Contrast shift as a type of diachronic change[*]

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1. Introduction

We propose that *contrast shift*, a change in the contrastive organization of a phonemic inventory, is an important type of phonological change. This insight goes back to Jakobson (1931),[1] but implementation of his idea was hampered by a lack of clarity as to how contrasts are represented in a phonological grammar. We assume, as in (1), that contrastive features are assigned hierarchically, using a method that was called "branching trees" in the literature of the 1950s and 1960s (Jakobson, Fant & Halle 1952; Jakobson & Halle 1956; Stanley 1967). We call it the Successive Division Algorithm (Dresher 1998; 2009), given informally in (2):

(1) *The contrastive feature hierarchy (Dresher 2009)*
Contrastive features are assigned by language-particular feature hierarchies.

(2) *The Successive Division Algorithm*
Assign contrastive features by successively dividing the inventory until every phoneme has been distinguished.

We assume further that phonology computes only contrastive features, in keeping with the Contrastivist Hypothesis in (3a); that is, only contrastive features can be *phonologically active*. If this hypothesis is correct, it follows as a corollary (3b) that if a feature is phonologically active, then it must be contrastive.

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[1]"Once a phonological change has taken place, the following questions must be asked: What exactly has been modified within the phonological system?…has the structure of individual oppositions [contrasts] been transformed? Or in other words, has the place of a specific opposition been changed…?"

(3) a. *The Contrastivist Hypothesis (Hall 2007)*

The phonological component of a language L operates only on those features which are necessary to distinguish the phonemes of L from one another.

b. *Corollary to the Contrastivist Hypothesis*

If a feature is phonologically active, then it must be contrastive.

One final assumption is that features are binary, and that every feature has a *marked* and *unmarked* value. We assume, as in (4), that markedness is language particular (Rice 2003; 2007) and accounts for asymmetries between the two values of a feature. We will designate the marked value of a feature F as [F], and the unmarked value as (*non-F*).

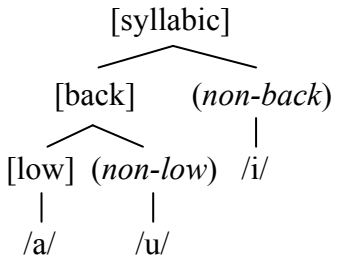
(4) *Feature markedness*

Each feature F has a marked value, [F], and an unmarked value, (*non-F*). Where these values function asymmetrically, the marked value is the more active one.

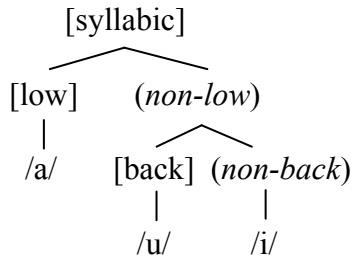
To illustrate the workings of the feature hierarchy and the Contrastivist Hypothesis, consider a hypothetical vowel inventory /i, u, a/. In (5), we illustrate two possible contrastive hierarchies and the feature specifications that they produce; hierarchies involving other contrastive features are also possible.

(5) *Two contrastive hierarchies for /i, u, a/*

a. *[back] > [low]*



b. *[low] > [back]*



The feature hierarchy constrains phonological activity in a number of ways. First, it follows from (3) that both /a/ and /u/ can potentially trigger backing in (5a), because both are contrastively [back]; in (5b), only /u/ is contrastively [back], so that is the only potential phoneme that could cause backing.

Second, the hierarchy constrains neutralization and merger: we make the hypothesis in (6). In (5a), we expect that /u/ could merge with /a/, whereas in (5b) it would more likely merge with /i/.

(6) *Hypothesis concerning diachronic mergers*

Mergers affect phonemes that are *contrastive sisters*.

Since the contrastive hierarchy has an important role in phonological patterning, we propose that a change in the hierarchy—a contrast shift—can have far-reaching effects on

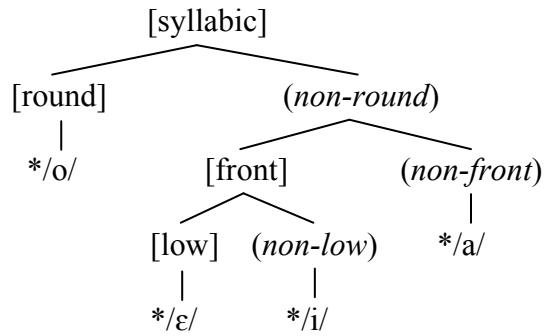
the phonology of a language.[2] That is, under the assumptions above, contrast shift itself emerges as an important type of diachronic phonological change. Further, a contrast shift can only be understood with reference to a particular feature hierarchy.

We will present two case studies of change in vowel systems that illustrate the importance of contrast shift. The first concerns a shift in the Eastern and Western Algonquian languages from Proto-Algonquian, as represented by the Central Algonquian languages. The second case involves shifts in the Khanty and Mansi languages as they developed from Proto-Ob-Ugric. Contrast shift will be shown to provide significant new insights into the patterning of sound change.

2. From Proto-Algonquian to the modern Algonquian languages

In a survey of the historical development of Algonquian vowel systems, Oxford (2011; 2012; forthcoming) identifies persistent patterns in vowel changes. In an attempt to make sense of these patterns, Oxford posits the feature hierarchy in (7) for Proto-Algonquian (the length contrast is omitted for ease of exposition).

(7) *Contrastive hierarchy for Proto-Algonquian vowels (Oxford, forthcoming): [round] > [front] > [low]*



The hierarchy in (7) is motivated by feature activity that can be recovered as having been present in Proto-Algonquian. Thus, */o/ triggers rounding, an indication that it has an active, hence contrastive, [round] feature. Similarly, */i/ triggers palatalization, indicating a contrastive feature we call [front]. Patterns of partial neutralization relate */ɛ/ and */i/, suggesting that they are contrastive sisters by (6). Finally, */a/ does not trigger any processes, consistent with its being assigned no positive (marked) contrastive features. This evidence is summarized in (8).[3]

[2]Other analyses that exploit the contrastive hierarchy in accounting for diachronic change include: Zhang (1996) and Dresher & Zhang (2005) on Manchu; Barrie (2003) on Cantonese; Rohany Rahbar (2008) on Persian; Dresher (2009: 215–225) on East Slavic; Compton & Dresher (2011) on Inuit; Gardner (2012), Roeder & Gardner (2012), and Purnell & Raimy (2013; forthcoming) on North American English vowel shifts and Old English; and large-scale studies by Harvey (2012) on Ob-Ugric, Ko (2010; 2011; 2012) on Korean, Mongolic, and Tungusic, and Oxford (2011; 2012; forthcoming) on Algonquian.

[3]See Oxford, forthcoming, for the sources of these observations.

(8) *Proto-Algonquian feature activity*

a. */o/ is [round]: triggers rounding

b. */i/ is [front]: triggers palatalization

c. */i, ɛ/ sisters: partial neutralization

d. */a/ has no positive contrastive features: is never a trigger

2.1 The Central Algonquian languages and Blackfoot

The Proto-Algonquian vowel feature hierarchy continues unchanged in the Central Algonquian languages and in Blackfoot. It accounts for two recurring patterns: (a) palatalization always includes */i/ as a trigger; and (b) */ɛ/ regularly merges with */i/. Examples of these processes are listed in (9). The patterns in (9a) support the view that palatalization is triggered by a contrastive [front] feature, and favours vowels that are (*non-low*); the mergers in (9b) are consistent with the idea (6) that mergers tend to involve terminal nodes in the feature tree.

(9) *Central Algonquian and Blackfoot feature activity*

a. *Palatalization always includes */i/ as a trigger*

i. Proto-Algonquian */t, θ/-palatalization is triggered by */i, i:/;

ii. Innu */k/-palatalization is triggered by */i, i:, ɛ:/;

iii. Betsiamites Innu /t/-palatalization is triggered by /i:/;

iv. Blackfoot */k/-assibilation is triggered by PA */i, i:/;

v. Blackfoot /t/-assibilation is triggered by Blackfoot /i, i:/.

b. **/ɛ/ regularly merges with */i/*

i. Partial or complete mergers of short */ɛ/ > /i/ occur in Fox, Shawnee, Miami-Illinois, Cree-Innu, Ojibwe, and Blackfoot;

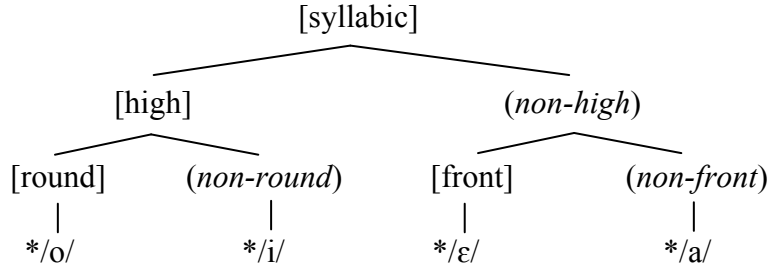
ii. long */ɛ:/ > /i:/ in Woods Cree, Northern Plains Cree, and Blackfoot.

2.2 The Eastern and Western Algonquian languages

On the eastern and western edges of the Algonquian area, developments diverge from the predictions of the Proto-Algonquian hierarchy: in particular, the high vowels, derived from Proto-Algonquian */o/ and */i/, begin to pattern together. In the east, Proto-Eastern Algonquian lost the length contrast only in the high vowels (i.e., the reflexes of */o/, */i/), and in the west, Proto-Arapaho-Atsina and Pre-Cheyenne merged */o, o:/ with */i, i:/.

Under the hierarchy inherited from Proto-Algonquian, however, the high vowels are not a natural class. If the hierarchy constrains patterning, then the height contrast, now reinterpreted as [high], must have come to outrank the place contrasts. That is, the feature [high] moves to the top of the hierarchy, creating the new hierarchy in (10).

(10) *Contrastive hierarchy for the eastern and western proto-languages (Oxford, to appear): [high] > [round] > [front]*



Subsequent developments in the eastern and western daughter languages follow the predictions of the new hierarchy. The patterns consistently differ from those of Central Algonquian: (a) palatalization in these languages is triggered by */ɛ/ but *excludes* */i/; and (b) */ɛ/ merges with or shifts to */a/ (not */i/). Instances of these processes are listed in (11).

(11) *Eastern and Western Algonquian feature activity*

a. *Palatalization is triggered by */ɛ/ but excludes */i/*
   i. Massachusett */k/-palatalization is triggered by Proto-Eastern Algonquian */ɛː/ but not */iː/;
   ii. Cheyenne "yodation", where */k/ > /kj/, is triggered by */ɛ(ː)/ only.

b. **/ɛ/ merges with or shifts to */a/*
   i. Partial or complete mergers of PA short */ɛ/ and */a/ occur in Abenaki, Mahican, Mi'kmaq, and Maliseet-Passamaquoddy;
   ii. Proto-Eastern Algonquian long */ɛː/ shifts to /aː/ in Massachusett and merges with */a/ in Western Abenaki;
   iii. long and short */ɛ(ː)/ shift to /a(ː)/ in Cheyenne;
   iv. vowel harmony involves */ɛ(ː)/ and */a(ː)/ in Arapaho.

Again, these patterns support the view that palatalization is triggered by a contrastive [front] feature: only /ɛ/ is contrastively [front] in these languages. The mergers in (11b) follow from the sisterhood of */ɛ/ and */a/ under the new hierarchy. A single contrast shift thus accounts for the patterning of a large number of phonological changes across the Algonquian family.

3. Contrast shifts in the Ob-Ugric Mansi and Khanty languages

The Algonquian languages have relatively simple vowel systems, and the types of phonological activity we observed follow from the contrastive trees in a rather straightforward manner. To see how alternations work in the context of more complex and asymmetric feature trees, we need to look at languages with larger vowel systems. Harvey (2012) shows that the principles of contrast shift can be used to describe the sound changes which have occurred over time in the vowel systems of the Ob-Ugric languages, from the

reconstructed Proto-Ob-Ugric up until modern times, starting approximately 3400 years ago when Hungarian split from Ob-Ugric. The Ob-Ugric languages are found in central Russia, to the east of the Ural mountains along the Ob river system. The two branches of Ob-Ugric are the Mansi languages, in the southwest, and the Khanty languages, to the east and north.

We will focus here on Mansi. Harvey (2012) posits the stages in (12) from Proto-Mansi to Early Western (13) and Early Northern Mansi (17), based on Steinitz (1955).

(12) *Stages from Proto-Mansi to Early Western and Northern Mansi*

a. Proto-Mansi: [long] > [front] > [high] > [round] > [low].

b. Western Mansi: At the Proto-Eastern-Western Mansi stage, [contour] becomes contrastive for two vowels: [long] > [front] > [high] > [round] > [low] > [contour]. Then in Early Western Mansi [round] is promoted one step above [high], causing [low] to be non-contrastive. This yields the hierarchy in (13).

c. Northern Mansi: [long] drops to the bottom of the hierarchy and [round] drops below [low] to give (17): [front] > [high] > [low] > [round] > [long].

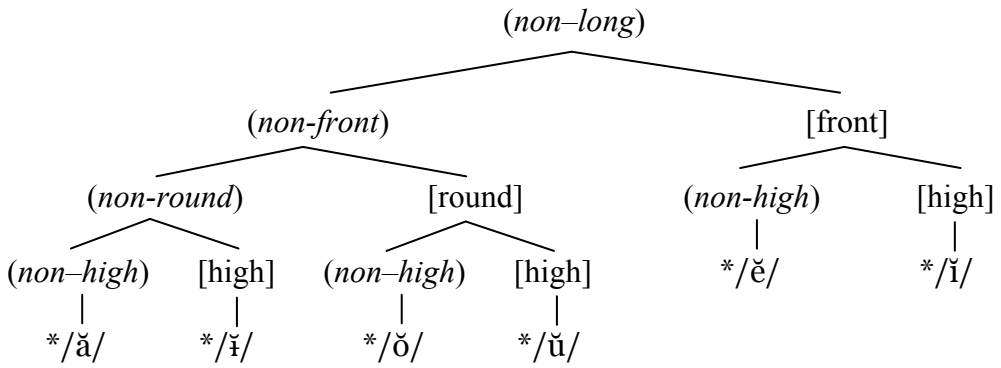
3.1 Western Mansi

Early Western Mansi (~600 ybp) has been reconstructed to have thirteen vowels (Steinitz 1955:154; Sammallahti 1988:504, Honti 1998:330). Harvey (2012) posits the Early Western Mansi contrastive hierarchy to be as in (13), where [contour] is realized as a diphthong (the hierarchies are for vowels in initial syllables, which exhibit the full range of contrasts).

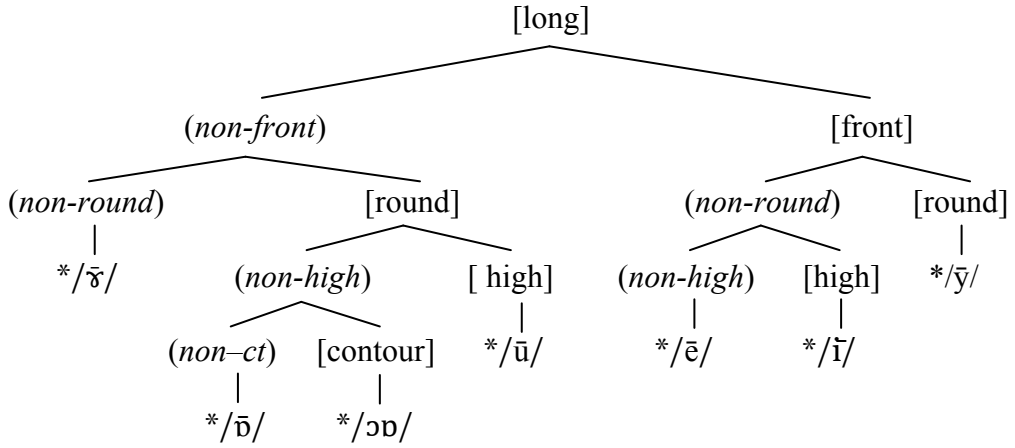
A major type of phonological activity that provides evidence for this hierarchy is front vowel harmony (14a), which we suppose to be governed by the feature [front]. The Ob-Ugric languages have no neutral vowels, therefore all vowels must have a contrastive value for this feature. Early Western Mansi also had a system of productive ablaut-like root vowel alternations, where a certain set of suffixes causes roots with long vowels to shorten, as in the Western Mansi examples in (14b).

(13) *Early Western Mansi contrastive hierarchy for (Harvey 2012): [long] > [front] > [round] > [high] > [contour]*

a. The (*non–long*) vowels



b. The [long] vowels



(14) *Early Western Mansi feature activity*

a. *Front vowel harmony*

Suffix vowels harmonize with root vowels in the feature [front]; thus, the vowel in the 1st person future suffix in Southern Mansi is front or back depending on the root vowel: e.g. *jām-ăm* 'I will go' ~ *wēr-ĕm* 'I will make'.

b. *Root vowel alternations*

A [long] vowel in a monosyllabic root becomes (*non-long*) when it occurs with specific lexically-defined inflectional or derivational suffixes, as well as appearing in certain compound environments: e.g. Western Mansi *kūrəm* 'three' > *kŭrmt* 'third'; *wɤ̄ɣm* 'I see' > *wăj* 'he/she sees'.

Both front vowel harmony and root vowel alternations have been reconstructed for the proto-languages (Honti 1988a:149; 1988b:174). Any contrastive hierarchy for Proto-Mansi must account for both of these processes. Moreover, changes to the hierarchies leading from Proto-Ob-Ugric to the modern languages must remain consistent with root vowel alternations or vowel harmony in those languages where these remain productive. That is, the features active in harmony and vowel alternation must remain contrastive.

The two processes in (14) crucially refer to the features [front] and [long], respectively, and both these features are contrastive over all vowels in (13).[4] The examples in (14) also illustrate the importance of markedness in the operation of these alternations. In front vowel harmony (14a), the suffix *-ăm* changes to *-ĕm*. Simply changing *ă* to be [front] yields the features (*non-long*), [front], (*non-round*), (*non-high*), a combination that does not exist in (13). In the branch of the tree under (*non-long*), [front], there is no contrastive (*non-round*); here we simply follow the path to (*non-high*), which yields */ĕ/. In (14b), the alternation */ū/ ~ */ŭ/ is straightforward (as is a similar

[4]Calling [long] a "feature" does not preclude representing the difference between long and short vowels in structural terms as well (see Odden 2011 for an overview of the representation of vowel length). However, the long/short contrast interacts with other features, and therefore has to be represented somewhere in the tree.

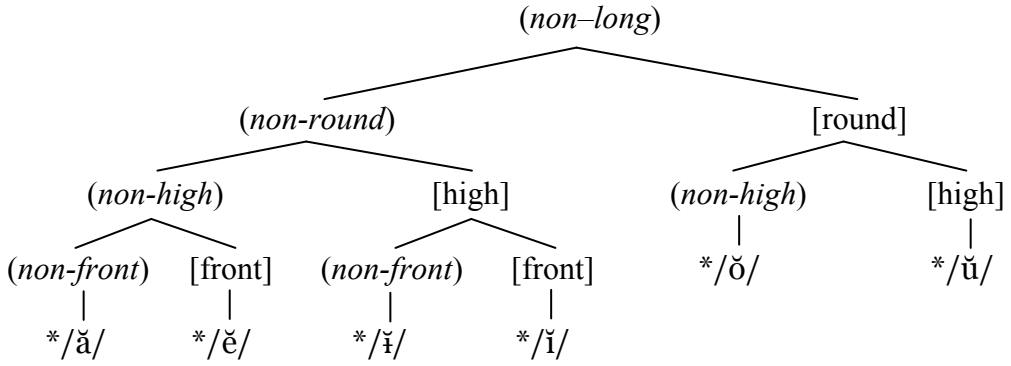
alternation */ī/ ~ */ĭ/), but */ɤ̄/ ~ */ă/ again shows the effects of choosing the unmarked value of an unspecified feature; in this case, we choose (*non-high*) */ă/ rather than [high] */ĭ/.

At some point a contrastive shift occurred whereby [front] dropped to the bottom of the hierarchy (15). As a result, five vowels, over one third of the inventory, no longer contrast for [front]. This change had important consequences for phonological activity in Western Mansi. First, front harmony is lost (Ob-Ugric harmony does not have neutral vowels).

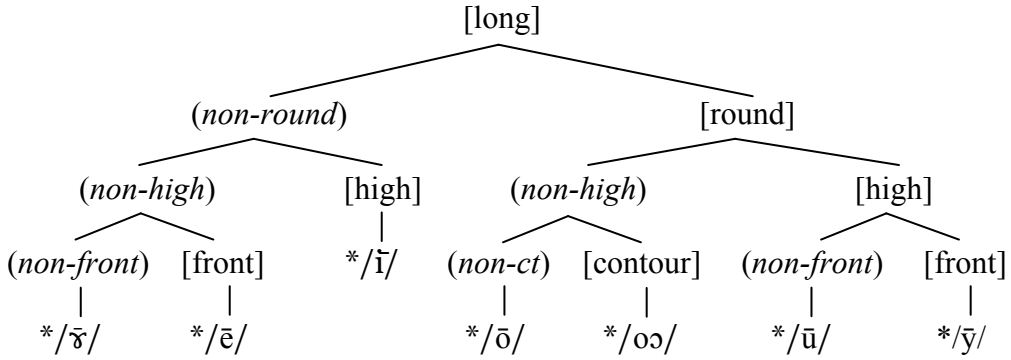
Second, the shift rearranges the pairs of vowels that participate in root vowel alternations. Previously, */ī/ could alternate with */ĭ/ by changing [long] to (*non-long*). Now, however, there are two short counterparts of */ī/ with features (*non-round*) and [high]; of these, */i̱/, not */ĭ/, is unmarked. One would predict that root vowel alternation would be lost as a productive process when a pair like Southern Mansi *ʌ̃ĭχ* 'wedge'~ *ʌ̃ĭχt* 'wedges' is no longer derivable by the phonology. Loss of productivity indeed occurs in the modern language.

(15) *Western Mansi contrastive hierarchy (Harvey 2012): [long] > [round] > [high] > [contour] > [front]*

a. The (*non–long*) vowels



b. The [long] vowels



A third consequence has to do with sub-phonemic drift. This can be illustrated by the diachronic changes that vowels with contrastive [contour] underwent, shown in (16).

(16) *Changes in the Western Mansi vowels contrastive for [contour] (Harvey 2012)*

a. [long], (*non-front*), (*non-high*), [low]: At the start of this stage the (*non-contour*) vowel was */ā/ and the [contour] vowel was */ʌ̄/. Later, in the stage shown in (13), they rounded to */ɒ̄/ and */ɔɒ/, respectively, an *enhancement* of their contrastive features (Stevens, Keyser & Kawasaki 1986; Hall 2011).

b. [long], (*non-front*), [round], (*non-high*): The addition of rounding may have contributed to the promotion of [round], with the consequence that [low] is no longer contrastive. Lacking [low] the vowels are free to raise to */ō/ and */oɔ/.

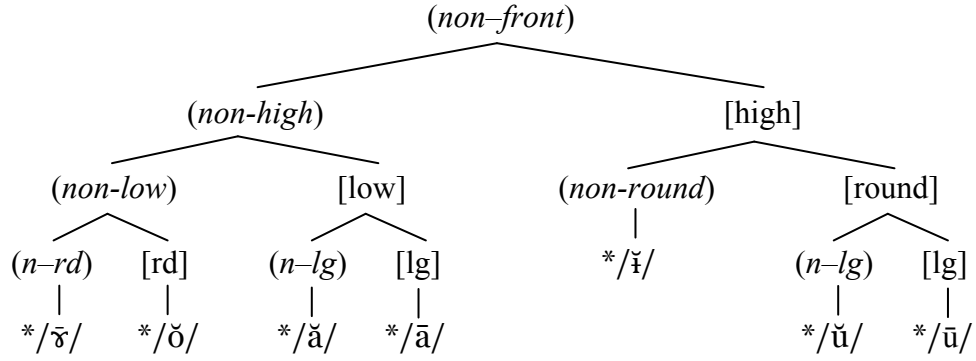
c. [long], [round], (*non-high*): When [front] is demoted as in (15), it no longer constrains the vowels' contrastive space. The result is that */oɔ/ is able to front to /øœ/ (e.g., Modern Western Mansi /øœmp/ 'dog'), while */ō/ is also fronted, though not as far (/o̝tər/ 'prince').

3.2 Northern Mansi

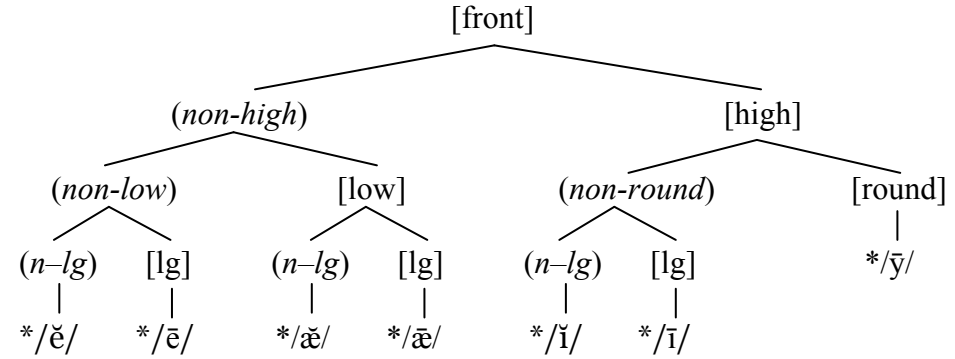
Northern Mansi has reduced phonological complexity more than any other Mansi dialect group, to the extent that front harmony and productive root vowel alternations have been completely lost. As in the Western dialect, all vowels in Early Northern Mansi were contrastive for [front] (see (12) above), and as in that dialect, [front] was demoted over time.

(17) *Early Northern Mansi contrastive hierarchy for (Harvey 2012): [front] > [high] > [low] > [round] > [long]*

a. The (*non–front*) vowels

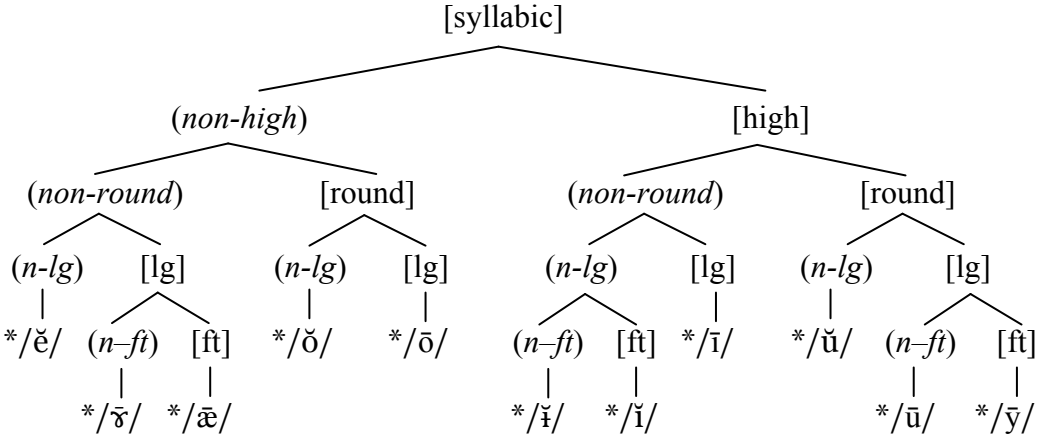


b. The [front] vowels



At a stage just prior to the modern Northern Mansi dialects, [front] had been demoted as shown in (18).

(18) *Pre-Modern Northern Mansi contrastive hierarchy (Harvey 2012): [high] > [round] > [long] > [front]*



When the front feature is dropped to the lowest rank, about half of the vowels lose their contrastive [front] feature. In the next stage the three remaining [front] vowels are merged to their back counterparts: */ǣ/ > */ɤ̄/, */ĭ/ > */ɨ̆/, and */ȳ/ > */ū/. Once complete, these mergers leave no vowels with a contrastive [front] feature at all. As expected, front harmony is no longer viable, and has disappeared from North Mansi.

We also expect that root vowel alternation would become untenable. For instance, in Proto-Mansi /ū/ alternated with /ŭ/. After */ȳ/ has merged with */ū/, there is no way for a speaker of the modern language to tell which /ū/ should alternate and which should not. As predicted, vowel alternation has almost completely vanished in Northern Mansi.

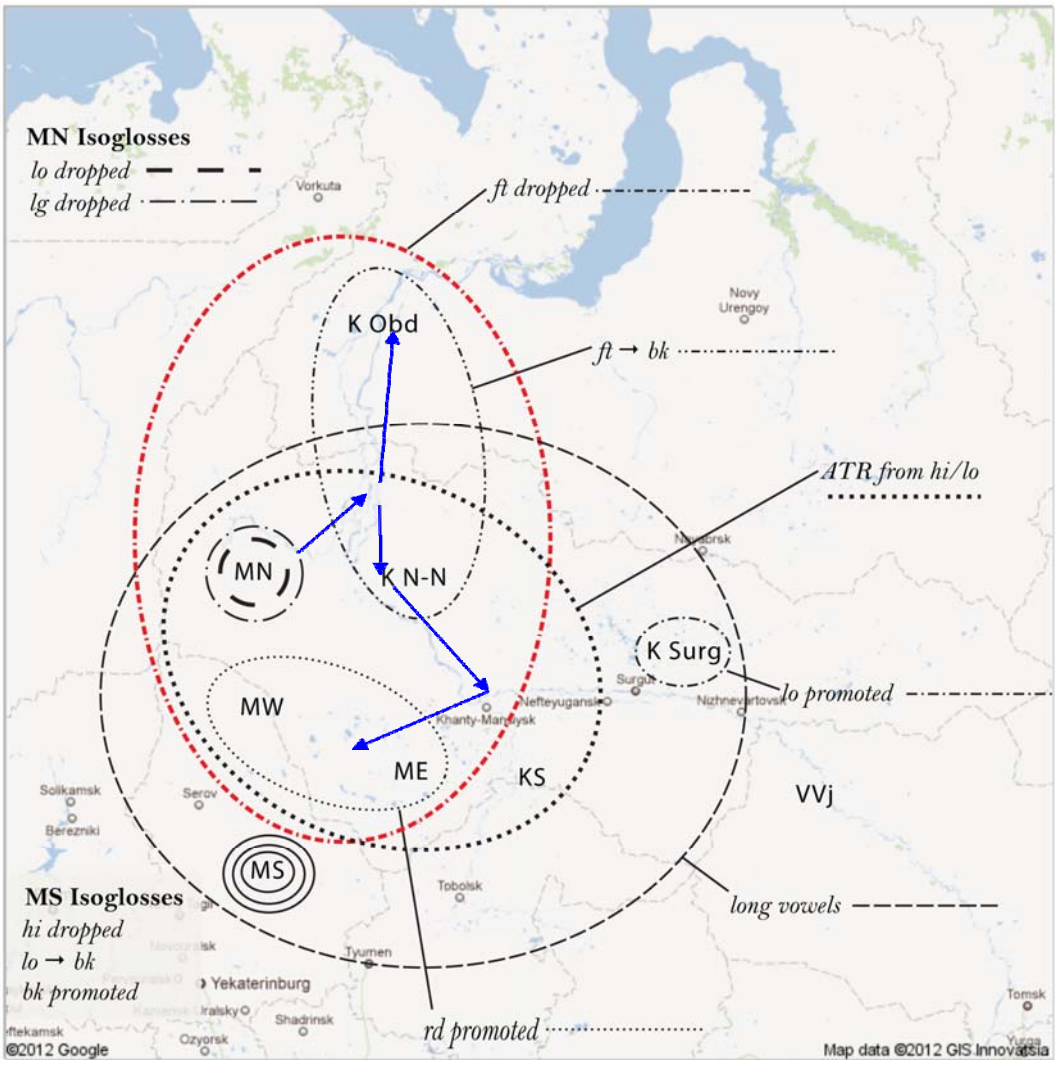
Although the evolution of the vowel systems of Western and Northern Mansi differ in their details, in both the feature [front] was demoted, and in both front harmony and root vowel alternations were adversely affected. Interestingly, the dropping of [front] has also produced two very different results. In Western Mansi, front dropping has caused some back vowels to become more front; in Northern Mansi, the loss of the same contrast has caused some front vowels to merge with their back counterparts.

3.3 Contrastive isoglosses

The dropping of [front] occurred in three out of the four Mansi languages, and all three have lost front harmony. However, [front] dropping did not occur in the early history of Mansi. It can be shown that the shift occurred later in the daughter languages, as illustrated in (21), where X indicates when [front] dropping occurred. If [front] dropping is not a genetic inheritance common to the non-Southern Mansi languages, could it have been spread by areal diffusion? That is, can contrast shift show areal patterning, like other elements of linguistic systems? To investigate this question, Harvey (2012) plotted a

number of contrast shifts on a map, and the results are shown in (19). It is clear that the contrast shifts have occurred in a way that is not at all random.

(19) *Ob-Ugric isoglosses of feature contrasts and contrast shifts (Harvey 2012)*



(20) Key to dialect groups and abbreviations

KN: Northern Khanty

K Obd: Obdorsk
K N-N: Kazym

KE: Eastern Khanty

K Surg: Surgut
VVj: Vach-Vasjugan

KS: Southern (Irtysh) Khanty

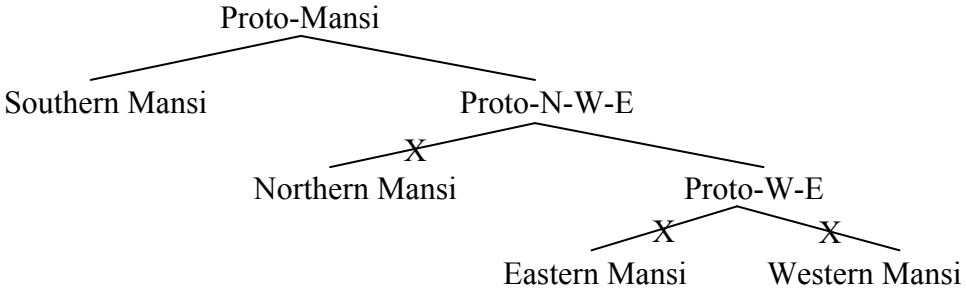
MN: Northern Mansi

MW: Western Mansi

ME: Eastern (Konda) Mansi

MS: Southern (Tavda) Mansi

(21) Chronology of [front] dropping in the Mansi languages



The map in (19) shows the Ob-Ugric language area, in central Russia to the east of the Ural mountains along the Ob river system. A key to the dialect groupings and language name abbreviations is in (20). Mansi languages (M) are in the southwest, and the Khanty languages (K) are east and north. The dashed (red) line labelled *ft dropped* shows all the languages which had the [front] dropping contrast shift. It appears that the innovative dialect from which [front] dropping radiated is Northern Mansi. Northern, Western, and Eastern Mansi all participate in the shift. Interestingly, two of the Khanty languages, Kazym and Obdorsk Khanty, *also* had a phase where [front] dropped. Those languages that are geographically and culturally farther away from the likely innovation centre have not borrowed the shift. The (blue) arrows indicate the Ob river and its tributaries, which are the main routes for cultural contact and communication.

We conclude that there a pattern to these contrastive changes: they follow routes of cultural contact. Contrast shifts show clear isoglosses and can be borrowed between languages. The contrastive analysis of the Ob-Ugric languages presented here is also consistent with earlier dialect studies (Honti 1998; Steinitz 1955), and matches earlier observations about which dialects are conservative or innovative.

4. Conclusions

As the Algonquian and Ob-Ugric examples show, viewing phonological change in terms of contrast shift accounts for large-scale phonological patterns that are hard to explain any other way. These developments in turn lend support to language-particular contrastive feature hierarchies as an organizing principle of individual phonological systems.

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