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Nasal Assimilation

Introduction

Nasal assimilation is a common cross-linguistic phenomenon that generally occurs when a nasal consonant is followed by a stop, fricative, or affricate. The nasal sound often takes some quality of the following obstruent. This rule occurs in English in certain circumstances, such as *em-power* and *en-lighten*. The morphemes *em-* and *en-* carry the same meaning, and this rule explains how they are underlyingly one morpheme. Since the nasal sound in *em-power* is followed by the labial sound /p/, the sound assimilates the place of articulation of /p/ and becomes /m/. For the word *en-lighten*, the nasal sound in the prefix is followed by the voiced alveolar stop /d/. This environment causes the nasal to assimilate the alveolar place of articulation and become /n/. Following this rule, the words **enpower* and **emlighten* are ungrammatical since the nasal does not match the place of articulation. This variety is called nasal place assimilation since the place of articulation is the feature that is assimilated into the nasal sound. English nasal assimilation is much more complicated than this, but we will only use these as a simple example of the rule in a familiar language before discussing more unfamiliar languages.

While the English example may appear to be the way languages necessarily must use the rule, many languages have different rules for nasal assimilation. In this, we will be discussing the languages of Norwegian (Germanic, Indo-European), Cairene Arabic (Semitic, Afroasiatic), and Welsh (Celtic, Indo-European).

Language 1: Norwegian

The Norwegian language is native to the country of Norway in Scandinavia. It is a descendant of Old Norse and is closely related to Swedish and Danish, and more distantly related to Icelandic, English, Dutch, and German. Norwegian has three nasal stop phonemes: the labial /m/, the alveolar /n/, and the velar /ŋ/. The dataset in (1) gives examples of some morphologically simple words that show nasal place assimilation within words.

(1) Data Illustrating Norwegian Nasal Place Assimilation Within Morphemes (from Kristofferson 2000)

	Word	Gloss
a.	[kɑmp]	‘battle’
b.	[tɛm.pu]	‘tempo’

c. [ɾum.bə] ‘rhombus’
d. [kɑnt] ‘edge’
e. [tɑn.tə] ‘aunt’
f. [kʉn.də] ‘customer’
g. [tɑŋk] ‘tank’
h. [tɑŋ.kə] ‘thought’
i. [tɑŋ.gu] ‘tango’

Based on this dataset, we can determine a simple underlying rule for Nasal Place Assimilation in Norwegian.

(A) Rule A: Simple Nasal Place Assimilation in Norwegian

This rule states that, in general, a nasal sound gains the place of articulation of the following consonant. Assuming we treat each of the nasal sounds in the dataset as /n/ underlyingly, we can show examples of the rule’s application as follows:

UR	kɑnt	tɑn.gu	kɑnp
	N/A	--ŋ--	--m-
PR	kɑnt	tɑŋ.gu	kɑmp

The first word in the above example, /kɑnt/, contains one nasal sound followed by an alveolar stop. Since the nasal sound is the alveolar nasal /n/, the sound remains unchanged and results in a phonetic realization of [kɑnt]. However, the second word /tɑn.gu/, contains an alveolar nasal followed by a velar stop. This environment triggers the rule, which changes the alveolar nasal /n/ to the velar nasal /ŋ/. The change generates a phonetic realization of [tɑŋ.gu]. The final word, /kɑnp/, contains an alveolar nasal followed by a labial stop. Since the two sounds do not match in place of articulation, the rule applies and transforms the alveolar nasal /n/ into a labial nasal /m/. This causes the final phonetic realization to be [kɑmp].

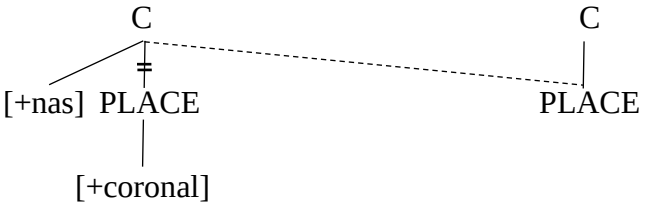
While this rule applies in all morphologically simple circumstances given in the dataset, there are some environments along morpheme boundaries that are exceptions to this rule. These examples can be seen in the dataset in (2), as listed below:

(2) Dataset Illustrating Conditional Nasal Place Assimilation in Norwegian (see Kristofferson 2000)

	Word	Gloss
	/li:m/ stem	
a.	[li:m.bɔn]	‘adhesive tape’
b.	[li:m.tʉ:.bə]	‘a tube of glue’
c.	[li:m.kɾuk.kə]	‘a pot of glue’
	/saŋ/ stem	
d.	[sɑŋ.bu:k]	‘song book’
e.	[sɑŋ.stɛm.mə]	‘singing voice’
f.	[sɑŋ.ku:ɾ]	‘choir’
	/tan/ stem	
g.	[tɑn.tɾo:]	‘dental floss’
h.	[tɑm.bœʂ.tə]	‘toothbrush’
i.	[tɑŋ.kɾe:m]	‘toothpaste’
j.	[tɑɱ.ʋæɾk]	‘toothache’

In (2), it becomes apparent that /m/ and /ŋ/ do not assimilate to the following consonant while /n/ does. Based on this evidence, we must propose a rule that is more specific and accounts for these variations. The new rule can be expressed as follows:

(B) Rule B: Nasal Place Assimilation in Norwegian



This new rule states that coronal nasals adopt the place of articulation of the following consonants. Norwegian has one phonemic coronal nasal stop, the alveolar nasal /n/. This means the rule will not apply to the stops /m/ and /ŋ/. However, it will still function on the examples listed for Rule A since we assumed each of those nasal sounds had an underlying /n/ phoneme. Examples from (2) that show this dataset are given below:

UR	li:m.kɾuk.kə	tɑn.kre:m	tɑn.bœʂ.tə
	N/A	--ŋ----	--m-----
PR	li:m.kɾuk.kə	tɑŋ.kre:m	tɑm.bœʂ.tə

In the first of these examples, the word /li:m.kɾuk.kə/ contains one nasal sound, but it is not the alveolar nasal. This means the rule does not apply to the word, which leaves the phonetic realization of [li:m.kɾuk.kə] unchanged from the underlying representation. The second word, /tɑn.kre:m/, contains an alveolar nasal followed by a velar stop. This triggers Rule B, which generates a phonetic realization of [tɑŋ.kre:m]. Finally, the word /tɑn.bœʂ.tə/ has one alveolar nasal, and that sound is followed by the labial /b/. This causes Rule B to apply and change the alveolar nasal /n/ to a labial nasal [m], which results in a phonetic realization of [tɑm.bœʂ.tə]. Based on datasets 1 and 2, we can determine that only alveolar nasal sounds are assimilated in Norwegian, while the labial and velar nasals are not.

Language 2: Cairene Arabic

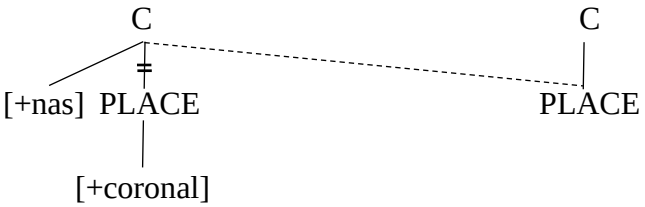
Cairene Arabic is the dialect of Arabic spoken within and around Cairo, Egypt that has become the standard dialect of Egypt. The dialect contains nasal place assimilation that functions similarly to Norwegian, but also includes a rule of sonorant deletion that Norwegian lacks. A dataset for simple assimilation is listed below in (3):

(3) Dataset Showing Nasal Place Assimilation in Cairene Arabic (see Watson 2002)

	Word	Gloss
a.	[ʒɑmb]	‘side’
b.	[bɑŋk]	‘bank’
c.	[miŋkɑm]	‘from how many, much’
d.	[miɱfɑjn]	‘from where’
e.	[mimmɑtɑ:]	‘from when’
f.	[nimsɑ:wi]	‘Austrian’

From this dataset, we can determine that the general nasal place assimilation rule of Norwegian applies to these words. Assuming that the nasal sounds that have the same place of articulation as the following consonant have an underlying representation of /n/, the rule would be as follows:

(C) Rule C: Nasal Place Assimilation in Cairene Arabic



This rule is identical to the Norwegian Rule B. It expresses that a coronal nasal, only one of which exists phonemically in Cairene Arabic, adopts the place of articulation of the following consonant. Given the dataset in (3), we can show this rule as follows:

UR	nimsɑ:wi	bɑnk	minfɑjn
	N/A	--ŋ-	--ɱ----
PR	nimsɑ:wi	bɑŋk	miɱfɑjn

In the first word, /nimsɑ:wi/, there are two nasal sounds. The alveolar nasal is followed by a vowel, so the conditions for the rule are not met. The labial nasal is followed by a consonant with a different place of articulation, but the nasal itself is exempt from the rule since it is not alveolar. Therefore, the word remains unchanged in its phonetic realization of [nimsɑ:wi]. In the second word, /bɑnk/, the alveolar nasal sound is followed by a velar stop. This causes the nasal sound to shift its place of articulation to be velar, rather than alveolar, to form [ŋ]. The change results in a phonetic realization of [bɑŋk]. Finally, the word /minfɑjn/ contains three nasal sounds. One sound is followed by a vowel, and another by a word boundary, so the environment is not met for either of those. However, the alveolar nasal in the middle of the word is immediately followed by the labiodental fricative /f/. The rule applies to this environment and causes the alveolar /n/ to become a labiodental [ɱ]. As a result, the phonetic realization of the word is [miɱfɑjn]. In all these examples, the Norwegian Rule accurately predicts and generates the correct phonetic realization for Cairene Arabic words.

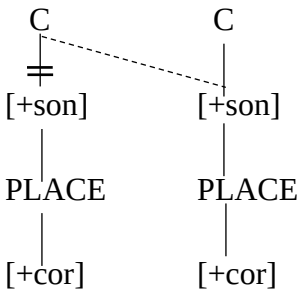
Cairene Arabic has a sonorant assimilation rule that extends beyond the Norwegian Rule. In Cairene Arabic, a coronal sonorant immediately preceding another coronal sonorant assimilates to match both nasally and laterally. A dataset that shows this is listed below in (4):

(4) Dataset Illustrating Sonorant Assimilation in Cairene Arabic (see Watson 2002)

	Word	Underlying Morphemes	Gloss
a.	[kɑ:llu]	/kɑ:n + lu/	‘it was to him; he had’
b.	[mɑ:nnɑ]	/mɑ:l + nɑ/	‘our property’
c.	[ʔunnɑ]	/ʔul + nɑ/	‘we said’
d.	[mirrigle:h]	/min # rigle:h/	‘from his legs’
e.	[millitne:n]	/min # litne:n/	‘from the two’
f.	[hɑrɑmlik]	/hɑrɑm + lik/	‘women’s quarters/

In this dataset, the first coronal sonorant changes to match the second. This can be expressed as the rule below

(D) Rule D: Sonorant Assimilation in Cairene Arabic



Rule D states that a coronal sonorant will assimilate all attributes of a following coronal sonorant. The phonemic coronal sonorants present in Cairene Arabic are /n/, /l/, and /r/. Given the underlying representations and phonetic realizations in (4), we can prove the rule as follows:

UR	haramlik	kɑ:nlu	mɑ:lnɑ	minrigle:h
	N/A	--l--	--n--	--r------
PR	haramlik	kɑ:llu	mɑ:nnɑ	mirrigle:h

The first word listed above, /haramlik/, contains a nasal followed by a coronal sonorant. However, the nasal is the labial nasal /m/, not the coronal nasal /n/. Therefore, the rule does not apply and leaves an unchanged phonetic realization of [haramlik]. The second word, /kɑ:nlu/, has the nasal coronal sonorant /n/ followed by the lateral coronal sonorant /l/. This causes the rule to apply and creates a phonetic realization of [kɑ:llu]. The reverse of that sound cluster is found in the third word, /mɑ:lnɑ/. The lateral coronal sonorant /l/ is followed by the nasal coronal sonorant /n/. The /l/ then assimilates the features of the /n/ since the rule applies. This generates a phonemic realization of [mɑ:nnɑ]. Finally, the phrase /minrigle:h/ contains a nasal coronal sonorant /n/ followed by the alveolar trill /r/. Since both are coronal sonorants, the /n/ takes the features of the /r/ to become [r]. This results in a phonemic realization of [mirrigle:h].

This rule is more extreme than the other nasal assimilation rule since it assimilates every aspect of the sound. With this rule, a nasal sound loses every feature that distinguishes it from the following coronal sonorant. While this rule applies more readily to coronal sonorants than nasals, the coronal nasal is the nasal sound assimilated by Rules B and C. In addition, this rule causes assimilation of nasal sounds and creates nasal sounds through assimilation. Based on these qualifications, I decided it was necessary to discuss

this rule when discussing nasal assimilation. Since this rule changes every aspect of a nasal sound except for its place of articulation, it shows how attributes other than place can be assimilated by a nasal. While place assimilation is more common cross-linguistically, other varieties of assimilation are possible.

Language 3: Welsh

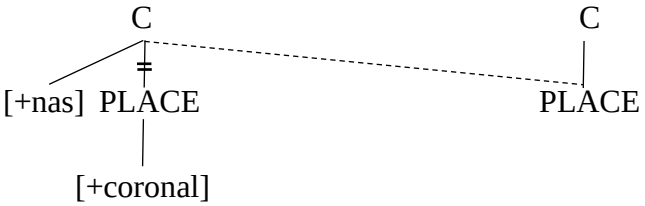
Welsh is a Celtic language native to the country of Wales on the western coast of Great Britain and is one of the official languages of Wales. It, along with other Celtic languages, has a complex mutation system that functions on morpheme boundaries. One mutation within this system is a form of nasal assimilation. A dataset that shows this mutation is shown in (5) below:

(5) Dataset Illustrating Nasal Assimilation in Welsh (see Kibre 1997)

	Word	/ən/+Word	Gloss
a.	[pabeł]	[əm m̥abeł]	‘tent’
b.	[taləbont]	[ən n̥aləbont]	‘Talybont’
c.	[kairdi:ð]	[əŋ ŋ̊airdi:ð]	‘Cardiff’
d.	[baŋgor]	[əm maŋgor]	‘Bangor’
e.	[dolgełai]	[ən nolgełai]	‘Dolgellau’
f.	[garð]	[əŋ ŋarð]	‘garden’

This dataset presents some interesting information in that the assimilation happens to both the nasal sound and the following stop. The assimilation of the nasal sound is identical to Norwegian Rule B and Cairene Arabic Rule C, as expressed below.

(E) Rule E: Nasal Place Assimilation in Welsh



This rule shows that the alveolar nasal /n/ copies the place of articulation of the following consonant. However, this rule on its own will not generate grammatical phonetic realizations for Welsh. A second rule describing the changes that occur to the following consonant is detailed below.

(F) Rule F: Obstruent Nasal Assimilation in Welsh

[-continuant] → [+nasal] / C[+nasal] # _____

This rule states that a stop becomes a nasal sound when preceded by a nasal sound on a word boundary. The dataset only shows changes along word boundaries since it is related to Welsh mutation, which occurs only on word boundaries. An important detail to note about this rule is that voicing is not explicitly defined. A voiceless stop would generate a voiceless nasal, which agrees with the dataset but did not occur in Norwegian or Cairene Arabic. Examples of this rule and Rule E applying are given below:

UR	ən taləbont	ən kairdi:ð	ən baŋgor
Rule E	N/A	-ŋ-------	-m------
Rule F	--n̥-------	--ŋ̊------	--m-----
PR	ən n̥aləbont	əŋ ŋ̊airdi:ð	əm maŋgor

The first phase, /ən taləbont/, contains an alveolar nasal sound followed by a voiceless alveolar stop. Since the places of articulation are identical, Rule E does not apply. However, since the alveolar stop follows the nasal, Rule F applies to transform it into a voiceless alveolar nasal. This results in a phonetic realization of [ən n̥aləbont]. The second phrase, /ən kairdi:ð/, has an alveolar nasal followed by a voiceless velar stop. Since the sounds do not match in place of articulation, the nasal sound becomes velarized to [ŋ] by Rule E. In addition, the /k/ sound becomes nasalized since it meets the environment detailed in Rule F. This generates a phonetic realization of [əŋ ŋ̊airdi:ð]. Finally, the phrase /ən baŋgor/ contains an alveolar nasal followed by a voiced labial stop. This environment triggers Rule E since the nasal and the stop do not share a place of articulation. Rule E then transforms the alveolar /n/ to the labial [m]. Following that, the environment also meets the requirements for Rule F to apply. This causes Rule F to change the voiced labial stop /b/ into the voiced labial nasal [m]. These changes result in a final phonetic realization of [əm maŋgor]. It is important to note that these rules are not necessarily ordered and applying Rule F before Rule E will generate the same results.

Conclusion

Each of these languages expressed nasal assimilation in a slightly different manner than the others, but one underlying rule emerged when comparing them. In all three languages, the alveolar nasal changed its place of articulation to be the same as the following consonant, as shown in Rule B, Rule C, and Rule E. Based on this small linguistic sample, this rule appears to occur across unrelated languages with little linguistic interaction. Further research into more languages would be necessary to determine the extent of the commonality of this rule, but the fact that it occurred in three unrelated

languages is not an insight that should be casually dismissed. Furthermore, nasal assimilation often extends beyond this simple rule. In Cairene Arabic, assimilation caused the complete loss of the features of a sound and total replacement by the following sound. This assimilation happened to nasals, but also was caused by nasals. In addition, Welsh assimilated oral stops into nasal stops, but maintained the stop's original voicing. Voiceless nasal sounds are uncommon, but Welsh nasal assimilation generated them regularly. Despite all these differences and unique attributes, the alveolar nasal place assimilation rule remained constant across all languages surveyed. This conclusion leads to the question of how common the rule is, which is a question that can only be answered by further research.

References

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