Hiatus resolution in the Cangin languages

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1   Hiatus resolution and consonant epenthesis

- In vowel hiatus, two vowels are directly adjacent to each other (meaning, no other material intervenes).

  - Some examples of hiatus, from Hawaiian:

    (1)   Hiatus in Hawaiian (Senturia 1998:26, via Casali 2011)
    - a.   [koana]   'space'
    - b.   [lilea]   (name of a shell)
    - c.   [kua]   'back'
    - d.   [huelo]   'tail'
    - e.   [huina]   'sum'
    - f.   [koena]   'remainder'

  - In many languages, vowel hiatus is dispreferred. Two Optimality Theoretic (Prince & Smolensky 2004) constraints are typically used to enforce this dispreference.

    (2)   **ONSET** (Prince & Smolensky 2004):
    Every syllable has an onset.

    (3)   **NOHIATUS** (Orie & Pulleyblank 1998):
    Assign one * for each adjacent pair of vowels.

  - (Why both? Because they make different predictions regarding the status of word-initial vowels!)

- There are a number of different strategies that languages use to avoid hiatus (examples via Casali 2011).

  - In **vowel deletion** (violating MAX), one of the vowels in a hiatus sequence deletes. Deletion typically targets V_1 (a in (4), but V_2 deletion also occurs.

    (4) V_1 deletion in Yoruba (Pulleyblank 1988)
    - a.   /bu ata/   →   [bata]   'pour ground pepper'
    - b.   /gé olú/   →   [gólú]   'cut mushrooms'
    - c.   /ta epo/   →   [tepo]   'sell palm oil'
    - d.   /kɔ́ ɛ̀kɔ́/   →   [kɛ́kɔ̃]   'learn'
    - e.   /ra ɔwɔ̀/   →   [rɔwɔ̀]   'buy a broom'

  - In **glide formation** (violating IDENT[±syllabic]), one of the vowels in a hiatus sequence maps to a glide. Glide formation typically targets V_1 (as in 5).

(5) Glide formation in in Ganda (Tucker 1962, Katamba 1985, Clements 1986)[1]
    a. /mu-iko/ → [mwiːko] 'trowel'
    b. /li-ato/ → [ljaːto] 'boats'
    c. /mu-ezi/ → [mweːzi] 'moon'
    d. /mu-ogezi/ → [mwoːgezi] 'talker'
    e. /mi-ezi/ → [mjeːzi] 'moons'

– In **coalescence** (violating UNIFORMITY), the two input vowels merge into a single output vowel, which retains properties of each.

(6) Coalescence in Attic Greek (de Haas 1988:126)
    a. /gene-a/ → [gé.nɛː] 'race (NOM ACC PL)'
    b. /tiːma-omen/ → [tiːmɔ̂ːmen] 'honor (1PL PRES IND)'
    c. /ajdo-a/ → [ajdɔ̂ː] 'shame (ACC SG)'
    d. /dɛːlo-ɛːte/ → [dɛlɔ̂ːte] 'manifest (2PL PRES SUB)'
    e. /zdɛː-omen/ → [zdɔ̂ːmen] 'live (1PL PRES SUB)'

– In **consonant epenthesis** (violating DEP), a consonant is inserted between the two adjacent vowels. Glides are common epenthetic consonants (as in (7)), but other options are possible…

(7) Consonant epenthesis in Washo (Midtlyng 2005)
    a. /ˈlaːdu-a/ → [ˈlaːduja] 'in my hand'
       'my hand-LOC'
    b. /leˈguʔu-iʔ/ → [leˈguʔuji] 'my daughter's child'
       '(1SG OBJ) mother's mother-ATTRIB-AG'
    c. /ˈlemts'iha-i/ → [ˈlémts'ihaji] 'I am waking him up'
       'I cause to wake-IMP'
    d. /ˈlemlu-ˈeːs-i/ → [ˈlémluˈjeːsi] 'I am not eating'
       'I eat-NEG-IMP'

• My interest here is in consonant epenthesis, and what the possible range of epenthetic consonants is.

• The general consensus is that common epenthetic consonants fall into one of two types.

– Glides ([w] and [j]), as in (7).
– Laryngeals ([ʔ] and [h]), as in (8).

(8) Glottal stop epenthesis in Malay (Ahmad 2001)
    a. /di+ubah/ → [diʔubah] 'to change (PASS)'
    b. /sə-indah/ → [səʔindah] 'to be as beautiful as'
    c. /sə-elok/ → [səʔeloʔ] 'to be as pretty as'
    d. /di-olah/ → [diʔolah] 'to beguile (PASS)'
    e. /di-aŋkat/ → [diʔaŋkat] 'to lift (PASS'

• While earlier surveys of consonant epenthesis (de Lacy 2002, Lombardi 2002) recognize a wider range of epenthetic consonants, recent work has cast doubt on the strength of this evidence.

– Staroverov (2014) and Morley (2015) conduct surveys of apparent cases of consonant epenthesis and conclude that many have alternative analyses available, or are otherwise not well-supported.

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[1]Casali (2011) also discusses diphthong formation as a hiatus resolution strategy, but it's not clear to me how this is different from glide formation. The status of this process isn't relevant here so I don't discuss it further.

> In Kaingang, the apparently epenthetic [ŋ] (Wiesemann 1968, 1972) is a fixed reduplicative segment.

> In Ajyíninka Apurucayali, [t] epenthesis can be re-analyzed as [t] deletion at suffix boundaries.

– In other cases, like Buriat (Mongolic, Staroverov 2020), apparently exotic consonant epenthesis patterns are not productive; speakers instead employ more typologically common hiatus resolution strategies.

> In Buriat, hiatus is generally resolved with velar [g] [ɣ] or uvular [ɢ] [ʁ].

> When presented with a new vowel-initial suffix, participants in a nonce word task resolved hiatus largely through vowel deletion or insertion of some consonant other than [g] (largely [r] or [l][2]).

1.1 Staroverov (2014) and the predicted typology of epenthetic consonants

• Theories of consonant epenthesis that appeal to markedness (like de Lacy 2002, Lombardi 2002) have problems, both generally and in accounting for this narrower typology (Steriade 2009, Staroverov 2014:10.3).

• One worked-out alternative comes from Staroverov (2014), whose main idea is that consonant epenthesis comes about through splitting. (Consonant insertion is presumed to be ruled out by GEN.)

(9)   Splitting vs. insertion

✓ Splitting   ✗ Insertion

Input   e   a   e   a

Output   e j   a   e   j   a
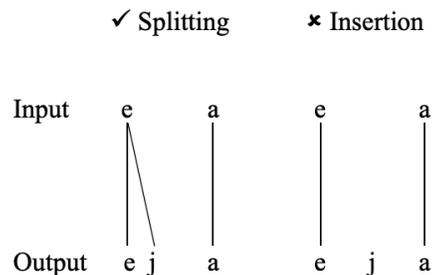
• Underlying /e/ and surface [j] stand in correspondence, so faithfulness constraints evaluate their similarity.

• The 'inserted' consonant thus has motivation to be as identical to the input vowel as is possible.

1.1.1 Glide epenthesis

• Staroverov (2014) considers a simplified version of Faroese (sources for the real pattenr: Lockwood 1977, Anderson 1972, Thráinsson et al. 2004, Árnason 2011), where glide epenthesis occurs next to high vowels.

(10)   Faorese glide epenthesis
    a.   /miː-aɹ/   →   [miːjaɹ]   'middle-PL.FEM'
    b.   /soː-m̥/   →   [soːjm̥]   'boiled'
    c.   /tʰuː-a/   →   [tʰuːwa]   'to say tú (thou)'
    d.   /kleː-i/   →   [kleːji]   'gladness'

• Splitting occurs to satisfy ONSET. Splitting results in a glide because it is featurally similar to a vowel; the only feature changed is [±syllabic].[3]

• We need a few faithfulness constraints, defined below, to get this analysis off the ground.

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[2]Staroverov (2020) attributes this to the experimental design: many of the training and filler stems ended in [r] or [l].

[3]Staroverov assumes that vowels and glides with the same [±back] value are featurally identical. I deviate from this assumption for consistency with what comes later.

(11) **MAX-SEG**:
Assign one * for each input segment that lacks an output correspondent.

(12) **UNIFORMITY (UNIF)**:
Assign one * for each output segment that has more than one input correspondent.

(13) **INTEGRITY (INTEG)**:
Assign one * for each input segment that has more than one output correspondent.

(14) **IDENT[±syllabic] (IDENT[±syll])**:
Assign one * for each input [±syllabic] segment whose output correspondent is [-αsyllabic].

- With INTEGRITY and IDENT[±syllabic] ranked low, glide epenthesis is the preferred repair.

(15) Faroese homorganic glide insertion (follows Staroverov 2014:7)

	/miː$_1$a$_2$ɹ/	ONSET	MAX-SEG	UNIF	INTEG	IDENT[±syll]
☞ a.	miː$_1$j$_1$a$_2$ɹ				*	*
b.	miː$_1$a$_2$ɹ	*!				
c.	miː$_1$ɹ		*!			
d.	miː$_{1,2}$ɹ			*!		

- In this context, insertion of any other consonant would be harmonically bounded.

  - An additional candidate [miː$_1$t$_1$a$_2$ɹ], with [t] epenthesis, would violate the same constraints as (15a), and also: IDENT[±consonantal], IDENT[±sonorant], IDENT[±voice]. . .

  - An additional candidate [miː$_1$w$_1$a$_2$ɹ], with [w] epenthesis, would violate IDENT[±back]. (This is why the 'inserted' glide agrees in [±back] with the neighboring vowel.)

- In this simplified example, epenthesis does not occur adjacent to non-high vowels.

(16) No epenthesis next to non-high vowels (Staroverov 2014:5)
   a. [ʊmrøːa]   'discussion'
   b. [leːa]   'to load'

- Incorporating the analysis of these forms requires only a few more insights.

  - Non-high glides are banned (*a̯), so it is not possible for splitting to violate only IDENT[±syllabic].

  - Satisfaction of other faithfulness constraints, i.e. IDENT[±high], is prioritized.

  - Given the ranking *a̯, [IDENT[±high] ≫ ONSET, it is better to tolerate hiatus than to try to repair it.

1.1.2 Other epenthetic consonants

- Staroverov's theory predicts that consonants less faithful to a neighboring vowel can be the result of splitting only when the more faithful consonants are unavailable (p. 12).

  ". . . it is impossible for a language to insert some consonant if a more faithful consonant is also allowed by the language-particular hierarchy in a given environment. Thus, we expect that the common epenthetic consonants will be those that share most features with the vowels. Approximants are particularly good candidates. On the other hand, non-approximant epenthesis may also arise, but only in languages where the more faithful options are blocked."

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- So, how do other epenthetic consonants arise? Some examples, with explanation:

  - In some contexts in Kalaallisut (Rischel 1974, Fortescue 1984, Rosenthal 1997), a [+back] glide is inserted before a [-back] vowel, and vice versa. (The fricative realization is for unrelated reasons.)

    (17)   Disharmonic glides in Kalaallisut (from Staroverov 2014:148)
       a. /naː-i/ → [naːvi] 'his stomach'
       b. /puː-utsiga/ → [puːjutsiga] 'my bag'

    ⊳ In Kalaallisut, homorganic glide-vowel sequences ([ji], [wu]) are prohibited.
    ⊳ Insertion of the 'wrong' glide is the next-best thing, given the language's constraint ranking.
  - In formal Farsi, glide epenthesis occurs adjacent to high vowels, and [ʔ] insertion occurs adjacent to mid and low vowels (Naderi & van Oostendorp 2011).

    (18)   Hiatus resolution in Farsi (from Staroverov 2014:135)
       a. /ʔahu-i/ → [ʔahuwi] 'a deer'
       b. /xɒne-at/ → [xɒneʔat] 'colloquial'

    ⊳ Glide insertion would be suboptimal in (18b), for reasons sketched above.
    ⊳ The idea is that laryngeals are [-high], making them featurally similar to mid and low vowels.

1.2 The P-map (Steriade 2009)

- An alternative way of looking at the preference for epenthetic glides and laryngeals comes from the observation that their insertion will induce minimal coarticulation on neighboring vowels (Steriade 2009).

- The import: these are the types of consonant epenthesis that will be the least perceptually salient.

- I don't think there's been any comparison of the predictions of featural vs. perceptual similarity, as far as consonant epenthesis is concerned. But this is fine, because I think what I'll show is a problem for both.

1.3 My contribution

- The Cangin languages are a small subgroup of Atlantic languages, spoken in Senegal.

  - **Noon** (Lopis 1980, Soukka 2000, Wane 2017)
  - **Laalaa** (Dieye 2010, Soukka & Soukka 2011)
  - **Saafi-Saafi** (Mbodj 1983, Stanton 2011, Pouye 2015, Botne et al. 2016)
  - **Palor** (D'Alton 1987, Soukka & Soukka 2011)
  - **Ndut** (Morgan 1996)

- All five languages resolve hiatus, but they do so in different ways. See Table 1 for a summary. (✓ in parentheses means that the strategy is rarely seen, or restricted to particular morphological circumstances.)

Table 1: Hiatus resolution strategies in the Cangin languages

Strategy	Noon	Laalaa	Saafi-Saafi	Palor	Ndut
vowel deletion	✓	✓	✓	✓	✓
glide formation		(✓)		✓	✓
coalescence					
glide epenthesis			(✓)		
[n] epenthesis	✓	✓	✓		

- My main goal is to convince you that [n] epenthesis occurs in Noon, Laalaa, and (maybe) Saafi-Saafi.

- I don't think this is predicted under anyone's theory of epenthesis. I'll try to convince you of this too.

2 Hiatus resolution in Noon

2.1 Noun classes and nasal epenthesis

- According to Lopis (1980), all nouns in Noon belong to one of eight classes (Table 2).

- Class markers only surface when the noun carries a definite suffix, like [-i].

Table 2: Noun classes in Noon (all data from Lopis 1980)

	Singular			Plural	
-∅	ɓet-i	'le femme'	-ɓ	ɓetëw²-ɓi	'les femmes'
-∅	terox-∅-i	'le tisserand'	-c	terox-c-i	'les tisserands'
	paːmn-∅-i	'le père'		paːmën-c-i	'les pères'
	ŋelem-∅-i	'le chameau'		ŋelem-c-i	'les chameaux'
-m	meːk-m-i	'le urine'	-c	meːk-c-i	'les urines'
	mboːs-m-i	'la bière'		mboːs-c-i	'les bières'
	malej-m-i	'le sable'		malej-c-i	'les sables'
-f	coːx-f-i	'l'éléphant'	-c	coːx-c-i	'les éléphants'
	faraːf-f-i	'le cadavre'		faraːf-c-i	'les cadavres'
	perem-f-i	'la langue'		perem-c-i	'les langues'
-n	kiː-n-i	'le palmier'	-c	kiː-c-i	'les palmiers'
	guro-n-i	'le kolatier'		guro-c-i	'les kolatiers'
	soːsla-n-i	'la froideur'		soːsla-c-i	'les froideurs'
-p	pUr-p-i	'la feuille'	-t	tUr-t-i	'les feuilles'
	poːx-p-i	'le mil'		toːx-t-i	'les (tas de) mil'
	pëltëk-p-i	'le fil'		tëltëk-t-i	'les fils'
-k	kumun-k-i	'le nez'	-t	tumun-t-i	'les nez'
	kan-k-i	'la calebasse'		tan-t-i	'les calebasses'
	katas-k-i	'le canari'		tatas-t-i	'les canaris'
-ɟ	ɟokor-ɟ-i	'le petit pilon'	-t	tokor-t-i	'les petits pilons'
	ɟokon-ɟ-i	'le doigt'		tokon-t-i	'les doigts'

- Class membership is mostly determined by the identity of the noun's first consonant, though in some cases semantic considerations also play a role.

  - The [m/c] class is home to mass nouns or those denoting liquids. Almost all begin with [m].
  - The [f/c] class consists of nouns denoting animals and many others beginning with [f].
  - The [p/t] class consists of nouns whose initial segment alternates between [p] and [t].
  - The [k/t] class consists of nouns whose initial segment alternates between [k] and [t].
  - The [nj/t] class consists of nouns whose initial segment alternates between [nj] and [t].

- The two classes don't have any clear correlate are the [∅/c] class and the [n/c] class.

- The [∅/c] class consists of: names, relations, body parts, loans, and other assorted nouns.
- The [n/c] class is similarly diverse, and exhibits no preference for [n]-initial words.

- These two classes house complementary sets of nouns: all words in the [∅/c] class are consonant-final, and all words in the [n/c] class are vowel-final.[4]

- **Hypothesis** (Soukka 2000, Wane 2017): the [∅/c] and [n/c] classes are really the same noun class.

  - In Table 2, [n] epenthesis occurs when [-i] is suffixed to a vowel-final member of the [∅/c] class.
  - The [∅/c] class is the 'default' class; there are no criteria for membership.

2.2 Further morphological evidence consistent with unified [∅/c], [n/c]

- Agreement phenomena with the [∅/c] and [n/c] classes are the same. I'll go through two examples here, but I don't know of exceptions.

- The [∅/c] and [n/c] classes share sets of pronouns.

  - Substitutive pronouns replace an NP; examples are in (19).

    (19)   Substitutive pronouns in Noon (from Soukka 2000)
    a.   Implicit noun: [túʃ] 'hut' ([∅/c] class)
          wa mor-in   'it is nice'
          it$_{[∅/c]}$ be.nice-PERF
          mi hot **wa**   'I see it'
          I see it$_{[∅/c]}$
    b.   Implicit noun: [kedik] 'tree' ([k/c] class)
          ki hoːr-in   'it is high'
          it$_{[k/c]}$ be.high-PERF
          ja lap **ka**   's/he climbs it'
          s/he climb it$_{[k/c]}$

  - Most noun classes are associated with their own substitutive pronoun, but the [∅/c] and [n/c] class share. (There is a further set of animate pronouns, as well as a locative. These aren't included here.)

    (20)   Summary of substitutive pronouns

	subject				object	
class	singular		plural		sg.	pl.
	PO.1	PO.3	PO.1	PO.3		
[∅/c]	wi	wa	ci	ca	wa	ca
[n/c]	wi	wa	ci	ca	wa	ca
[f/c]	fi	fa	ci	ca	fa	ca
[m/c]	mi	ma	ci	ca	ma	ca
[k/t]	ki	ka	ti	ta	ka	ta
[p/t]	pi	pa	ti	ta	pa	ta
[ɟ/t]	ɟi	ɟa	ti	ta	ɟa	ta

  - As far as I can tell, all pronouns display similar behavior: nouns of the [∅/c] and [n/c] class share.

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[4]With the exception, only in Lopis (1980), of [oːmax] 'child'. In other sources, this word is vowel-final

- Adjectives within the noun phrase agree with the head noun for class and other properties.

  - When the head noun is definite, the adjective displays two agreement markers.

    (21)   Adjective agreement in Noon
            [waːs-um **wi**-jak-**wum**]   'the big road (near you)'   [∅/c]
            [kedik-kiː **ki**-sewiɲ-**kiː**]   'the thin tree (here)'   [k/c]

  - Adjectives agreeing with [∅/c] and [n/c] nouns have the same agreement markers: they start with [w].

2.3   Evidence from other morphological contexts

- Soukka (2000) states that epenthesis occurs any time a vowel-initial suffix is added to a vowel-final stem. My search of Soukka (2000), Lopis (1980), and Wane (2017) bears this out: I haven't found an exception.

  - The **vocative** can appear as [-oː] or [-n-o].

    (22)   a.   [maː   jiːj-**oː**]
                  PTC.Q mother-VOC
                  'Say, mother?'
            b.   [mbok-ciː-**n-ó**ː]
                  relatives-DEF-N-VOC
                  'brothers and sisters!' (lit: 'family members')
            c.   [mati-**n-o**ː]
                  woman's.name-VOC
                  'Mati!'

  - The **proximal deictic** can appear as [-iː] or [-n-iː] (for the [∅/c] and [n/c] classes only)

    (23)   a.   [hal-**i**ː]
                  door-DEICT.PROX
                  'this door'
            b.   [fë hot-ën   oto-**n-i**ː   wiː]
                  2SG voir-par auto-N-∅:DEICT.PROX w:DEM-∅:DEICT.PROX
                  'tu as vu cette voiture'
            c.   [oːma-**n-i**ː   jë-ɲof-jiː]
                  enfant-N-∅:DEICT.PROX y:JONC-être.bon-y:∅:DEICT.PROX
                  'le gentil enfant'

  - The **distal deictic** can appear as [-aː] or [-n-aː] (for the [∅/c] and [n/c] classes only)

    (24)   a.   [hal-**a**ː]
                  door-DEICT.DIST
                  'that door' (far from speaker and listener)
            b.   [oːma-**n-a**ː   kar-ën]
                  enfant-N-∅:DEICT.DIST partir-PARF
                  'l'enfant est parti'

– The **conditional** can appear as [-aː] or [-n-aː].

(25) a. [fë paːs-**aː**   kaj laːk-siːs-soː   ɲariɲ]
          2SG enlever-COND EMPH avoir-ITER-NEG utilité
          Si tu l'enlèves alors il n'y aura plus d'efficacité
      b. [fë nup-piː-**n-aː**   fë ap-pë]
          2SG courir-NEG-N-COND 2SG tuer-O2SG
          'si tu ne cours pas il te tuera'
      c. [fu an   músú-**n-aː**]
          you drink water-SUB
          'If/when you drink water…'

– The **perfect** can appear as [-ën] or [-n-ën].

(26) a. [awa mbec-**ën**   mbes kanak]
          awa danser-PARF jour   deux
          'Awa a dansé deux fois.'
      b. [ɓet-iː   ɲíːl-eː-**n-ën**]
          femme-∅DEICT.PROX être.malade-PAS-N-PARF
          'la femme est malade.'
      c. [ɓeti-caː   toːn-uː-**n-ën**   pe-caː]
          femme-cː DEICT.DIST vendre-PL-N-PARF chèvre-cː DEICT.DIST
          'les femmes ont vendu les chèvres'

– The **polar question marker** can appear as [-e] or[-n-e].

(27) a. [fë kar-an   dakar-**e**]
          2SG partir-FUT dakar-PI
          'Partiras-tu à Dakar?'
      b. [ɓë haj kë-lom   mbaːl-iː-**n-e**]
          ɓː 3PL venir INF-acheter mouton-∅ː DEICT.PROX-N-PI
          'est-ce qu'ils achèteront le mouton?'
      c. [noh-iː tam-oː-**n-e**]
          sun-DEF be.hot-PRES.NEG-N-PQ
          'Isn't the sun hot?'
      d. [fu hot-in   mati-**n-e**]
          you see+PERF mati-PQ
          'Have you seen Mati?'

– The **singular imperative** marker can appear as [-aː] or [-n-aː].

(28) a. [acːa ɲam-**aː**]
          INTJ manger-IMPER.SG
          'Maintenant, mange!'
      b. [fë nup-piː-**n-aː**   fë ap-paː]
          2SG courir-NEG-N-IMPER.SG 2SG tuer-O2SG
          'si tu ne cours pas il te tuera'

– The **'or' conjunction** can appear as [-oː] or [-n-oː].

    (29)   a.   [ɓet-**oː**   ʃaːl]
                  woman-OR man
                  'Woman or man?'

            b.   [fu   dëk padeː-**n-oː**   caːɲaːk]
                  you(SG) live fandène-N-OR thiès
                  'Do you live in Fandène or Thiès?'

            c.   [ɗi   ʃah ki-lom tohoː-**n-oː** maːlu]
                  we.EXCL go INF-buy millet-N-OR rice
                  'We are going to buy millet or rice.'

- Why all of these examples?

  – If [n] epenthesis occurred only adjacent to one or two morphemes, an alternative analysis appealing to phonologically conditioned allomorphy, and not epenthesis, might be appropriate.

  – However, as [n] epenthesis applies adjacent to all vowel-initial morphemes, it seems more likely that it serves a more general phonological purpose: to resolve hiatus.

2.4   Epenthesis, not deletion

- Another possible interpretation of the data seen thus far is that [n] is not epenthesized, but rather deleted adjacent to a consonant.

  – Under this interpretation, all 'vowel-initial' suffixes are actually [n]-initial, as in (52).

    (30)   Re-interpretation of nasal epenthesis data
            a.   /hal+**niː**/ → [hal-iː] 'this door'
            b.   /oto+**niː**/ → [oto-niː] 'this car'

  – This would require us to claim that a large number of Noon's suffixes are [n]-initial! Granting that. . .

- There are two reasons to doubt that this reinterpretation is correct.

  – Noon has consonant-initial suffixes. Two, [-neː] and [-naːs], are [n]-initial; they denote a distal function of the verb. The [n] is realized even when the suffixes are attached to a consonant-final stem.[5]

    (31)   Distal [-neː] attaches to vowel- and consonant-final stems (Soukka 2000)

            a.   [mi mi dëk kaːn-fa   fú-**neː**]
                I   I   live house-DEF DEM(PO.3.SP)-DIST
                'Me, I live in the house over there'

            b.   [mi ʃah padeː   kuwis   kikaːl-s-uk-**neː**]
                I   go fandène tomorrow INF-hunt-INT-REFL-DIST
                'I go to Fandéne tomorrow to go hunting'

            c.   [mi kar-in   ki-jaŋ-**neː**   ga dëk wiliːs]
                I   leave-PERF INF-study-DIST in town other
                'I have gone to study in another town'

---

[5]One could try to argue that [-neː] and [-naːs] (and not the alternating suffixes) have invariant forms not because of a difference in their representations, but because the distal/andative suffixes are not as 'close' to the stem as those that alternate. But this won't work: the polar question marker, for example, is phrase-final (probably a clitic?), and it alternates.

d. [mi ʃah ki-kënɗ-oh-**neː**]
    I   go INF-greet-DUR-DIST
    'I'm going to greet (people)'

e. [ja ɟom   ki-heːl-**neː** soːkoːɲ]
    s/he should(AUX) INF-get-DIST firewood
    'She should go to get firewood'

(32)   Distal [-naːs] attaches to consonant-final stems (Wane 2017)

a. [peʔ-fiː   ʃah kë-pok-**naːs**-ës]
    chèvre-f:DEICT.PROX aller INF-attacher-AND-PASS
    'La chèvre va être attachée'

b. [koːʔ-**naːs**-ë   eːj haj kë-kaʔ]
    élever-AND-IMPER.SG oui venir INF-partir
    'Va soulever! Oui, il va partir.'

– Within the stem, consonant clusters with [n] as a second member are created through syncope (33a-b).

– Syncope does not ignore phonotactic constraints; it cannot create a triconsonantal cluster (33c).

(33)   Syncope in Noon
    a. /moro**mën**-i/   → [moro**mn**-i]   'le camarade'
    b. /eː**wën**-i/   → [eː**wn**-i]   'la mère'
    c. /moromën-c-i/ → [moromën-c-i] 'les camarades' (*moromn-c-i)

• The ability of [n] to appear post-consonantally (without apparent restrictions) makes it unlikely, I think, that the alternations discussed above are reflective of deletion.

2.5 Sketch of an analysis

• The markedness constraint compelling hiatus resolution in Noon is likely ONSET, or something like it: words must begin with a consonant (Soukka 2000:59).

(34)   **ONSET**:
    Every syllable has an onset.
    (Or, in string-based terms: assign one * for each vowel not directly preceded by a consonant.)

• To reflect the fact that [n] epenthesis is the preferred hiatus resolution strategy, all other relevant faithfulness constraints (35-37) must dominate DEP-SEG (38).

(35)   **MAX-SEG**:
    Assign one * for each input segment that lacks an output correspondent.

(36)   **IDENT[±syllabic] (IDENT[±syll])**:
    Assign one * for each [αsyllabic] input segment whose output correspondent is [-αsyllabic].

(37)   **UNIFORMITY**:
    Assign one * for each output segment that corresponds to more than one input segment.

(38)   **DEP-SEG**:
    Assign one * for each output segment that lacks an input correspondent.

• These are the only crucial rankings. A tableau (39) demonstrates.

(39) Deriving consonant epenthesis in Noon (/guro+i/ → [guroni], 'le kolatier')

/guro$_1$-i$_2$/	ONSET	MAX-SEG	IDENT[±syll]	UNIFORMITY	DEP-SEG
a. [guro$_1$i$_2$]	*!				
b. [guri$_2$]		*!			
c. [gurw$_1$i$_2$]			*!		
d. [gure$_{1,2}$]				*!	
☞ e. [guro$_1$n$_3$i$_2$]					*

- But there's a question lurking here: why is [n] Noon's epenthetic segment of choice? Why doesn't it avail itself of one of the more common options, like [j] or [w] or [h] or [ʔ]?

  – One possible but wrong answer could be that intervocalic glides and laryngeals are prohibited.

  (40) Intervocalic [j] in Noon
      a. [pa**j**-iː]   'la guérison, la divination'
      b. [pa**j**oh]   'devin'

  (41) Intervocalic [w] in Noon
      a. [ku**w**is]   'demain'
      b. [ko**w**u-kiː]   'l'enfant'

  (42) Intervocalic [h] in Noon
      a. [zan an-o**h**-iː]   'Jean est l'ivrogne'
         Jean boire-AG-∅:DEICT.PROX
      b. [oːmaː-c-aː heːɲ-o**h**-o**h**-ës në ndoʔ]   'Les enfants se battent avec des bâtons'
         enfants-c:DEICT.DIST battre-RECIPR-APPL-PL avec bâton

  (43) Intervocalic [ʔ] Noon
      a. [ɓoː**ʔ**-aː]   'la personne'
         personne-∅:DEICT.DIST
      b. [kowu-kiː wo**ʔ**-oː]   'L'enfant ne parle pas'
         k:enfant-k:DEICT.PROX parler-NEG

  – The approximants [r] and [l] can also occur between vowels, without apparent restrictions.

  (44) Intervocalic [r] in Noon
      a. [jíːnóː ŋë-**r**íː kar-ën]   'Un parmi nous est parti'
         j:un PREP-O1PL.EXCL partir-PARF
      b. [mo**r**oːm]   'ami'

  (45) Intervocalic [l] in Noon
      a. [mbi**l**im]   'mbilim (game, music?)'
      b. [ɓë haj kë-**l**om mbaːl-iː-n-e]   'Est-ce qu'ils achèteront le mouton?'
         ɓ:3PL venir INF-acheter mouton-∅DEICT.PROX-N-PI

  – Another possible but I think unlikely answer is that [n] is the most similar consonant to a vowel.

  ▷ Featurally (following Staroverov 2014): I don't see any possible way in which [n] is featurally closer to [i], for example, than [j] is.

  ▷ Perceptually (following Steriade 2009): nasals like [n] typically nasalize surrounding vowels, which is possibly pretty salient (though, of course, I haven't verified this).

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- For now I analyze this preference using a ranked set of DEP-SEG constraints (following Steriade 2009). I assume that DEP-SEG[ʔ], DEP-SEG[h] and the like (46-50) penalize insertion of the named segments.

(46) **DEP-SEG[j]:**
Assign one * for each output [j] that lacks an input correspondent.

(47) **DEP-SEG[w]:**
Assign one * for each output [w] that lacks an input correspondent.

(48) **DEP-SEG[ʔ]:**
Assign one * for each output [ʔ] that lacks an input correspondent.

(49) **DEP-SEG[h]:**
Assign one * for each output [h] that lacks an input correspondent.

(50) **DEP-SEG[n]:**
Assign one * for each output [n] that lacks an input correspondent.

- To derive [n] epenthesis, DEP-SEG[n] must be ranked below the rest of the DEP-SEG constraints.

(51) Deriving [n] epenthesis in Noon (/guro+i/ → [guroni], 'le kolatier')

/guro+i/		DEP-SEG[j]	DEP-SEG[w]	DEP-SEG[ʔ]	DEP-SEG[h]	DEP-SEG[n]
a.	[guroji]	*!				
b.	[gurowi]		*!			
c.	[guroʔi]			*!		
d.	[gurohi]				*!	
☞ e.	[guroni]					*

- I don't like this solution, but at present, I don't have anything more insightful.

2.6 Complications

- There are several exceptions to the generalization that hiatus in Noon is resolved through [n] epenthesis.

  – Soukka (2000) notes that when the stem ends in a short vowel, it is more common for that vowel to be deleted than it is for [n] epenthesis to occur (though there is variation).[6]

    (52) Hiatus resolution through vowel deletion
    a. /mati-ó:/ → [mató:] 'Mati-VOC'
    b. /ko:ni-i:/ → [ko:ni:] 'the palm fruit'
    c. /ʔotu-i:/ → [ʔoti:] 'the car'

  – When a vowel-final suffix is added to a verb ending with the distal [-ne:], the distal's [e:] is deleted.

    (53) Deletion of the distal marker's vowel
    a. /lom-ne:-a:/ → [lomna:] 'go and buy!'
       buy-DIST-IMP
    b. /he:l-ne:-a: mi:s/ → [he:lna: mi:s] 'go and get milk!'
       get-DIST-IMP milk

---

[6]This isn't echoed in the other descriptions, and [n]-epenthesis following short vowels is transcribed. Perhaps the dialects differ. Soukka (2000) also notes that root-final short vowels are very uncommon and are limited to [+high] vowels.

- The data in (52) point to a possible reinterpretation of the data: [n] epenthesis applies only when the first vowel is long. Otherwise, the first vowel in the hiatus sequence deletes.

- One possible way of implementing this idea would, informally, look like this:

  – Vowel deletion is the preferred strategy for hiatus resolution in Noon.

  – However, long vowels cannot delete.

  – Consonant epenthesis is the next-best strategy for hiatus resolution. So in cases where vowel deletion is impossible (i.e. when the vowel targeted for deletion is long), an [n] is inserted to resolve hiatus.

- I'll save formalization of this analysis for hiatus resolution in Laalaa, where it is more obviously correct.

3   Hiatus resolution in Laalaa

- Laalaa (like Noon) resolves hiatus at least in part through [n] epenthesis. However, the distribution of [n] epenthesis in Laalaa may be more limited.

- Soukka & Soukka (2011) claim that epenthesis occurs variably when a stem-final long vowel is followed by one of the four vowel-initial suffixes in (54).

  (54)   Suffixes conditioning insertion in Laalaa (Soukka & Soukka 2011:50)
          Suffix   Function
       a. [-e]   question totale
       b. [-aː]   subordonnation
       c. [-oː]   énumération
       d. [-aː], [-am], [-iː] article défini

- The description by Dieye (2010) differs by treating epenthesis as categorical and language-wide; in other words, it is not limited to the morphological contexts in (54).

3.1   Noun classes, agreement, and nasal epenthesis

- Nouns in Laalaa can belong to one of seven classes: [∅/ɓ], [∅/c], [n/c], [m/c], [f/c], [p/t], [k/t], [ɟ/t]. These are the same noun classes that are found in Noon and membership is determined similarly.

- The evidence for an epenthetic [n] from this domain is more or less identical to what we found in Noon.

  – For most noun classes, the class marker is realized on the head noun and its modifiers (Table 3).

  – The [∅/c] and [n/c] classes behave differently. The agreement marker for both classes is [w], but the head noun is never marked itself with [w].

  ⊳ If the noun is consonant-final, there is no overt class marker.

    (55)   Examples of the [∅/c] class
         a. taːb-a   waːs-**iː**   w-i   jítúːt-w-iː
            suivre-INJ chemin-DEM1 CL2-REL être.petit-CL2-DEM1
            'suis le court chemin'
         b. oːmah-**iː** w-e   mariʔ   w-iː
            enfant   CL2-DEM1 CL2-REL être.beau CL2-DEM1
            'le bel enfant-ci'

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Table 3: Noun class agreement in Laalaa (from Dieye 2010)

Noun class	Example
[j/ɓ]	—[7]
[m/c]	miːs-m-aː m-úːní lait-CL3-DEM2 CL3-DEM3 'le lait là-bas'
[f/c]	peʔ-f-iː f-e jaːnaːw-f-iː chèvre-CL4-DEM1 CL4-REL être.beau-CL4-DEM1 'la chèvre blanche ci'
[p/t]	pëlkít-p-e jaːnaːw-p-iː fil CL7-REL être.blanc-CL7-DEM1 'le fil blanc'
[k/t]	keːloːkaː ke as kaː CL5-canari CL5-DEM2 CL5-REL être.neuf-CL5-DEM2 'le nouveau canari'
[ɟ/t]	ɟokon-ɟ-e ɟítúːt-ɟ-iː doigt CL6-REL être.petit CL6-DEM1 'le petit doigt'

⊃ If the noun is vowel-final, [n] appears in the class marker's position.

(56) Examples of the [n/c] class

    a. [nofaː-**n-aː**   w-íːde]
     oreille-N-DEM2 CL2-quel
     'quelle oreille?'

    b. [jaː baːɟiː-**n-**iː   hadoh ciːcër ɓeːɓ]
     FOC huile-N-DEM1 amener DEM tout
     'c'est l'huile qui donne tout ceux-ci'

• The [n] only appears when the noun ends with a long vowel. If the noun ends with a short vowel, the demonstrative is suffixed directly (example from Dieye 2010).

(57) [saliou ɲam-í   ceːp na   kúdú-**i**]
     saliou manger-PST riz PREP cuillère-DEM1
     'Saliou avait mangé du riz avec la cuillère'

• The idea: a class marker generally breaks hiatus when a vowel-final noun meets a determiner. But the [∅] class, the class marker is absent, so a default [n] is inserted instead. [∅/c] and [n/c] are one big class!

3.2 Other morphological contexts

• Other grammatical markers behave similarly to one another, in that they have vowel-initial allomorphs after consonant-final words and [n]-initial allomorphs after stems that end in a long vowel. My list so far:

---

[7]The [j] is deleted after consonant-final nouns. I can't find a noun phrase with modifiers where the head noun is vowel-final.

– The **polar question** marker is [-n-e] after a word ending in a (long) vowel and [-e] otherwise.

(58) a. [fu   en marir-**e**]
          S.2SG être en.paix-Q
          'es-tu en paix ?'
      b. [fu   juː   liːs diː-**n-e**]
          S.3.SG. C11-DEM1 rester ici-N-Q
          'tu es resté là ?'

– The **subordination** marker is [-n-aː] after a word ending in a (long) vowel and [-aː] otherwise.

(59) a. [me laːk xëːlis-**aː**   me lom-an   togah-c-aː]
          S.1SG avoir argent-HYP S.1SG acheter-FUT chaussures-CL9-DEM2
          'Si j'ai de l'argent, j'achèterai les chaussures'
      b. [Fu   hot kuː-soː-**n-aː**   er-a-re   kó:déːr-aː]
          S.2SG voir fils-POSS.1SG-N-HYP donner-INJ-O.3.SG marmite-CL2-DEM2
          'Si tu vois mon fils, donne lui la marmite'

– The **perfect** marker is [-n-en] after a word ending in a (long) vowel and [-en] otherwise.

(60) a. [ʃaːl-aː   keːn-**en**]
          homme-DEM2 tomber-PFT
          'l'homme est tombé'
      b. [enoh-f-aː   ap-u:-**n-un**][8]
          vache-CL4-DEM tuer-PASS-PFT
          'la vache a été tué'

• As with the nominal modifiers, no [n] appears if the suffix attaches to a word ending in a short vowel.

(61) [ɓe-a-re   lak fo   hotː-e-**a**]
      appeler-INJ-O.3SG si   O.2SG voir-O.3SG-HYP
      'Appelle-le, si tu le vois'

3.3   Short hiatus sequences

• While Dieye (2010) transcribes hiatus sequences if the first vowel is short, discussion in both sources suggests that these short hiatus sequences are also resolved.

– In most contexts, the first vowel deletes, with the second vowel retaining its length. (Soukka & Soukka 2011 note that this is most common when /a/ precedes /ë/.)

(62) Total assimilation in VV sequences
      a. /loːɓːa-e/   → [loːɓːeː]   'tas de bois + question'
      b. /faːdːa-in/ → [faːdːiːn]   '(il) a fait un croche-pied'
      c. /ŋalaɓ-e/   → [ŋaleː]   '(il) prend habituellement'
      d. /jélːë-in/   → [jélːiːn]   '(il) a lancé à l'autre côté'
      e. /jabːo-e/   → [jabeː], [jabːoe] 'nuage?'

---

[8]The perfect's vowel is [u] because the previous vowel is [u]. See Dieye 2010:194.

- There is one example, provided by Dieye (2010), where the second vowel deletes instead: /wɔː+us/ → [wɔːs] ('appeler-PASS'). My guess is that the second vowel deletes because the first vowel is long.

- Glide formation can occur, though it is not clear to me how general this is.
    - ⊳ Soukka & Soukka (2011) note that, in hiatus contexts, the suffixal vowel will sometimes map to a glide (e.g. /naː+i/ → [naːi], [naːj] 'le puits').
    - ⊳ Dieye (2010) notes a few other contexts for gliding, including in hiatus sequences where the first vowel is [+round] (/goat/ → [gwat] 'couteau').

- For an analysis, I make a simplifying assumption: in short hiatus sequences, the first vowel deletes.

3.4 Sketch of an analysis

- The pattern, in summary:

    - When the first vowel is short, hiatus is resolved through deletion of the first vowel. The second vowel retains the first vowel's length.

    - When the first vowel is long, hiatus is resolved through [n] epenthesis.

- I'll start with the short hiatus sequences. The analysis of these assumes that vowel deletion is the preferred strategy for hiatus resolution; MAX-SEG is the lowest-ranked faithfulness constraint.

- This analysis must also explain why the second vowel lengthens in response to the first's deletion. I assume it's because MAX-μ is undominated: deleting features is okay, but deleting a timing unit is not.

(63) **MAX-μ:**
      Assign one * for each output mora that lacks an input correspondent.

    - In this analysis, I omit IDENT[±syll], UNIFORMITY, and candidates that violate them.
    - I also assume that the deleted vowel's mora must reassociate to the neighboring vowel.

- With this addition, we can derive hiatus resolution through vowel deletion.

(64) Deriving vowel deletion in Laalaa (/loːbːa-e/ → [loːbːeː], 'tas de bois?')

/loːbːa+e/	ONSET	MAX-μ	DEP-SEG	MAX-SEG
a. [loːbːae]	*!			
b. [loːbːe]		*!		*
c. [lobːane]			*!	
☞ d. [loːbːeː]				*

- Now, the task is to explain why [n] epenthesis occurs when the first vowel is long.

- I attribute this to the activity of MAX-μ, as well as a new constraint banning extra-long vowels (65).

(65) *$\mu\mu\mu$:
      Assign one * for any output segment associated with three (or more) moras.

    - It is impossible to both resolve hiatus and retain the number of moras that the hiatus sequence possesses.
    - The best solution is to appeal to another repair strategy: in this case, [n] epenthesis.

- To achieve the intended effect, $*\mu\mu\mu$ must dominate MAX-μ. MAX-μ must, in turn, dominate DEP-SEG, as inserting a consonant (66d) is preferable to losing moras (66c).

(66)   Deriving nasal epenthesis in Laalaa (/baːgiː-iː/ → [baːgiːniː], 'l'huile')

/baːgi+iː/	ONSET	$*\mu\mu\mu$	MAX-μ	DEP-SEG	MAX-SEG
a. [baːgiːiː]	*!				
b. [baːgiːː]		*!			
c. [baːgiː]			*!		*
☞ d. [baːgiːniː]				*	*

- Faithfulness constraints penalizing other repair strategies, like IDENT[±syllabic] and UNIFORMITY, must also dominate DEP-SEG, to explain why they do not occur.

- This analysis makes a prediction: in hiatus sequences where the first vowel is short and the second vowel is long, [n] epenthesis must also occur.

  – Why? Because saving the mora associated with the short vowel would violate $*\mu\mu\mu$.

  – I don't know yet whether or not this is the right prediction; cases of this sort are apparently rare.

  – If it is incorrect, then the preference for [n] epenthesis after long vowels could be due to a faithfulness constraint penalizing mora deletion from long vowels (or, just, deletion of long vowels).

- As with Noon, there is no apparent reason as to why [n] should be the epenthetic consonant: there are available consonants more similar to vowels (data from Soukka & Soukka 2011 and Dieye 2010).

  – There are no (apparent) relevant phonotactic restrictions on glides.

    (67)   Intervocalic [j] in Laalaa
           a.   loji   'le noeud de tissu pour garder des choses (ici)'
           b.   kajoːn   'apprendre'

    (68)   Intervocalic [w] in Laalaa
           a.   maːwiː   'la dernière feuille sur le rônier'
           b.   kawot   'emprunter'

  – There are also no (apparent) relevant phonotactic restrictions on laryngeals.

    (69)   Intervocalic [h] in Laalaa
           a.   tahiː   'le bâtiment'
           b.   kahot   'voir'

    (70)   Intervocalic [ʔ] in Laalaa
           a.   peʔe   'un chèvre'
           b.   ɓoʔoː   'mon homme'

  – I haven't found any relevant restrictions targeting approximants, either.

3.5   Alternatives

- I don't currently have any evidence that [n] can be the second member of a consonant cluster. So, at this point, a deletion analysis is viable.

  – It would be a strange analysis, though: the [n] would have to delete after consonants and short vowels.

– Why delete after a short vowel and create a hiatus sequence (that is then resolved in another way)?

- I am hopeful, though, that this lack of evidence reflects the project's early stage.

    – I don't know yet if Laalaa has a cognate to Noon's distal [-neː] and [-naːs].

    – Like Noon, Laalaa has syncope that results in consonant clusters. I haven't yet found a case where syncope results in a cluster involving [n], but this could just be because I haven't found it yet!

4 Hiatus resolution in Saafi-Saafi

- I'm skipping this, because I suspect we won't have time; details and analysis in the appendix.

- Why skip this one? It's less clear to me that [n] epenthesis is a general hiatus resolution strategy. This is due to independent facts about Saafi's lexicon; it is harder to create a hiatus sequence.

5 Hiatus resolution in Ndut and Palor

5.1 Hiatus resolution in Ndut

- Hiatus resolution in Ndut looks quite different than hiatus resolution in Noon and Laalaa: there is no [n] epenthesis. The generalizations below are from Gueye (1980) via Morgan (1996).

- In a hiatus sequence where the first vowel is short, the first vowel is deleted.

(71) Vowel deletion in Ndut (Morgan 1996:17)
   a. /wa-aj paj/   →   [waj paj]   'they will go' (they-will.go)
   b. /mi-aj paj/   →   [maj paj]   'I will go' (I-will go)
   c. /mi-ot/   →   [mot]   'I see' (I-see)
   d. /mi-iː paj/   →   [miː paj]   'I will not go' (I-NEGFUT go)
   e. /fu-iː paj/   →   [fiː paj]   'you will not go' (you-NEGFUT go)

- In a hiatus sequence where the first vowel is long, it shortens. A glide develops between the vowels, its quality depending on the backness of the second vowel.

(72) Vowel shortening and gliding in Ndut (Morgan 1996:17).
   a. /loː-U/   → [lowu]   'your stomach' (stomach-your)
   b. /loː-I/   → [loji]   'his stomach' (stomach-his)

- Hiatus resolution is variable, and its application depends to some extent on the type of morphological boundary that the hiatus sequence spans. It is more frequent across 'closer' suffixes, like those in (72).

5.1.1 Sketch of an analysis

- One way to interpret the data in (72) is that the long vowel sacrifices part of itself to resolve hiatus.

    – Under this analysis, the hiatus resolution strategy in (72) is splitting: $/o\text{ː}_1/ \rightarrow [o_1 w_1]$ or $[o_1 j_1]$.

    – It is better for half of the vowel to violate IDENT[±syllabic] than it is to violate ONSET.

- But then we have to understand why a short vowel does not map to a glide.

- I will assume here that this is because IDENT[±syllabic] prohibits glide formation.
  - ⊳ An alternative: glide formation in this context would create a consonant cluster, which is dispreferred.
  - ⊳ Ndut phonology isn't described well enough for me to know if this is correct. Available evidence suggests it's not: Ndut, like the other Cangin languages, has syncope targeting stressless vowels.

  (73) Syncope in Ndut (Morgan 1996:20)
    a. /ki**lik**-a/ → [ki**lk**-a] 'the tree'
    b. /ga**wa-f**-a/ → [ga**wf**-a] 'the grass'
    c. /hú**lúɓ**-a/ → [hú**lb**-ë] 'the ravine'

- The distribution of glide formation suggests that IDENT[±syllabic] is existentially defined (74): it is fine for part, but not all, of a segment to violate IDENT[±syllabic].

  (74) ∃-**IDENT[±syllabic]** (∃-**IDENT[±syll]**) (after Struijke 2002:33):
       Assign one * if all output correspondents of a [αsyllabic] input segment are [-αsyllabic].

- I will assume, for an analysis, that splitting with glide formation is the preferred strategy to resolve hiatus, and that vowel deletion kicks in when this strategy is not available.

- This translates to a ranking among faithfulness constraints:

  (75) Partial ranking of faithfulness constraints for Ndut
       ∃-IDENT[±syllabic], UNIFORMITY (and others) ≫ MAX-SEG ≫ INTEGRITY

- This constraint ranking ensures that when the first vowel is long, splitting and gliding occur.

  (76) Splitting and gliding with a long first vowel

		/loː$_1$-U$_2$/	ONSET	∃-IDENT[±syllabic]	UNIF	MAX-SEG	INTEG
☞	a.	[lo$_1$w$_1$u$_2$]					*
	b.	[loː$_1$uts2]	*!				
	c.	[lw$_1$u$_2$]		*!			
	d.	[luː$_{1,2}$]			*!		
	e.	[lu$_2$]				*!	

- When the first vowel is short, gliding is not possible, so vowel deletion is the next best choice.

  (77) Vowel deletion with a short vowel

		/mi$_1$-o$_2$t/	ONSET	∃-IDENT[±syllabic]	UNIF	MAX-SEG	INTEG
	a.	[mj$_1$o$_2$t]		*!			*
	b.	[mi$_1$o$_2$t]	*!				
	d.	[me$_{1,2}$t]			*!		
☞	e.	[mo$_2$t]				*	

- A question: why can't a short vowel split into two pieces (so, /mi$_1$-o$_2$t/ → *[mi$_1$j$_1$o$_2$t])? Relatedly: why does the long vowel shorten when part of it maps to a glide (why not /loː$_1$-U$_2$/ → *[loː$_1$w$_1$u$_2$])?

  - One possible explanation is that creating a new timing slot is forbidden. Creation of a new segment is only possible if it occupies an already-present timing slot.
  - If glides are moraic, we could enforce this with high-ranked DEP-μ.

(78) **DEP-**μ:
Assign one * for each output mora that lacks an input correspondent.

- – Otherwise, we could appeal to a sort of chain shift, but I don't know entirely how this would work.
  - ⊳ In hiatus, short vowels delete.
  - ⊳ In hiatus, long vowels can't delete. But they can shorten, and then glide insertion resolves hiatus.
  - ⊳ The trick here would be to figure out what motivates shortening.

5.1.2 Zooming out: larger differences between Ndut and Noon/Laalaa

- If [n] epenthesis is responsible for the apparent cases of allomorphy in Noon and Laalaa, then we would expect none of this to be present in Ndut. This prediction is borne out.

  - – Ndut has some of the same noun classes as Noon and Laalaa, with the same semantic and phonological correlates. The [n] class is among those missing.

Table 4: Noun classes in Ndut (all data from Morgan 1996)

Singular			Plural		
[-ɓ]	–		[-C]	buːr-r-a	'the kings'
[-∅]	af-a	'the head'		wic-c-a	'the horns'
	gin-a	'the village'		koj-j-a	'the children'
	beːɲ-a	'the sand dune'		faːm-m-a	'the households'
[-f]	peʔ-f-a	'the goat'		ɓeleɓ-ɓ-a	'the women'
	finiːn-f-a	'the evening'		jaʔ-j-a	'the hands'
	jaː-f-a	'the mother'		loː-j-a	'the stomachs'
[-k]	koj-k-a	'the child/fruit'			
	kiːl-k-a	'the needle'			
	toː-k-a	'the millet'			
[-m]	mira-m-a	'the salt'			
	misoːk-m-a	'the urine'			
	mún-m-ë	'the flour'			

- – The plurals suggest that newly created hiatus sequences are resolved through glide epenthesis.
  - ⊳ If the noun ends in a consonant other than [h] and [ʔ], the plural is marked by its gemination.
  - ⊳ If the noun ends in [h], [ʔ], or a vowel, [j] is inserted (e.g. /loː-a/ → [loːja] 'the stomachs').[9]
- – I haven't found any morphemes that alternate between an [n]-initial and a vowel-initial form.

- An analysis appealing to [n] epenthesis in Noon and Laalaa predicts these larger differences amongst the languages. I don't think the alternatives do.

5.2 Hiatus resolution in Palor

- Hiatus resolution in Palor looks quite a bit like hiatus resolution in Ndut, with an interesting twist.

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[9]Note that the vowel in 'stomach' doesn't shorten. This is because the plural suffix comes with its own timing slot, as is clear from its realization following consonant-final roots.

– In a hiatus sequence where the first vowel is long, it shortens. A glide develops between the vowels.

(79) Shortening and gliding in hiatus (Soukka & Soukka 2011:88)
  a. /ɓoo/ + /-te/ → [ɓoote] '(il) a lavé' (accompli)
  b. *cf.* /ɓoo/ + /-e/ → [ɓoje] 'lave !'
  c. /loo/ + /ja/ → [looja] 'les ventres'
  d. *cf.* /loo/ + /-a/ → [loja] 'le ventre'

– In a hiatus sequence where the first vowel is short, it assimilates totally to the second vowel.

(80) Regressive assimilation in hiatus (D'Alton 1987:81-21)
  a. [kilii] 'il avait entendu' (from /kiloxi/)
  b. [caabaa] 'la clé' (from /caːbija/)
  c. [kelUU] 'ils entendent (from /keloxU/)
  d. [mUlaa] 'l'eau' (from /mUlUbma/)

– D'Alton (1987) is explicit that assimilation results in two short vowels, rather than one long one (p. 81, literal translation mine): "each vowel is the support of a syllable; the geminates are disyllabic."

– These disyllabic long vowels appear within morphemes, too; they're not only derived (81).

(81) Hiatus in Palor (D'Alton 1987:81)
  a. [laan] 'porter un fardeau sur la tête'
  b. [xeel] 'jouer'

5.2.1 Sketch of an analysis

• The analysis of Palor hiatus resolution begins similarly to the analysis for Ndut proposed above.

  – When the first vowel is long, splitting results in a vowel-glide sequence ($/o_1/ \rightarrow [o_1 j_2]$).
  – When the first vowel is short, splitting cannot occur, due to high-ranked ∃-IDENT[±syllabic].

• Palor differs from Ndut in how hiatus sequences are treated when the first vowel is short.

  – The fact that same-vowel hiatus sequences are tolerated suggests that the relevant markedness constraint is not ONSET, but rather something like (82).

  (82) ***[+syllabic]$_\alpha$[+syllabic]$_\beta$ (*V$_\alpha$V$_\beta$)**:
     Assign one * for each vowel that is directly followed by a non-identical vowel.

  – And the fact that violation of (82) is resolved through assimilation, rather than deletion, suggests that MAX-SEG the IDENT constraints that govern vowel place features.

• These observations translate to a ranking among faithfulness constraints:

(83) Partial ranking of faithfulness constraints for Palor
     ∃-IDENT[±syllabic], MAX-SEG, . . . ≫ IDENT[±back], . . . ≫ INTEGRITY

• This constraint ranking ensures that when the first vowel is long, splitting and gliding occur.

(84) Splitting and gliding with a long first vowel

	/lo$_1$o$_2$-a$_3$/	* V$_\alpha$V$_\beta$	∃-IDENT[±syll]	MAX-SEG	IDENT[±back]	INTEG
a.	[lo$_1$o$_2$a$_3$]	*!				
☞ b.	[lo$_1$j$_2$a$_3$]				*	*
c.	[la$_1$a$_3$]			*!		

- A few notes on candidates not considered in (85):

  – A further candidate, [la$_1$a$_2$a$_3$], can be ruled out by a general ban on sequences of three vowels or more (D'Alton 1987:70): these are not attested in Palor.

  – A candidate with a back glide, *[lo$_1$w$_2$a], is harder to rule out.

    > D'Alton's description leads me to believe that the hiatus-breaking segment is always [j].
    > However, I haven't yet found examples of epenthetic [j] preceding a back vowel.
    > Assumption for now, to be revisited when necessary: this candidate is ruled out by a constraint banning glide-vowel sequences that disagree for [±back].

- When the first vowel is short, gliding is not possible, so vowel assimilation is the next best choice.

(85) Vowel assimilation with a short first vowel

	/kilo$_1$-i$_2$/	* V$_\alpha$V$_\beta$	∃-IDENT[±syll]	MAX-SEG	IDENT[±back]	INTEG
a.	[kilo$_1$i$_2$]	*!				
b.	[kilw$_1$i$_2$]		*!			
c.	[kili$_2$]			*!		
☞ d.	[kili$_1$i$_2$]				*	

- As before, the assumption is that a candidate like [kilo$_1$w$_1$i$_1$] is ruled out by DEP-μ or the equivalent.

5.2.2 Zooming out: larger differences between Palor and Noon/Laalaa

- As is the case with Noon, none of the apparent allomorphy in Noon and Laalaa is attested in Palor.

  – The noun class system in Palor is familiar. As with Ndut, there is no sign of an [n] class (Table 5).[10]

Table 5: Noun classes in Ndut (all data from Morgan 1996)

|	Singular			Plural	
[-ɟ]	–		[-ɟ]	ɓo-ɟ-a	'les personnes/gens'
[-∅]	tif-a	'la mère'	[-j]	waːx-j-a	'les oeufs'
	ɓuɡ-a	'la bouche'		laʔ-j-a	'les cailloux'
[-f]	kisi-f-a	'la mer'		kiːl-j-a	'les années'
	faːm-f-a	'la matinée'		kʊɗ-j-a	'les pilons'
[-k]	kuːŋ-k-a	'le miel'		ɓeleɓ-j-a	'les femmes'
	kit-k-a	'le couscous'		saːf-j-a	'les feuilles'
[-m]	mera-m-a	'le sel'			
	ɲIf-m-a	'le sang'	–		

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[10]D'Alton (1987) includes two [k]-initial classes. As far as I can tell, this is for semantic/syntactic reasons. Some of these nouns are mass nouns and do not take a plural. The remainder is more diverse, but it includes a large number of nouns referring to small things (e.g. [kolojka] 'le petit canari').

– I have not found any morphemes in Palor that alternate between an [n]-initial and a vowel-initial form.

6 Some final thoughts

- My goals for this class were modest:

  – Convince you that [n]-epenthesis occurs in Noon and Laalaa, and

  – Convince you that this pattern is not predicted by extant theories of copy epenthesis.

- (If you are not convinced, what would convince you?)

- Speculating wildly, my guess is that [n] epenthesis was innovated a while ago: before Saafi-Saafi broke off from Noon/Laalaa, and before Noon and Laalaa separated from each other.

  (86)   Hypothesized Cangin family tree (Drolc 2006)
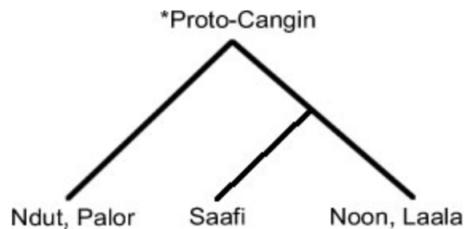
  – If I'm right, then this means that [n] epenthesis has probably been around for a long time, and there's no evidence that it's in danger of being replaced.

  – This makes sense, given how general [n] epenthesis is: there's probably a lot of evidence for it.

- This is work in progress; I don't have an explanation yet for why the best epenthetic consonant in these languages is [n]. Regardless, the right theory of consonant epenthesis should have an analysis of this.

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Appendix: hiatus resolution in Saafi-Saafi

- With the exception of Stanton (2011), descriptions of Saafi(-Saafi) phonology do not discuss nasal epenthesis. The descriptions however both discuss and show that hiatus is not possible in this language.

  – One of the reasons that Mbodj (1983) gives for treating /j/ and /w/ as consonants is that the alternative, treating them as vowels, would introduce vowel sequences, which otherwise aren't attested.

  – Pouye (2015) lists possible word shapes in Saafi-Saafi, and words involving hiatus are conspicuously not present. (Mbodj 1983 shows the same, but with fewer examples.)

(87)   Possible and impossible (or, not listed) word shapes in Saafi-Saafi (from Pouye 2015)

Syllables	Possible forms	Example		Impossible forms
Two	CV.CVC	[marak]	'regarder'	
	CVC.CV	[ɉaɓko]	'vieux'	*CV.VC
	V.CV	[oto]	'véhicule'	*CV.V
	V.CVC	[ufis]	'abcès'	*V.V
	CV.CV	[hoso]	'voix'	*V.VC
	CVC.CVC	[ndaŋkaːh]	'dix'	
Three	CV.CV.CV	[komaki]	'enfant'	*CV.V.CV
	VC.CV.CV	[inwaso]	'regret'	*VC.CV.V
	CV.CVC.CVC	[burufruf]	'poumon'	*CV.VC.CVC
	CV.CV.CVC	[ɲɉoŋolor]	'zénith'	*CV.V.CVC
	CV.CVC.CV	[meleɲsu]	'étincelle'	*CV.VC.CV
Four	VC.CV.CV.CV	[inwasoni]	'le regret'	*VC.CV.V.CV
	CV.CV.CV.CV	[ɲɉoŋolori]	'le zénith'	*CV.V.CV.CV
	CV.CVC.CV.CV	[burufrufi]	'le poumon'	*CV.CVC.CV.V

- When a hiatus context is created through suffixation, a nasal is inserted. This is mainly observable in the noun class system, which is very similar to (but simplified, compared to) Noon's and Laalaa's.

  – The vast majority of nouns in the [n/c] class are vowel-final.[11]

(88)   [n] class nouns in Saafi (Mbodj 1983:152)
        a. [ˈsaŋe-n-i]   'la guerre'
        b. [ˈmuma-n-i]   'le lion'
        c. [ˈjawo-n-i]   'le ciel'

  – The vast majority of words in the [∅/c] are consonant-final.[12]

(89)   [∅] nouns in Saafi (Mbodj 1983:153)
        a. [ˈwiːc-∅-i]   'la corne'
        b. [peɗem-∅-i]   'la langue'
        c. [ˈpus-∅-i]   'le plaie'

---

[11] I think all of them are, and this is echoed in the descriptions by Pouye (2015) and Mbodj (1983). However, 3/33 [n] class forms in the list provided by Botne et al. (2016) are consonant-final: [cafaɉ-n-i] 'the girl', [ŋakuɗ-n-i] 'the gecko', and [pulohaːɗ-n-i] 'the exit'. I would want to know more about these words. The only one I have found in another source is 'girl', which is [n]-final and belongs to the ∅ class in Stanton (2011).

[12] Again, there are a couple of counterexamples given by Botne et al. (2016): [fuː-wi] 'the buttock' and [ɲaː-ji] 'the basket', both with apparent glide insertion. I haven't been able to find either of these words in another source.

- Both the [n/c] and the [∅/c] classes are semantic and phonological grab bags: there are no unifying properties that unite the nouns belonging to these classes.

  – Newly derived or borrowed nouns belong to either the [n] or the [∅/c] class, depending on whether they are vowel- or consonant-final (Mbodj 1983).

    > If vowel-final, it joins the [n/c] class (or, rarely, the [nd/c] class, as in (90c)).

      (90)   Newly derived and borrowed vowel-final nouns (Mbodj 1983:156)
              a.   [marˈkoha-n-i]   'le miroir' (from [marak] 'regarder')
              b.   [ˈlempo-n-i]   'l'impôt' (emprunt au français)
              c.   [ˈdole-nd-i]   'la force' (emprunt au wolof)

    > If consonant-final, it usually joins the [∅/c] class (but sometimes, if the noun is [k]-initial it joins the [k/c] class, or if it is [m]-initial it joins the [m/c] class).

      (91)   Newly derived and borrowed consonant-final nouns (Mbodj 1983:157)
              a.   [ʔeˈkol-∅-i]   'l'école' (emprunt au français)
              b.   [kaˈlas-∅-i]   'la classe' (emprunt au français)
              c.   [miˈsoːk-m-i]   'l'urine' (derived from [sːk] 'uriner')
              d.   [kaˈɲaːm-k-i]   'la nourriture' (derived from [ɲaːm] 'manger')

  – My interpretation of these facts is that [∅/c] and [n/c] nouns form one class: the default. Interestingly, a number of nouns vary as to whether they are marked with their usual class or the default.

    (92)   Variation in class markers (from Stanton 2011)
            a.   [ŋif-m-i], [ŋif-i]   'the blood'
            b.   [kiat-k-i], [kiat-i]   'the book'
            c.   [paːn-f-i], [paːni-n-i] 'the monkey'

  – Saafi's noun class system is in decline; noun reassignment to the 'default' class is consistent with this.

  – The easiest way to make sense of all these facts is, I think, by assuming that [n/∅] are the same class.

- Another context where [n] epenthesis is visible comes from agreement within the noun phrase.

  – Adjectives and other nominal modifiers agree with the head noun in number and specificity[13] but not class (examples from Stanton 2011).

    (93)   Number and specificity agreement in the noun phrase
            a.   [kiat-k-i   ʔas-i   suːsus-i]
                 kiat-CL-SPEC new-SPEC black-SPEC
                 'the new black book'
            b.   [mbu-c-i   ʔas-c-i]
                 dog-PL-SPEC new-PL-SPEC
                 'the new dogs'

  – If an adjective is vowel-final, an [n] is inserted between the stem-final vowel and the specificity marker, even when the noun does not belong to the [n/c] class.

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[13]And probably definiteness, but I haven't yet found much data that bear on this.

(94)   Nasal insertion in noun phrase agreement

     a.   [mbu-f-i   maːɲɟi-n-i   sokola-n-i]
         dog-CL-SPEC old-N-SPEC brown-N-SPEC
         'the old brown dog'

     b.   [paŋ-f-i   liːli-n-i]
         grass-CL-SPEC green-N-SPEC
         'the green grass'

- This is all of the relevant data I have found; further contexts of hiatus are difficult to locate. The majority of Saafi verbs are consonant-final, and most suffixes are consonant-initial.

6.1   Sketch of an analysis

- An analysis of the facts presented so far is fairly straightforward, and mirrors the analysis of Noon: [n] is epenthesized because it is the preferred repair in hiatus contexts.

- To sketch this, we need only a few constraints, all familiar from before.

- For the analysis to work, (DEP-SEG must be the lowest-ranked faithfulness constraint: all other possible hiatus resolution strategies are penalized relative to nasal epenthesis.

  – In (95), the [∅] class noun is consonant-final, so there is no ONSET violation to avoid.

(95)   No nasal epenthesis in consonant-final [∅] class nouns.

/peɗem+∅+i/	ONSET	MAX-SEG	IDENT[±syll]	DEP-SEG
☞ a. [peɗemi]				
b. [peɗmi]		*!		
c. [peɗemj]			*!	
d. [peɗemni]				*!

  – In (96), the [∅] class noun is vowel-final, so ONSET is satisfied by nasal epenthesis.

(96)   Nasal epenthesis in vowel-final [∅] class nouns.

/muma+∅+i/	ONSET	MAX-SEG	IDENT[±syll]	DEP-SEG
a. [mumai]	*!			
b. [mumi]		*!		
c. [mumaj]			*!	
☞ d. [mumani]				*

- As with Noon and Laalaa, there is no obvious reason why [n] should be the epenthetic consonant.

  – There are no apparent relevant phonotactic restrictions on intervocalic glides.

(97)   Intervocalic [j] in Saafi-Saafi
     a.   [kaːjiɗ]   'refroidir pour quelqu'un (la bouillie)'
     b.   [woju]   'chanté'

(98)   Intervocalic [w] in Saafi-Saafi
     a.   [bawis]   'aboyer encore'
     b.   [saːwu]   'être mis au monde (aimer)'

– There are no apparent relevant phonotactic restrictions on intervocalic laryngeals.

(99)   Intervocalic [h] in Saafi-Saafi
    b.   [reːhiɗ]   'to finish'
    b.   [toho]   'mil'

(100)   Intervocalic [ʔ] in Saafi-Saafi
    a.   [boʔis]   'bégayer à nouveau'
    b.   [jinoˈʔoh]   'réunir, unifier'

6.2 Complications

• One challenge for this analysis comes from cases of intramorphemic hiatus resolution.

– In disyllabic verbs: [ɗ], [m], and [ʄ] can delete between vowels (if the first vowel is short).

– When the consonant deletes, the first vowel in the newly established hiatus sequence deletes too.

(101)   Deletion in disyllabic verbs (from Mbodj 1983)
    a.   /ʔa kaˈɗaŋ/   →   [ʔa kaŋ]   'il part'
    b.   /ɓa ˈjomeː ˈhaʄ/   →   [ɓa jeː haʄ]   'ils devaient venir'
    c.   /fu woˈʄaŋ ne/   →   [fu waŋ ne]   'tu es en train de dire que…'
    d.   /ʔa haˈʄiɗ/   →   [ʔa haˈʄiɗ], [ʔa hiɗ]   'il est venu'

– One way to solve this problem could be to introduce a constraint like CONTIGUITY (102), specifically McCarthy & Prince's (1995) O-CONTIG, to rule out morpheme-internal epenthesis.

(102)   **O-CONTIG** ("No Intrusion"):
    The portion of S_2 standing in correspondence forms a contiguous substring. Range ($\mathfrak{R}$) is a single contiguous substring in S_2.

– But this might be like plugging a leak in a dam that's about to blow. Pouye (2015) cites a couple of examples of cross-morphemic hiatus retention or resolution through deletion.[14]

(103)   Unexpected responses to hiatus (Pouye 2015: 97, 102)
    a.   [woiɗ]   'porter la parole de quelqu'un' (from [woː] 'parler')
    b.   [saːŋin]   'ombrager' (from [saːŋgu] 'ombre')

• A possible alternative analysis is that definite suffix has two allomorphs, [-i] and [-ni]. [-i] attaches to consonant-final nouns and [-ni] attaches to vowel-final nouns.

• Is apparent [n] epenthesis really limited to this suffix? It's not clear.

– There may be other morphological contexts where [n] breaks up hiatus sequences, but these examples are of limited usefulness because I don't know what the final morpheme is.

(104)   Nasal epenthesis between suffixes (from Stanton 2011)
    a.   [ɓitsiɗ-oh-a-n-a]
        to.learn-AGT-LOC-N-??
        school

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[14]Mbodj (1983) cites an example like this as well: [ˈxawra] ('ce griot-la'), from /xaˈwru-∅-a/. I think that this is a typo, though, as the root is written as [xawur] elsewhere.

      b.   [ɟaŋ-oh-a-n-a]
             to.study-AGT-LOC-N-??
             'place where (someone) studies'

– The pronom objet relevé used for things has two allomorphs, [-wa] and [-a], whose distribution parallels that of [-ni] and [-i]. Epenthesis, deletion, or allomorphy?

(105)   Realizations of this suffix
      a.   [ŋ hoteːn kulɓa ki wi a supte **wa**]
             1S.voir-MTA habit CL-DET lorsque 3S coudre-MTA 3S
             'J'avais vu l'habit lorsqu'il le cousait'
      b.   [ŋ hoteːn kulɓa ki wi a supit**a**]
             1S.voir-MTA habit CL-DET lorsque 3S coudre-3S
             'J'avais vu l'habit lorsqu'il le cousait'

• So far I have only limited evidence that [n] is tolerated in post-consonantal position.

– The second consonant in a root-internal cluster can be [n], but I have only a few examples. At least some (maybe all) arise as a result of syncope.

(106)   [n] as the second member of a root-internal cluster (Pouye 2015:76-7, Mbodj 1983:87)
      a.   [cakna]   'ongle'
      b.   [ɲimˈniɗ]   'nombreux'
      c.   [ˈcaɓni]   'le lion'
      d.   [ˈkaħni]   'le maison'

– I don't have any examples of a [n]-initial suffix attaching to a vowel-final stem.

• My intuition is that Saafi-Saafi has [n] epenthesis, like Noon and Laalaa. But it's a harder sell, I think.