# Phonotactics and the prestopped velar lateral in Hiw

## *Resolving the ambiguity of a complex segment*

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**Abstract**

*Mielke (2005) underlined the inherent ambivalence of certain segments in terms of phonological features. A similar form of ambiguity concerns complex segments consisting of two phases (e.g. Anderson 1976, Ewen 1982), raising the question of which phase is phonemically definitory – e.g. whether /t͡n/ is a stop or a nasal. This phonological problem is here addressed through the typologically unusual phoneme /ɡ͡ʟ/ of Hiw, an endangered Oceanic language of Vanuatu. This complex segment combines a velar voiced stop and a velar lateral approximant. Similar phonemes, in the few languages which have them, have received conflicting descriptions: as a (laterally released) stop, as an affricate, or as a (pre-stopped) lateral. The nature of /ɡ͡ʟ/ in Hiw can be assessed by observing how it patterns in tautosyllabic consonant clusters. Hiw complies with the Sonority Sequencing Principle, albeit with some language-specific adjustments, in the licensing of its word-initial CC clusters. Consequently, the well-formedness of words like /*mɡ͡ʟejiŋə*/ 'berserk' relies on /ɡ͡ʟ/ being analysed as a prestopped velar lateral approximant, the only liquid of the system.*

## 1 An unusual consonant in Hiw

Hiw is an endangered Oceanic (Austronesian) language, spoken by 150 speakers on Hiw, the northernmost island of the Vanuatu archipelago. *Map 1* situates Vanuatu within Island Melanesia, and locates the various languages mentioned in the present paper.[1]

Compared to other members of its language family, Hiw shows a number of innovative features, including in its phonology. For example, we will see (§4) that Hiw licenses word-initial consonant clusters (e.g. /pt/, /ɣt/, /kŋʷ/, /kʷj/, /wt/, /ws/, /jw/) which are very rare within the Austronesian family, and uncommon within the world's languages more generally.

A typologically even more unusual feature of Hiw is the existence of a complex phoneme /g͡ʟ/. Phonetically, this consonant can be described as the combination of a voiced velar stop [g] with a velar lateral approximant [ʟ]. Only a small number of languages in the world – mostly located on the island of New Guinea – have been reported to have a similar segment in their inventory (see §6). In these languages, the consonant has been analysed in three different ways, depending sometimes on the describer, sometimes on aspects of the language's phonological system. Under some accounts, the velar consonant [g͡ʟ] is analysed as a lateral AFFRICATE /g͡ʟ̝/; in others, it is presented as a laterally-released STOP /gᶫ/; others again describe it as a prestopped lateral APPROXIMANT /ᶢʟ/. From these three equally plausible descriptions, the present study will try to identify which one fits best the phonological system of Hiw.

In order to address this issue, I shall observe how /g͡ʟ/ patterns with regard to consonant clusters and to phonotactic constraints related to sonority. As we will see, tautosyllabic clusters are common in Hiw, and mostly comply with the *Sonority Sequencing Principle* (e.g. Selkirk 1984; Clements 1990; Blevins 1995), albeit with some adjustments. Eventually, these structural observations will provide us with the heuristic lever needed to identify the status of /g͡ʟ/ in Hiw. I will show that this phoneme has the sonority status of a liquid, and is therefore best analysed as a *prestopped velar lateral approximant* /ᶢʟ/.

[1] I wish to thank the LACITO "Langues et Civilisations à Tradition Orale" (Centre National de la Recherche Scientifique, Paris) and the French Ministère de la Recherche (ACI Jeunes Chercheurs) for funding my field trips to Vanuatu since 2003; as well as the Linguistics department at Australian National University, for its intellectual support during the writing of this paper. This study was presented at the 2009 *Australian Language and Speech* conference in Sydney; I am grateful to the participants of the OzPhon workshop there (especially Brett Baker and Jonathan Harrington) for their constructive suggestions. I would like to thank also Juliette Blevins, Mark Donohue, Alexis Michaud, Steve Parker, as well as the reviewers and editors of *Phonology*, for their helpful comments on earlier versions of this article; any remaining errors remain mine. Finally, such a study would not have been possible without the help and kindness of the many Hiw people who patiently taught me their language – *noke yöywye ti* Sipo Ngwoypitven, Mama Stanley Veniwyoy, Mama Jimmy Tiwyoy, and *r̄akevar̄eñwōt* Sekop Elison.

**Map 1** – *A map of the northern Vanuatu archipelago, showing the location of several languages relevant to this study, including Hiw*


After an overview of Hiw phonology (section 2), section 3 will describe the phonetic properties of the complex consonant /ɡ͡ʟ/, and underline its inherent ambiguity. In order to understand the velar lateral of Hiw within its system-internal context, I will then observe the general phonotactic rules governing consonant clusters in this language (section 4); this observation will establish that Hiw – unlike its close relative Dorig – treats sonority as a relevant parameter in defining the well-formedness of its tautosyllabic clusters. Finally, the mapping of attested clusters onto the sonority scale (section 5) will demonstrate that the complex segment /ɡ͡ʟ/ functions as a liquid – just like the apical trill /r/, with which /ɡ͡ʟ/ is associated historically and areally. In a short typological survey, section 6 will review other languages of the world where similar segments have been reported, and show they have received varying phonological analyses. The general conclusion (section 7) will discuss the potential ambivalence of complex segments, and highlight the methodological and theoretical implications of this ambiguity.

# 2 Overview of Hiw phonology

There is no published description of Hiw phonology or grammar. The data presented here originate in research conducted by the author in various trips since 2003 on the languages of the Banks and Torres islands north of Vanuatu. François (2005) documents the phonological history of vowels in these seventeen languages, and the evolution of their phonotactic structures. François (f/c) reconstructs the history of the rhotic consonants *r and *R (see §5.2), in this area and elsewhere in Vanuatu. A grammar of Hiw is in preparation, based on a transcribed corpus of currently about 25,000 words.

## 2.1 Phoneme inventory

This overview presents the essential elements of Hiw's phonological system.

### 2.1.1 Consonants

The 14 consonants of Hiw are given in *Table 1*.

**Table 1** – *The 14 consonants of Hiw*

| | *labial* | *alveolar* | *palatal* | *velar* | *labiovelar* |
|---|---|---|---|---|---|
| plosives | **p** | **t** | | **k** | **kʷ** |
| fricatives | **β** | **s** | | **ɣ** | |
| nasals | **m** | **n** | | **ŋ** | **ŋʷ** |
| glides | | | **j** | | **w** |
| prestopped lateral | | | | **g͡ʟ** | |

The consonant inventory of Hiw lacks voiced or prenasalised stops – common in the area, and reconstructible for Hiw's ancestors. Even though /β/ and /ɣ/ are always voiced,[2] and /s/ always voiceless, voicing as such is nowhere a relevant feature in the system.

While /w/ is a labiovelar glide (Ohala & Lorentz 1977), the two consonants /kʷ/ and /ŋʷ/ are phonetically velar stops accompanied by labial rounding. Despite their distinct phonetic nature, these three consonants form a single phonemic class. For example, all three condition the back rounded allophone [u]:

– following {/kʷ/, /ŋʷ/, /w/}, the central vowel /ʉ/ surfaces obligatorily as [u]:
  e.g. /tʉkʷʉg͡ʟ/ 'invasive' → [tʉkʷ**u**g͡ʟ]; /kŋʷʉ/ 'any' → [kŋʷ**u**]; /wʉ/ 'god' → [w**u**]
– following {/kʷ/, /ŋʷ/, /w/} in pretonic syllables, a schwa /ə/ surfaces optionally as [ə] or [u]:
  e.g. /kʷətʉkŋʷaenə/ 'now' → [kʷəˌtʉkŋʷaˈenə] ~ [kʷ**u**ˌtʉkŋʷaˈenə];
  /ŋʷətɔj/ 'short' →[ŋʷəˈtɔj] ~ [ŋʷ**u**ˈtɔj]; /wəjɔɣ/ 'again' → [wəˈjɔɰ] ~ [w**u**ˈjɔɰ]

I shall refer to these three consonants /kʷ/, /ŋʷ/, /w/ using the umbrella term of

[2] The velar fricative /ɣ/ surfaces as an approximant [ɰ] in syllable codas: e.g. /wg͡ʟɔɣ/ 'through' surfaces as [wg͡ʟɔɰ], /miɣmiɣi/ 'hardworking' as [ˌmiɰmiˈɣi].

*labiovelars*, with no further specification. Incidentally, this is also the term used among Oceanic scholars (Lynch 2002).[3]

Except in a few loanwords (*Table 10* p.28), Hiw has no rhotic, and also lacks the alveolar lateral *l. The only liquid of the system is a prestopped velar lateral /g͡ʟ/, which is the focus of this paper (§3).

### 2.1.2 VOWELS

The nine vowel phonemes of Hiw are short monophthongs: /i ɪ e ɵ ə a ʉ o ɔ /. Hiw has no diphthongs, no tones, and vowel length is not phonemic (see §2.3.2).

Two characteristics of vowels will be relevant to our discussion on phonotactics and consonant clusters. First, an underlying vowel /i/ followed by another vowel is systematically desyllabified into a glide /j/: e.g. /ja-i-ə/ 'take him' surfaces as [ˈjajə], homophonous with /jajə/ 'trochus; /βatβi-ə/ 'rescue him' surfaces as [ˈβatβjə], with a sequence of three consonants.

Second, schwa /ə/ is a genuine phoneme. In some of the world's languages (e.g. Itô 1989, Blevins 1995, Blevins & Pawley 2010), [ə] lacks phonemic status, because its presence is entirely predictable from the phonotactics or morphophonemics of the system. Conversely, in Hiw, the presence of /ə/ cannot be predicted from the context: it is specified in the lexicon, just like any other phoneme. Thus contrast /t**ə**g͡ʟɔɣ**ə**/ 'dirty' with /t**ə**g͡ʟɔɣ/ 'peace' and /tg͡ʟɔɣ/ 'throw:PL'. The only feature which makes /ə/ special is its incompatibility with primary stress (§2.2).

## 2.2 Stress

Primary stress regularly falls on the last vowel other than /ə/:

| | | |
|---|---|---|
| (1) | [jəkʷˈjʉkʷ] 'count'; | [jəˈkʷen] 'woman'; |
| | [ˌβɔg͡ʟsasɪˈg͡ʟɪɣ] 'sit:PL'; | [ˌtakəˌtiməˈg͡ʟen] 'time' |
| (2) | [moˈwɪ] 'moon'; | [ŋʷuˈjɔ] 'Megapode bird'; |
| | [ɔˈg͡ʟje] 'rope, vine'; | [tɵˈg͡ʟɵ] '1inc:Dual' |
| (3) | [ˈmowə] 'collect'; | [ˈŋʷujə] 'return'; |
| | [ˈɔg͡ʟjə] 'sun'; | [kaˈmag͡ʟə] '1exc:Dual' |
| (4) | [ˈwɔtəjə] 'maybe'; | [ʉwˈtamətə] 'faint' |
| (5) | [ˈŋʷutə=pənə] 'here'; | [ˈjə-ŋʷə=pənə] 'in this house'. |

One possible way to model stress in Hiw would be to posit right-aligned iambic feet, with all final schwas counting as extrametrical.

The only words licensing a stressed schwa are the very few which contain no other vowel. Stress is unpredictable for such words:

[3] Historically, Hiw's rounded *velars* /kʷ/ and /ŋʷ/ evolved regularly from the delabialisation of rounded *labio-velar* consonants /k͡pʷ/ and /ŋ͡mʷ/ (François n.d.). The latter phonemes, which are still common in the close Banks islands (see the Dorig data p.15), reflect segments which are reconstructed as */ᵐbʷ/ and */mʷ/ respectively in Proto Oceanic (Ross 1988, Lynch 2002).

| | | | |
|---|---|---|---|
| (6) | [βəˈjə] ‘pandanus leaf’; | [βəˈwjə] ‘true’; | [kʷəˈsə] ‘female’; |
| | [ˈtəpjə] ‘dish’; | [ˈŋəjə] ‘when’ | [ˈəjə]  ‘about it’ |

Starting from the syllable with primary stress, secondary stress normally falls on every second vowel to the left (including /ə/):

| | | |
|---|---|---|
| (7) | [ˌg͡ʟakəˌβag͡ʟəˈŋʷot] ‘especially’; | [ˌβəɣəˈβaɣə] ‘speak’; |
| | [ˌwətəˌwɔtəˈŋʷo] ‘firstborn’; | [kʷəˌtʉkŋʷaˈenə=pənə] ‘now’ |

## 2.3 Phonotactics

### 2.3.1 SYLLABIC TEMPLATE CCVC

The maximal syllable is CCVC, with the consonants being optional. Only vowels can form the nucleus of a syllable. Syllables are attested with any of the possible combinations: V, CV, CCV, VC, CVC, CCVC.

Of course, the template must be understood as applying on the phonological level rather than the phonetic forms. Thus, such phonetic strings as [tgʟɔɰ] ‘throw’, [tɔkw] ‘holy’, [gʟeŋw] ‘harvest’, [kwokʟ̥] ‘dream’, [kwgʟɵɰ] ‘wooden club’ all superficially violate the CCVC template. However, considering that each complex phoneme /kʷ/, /ŋʷ/, /g͡ʟ/ occupies just one position, the underlying phonemic representations of these words – respectively /tg͡ʟɔɣ/, /tɔkʷ/, /g͡ʟeŋʷ/, /kʷog͡ʟ/, /kʷg͡ʟɵɣ/ – all constitute well-formed syllables in Hiw. As these examples show, heterorganic clusters are common in Hiw.

Any consonant can form the coda of a syllable. Likewise, all consonants are attested in the $C_1$ slot, as well as in the $C_2$ slot. However, there are restrictions on which consonants may cluster together at the onset of a syllable – see §4 below.

Finally, sequences of three consonants are attested word-medially, albeit rarely:

| | | | | |
|---|---|---|---|---|
| (8) | /jɵ**jwj**ə/ | ‘thanks’; | /a**g͡ʟmj**e/ | ‘surgeonfish’; |
| | /g͡ʟa**kβj**ə/ | ‘bewitch him’; | /g͡ʟa**βws**ɔɣ / | ‘shake hands’; |
| | /kʷɔ**ttɣ**o/ | ‘stubborn’; | /ɪ**ptɣ**o/ | ‘shame’; |
| | /to**tpg͡ʟ**it/ | ‘resolute’; | /sɵ**g͡ʟŋg͡ʟ**e/ | ‘(bird's) beak’ |

Because Hiw's syllabic template is CCVC, these clusters of three consonants are best understood as CCV**$C_1$.$C_2C_3$**VC – where $C_1$ forms the coda of the first syllable, while $C_2$ and $C_3$ form an onset cluster in the following syllable.

### 2.3.2 GEMINATION AND LENGTHENING

Hiw allows consonant gemination, both word-medially and word-initially.

This gemination may be stored in the lexicon as the segmental form of the word: e.g. /ttin/ ‘hot’ vs /tin/ ‘buy’. These cases may be simply analysed as $C_1C_2$ consonant clusters in which $C_1$ and $C_2$ happen to be identical.

In addition, consonants (or vowels) are commonly lengthened for expressive purposes: thus /ne maβə/ ‘it's heavy’ → /ne mːaβə!/ ‘it's so heavy!’; /ne ŋʷətoj/ ‘it's short’ → /ne ŋʷətːoj/ ‘it's very short!’ (see also *Figure 2* p.9).

Gemination and consonant lengthening, while phonologically distinct, surface in phonetically similar forms.

# 3 The velar lateral of Hiw

I now turn to the phonetic description of the phoneme /g͡ʟ/. For the sake of convenience, I will occasionally refer to this phoneme as a “velar lateral”. I intend this term to be neutral with regard to the precise nature of this consonant (stop, affricate or approximant?), an issue which will be solved later (§5).

## 3.1 Articulatory properties

The articulation of the phoneme /g͡ʟ/ can be described by observing the way it is produced by speakers, provided the surrounding vowels are open enough to allow visual observation. Additionally, I have taken into account the speakers' description of their own production process,[4] as well as my own understanding of this articulation once I was able to produce it in a manner perceived by native speakers to be accurate. The use of palatographic (EPG) technology would have been inconvenient for a number of reasons; furthermore, the closure of the consonant is too far back in the mouth to be observed by these means (Ladefoged & Maddieson 1996:190).

The phoneme is articulated by bunching and raising the dorsum at the velum, in a way identical to the articulation of velar obstruents. The consonant's onset phase corresponds to a voiced velar stop [g] – a consonant otherwise absent from Hiw's inventory. This occlusive onset is unreleased; immediately after it, the bunched tongue lets the air flow on one (or both) side(s) of the dorsum, in the region of the back molars, thereby triggering a lateral release.[5]

The shift from the onset phase (occlusive, central) to the release phase (approximant, lateral) is only performed by retracting the sides of the dorsum. It does not involve any movement of the apex, nor any change of position of the central ridge of the tongue, whether forward or backward: in other terms, the point of articulation of the lateral release is neither alveolar/coronal[6] nor uvular, but remains velar. *Figure 1* illustrates the position of the tongue during the lateral phase of the phoneme, for a meaningless sequence [ag͡ʟa]. More than any of its two phases (occlusion, release) considered alone, it is arguably the transition between them which is crucial to the production and perception of this consonant (see below).

[4] A video recording of a 2005 elicitation session on this consonant can be seen in the documentary film *The Poet's Salary* (Wittersheim 2009).

[5] See similar observations in Ladefoged *et al.* (1977), or Ladefoged & Maddieson (1996:190), for other languages.

[6] The facts of Hiw run counter to Blevins' (1994:345) claim that “velar laterals are coronal at some level of representation”.

In sum, the complex segment of Hiw is a consonant [g͡ʟ], consisting of a velar plosive onset followed by a velar lateral release,[7] with no apical or laminal contact.

**Figure 1** – *Front view of the mouth maintaining the tongue position of the prestopped velar lateral*

When the velar lateral of Hiw is pronounced without lengthening, the occlusive onset is at least as audible as the lateral release, and occasionally may even be perceived as auditorily prominent. However, despite the importance of this onset, some younger speakers (roughly under 20 years of age) show a tendency to drop it, thus pronouncing [ʟ] rather than [g͡ʟ]. In fluent speech, this articulatory habit makes the sound dangerously similar to the other velar continuant of the system /ɣ/ [ɣ]~[ɰ], to the point where the phonemic contrast even seems to fade out from these speakers' idiolects. Such minimal pairs as /ɣɵ/ 'quick' vs /(g͡)ʟɵ/ 'decorate', about which elder speakers were otherwise adamant, are considered homophones by at least some younger individuals. Whenever these speakers would teach me a new word containing a velar continuant, I had to double-check with elder speakers – or with those same-age peers who kept the distinction – what the "correct" consonant should have been. This might be a sign that /g͡ʟ/ and /ɣ/ are doomed to merge eventually.[8] However, at this stage, the two phonemes are still distinguished by the majority of speakers.

## 3.2 Acoustic properties

Acoustic observation also shows that the velar lateral consists of two clearly distinct phases. When taken in a voiced environment, the occlusive onset [g] takes the form of a short depression of F1, what Steed & Hardie (2004:348) describe as a "transient". It is followed by a more or less long phase corresponding to the lateral release; this release is characterised by a relatively strong broadband noise above 1500 Hz, with its precise range depending on the immediate environment. When the segment is voiced, F1 forms

[7] I am grateful to Ian Maddieson (pers. com., 2006) for helping me confirm and refine my interpretation of this phoneme.

[8] A number of regular processes of interference involve the two velar phonemes /g͡ʟ/ and /ɣ/: see §5.2.

a plateau, typically between 300 and 400 Hz.

These characteristics can be illustrated on a spectrogram (*Figure 2*). The release phase of the phoneme is being here lengthened for pragmatic reasons (§2.3.2). During this lateral phase, F1 forms a stable plateau, at about 340 Hz for this speaker (male, aged 36).[9] The plateau is visibly preceded by a short depression (arrow): this corresponds to the clearly audible plosive onset [g] that precedes the lateral phase [ʟ].

**Figure 2** – *Spectrogram of the sequence* [məˈg͡ʟːːaː] *taken from the exclamatory utterance* /ne məg͡ʟawə/ *'That's great!'*.

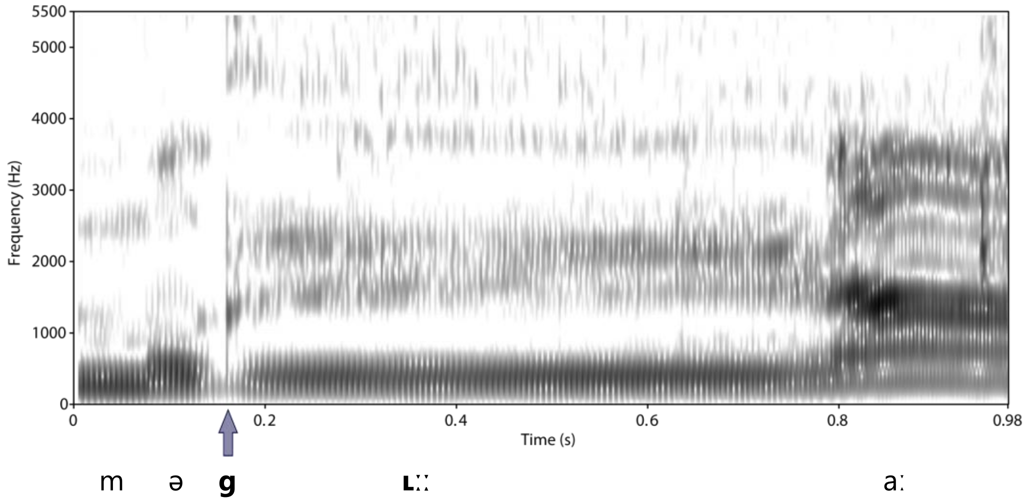
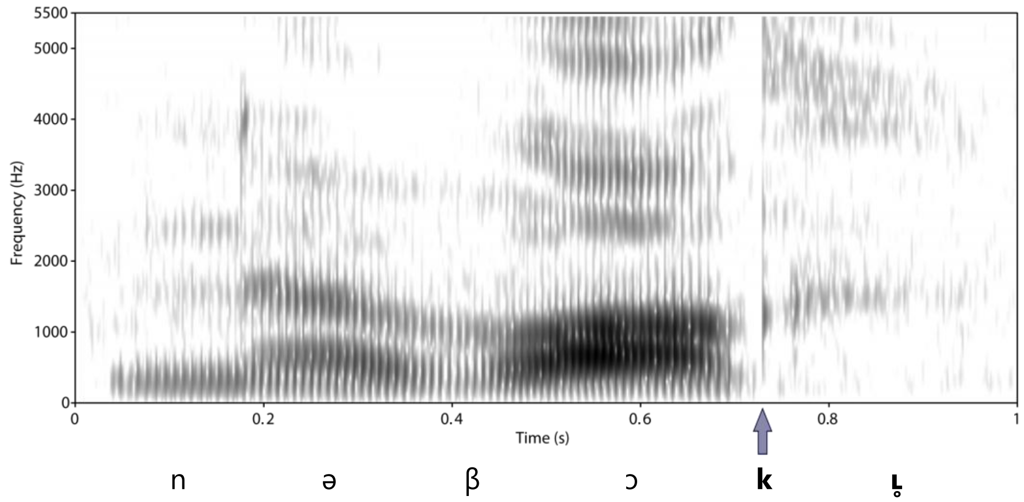



**Figure 3** – *Spectrogram of the sequence* /nəβɔ**g͡ʟ**/ *'hibiscus'. Due to its word-final position, the velar lateral is devoiced* [nəˈβɔkʟ̥].




In coda position before a voiceless phoneme, or in word-final position before a pause, the consonant is optionally devoiced as [g͡ʟ̥] or [k͡ʟ̥]: e.g. /tig͡ʟtig͡ʟ/ 'strong' is realised [tig͡ʟtig͡ʟ] ~ [tig͡ʟ̥tig͡ʟ̥] ~ [tik͡ʟ̥tik͡ʟ̥]. In *Figure 3*, the devoicing of the word-final

9 Mean value for the first three formants during the central section of the lateral phase: F1=335 Hz; F2=1737 Hz; F3=2285 Hz.

consonant in /nəβɔg͡ʟ/ 'hibiscus' is visible from the absence of a voicing plateau, in contrast with *Figure 2*. However, the contrast between the occlusive onset [k] and the lateral release [ʟ̥] remains perceptible from the absence vs presence of turbulence in higher frequencies.

A thorough acoustic examination of Hiw's velar lateral is beyond the scope of the present study. These preliminary observations in Hiw appear to be consistent with the results presented in Ladefoged & Maddieson (1996:194) for Mid-Wahgi laterals, and in Steed & Hardie (2004) for the voiceless allophone of the Kuman lateral "fricative".

## 3.3 The phonemic ambiguity of complex segments

After this phonetic account of the segment, the question arises of what its best description should be in phonological terms.

In principle, a complex segment consisting of a voiced velar stop plus a velar lateral release can receive three phonologically different interpretations:

- /**g͡ʟ̝**/: a voiced velar lateral AFFRICATE (closure [g] + lateral fricative [ʟ̝])
- /**gᴸ**/: a voiced velar STOP which is laterally released
- /**ᶢʟ**/: a voiced velar lateral APPROXIMANT, which is prestopped

It could be argued that these analyses are all interchangeable from the phonemic point of view, and can be chosen arbitrarily. And in fact, we will see later (§6.3) that similar consonants in other languages have received a variety of descriptions in the literature. Several competing accounts can even be found for the same segment in one language. To take just one example, the velar lateral of the Papuan language Kuman (Chimbu family) has been described sometimes as an *approximant* (Lynch 1983, Ladefoged & Maddieson 1996:194), sometimes as a *fricative* (Steed & Hardie 2004), sometimes as a *laterally-released affricate* (Piau 1985). Such cases of discrepancy may be due to arbitrary choices on part of the describers. However, one may also want to look for positive evidence leading to favour one phonological analysis over the others. It is thus the purpose of this study to try and identify, on empirical grounds, the phonemic status of Hiw's velar lateral consonant.

The phonological ambivalence of certain classes of segments has sometimes been pointed out, in particular by Mielke (2005):

> "While some sounds have attracted a broad consensus concerning their appropriate representation, the phonological ambivalence of others has led to disagreements in how they should be represented".

The sounds Mielke has in mind include precisely laterals:

> "Flaps, trills and lateral liquids have been observed patterning as continuants with fricatives and also patterning as non-continuants with stops."

Numerous other studies have highlighted the fundamental ambiguity of complex segments (e.g. Campbell 1974, Anderson 1976, Ohala & Lorentz 1977, Ewen 1982, Shaw 1989, Weijer 1993), whether they show simultaneous coarticulation of two sounds, or a sequence of two phases within a single phoneme. Consider, for example, a sequence {oral stop + homorganic nasal}: the segment [t͡n] is analysed as a *postnasalised stop* /$t^n$/ in Nemi of New Caledonia (Ozanne-Rivierre 1975; 1995:54), but as a *prestopped nasal* /$^t n$/ in Eastern Arrernte of Central Australia (Dixon 1980:200; Henderson & Dobson 1994; Butcher 2006).

Complex segments consisting of three phases raise similar questions. For example, Avava, another Oceanic language spoken on Malekula I. (Vanuatu), has two prenasalised voiced trills, one bilabial [m͡bʙ], one alveolar [n͡dr] (Crowley 2007:26). A potential question would be whether these complex consonants are phonemically NASALS with a trilled release, or prenasalised TRILLS (both involving predictable epenthesis); or whether they have the status of STOPS, with both prenasalisaton *and* a trilled release.

Just like Hiw's velar lateral, such examples thus raise the question of which phase (stop, nasal, lateral, trill…) defines the phoneme's status, and which should be understood as accessory or secondary. This question can also be formulated in terms of features: given a segment [g͡ʟ], [t͡n], or [n͡dr], which features should be assigned to it within the language's system: [±obstruent], [±continuant], [±sonorant], [±nasal]…?

## 3.4 Identifying the relevant domain of observation

In order to identify the status of such complex segments, one could propose to carry out more detailed observation of its phonetic properties, whether in the articulatory or acoustic dimensions. For example, the question whether Hiw's lateral release is to be analysed as a fricative [ʟ̝] or an approximant [ʟ], could presumably be addressed based on an assessment of the raising of the tongue and narrowing of the vocal tract; or on acoustic measurements of the turbulence produced by this release. Likewise, one might propose to discriminate between the stop /$g^ʟ$/ and the approximant /$^g ʟ$/ interpretations by measuring the relative prominence of the two phases, whether in terms of timing, intensity, or other parameters.

This sort of phonetic approach is hinted at by Breen & Pensalfini (1999: 20), about the complex segments {oral stop + nasal} of Central Australia:

> "In the absence of a full instrumental study of these segments, *prestopped nasals* are best described as *stops with a nasal release*."

The assumptions underlying such a statement could however be debated. As much as a "full instrumental study" might tell us about these segments' *phonetics*, it is doubtful whether it would provide us with any legitimate conclusion about their *phonological* status.[10] In principle, these are two distinct dimensions which should be kept apart. The phonetic properties of each phase – in terms of timing, intensity, formant transitions, etc. – do not necessarily mirror the emic features which are relevant to account for their phonological behaviour in the system. There *may* be a correlation between phonetic prominence and phonemic status, but this must not be taken for granted, nor must one

[10] Evans (1995:735) argues that these *{oral stop + nasal}* complex segments in Central Australian languages are really prestopped nasals (rather than postnasalised stops), based on phonological evidence.

be a criterion for the other. It could well be that the two dimensions do not line up, as if the phase which is phonologically essential happened to be less prominent in the surface forms.

In sum, the only appropriate approach in order to identify the phonological status of such complex segments, should be based on system-internal structural rules and constraints. In the case of /g͡ʟ/, we need to discriminate between three interpretations: *affricate, stop, approximant*. The relevant constraints therefore must involve features involved in the definition of these three statuses. For example, should some test tell apart [+continuant] from [-continuant] consonants, and /g͡ʟ/ patterned as [+continuant], then this would rule out at least the plosive interpretation. Should some constraint involve the feature [±obstruent], then it should help discriminate between the approximant [-obstruent] reading and the other two possibilities, which are both [+obstruent].

Obviously, such phonological constraints are language-specific, and one test available in one language may be irrelevant in another. Consider the case of the segment /g͡ʟ/ of the Chimbu language Kuman, mentioned briefly above. It so happens that in Kuman, the only acceptable consonants in syllable codas are [+sonorant], whether nasals or liquids, like /m/ in *wam* 'fat' or /r/ in *ir* 'sky' (Pfantz & Pfantz 2004). The fact that the velar lateral /g͡ʟ/ is also found in codas (e.g. *togl* 'fence', *pigl* 'knife') is a strong argument for analysing the phoneme, in this language, as [+sonorant]. This phonological test makes it possible to conclude that the best interpretation of Kuman's velar lateral is as a (prestopped) lateral approximant /ᶢʟ/ – in line with Lynch's description – rather than a (laterally-released) stop or a fricative. Crucially, this conclusion for Kuman will come in contrast with other languages such as Laghuu or Ekari, in which the same complex segment is best analysed as a laterally-released stop /gᴸ/ (§6.3).

However, the simple phonotactic test available for Kuman is not applicable in Hiw. The fact that Hiw also allows the velar lateral /g͡ʟ/ to occur in syllable codas (e.g. /tɔg͡ʟ/ 'bake') cannot be taken as an argument for any conclusion, because this distributional property does not distinguish it from other consonants. Indeed, we already know (§2.3.1) that Hiw allows any consonant to occur in syllable codas, including stops (e.g. /tɔkʷ/ 'holy'). A more elaborate criterion is needed before the phonological status of Hiw /g͡ʟ/ can be defined on language-internal grounds.

My proposal in this paper is to observe the behaviour of the velar lateral in *tautosyllabic consonant clusters*. This appears to be a domain where the distribution of consonants is sensitive to specific phonotactic constraints, in particular those subsumed under the concept of sonority. To use a chemistry metaphor, I propose to observe how the velar lateral "reacts" to this particular environment, and use these observations as a diagnostic for assessing its nature within the system. This method will allow me to empirically demonstrate the status of this phoneme, on language-internal grounds, as a prestopped lateral approximant /ᶢʟ/.

But before we can arrive at this conclusion, it is necessary to observe in some detail the rules that govern tautosyllabic consonant clusters in Hiw.

# 4 Consonant clusters and sonority in Hiw

## 4.1 On the Sonority Sequencing Principle

A great number of phonological studies have proposed that the sounds of the world's languages can be organised along a universal scale of sonority (see, inter alia, Sievers 1901 [1876], Jespersen 1904; Steriade 1982; Selkirk 1984; Vennemann 1988; Clements 1990; Kenstowicz 1994; Blevins 1995; Parker 2002). The hierarchy in (9) constitutes a widely accepted version of this scale:

(9) A minimal version of the sonority hierarchy (Kenstowicz 1994:254)
VOWELS > GLIDES > LIQUIDS > NASALS > OBSTRUENTS

One domain where the notion of sonority typically proves relevant is in the observation of preference laws for syllabification – in particular, the SONORITY SEQUENCING PRINCIPLE (Selkirk 1984, Clements 1990, Blevins 1995):

(10) Sonority Sequencing Principle (Blevins 1995: 210)
Between any member of the syllable and the syllable peak,
a sonority rise or plateau must occur.

Thus, most languages favour those syllable onset clusters[11] that follow a rising slope in terms of sonority (e.g. *pla*, where /l/ is more sonorous than /p/ and less than /a/). The reverse combination (e.g. **lpa*), known as a "sonority reversal", tends to be avoided (but see §4.2).

There is still debate whether the notion of sonority is indeed a valid concept in phonology, especially considering that it has always been difficult to correlate it with empirical, physical properties of sounds. This has raised concerns that arguments based on sonority, when accounting for syllable shapes, may be circular: "terms such as sonority are just labels for the rank ordering of the segment types; they do not explain it." (Ohala 1992:320). Some authors have addressed this problem, and proposed to correlate sonority with empirical measures of the physical properties of sounds, whether articulatory (e.g. Lindblom 1983) or acoustic (Parker 2002, 2008). The sonority scale proposed by Parker (2002), based on measurements of "sound level protrusions", is similar to (9), but attempts at a finer-grained distinction between classes of segments:

(11) A phonetically grounded sonority scale (Parker 2002: 235)
low vowels > mid vowels > high vowels > /ə/ > glides > laterals > flaps > trills
> nasals > /h/ > voiced fricatives > voiced stops > voiceless fricatives
> voiceless stops & affricates

[11] Under its universal formulation, the SSP is concerned symmetrically with both clusters forming the onset of syllables (e.g. *pla* vs **lpa*) and those forming codas (e.g. *alp* vs **apl*). Because the languages I am discussing here have a syllable structure of the form CCVC, I shall be concerned only with onset clusters.

Another argument often put up against the notion of sonority is that it suffers exceptions (Ohala 1992, Wright 2004). While some languages comply with the SSP, others allow for infringements to the principle, whether with specific segments only, or across their entire system.[12] This argument is however not sufficient to discard the SSP altogether, especially considering the overwhelming number of languages which confirm its relevance. Simply, like most proposed universals,[13] the Sonority Hierarchy must be understood as a solid statistical tendency rather than an unrestricted universal. Sonority can be understood as one among several operating principles that may or may not operate within particular systems, sometimes in conflict with other motivations. The sections below will precisely compare Hiw – a language which essentially complies with sonority constraints – with its neighbour Dorig – a language which freely infringes the sonority hierarchy in the definition of its syllables.

Finally, a third argument sometimes held against sonority, is that this model leaves a number of phonological phenomena unexplained. The desire to identify a model capable of covering more ground has led to the useful proposal of alternative explanatory models, mostly based on acoustic and perceptual properties of sounds (Ohala 1992, Wright 2004, Harris 2006). The application of such alternate models to the data of Hiw would potentially bring interesting results, and would eventually form welcome additions to the present study.[14] However, this article will confine itself within the boundaries of the traditional approach to the sonority hierarchy. This will facilitate comparison with those phonological results which have been formulated with the same framework for other languages.

## 4.2 Dorig, a language which disregards the sonority hierarchy

While most languages comply with the Sonority Sequencing Principle, this is far from being always the case (Clements 1990:288). Some language families infringe the SSP more than others; infringements appear to be particularly rare among Austronesian languages.[15] Interestingly, the language of Dorig [$^{n}$dʊriɣ̞], spoken on Gaua (Banks Is) in the vicinity of Hiw (see *Map 1* p.3) and closely related to it, constitutes a conspicuous exception to this universal tendency.

*Table 2* illustrates the word-initial consonant clusters attested in Dorig (François, pers. data), within a strict CCVC syllabic template similar to the one found in Hiw. Phonemes are ranked by order of increasing sonority, based on the scale in (11); the first consonants $C_1$ of clusters are listed in rows, the second $C_2$ in columns.

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[12] Examples of such massive infringements will be given in §4.2 below.

[13] "[H]ypothesized absolute universals tend to become statistical ones as we sample languages more widely" (Evans & Levinson 2009).

[14] I will show below that certain sound patterns of Hiw resist these alternative models as much as they challenge the more classical approach to sonority (§4.3.3.2).

[15] See Hajek & Bowden (1999) for the case of Leti, Taba and Roma, three Austronesian languages of Eastern Indonesia.

The shaded areas in *Table 2* all correspond to sonority reversals. Evidently, Dorig freely infringes the Sonority Sequencing Principle by allowing any sequence of sonority classes, "with no restriction whatsoever on the nature of the consonants that may cluster together" (François 2005:471). Overall, constraints on sonority do not appear to play any role in the definition of well-formed consonant clusters in Dorig – a phenomenon which, incidentally, is in itself worth of notice for the typologist.

**Table 2** – *Word-initial consonant clusters in Dorig* (*Banks Is, Vanuatu*)

| *C₁* | | *C₂=plosive* | *C₂=fricative* | *C₂=nasal* | *C₂=trill* | *C₂=lateral* | *C₂=glide* |
|---|---|---|---|---|---|---|---|
| *plosives* | k͡pʷ | ***k͡pʷt****i* 'head' | ***k͡pʷɣ****ar* 'Diodon' | | ***k͡pʷr****aːt* 'flying-fox' | ***k͡pʷl****il* 'fold' | |
| | t | ***t***$^{m}$***b****ɪŋ* 'shut' | ***tβ****iɣ* 'bury' | ***tŋ͡mʷ****ɛ* 'like' | ***tr****ɔ* 'dove' | ***tl****a* 'clam' | ***tw****a* 'sing' |
| | k | | | ***km****aːr* 'we' | ***kr****aβi* 'twig' | | |
| | $^{m}$b | $^{m}$***bt****ɔt* 'pegs' | $^{m}$***bs****ɪ* 'tree sp.' | $^{m}$***bn****i* 'wing' | $^{m}$***br****iŋ* 'help' | $^{m}$***bl****ʊ* 'sky' | |
| | $^{n}$d | | $^{n}$***dɣ****i* 'flower sp.' | $^{n}$***dŋ͡mʷ****uɣ* 'mosquito' | $^{n}$***dr****uŋ* 'watch' | $^{n}$***dl****ʊm* 'swallow' | |
| *fricatives* | β | ***βt****aːl* 'banana' | ***βɣ****ʊl* 'insult' | ***βn****i* 'skin' | ***βr****ɛ* 'village' | ***βl****ala* 'argue' | |
| | s | | ***ss****aːŋ* 'carry' | ***sŋ͡mʷ****an* 'ill' | ***sr****ɪɣ* 'follow' | ***sl****at* 'worm' | ***sw****ɪl* 'down' |
| | ɣ | ***ɣt****am* 'door' | ***ɣs****ʊw* 'rat' | ***ɣm****aːl* 'men's club' | ***ɣr****aːt* 'volcano' | ***ɣl****ɛ* 'tail' | ***ɣw****ur* 'house' |
| *nasals* | ŋ͡mʷ | ***ŋ͡mʷ***$^{n}$***d****u* 'carry on stick' | ***ŋ͡mʷs****ar* 'poor' | ***ŋ͡mʷn****aɣ* 'wrap' | ***ŋ͡mʷr****aɣ* 'be like' | ***ŋ͡mʷl****a* 'Megapode' | |
| | m | ***mk****ɛ* 'above' | ***ms****aɣ* 'fever' | ***mn****ɔɣ* 'done' | ***mr****ɛ* 'eel' | ***ml****ɪ* 'again' | |
| | n | ***nt****i* 'child' | ***nɣ****ɔn* 'his face' | ***nn****ar* 'tree sp.' | | | |
| | ŋ | ***ŋ***$^{n}$***d****ɪr* 'Birgus' | ***ŋs****i* 'snout' | ***ŋŋ****is* 'vanish' | ***ŋr****aːɣ* 'thrust' | | |
| *trill* | r | ***rk͡pʷ****a* 'woman' | ***rɣ****a* 'wood' | ***rŋ͡mʷ****ɔs* 'Casuarina' | ***rr****aːβ* 'Erythrina' | | ***rw****ʊ* 'tuna' |
| *lateral* | l | ***lk****ɔn* 'Gaua' | ***lβ****it* 'bind' | ***lm****a* 'hand' | | ***ll****ɔs* 'bathe' | ***lw****ɔ* 'big' |
| *glide* | w | ***w***$^{n}$***d****ɛ* 'pig' | ***ws****a* 'egg' | ***wm****al*$^{m}$*bʊs* 'parrot sp.' | ***wr****ɪt* 'squid' | ***wl****iɣ* 'plait' | |

Now crucially, were Hiw to behave like its sister Dorig, and allow any combination of consonants in clusters, we would be unable to take this domain as heuristic for solving our problem – that is, we would be unable to identify the phonological status of /g͡ʟ/ based on its combinatorics with other consonants. Consequently, before we start drawing any conclusion about the behaviour of the velar lateral in clusters, a preliminary step must be to establish whether the phonology of Hiw treats sonority as a relevant parameter at all. As the following section will show, the answer to this question is positive.

## 4.3 The Sonority Sequencing Principle in Hiw

On some occasions, Hiw seems to occasionally violate the sonority hierarchy, with words such as /βti/ 'star', or /wte/ 'small'. However, despite these examples, we will see that Hiw – unlike Dorig – does in fact follow sonority-based preference laws in the constitution of its syllables, even though the way it does so calls for some language-specific adjustments to the typical sonority hierarchy.

### 4.3.1 WORD-MEDIAL CONSONANT CLUSTERS

As mentioned in §2.3, the syllabic template of Hiw is CCVC, with all consonants optional. Word-medial consonant clusters are common in Hiw. Ex (8) cited sequences of three consonants. Yet, for historical reasons which I shall not detail here (see François 2005), such CCC clusters are rare in the language: all attested instances in my corpus are shown in (8). Much more common are word-medial clusters of two consonants – e.g. /ka**jg͡ʟ**akə/ 'stand up'; /tə**kŋʷ**a/ 'people'.

*Table 3* lists the word-medial clusters which are attested in my corpus.

**Table 3** – *Word-medial consonant clusters in Hiw*

| | **p** | **t** | **k** | **kʷ** | **β** | **s** | **ɣ** | **m** | **n** | **ŋ** | **ŋʷ** | **g͡ʟ** | **j** | **w** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **p** | | pt | | | | ps | | | pn | | | pg͡ʟ | pj | pw |
| **t** | tp | tt | | tkʷ | tβ | ts | tɣ | tm | tn | tŋ | tŋʷ | tg͡ʟ | tj | tw |
| **k** | kp | kt | kk | kkʷ | kβ | | | km | | kŋ | kŋʷ | kg͡ʟ | kj | kw |
| **kʷ** | | kʷt | | | | kʷs | | | | | kʷŋʷ | kʷg͡ʟ | kʷj | |
| **β** | | βt | | | | βs | βɣ | | | βŋ | | βg͡ʟ | βj | βw |
| **s** | | | sk | | | ss | | | | | | sg͡ʟ | sj | sw |
| **ɣ** | ɣp | ɣt | | ɣkʷ | ɣβ | ɣs | ɣɣ | ɣm | ɣn | | | ɣg͡ʟ | ɣj | |
| **m** | mp | mt | | | | ms | | mm | mn | | mŋʷ | mg͡ʟ | mj | |
| **n** | np | nt | nk | nkʷ | nβ | | nɣ | nm | nn | nŋ | | ng͡ʟ | nj | nw |
| **ŋ** | | ŋt | ŋk | | | | | ŋm | | | | | | |
| **ŋʷ** | | | | | | | | | | | | ŋʷg͡ʟ | ŋʷj | |
| **g͡ʟ** | g͡ʟp | g͡ʟt | | g͡ʟkʷ | g͡ʟβ | g͡ʟs | | g͡ʟm | | g͡ʟŋ | | | g͡ʟj | g͡ʟw |
| **j** | jp | jt | jk | jkʷ | jβ | js | jɣ | jm | | jŋ | jŋʷ | jg͡ʟ | jj | jw |
| **w** | | wt | | | | ws | | | wn | wŋ | | wg͡ʟ | wj | |

At first sight, Hiw allows virtually any combination of consonants, including sequences in which $C_1$ is higher in sonority than $C_2$ (shaded). However, these should only be considered proper instances of "sonority reversals" if these sequences $C_1C_2$ can unambiguously be assigned to a single syllable. Considering that a syllable in Hiw may begin with a consonant cluster, it is in fact ambiguous where the word-medial syllable-boundary should be identified in a -VCCV- sequence (cf. Kenstowicz 1994:262). For example, knowing that /pg͡ʟɔɣ/ 'stow:PL' is a well-formed syllable in Hiw, how should we parse its reduplicated form /pəpg͡ʟɔɣ/: as /pəp.g͡ʟɔɣ/, or as /pə.pg͡ʟɔɣ/? I will not attempt to answer this question here. But the fact that word-medial clusters may be separated by a syllable boundary may explain why essentially no sonority restrictions affect them in

Hiw. Because basically all combinations seem possible here, word-medial clusters cannot provide the sort of domain we need to identify sonority constraints.

In order to avoid the difficult problem of knowing where to locate syllable boundaries with word-internal consonant clusters, I will now focus on *word-initial* clusters, as they can readily be assigned to a single syllable. Focusing on word margins also helps avoid the risk of circularity in statements about sonority (Ohala 1992:320).

### 4.3.2 WORD-INITIAL CLUSTERS IN HIW

Tautosyllabic sequences of consonants are also common in Hiw, and show a high variety of combinations. However, not all combinations are attested.

*Table 4* lays out all word-initial clusters which are attested in my corpus. *Table 5* exemplifies most of these clusters – at least one combination for each sonority class – with lexical items.

**Table 4** – *Word-initial consonant clusters in Hiw*

| | **p** | **t** | **k** | **kʷ** | **β** | **s** | **ɣ** | **m** | **n** | **ŋ** | **ŋʷ** | **g͡ʟ** | **j** | **w** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **p** | pp | pt | | | | | | | pn | | | pg͡ʟ | pj | pw |
| **t** | | tt | | | tβ | | tɣ | tm | tn | tŋ | | tg͡ʟ | | tw |
| **k** | | | kk | kkʷ | | | | | | | kŋʷ | kg͡ʟ | kj | |
| **kʷ** | | | | | | | | | kʷn | | | kʷg͡ʟ | kʷj | |
| **β** | | βt | | | ββ | βs | | | | | | βg͡ʟ | βj | |
| **s** | | | | | | ss | | | | sŋ | sŋʷ | sg͡ʟ | | |
| **ɣ** | | ɣt | | | | | ɣɣ | | | | | | ɣj | |
| **m** | | | | | | | | mm | mn | | | mg͡ʟ | mj | |
| **n** | | | | | | | | | | | | | | |
| **ŋ** | | | | | | | | | | | | ŋg͡ʟ | | |
| **ŋʷ** | | | | | | | | | | | | ŋʷg͡ʟ | | |
| **g͡ʟ** | | | | | | | | | | | | | g͡ʟj | |
| **j** | | | | | | | | | | | | | jj | jw |
| **w** | | wt | | | | ws | | | wn | | | wg͡ʟ | wj | |

The question whether Hiw complies with universal sonority tendencies is not straightforward. At first sight, a number of these initial clusters (striped areas: /βt/, /ws/, etc.) violate the Sonority Sequencing Principle[16] – see the discussion in §4.3.3. Does this mean that Hiw simply allows just any cluster of consonants, regardless of their sonority value, just like Dorig? The answer is negative. The data given in *Table 4* and *Table 5* suggest that Hiw does in fact obey some specific phonological constraints linked with sonority.

In some cases, a pattern may be lacking simply because it happens to be absent from

[16] By the same token, some also violate Universal n.19 of Greenberg (1978:259), which proscribes syllable-initial clusters of {*voiced semivowel* + *obstruent*}; and/or Universal n.21 (1978: 260), which proscribes syllable-initial clusters of {*voiced C* + *voiceless C*}. Recall however that strictly speaking, voicing is not a structural feature in the phonemic system of Hiw (§2.1.1).

my corpus, or from the lexicon. For example, it is likely that sequences {/s/+plosive} or {/β/+nasal} should be possible in Hiw, and might turn up in a wider corpus. At least this is suggested by the fact that other phonemes of the same sonority class, which otherwise behave in similar ways, are attested in these combinations.

**Table 5** – *Word-initial consonant clusters in Hiw: examples*

| $C_1$ | | $C_2$= plosive | $C_2$= fricative | $C_2$= nasal | $C_2$= liquid ? | $C_2$= glide |
|---|---|---|---|---|---|---|
| *plosives* | p | ***pt**ɔɣ* '(V) off' | | ***pn**e* 'sling s.t.' | ***pg͡ʟ**ɔɣ* 'stow:PL' | ***pj**a* 'fence' |
| | t | ***tt**əm* 'think' | ***tβ**a* 'cough' | ***tn**ɪɣ* 'very' | ***tg͡ʟ**ət* 'sweet' | ***tw**ɔɣ* 'game' |
| | k | ***kkʷ**a* 'belly' | | ***kŋʷ**a* 'today' | ***kg͡ʟ**e* 'scraps' | ***kj**e* 'back' |
| | kʷ | | | ***kʷn**e* 'smell' | ***kʷg͡ʟ**ɪ* 'dolphin' | ***kʷj**it* 'chiton' |
| *fricatives* | β | ***βt**i* 'star' | ***βs**ʉ* 'finger' | | ***βg͡ʟ**ɔβ* 'cook' | ***βj**ə* 'water taro' |
| | s | | ***ss**a* 'bad' | ***sŋ**i* 'snout' | ***sg͡ʟ**i* 'bone' | |
| | ɣ | ***ɣt**iɣ* 'waist' | ***ɣɣ**ɔnə* 'bitter' | | | ***ɣj**ajə* 'decide' |
| *nasals* | m | | | ***mn**ɔskəŋ* 'chatterbox' | ***mg͡ʟ**e* 'wrath' | ***mj**ə* 'pull out' |
| | n | | | | | |
| | ŋ | | | | ***ŋg͡ʟ**e* 'cape' | |
| | ŋʷ | | | | ***ŋʷg͡ʟ**ewon* 'bush' | |
| *liquid ?* | g͡ʟ | | | | | ***g͡ʟj**ə* 'tail' |
| *glides* | j | | | | | ***jw**ə* 'big' |
| | w | ***wt**e* 'small' | ***ws**ɔɣ* 'snatch' | ***wn**ɔt* 'parcel' | ***wg͡ʟ**ən* 'fetch' | ***wj**ə* 'good' |

But some combinations appear to be unattested for entire sonority classes; these have been shaded in *Table 4* and *Table 5*. The nine combinations which are systematically unattested all correspond to cases where $C_1$ is more sonorous than $C_2$, so that a sequence $C_1C_2V$ would have constituted a sonority reversal. The stair-like shape of the shaded areas in the tables is a logical consequence of this pattern. Judging by these cases, it appears that Hiw tends to avoid sonority reversals, in accordance with universal tendencies. For example, no cluster can consist of a nasal followed by an obstruent, whether plosive or fricative: while the word *pne* 'carry s.th. by slinging it on shoulder' is well-formed (because the sequence STOP-NASAL-VOWEL constitutes a steady rise in sonority), a word like **npe* – or even a homorganic **mpe* – would be ill-formed, because a sequence NASAL-PLOSIVE-VOWEL would violate the SSP. Likewise, the palatal glide /j/ can only be followed by another glide. (The case of /g͡ʟ/ will be discussed in §5.) If we agree to temporarily set aside the problematic case of the phonemes /β/, /ɣ/, and /w/ (discussed below), the internal logics of Hiw syllable structures can be said to comply with the Sonority Sequencing Principle (10).

Many of the world's languages require a minimal sonority distance between $C_1$ and $C_2$ (Steriade 1982, Selkirk 1984) – e.g. French licenses /pla/ but not */pna/ or */pta/. Hiw is less strict in this regard. It allows the two consonants $C_1$ and $C_2$ to be close in sonority (e.g. *tβa* 'cough', *tɣo* 'stiff') or even equivalent, i.e. from the same sonority class – hence the well-formedness of onsets consisting of two plosives (*ptɔɣ* '[take] off'), two fricatives (*βsʉ* 'finger'), two nasals (*mnɔskəŋ* 'chatterbox'), or two glides (*jwə* 'big:SG'). These cases illustrate what Clements (1990: 288) labelled "sonority plateaus"; they do not constitute infringements to the SSP.

In sum, Hiw follows the same mechanism as the majority of the world's languages, inasmuch as it generally prohibits complex syllable onsets where $C_2$ is less sonorous than $C_1$. I now turn to the discussion of the apparent counter-examples.

### 4.3.3 LANGUAGE-SPECIFIC ADJUSTMENTS TO THE SSP

Two problems remain to be solved. One is the relation between fricatives and plosives; the other is the unexpected behaviour of /w/.

#### *4.3.3.1 Fricatives and plosives*

Authors who adopt a fine-grained formulation of the sonority scale suggest that fricatives should outrank in sonority their plosive counterparts. This was apparent from the detailed sonority scale proposed in (11) above, and partially reproduced below:

(11′) Relative sonority of obstruents (Parker 2002: 235)
voiced fricatives > voiced stops > voiceless fricatives > voiceless stops & affricates

Under this scale, such Hiw words as *tβa* 'cough' or *tɣo* 'stiff' are well-formed; but *βti* 'star' and *ɣtiɣ* 'waist' would constitute sonority reversals.

However, it is not always the case that individual languages distinguish between all sonority classes. As Parker (2008:61) puts it, "languages differ in terms of (…) which (adjacent) categories in the sonority hierarchy they systematically distinguish". The fact that Hiw allows both combinations {*fricative+plosive*} and {*plosive+fricative*} shows that it does not treat fricatives and plosives as separate classes with regard to sonority. The only category which Hiw treats as emic, with regard to sonority, is an umbrella class of "obstruents", which lumps together fricatives and plosives.

In sum, a version of the sonority hierarchy adapted to Hiw's phonology would be (9′). As it happens, the underspecification of the class "obstruents" makes this version of the scale identical to the minimal version of the hierarchy as it was cited in (9) above.

(9′) Adapted sonority scale for Hiw consonants:
VOWELS > GLIDES > LIQUIDS > NASALS > OBSTRUENTS

Under this new version of the hierarchy, words like *βti* and *ɣtiɣ* are just as well-formed as *tβa* and *tɣo* within the system of Hiw. These are sonority plateaus, and do not constitute solid counter-evidence to the suggestion that Hiw essentially complies with the Sonority Sequencing Principle.

#### *4.3.3.2 The labiovelar glide /w/*

Another issue, obvious from the last row of *Table 5*, is the unexpected behaviour of the labiovelar glide /w/. On the one hand, the palatal approximant /j/ obeys the SSP quite faithfully, in the sense that it can only be followed by another glide, and not by a lateral, a nasal or an obstruent. On the other hand, the labiovelar glide /w/ is commonly found to form the onset of any consonant cluster, with apparently no restriction on their sonority class: *wte* 'small', *wto* 'buttocks', *wtaɣə* 'Barringtonia edulis'; *wsa* 'egg', *wsɔɣ* 'snatch'; *wni* 'fruit', *wnɔt* 'food parcel'; *wg͡ʟat* 'dodge'; *wg͡ʟɔɣ* 'through', etc. Phonetically speaking, these examples clearly violate the SSP. How can we account for this exceptional behaviour of /w/?

It is a controversial issue whether the sonority scale should be considered universal and fixed, or if languages have a certain degree of freedom in the assignment of their segments to sonority classes (Steriade 1982; Selkirk 1984; Clements 1990; Morelli 1999). In many Indo-European languages, for example, the fricative /s/ is famous for behaving in a paradoxical way compared to other obstruents (e.g. Cho & King 2003:185, among others). To take just the example of English, /s/ is the only obstruent which may be followed by another obstruent (*st*, *sp*…), by a nasal (*sm*, *sn*…) or another consonant cluster (*str*, *skr*). These sonority reversals, however, do not mean that English treats sonority and the SSP as totally irrelevant; rather, it suggests that universal principles of sonority may have to leave some room for certain language-specific adjustments in otherwise powerful universal principles. Many proposals have been made to explain the particular case of English, which I will not discuss here.

A similar reflection may be necessary to account for the non-canonical behaviour of /w/ in Hiw. Interestingly, it constitutes not only a counter-example to the sonority hierarchy, but also to some alternate models which have been proposed to replace it. For example, Wright (2004) chooses a perception-based approach, based on the relative auditory robustness of segments in the chain. Contrary to traditional approaches to sonority, his model manages to explain the frequent unorthodox behaviour of /s/:

> "In a Sonority Sequencing Constraint that is based on perceptual robustness, a stranded consonant (one without a flanking vowel, liquid, or glide) is dispreferred unless it has sufficiently robust internal cues to survive in the absence of formant transitions. (…) Segments that we expect to survive without the benefits of flanking vowels, and thus be found at syllable edges with intervening stops, are the sibilant fricatives, potentially other fricatives (…), and nasals." (Wright 2004:52)

Glides thus do not belong to the list of consonants which Wright would describe as capable to "survive" in a "stranded" position. In other words, the behaviour of /w/ in Hiw constitutes a problem both for the traditional approaches to the sonority hierarchy, and for the alternate, perception-based model proposed by Wright.

One way to go would be to analyse this phoneme of Hiw as simply an exception to the SSP, with no further attempt at an explanation. Yet I would like to put forward here a tentative hypothesis in order to account for its unorthodox distribution in consonant clusters.

Despite its clear phonetic nature as a glide, /w/ patterns syllable-initially as if it belonged to the class of OBSTRUENTS. This unexpected phonological assignment may result from what is a structural gap in the inventory of Hiw consonants (see *Table 1* p.4): while the system has four plosives { p t k kʷ } and four nasals { m n ŋ ŋʷ }, it has only three fricatives { β s ɣ }. The box which is left empty is one that would correspond to a "labiovelar fricative" such as *ɣʷ (a rounded voiced velar fricative). The latter consonant does not exist in Hiw – not even as an allophone – yet its description is close enough to

/w/ for the latter approximant to be structurally integrated, at an abstract level of representation, into the row of fricatives.[17]

Although one should be prudent in applying so-called “pigeonhole-filling” arguments in phonological reasoning (Ohala & Lorentz 1977), these should probably be considered legitimate when they are supported by empirical patterns of a particular system, as is the case here. This structural explanation might explain why Hiw, which otherwise tends to obey the hierarchy of sonority in its consonant clusters, still licenses sequences of /w/ with any consonant. If one is ready to admit that Hiw treats /w/, from a system-internal point of view, as though it belonged to the class of obstruents, then a word like *wte* ‘small’ becomes parallel with *βti* ‘star’. At some abstract level of representation, each of these two words arguably constitutes a sequence of [+obstruent] consonants – a sonority plateau which, again, ultimately complies with the SSP.

## 4.4 The diachronic evidence

Overall, Hiw appears to mostly comply with the Sonority Sequencing Principle in the licensing of its consonant clusters. This point can be established, as I just did, by observing the clusters attested in the modern language. But one can also take the historical perspective, and show that some illicit patterns were in fact actively avoided by the system.

Historically, word-initial consonant clusters arose through deletion of an unstressed, pretonic vowel in former three-syllable (or five-syllable) etyma (François 2005:469) – under one condition. The pretonic vowel was deleted if, and only if, it was a high vowel (*i, *u) or was higher (i.e. less sonorous, cf. (11)) than the stressed vowel that followed.[18] The typical result of unstressed vowel deletion is that a former three-syllable etymon became a CCVC monosyllable, e.g. PTB[19] *ᵑgulá-ᵑgu ‘my back’ > /kjɔk/ – see *Table 6*.

**Table 6** – *Word-initial consonant clusters originate in unstressed vowel deletion*

| MEANING | PTB ETYM. | HIW | MEANING | PTB ETYM. | HIW |
|---|---|---|---|---|---|
| ‘my back’ | *ᵑgulá-ᵑgu | kjɔk | ‘bone’ | *surí-i | sg͡ʟi |
| ‘decide’ | *ɣilála | ɣjajə | ‘cape’ | *ŋorái | ŋg͡ʟe |
| ‘star’ | *βitúu | βti | ‘dolphin’ | *ᵑguRío | kʷg͡ʟɪ |
| ‘snatch’ | *wosáɣi | wsɔɣ | ‘smell’ | *ᵐbuná-i | kʷne |
| ‘Barringtonia’ | *wotáɣa | wtaɣə | ‘belly’ | *toᵐbʷá- | *tkʷa> kkʷa |

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[17] In a similar way, Donohue (n.d.:37) proposes to analyse the /w/ of Skou, which is phonetically a glide, as an underlying voiced stop /(g)w/, for phonological reasons.

[18] In all other cases, the pretonic vowel yielded a schwa: e.g. POc *panako ‘steal’ > *βəneɣ*; *panua > *βənjə* ‘island’; *kapika > *ɣəβiɣə* ‘Malay apple’.

[19] The protoforms given here belong to Proto Torres-Banks (PTB), the closest reconstructible ancestor of Hiw (François 2005; n.d.).

The consonant clusters shown in *Table 6* illustrate the most frequent case, namely when the modern consonants simply reflect the original sequence of their etymon: for example, the order of consonants in /kʷne/ is parallel to the order of consonants in the proto-form *$^{m}$buná-i. All these clusters were preserved in the modern language because they complied with the sonority hierarchy – at least the one defined on emic, language-internal terms.

But what happened when unstressed vowel deletion would have produced a sonority reversal? The evidence shows that such ill-formed sequences were systematically avoided. For example, the etymon *limá-$^{ŋ}$gu 'my hands', if regular correspondences applied, should have yielded a form ***jmɔk*. Such a sequence {glide+nasal} would have infringed the SSP. Hiw avoided such an illicit consonant cluster, by means of a metathesis: **jmɔk → *mjɔk*.[20]

*Table 7* shows that two strategies were used to avoid illicit consonant clusters: metathesis, and schwa epenthesis.[21] The last column includes the following abbreviations: O *obstruent*, N *nasal*, L *liquid*, G *glide*.[22] The vertical bar between two consonants represents a vowel epenthesis.

**Table 7** – *Metathesis and epenthesis as two strategies to avoid illicit consonant clusters*

| STRATEGY | PTB ETYMON | EXPECTED REFLEX | ACTUAL REFLEX | MEANING | PATTERN AVOIDED |
|---|---|---|---|---|---|
| METATHESIS | *limá-$^{ŋ}$gu | **jmɔ-k | ***mj**ɔ-k* | 'my hands' | *GN → NG |
| | *ŋusú-i | **ŋsi | ***sŋ**i* | 'snout' | *NO → ON |
| EPENTHESIS | *mʷi$^{n}$dólo | **ŋʷtoj | *ŋʷ**ə**toj* | 'short' | *NO → N‖O |
| | *mʷotári | **ŋʷtɔg͡ʟ | *ŋʷ**ə**tɔg͡ʟ* | 'noble woman' | *NO → N‖O |
| | *roβáli | **g͡ʟβɔj | *g͡ʟ**ə**βɔj* | 'carry on stick' | *LO → L‖O |

The comparison with the neighbouring language Dorig is instructive here. Dorig has cognate forms for the first two of these etyma: *limá-i > *lma* 'hand'; *ŋusú-i > *ŋsi* 'snout' (see *Table 2* p.15). Because sonority is not a relevant parameter in Dorig phonology, the sonority reversals of the modern forms were kept unchanged. By contrast, the system of Hiw treated these reversals as ill-formed, and "rectified" them by means of a metathesis.

[20] The same etymon *lima 'hand', when stressed on the /i/, yielded a form *jimə* with no metathesis – e.g. *ɣəjɣaj-jimə* 'wash hands' (incorporated object, no possessor suffix).

[21] Interestingly, modern loanwords tend to avoid consonant clusters through vowel epenthesis, even when their sequence {*plosive* + *liquid*} would comply perfectly with the SSP: BREAD > ***pə**ret*; FLOUR > ***pə**lɔwə*; FLOWER > ***pə**lawə*; FLAT > ***pə**lat*; PLAY > ***pə**lp**ə**le*; GRAVEYARD > ***ke**g͡ʟeβjat*; CRANKY > ***kə**g͡ʟaŋki* 'crazy'; the only exceptions are loanwords which have not been nativised to the phonology of Hiw (*Table 10* p.29). This may be a sign that the licensing of word-initial consonant clusters is a historical phenomenon, which does not extend to newly introduced lexical items.

[22] Note that I include here an example of /g͡ʟ/ (last row) in anticipation of its analysis as a liquid (see §**Erreur ! Source du renvoi introuvable.**).

This is again evidence that Hiw, unlike Dorig, treats the sonority hierarchy as an operational constraint in the definition of its well-formed consonant clusters.

# 5 The velar lateral of Hiw: synchrony and diachrony

## 5.1 Solving the synchronic puzzle

The preceding section has shown that Hiw regularly complies with the Sonority Sequencing Principle in the formation of its consonant clusters. This parameter can now be used as a heuristic lever in solving the initial puzzle of the present study (§3.4) – that is, identifying the phonological status of the velar lateral /g͡ʟ/.

Should we be dealing with a lateral affricate, or a (laterally-released) stop, then this consonant should pattern, as far as sonority is concerned, the same way as obstruents. Conversely, if the consonant is to be analysed as a lateral approximant proper, then it should behave like liquids – that is, fit between nasals and glides on the sonority scale. The answer to this question can be drawn from *Table 5* p.18, combined with our knowledge of sonority-linked rules governing clusters.

In itself, the fact that /g͡ʟ/ may be preceded by a stop (as in *kʷg͡ʟɪ* 'dolphin')[23] does not give away the segment's status. Knowing that Hiw licenses sonority plateaus (§4.3.2), such words would be well-formed whether the velar lateral is a liquid /ᶢʟ/, a stop /gᴸ/ or an affricate /g͡ʟ̥/.

The sequence {fricative + /g͡ʟ/} – as in *βg͡ʟɔβ* 'cook' or *βg͡ʟiwanə* 'funny' – might have been regarded as an argument for ruling out the stop interpretation, because {fricative +stop}, in principle, constitutes a sonority reversal. However, we saw that Hiw does not distinguish stops from fricatives in its treatment of sonority, and handles only one emic category of obstruents (§4.3.3.1). Consequently, a cluster like /βg͡ʟ/ parses as {obstruent +/g͡ʟ/}, and thus remains ambiguous with regard to the sonority status which should be assigned to the velar lateral. The word-initial cluster /wg͡ʟ/ (e.g. *wg͡ʟɵn* 'fetch')[24] does not prove much either, considering that the labiovelar glide patterns as an obstruent in Hiw (§4.3.3.2).

The crucial evidence comes from the combination with nasals. Whereas obstruents can be followed by a nasal (e.g. *kʷne* 'smell', *sŋi* 'snout'), the velar lateral /g͡ʟ/ *cannot*: no syllable in Hiw can start with a cluster like **g͡ʟn* or**g͡ʟŋ*. Conversely, /g͡ʟ/ can *follow* a nasal – e.g. *mg͡ʟe* 'wrath', *ŋʷg͡ʟewon* 'bush'.[25] This property makes the velar lateral distinct from

[23] Besides examples presented in *Table 5*, other words where /g͡ʟ/ is preceded by a stop include: *pg͡ʟawə* 'slippery', *tg͡ʟaŋə* 'wealthy', *tg͡ʟaŋʷə* 'hit:PL', *tg͡ʟɪɣ* 'poison', *tg͡ʟɔɣ* 'throw:PL', *tg͡ʟɵ* 'some', *tg͡ʟɵŋʷɪj* 'centipede', *kʷg͡ʟe* 'dream of'.

[24] Other examples include: *wg͡ʟat* 'dodge', *wg͡ʟiɣɔj* 'fishing rod', *wg͡ʟɔɣ* 'through', *wg͡ʟɔt* 'ground-bait', *wg͡ʟo* 'wear around the neck', *wg͡ʟʉ* 'carry on shoulder'.

[25] Other examples include: *ŋg͡ʟɔ-k* 'my mouth', *mg͡ʟejiŋə* 'berserk', *mg͡ʟoŋʷe* 'obtuse', *mg͡ʟɵtɵg͡ʟ* 'hogwash, bullshit'. Remember also the onset consonant cluster /ŋg͡ʟ/ in the word *sɵg͡ʟ.ŋg͡ʟe* 'beak' cited in (8) p.6.

obstruents again (as *mp, *ns, *ŋɣ… are illicit clusters).

The only consonant attested to follow /g͡ʟ/ is the glide /j/ – e.g. *g͡ʟjə* 'tail', *g͡ʟje* 'sweep'.

This suggests that /g͡ʟ/ is less sonorous than the glide /j/, but more sonorous than all other consonants, whether obstruents or nasals. In other words, within the sonority scale (9′), the velar lateral /g͡ʟ/ fits exactly the slot of LIQUIDS.

The historical evidence cited in §4.4 confirmed these synchronic observations. Whereas words like /sg͡ʟi/ 'bone' or /ŋg͡ʟe/ 'cape' are well-formed in Hiw, a sequence like **g͡ʟβɔj would have involved an illicit cluster {liquid+obstruent}, which had to undergo epenthesis → *g͡ʟəβɔj* (*Table 7*).

This empirically grounded conclusion allows us to rule out two of the three phonological analyses (§3.3) which were theoretically possible for the phone [g͡ʟ]. Since this segment patterns like a liquid, it can be neither a lateral AFFRICATE, nor a laterally-released STOP. The best phonological analysis is to assign it the status of a lateral APPROXIMANT – or more precisely, a *velar prestopped lateral approximant*.

Although the notation with the ligature /g͡ʟ/ is still correct, an alternative is to use a superscript |$^g$|. This choice of notation serves to indicate that the plosive phase is an accessory articulation, in the sense that it does not participate in the phoneme's behaviour within the system's structural constraints. Such a notation would be parallel to the widespread use of superscript typography with prenasalised (/$^m$b, $^n$d/…), rounded (/$^m$b$^w$, ŋ$^w$/…) or aspirated (/k$^h$, p$^h$/…) consonants. In each case, the superscript symbol represents a phonetic element which is present, yet plays no role in the phoneme's status with regard to emic constraints: thus, /$^m$b/ can normally be shown to behave like a stop rather than a nasal, and /ŋ$^w$/ as a nasal rather than a glide.

Finally, from a strict notational point of view, one could choose to represent the Hiw phoneme as simply /ʟ/, especially since the prestopped velar lateral does not contrast with any plain lateral. However, I believe this would represent unfaithfully the complex nature of the consonant, whose plosive onset is recognised by conservative speakers as essential to its articulation, and to its auditory distinction from the velar constrictive /ɣ/ (§3.1). I shall therefore transcribe the prestopped lateral consonant consistently as /$^g$ʟ/ in future phonological transcriptions of Hiw. The only reason why /ʟ/ might constitute a more elegant representation, would be if prestopping were shown to be an inherent feature of all velar laterals. While this indeed may be true (see §6.2), at this stage it has not been confirmed by cross-linguistically detailed research.

## 5.2 Historical origin of the velar lateral

This synchronic study has thus established that the velar lateral of Hiw is phonologically a liquid – in fact, the only liquid of the system (§2.1.1). Interestingly, it can be shown that this phoneme, historically, also originates in a liquid, but of a very different sort. In all the words whose etymology is clear, /g͡ʟ/ always reflects a former rhotic – what was probably an apical trill /r/ in the earlier history of the language.

A few brief notes may help situate the consonant of Hiw within the context of its language family. We know that Hiw is one of about 95 languages belonging to the *North*

*Central Vanuatu linkage* (Clark 2009); the latter belongs to a larger set of about 450 *Oceanic* languages, which in turn form a well-defined subgroup within the large *Austronesian* family.

Proto Austronesian and Proto Oceanic, the ancestors of Hiw, are reconstructed with two different rhotics, noted *r and *R (Milke 1958; Ross 1988, 1998) – in addition to an alveolar lateral *l. Although the evidence for their phonetic realisation is scarce, Blust (2009: 582) suggests that the contrast *r/*R could have been originally a contrast between, respectively, an alveolar flap and an alveolar trill; yet there is still debate on this matter (François f/c).

In fact, modern languages of Vanuatu never reflect *r and *R with different segments. Rather, what happens is that *r is regularly reflected by a segment, whereas the other rhotic *R underwent patchy and unpredictable loss (*R>Ø) at an early time when the two rhotics were still distinct (Geraghty 1990; Lynch 2009; François f/c). In a subsequent phase, the surviving instances of *R merged with *r in all languages of Vanuatu, thereby suppressing evidence of their former contrast. These intricate issues of reconstruction need not concern us here. Suffice it to say, the two protophonemes *r and *R of Proto Oceanic had demonstrably merged as an alveolar trill in Pre-Hiw – and this trill, in turn, is the source of the velar lateral [g͡ʟ] of modern Hiw.

(12) provides a few examples of regular change from *r/*R to Hiw /g͡ʟ/. Protoforms are given either in Proto Oceanic (POc) or Proto North Central Vanuatu (PNCV, Clark 2009).

| | | | | |
|---|---|---|---|---|
| (12) | POc | *rua | > -g͡ʟə | 'two' |
| | POc | *$^{m}$barapu | > pəg͡ʟɔ | 'long' |
| | POc | *RapiRapi | > g͡ʟəβg͡ʟɔβ | 'evening' |
| | POc | *[ka]ŋaRi | > ŋeg͡ʟ | 'Canarium almond' |
| | PNCV | *maraya | > meg͡ʟje | 'eel' |
| | PNCV | *maturu | > mitig͡ʟ | 'sleep' |
| | PNCV | *Roʔoti | > g͡ʟɵt | 'tie' |
| | PNCV | *$^{ŋ}$guRio | > k$^{w}$g͡ʟɪ | 'dolphin'. |

The only cases where /g͡ʟ/ does not directly reflect a rhotic correspond to rules of metathesis or assimilation involving the two velar continuants of modern Hiw, /g͡ʟ/ and /ɣ/. These historical processes of interference[26] between the two consonants (François f/c) are regularly correlated with stress. Without going into the full detail of these rules, I will only cite three of them here (underscores represent vowel slots):

[26] I use "interference" in the sense of Blust (2009:206), to designate those cases where "segments are sensitive to one another in adjacent syllables".

(13) METATHESIS: *ˈk_r_ > *ˈɣ_g͡ʟ_ > ˈg͡ʟ_ɣ_
→ e.g. *kíRe 'pandanus' > *ɣire > *ɣig͡ʟə > *g͡ʟiɣə*

(14) ASSIMILATION: *k_ˈr_ > *ɣ_ˈg͡ʟ_ > g͡ʟ_ˈg͡ʟ_
→ e.g. *kaRúve 'ghost crab' > *ɣaruwe > *ɣəg͡ʟʉwə > *g͡ʟəg͡ʟʉwə*

(15) DISSIMILATION: *ˈr_r_ > *ˈg͡ʟ_g͡ʟ_ > ˈg͡ʟ_ɣ_
→ e.g. *rára(p) '*Erythrina indica*' > *g͡ʟag͡ʟə > *g͡ʟaɣə*

These regular processes account for more than 60 lexical items. Assuming that they somehow result from the property [velar continuant] shared by the two consonants, it is most likely that these rules arose once the apical trill *r had already changed into /g͡ʟ/.

## 5.3 From apical trill to velar lateral

Among all Oceanic (or even Austronesian) languages I know of, Hiw is the only one in which the rhotics became a (prestopped) velar lateral /g͡ʟ/. The most common reflexes of *r/*R in Oceanic languages are generally as an apical trill /r/, but also often as an *alveolar* lateral /l/. For example, *r/*R are reflected as /l/ in the Temotu group of the Solomon Islands (Ross & Næss 2007), or in some Polynesian languages.

A possible hypothesis might then suggest that the apical trill of Pre-Hiw may have become first an alveolar lateral *[r]>[l], before changing its point of articulation to a velar lateral [g͡ʟ].[27] However, this potential scenario is not clearly supported by the dialectological evidence observable in the vicinity of Hiw.

**Table 8** – *Reflexes of the proto-rhotics *r/R in some North Central Vanuatu languages*

| IPA | reflex | language | reference |
|---|---|---|---|
| ᶢʟ | prestopped velar lateral | Hiw (Torres Is) | |
| r | alveolar trill | most of the 95 NCV languages; including Hiw's neighbour Lo-Toga | François (f/c) |
| j | palatal glide | 4 languages in north Banks (incl. Lehali, Mwotlap) | François (f/c) |
| Vː | lengthening of V σ-finally[28] | Lakon (Gaua I.) | François (2005) |
| ɾ | alveolar tap | Araki (Espiritu Santo I.) | François (2002) |
| l | alveolar lateral | Paamese, Lewo (Central Vanuatu) | Lynch (2008) |

[27] Such a scenario would need to take place after the alveolar lateral of Pre-Hiw had become a palatal glide (*l>j) – e.g. *tolu 'three' > Hiw *təj*.

[28] The rhotics *r/R are reflected in Lakon as a trill [r] syllable-initially, but as an extra vowel mora (reflecting loss with compensatory lengthening) syllable-finally: e.g. *zara 'village clearing' > *sar > [saː] (François 2005; f/c).

*Table 8* lists the reflexes of *r/*R in the North Central Vanuatu subgroup to which Hiw belongs, from north to south. It shows that the original rhotics are only reflected as a lateral /l/ in languages such as Paamese and Lewo, at a considerable distance from Hiw (see *Map 1* p.3). Several dozen languages intervene between Paamese and Hiw (Tryon 1976), none of which reflects *r/*R as a lateral. In terms of historical phonology, the dialectological evidence does not support the hypothesis that the velar lateral of Hiw should be derived from, or have any connection with, an alveolar lateral *l. It seems more likely that the velar lateral evolved directly, as it were, from an alveolar trill.

It is unclear how exactly a former apical trill *r would change into a prestopped velar lateral /g͡ʟ/.[29] I might propose here a preliminary hypothesis. While an apical trill [r] is primarily defined by the motion of the apex against the alveolar ridge, it also entails a vibration of the entire tongue's body. A movement of the lower body (dorsum and root) is precisely involved in the articulation of [g͡ʟ], in the transition between the occlusive onset phase and the lateral release (§3.1). It is possible that what was an apical trill [r] may have, over time, shifted its defining articulation from the apex to the root, in a way similar to the better attested change [r]>[ʀ]. Acoustic properties possibly also played their part in the change from [r] to [g͡ʟ], if the turbulence produced by [g͡ʟ] was perceived to be similar to the one formerly associated with [r], enough to ensure continuity in the phoneme's identification. This hypothesis would warrant further investigation.

## 5.4 Language contact and the velar lateral

The connection between the apical trill *r and the velar lateral of modern Hiw /g͡ʟ/ is first and foremost a historical one, the former being reconstructable as the ancestor of the latter. As such, this link would not be expected to be conscious to modern speakers. However, Hiw speakers are constantly reminded of the connection through their exposure to the languages of the Torres and Banks islands, which have kept the alveolar trill (cf. *Table 8*). In particular, most Hiw speakers are bilingual in the neighbouring language Lo-Toga,[30] and are familiar with regular correspondences between /r/ and /g͡ʟ/ in cognate forms (*Table 9*).

Due to this regular correspondence between the velar lateral /g͡ʟ/ of Hiw and the apical trill of neighbouring languages, the spelling system preferred by Hiw speakers uses a grapheme derived from <r>, with a diacritic. Thus /βɔg͡ʟtʉg͡ʟ/ is spelt <*vor̄tur̄*> in the orthography, /wg͡ʟiɣɔj/ is <*wr̄igoy*>, /kʷg͡ʟɵɣ/ is <*qr̄ög*>, /ɵg͡ʟə/ is <*ör̄e*>, etc.

The ongoing association between the velar lateral and rhotics is also partly apparent from the treatment of loanwords. Hiw has borrowed lexical items from several languages which have an alveolar trill in their inventory. This is true, on the one hand, of some of

[29] Ra'ivavae, a Polynesian language spoken in the Austral Is of French Polynesia, reflects *r/R as a voiced velar stop /g/ (Charpentier & François, f/c).

[30] Hiw has always had relationships of trade and interisland marriage with their southern neighbours from Lo and Toga islands. Furthermore, Hiw children nowadays are regularly sent to boarding school on Lo for their primary education, and become bilingual in Lo-Toga.

the neighbouring vernacular languages of the Torres and Banks islands (especially Mota, the language of christianisation during 19th c.); and on the other hand, of the pidgin Bislama, which usually forms the bridge between European donor languages (French, English) and Hiw. Note that all Hiw speakers today are fluent in Bislama, and produce the apical trill of that language (and of Lo-Toga) with no difficulty.

**Table 9** – *Some regular correspondences between Hiw /g͡ʟ/ and Lo-Toga /r/*

| *Hiw* | *Lo-Toga* | *meaning* |
|---|---|---|
| jəjməg͡ʟen | lolmərɛn | 'know' |
| βɔg͡ʟtʉg͡ʟ | βɛrtʉr | 'stand:PLUR' |
| sʉkʷəg͡ʟɔt | hʉkʷərɔh | 'paramount chief' |
| kʷg͡ʟɵɣ | kʷərəŋ | 'wooden club' |
| wg͡ʟiɣɔj | wʉriɛl | 'fishing rod' |
| ɵg͡ʟə | ərə | 'bamboo drum' |
| ɔg͡ʟ | hɛr | 'husk (coconut)' |

When a lexeme contained an apical trill /r/ in the donor language, it was sometimes preserved in Hiw, despite its absence in the native inventory of Hiw consonants [*Table 10*]. However, some loanwords – perhaps borrowed earlier? – have undergone phonological nativisation. In loans containing a trill, this process triggered the change from /r/ to /g͡ʟ/ [*Table 11*].

**Table 10** – *Some non-nativised loanwords containing /r/*

| | | *Bislama* | *Hiw* | *meaning* |
|---|---|---|---|---|
| ENG | *bread* | /bred/ | /pəret/ | 'bread' |
| ENG | *try* | /traem/ | /tra/ | 'Polite Imperative' |
| ENG | *Saturday* | /sarere/ | /sarəre/ | 'Saturday' |
| ENG | *drunk* | /droŋ/ | /troŋ/ | 'drunk' |
| FR | *citron* | /sitroŋ/ | /stəroŋ/ | 'Citrus sp.' |
| ? | ? | | /rʉrʉᵐbe/ | 'a women's dance' |

**Table 11** – *Some nativised loanwords showing /r/>/g͡ʟ/*

| | | *Bislama* | *Hiw* | *meaning* |
|---|---|---|---|---|
| Mota | *tataro* | … | /tatag͡ʟɔ/ | 'pray' |
| ENG | *cranky* | /kraŋke/ | /kəg͡ʟaŋki/ | 'crazy' |
| ENG | *graveyard* | … | /keg͡ʟeβjat/ | 'graveyard' |
| | *Andora* | … | /tog͡ʟa/ | (female name) |
| | *Martha* | … | /mag͡ʟita/ | (female name) |

The examples in *Table 11* suggest that Hiw speakers still perceive a link between their own velar lateral and the rhotics of other languages.

# 6 A typological survey of velar laterals

I propose to end this study with a brief typological overview of velar lateral consonants.

## 6.1 A rare phoneme

Velar lateral phonemes are vanishingly rare amongst the world's languages – in fact so rare, that they were once considered impossible (Chomsky & Halle 1968, Ladefoged 1971), or mere variants of more common coronal laterals. However, more recent research has proved their existence in a small number of languages (Ladefoged, Cochran, Disner 1977; Blevins 1994; Ladefoged & Maddieson 1996:190). To my knowledge, Hiw is the only Austronesian language attested to have such a consonant.

In his typological survey of lateral consonants, Maddieson (2008) contrasts various types of languages, depending on whether they have lateral consonants at all (16.8% do not), and if they do, what their points of articulation are. The most common type (68.4% of his sample) is for a language to have only one lateral, the alveolar /l/. Hiw belongs to a minor category, that of languages with "laterals, but no /l/"; these form only 6.5% of his typological sample (37 languages out of 567). Together with Kanite and Yagaria (Blevins 1994:314), Hiw even belongs to the very small set of the world's languages whose only lateral segment – or indeed, whose only liquid – is a velar.

*Table 12* cites data from other languages of the world which possess – usually along with the more common alveolar /l/ – a voiced velar consonant that is phonetically similar to the /g͡ʟ/ of Hiw. The fourth column lists the phonological representation which is used by the authors, even in those cases where it is not consistent with their own description, or where it makes inaccurate use of IPA conventions. Although this table may miss a few languages, it is close to being comprehensive – this alone tells a lot about the typological rarity of velar laterals.

Note that *Table 12* only cites phonemes which include, or may include, the voiced velar string [g͡ʟ] as one of their surface forms. One may also want to enrich this list with other {stop+ lateral} velar phonemes which are reported for some languages, but whose description clearly points to different phonetic forms. This is the case, for example, with the *voiceless velar ejective affricate* /k͡ʟ̝̊'/ of Zulu (Blevins 1994:312, Ladefoged & Maddieson 1996:205); or with the *voiceless velar plosive with alveolar lateral fricative release* /k͡ɬ/ of Axluxlay, a Macro-Panoan language of Argentina (Stell 1972).

Among its 91 consonants, the Caucasian language Archi is reported to have a set of velar lateral (voiceless and voiced) fricatives, as well as voiceless velar lateral affricates and ejectives. Among this rich inventory, the segment closest to Hiw /g͡ʟ/ would be the voiced lateral fricative, transcribed /ʟ̝/ by Ladefoged & Maddieson (1996: 128). However, this consonant, described by Kodzasov (1977) as pre-velar rather than velar, has been recently reanalysed as a "palato-velar lateral fricative" transcribed /ɮ/ (Chumakina *et al.* 2008). Besides, the strong degree of frication – audible from audio recordings (*ibid.*) – makes it phonetically quite distinct from the velar lateral of Hiw.

**Table 12** – *Some languages with voiced velar laterals or similar phonemes*

| language | family | phonological status in description | transcription used | reference |
|---|---|---|---|---|
| Hiw | Oceanic (Austronesian) | prestopped lateral | /ᶢʟ/ | [*this paper*] |
| Wahgi | Chimbu (Trans New Guinea) | lateral | /ʟ/ | Ladefoged & Maddieson (1996:190); SIL (n.d.) |
| " | " | laterally released stop | =/ɫ/ | Ramsey (1975:xi) |
| Melpa | Chimbu (TNG) | lateral | /ʟ/ | Ladefoged & Maddieson (1996:190); Stucky (1994b) |
| Nii | Chimbu (TNG) | lateral | /ʟ/ | Stucky & Stucky (1973); Stucky (1994a) |
| Kuman | Chimbu (TNG) | lateral | /ʟ/ | Pfantz & Pfantz (2004) |
| " | " | lateral fricative | =/ʟ/ | Steed & Hardie (2004) |
| " | " | lateral | =/gl/ | Lynch (1983) |
| " | " | laterally released affricate | =/gɫ/ | Piau (1985), in Foley (1985:63) |
| Ku Waru | Chimbu (TNG) | velarised lateral | [g͡l ~ ʟ] | Rumsey (2007:237) |
| Kanite | Gorokan (TNG) | (velar) lateral affricate | | Young (1962); Pike (1964:123) |
| Yagaria | Gorokan (TNG) | lateral | /ʟ/ | Ladefoged & Maddieson (1996:190); Renck (1975; n.d.) |
| Ekari | Wissel (TNG) | laterally released stop | /gˡ/ | Doble (1987:58); Hyman (2008:91) |
| Auye | Wissel (TNG) | laterally released stop | /gʟ/ | Donohue (2007:530) |
| Laghuu | Yi (Tibeto-Burman) | laterally released stop | /gl/ | Edmondson & Ziwo (1999) |
| Archi | Lezgic (Nakh-Daghestanian) | voiced pre-velar fricative | /ʟ̠/ | Ladefoged & Maddieson (1996:190); Kodzasov (1977) |

A careful distinction is necessary between the velar lateral [ʟ], and the *velarised alveolar lateral* approximant [ɫ] (Ladefoged & Maddieson 1996:191), also known as "dark L" – e.g. English *peel* [pʰiːɫ]. These two lateral consonants show major differences, both in their articulation and in their auditory perception. A velar lateral [ʟ] involves *contact* at the velar place of articulation, with the airstream flowing on the sides of the dorsum, close to the back molars (§3.1). By contrast, [ɫ] involves contact – and lateral airstream flow – at the alveolar ridge; the velarisation only consists in the raising of the dorsum *towards* the velum, without any actual velar contact. For [ɫ] to lose its alveolar gesture does not make it a velar lateral. Due to the loss of any contact of the tongue with the upper articulators, the segment loses its lateral status altogether, and typically becomes a back vowel or glide: e.g. European Portuguese [sɔɫ] > Brasilian Portuguese [sɔʊ̯] 'sun' (Barbosa & Albano 2004: 229). This is why velarised alveolar laterals are not included in the present typological survey of velar laterals.[31]

[31] As *Table 12* shows, a number of authors have used the typographical sign [ɫ] in order to …/…

## 6.2 The typical prestopping of velar laterals

One of the few families in the world where velar laterals are commonly found (Foley 1985:63) is the Chimbu family of Trans-New Guinea languages, located in the highlands of Papua New Guinea. From the sources cited, it seems that most of these languages provide the velar lateral with a plosive onset, just like Hiw – even though, for some of these languages, the prestopping is reported as optional.

The possibility of prestopping the lateral is sometimes mentioned explicitly by describers, and sometimes can be inferred from other clues, such as the language's orthography. For instance, Ladefoged & Maddieson (1996:194) describe the velar lateral of Mid-Wahgi as essentially an approximant /ʟ/, which is "occasionally prestopped"; the convention to spell it <gl> or <kl> (Ramsey 1975:xi; SIL, n.d.) tends to confirm that this prestopping is a typical feature of the phoneme. Another clue can be the terminology chosen by the describer: thus, Pike's description of Kanite's segment as a "velar lateral affricate", with no further phonetic characterisation, suggests prestopping.

Likewise, Kuman has a velar lateral, which Pfantz & Pfantz (2004) transcribe as /ʟ/. About the same language, Foley (1985:63), citing Piau (1985), describes this consonant as a "laterally released velar affricate /gɫ/, voiceless finally [kɫ̥], voiced elsewhere [gɫ]." This description suggests the velar lateral of Kuman, again, exhibits a plosive onset similar to the one found in Hiw. Despite the varying transcriptions used to represent the consonant, it seems that its phonetic properties essentially match those of Hiw [g͡ʟ]. This is confirmed by acoustic observations made by Steed & Hardie (2004:348), who consistently identify a transient at the initial phase of the Kuman lateral.

It would be interesting to see whether any language has a genuine velar lateral approximant [ʟ] which does not include any prestopping among its variants. In the absence of such a comparative study, the available literature suggests that known velar lateral approximants typically involve prestopping. The motivation for such a tendency should be addressed by future research.

This typical prestopping distinguishes velar laterals from their more common alveolar counterparts, for which prestopping is extremely rare. Only a small number of the world's languages are reported to have prestopped laterals for other points of articulation – at least as allophones of plain lateral phonemes. Along with prestopped nasals, which are also common among Australian languages (see §3.3), Hercus (1972) thus reports on two prestopped laterals in Arabana-Waŋgaŋuru languages of Southern Australia, an alveolar [d͡l], and a dental [d̪͡l̪]. Martuthunira, a now extinct language of Western Australia, also prestopped its four laterals syllable-finally: [t̪l̪], [tl], [cʎ], [tɭ] (Dench 1995: 27).

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represent a proper velar lateral, which IPA conventions represent as [ʟ].

## 6.3 An ambiguous phonological status

Following the discussion on Hiw, it is useful to emphasise that the phonological status of prestopped velar laterals differs from one language to another. This variety is first suggested by the diversity of descriptive labels which have been proposed by the describers themselves: what seems to be phonetically the same – or a similar – segment has been described as a stop in some languages, as an affricate in others, or as a lateral approximant in other languages again. In some cases, this terminological variety is not grounded on any empirical evidence, and is mostly an artefact of the describers' arbitrary choice. This is especially true when descriptions differ for the very same language across authors (as for Kuman or Wahgi); or when a single author's representations suggest contradictory interpretations – as when Ramsey (1975) describes Wahgi's segment as a stop, yet uses the symbol for a lateral approximant.

But crucially, the variety of descriptions partly reflects an actual diversity of phonological statuses, as defined by each language's system. Without going into the detail of all languages mentioned in *Table 12*, I will only cite a couple of examples.

Thus, we saw that the Kuman consonant patterns as [+sonorant], because it is allowed in syllable codas – a position only taken by sonorants in this language (§3.4).[32] This is clear evidence that the prestopped velar lateral of Kuman – despite its occasional description as an “affricate” or a “fricative” – has the status of a lateral approximant /$^{g}$ʟ/, just like in Hiw.

In other languages, the segment [g͡ʟ] is apparently best described as a stop. Thus the language Ekari (Wissel Lakes, another branch of TNG) has a consonant which Doble (1987:58) describes as “laterally released [g$^{l}$], the lateral being back in the velar position”; as far as its phonetic realisation is concerned, this consonant is thus exactly the same sound as the [g͡ʟ] of Hiw.[33] However, Doble considers this to be just the surface realisation of a phoneme which she analyses as fundamentally a voiced stop /g/, belonging in the occlusive series /p t k b d _/.[34] Although this voiced velar /g/ happens to always have a lateral release [g$^{L}$], it regularly patterns with stops, and particularly with its voiceless (and non-lateralised) counterpart /k/. Thus, /g$^{(L)}$/ and /k/ share the properties of leniting intervocalically (Donohue, p.c.), and of becoming rounded after back vowels: e.g. /b**u**ka/ → [buk$^{w}$a] ‘bow’; /e**u**ga/ [eug$^{LW}$a] ‘more’ (Doble 1987:58).

Similarly, Laghuu, a Tibeto-Burman language of the Yi branch, contrasts a series of plain voiced velar stops /k kh g $^{ŋ}$g/ with another series of laterally released stops, which Edmondson & Ziwo (1999) transcribe /kl khɬ gl ŋkhɬ/. Although the authors' description of the phonological system remains brief, it seems that the best analysis of the voiced velar segment is as a laterally released stop – what I would represent as /g$^{L}$/ – rather than as a lateral.

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[32] See Lynch (1983) for other phonological properties of the Kuman velar lateral.

[33] This point was confirmed by Niko Kobepa (pers. com.), a native speaker of Ekari.

[34] A similar situation holds for the closely related language Auye (Donohue 2007:530, after Moxness n.d.).

In order to determine the precise phonological status of the various segments [g͡ʟ] represented in *Table 12*, one would need more detailed information on the way in which they pattern within each system's phonological constraints.

# 7 Conclusion: The ambiguity of complex segments

This article can be read at two different levels.

For one thing, this case study provides firsthand data on the phonology of Hiw, an undocumented and endangered Oceanic language of Vanuatu. I have discussed both the phonetic and phonemic properties of an unusual consonant of Hiw, a prestopped velar lateral approximant /g͡ʟ/. I then observed the way this phoneme behaves within the structural constraints of its system, particularly in the domain of tautosyllabic consonant clusters, and how these are regularly shaped by the sonority hierarchy. This perspective allowed me to define empirically the phonemic status of the velar lateral as a liquid, thereby ruling out alternate analyses (velar affricate, laterally-released stop) which have been proposed for similar consonants of other languages. This result contributes to our knowledge of Hiw in particular, and of Oceanic languages more generally.

However, this study may also have some more universal relevance, due to the methodological and theoretical questions it raised. Although some of the following points may already receive wide acceptance, it is perhaps useful to illustrate and support them with the new evidence provided here from Hiw, as well as from the other languages cited in the present paper.

- Given a complex segment consisting of two distinguishable phases, it is typically the case that one of these two phases is phonemically definitory while the other phase is structurally accessory, in the sense that only one phase takes part in the definition of the segment's phonological status within the system (Campbell 1974, Anderson 1976, Ewen 1982, Shaw 1989).
- Two languages may share a complex segment that is phonetically identical, yet assign it a different status within their phonological system. This paper illustrated this point with a homorganic velar consonant [g͡ʟ], consisting of {*stop* + *lateral approximant*}: in some languages, like Ekari (§6.3), the plosive phase is analysed as definitory and the lateral phase as accessory /$g^{ʟ}$/; but the situation is reversed in Hiw, where this segment was shown to pattern like a liquid /$^{g}$ʟ/. A similar situation holds for the complex segment [t͡n], which some languages treat as a *postnasalised stop* /$t^{n}$/, others as a *prestopped nasal* /$^{t}$n/ (§3.3).
- The phase which is phonemically definitory is not necessarily prominent phonetically (in terms of intensity, timing, perception, etc.). These two dimensions are two logically independent parameters, which may or may not coincide. Given such an ambiguous segment, the phonological hierarchy between its two phases (i.e. which one is definitory vs accessory) should be determined empirically, by observing how the phoneme behaves within the phonological constraints of its own system.
- There is no universal method for defining a phoneme's status, because languages differ as to what phonological constraints they treat as operational. A key criterion

in one language may be irrelevant in another (§3.4).

- Some languages may provide no way to discriminate between competing hypotheses. For example, should a system treat all obstruents identically without ever contrasting stops from fricatives, then a segment [p͡ɸ] may remain ambiguous regarding its phonemic status (stop or fricative?). Conversely, some languages may provide more than one criterion for solving a given puzzle. Ideally these criteria should coincide; but of course there is also the possibility of conflict. That is, a segment [t͡n] could be found to pattern with stops under some constraints, but as nasals under other constraints, within the same language. There is no easy way out of such a situation (see Ohala & Lorentz 1977).
- Some universal tendencies, such as the Sonority Sequencing Principle, may be fully operative in some systems, and fully irrelevant in others (cf. consonant clusters in Dorig, §4.1). Even in those languages where such a tendency proves operational, it may entail some language-specific adjustments. Thus we saw that the glide /w/ freely infringes the rules of sonority in Hiw. This does not mean that the parameter of sonority is totally irrelevant in this system, but simply that it is regularly infringed by one phoneme. Ideally, these exceptions should be accounted for in the system – for example, it seems that /w/, for structural reasons, patterns as an obstruent rather than a glide (§4.3.3.2).
- The relevance of a phonological parameter in synchrony can sometimes be confirmed by historical evidence. Thus we saw that sonority-based constraints have historically resulted in processes of metathesis and epenthesis. This active avoidance of illicit clusters confirms that the sonority hierarchy – whatever its phonetic grounding may be ultimately – is relevant in accounting for attested consonant clusters of Hiw.
- Phonotactic constraints operate on the underlying (phonemic) representation rather than on surface (phonetic) output.[35] For example, surface forms such as [mgʟe] 'wrath', [βɔkʟ̩] 'stingray', [gʟeŋw] 'harvest', [wgʟat] 'dodge', [kwgʟɵɰ] 'wooden club'…, all seem to infringe both the CCVC syllable template and the Sonority Sequencing Principle. However, these all become well-formed syllables again if one adopts a phonemic approach, and takes into account, for each complex segment, the internal hierarchy between its definitory vs accessory phases. Thus /mᶢʟe/, /βɔᶢʟ/, /ᶢʟeŋʷ/, /wᶢʟat/ and /kʷᶢʟɵɣ/ are all well-formed monosyllables within the phonotactic rules of Hiw.

In sum, languages may differ at virtually all levels in their process of categorisation – not only in how they group sounds into emic categories (phonemes) but also in the way their particular constraints group these phonemes into meta-categories (classes of phonemes). These constraints, in turn, have to be defined system-internally, even when they derive from such supposedly universal parameters as sonority. Haspelmath (2007:

[35] "The Sonority Sequencing Principle holds at deeper levels of representation than surface representation" (Clements 1990:289).

129) reminds us that "structural categories of language are language-particular, and we cannot take pre-established, *a priori* categories for granted". Such a stance does not rule out the possibility of universal generalisations, but entails that they can only be based on the empirical study of language-internal structures, and the acknowledgment of cross-linguistic diversity.

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