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VOWEL HARMONY LOSS IN URALIC AND ALTAIC

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The Problem of Vowel Harmony Loss. Most Uralic and Altaic languages, including Finnish, Hungarian, Mongolian, and Turkish exhibit what is called palatal vowel harmony.* In palatal vowel harmony vowels are classified into separate sets. Within a given word members of different sets may not co-occur (see Vago 1980b: xi). The harmonic sets consist of front vowels (vowels articulated in the palatal region) such as /i, e, ö, ü/ and back vowels (those in the velar region) such as /i, a, o, u/.[1] Root morphemes generally govern which vowels occur in suffixes. Palatal vowel harmony is a process of assimilation or agreement, and has been called (for example by Anderson (1980: 44)) a type of metaphony.

		Round			
		−		+	
		High		High	
		−	+	−	+
Back	−	e	i	ö	ü
	+	a	ı	o	u

It may be useful here to sketch briefly the classical form of palatal vowel harmony as exemplified in Turkish. Standard Turkish has an eight-vowel system, comprising /a, ı, o, u, e, i, ö, ü/. This system is totally

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[1] The feature of backness will further pertain to such consonants as the oral velar stops and the lateral liquids, which also have front and back variants. There is considerable debate as to whether the consonant harmony is the same phenomenon, and can be handled by the same rule, as vowel harmony. See for example Anderson 1974: 210f.

symmetrical, and it may be characterized phonologically in terms of three distinctive features, namely those of height, backness, and rounding.[2]

[2] See Anderson 1974: 210, 1980: 7. Lightner (1965) used the term "gravity" for the phonological feature of backness. Gravity is a feature of both consonants and vowels and in consonants covers segments further forward in the oral cavity than the palatal region as well as those further back. Aoki 1968: 143 gives "gravity harmony" as an alternative name for "palatal harmony." Crothers and Shibatani (1980) use the feature "palatal" (i.e., essentially "front") rather than "back."

There is reason to regard as the marked values in the system the high, back, and round(ed) vowels, and thus as unmarked the non-high (phonetically low), non-back (phonetically front), and non-round (phonetically "flat") vowels.

Greenberg (1966: 13f., 21f.) cites several criteria for markedness of phonological segments, including these: (1) the unmarked segment occurs as the "otherwise," "elsewhere," or unconditioned alternant; (2) in neutralization it is the unmarked member which tends to occur; (3) unmarked segments are of higher frequency than marked ones; (4) the number of segments in a languages which have a marked characteristic (feature) is never greater than the number having the corresponding unmarked characteristic; (5) languages do not have segments (or sequences containing segments) of a marked type unless they also have segments (or sequences containing segments) of the corresponding unmarked type.

In line with his not uncontroversial proposals, evidence for front vowels being unmarked and back ones marked would include: (a) the tendency of /i, e/ to neutrality; (b) the frontness of neutral /i/ in Mongolian, Finnish, Hungarian, etc.; and (c) the preference for back vocalism in prestigious loans in Finnish containing /ü/ (Campbell 1980: 250f.). One indication low (non-high) vowels are unmarked and high vowels marked is that under general conditions /e, a, o/, i.e., low vowels, tend to appear as opposed to high vowels.

Evidence that non-round (flat, unrounded) vowels are unmarked and round vowels marked include the facts that: (a) under general conditions, /e, a, i, i/ tend to appear rather than round vowels, which have more highly restricted environments; (b) there is unconditioned loss of front rounded and back flat vowels, but not unconditioned loss of front flat or back rounded vowels; and (c) /o, ö/ only occur in the first syllable or under assimilation, and occur in highly restricted environments.

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The precise formulation of Uralic-Altaic palatal vowel harmony is controversial, as it challenges particular proposals in general theoretical phonology. There have been many different approaches to stating the rule.[3]

However formulated, the palatal vowel harmony rule for Turkish predicts the occurrence of words like *asla* 'never' and *sonlar* 'ends' which contain only [+back] vowels, and words like *nispeten* 'relatively' and *üzüm* 'grapes', which contain only [-back] (front) vowels. It excludes potential words which mix the two, for example **aslen*, **sönlar*, and **uzüm*. This Turkish system is highly ideal, given that in no Uralic or Altaic spoken dialect or written standard language does such a system occur without exception.

In some synharmonic (harmonizing) languages there exist neutral vowels, neutral velar stops or both, which under given circumstances, can occur in both back-vocalic and front-vocalic words. There also occur invariable suffixes which do not obey vowel harmony. This is the situation in standard modern Turkish. In other languages palatal vowel harmony is entirely or for the most part lost, or at least fossilized and non-productive. For those languages it is impossible to identify harmonic sets of vowels. In a sense, all vowels are neutral with respect to vowel harmony. Affixes either do not alternate, or do so only sporadically. Very few Altaic dialects have reached this stage.[4] Many more Uralic ones (e.g., northern and standard Estonian, and Lapp) have.

Scholars have often attributed this weakening or loss to foreign influence. Thus Räsänen, in discussing exceptions in Turkic, writes (1949:104f.) that the stronger the foreign influence to which Turkic languages have been subjected, the more they violate vowel harmony, to the point where in Iranized Uzbek dialects (quoting S. Wurm) "the vowel-harmony is almost entirely destroyed." At the same time he notes that without having to assume foreign influence, we encounter in many Turkic languages unvocalharmonic forms. Similarly, Gabain (1952: 107) is critical of the assumption of Slavic and Iranian influence in the loss of vowel harmony in Turkic, ar-

various vowels in Finnish (Hakulainen 1961: 5): o—10%, u—10%, ö—1%, ü—3%; and as percentages of all sounds in Hungarian (Kálmán 1972: 77): o—4.19%, ö—1.14%, u—0.85%, ü—0.42%, ó—1.12%, ő—0.75%, ú—0.45%, ű—0.07%. Greenberg (1966: 18f.) gives roughly comparable figures.

[3] Vago (1973, 1976, 1980b) has set out the major issues well.

[4] Examples are the Mongolian language Monguor, certain dialects of the Turkic language Uzbek, and the Tungusic language Sibe (which is closely related to classical Manchu).

guing that substratal influence remains to be proved, and does not explain similar effects in cases where no foreign influence is apparent.

Even if one accepts the proposition that vowel harmony loss can be explained by foreign influence, one would still wish to know what the mechanisms of such a massive, systematic change might be. Knowledge of those factors that initiate these phonological changes does not in and of itself provide an understanding of the diachronic processes involved. Nor does it explain the difference between dialects which under foreign influence have substantially or totally lost harmony and those which under similar influences have not. It remains an interesting question to what extent this historical process can be attributed to factors external to the languages in question, as opposed to those within the system of harmonization itself. This is particularly true where foreign influence is weak or non-existent.

It would be possible to describe the historical process of vowel harmony weakening and loss as consisting of the proliferation of exceptions—disharmonic stems (such as Turkish *elma* 'apple'), invariable affixes (like Khalkha *-güj* 'without, not'), and neutral vowels (/i, e/ in many languages) —and certainly this process is associated with such a proliferation. At the same time such an approach assumes that harmony is inherently stable and that it changes only under specific, contingent conditions that induce such developments.

Alternatively, it may be the case that vowel harmony is inherently unstable and that vowel harmony loss is an example of the tendency of related, structurally similar languages to undergo similar changes over time in a relatively fixed sequence. While foreign influence may accelerate or even trigger certain changes, it does not dictate the nature or sequence of such changes. This is the view that will be explored and supported here. Language-internal developments of a relatively predictable, non-contingent sort play the dominant role in the weakening and ultimate loss of vowel harmony.

Exceptionality and Disharmony in Palatal Vowel Harmony Systems

1. Disharmonic Loan Words. In many Uralic and Altaic languages numerous foreign borrowings violate vowel harmony by mixing front and back vowels. Examples of this include: Turkish *mikrop* 'microbe' (< French) and *beyan* 'declaration' (< Arabic) (Lewis 1975: 17); Mongolian *farmačevt* 'pharmacist' and *professor* 'professor' (both < Russian) (Lessing 1973: 338, 649); Hungarian *sofőr* 'chauffeur' and *amőbá* 'amoeba' (Ringen 1980: 138); Finnish *akronyymi* 'acronym', *etymologia* 'etymology', *flygata* 'to fly' (< Swedish *flyga*), *hierogl*
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Swedish *flyga*), *hieroglyfi* 'hieroglyph' and *jonglööri* 'juggler' (< French *jongleur*).

The vocalism of totally unassimilated recent loans, such as *baby* [beibi], *copyright* [kopirait], and *design* [disain] in Finnish (Campbell 1980: 249, 253), vacillate, taking indifferently a front or back form, without regard to the vowels in the stems. Vacillation of vowels is also found in Hungarian. Vago (1980a: 157) refers to vacillating stems such as *Ágnes*: cf. *Ágnesnak/Agnes-nek* 'to Agnes'. Other Hungarian examples, from Ringen (1980: 140), include *dzsungel* 'jungle' (*dzsungelben/dzsungelban* 'in the jungle'), and *analízis* 'analysis' (*analízisnek/analízisnak*).

Most borrowed forms, by contrast, take perfectly normal suffixation, as determined by the last vowel of the stem.[5] Thus there is little, if any, systematic impact of such irregularities. Moreover, foreign borrowings in Turkish, as well as in other languages, do not invariably remain in conflict with vowel harmony. There is a tendency for such forms to change in order to come into conformity with it, e.g., Turkish *madalya* 'medal' < Italian *medaglia* (Lewis 1975: 17); Finnish *olympialaiset* 'Olympic games' has the variants *olump(p)ialaiset* and *ölympiälāiset* (Campbell 1980: 246).

2. Disharmony in Native Morphemes. Loan words complicate vowel harmony by introducing disharmonic stems and, as in prestigious borrowings in Finnish, by introducing new neutral vowels (/ü/ in this case). However, very similar disharmonic effects are already to be found in compound native forms in many Uralic and Altaic languages, e.g., Turkish *bugün* 'today' (= *bu* 'this' + *gün* 'day'). Such forms generally conform to vowel harmony constraints in suffixation. Compare the compound names of Tibetan origin in Mongolian; e.g., *Tserendulmaa* (Street 1963: 68).

In many languages there are invariable suffixes, such as the Turkish present-tense marker *-yor* (Lewis 1975: 17, 107), the Hungarian suffix *-kor*

[5] Lewis (1975: 19-20) points out numerous exception to this in Turkish, in which foreign borrowings, even some of which obey palatal harmony within the root or stem, take exceptional suffixation. Such examples are generally predictable. For example, words of Arabic or French origin ending in *l* are treated as front-vocalic (e.g., *rol* 'role': accusative *rolü*, not **rolu*). In many cases such irregular forms are being regularized. Lewis predicts (20) that while "some elderly people still give *sanat* ['art', < Arabic]...front-vocalic suffixes[,] for a young person to do so would be regarded as affectation, and it is a fairly safe prediction that *rolü*, *idraki*, *harbi*, and so on will one day yield to *rolu*, *idrakı*, *harbı*, first in vulgar speech, then in educated speech, and finally in writing."

(*hatkor* 'at six', *ötkor* 'at five') (Vago 1980a: 172), and the Khalkha negator *-güj* 'not, without' (*javsangüj* 'didn't go, without going', *ögsöngüj* 'didn't give, without giving') (Street 1963: 10). However we might wish to treat these in phonology, they pose no systematic challenge to harmony, since they do not function to block or modify the operation of the rule outside of their own syllable(s). For example, the instrumental suffix of Khalkha would be the expected *-gaar* with *javsangüj* (*javsangüjgaar* 'by not going') and the expected *-göör* with *ögsöngüj* (*ögsöngüjgöör* 'by not giving').

The system as a whole remains productive, these exceptions do not significantly weaken it, and in most Turkic languages vowel harmony is in no apparent danger of disappearing.[6]

3. The Proliferation of Neutral Vowels. The decay of vowel harmony has been closely associated with the proliferation of neutral vowels in many languages in which palatal vowel harmony is essentially productive and generally regular, for example Turkish. In many languages /i/ and /e/ are such neutral vowels, and appear so often and under so many conditions in back-vocalic stems that scholars have simply been forced to treat them as exceptional.

In languages in which palatal vowel harmony has been rendered partially non-productive, such neutral segments abound. These are typically engendered by the coalescence of corresponding front and back vocalic phonemes, e.g., /i/ with /ɨ/, /ü/ with /u/, /ö/ with /o/, and the like. This is a phenomenon of markedness, the neutral vowels *par excellence* being /i/ and /e/, which are, from the point of view of the Turkish system set out above, relatively unmarked; indeed, /e/ is the most highly unmarked vowel, being non-high, non-back, and non-round. It is generally accepted that "historical changes are from the marked to the unmarked"; consequently "it is easy to see why the neutral vowels are among the least marked" (Aoki 1968: 145).

A number of changes in synharmonic languages resulting in the neutralization of segments can be seen as markedness effects, for it is a universal phenomenon that front vowels tend to be unrounded while rounded vowels tend to be back. Thus /i/ is less marked than /ɨ/ and/o/ and /u/ are

[6] In Turkish, as in most vowel-harmonizing (synharmonic) languages there exist some exceptions to vowel harmony, of native origin or older loans, such as Turkish *dahi* 'also' or *elma* 'apple'. Many of these represent unassimilated loans or the remnants of no longer productive phonological processes. This is evidently the case of *elma* 'apple', which < **alima*. See Sevortjan 1974: 138.

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less marked than /ö/ and /ü/. (See fn. 2.) This universal tendency to reduce such characteristically marked vowels to the respective unmarked ones clearly applies within the Uralic and Altaic languages. But the consequence of this is a tendency for certain vowels to be rendered neutral.

3.1. Fronting of /ɨ/ to /i/. A pervasive change in Altaic is the fronting of the [+back] segment /ɨ/ (that is, a high back unrounded vowel) to /i/. This vowel is generally preserved in Altaic only in the Turkic sub-family, but even there, in East Turki, no /ɨ/ has survived, and /i/ from older /ɨ/ has secondarily fronted a preceding **a* to *e*, e.g., East Turki *eliš* 'the taking' from *al-* 'to take' (Poppe 1965: 182).

The same change of /ɨ/ to /i/ is quite general in Mongolian and Tungusic. No attested Mongolian language shows any residue of the old phoneme /ɨ/ outside of the collocations /qɨ/ and /ɣɨ/: Moghol, Middle Mongolian *qilɣasun* 'hair, horsehair' = Middle Mongolian (*Secret History*) and Classical *kilɣasun* (Poppe 1955: 33, 133).

In the vast majority of Mongolian languages /ɨ/ has been lost and /i/ is a neutral vowel, cf. written Khalkha *morior* 'by horse', *amžilttajgaar* 'successfully' (Street 1963: 218f.).[7] Thus in Classical Mongolian we find both forms like *dakin* 'again' and those like *tegši* 'level'. In Tungusic, according to Poppe (1965: 203), the same development has taken place; Mongol *čiqul* 'anger' corresponds to Evenki *tikul-* 'to become angry'. It was these facts that prompted Lightner (1965) and others in their synchronic analyses of Classical Mongolian to posit an underlying eight vowel system identical to that of Turkish, with the opposition of /i/ and /ɨ/ being neutralized by a transformational rule. This abstract solution considerably simplified the statement of the vowel harmony rule by eliminating the need to posit neutral vowels in Mongolian palatal vowel harmony. Similarly, Vago (1973: 583ff.) and Odden (1978: 62) assumed an underlying seven vowel system for Manchu with absolute neutralization of back /ɨ/ → /i/ and front /ü/ → /u/.[8]

Ringen (1980: 173f.) discusses, and rejects, arguments by Vago (1973, 1980d) and Jensen (1972, 1978) for a similar abstract treatment of Hungarian /i/ in *híd* 'bridge' and such examples of neutral stems which nonetheless

[7] /i/ in the first syllable is generally front-vocalic.

[8] Ard (1981, 1984) argues that harmony in Proto-Tungusic and Manchu was not one of backness but rather of tenseness or tongue-root retraction (height harmony). Consequently, many of the details of the development of Tungusic vowel harmony are regarded as controversial.

take back vocalic affixation. Vago (1980a: 176, 1980d: 10) offers historical support for his synchronic analysis, reporting that such vowels historically come from back /i/.[9] Presumably one could argue for an abstract solution to the neutral vowel problem in Finnish as well. Campbell (1980: 255) similarly reports that some, although perhaps not most, scholars believe that Proto-Finnic had no neutral vowels, present-day /i/ and /e/ partly reflecting earlier back /i̯/ and /e̯/. (See 254f., and Hakulainen 1961: 20f., for a contradictory view.)

The problem here is that some scholars attempt to explain apparent anomolies in the synchronic analysis of vowel harmony by making recourse to historical phenomena. This practice can lead to a circularity in that in some cases (e.g., that of Finnish) the major support for an historically underlying /i̯/ and /e̯/ is precisely the neutrality of/i/ or /e/ in the modern languages. That there is strong historical evidence for the reality of earlier /i/ in the Mongolian languages, for example, does not necessarily apply generally to other language groups (e.g., Uralic).[10]

3.2. Elimination of Front Rounded Vowels. Another very common change is the elimination of the distinction between rounded and unrounded vowels. In the Tungusic languages, according to Poppe (1965) /ö/ has generally become /u/ (through /ü/?); at the same time /ü/ has generally become /i/, the net result being the elimination of front rounded vowels. Thus we have the following cognate sets (from Poppe 1965: 203): Classical Mongolian (Cl. Mo.) *ögede* 'up', Evenki *ugile* 'above'; Cl. Mo. *kötel* 'mountain pass', Lamut *kuter-* 'climb upwards'; Cl. Mo. *örö* 'aorta', Evenki *ur* 'stomach'; Cl. Mo. *ürgü-* 'be frightened', Manchu *fuče-* 'be angry', Ulcha *pučų-* 'jump up'; Cl. Mo. *jüge-* 'transport', Evenki *jugū-* 'transport on sleighs'.

Similar changes are seen as well in Mongolian languages, namely Monguor and a number of other southwestern Mongolian dialects: Cl. Mo. *ödün* 'feather', Monguor (Mgr.) *fōdi*, San-chuan (Sa.) *xotu*, Dunghsiang (Du.), Baoan (Ba.) *xodun*; Cl. Mo. *söni* 'night', Mgr., Sa. *soni*; Cl. Mo. *köl* 'foot', Mgr. *kuor*, Sa. *kor*, Du. *kuan*, Ba. *kul*; Cl. Mo. *törö-* 'be born', Mgr. *turo-*; Cl. Mo. *üge* 'word', Mgr. *uge*, Sa. *ugi*; Cl. Mo. *ükü-* 'die',

Mgr. *fugu-*, Sa. *uxu-*, *buri-* 'make a cover of *unie* (Poppe 1955: 49

Loss of front rou Turkic: Chuvash *kos* 'become straight' (cf. Osman *donüp* < *dönü* < *köz*; Uzbek *tun* 'nig

Similarly, Vago (*o*, *ö* in the Turkish d some stems act as fr as back-vocalic: *buz-d* (locative)', *dort-te* 'fo become palatalized in /u/ < /*u/.

In Uralic too *ü /u/ or /o/. It is prese Finnic languages and 1965: 100, 136ff.): F Votyak *diń*, Ziryene *d* Fi. *syksi* 'autumn', es from'; Fi. *nysi* 'handl Fi. *yksi* 'one', Mordvi *sul*; Fi. *pyy* 'woodgro

3.3. Umlauting. Tl is not the only force t neutral segments. A trasts is the assimilati vocalic segments, usu phonemically, is usual fully umlauted one, i.e ern Uighur /a/ and / syllables when the fol realized as *elinmaq* ' Tenišev (1984: 82) re *i*-Umlaut) in the Tur Turki *elip*, gerund of ate to'; Osman *elma* < **bar-i*).

[9] Kálmán (1972: 62f.) discusses this change and notes the back vocalism of the modern reflexes of old **i*, e.g., *ír* 'he writes': *írok* 'I am writing'.

[10] Collinder (1960, 1965) argues for **i̯*, **e̯* (his **y*, **ō*) in Proto-Uralic, although "**y* seems to have been of rare occurrence" (1965: 97), and he knows of no reflex in, e.g., Hungarian. Steinitz (1964) proposes **i̯* but not **e̯*, in Proto-Finno-Ugric.

Mgr. *fugu-*, Sa. *uxu-*, Du. *fugu-*, Ba. *hgude-*; Cl. Mo. *büri-* 'cover', Mgr. *buri-* 'make a cover of leather for a drum'; and Cl. Mo. *ünijen* 'cow', Mgr. *unie* (Poppe 1955: 49ff.; Todaeva 1973: 340, 360, 368, 370).

Loss of front rounding is also reported by Räsänen (1949: 94, 96) for Turkic: Chuvash *kos'* 'eye' (cf. Turkmen *göz*), *kor-* 'see' (cf. *gör-*), *kon-* 'become straight' (cf. *göni-*); East Turki *kop* 'much' < **köp*; Konja Giese Osman *donüp* < *dönüp*; Halič and Lutsk Karaim *egiz* 'ox' < *öküz*, *kez* 'eye' < *köz*; Uzbek *tun* 'night' < **tün*; Halič and Lutsk Karaim *ic* 'three' < **üc*.

Similarly, Vago (1973: 582f.) reports neutralization of *u*, *ü*, and of *o*, *ö* in the Turkish dialect of Vadin on the Danube, as a result of which some stems act as front-vocalic while yet others with the same vowel act as back-vocalic: *buz-da* 'ice (locative)', *oq-ta* 'arrow (locative)', *uş-te* 'three (locative)', *dort-te* 'four (locative)'. He further notes that /k, g, l/ usually become palatalized in the environment of /u/ < /*ü/, but not in that of /u/ < /*u/.

In Uralic too **ü* tends either to unround to /i/ or /e/ or to retract to /u/ or /o/. It is preserved only sporadically outside of Finnish and related Finnic languages and is found as /ö/ in Hungarian (Collinder 1960: 180ff., 1965: 100, 136ff.): Finnish (Fi.) *tyvi* 'butt, base', Hungarian (Hu.) *tő*, Votyak *diń*, Ziryene *din*; Hu. *köd* 'fog, haze', Tavgi Samoyed *kinta* 'smoke'; Fi. *syksi* 'autumn', eastern Cheremis *šižə*; Fi. *yla-* 'over-', Ostyak *elti* 'off, from'; Fi. *nysi* 'handle', Vogul *nɛl*; Fi. *tyma* 'glue', Ziryene, Votyak *l'em*; Fi. *yksi* 'one', Mordvin *vejke*, Votyak *og*; Fi. *syli* 'bosom', Hu. *öl*, Votyak *sul*; Fi. *pyy* 'woodgrouse', Mordvin *povo*, Lule Lapp *boggoi*.

3.3. Umlauting. The shift in value of vowels from marked to unmarked is not the only force that has tended to weaken vowel harmony by creating neutral segments. Another general tendency leading to neutralized contrasts is the assimilation of back vowels to front in the environment of front vocalic segments, usually /i/ or /j/. The result phonetically, if not always phonemically, is usually a partially umlauted vowel, i.e., centralized, or a fully umlauted one, i.e., fronted. Anderson (1980: 3-4) reports that in Modern Uighur /a/ and /ä/ are raised and fronted to [e] in initial unstressed syllables when the following syllable contains /i/: thus, /al+in+mAq/ is realized as *elinmaq* 'to be taken'. Likewise Räsänen (1949: 78ff.) and Tenišev (1984: 82) report many cases of umlaut (palatalisierender Umlaut, *i*-Umlaut) in the Turkic languages: for example, *a* > *e* (Taranchi East Turki *elip*, gerund of *al-* 'take'); *a* > ɛ (Chuvash *sɛjrɛn* ~*sajran* 'appropriate to'; Osman *ɛlma* 'apple' < ? Mongol *alima*); *a* > *ä* (Kazakh *bäri* 'all' < **bar-i*).

Such cases are extremely common in the Mongolian languages. Generally /a o u/ → /ä ö ü/ in Kalmuck (and /o/ to /ö/ in Chakhar), and to central (fronted) varieties in Dagur, Khalkha, Buriat, and other central dialects, before /i/ in the following syllable (Poppe 1955: 26, 28, 31f.): Cl. Mo. *bari-* 'seize', Dagur, Buriat *bäri-*, Kalmuck (Klm.) *bär-*; Cl. Mo. *morin* 'horse', Chakhar *möri*, Ordos *möri*; Cl. Mo. *qurim* 'wedding party', Klm. *χürṇ*.

In both Mongolian and Turkic such changes generally do not result in neutral vowels. Rather, such phonetically disharmonic segments function phonologically in a regularly harmonic way. In both Buriat and Kalmuck certain dialects reduce diphthongs historically of the form Bi (< Cl. Mo. B*ji*; B = a back vowel, except in Kalmuck where it equals only /a/ or /o/, because Kalmuck /u/ generally remains) to long front "umlaut" vowels: Cl. Mo. *sajin* 'good', Alar Buriat (AB) *hā̈ⁱn*, Ordos, Kalmuck (Klm.) *sā̈n*; Cl. Mo. *dalai* 'sea', AB, Dörbet Klm. *dalā̈*; Cl. Mo. *oi* 'forest', AB *ō̈ⁱ*, Klm. *ō̈* (Poppe 1955: 77, 79). In both languages vowels that at the phonetic level are front monophthongs, but which derive historically from diphthongs, function at the phonological level as back segments (Poppe 1955: 91f.): AB *bā̈ⁱγāt* 'having stood' < **baji-*; Dörbet Klm. *ō̈γur* 'nearby' < *ör^{ō}* 'near'.[11] In languages in which harmony is moribund such fronted vowels are neutral. Ard (1984: 72), using examples of S. Kałużyński, notes in Sibe assimilatory processes leading to new, fronted vowels: Sibe *ämäs*, Manchu *amasi* 'backwards'; Sibe *dövir'*, Manchu *dobori* 'night'; Sibe *fönʒi-*, Manchu *fonǰi-* 'question'; Sibe *tüč-*, Manchu *tuči* 'come out'.

The fronted monophthongs that have arisen through this process in Kalmuck may induce a secondary fronting of the succeeding vowel: *ō̈rd^{ö}χɔ* < *ō̈rd^{o}χɒ* 'to approach' < **ojirad-* (Ramstedt 1935: 305). Similarly the fronting of *a* to *ä* because of a palatal glide *y* may induce in Kirghiz a secondary fronting of *i* to *i:* *kilbäymin* ~ *kilbäymin* 'I do not make' (Johnson 1980: 97, using data of S. Wurm). Compare Taranchi East Turki *elip*, gerund of *al-*, 'take' (Räsänen 1949: 78). Similar changes are seen in

[11] Not all monophthongized diphthongs of the type F: < Bi are phonologically back. While none is front, some are neutral. Thus AB *ṻⁱ* < both *uï* and *üi*, e.g., *ṻⁱlāt* 'having weeped' < **ui-*, but *ṻⁱlēr* 'by needlework' < **üi-*; Moghol *ɛi̯*, Monguor *ɛ̄i̯* < *ai*, *ei*, e.g., Cl. Mo. *arbai*, Moghol *arfɛi̯*, Mgr. *ṣbɛ̄i̯*, Cl. Mo. *isegei* 'felt', Moghol *sisgɛi̯*, Mgr. *ṣgɛ̄i̯* (Poppe 1955: 91-92). Notice that in an abstract treatment the underlying vowels /ui/, /üi/, /ai/, and /ei/ are *not* neutral in these cases.

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1984: 67, 69).

3.4. Schwaificati
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Mongolian *naran* 's
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In Mongolian l
tendency to lose init
adali (Todaeva 1973
Mo. *edür*, Sa. *udur*
Cl. Mo. *eljige*, Du.
ayaγa; Du., Ba. *jig*
nt(er)a- 'sleep' : Cl.
Ba. *re-* (356).[12]

[12] Such languages
initial stress: Mgr.
dansun, Ba. *dabso*

western Kazakh *ajel* < *ajal* 'woman'; Azerbaijan *öjnämax* 'to play' (Tenišev 1984: 67, 69).

3.4. Schwaification. Norman (1974: 163) noted that in Sibe "when unstressed, the vowels /i/, /u/, and /ə/ are drastically reduced, especially in final position" where they are realized as consonant modifiers. Norman further notes that "in other positions they are reduced but generally retain their syllabicity."

In the Mongolian languages it is generally the case that short unstressed vowels are reduced. Because the first syllable is normally stressed, unless long vowels occur in the word, the effect of this reduction is felt commonly in non-first syllables, and is stronger the further removed the unstressed syllable is from the stressed. This stress reduction can be characterized in terms of a gradual lessening of syllabicity. What was originally a full schwa with vowel coloration has reflexes in such secondary consonantal articulations as palatization or labialization.

These effects are most pronounced in languages like Khalkha (Kh.) and Kalmuck, with strong initial stress, in both of which short unstressed non-initial syllables tend to be reduced in the ways indicated above. In Kalmuck final syllables tend to be lost (Poppe 1951, 1955). Thus Classical Mongolian *naran* 'sun' is Kh. [nɑrɒ], Klm. [nɑrn̥]; *ene* 'this' is Kh., Klm. [enə]; *öndör* 'high' is Kh. [ʊ̈nDɑr], Klm. [öndr̥]; *bari-* 'seize' is Kh. [barɪ], Klm. [bär]; *boro* 'grey' (Middle Mongolian—Muqaddimat al-Adab—*bora*) is Kh. [borɒ], Klm. [bor°], where [ə, ɪ, ɑ, ɒ] are reduced vowels. Ramstedt (1935: xii) offers the Kalmuck alternates [köd^{u}lm^{ö}š] ~[ködl̥m^{i}š] ~ [ködl̥mš̥] 'work'; Poppe (1951: 18) has Khalkha *surgūl^{i}ār* ~*surgūl´ār* 'by, through school'.

In Mongolian languages such as Monguor with end stress, there is a tendency to lose initial syllables. Thus Mgr. *dali* 'like, similar' : Cl. Mo. *adali* (Todaeva 1973: 327); Mgr. *dur* 'day' : Middle Mongolian *ödür*, Cl. Mo. *edür*, Sa. *udur*, Ba. *uder*, Du. *udu* (331f.); Mgr. *(r)džige* 'donkey : Cl. Mo. *eljige*, Du. *endzege*, Ba. *ndzige* (333); Mgr. *jaga* 'cup' : Cl. Mo. *ayaya*; Du., Ba. *jiga* (336); Mgr. *nde* 'here' : Cl. Mo. *ende* (349); Mgr. *nt(er)a-* 'sleep' : Cl. Mo. *unt(ar)a-* (352); Mgr. *re-* 'come' : Cl. Mo. *ire-*, Ba. *re-* (356).[12]

[12] Such languages still retain evidence of earlier stages in which they had initial stress: Mgr. *dabse* 'salt'; Cl. Mo. *dabusun*, Moghol *dabsun*, Du. *dansun*, Ba. *dabsoŋ* (Todaeva 1973: 326); Mgr., Ba. *dogloŋ* 'limping':

In some Mongolian languages with inital stress similar effects can be seen when a long vowel causes stress to shift to a non-initial syllable. Thus in Buriat dialects we have: Kachug *taarxaxa*: Literary Buriat *ataarxaxa* 'to envy'; Barguzin *n'een*: Literary Buriat *ūn'een* 'cow'; Barguzin *nebšaa*: Literary Buriat *nege bišixan* 'a bit' (Rassadin 1982: 27f.).

Schwas are purely neutral with regard to vowel harmony. Some scholars have gone so far as to propose phonemicizations in which schwa is a separate, neutral vowel phoneme (for example Street 1962; see also Krueger 1961).

Vowel reduction in Altaic occurs not only in Tungusic and Mongolian, but also in Turkic. The occurrence of schwa-like vowels is noteworthy, for example, in Chuvash. Krueger (1961: 71) writes that:

> The back, low, rounded vowel...is always reduced, and can occur stressed only in the first syllable of a polysyllabic word.... It is fleetingly pronounced, and sometimes so reduced as to sound almost coalesced with the following consonant as in /kăvak/ 'blue', almost > [kvak]... This vowel is an unstable one and drops easily at the end of words, or in compounds, e.g., *tăvat(ă) ura* 'four feet'.

Of the front counterpart, he writes (72) that:

> It too occurs only reduced, and may be stressed only in the first syllable.... It may also virtually disappear between consonants.... It is fleetingly pro-

Cl. Mo. *doyolang* (330). There are numerous Monguor forms with syncope of the middle syllable. That this reflects a period in which initial stress induced vowel loss rather than a period in which end-stress did so is demonstrated by (1) evidence for weakening of the second syllable in disyllabic forms: Mgr. *t'š'iäsẹ* (where [ẹ] is a mid-central, schwa-like vowel) 'snow': Cl. Mo. *časun* (Poppe 1955: 27); Mgr. *mōdi* 'wood': Cl. Mo. *modun*, Du. *mutun*, Ba. *muto* (Todaeva 1973: 345); (2) the lengthening of /a/ in the initial syllable before /u/ in the second syllable: Mgr. *dālī* 'shoulder': Cl. Mo. *daru-* 'scapula'; Mgr. *dāri-* 'press' (Poppe 1955: 26); (3) rounding assimilation in forms such as Mgr. *sgō-* 'scold': Cl. Mo. *sōge-*; Mgr. *murōn* 'river': Cl. Mo. *moren*; Mgr. *gudoli-* 'move': Cl. Mo. *kōdel-* (Todaeva 1973: 15, 19, 23); and (4) unrounding in the second syllable in a form like Mgr. *se* : Cl. Mo. *usun* 'water' (Todaeva 1964: 8,9), which could only result under initial, but not final, stress.

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Cheremis *kit*, Votya
Finnish *silmä* 'eye',
Finnish *suoni* 'sine
Ziryene *sōn*, Hunga

nounced, and like /ă/ is unstable in compounds and at the end of words.

The Chuvash schwa can be lost also in the first syllable (Räsänen 1949: 53f.).[13] In Uralic schwaification seems to occur rarely, although apocope is quite common.[14]

3.5. Other Conditioned Changes. Word-final vowels are often vulnerable to changes. In Kalmuck long close vowels in this position tend to open: *irnē* ~ *irnā* 'comes', Dörbet *būdā* ~ *būd'ā* ~ *būd'ā* ~ *bṻd'ā̈* ~ *bṻdā̈* ~ (Ölöt) *būdā̈* (Ramstedt 1935: xii). Something similar is seen in the final syllables of Chuvash, especially open final syllables. See Räsänen 1949: 105.

Consonants may have an impact on vowel quality as well. In Kalmuck, velars condition the opening of vowels, especially ē and ā: *sāγār* 'well', *sāńār* 'well'; *temēgēr* ~ *temēγēr* ~ *temēγār* ~ *temɛγär* 'by camel' (Ramstedt 1935: xiii). The consequence of this opening of vowels when taken in conjunction with the changes suffered by word-final vowels, and with schwaification, is that in some dialects almost all non-initial vowels have disharmonic free variants.

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[13] While schwaification does occur in other Turkic languages, it apparently is nowhere as advanced as in Chuvash. What is found is vowel loss, i.e., apocope, syncope, etc. While loss of the vowel of the first syllable occurs both in Chuvash (Räsänen 1949: 44f., 53f.) and in other Turkic languages, syncope and apocope are most frequent, as we would expect, in languages with dynamic stress on the first syllable, and Räsänen notes that already in the Runic inscriptions such loss is to be observed, e.g., *oγ(u)li*, 3rd pers. of 'son'. He cites such examples as Osman *hepsi* 'all of them' < *hepisi*; Taranchi *kiškä* 'to the person' < *kišikä*; Karakirghiz *emki* 'present' < *emiki*. Apocope is expecially common in the formation of compounds, as in Soyon Karakirghiz *karat* 'black horse' < *kara at* and Osman *ne üčün* 'why' > *ničün*.

[14] In Uralic loss of the vowel of the second syllable is quite common with only Finnish and other Finnic languages generally preserving all vowels (Collinder 1960, 1965): Finnish *kala* 'fish', Mordvin *kal*, Cheremis *kol*, Ostyak *kul*, Hungarian *hal*; Finnish *käsi*, *käte-*, 'hand', Mordvin *ked'*, Cheremis *kit*, Votyak, Ziryene *ki*, Vogul *käät*, Ostyak *köt*, Hungarian *kéz*; Finnish *silmä* 'eye', Ziryene *śin*, Vogul *šäm*, Ostyak *sem*, Hungarian *szëm*; Finnish *suoni* 'sinew, tendon', Mordvin *san*, Cheremis *šün*, Votyak *son*, Ziryene *sõn*, Hungarian *ín*, Kamassian *ten*.

Cues for Harmony

We need not have recourse to foreign influence in order to explain the weakening and loss of palatal vowel harmony in Uralic and Altaic languages. Such developments are inherent in systems chaacterized by agglutinative suffixation and root stress, given universal tendencies towards weakening of unstressed vowels, umlauting, and replacement of marked segments by their relatively unmarked counterparts.

As we have seen, a number of phenomena lead to initial syllables that are either neutral or disharmonic relative to the root as a whole. In general such roots do not induce harmonic loss or changes in affixes, since sufficient information in preserved in non-initial vowels to guide the process of harmony. Even when the root is originally monosyllabic (e.g., Hungarian *híd* 'bridge') or monosyllabic through monophthongization or through vowel loss (e.g., AB *hāⁱn* 'good'), or all vowels have been rendered either neutral or disharmonic relative to their etymological harmony (e.g., Da. *bárí-* 'seize'; Klm. *χöwn* 'part', cf. Cl. Mo. *qubi*; Klm. *χüwl-* 'change appearance', cf. *qubil-*), we must assume no fundamental, underlying change in the harmonic nature of the root in those cases in which affixal harmony continues to operate (cf. AB *bāⁱγāt* 'having been', *ūⁱlāt* 'having slept' *ūⁱlēr* 'by needlework').

So long as such derived forms of a root show harmony a root is unlikely to change its underlying harmony. We may compare here the case of Yiddish *avek* 'away'. At one time Yiddish had the same terminal devoicing rule as German; *avek* was {a + veg} (cf. English *a + way*). But by the time Yiddish lost this rule, *avek* had been semantically isolated from 'way' and retained the final [k]; hence it now has /k/, not /g/.

Given that such semantic isolation is not in question here, and that these agglutinative languages retain numerous derived stems for each root, how can roots ever change their underlying representatins to neutral or etymologically disharmonic ones? The crucial factor seems to be the phonetic alternation of vowels. We will examine here by way of illustration the case of Kalmuck.

Kalmuck shares the Mongolian $*i > i$ change and readily umlauts and monophthongizes. This would be insufficient to disturb affixal vowel harmony were it not for the strong, initial stress of Kalmuck and concomitant loss or weakening of almost all non-initial short vowels. Even so, Kalmuck preserves the distinction of velars (k:$x < q$; g:$ɣ$, $ɣ$), and it distinguishes according to Ramstedt $ɒ$ (back) and $ə$ (front) as reduced vowels. The problem is that phonetic processes in Kalmuck, have, as we have seen, very nearly obliterated all other distinctions in non-initial syllables, and in some cases

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even in initial ones. Consequently, even when etymologically harmonic vowels occur in non-initial syllables, these developments have essentially rendered them neutral. Vowel harmony in the Kalmuck language as described by Ramstedt (1935) is only a tendency. In this transitional stage the literary language and the more conservative dialects preserve enough of the distinctions that phonetic effects do not induce underlying phonemic change. But it seems harmony is moribund in Kalmuck, as the surface phonetics of more innovative dialects provide no evidence of differing harmonic vowel sets. Any predictions one can make of the shape of any non-initial vowel depend as much on the consonantism as the vocalism.

Quite natural processes that produce in languages of the Uralic and Altaic type phonetically disharmonic vowels tend over time to induce phonological disharmony through the elimination of cues necessary for the maintenance of the system. It is by predictable language-internal processes, rather than by the contingent accumulation of disharmonic forms or segments, that we can best account for vowel harmony loss, and we may speculate that even those languages furthest removed from foreign influence will eventually lose palatal harmony.

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