Chapter 4: Nasalization

1. Introduction

In the previous chapter, I discussed the distributional properties of Gemination as a final feature. The behavior of Nasalization is similar; the Nasalizing final feature emerges before stops and nasals and is silent elsewhere. In this chapter I give an account of the surface distribution of Nasalization. In this account, I also show that Nasalization, like Gemination, should be considered a full segment in its own right; that is, a segment with a root node and dependent features, rather than a floating feature or latent segment. The argument for this position will not be made explicitly until section 4, but the correctness of this position will be assumed throughout this chapter. The organization of this chapter is as follows. Section 2 provides descriptive summaries and an analysis of Nasalization as a final feature. Section 3 accounts for the absence of Nasalization on the surface on stems which would otherwise be expected to show it. Section 4 discusses the behavior of Nasalization with the accusative suffix -a; this behavior is interesting because it presents an apparent exception to the deletion patterns discussed in section 3, and because it provides a clear argument for considering Nasalization to be a full segment. Section 5 is a short summary.

2. Description of Nasalization patterns

In this section, I give a descriptive summary of the patterns of realization and silence which are characteristic of the Nasalizing final feature. In 2.1 I provide examples of the surface expression of Nasalization, and in 2.2 I show examples where Nasalization is not realized on the surface.

2.1. The realization of Nasalization

The discussion of the Nasalizing final feature begins with the following observation: following certain morphemes, a voiceless stop alternates with a nasal-voiced stop cluster. Some examples are given in (1).

(1) Nasalization

[aː]	'horn'	[aːmbai]	'have a horn'
[t̪θoː]	'beads'	[t̪θoːmbai]	'have beads'

(cf. [t̪θoː] 'great-grandparent' [t̪θoːβai] 'have a great-grandparent')

/ɨn-/ 'your (SG)'			
[pia]	'mother'	[ɨmbia]	'your (SG) mother'
[tua]	'son'	[ɨndua]	'your (SG) son'
[t̪θoː]	'great-grandparent'	[ɨndðoː] grandparent'	'your (SG) great-
[kaɣu]	'grandmother'	[ɨŋgaɣu]	'your (SG) grandmother'
[kʷasu]	'shirt'	[ɨŋgʷasu]	'your (SG) shirt'
[kʷasu] 'shirt'			
/-pan/	'on top'	[kʷasumba]	'on top of the shirt'
/-tukkan/	'under'	[kʷasundukka]	'under the shirt'
/-kappan/	'inside'	[kʷasuŋgappa]	'inside the shirt'
[yuː] 'gentle'			
/-pit̪t̪θɨh/	'ABSOLUTIVE'	[yuːmbittšɨ̥]	'gentle animal'
[kuittšu]	'cow'	[yuːŋguittšu]	'buffalo'
[kahni]	'house'	[yuːŋgahni]	'tipi'
[ontɨ] 'brown'			
/-kaitɨ/	'ABSOLUTIVE'	[ondɨŋgaiðɨ]	'brown'
[paː]	'water'	[ondɨmbaː]	'whiskey'

In the examples in (1), the stems are vowel-final in isolation. Upon concatenation with a stop-initial morpheme, a nasal stop cluster is formed (underlined); Comparing 'have a bead' with 'have a great-grandparent' in (1) shows that the presence of a surface NC cluster is dependent on the leftmost morpheme; the otherwise homophonous forms [t̪θoː] 'beads' and [t̪θoː] 'great-grandparent' differ only in that 'beads' is followed by a nasal-stop cluster upon suffixation, while 'great-grandparent' is followed by no such cluster. This suggests that there is some nasal element at the right edge of morphemes like 'beads', 'horn', 'gentle', and the plural suffix; it is this nasal element which is the Nasalizing final feature. I transcribe the Nasalizing final feature as /-n/ in underlying forms (in section 2.4 I argue that these morpheme-final elements are in fact full segments). Thus, the underlying form of 'bead' is represented as /t̪θoːn/, and that of 'horn' as /aːn/.

Nasalization is not confined to interactions between morphemes in a single word but also occurs in phrasal contexts (2).

(2) Nasalization in phrasal contexts

[nɨmmɨm̱ ḇɨaišɨ ɨkkʷoihondui]

nɨmmɨn	pɨai	-sɨn	ɨkkʷoi	-hVn	-tui
we/EXCL	already	-EMPH	sleep/PL.SUBJ	-completely	-FUT

'We already went to sleep.'

[taiβow̃aṉ ḏeɣʷa]

taipo	-man	tekʷa
white.man	-with	talk/SG.SUBJ

'talk with the White Man'

[piɨnɨːṉ ḏɨasɨ̥]

piɨ	-nɨːn	tɨa	-sɨn
boy/NON.SG	-PL	also	-EMPH

'the boys also'

[nɨmmɨŋ̱ g̱e šumbanainnḁ]

nɨmmɨn	ke	sumpanai	-nna
we/EXCL	NEG	know	-ASP

'We didn't know.'

[nɨmmɨŋ̱ g̱ia sattu miaɾɨ]

nɨmmɨn	kia	sattu	mia	-tɨn
we/EXCL	then	there	walk	-ASP

'We then walked through there.'

Following morphemes where stops alternate with NC clusters, nasals are regularly geminated. The examples in (3) demonstrate nasal-nasal clusters across morpheme boundaries.[1] In (3a) and (3b), the first member of each pair illustrates a typical heteromorphemic nasal-stop interaction; the second member of each pair shows a nasal-nasal cluster in a similar environment, demonstrating that the output consists of a geminate nasal.

(3) Nasalizing final features and nasal-initial morphemes

a. [animui ɨŋgʷasumbaŋ gattɨ]
animuih ɨŋ- kʷasun -pan kattɨ
fly your- shirt -on.top.of sit/DUR
'There's a fly sitting on top of your shirt.'

[animui ɨŋgʷasummaŋ gattɨ]
animuih ɨŋ- kʷasun -man kattɨ
fly your- shirt -on sit/DUR
'There's a fly sitting on (the side of) your shirt.'

b. [keža:ndɨ]
ke t̪θa:n -tɨn
NEG good -ASP
'(it is) no good'

[aɾɨŋ ge ža:n nɨwɨ]
atɨn ke t̪θa:n nɨwɨ
that NEG good person
'that no good person'

To summarize the Nasalization patterns seen thus far, a stem may end with a nasal element. This nasal element is realized as a homorganic nasal segment before a stop. Before a nasal, the stem-final nasal element is also realized as a homorganic nasal creating a surface geminate nasal.

Accounting for the hetero-morphemic alternation of voiceless stop with a nasal-stop cluster or of a singleton nasal with a geminate nasal involves constraints which were already

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[1]There are many instances of geminate nasals within a single morpheme; some examples include: [tommo] 'winter, year', [kammu] 'jackrabbit', [tenna-ppɨ] 'man-ABS', [anni] 'to fall over'. It is impossible to determine if morpheme-internal geminate nasals in forms like these are due to Gemination or to Nasalization; I will make the simplifying assumption that it is Gemination. Historical and comparative analysis may help resolve this question on a case by case basis, but this will have little bearing (if any) on the synchronic phonology of Gosiute.

introduced in chapter 2. In particular, the following two facts need to be accounted for: i) the stop of the nasal-stop cluster is always voiced, and ii) the nasal-stop cluster is always homorganic. The first fact follows from constraints introduced in section 3.1-2 of chapter 2, repeated below.

(4) OBS/VOI: 'If [–sonorant] then [–voice]; if [–sonorant] then not [–voice].'
(figure (45) from chapter 2)

VOI: N_: 'If post-nasal then [+voice]; if post-nasal then not [–voice].'
(figure (48) from chapter 2)

The first constraint expresses a grounding condition on the features [–sonorant] and [voice] which is independent of the environment in which the segment finds itself. The second constraint expresses the generalization that segments which follow nasals prefer to be voiced. When these two constraints are ranked VOI:N_ » OBS/VOI, the voicing of post-nasal stops follows.

(5) VOI:N_ » OBS/VOI

	/aːn-pai/	VOI:N_	OBS/VOI
a. ☞	aːmpai		*
b.	aːmpai	*!	

In the tableau in (5), candidate (5a) satisfies VOI:N_, the top-ranked constraint. Candidate (5b) violates this constraint, and is therefore rejected in favor of (5a). This is a pattern familiar from the analysis of the distribution of voicing found in section 3 of chapter 2.

The homorganicity of heteromorphemic stop-nasal clusters is also dealt with using constraints already established in section 3.3. of chapter 2. These constraints are repeated in (6) below.

(6) PLONS: '[αF], where F is a consonantal point of articulation feature must be licensed, *in at least one associated segment*, by membership in the onset.' (figure (51) of chapter 2)

IDENT$_{IO}$ONS[Place]: 'The output correspondent of an input segment bearing a Place feature bears that same Place feature; this segment is in the onset.'

IDENT$_{IO}$[Place]: 'The output correspondent of an input segment bearing a Place feature bears that same Place feature.'

In the tableau in (7), the ranking PLONS » IDENT$_{IO}$ONS[Place] » IDENT$_{IO}$[Place] yields the correct results for heteromorphemic contexts (the voicing of the stop is assumed based on the results in (5)).

(7) Homorganicity of NC clusters

input: aːn-pai / \ COR LAB	PLONS	IDENT$_{IO}$ONS [Place]	IDENT$_{IO}$ [Place]
a. ☞ aːmbai \/ LAB			*
b. aːndai \/ COR		*!	*
c. aːnbai / \ COR LAB	*!		

In this tableau, candidate (7a), which preserves and shares the onset Place features between the members of the NC cluster, is selected as optimal. Candidate (7b) shares a Coronal feature between the nasal and the stop but fails to preserve the onset's Labial specification, in violation of IDENT$_{IO}$ONS[Place]. Candidate (7c) fails to license the coda Coronal feature and thus runs afoul of PLONS.

3. Nasal Deletion

The nasalization facts as presented and analyzed in section 2 are very regular and straightforward. In this section I discuss Nasal Deletion—cases where an underlying

Nasalizing final feature is not present on the surface; these cases are of three kinds. First, a stem-final nasal deletes when it occurs in word-final position. Second, when a stem with a final nasal precedes a vowel-initial morpheme the Nasalizing final feature is again absent in surface form. Finally, in potential NC clusters where C is a continuant ([s, h, y, w]) the nasal is absent in the output. These results are achieved by drawing on constraints which govern the potential mismatch between word and syllable boundaries, as well as constraints prohibiting certain features in adjacent segments. I discuss each of these cases in turn, beginning with phrase-final deletion.

3.1. Phrase-final Nasal Deletion

A stem-final nasal deletes when phrase-final (8).[2]

(8) a. [piɨnɨːn dɨasi̥]
pii -nɨːn tɨa -sɨn
boy/NON.SG -PL also -EMPH
'the boys also'

b. [sɨmmɨ ɣahniɣuppa]
sɨmmɨ kahni -kuppan
one house -in
'in one house'

c. [nɨmmɨŋ gia sattu miaɾɨ]
nɨmmɨn kia sattu mia -tɨn
we/EXCL then there walk -ASP
'We then walked (through) there.'

Notice that for each phrase-final nasal element, there is no following stop. The constraint PLONS thus provides a partial explanation for the illformedness of phrase-final nasals, since the nasals in these cases are not followed by an onset which can license place

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[2]There is optional nasalization of vowels immediately preceding a stem final nasal. This nasalization may surface even when there is no consonantal reflex of Nasalization.

features. Requiring that place features be linked to the onset leaves two logical options for phrase-final nasals: (i) the nasal can emerge placeless, or (ii) the nasal can be deleted; otherwise, PLONS would be violated by allowing place features on a final nasal. In Gosiute, the nasal is deleted in phrase-final position. In Optimality Theoretic terms, this is construed as a violation of MAX, defined in (9).

(9) MAX: Every segment of the input has a correspondent in the output.

This constraint is ranked below PLONS; the tableau in (10) shows the candidate competition under this ranking.

(10) PLONS » MAX

	/mia-tɨn/	PLONS	MAX
a. ☞	miaɾɨ		*
b.	miaɾɨn	*!	

Candidate (10a) violates MAX by the deletion of the stem-final nasal; candidate (10b), which satisfies MAX, violates higher-ranking PLONS since the stem-final nasal, which has been retained, has place features which are not licensed by an onset. This candidate competition is a typical Optimality Theory pattern; satisfaction of the higher-ranking constraint, PLONS, comes at the cost of a violation of lower-ranked MAX. This ranking of PLONS and MAX ensures that candidate (10a) [miaɾɨ] emerges as the winner over candidate (10b) [miaɾɨn].

3.2. Pre-vocalic Nasal Deletion

Stem-final nasals are deleted when the second morpheme is vowel-initial; examples are given in (11).

(11) surface underlying

[tammɨaɾa] /tammɨn-ata/ 'our (INCL) uncle'
[tammɨot̪t̪θa] /tammɨn-ot̪t̪θa/ 'our (INCL) jug'

[nɨmmɨ oyɨsɨn daiβo niwɨnɨyu]
nɨmmɨn oyɨ -sɨn taipo niwɨnɨ -yu
we/EXCL always -EMPH white.man talk/PL.SUBJ -ASP
'We always spoke English.'

It is not immediately obvious why the nasal in these cases should delete; the resulting syllables would be perfectly well-formed with a surface nasal: /tammɨn aɾa/ → *[.tam.mɨ.na.ɾa.]. There seems to be no phonetically grounded reason for Nasal Deletion in these cases.

Note, however, that in each instance of pre-vocalic Nasal Deletion, the retention of the nasal would have required either syllabification across a morpheme boundary, or the unusual syllabification of the stem-final nasal as the coda of the preceding syllable leaving the following syllable onsetless. These two options are shown in (12).

(12) a. Syllabification across a word boundary:
/tammɨn-ata/ → *[.tam.mɨ.na.ɾa.]

b. Unusual syllabification:
/tammɨn-ata/ → *[.tam.min.a.ɾa.]

The syllabification shown in (12b) is prevented by the constraint PLONS, which requires a place of articulation to be linked to an onset, effectively prohibiting a coda from bearing a unique place of articulation. The syllabification pattern in (12a) is prevented by invoking the constraint in (13) based on the Generalized Alignment schema proposed in McCarthy and Prince (1993); this constraint was introduced in section 4.2.2 of chapter 3).

(13) ALIGN (Morph, R; σ, R) (ALIGN-R): 'For every morpheme there is a syllable such that the right edge of the morpheme and the right edge of the syllable coincide.'

The effect of the constraint in (13) is to prohibit the overlapping of morphemes and syllables; every morpheme boundary coincides with a syllable boundary as well.[3] The constraints PLONS and ALIGN-R are ranked above MAX. In the tableau in (14), syllable boundaries are indicated by parentheses, and morpheme boundaries are indicated by square brackets.

(14) {PLONS, ALIGN-R} » MAX

	/[tammɨn][aɾa]/	PLONS	ALIGN-R	MAX
a. ☞	[(tam)(mɨ)][(a)(ɾa)]			*
b.	[(tam)(mɨ)(n][a)(ɾa)]		*!	
c.	[(tam)(mɨn)][(a)(ɾa)]	*!		

Candidate (14c) violates PLONS because of the presence of a coda [n] with independent place features which are not linked to a following onset. Candidate (14b) violates ALIGN-R because of a mismatch in syllable and morpheme boundaries; the [n] of the possessive pronoun tammɨn is syllabified into the following noun stem. Violations of either PLONS or ALIGN-R are sufficient to eliminate candidates (14b) and (14c) and candidate (14a) emerges as the winner in spite of the fact that it violates MAX because of the deletion of the final nasal of the possessive pronoun; deletion of the nasal is actually the winning strategy.

[3]There are examples of suffixes which obligatorily begin with a geminate or nasal-stop cluster; these include /-ppɨh/ 'absolutive', /-ttθi/ 'diminutive', /-nkɨ/ 'causative; benefactive', and /-kka/ 'resultative'. In each case, there is a mismatch between syllable boundaries and morpheme boundaries since the geminate or nasal-stop cluster will close the final syllable of the preceding morpheme. I assume the activity of high-ranking morpheme-specific constraints ensuring the faithfulness of geminates and clusters in such suffixes, but I do not provide a detailed analysis here. The accusative suffix /-a/ is also an example of the potential mismatch between syllable and morpheme boundaries; it is discussed in section 4.

3.3. Pre-continuant Nasal Deletion

In morphological environments where the consonant of a potential NC cluster is a continuant, the stem-final nasal deletes (15). In each of (15a), (15b), and (15c), the forms illustrating the absence of the Nasalizing final feature is followed by a form in which it is present to demonstrate that there is in fact a Nasalizing final feature on the morpheme.

(15) Nasalization deletion

a.	[ɨsɨɣi]	/ɨn-sɨki/	'your (SG) leaf'
	[ɨhut̪t̪θi]	/ɨn-hut̪t̪θi/	'your (SG) grandmother (FaMo)'
	[ɨyaippɨ]	/ɨn-yaippɨ/	'your (SG) mother-in-law'
	[ɨwosa]	/ɨn-wosa/	'your (SG) burden basket'
	cf.		
	[ɨŋgaɣu]	/ɨn-kaku/	'your (SG) grandmother (MoMo)'
b.	[tɨhuːppi]	/tɨn-huːppin/	'counting sticks' (rock + stick)
	cf.		
	[tɨmbi]	/tɨn-pin/	'rock' (rock + ABS)
c.	[ondɨyakk^{w}a]	/ontɨn-yakk^{w}a/	'deerfly' (brown + ?)
	cf.		
	[ondɨngaiθɨ̥]	/ontɨn-kaihtɨn/	'brown' (brown + ABS)

The reason for Nasal Deletion in these cases is to be found in the interaction of constraints governing the adjacency and cooccurrence of nasality and continuancy. In his survey of nasal-consonant assimilation, Padgett (1994) notes that for languages which show nasal place assimilation to a following stop, it is always the case that languages with nasal-continuant place assimilation will also have nasal-stop place assimilation, but that the reverse is not true; that is, languages with nasal-stop place assimilation do not always have nasal-continuant place assimilation. In fact, one of three things typically happens when there is no assimilation: i) the nasal receives a default place of articulation, ii) the nasal deletes, or iii) the nasal assimilates but simultaneously hardens the continuant to a stop or affricate (Padgett 1994: 470). Gosiute is an example of the second pattern—the nasal in nasal-continuant sequences deletes. Padgett posits the following marking condition on potential nasal-continuant sequences:

(16) Nasal/Continuant Marking Condition:
If [+nas, +cons] then [–cont]. (Padgett 1994: 478)

The formulation of this marking condition is identical to a grounded condition (Archangeli and Pulleyblank 1994); I will take it to be a constraint on surface forms in Gosiute and give it the abbreviation NAS/CONT.

In Suzuki (1995, 1997) and Archangeli and Suzuki (1995) the notion of *sequential grounding* is introduced and defended. Briefly, for any grounded condition X/Y prohibiting the cooccurence of X and Y in a path, there is a *sequential* constraint which prohibits X and Y in adjacent paths. This constraint is abbreviated X…Y, and is universally lower-ranked than the constraint X/Y. This means that for the constraint NAS/CONT there is also a related, subordinate sequential constraint NAS…CONT. It is the sequential constraint NAS…CONT which is active in the analysis of potential nasal-continuant clusters in Gosiute. This constraint is defined in (17).

(17) NAS…CONT: A path bearing [nasal] does not precede a path bearing [+continuant].

This constraint is ranked above MAX, which prohibits the deletion of underlying segments; it is preferable to delete the nasal segment than to allow it to be adjacent to a continuant.

While the constraint NAS…CONT is crucial in the analysis of underlying nasal-continuant clusters, it will not provide an account for the lack of surface nasal-continuant clusters by itself. There are three different cases to consider in the analysis of underlying nasal-continuant clusters: /ns/, /nh/ and /nG/ (where /G/ is a cover symbol for /w/ and /y/). In each case, the use of constraints motivated in the previous chapter will prove essential in accounting for each type of nasal deletion. I will discuss each of these in turn.

3.3.1. /ns/ clusters

Constraints from chapter 2 on the presence and preservation of stridency can be used to account for the deletion of nasals before /s/. IDENT$_{IO}$[str] ensures preservation of underlying stridency, and STR/CONT ensures that segments specified [+strident] are also [+continuant]. The constraint NAS…CONT introduced above militates against adjacent [nasal] and [continuant] specifications. All three of these constraints are ranked above MAX; the tableau in (18) illustrates.

(18) { IDENT$_{IO}$[str], STR/CONT, NAS…CONT } » MAX

/ɨn sɨki/		IDENT$_{IO}$ [str]	STR/ CONT	NAS… CONT	MAX
a.	ɨntɨɣi	*!			
b.	ɨntsɨɣi		*!		
c.	ɨnsɨɣi			*!	
d. ☞	ɨsɨɣi				*

In the tableau given in (18), any violation of IDENT$_{IO}$[str], STR/CONT, or NAS…CONT results in the disqualification of a candidate. Candidate (18d) satisfies all of these constraints and is judged as optimal by the hierarchy in spite of its violation of MAX.

3.3.2. /nh/ clusters

In chapter 2, the constraint IDENT$_{IO}$[+sg] was introduced and used to account for the presence of intervocalic voiceless fricatives (see chapter 2, section 3.3.2 for discussion). When this constraint is ranked above MAX along with NAS…CONT the nasal deletion effects in underlying /nh/ clusters falls out. The tableau in (19) illustrates.

(19) {IDENT$_{IO}$[+sg], NAS…CONT} » MAX

/ɨn hut̪t̪θi/		IDENT$_{IO}$ [+sg]	NAS… CONT	MAX
a.	ɨnʔut̪t̪θi	*!		
b.	ɨnhut̪t̪θi		*!	
c. ☞	ɨhut̪t̪θi			*

In (19), any candidate which violates IDENT$_{IO}$[+sg] or NAS…CONT is eliminated. Candidate (19c), which satisfies both of these constraints at the expense of a MAX violation is selected as optimal.

3.3.3. /nG/ clusters

In the analysis of underlying /nG/ clusters, the constraint IDENT$_{IO}$[+son] (defined in (20) below) plays a role similar to that of the other IDENT constraints discussed above.

(20) IDENT$_{IO}$[+son]: An output correspondent of an input segment bearing [+sonorant] also bears [+sonorant].

When IDENT$_{IO}$[+son] and NAS…CONT are ranked above MAX, surface deletion of the nasal from underlying /nG/ clusters results. The tableau in (21) illustrates.

(21) {IDENT$_{IO}$[+son], NAS…CONT} » MAX

/ɨn wosa/		IDENT$_{IO}$ [+son]	NAS… CONT	MAX
a.	ɨŋgʷosa	*!		
b.	ɨŋwosa		*!	
c. ☞	ɨwosa			*

Candidates (21a) and (21b) both crucially violate a high-ranking constraint; (21a) has a voiced labiovelar stop in correspondence with an underlying labiovelar glide, in violation of IDENTIO[+son] and is therefore eliminated. Candidate (21b) violates NAS…CONT because of the adjacency of [N], specified as [nasal], and [w] specified as [+continuant]; it too is eliminated. Candidate (21c) violates MAX since there is no output correspondent for input /n/. However, since MAX is ranked below the other constraints, candidate (21c) is judged as optimal.

3.4. Summary

In this section I have provided analyses for the deletion of morpheme-final nasals in various positions. Phrase final Nasal Deletion was shown in 3.1 to be the result of ranking PLONS above the faithfulness constraint MAX. Thus, coda nasals which could not share a place of articulation with a following stop were deleted. In 3.2, the analysis of pre-vocalic Nasal Deletion made use of the same hierarchy, PLONS » MAX, and re-introduced from chapter 3 the Alignment constraint ALIGN-R requiring morpheme edges to coincide with syllable edges. Finally, pre-continuant Nasal Deletion was shown to follow from a number of factors, including a general prohibition on nasal-continuant sequences (17), and a ranking of faithfulness constraints which give priority to the preservation of input features such as [+strident], [+sg], and [+sonorant] over the preservation of nasality.

4. Accusative Nasalization

In this section I discuss an apparent exception to Pre-vocalic Nasal Deletion, discussed in 3.2 above. This exceptional pattern occurs as a result of the suffixation of the accusative suffix -*a*. Recall that a stem-final nasal element doesn't surface when followed by a vowel-initial morpheme. The accusative pattern is different in that the stem-final nasal element *is* realized before the accusative suffix in a pattern that I will refer to as Accusative Nasalization. Compare the forms below in (22).

(22)	a.	kʷahaɾɨmba	'on top of an antelope'
	b.	kʷahaɾɨ oyɨsɨ	'(the) antelope also'
	c.	kʷahaɾɨna	'antelope-ACC'

In (22a) the stem-final nasal element surfaces as [m] when the postposition 'on top of', realized here as [ba], is suffixed to the stem. In (22b) the stem-final nasal doesn't surface because the following morpheme is vowel-initial. In (22c), the nasal is realized before the accusative suffix -a.

In this section, I use this pattern to provide evidence for the representation of stem-final nasal elements as full segments. This section is organized as follows. In 4.1 I provide more examples of Accusative Nasalization, and compare this pattern with a similar pattern found with [h]-final stems (see Chapter 5: Aspiration) and the accusative pattern found with vowel-final stems. A constraint requiring an onset for the accusative suffix is proposed and ranked above the hierarchy given for Pre-vocalic Nasal Deletion. In 4.2 I show that assuming the stem-final nasal element to be a full segment provides complete coverage of the Accusative Nasalization data, as well as accounting for the lack of an onset on accusatives appearing on vowel-final stems. In 4.3 I show that assuming the stem-final nasal element to be a floating feature yields inconsistent results. 4.4 provides a brief summary.

4.1. Accusative Nasalization: the basic pattern

In (23), more examples are given of Accusative Nasalization. Each form in (23) is given in the nominative (uninflected), accusative, and with either a postposition or the verbalizing suffix, 'have X' (realized in the examples in (23) as [-bai]), to demonstrate that the stem does in fact have a final nasal.

(23) Accusative Nasalization

a.	[paɣambai]	'have an arrow'
	[paɣa]	'arrow'
	[paɣana]	'arrow-ACC'
b.	[t̪θoːmbai]	'have beads'
	[t̪θoː]	'beads'
	[t̪θoːna]	'beads-ACC'
c.	[taindɨŋgappa]	'inside the hole'
	[taindɨ]	'hole'
	[taindɨna]	'hole-ACC'
d.	[aːmbai]	'have a horn'
	[aː]	'horn'
	[aːna]	'horn-ACC'

The accusative pattern in (23) should be contrasted with the forms in (24), where no stem-final element is present. In these cases, the accusative suffix is simply affixed to the vowel-final stem.

(24) Gosiute Accusative -*a*

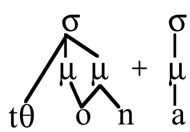
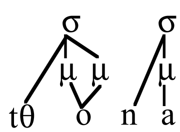
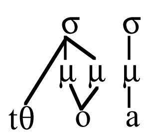
a.	[t̪θoː]	'great-grandparent'
	[t̪θoːa]	'great-grandparent-ACC'
b.	[poe]	'road, path'
	[poea]	'road-ACC, path-ACC'
c.	[ižappɨ]	'coyote'
	[ižappɨ]	'coyote-ACC'
d.	[appɨ]	'father'
	[appɨa]	'father-ACC'

Accusative Nasalization (24) suggests that the principle blocking deletion of stem-final nasals before the accusative suffix is a property of this suffix. In particular, it seems that the accustive suffix -*a* requires an onset. I formalize this notion in the constraint in (25).

(25) ONSACC: The accusative suffix -*a* has an onset.

This constraint can be seen as the particularization to a specific morpheme of a more general constraint on syllable structure, ONS (Prince and Smolensky 1993: 16), which requires syllables to have onsets.[4] ONSACC is ranked above ALIGN-R, which was motivated in section 3.2 for pre-vocalic Nasal Deletion, since its requirements take precedence over the deletion pattern presented there. The tableau in (26) shows the candidate competition for the form (23b) t̪θoːna 'bead-ACC' with prosodic structure made explicit, under the assumption that the Nasalizing final feature is a full segment.

(26) ONSACC » ALIGN-R

	ONSACC	ALIGN-R
a. ☞ 		*
b. 	*!	

In (26), candidate (26b) violates ONSACC since the accusative suffix is allowed to surface without an onset. This is a sufficiently serious violation to merit the elimination of this candidate, given the ranking of the constraints. Candidate (26a) however, satisfies ONSACC by syllabifying the Nasalizing final feature as the onset for the accusative suffix. This prosodic parse entails a violation of ALIGN-R since there is a mismatch between morpheme

[4]Limiting a constraint to a single morpheme has precedents in the Optimality Theory literature. In Prince and Smolensky (1993), a discussion of Tagalog infixation makes reference to an Alignment constraint which is restricted to the morpheme *um* (Prince and Smolensky 1993: 35). More recent work (Hammond 1995, Russell 1995, and Elzinga 1995) carries this notion further and argues that underlying phonological forms as such do not exist, but are in fact encoded as constraints in the constraint hierarchy. This move allows for the elegant expression of exceptions and exceptional patterns.

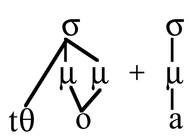
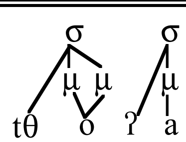
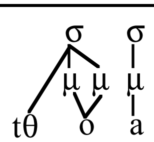
and syllable boundaries on the right edge, but this constraint violation is not serious enough to prevent the selection of (26a) as the optimal candidate.

In addition to the Faithfulness constraint MAX prohibiting deletion of an underlying segment, there is a constraint DEP which prohibits insertion of segments which are not present in underlying representation. As with MAX, I assume that by 'segment' is meant the root node and its associated features. In languages with epenthesis, DEP is violated regularly to rescue otherwise ill-formed prosodic structures. DEP is defined in (27).

(27) DEP: An output segment has a correspondent in the input.

The accusative forms given in (24) show that the constraint DEP must be ranked above ONSACC, since none of these forms provides the accusative suffix with an onset; this is shown in the candidate competition in (28) for the form in (24a) t̪θoːa 'great-grandparent-ACC'.

(28) DEP » ONSACC

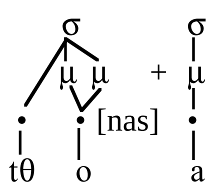
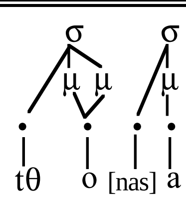
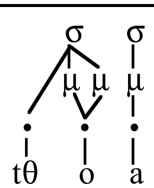
	DEP	ONSACC
a. 	*!	
b. ☞ 		*

In the tableau in (28), insertion of a consonant in (28a) to satisfy ONSACC results in a violation of higher-ranking DEP (I assume a glottal stop for purposes of illustration; any consonant would be as egregious a violation of DEP in this case). Candidate (28b) avoids this violation at the cost of an ONSACC violation. Since DEP is ranked above ONSACC the candidate satisfying it (28b) is preferred over (28a) which violates it, in spite of its violation of ONSACC. The constraint hierarchy DEP » ONSACC » ALIGN-R thus correctly accounts for the attested patterns of accusative formation in Gosiute under the assumption that the Nasalizing final feature is a full segment. This ranking of these three constraints in fact follows from this assumption.

4.2. Accusative Nasalization and floating [nasal]

The alternative to a segmental analysis of final features is to assume that they are latent segments consisting of floating features not linked to a root node. If the morpheme-final nasal element is a floating [nasal] feature underlyingly, then ONSACC must outrank DEP, as shown in (29) for the input /t̪θoːn-a/ 'bead-ACC'.

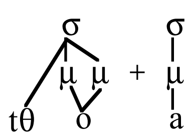
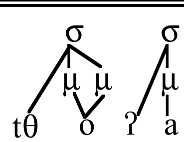
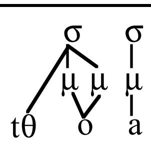
(29) ONSACC » DEP

	ONSACC	DEP
a. ☞ 		*
b. 	*!	

Candidate (29a) [t̪θoːna] violates DEP because of the insertion of the root node dominating the feature [nasal]. However, it satisfies higher-ranked ONSACC. Candidate (29b) [t̪θoːa] avoids a DEP violation by not providing the accusative suffix with an onset. In so doing, a violation of higher-ranking ONSACC is incurred. Candidate (29a) is judged optimal since it satisfies the higher ranked constraint, ONSACC.

This ranking predicts that noun stems which do not have a floating feature of any kind will insert a consonant in the accusative case. Recall from (24) that there are vowel-final noun stems which form the accusative simply by suffixation of -a. The ranking ONSACC » DEP incorrectly predicts that these forms will have an epenthetic consonant in order to satisfy the requirements of ONSACC. This is shown in the tableau in (30) for the underlying form /t̪θoː-a/ 'great-grandparent-ACC'.

(30) ONSACC » DEP: incorrect prediction

	ONSACC	DEP
a. ✘ 		*
b. (☞) 	*!	

In the tableau in (30), the ranking ONSACC » DEP demands the insertion of a consonant to avoid violation of high-ranking ONSACC. However, forms such as candidate (30a), which is selected by the constraint hierarchy as optimal, are unattested in the language. This constraint ranking thus fails to account for the full range of accusative suffix patterns of the language.

In summary, when the stem-final nasal elements are assumed to be floating features, the constraint ranking ONSACC » DEP which accounts for Accusative Nasalization cannot account for accusatives of vowel final stems. As with the discussion in chapter 4 concerning Gemination, the representation of the final feature as a segment with a root node is crucial for the correct outcome.

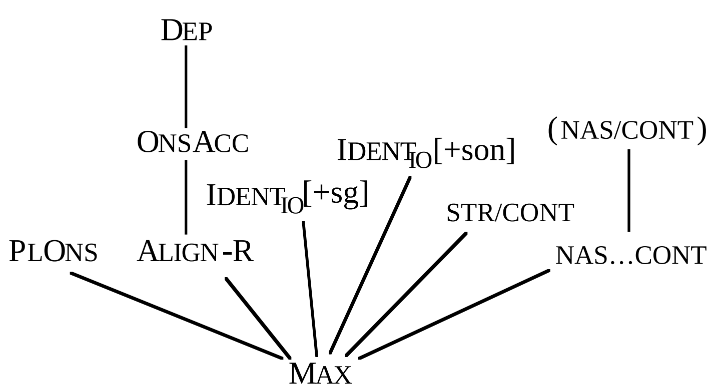
4.3. Summary

The analytical task of determining the ranking of OnsAcc and Dep depended crucially on the representation of the morpheme-final nasal element. When this element was taken to be a floating feature the ranking required to get the Accusative Nasalization facts right (OnsAcc » Dep) yielded false results for other cases not involving a final nasal element. Assuming that the final nasal element was a full segment required a ranking which not only got the Accusative Nasalization facts right, but also correctly accounted for cases where no such final element was present. For this reason, I conclude that morpheme final nasal elements in Gosiute are best represented as full segments.

5. Conclusion

The constraints invoked in this chapter show the ranking relations given in (31).

(31) Ranking relations



In this chapter I have provided an analysis of Nasalization in Gosiute. The homorganicity of NC clusters is primarily a consequence of the ranking of IDENT_{IO}ONS[Place] and PLONS above IDENT_{IO}[Place]; this ranking requires that place features be linked to an onset, thus prohibiting codas from having place features independent of onsets and that the place of the onset is preserved over the place features of the coda.

The deletion of the Nasalizing final feature is the result of low-ranking MAX. In heteromorphemic nasal-continuant sequences nasal deletion was shown to be in part the result of a sequential grounded constraint NAS…CONT. An explanation for nasal deletion before vowels was shown to follow from the ranking of PLONS and ALIGN-R above MAX. Nasal deletion before glides is the result of ranking IDENT_{IO}[+son] above MAX.

Finally, the decision to represent morpheme-final nasal elements as full segments received justification from an analysis of Accusative Nasalization. When the Nasalizing final feature is assumed to be a segment with root node, the ranking DEP » ONSACC » ALIGN-R yielded the correct outputs for Nasalizing stems and non-Nasalizing stems alike. Assuming Nasalization to be a floating feature led to a contradiction in which either the Nasalizing stems or the non-Nasalizing stems were accounted for, but not both at the same time.