

# 4

## Phonological Aspects of Approximants

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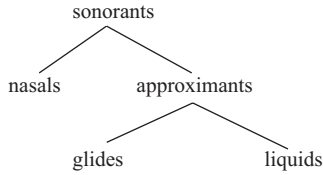
### 4.1 Introduction

In this chapter, we discuss a number of phonological aspects of approximants. We will focus on the phonological evidence for the (natural) class of approximants and the way this class is captured representationally. Ultimately, we argue that approximants do form a natural class, but that this class can be captured in a variety of ways: by way of a single phonological feature, by way of a combination of features, or structurally in particular feature geometry proposals.

After a brief introduction in which we touch upon the use of the term *approximant* (§4.2), we discuss whether approximants should be regarded as a natural class (§4.3), approaching the question from a number of different perspectives including segmental inventories, syllable structure, and phonological rules (the acquisition of approximants is dealt with in Part 2 of this volume). Then, §4.4 reviews a number of different approaches to representing approximants in feature or element models, and §4.5 presents a brief conclusion.

### 4.2 The Term *Approximant*

Sonorants (segments with “spontaneous voicing,” or segments capable of bearing tone or capable of being syllabic – with some complications that we do not discuss here) are typically divided into two subclasses: vowels and sonorant consonants. Phonologically, the sonorant consonants are typically divided into nasals and approximants, and the approximants themselves are typically divided into liquids (l, r) and glides (or semivowels) (j, w) (see Figure 4.1).



**Figure 4.1** Typical (phonological) division of sonorant consonants.

Approximants have also been referred to in other ways: for instance, they were traditionally called “frictionless continuants” (e.g., Ball & Rahilly, 2011). A number of issues immediately arise here: for instance, it has been suggested that there are guttural approximants (e.g., in Arabic), indicated as such in Pierrehumbert (1993), as well as a “pharyngeal approximant” (Mazaudon, 2007). Japanese is often described as having a nasalized (labial-)velar approximant, where the question is whether this is a phonological segment or a phonetic output (e.g., Kuroda, 1965). Here we will assume these are phonetic facts (e.g., since it is articulatorily difficult to make a full contact in the pharynx) and focus on phonological criteria, such as contrastiveness in segment inventories.

Apart from the question of whether segments like those above should be counted as approximants, there is sometimes related confusion about the term *approximant* itself, such as when this term is used as almost a synonym for (consonantal) *sonorant*, or when it is not quite clear whether usage of the term is based on phonetic or phonological considerations. For our purposes, we will use the term as suggested by the display in Figure 4.1 above and accept, for now, that different languages may define the class of approximants in different ways, either based on their phonological behaviour in specific languages, or with reference to different articulatory or acoustic properties.

### 4.3 Phonological Evidence for Approximants as a Phonological Class

Here we discuss three sources of phonological evidence for approximants – that is, the kinds of patterns and processes that are comparable to those that have been adduced as evidence for other natural classes, such as vowels, sonorants, or voiceless stops. In particular, we will adduce evidence from segmental inventories, syllable structure, and phonological rules.

Some languages appear to have some sonorants, but not approximants. For instance, Gregová (2016) claims that “there are no approximants in Slovak” (p. 80), but she appears to mean “glides” here (cf. our remark on confusion about the term *approximant* above). We consulted Maddieson (1984) on the occurrence of approximants in segmental inventories. Note that Maddieson only discusses “vocoid approximants” (j, w), so we used the web-based interface for the UCLA Phonological Segment Inventory Database (UPSID) ([web.phonetik.uni-frankfurt.de/upsid.html](http://web.phonetik.uni-frankfurt.de/upsid.html)), which showed that there are languages without /l, r, j, w/, mostly located in South America and Papua New Guinea: Ache (South American), Andoke (South American), Apinaye (South American), Cubeo (South American), Koiari (Papuan), Maxakali (South American), Muinane (South American), Nama (Khoisan), Nasioi (Papuan), Nimboran (Papuan), Ocaina (South American), Pirahã (South American), Roro (Austro-Tai), Rotokas (Papuan), Tigak (Austro-Tai), Wantoat (Papuan), and Xiamen (Sino-Tibetan). The absence of precisely this class of segments may be considered a piece of evidence (albeit in absentia) for the natural classhood of approximants. We can probably not exclude the possibility that, in at least some of the languages just mentioned, glide-like segments may occur as allophonic hiatus-filling sounds or as allophonic, positionally reduced versions of other consonants.

Clements (1990) specifically recognizes a feature [approximant] and adduces evidence based on the behaviour of phonological segments:

The recognition of approximant as a feature is justified by the fact that approximants tend to pattern together in the statement of phonological rules. For example, many languages allow complex syllable onsets only if the second member is an oral sonorant, i.e. an approximant in our terms. Similarly, non-approximants often pattern together. In Luganda, only non-approximants occur as geminates: thus we find geminate /pp, bb, ff, vv, mm/, etc., but not /ww, ll, yy/. (p. 293)<sup>1</sup>

We note that Clements’s definition of [+approximant] includes vowels, so a combination of features would still be necessary to capture the natural classes involved here.<sup>2</sup>

Another argument for this natural class could come from syllable structure in other languages (e.g., in English triconsonantal clusters the third consonant is always an approximant). Consider Brown (2015):

If all the permutations of the six plosives /p, b, t, d, k, g/ and the four approximants /l, r, w, j/ existed, there would be 24 possible combinations. However, only 18 of the 24 possible combinations occur, e.g., *play*, *bring*, *quick* /plei,

brɪŋ, kwɪk/. The following do not occur: /pw, bw, tl, dl, gw, gj/. There are some rare words and foreign loanwords that contain these clusters (e.g., *pueblo, bwana, Tlingit, guava, guano, gules*<sup>3</sup>), but no common native words. (p. 97; see also Roach, 2009, p. 57); Duanmu, 2008, pp. 43, 160).

With respect to the occurrence of marginal clusters that native speakers “are prepared to accept,” we can take either of two positions: the first of these is that these clusters are not actually ill-formed but rather the words in which they appear happen to be infrequent (van de Weijer, 2014). We could refer to the marginal clusters as “phonological idioms,” just like certain syntactic constructions that deviate from regular phrasal structures can be lexically stored (compare, for example, proverbs, which commonly violate regular syntactic rules, as in “The more, the merrier”). This is why we see no evidence, for example, for vowel epenthesis in words such as *guano* by native speakers of English (contrast this with the common occurrence of vowel epenthesis in other languages that do not allow clusters, such as Japanese).

The second view is that these clusters are indeed ill-formed, being excluded not based on general onset constraints but for independent reasons (unrelated to the class of approximants): /pw, bw/ would then be ill-formed because both consonants in the cluster are labial here (independently supported by the fact that /fw, vw/ are also ill-formed); /tl, dl/ are also ill-formed because both consonants are alveolar (or coronal) non-continuants (independently supported by the fact that /tn/ [and /tʃn/] is also ill-formed as an onset). Further, a constraint (or constraints) against /gw/, /gj/ could be related to a constraint against two adjacent (voiced) dorsals (assuming that /j/, as a palatal glide, also has a dorsal component). In both cases, the natural class of approximants is supported.

Related to syllable structure is of course the question of sonority. If approximants form a natural class, they are expected to have the same sonority value (or at least be adjacent on the scale). For Dutch, there is some discussion if glides and liquids in fact do have the same sonority value (van der Hulst, 1984, p. 83). In fact, in all of the 40 sonority hierarchies compared by Yin (2021), in only one (2S-IO) do all approximants (as defined here) have the same sonority value, which happens to be a scale that has not actually been proposed in the literature. (As we will see below, in Clements’s (1990) scale, the four approximants also do not have the same sonority value, in spite of the fact that they share a feature [approximant], because liquids are [–vocoid] and glides are [+vocoid], resulting in different sonority values).

As for the behaviour of the class of approximants in phonological rules, approximants often emerge as the outputs in the context of lenition, a

process which has been hard to capture in traditional phonological feature systems. In such cases the question arises of whether the output is allophonic, or if it produces a phonemic category.


Finally, other chapters in this book discuss other aspects of approximants, such as the question of whether approximants behave as a class in first language acquisition (see Part 2 of this volume; cf. also Johnson & Reimers, 2010; Owens, 2016), while a recent curious piece of paralinguistic evidence is that approximants appear to be avoided in swear words cross-linguistically (Lev-Ari & McKay, 2022).

Having illustrating the natural classhood of approximants, which appears to be reasonably well supported in our view, though not always uncontroversial, let us turn to the representation of this class of segments in phonological theory.

## 4.4 The Phonological Representation of Approximants

In this section we discuss different ways in which the class of approximants has been captured in different phonological models. The [approximant] is not a feature in Chomsky and Halle's (1968) *The Sound Pattern of English* (*SPE*). It is interesting to note that in their description of English stress, Chomsky and Halle refer to the combined set of liquids and glides a few times (e.g., p. 83) and provide a feature definition of both (p. 68).<sup>4</sup>

- 1)  $\left[ \begin{array}{l} +\text{vocalic} \\ +\text{consonantal} \end{array} \right] = \text{liquid } (l, r)$
- $\left[ \begin{array}{l} -\text{vocalic} \\ -\text{consonantal} \end{array} \right] = \text{glide } (h, \text{ʔ}, y, w)$

Thus, Chomsky and Halle note, “liquids and glides are the categories that are identical in specification with respect to the features [vocalic] and [consonantal]” (p. 83) and can be represented as a single class using the (in) famous alpha notation 

- 2)  $\left[ \begin{array}{l} \text{vocalic} \\ \text{consonantal} \end{array} \right]$

Kaisse (2011), in a discussion of the stricture features (vs. place of articulation features and laryngeal features), distinguishes [continuant], [consonantal], and [sonorant], “along with the less widely adopted feature

[approximant]” (p. 288). This feature was proposed by Clements (1990, pp. 284, 292), mainly to derive the sonority values of a small number of segmental classes:

3)	Obstruents	Nasals	Liquids	Glides
“Syllabic”	–	–	–	–
Vocoid	–	–	–	+
Approximant	–	–	+	+
Sonorant	–	+	+	+
	0	1	2	3

The implied sonority hierarchy (and divisions in sonority between segments) is a topic that we will not go into here (“vocoid” is the converse of [consonantal], adopted by Clements so that the plus signs could be added up; and “syllabic” is a bit suspect because it is nowadays generally accepted that the syllabicity of a segment is better regarded as a structural, rather than a featural, property), but see, for example, Yin (2021) and Yin et al. (2023) for discussions of this topic.

Clements (1990, p. 293) notes the usefulness of grouping liquids, glides, and vowels together, mainly on phonetic grounds, and refers to Ladefoged (1982), who defines it as “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” (p. 10; see also Catford, 1977, p. 122, who refers to Ladefoged, 1968, p. 25; Pike, 1943). This phonetic definition is maintained verbatim in Ladefoged and Johnson (2015, p. 17) and Clements and Hume (1995, p. 292), and others, following Clements, maintain or adopt [approximant] as a feature (e.g., Zec, 1995).

Hall (2007) comments on the fact that Clements’s “definition differs from the one traditionally assumed in phonetics, according to which only sounds like /j, w, l, r/ but not vowels are approximants ... Clements notes that [+approximant] also includes voiceless sonorants, which are normally produced with audible turbulence ... It is unclear whether or not laryngeals (/h ?/) are [+approximant] or [–approximant]” (p. 333n1). (Recall the *SPE* natural class in example [1] above.) An acoustic definition of the class is provided by Clements (2009): “Approximant consonants (including liquids and semivowels) differ from vowels in generally having a reduced low-frequency spectrum amplitude, an additional decrease in amplitude at higher frequencies, and reduced prominence of the second or third formant peak” (pp. 167–8; see also Harrington, 2010, pp. 100–2).

To deal with lenition processes in phonological frameworks, non-binary feature-based approaches have also been adopted, for example in *Principles*

of *Dependency Phonology* (Anderson & Ewen, 1987) and *Principles of Radical CV Phonology* (van der Hulst, 2020), where approximants are sometimes identified as a natural class by virtue of having vowel-like components or elements. As van der Hulst (2020) writes, “all non-nasal sonorants, which are often taken together as the class of approximants, share the formal property of containing a V element” (pp. 131–2):

4) In onset V (i.e., dependent) position<sup>5</sup>

Here the class of approximants is defined as all segments that have a V element.

For discussion of lenition in this context, see Lass and Anderson (1975), Kaisse (2011), and Harris (1990). Related is the approach taken by Steriade (1993), where approximants are defined in terms of aperture positions. Since lenition reduces stricture, it can be captured by the deletion of  $A_0$  (Grijzenhout, 2011). Duanmu (2016, p. 105) also recognizes approximants as a natural class and defines them as a feature combination: [–stop, fricative] in a non-standard feature system.

## 4.5 Conclusion

In this chapter we have seen that there is phonological evidence for grouping together liquids and glides as a natural class of approximants, although the term itself is not always used consistently. The evidence comes mainly from segmental inventories and syllable structure (phonotactics). However, this does not necessarily force us to adopt a phonological feature [approximant], as proposed by Clements (1990). Probably the most often cited and widely adopted natural class is that of voiceless stops, which are not characterized by a single feature either, but as a combination of (at least) two features: [–continuant, –voice]. Likewise, the class of approximants can be described as [+sonorant, –nasal], or in a number of other ways that we have discussed, using single-valued features. Clements proposed the feature [approximant] to derive a particular sonority scale, but deriving sonority could also be handled in many other ways, and it is empirically unclear whether the particular scale proposed by Clements is the optimal (universal?) sonority scale.

Other factors of phonological interest are the relation between approximants and secondary articulation and their use as hiatus fillers, although this might first and foremost apply to the behaviour of glides. Finally, typical places of articulation of approximants could be investigated more closely.

## Notes

- 1 These two arguments are repeated without further elaboration by Hall (2007, p. 316). For Luganda, the observation is correct (Snoxall, 1967, pp. xiii–xv): /l, r/ (the two are probably allophones of the same phoneme) and /j, w/ are never doubled. Crabtree (1902, p. 14) notes two exceptions: *Mbu'ya* (the apostrophe indicates the consonant following it is long), a place name (the name of a hill in Kampala, the capital of Uganda), and *wa'ya* (no gloss provided). A minimally different case comes from Dutch, where /w, l, r/ form a class in that they can form a branching onset, but from which /j/ is excluded, as shown by syllabifications such as *at.jar* (acar, vegetable pickle) (Trommelen, 1983; van der Hulst, 1984).
- 2 We also point out that in such a feature system the converse value (i.e., [–approximant]) is also predicted to form a natural class.
- 3 The word *gules* means “red” in heraldic descriptions, c. 1300, from the Old French *goules*, “neckpiece of (red) fur,” plural of *gole*, *guele*, “throat,” from Latin *gula*, “throat.”
- 4 Note the appearance of the glottals in the class of glides, which has been widely criticized. It seems preferable to capture the special behaviour of glottals by specifying them as placeless.
- 5 Here the notion “bridge” refers to the onset dependent position in complex, branching onsets.

## References

- Anderson, J.M., & Ewen, C.J. (1987). *Principles of dependency phonology*. Cambridge University Press. <http://doi.org/10.1017/CBO9780511753442>.
- Ball, M.J., & Rahilly, J. (2011). The symbolization of central approximants in the IPA. *Journal of the International Phonetic Association*, 41(2), 231–7. <http://doi.org/10.1017/S0025100311000107>.
- Brown, A. (2015). Syllable structure. In J.M. Levis & M. Reed (Eds.), *The handbook of English pronunciation* (pp. 85–105). Wiley-Blackwell. <https://doi.org/10.1002/9781118346952.ch5>.
- Catford, J.C. (1977). *Fundamental problems in phonetics*. Indiana University Press.
- Chomsky, N., & Halle, M. (1968). *The sound pattern of English*. Harper & Row.
- Clements, G.N. (1990). The role of the sonority cycle in core syllabification. In J. Kingston & M.E. Beckman (Eds.), *Papers in laboratory phonology I: Between the grammar and physics of speech* (pp. 283–333). Cambridge University Press. <https://doi.org/10.1017/CBO9780511627736.017>.
- . (2009). Does sonority have a phonetic basis? In E. Raimy & C.E. Cairns (Eds.), *Contemporary views on architecture and representations in phonology* (pp. 165–76). MIT Press. <https://doi.org/10.7551/mitpress/7997.003.0011>.

- Clements, G.N., & Hume, E. (1995). The internal organization of speech sounds. In J.A. Goldsmith (Ed.), *The handbook of phonological theory* (pp. 245–306). Basil Blackwell.
- Crabtree, W.A. (1902). *Elements of Luganda grammar, together with exercises and vocabulary*. Society for Promoting Christian Knowledge.
- Duanmu, S. (2008). *Syllable structure: The limits of variation*. Oxford University Press. <http://doi.org/10.1093/acprof:oso/9780199267590.001.0001>.
- . (2016). *A theory of phonological features*. Oxford University Press. <http://doi.org/10.1093/acprof:oso/9780199664962.001.0001>.
- Gregová, R. (2016). *The generative and the structuralist approach to the syllable: A comparative analysis of English and Slovak*. Cambridge Scholars Publishing.
- Grijzenhout, J. (2011). Consonant mutation. In M. van Oostendorp, C.J. Ewen, E.V. Hume, & K. Rice (Eds.), *The Blackwell companion to phonology* (Vol. 3, pp. 1537–58). Wiley-Blackwell. <https://doi.org/10.1002/9781444335262.wbctp0065>.
- Hall, T.A. (2007). Segmental features. In P. de Lacy (Ed.), *The Cambridge handbook of phonology* (pp. 311–34). Cambridge University Press. <https://doi.org/10.1017/CBO9780511486371.014>.
- Harrington, J. (2010). Acoustic phonetics. In W.J. Hardcastle, J. Laver, & F.E. Gibbon (Eds.), *The handbook of phonetic sciences* (2nd ed., pp. 81–129). Wiley-Blackwell. <https://doi.org/10.1002/9781444317251.ch3>.
- Harris, J. (1990). Segmental complexity and phonological government. *Phonology*, 7(2), 255–300. <https://www.jstor.org/stable/4420018>.
- Johnson, W., & Reimers, P. (2010). *Patterns in child phonology*. Edinburgh University Press. <http://doi.org/10.1515/9780748642489>.
- Kaisse, E.M. (2011). Stricture features. In M. van Oostendorp, C.J. Ewen, E.V. Hume, & K. Rice (Eds.), *The Blackwell companion to phonology* (Vol. 1, 288–310). Wiley-Blackwell. <https://doi.org/10.1002/9781444335262.wbctp0013>.
- Kuroda, S.Y. (1965). *Generative grammatical studies in the Japanese language* [Unpublished doctoral dissertation]. Massachusetts Institute of Technology.
- Ladefoged, P. (1968). *A phonetic study of West African languages: An auditory-instrumental study* (2nd ed.). Cambridge University Press.
- . (1982). *A course in phonetics* (2nd ed.). Harcourt Brace Jovanovich.
- Ladefoged, P., & Johnson, K. (2015). *A course in phonetics* (7th ed.). Cengage.
- Lass, R., & Anderson, J.M. (1975). *Old English phonology*. Cambridge University Press.
- Lev-Ari, S., & McKay, R. (2022). The sound of swearing: Are there universal patterns in profanity? *Psychonomic Bulletin & Review*, 30(3), 1103–14. <https://doi.org/10.3758/s13423-022-02202-0>.
- Maddieson, I. (1984). *Patterns of sounds*. Cambridge University Press. <http://doi.org/10.1017/CBO9780511753459>.
- Mazaudon, M. (2007). A low glide in Marphali. In R. Bielmeier & F. Haller (Eds.), *Linguistics of the Himalayas and beyond* (pp. 163–88). Mouton de Gruyter. <https://doi.org/10.1515/9783110968996.163>.
- Owens, R.E. (2016). *Language development: An introduction* (8th ed.). Pearson Education.

- Pierrehumbert, J.B. (1993). Dissimilarity in the Arabic verbal roots. *Proceedings of the North East Linguistic Society*, 23(2), 367–81.
- Pike, K.L. (1943). *Phonetics: A critical analysis of phonetic theory and a technic for the practical description of sounds*. University of Michigan Press. <http://doi.org/10.3998/mpub.9025>.
- Roach, P.J. (2009). *English phonetics and phonology: A practical course* (4th ed.). Cambridge University Press.
- Snoxall, R.A. (1967). *Luganda-English dictionary*. Clarendon Press.
- Steriade, D. (1993). Closure, release, and nasal contours. In M.K. Huffman & R.A. Krakow (Eds.), *Nasals, nasalization, and the velum* (pp. 401–70). Academic Press. <https://doi.org/10.1016/B978-0-12-360380-7.50018-1>.
- Trommelen, M. (1983). *The syllable in Dutch: With special reference to diminutive formation*. Foris. <http://doi.org/10.1515/9783110846379>.
- van der Hulst, H. (1984). *Syllable structure and stress in Dutch*. Foris. <http://doi.org/10.1515/9783112419984>.
- . (2020). *Principles of radical CV phonology: A theory of segmental and syllabic structure*. Edinburgh University Press. <https://doi.org/10.3366/edinburgh/9781474454667.001.0001>.
- van de Weijer, J. (2014). The origin of OT constraints. *Lingua*, 142, 66–75. <http://doi.org/10.1016/j.lingua.2014.01.007>.
- Yin, R. (2021). *The sonority sequencing principle: A large-scale cross-linguistic investigation of phonotactics* [Unpublished doctoral dissertation]. University of Queensland. <https://doi.org/10.14264/426e3b0>.
- Yin, R., van de Weijer, J., & Round, E.R.. (2023). Frequent violation of the sonority sequencing principle in hundreds of languages: How often and by which sequences? *Linguistic Typology*, 27(2), 381–403. <http://doi.org/10.1515/lingty-2022-0038>.
- Zec, D. (1995). Sonority constraints on syllable structure. *Phonology*, 12(1), 85–129. <http://doi.org/10.1017/S0952675700002396>.