with the words *vi o...* [bi.o] "I saw or...", pronounced with a hiatus and *vio* [bjo] "s/he saw", pronounced with a diphthong, respectively.

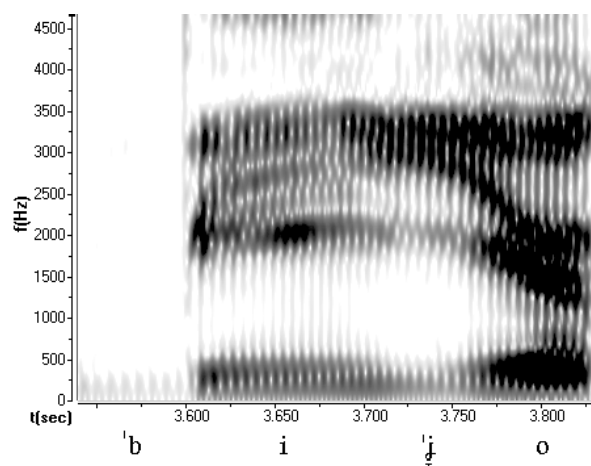


Figure 4. Spirant approximant

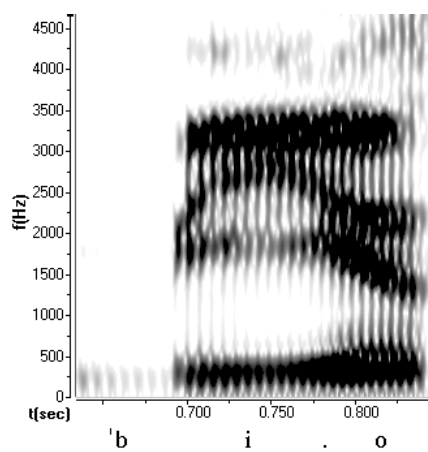


Figure 5. Vowel

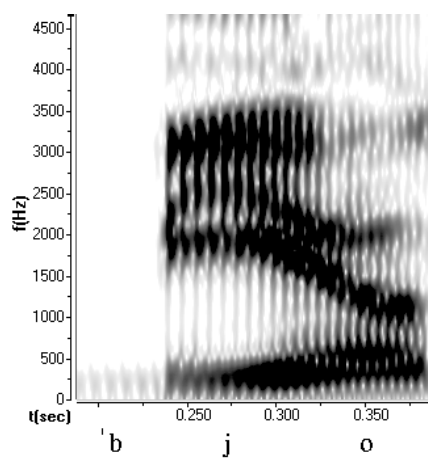


Figure 6. Semi-vowel approximant

In my opinion, the IPA shows a lack of precision in the treatment it gives to approximants, if we take into account our appreciation in the phonetics of Spanish. [j̞] and [j] are two different segments, but they have to be labelled as voiced palatal approximant consonants. I think that the former is a real consonant, whereas the latter is a semi-consonant, as it has traditionally been called in Spanish, or a semi-vowel, if preferred. The IPA, though, classifies it as a consonant.

In general, Spanish phonologists (e.g. Alarcos 1950), have considered that the consonant they transcribe as /y/ (non-IPA) has two allophones that in IPA transcription are [j̞] and [j̠] - the former after a pause, a nasal or [l], the latter elsewhere: *cónyuge* ['konj̞juxe] ‘partner’, *mayo* ['maj̞o] ‘May’. This phoneme resembles, thus, the phonemes /b, d, g/, which, in very similar contexts, have stop allophones and spirant approximant allophones.

[j̞] had not been used before in symbolic representations, since the most common way to represent it used to be [dʒ] (Quilis, 1993). We have studied this phenomenon (Martínez-Celdrán & Fernández-Planas, 2001) and we agree with Navarro Tomás (1918), who remarks that the second element was not the same as the French [ʒ] but weaker, that is, indeed, an approximant. Furthermore, it is pronounced further back than [tʃ], which is palato-alveolar. Navarro Tomás says that it is not the voiced sound corresponding to this one. Our transcription is, thus, more appropriate (Figure 7). Alarcos (1950) considers that the affricate feature is not pertinent and classifies both affricates together with the stops.

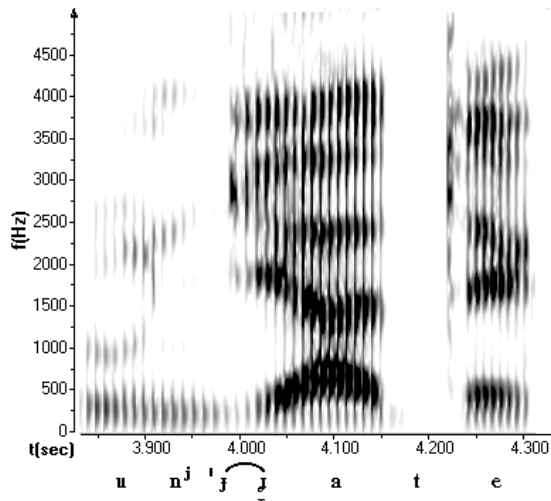


Figure 7. Voiced palatal affricate: *un yate*, “a yacht”.

To sum up, as it is shown in the spectrograms:

- [i] has a clear formant structure, and it is always found in the nucleus of the syllable.
- [j] is shorter and is usually a merely transitory sound. It can only exist together with a full vowel and it does not appear in syllable onset.

- [j̥] has a lower amplitude, mainly in F2. It can only appear in syllable onset. It is not noisy either articulatorily or perceptively. [j̥] can vary towards [j] in emphatic pronunciations, having noise (turbulent airstream).

- [j̥j̥] begins with an occlusion and after the explosion has some weak formants that have a stationary area which corresponds with non-semi-vowel palatal approximant.

There is a further argument through which we can establish a clear difference between [j] and [j̥]: the first sound cannot be rounded, not even through co-articulation, whereas the second one is rounded before back vowels or the back semi-vowel. Thus, in words like *viuda* ['bjuða] “widow”, *Dios* ['djos] “God”, *vio* ['bjo] “s/he saw”, etc., the semi-vowel [j] is unrounded; if it were rounded a sound that does not exist in Spanish [ɥ] would appear. On the other hand, [j̥] is unspecified as far as rounding is concerned and it is assimilated to the labial vowel context: rounded with rounded vowels, *ayuda* [a'j̥wuða] “help”, *coyote* [ko'j̥wote], *hoyuelo* [o'j̥welo] “dimple”, etc., and unrounded with unrounded vowels: *payaso* [pa'j̥aso] “clown”, *ayer* [a'j̥er] “yesterday”.

## 5. Conclusion

In conclusion, I think that the Association should revise the concept of approximant and the classification of the elements forming this category, admitting that there exist several subcategories. This implies eliminating from the pulmonic consonants chart the row that currently appears with the label “approximants”, since that row contains segments belonging to very different subcategories. Hence, the segments that appear in that row should be moved into “Other symbols”, with their appropriate description.

In the description, the label “semi-vowel” should be kept for the segments that are closely related to vowels:

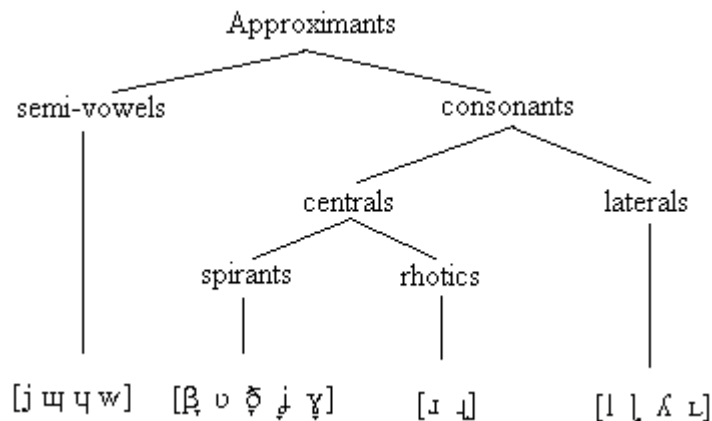
- j** Voiced palatal semi-vowel approximant
- w** Voiced labial-velar semi-vowel approximant
- ɥ** Voiced labial-palatal semi-vowel approximant
- ɰ** Voiced velar semi-vowel approximant
- ʋ** Voiced labiodental spirant approximant
- ɹ** Voiced alveolar rhotic approximant
- ɻ** Voiced retroflex rhotic approximant

Obviously, the special openness diacritic (tiny T) should be kept for the spirant approximants that do not have a symbol of their own: β̥.

I think we should attempt a definition of approximant that, echoing Ladefoged’s proposal, incorporated the aforesaid characteristics: “Approximants are segments that, having a certain degree of constriction, lack the required articulatory precision to produce turbulent airstream, either because of the non-existence of the necessary articulatory tension and/or without the vocal tract being narrowed to such an extent that this turbulent airstream is produced”.

To finish with, I offer a scheme with the established classification:





### Acknowledgements

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