

# Alternatives to Stricture-Driven Assimilation

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## 1 Introduction

Sequences of nasals followed by fricatives have proven to be a special case of marked structures cross-linguistically, triggering repairs that are not enforced with other sequences, such as nasals followed by stops. Most orthodox analyses of the marked cases of nasal+fricative rely on the feature [continuant], viewing stops and nasals as sharing the value [-cont], and nasals and fricatives as being mismatched for the value of the feature. This mismatch is thought to be the source of the markedness of this configuration.

This short paper engages the possibility, proposed by Mielke (2005, 2008), that nasals in some languages have the opposite value for the feature continuant, which predicts that they are in conflict with the value for stops in these languages. The further prediction is that in these languages, fricatives should exhibit assimilation, but stops will trigger other repairs. A case study from Finnish indicates that this is not the case: as normally happens, stops undergo place assimilation, but fricatives either resist assimilation, or undergo other repairs.

## 2 The role of stricture in nasal place assimilation

Work on assimilation involving nasals, notably by Padgett (1991, 1994, 1995), has indicated that nasal place assimilation not only involves agreement in place of articulation, but often also agreement in stricture. Padgett's observation is that while nasals assimilate in place of articulation to a following stop, post-nasal fricatives may behave differently. For example, English nasal place assimilation with the prefix *in-* is obligatory with stops, but not with fricatives (Padgett 1994:471):

- |     |            |             |
|-----|------------|-------------|
| (1) | impale     | *inpale     |
|     | impossible | *impossible |
|     | implicit   | *implicit   |
|     | infallible | *imfallible |
|     | infamous   | *imfamous   |
|     | infinite   | *imfinite   |

According to Padgett, this nasal+fricative structure can surface unaltered in some languages, such as English, or can be repaired by either (a) the nasal becoming a continuant, (b) the nasal deleting, or (c) nasal place assimilation with simultaneous hardening of the fricative to an affricate or stop. Padgett identifies the source of this marked configuration as the co-occurrence of conflicting values for continuancy: a [-cont] nasal is followed by a [+cont] fricative. The same problem does not arise with stops because they are specified [-cont], identical to the nasals. These observations give rise to what might be termed "Padgett's generalization":

- (2) Padgett's generalization: If a language exhibits nasal place assimilation with fricatives, it also exhibits nasal place assimilation with stops.

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Padgett’s analysis of this generalization is representational in nature. Since there is an implicational effect, this can be representationally encoded by making the feature [continuant] subordinate to place of articulation. In geometric terms, not only the Place node, but also the individual place features dominate the stricture feature [cont]:

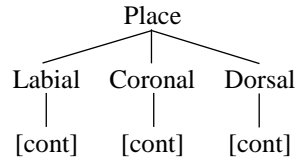


Figure 1: Geometry of place/stricture based on Padgett (1994)

The dependency between place and continuancy in this geometric representation guarantees that continuancy assimilation is possible, but only if place assimilation is realized.

A constraint-based approach to these patterns is offered by Baković (2007). The constraint [STR/PL] is proposed to account for the dependent stricture agreement (pg. 340):

- (3) [STR/PL]: Adjacent output segments that have the same place feature value must also have the same value of the stricture feature [ $\pm$ continuant]

In other words, if there is stricture agreement, there must be place agreement. This reflects the generalization in (2) in that nasals and stops are free to undergo place assimilation, with no further expectation of change (for the purpose of agreement). Fricatives, however, are subject to the additional force of this constraint. Pulleyblank (1997) presents an alternative analysis, where there are independent constraints that demand agreement with respect to [cont] and to [place], but with a fixed ranking imposed on these constraints, which amounts to roughly the same kind of effect.

Violating [STR/PL] is a possibility for a grammar, and as Baković notes, this is what obtains in varieties of English. Satisfying [STR/PL] is also possible by deleting the nasal altogether, but the more interesting repair strategies involve hardening the fricative into a stop, or converting the nasal into a fricative. As nasalized fricatives are extremely rare cross-linguistically, Baković adopts a constraint that prohibits these segment types in the output (NoNasFric).

Crucially, these options involve changes in response to postnasal fricatives, as stops automatically satisfy the constraint [STR/PL]. There is, however, one option that has yet to be considered: that the surface nasal is specified [+cont], but without exhibiting phonetic properties normally associated with [+cont]; i.e. without becoming a nasalized fricative. This alternative conception of nasals will be entertained in the remainder of this paper.

### 3 Nasal ambivalence

The explanation for the generalization in (2) crucially rests on the assumption that nasals are universally defined as [-cont] segments (cf. Chomsky & Halle 1968, Anderson 1976). Padgett (1994) expresses this as a marking condition “If [+nas, +cons], then [-cont]”, which Pulleyblank (1997) and Baković (2007) formalize as constraints banning continuant nasals. Recent work by Mielke (2005, 2008), however, has claimed that nasals are ambivalent with respect to the feature [continuant], and can pattern as either [-cont] or [+cont] on a language-specific basis. This stems from the fact that the phonetic cues to continuancy are ambiguous for these segment types. In fact, Mielke has demonstrated that nasals pattern as [+cont] *more* than [-cont] (in 63.8% of the languages in his database; cf. Mielke 2008). Languages identified by Mielke with this specification for nasals include systems where the nasals pattern with the fricatives and other continuant sonorants, to the exclusion of stops. While Kaisse (2011) warns against a wholesale adoption of [+cont] for nasals based on large-scale cross-linguistic studies, the detailed study of individual phonologies may warrant such an analysis.

A revised conception of Padgett’s generalization, which assumes that in some languages nasals can be specified as [+cont], generates novel predictions, specifically, that languages with [+cont] nasals which

display place assimilation triggered by stops must also display place assimilation with fricatives. This is the inverse of the prediction made with nasals that are specified as [-cont]. A corollary to this is that some subset of these languages will involve nasal place assimilation triggered by fricatives, but where stops are repaired because the disagreeing sequence of values for [continuant] is marked.

#### 4 Finnish nasal place assimilation

Finnish is one of the languages identified by Mielke (2005, 2008) as having [+cont] nasal consonants. The argument for this specification comes from the patterning of the coronal sonorants /n, l, r/ and the fricative /s/ in triggering deletion of a following /e/ (specifically, in some infinitives, the passive, the second participle active, the imperative, and the potential; Sulkala & Karjalainen 1992:394). This is illustrated in (4) with the process triggered by a nasal through the paradigm:

- (4) Verbal paradigm exhibiting /e/ deletion
- |         |            |                             |
|---------|------------|-----------------------------|
| mennä   | go-1inf    | (cf. <i>menen</i> ‘go-1sg’) |
| mennään | go-p-pas   |                             |
| mennyt  | go-2ptc    |                             |
| menkää  | go-imp+2pl |                             |
| mennee  | go-pot-3sg |                             |

There is thus justification, in the class triggering the process, for considering nasals to be marked [+cont]. Since the triggering class includes both the sonorants and the fricative /s/, it appears [+cont] is the only available label for the class. Since the coronal nasal belongs to this class, there is no immediate way of accounting for this class without resorting to a disjunctive use of distinctive features. All other things being equal, resorting to a reclassification of Finnish nasals as [+cont] would appear to be an ad hoc solution to the problem. However, given the context of Mielke’s findings, it is actually not uncommon for systems to be organized in this fashion. Thus, the pattern in (4), while only a single pattern, at present provides compelling evidence for entertaining the notion that Finnish nasals are [+cont].

In addition to this pattern, nasals in the language tend to agree in place of articulation with a following stop. Suomi et al. (2008) provide a detailed discussion of this phenomenon, including in postlexical contexts. Across word boundaries, there is place assimilation of a word-final nasal to a word-initial stop:

- (5) Nasal place assimilation preceding stops
- |             |                 |              |
|-------------|-----------------|--------------|
| tytön pää   | ‘a girl’s head’ | [tytømpæ:]   |
| tytön takki | ‘a girl’s coat’ | [tytøntak:i] |
| tytön kello | ‘a girl at’     | [tytøŋkel:o] |

Suomi et al. go on to explain that /n/ can be deleted before the fricatives /h/ and /s/ (and also possibly before /f/) in these contexts, and that this is especially true for informal or rapid speech:

- (6) Nasal deletion/assimilation preceding fricatives
- |               |                              |                    |
|---------------|------------------------------|--------------------|
| järven hiekka | [jærvehiekka]                | ‘lake sand’        |
| järven selkä  | [jærveselkæ]                 | ‘back of the lake’ |
| pojan farkut  | [pojafarkuŋ] ~ [pojɑmfarkuŋ] | ‘boy in jeans’     |

Suomi et al. note that labiodental [ŋ] is rare, as both the phoneme /f/ and the sequence /mf/ are rare to begin with in Finnish, and that these tend to show up in loanwords (*kamferi* ‘camphor’).

Thus, despite Finnish having a set of nasals that appear to class with the [+cont] segments, nasal+fricative sequences continue to behave as marked structures, and are repaired through deletion, one of the strategies originally observed by Padgett.

## 5 Discussion

The interesting result derived from this case study is the discovery of the fact that even when the value for [cont] with respect to nasals is inverted to [+cont] within a system, Padgett's original generalization still holds true. This proves to be problematic for approaches like Padgett's, which rely on the grammar enforcing a continuancy agreement on nasals and obstruents. That is, the generalization is not due simply to the continuancy value of the nasal; instead, it is symptomatic of a deeper problem with the ordered sequence of nasals and fricatives. The fact that none of the "[+cont] nasal" languages exhibit repairs with postnasal stops supports this. The conclusion is that nasal-fricative sequences must be marked structures, a possible explanation for phenomena such as intrusive stops interrupting these sequences in English, even for dialects that normally tolerate nasal place assimilation with fricatives: [p.rɪnts] 'prince', etc. (cf. Ohala & Ohala 1993). These patterns imply that there exists a more specific constraint on nasals followed by fricatives. An extremely rough first approximation of this constraint is found in (7):

(7) \*NS: nasal-fricative sequences are prohibited

Such a constraint would simply replace [STR/PLC] in the rankings outlined in section 2. This approach, however, runs into a larger question about phonetic grounding, and what properties make nasal+fricative sequences marked. Nasals and fricatives are not perceptually more confusable than most other pairs of consonants (Miller & Nicely 1955), ruling out a perceptual grounding. There is, however, an articulatory motivation for the constraint. Ohala & Ohala (1993) claim that nasalization is often correlated with defricativization. They cite the intrusive stop phenomena from English and other languages, but also go on to note that the difficulty with obstruent airflow following nasals also extends to nasalized vowels, a state of affairs not predicted by Padgett (1991, 1994, 1995).

In relation to this, one final issue that this study raises is the role that other sonorant continuants play in triggering assimilation. If there is a continuancy agreement that holds between nasals and stops, and in other instances, nasals and fricatives, then it stands to reason that other sonorant continuants could also trigger assimilation (or other repairs) with stops. At present, it is not clear whether these types of patterns exist independently of other confounding patterns, though it is suggested as an avenue for future research.

## References

- Anderson, Stephen R. 1976. Nasal consonants and the internal structure of segments. *Language* 52:326-344.
- Baković, Eric. 2007. Local assimilation and constraint interaction. In Paul de Lacy (ed.), *The Cambridge handbook of phonology*. Cambridge: Cambridge University Press, pp. 335-351.
- Chomsky, Noam & Morris Halle. 1968. *The sound pattern of English*. New York: Harper and Row.
- Kaisse, Ellen M. 2011. The stricture features. In Marc van Oostendorp, Colin J. Ewen, Elizabeth Hume, & Keren Rice (eds.), *The Blackwell companion to phonology*. Malden, MA: Blackwell, pp. 288-310.
- Mielke, Jeff. 2005. Ambivalence and ambiguity in laterals and nasals. *Phonology* 22:169-203.
- Mielke, Jeff. 2008. *The emergence of distinctive features*. Oxford: Oxford University Press.
- Miller, George A. & Patricia Nicely. 1955. An analysis of perceptual confusions among some English consonants. *Journal of the Acoustical Society of America* 27:338-352.
- Ohala, John J. & Manjari Ohala. 1993. The phonetics of nasal phonology: Theorems and data. In Marie K. Huffman and Rena A. Krakow (eds.), *Nasals, nasalization, and the velum*. New York: Academic Press, pp. 225-249.
- Padgett, Jaye. 1991. Stricture in feature geometry. PhD dissertation, University of Massachusetts, Amherst.
- Padgett, Jaye. 1994. Stricture and nasal place assimilation. *Natural Language & Linguistic Theory* 12:465-513.
- Padgett, Jaye. 1995. Partial class behavior and nasal place assimilation. In Keiichiro Suzuki & Dirk Elzinga (eds.), *Proceedings of the 1995 Southwestern workshop on Optimality Theory*. Tucson, AZ: University of Arizona.
- Pulleyblank, Douglas. 1997. Optimality Theory and features. In Diana Archangeli & D. Terence Langendoen (eds.), *Optimality Theory: An overview*. Malden, MA: Blackwell, pp. 59-101.
- Sulkala, Helena, & Merja Karjalainen. 1992. *Finnish*. New York: Routledge.
- Suomi, Kari; Juhani Toivanen, & Riikka Ylitalo. 2008. *Finnish sound structure*. Oulu, Finland: Studia Humaniora Ouluensia.