

## THE PRIMARY LARYNGEAL IN URALIC AND BEYOND

### 1. Laryngeals in synchronic systems

Many languages, though not all, have in their phonemic inventory one or more segments that may be classified as “laryngeals”, that is, as segments belonging to what may be called the “laryngeal range” of the consonantal paradigm. In a narrow sense of the term, the laryngeal range would comprise of only segments produced with a laryngeal (glottal) primary articulation, but in a broad understanding this may be conveniently defined as comprising of any velar or postvelar consonants that are distinct from the basic velar stops [k g] in terms of either the place or manner of articulation. Most laryngeals are continuants produced as either fricatives (with a relatively strong frication) or spirants (with a relatively weak frication) in the velar, uvular, pharyngeal, epiglottal or glottal zones of the vocal tract (cf. e.g. Ladefoged & Maddieson 1996: 39–46), though there are also non-continuant laryngeals produced as stops or affricates in the uvular and glottal zones. With the exception of the glottal stop [ʔ], which is produced with a closure of the vocal chords, the segments classifiable as laryngeals can be either voiced or voiceless.

It is synchronically typical of laryngeals that they often involve a considerable lability of the articulatory parameters. Most languages have a very limited set of segments classifiable as laryngeals, which is why features such as place of articulation and voice are rarely fully exploited to distinguish one laryngeal from another. Many languages have only one segment in the laryngeal range, in which case its phonetic value can vary within a broad range. For instance, a laryngeal basically produced as a voiceless continuant can have positional or dialectal variants ranging from a velar fricative [x] to a glottal spirant [h], including also the corresponding voiced segments [ɣ] and [ɦ]. The uvular trill [ʀ] is also within the laryngeal range, and its relationship to the velar and uvular fricatives is in most cases allophonic. The only feature that at first glance would seem incompatible with the laryngeal range is nasality, but even nasals, especially the velar nasal [ŋ], seem to be related to laryngeals by the “mysterious connection” of “rhinoglottophilia” (Matisoff 1975).

Functionally, also, laryngeals tend to be ambivalent, in that they can occur variously in the roles of stops, fricatives, liquids, and glides. The phonetic realisation of a laryngeal segment should not be taken at face value, for its functional position can be different from what its phonetic nature would seem to imply. For instance, many languages have a glottal spirant of the type [h] or [ɦ], involving a glottal (in some cases also pharyngeal) constriction with or without voice, but without distinctive oral articulation. In many languages this segment functions as a velar fricative. A common situation is the one observed in, for instance, Ewenki (table 1), which has a subsystem of four oral continuants /w s y x/ corresponding to four distinct places of articulation. The labial and palatal continuants /w y/ are normally realised as voiced and may be functionally characterised as glides, while the dental and velar continuants /s x/ are realised as voiceless and function as fricatives. In this system, the velar fricative /x/ has the largest space for movement, and its realisation can vary between the velar and glottal zones with no functional distinction.

m	n	ñ	ng
b	d	j	g
p	t	c	k
	s		x
w		y	
	r		
	l		

Table 1. Ewenki (phonemic).

In other languages, a segment realised as a glottal spirant is often better interpreted as a velar glide. This is the case in, for instance, Finnish, which also has two other glides /w y/, orthographically <v j>, and a dental fricative /s/ <s>. In standard Finnish grammars, which do not problematise phonological issues, the glottal spirant, orthographically <h>, is normally classified as a “laryngeal” or “glottal” fricative (cf. e.g. Hakulinen & al. 2004: 38–40), but since there is no distinctive laryngeal place of articulation in Finnish, and since the relevant Finnish segment has actually also other than glottal realisations (both velar and palatal), its exact position in the system has to be defined on (morpho)phonological, rather than phonetic, grounds. In particular, gradational alternations of the type <ht-> : <hd->, as opposed to <st-> : <st->, suggest that the Finnish segment <h> is in a class different from that of the fricative /s/. The only place in the system that it can occupy is that of a velar glide (table 2).

m	n		ng
	d		
p	t		k
	s		
v		j	h
	r		
	l		

Table 2. Finnish (orthographic).

It may be noted that some forms of Finnish also possess another laryngeal in the system, the item of the so-called “final reduplication”, also known as “initial reduplication”. This is often defined as a morphophoneme with no independent segmental identity at the phonemic or phonetic levels (Karlsson & Lehtonen 1977), but the matter can hardly be regarded as settled. Leaving this problem aside, the status of the Finnish laryngeal <h> is also connected with that of the segment expressed orthographically as <d>. The principal native realisation of <d> (intervocally and after <h>) used to be the dental spirant [ð], and functional criteria would favour the identification of this segment as a dental glide. The earlier system of glides would, consequently, have comprised the four segments /w d y x/. In principle, this system is still functionally valid for the native vocabulary of Finnish (table 3), but in practice a restructuring has taken place in the language due to secondary factors, such as the introduction of the new marginal phonemes /b g/.

m	n		ng
p	t		k
	s		
w	d	y	x
	r		
	l		

Table 3. Finnish (functional).

An important aspect of the synchronic status of laryngeals concerns their phonotactic behaviour. Laryngeals often exhibit a restricted phonotactic distribution, though the rules of their distribution vary from language to language. Some languages, like Dagur, have a laryngeal (realised as a velar to glottal continuant) that only occurs in initial position. In some forms of Ewenki, the laryngeal seg-

ment /x/ is only present in medial intervocalic position, while in others it occurs both medially and initially. Other languages, like Amdo Tibetan, have several distinct laryngeals in prevocalic position (a voiceless velar fricative, a voiced velar fricative, a uvular trill, and a voiced or voiceless glottal spirant), but only one laryngeal segment that occurs in preconsonantal position (realised as a voiced or voiceless glottal spirant, but not necessarily representing the same phoneme as the corresponding sound in prevocalic position).

## 2. Diachronic sources of laryngeals

As far as diachrony is concerned, a common feature of laryngeals is that they tend to be short-lived. Laryngeal consonants are conspicuously easily lost from the paradigm, but, at the same time, they are easily replaced by new laryngeals arising from other segments. The diachronic instability of laryngeals suggests that they involve, possibly universally, a minimal degree of phonological marking. This situation is exemplified by Tundra Nenets (and other Northern Samoyedic languages), in which the glottal stop /q/ is best analysed as a segment marked only for the very feature of segmentality (cf. Janhunen 1986: 48–49 & *passim*). Obviously, the segmental loss of a glottal stop in a language involves a minimal loss of information, and the situation is not very different in the case of other laryngeal segments, which also tend to have very few marked properties.

Correspondingly, the formation of laryngeals may be seen as a process in which a segment gradually loses its marked properties until only a minimum remains. In addition to the feature of segmentality, properties characterising laryngeals, and potentially distinguishing them from each other, include continuantness and voice. However, markedness relationships also depend on the syntagmatic environment, and the presence of voice, for instance, is likely to be unmarked in a voiced environment (between vowels and sonorant consonants), while the absence of voice is a marked property in this context. This is exemplified by Old Finnish (Early Written Finnish), which had two laryngeals, a voiceless /x/ <h> and a voiced /g/ <gh>. In this system, the voiced segment /g/, apparently pronounced as a voiced velar fricative [ɣ], may be analysed as a glide on a par with /w d y/, while /x/ occupied the position of a velar fricative (table 4). It is perhaps relevant to note here that the status of /x/ <h> as a glide even in modern Finnish is still somewhat ambiguous, as is suggested by the fact that the sequence <hk> is ambivalent with regard to consonant gradation, although the sequence <ht> does participate in gradation. In any case, since the other laryngeal /g/ occurred only in voiced environments, in which it normally represented the weak grade of the velar stop /k/, it was ultimately lost in most modern dialects (\*g > Ø), after which its former place was occupied by /x/, which today also has voiced realisations.

m	n		ng
p	t		k
	s		x
w	d	y	g
	r		
	l		

Table 4. Old Finnish (phonemic).

Velar consonants are one common source of laryngeals in many languages. Another example is offered by Mongol (proper) and Buryat, in which the strong (unvoiced aspirated) velar stop has yielded a velar fricative ( $*k > x$ ), which dialectally can also be realised as a glottal spirant [h]. Originally, the spirantisation of the strong velar stop took place only before vowels, but the subsequent loss of short vowels in non-initial syllables has expanded the distribution of the laryngeal in Mongol (but not in Buryat), e.g.  $*k\ddot{o}k\ddot{o}$  ‘blue’  $> *x\ddot{o}x\ddot{o} > x\ddot{o}x$ . Ultimately, the phonemic status of the new laryngeal segment was confirmed by the introduction into the language of a secondary velar stop phoneme /k/. A similar process, but concerning only the position before original back vowels, is observed in several other Mongolic languages. Some dialects of Mongol (proper) also have a parallel process which spirantises the weak (unvoiced unaspirated) velar stop before original back vowels ( $*g > gh$ ), e.g.  $*baga$  ‘small’  $> bagh$ . The resulting segment is pronounced as a voiced uvular fricative /gh/ [ɣ], which, however, in syllable-final position can also be realised as a voiceless uvular fricative [χ] or even as a uvular stop [q].

The Mongolic languages exemplify the fact that laryngeals are often produced from different sources by parallel or recursive processes. The laryngeal segment produced by the spirantisation of the strong velar stop represents a Post-Proto-Mongolic innovation. Another innovation on the same chronological level is the laryngealisation of the dental sibilant  $*s$  in the position before vowels other than  $*i$  in Buryat and (the Urulga dialect of) Khamnigan Mongol ( $*s > h$ ). This process involves phonetically the loss of the oral articulation of  $*s$ , and the resulting segment is pronounced as a glottal spirant [h] which in most dialects of Buryat is phonemically distinct from the velar fricative [x] representing the spirantised reflex of the strong velar stop  $*k$ . Dialectally, however, especially in Western Buryat and Old Bargut, the reflexes of  $*k$  and  $*s$  can also merge into a single laryngeal /x/ (Rassadin 1982: 78–79), which can vary freely phonetically between the velar and glottal zones. A similarly wide range of articulatory freedom is characteristic of the laryngeal in Khamnigan, a language which lacks the spirantisation development of the velar stop  $*k$ .

While the laryngeals deriving from velar and sibilant sounds in Mongolic represent Post-Proto-Mongolic innovations, there was also a Pre-Proto-Mongolic innovation which produced a laryngeal from the original strong labial stop *\*p*. For Proto-Mongolic it is necessary to reconstruct a laryngeal segment *\*x*, but its derivation from *\*p* can be verified by external evidence, such as loanwords, e.g. Mongolic *\*taxa-* ‘to guess’ = Turkic *\*tap-* id. (< *\*tapa-*). The fact that the laryngeal had developed from a strong labial stop (*\*p* > *\*x*) is also suggested by the corresponding gap in the synchronic system of Proto-Mongolic (table 5), though later a new marginal phoneme /p/ was again added to the language. Importantly, in medial position (always intervocalic), the Proto-Mongolic laryngeal was segmentally lost in all modern Mongolic languages (*\*x* >  $\emptyset$ ) before any new laryngeals (from *\*k* and *\*s*) were developed. In initial position, however, the Proto-Mongolic laryngeal is still preserved in several marginal languages (Dagur and the Shirongolic group), in which it has partly merged with the secondary laryngeals (in these languages always from *\*k*).

m	n		ng
b	d	j	g
	t	c	k
	s		x
		y	
	r		
	l		

Table 5. Proto-Mongolic (reconstructed).

In this context, it is important to note that the segmentogenesis of laryngeals is often conditioned by areal factors. The development of the labial stop /p/ into a laryngeal has a particularly wide distribution in central and northern Eurasia and covers, in addition to Mongolic, languages and language families such as Turkic, Northern Tungusic, and Mator. For Japanese and Nganasan, an intermediate stage involving a bilabial fricative [ɸ] /f/ is historically documented, while Hungarian and Manchu still remain at this intermediate stage synchronically (*\*p* > *f*). The development of the dental sibilant /s/ into a laryngeal is shared by several languages in Siberia and Manchuria, notably Northern Tungusic, Yakut, and Buryat, but also Forest Nenets. A possibly related process, but at an earlier time level, is the desibilisation of *\*s* in the so-called Ugric branch, where Hungarian has completed the full cycle and even lost the segment (*\*s* > *\*h* >  $\emptyset$ ). Finally, the spirantisation of /k/ is a development that seems to have taken place in several regions in Eurasia, notably Manchuria and Western Siberia. In Manchuria, the development is observed, in addition to Mongolic, also in Korean, Manchu,

and several other Manchurian Tungusic languages and dialects. In Western Siberia, this feature, with varying contextual conditions, is shared by Nenets-Enets, Khanty, Mansi, and Hungarian.

Laryngeals can also have a non-segmental origin, in which case they are often initially reminiscent of suprasegmental features, which, however, can develop into actual laryngeal segments. An example is offered by the Sayan Turkic languages (Tuva and Tofa), which have inserted a laryngeal segment (also called “pharyngealisation”) between an original short vowel and a syllable-final strong stop (Janhunen 1980), e.g. *\*at* ‘horse’ > (Tuva) *aqd*. A similar process is known from Sayan Samoyedic (Kamas and Mator), where it has resulted in the loss of the original stop consonant, e.g. *\*mät* ‘house’ > (Kamas) *maqđ* > *maq*. Further connections are found in Northern Yeniseic (Ket and Yug), where the feature is normally analysed in terms of a tonal contrast, and Northern Samoyedic, where the glottal stop functions as a regular member of the consonant paradigm. (The aspiration in Saamic is an areally unrelated phenomenon.)

### 3. Primary laryngeals in reconstructions

From the examples discussed above it is obvious that synchronic laryngeals can often be diachronically derived from non-laryngeal segments, or even from non-segmental features. In many reconstructed protolanguages there is, however, ultimately a laryngeal segment, or several laryngeal segments, that cannot be derived from other sources. Such laryngeals may be termed “primary”. Mongolic, for instance, has four different chronological levels of laryngeals (Janhunen 1999: 126), which may be identified as primary (*\*x*), secondary (*\*p* > *\*x*), tertiary (*\*k* > *x* / *h*), and quaternary (*\*s* > *h* / *x*). Thus, even if we restore the source of the Proto-Mongolic laryngeal (*\*p*) into the consonant paradigm, there still remains a Pre-Proto-Mongolic laryngeal segment (*\*x*) whose origin is unclear (table 6). (We ignore here the other additional consonants, notably the palatal *\*ñ*, which may also have been present in Pre-Proto-Mongolic.)

m	n		ng
b	d	j	g
p	t	c	k
	s		x
		y	
	r		
	l		

Table 6. Pre-Proto-Mongolic (reconstructed).

At the Proto-Mongolic level, the primary laryngeal (*\*x*) had merged with the secondary laryngeal (*\*p*), but external loanword correspondences show that the two segments were originally distinct. Examples of the type Mongolic *\*kaxan* ‘emperor’ = Turkic *\*kagan* id. would suggest that the primary laryngeal was connected with the weak velar stop *\*g*, but from the Proto-Mongolic point of view the segments *\*k \*g \*x* functioned as separate phonemes, which contrasted at least between vowels. It is therefore impossible for the time being to specify the exact source of the primary laryngeal. The primary laryngeal has, however, also areal parallels. Of the language families adjacent to Mongolic, at least Tungusic seems to have had a similar segment, that is, a laryngeal that cannot be derived from any of the other known sources of laryngeals in the region (*\*p \*s \*k*, all of which have yielded laryngeals also in Tungusic).

The most celebrated case of primary laryngeals is connected with the Indo-European “laryngeal theory”, according to which Proto-Indo-European had a number of laryngeal consonants which are synchronically reflected at various levels of phonology and morphophonology in the branches of the family. Even if a critical examination of the comparative material must probably reduce the number of the laryngeals (Pyysalo 2003), the fact remains that Proto-Indo-European had at least one (and probably only one) laryngeal consonant in its segmental paradigm. As can be expected, this consonant was lost in almost all branches of the family (with the exception of Hittite), to be replaced by a variety of new laryngeals from different sources. Although we do not know what the original source of the primary laryngeal was, the general cross-linguistic picture of laryngeal diachrony suggests that it, too, must have represented a secondary development of some other segment or feature.

A chronological layering of laryngeals is also observed in Uralic. Most Uralic languages have synchronically at least one segment that may be classified as a laryngeal, and these segments can almost invariably be derived from other consonants. The Finnish laryngeal <*h*>, for instance, goes back to the Proto-Finnic laryngeal *\*h* (we could equally well write *\*x*), which basically represents the desibilised reflex of the Pre-Proto-Finnic retroflex sibilant *\*sh* [ʃ], traditionally rendered as <*š*>, which itself was probably a secondary Post-Proto-Uralic addition to the consonant paradigm. Positionally, *\*h* can also represent other segments, including the dental sibilant *\*s* [s], as in (locative) <*läs-nä*> : (lative) <*lähe-s*> ‘vicinity’, and the velar stop *\*k*, as in <*kaksi*> : (partitive) <*kah-ta*> ‘two’. It is well known that *\*h* has tended to be lost in Southern Finnic (*\*h* > Ø), either positionally (as in Estonian and Votic) or even as a paradigmatic entity (as in Livonian, which, on the other hand, has introduced a glottal tone). The positional loss of *\*h* is also attested in Finnish, but there are other developments that have strengthened the status of the segment. In particular, *\*h* has dialectally ab-

sorbed the desibilised reflex of the cluster *\*ts* > *\*th* [θθ], as in *\*metsä* ‘forest’ > Finnish dialectal <*mehtä*> : <*mehä*->.

According to a generally accepted hypothesis, Proto-Uralic also had a primary laryngeal, which may be reconstructed as *\*x* (we could equally well write *\*h*). Opinions differ widely as to what the phonetic nature of this primary laryngeal could have been. The traditional point of view is that it was realised as a voiced velar fricative [ɣ] (cf. e.g. Collinder 1960: 105–107, where the segment is listed among the “non-sibilant fricatives”). As an alternative, it has been suggested that the segment was a glottal spirant of the type [h] (Ruppel 1999). The issue is, however, irrelevant, for, like the laryngeals in the synchronic systems of many living languages, the Proto-Uralic primary laryngeal may have been realised with a broad range of articulatory freedom, extending from the velar to the laryngeal zone and comprising different manners of articulation. Some of the realisations may even have involved non-segmental (suprasegmental or junctural) features. Since it is a question of a reconstructed segment, its exact phonetic nature can never be verified. What is, however, important is its position in the Proto-Uralic synchronic consonant system.

There were three series of consonants in Proto-Uralic with which the laryngeal *\*x* could have been paradigmatically associated. The first group is formed by the glides *\*w* *\*y* (labial and palatal), to which the laryngeal could have adjoined as a velar member very much like the analogous segment in Finnish today (table 2). The second group is formed by the dental sibilant *\*s*, which the laryngeal could have complemented as a velar fricative in a way similar to the situation reconstructed for Proto-Mongolic (table 5). (There was also a palatal sibilant in Proto-Uralic, traditionally reconstructed as a continuant and written as <*ś*>, but the latter is better understood as a member of the stop system (palatal stop) and is here written as *\*c*, as in *\*cilmä* ‘eye’.) The third group is formed by the so-called spirants *\*d* *\*j* (dental and palatal), for which the laryngeal could also have functioned as a velar counterpart. In the absence of binding evidence, but with a view on the overall configuration of the consonant system, we may tentatively place the laryngeal in the group of spirants (table 7).

m	n	ñ	ng
p	t	c	k
	z		
	s		
	d	j	x
w		y	
	r		
	l		

Table 7. Proto-Uralic (reconstructed).

The spirants are a notoriously obscure class of segments in the Proto-Uralic reconstruction. The dental spirant may, in principle, have been realised as a voiced dental fricative [ð] (as still in Saamic), but its palatal counterpart, traditionally defined as a “palatalised dental spirant”, involves a phonetic improbability for which it is difficult to find credible analogies in living languages. It is therefore more reasonable to assume that the spirants were simply weak obstruents, which may or may not have involved a fricative pronunciation. In such a framework, the regular dental spirant *\*d* may be seen as the weak continuant counterpart of the dental stop *\*t*, while the palatal spirant, perhaps pronounced as a voiced palatal fricative [j], would have a similar relationship to the palatal stop *\*c*. In the same way, the laryngeal segment *\*x* would represent the weak continuant counterpart of the velar stop *\*k*. This interpretation does not necessarily imply that the velar spirant was pronounced as a voiced velar fricative [ɣ], for in view of the great variation and articulatory freedom exhibited by laryngeals in the synchronic systems of living languages it may equally well have had glottal realisations of the types [h f].

#### 4. The Proto-Uralic primary laryngeal

The placing of the Proto-Uralic laryngeal in the class of spirants is not the only possible solution to the problem concerning its paradigmatic status. Assuming that there were three different classes of non-liquid non-nasal continuant sounds (glides, fricatives, and spirants), it is immediately obvious that these three classes do not contrast in any single place of articulation. There is maximally only a two-way contrast, which in the dental zone is between a fricative (*\*s*) and a spirant (*\*d*), and in the palatal zone between a spirant (*\*j*) and a glide (*\*y*). In the labial and velar zones, there is only one type of segment in each zone: a labial glide (*\*w*) and a velar spirant (*\*x*). This configuration allows many speculations. As

one possibility, it could be assumed that Proto-Uralic, like Finnish (table 3), actually had a system with four glides (*\*w \*d \*y \*x*) and one fricative (*\*s*). The odd segment would have been the palatal spirant, which could plausibly be reinterpreted as a palatal liquid (table 8) like, for instance, the Czech <ř> (Ladefoged & Maddieson 1996: 228–230).

m	n	ñ	ng
p	t	c	k
	z		
	s		
w	d	y	x
	r	j	
	l		

Table 8. Proto-Uralic (alternative).

To assess the status of the laryngeal segment (*\*x*) it is also useful to consider its phonotactic behaviour in comparison with the other consonants. Unfortunately, the total Proto-Uralic (Finno-Ugric-Samoyedic) comparative corpus is so small that it is difficult to draw definitive conclusions concerning the phonotactics of individual segments, for what might look like a systematic phonotactic gap may actually be due to an accidental gap in the extant lexical database. Even so, it seems that the laryngeal had a distinct phonotactic profile. For one thing, there is no evidence of the laryngeal in word-initial position. In this respect, the laryngeal resembles the dental spirant *\*d*, perhaps defining these two spirants as a single class of segments. On the other hand, segments not occurring in word-initial position include also the vibrant *\*r* and the velar nasal *\*ng*. In fact, cross-linguistic empirical evidence would suggest that the non-occurrence of *\*r* and *\*ng* in word-initial position may well reflect a systematic gap, while in the case of *\*d* it might also be a question of an accidental gap.

The question concerning the word-initial position is also connected with what the status of vocalic anlaut (initial vowels) was in Proto-Uralic. In many languages, vocalic anlaut (Ø) is in a complementary distribution with the velar nasal [ŋ], and this may also have been the case in Proto-Uralic. At the Post-Proto-Uralic level, this “rhinoglottophilic” connection is illustrated by the nasal prothesis (*\*Ø > \*ng /#\_*) in Northern Samoyedic. On the other hand, it is equally possible that the words conventionally reconstructed with a vocalic anlaut, or some of them, actually began, or had originally begun, with the laryngeal *\*x*. However this may have been, it is easy to imagine that the distributional restrictions of *\*x* may have been the result of contextual processes that had reduced the

occurrences of the segment. The situation may have been similar to that in many Estonian dialects, where the Proto-Finnic laryngeal segment *\*h* survives only in medial position, either intervocalically (as in <*raha*> ‘money’) or preconsonantly (as in <*nahk*> ‘leather’). Even without knowledge of other Finnic languages one could reach the correct conclusion that the segment was once present also in word-initial position (and possibly other positions). However, as we know from Estonian, this does not mean that all words with a vocalic anlaut in the modern language originally began with a laryngeal, so the conclusion for the Proto-Uralic reconstruction remains ambiguous.

The intervocalic and pre-consonantal (medial syllable-final) positions are the two positions for which also the Proto-Uralic laryngeal can be reconstructed. The intervocalic position was apparently the least marked of all, for it is the only environment characterised by a full paradigm of consonantal distinctions, while the pre-consonantal position lacks the palatal segments *\*ñ* and *\*j*, a possibly systematic gap connected with the relatively high markedness of these segments. In general, it has to be recalled that the reconstruction of consonant clusters may involve a systematic distortion by the comparative method (Korhonen 1986). Even so, the laryngeal can be reconstructed with reasonable reliability in clusters both before obstruents (*\*kaxsi* ‘fir-tree’, *\*uxti* ‘road’) and before sonorants (*\*käxli* ‘tongue’, *\*jixmi* ‘bird-cherry’), a feature that relates it to the other non-nasal sonorants (glides, liquids), while nasals and obstruents (stops and fricatives) are attested only before obstruents.

It is possibly relevant to note here that uncontroversial occurrences of post-consonantal glides in Proto-Uralic reconstructions seem to be present only in sequences of two glides. Thus, the labial glide *\*w* is attested post-consonantly in the cluster *\*y<sub>w</sub>* (*\*oywa* ‘head’, *\*kaywa-* ‘to dig’, *\*päywa* ‘warmth’), while the palatal glide *\*y* is attested after the laryngeal *\*x* in the cluster *\*xy* (*\*üxyi* ‘belt’, *\*koxyi* ‘birch-tree’, *\*sexyi* ‘pus’). This would suggest that *\*x* was, indeed, a glide (as implied in table 8). On the other hand, neither *\*x* nor the dental “spirant” *\*d* is attested after any consonant segment, including the glides. Since this is also true of the palatal “spirant” *\*j*, the situation could be interpreted in favour of the assumption that the segments *\*d* *\*j* *\*x* formed, after all, a coherent set of spirants or weak obstruents (as in table 7), distinct as a class from the true glides *\*w* *\*y*. Obviously, the material can be interpreted in several different ways, but no interpretation can be fully verified, since there remains the possibility of accidental gaps in the lexical database.

At the Post-Proto-Uralic level, a segmental trace of the primary laryngeal is most systematically preserved in Proto-Samoyedic, though only in pre-consonantal position, in which the laryngeal is normally assumed to have been represented by a reduced vowel *\*ø* [ə]. The vocalisation of the laryngeal (*\*x* > *\*ø*) is

a natural process, but the question is *when* it took place. In Pre-Proto-Samoyedic, the consonant system underwent several paradigmatic changes, which had a potential impact on the status of the laryngeal. These changes included (1) the merger of *\*s* with *\*t*, (2) the merger of *\*d* with *\*r*, (3) the merger of *\*j* with *\*y*, and (4) the spirantisation and depalatalisation of *\*c* into a new dental fricative *\*s* [s]. As a result, there were four non-liquid continuants in the system: the glides *\*w* *\*y*, the fricative *\*s* (< *\*c*), and the laryngeal *\*x*. It is tempting to analyse this system as a parallel to synchronic systems of the Ewenki type (table 1), in which the laryngeal functions as a velar fricative. On the other hand, it could equally well be a question of an analogy to the Finnish type (tables 2 and 3), in which the laryngeal functions as a velar glide. Assuming that the latter interpretation is correct, Pre-Proto-Samoyedic would have had a system of three glides, *\*w* *\*y* *\*x* (table 9).

m	n	ñ	ng
p	t		k
	z		
	s		
w		y	x
	r		
	l		

Table 9. Pre-Proto-Samoyedic (reconstructed).

It is not impossible that the laryngeal continued to be a glide even in Proto-Samoyedic. This is, in particular, suggested by the fact that it could be followed by a syllable-final (including word-final) consonant, after which an original Proto-Uralic high (reduced) vowel had been lost, as in *\*kaxsi* ‘fir-tree’ > *\*kaxt*. An analogous phonotactic behaviour is shown in the Proto-Samoyedic lexicon by the palatal glide *\*y*, as in *\*køym* ‘short’, and morphophonological data would suggest that the same was true of the labial glide *\*w*, as in *\*kaw* ‘ear’: (genitive) *\*kaw-n* > Tundra Nenets *xa-h*. In all of these cases we are dealing with segments that phonotactically combine features of consonants and vowels, that is, segments that are most conveniently defined as a class of glides (semivowels). For the sake of consistence we could write them all either as consonants (*\*w* *\*y* *\*x*) or as vowels (*\*u* *\*i* *\*ø*). By contrast, other (true) consonants could not form final clusters, and no vowel loss took place after them in the Proto-Uralic data, as in *\*yānti* ‘sinew’ > *\*yentø*.

## 5. The origin of the Uralic laryngeal

The Proto-Uralic primary laryngeal is today standardly reconstructed for two medial positions: the pre-consonantal (syllable-final) position and the intervocalic (medial syllable-initial) position. The etymons representing these two positions constitute two separate groups with different sets of correspondences. Thus, the pre-consonantal occurrences of the laryngeal are mainly reconstructed on the basis of the correspondence between the Proto-Samoyedic laryngeal *\*x* or its vocalised reflex *\*ø*, on the one hand, and the Finnic so-called “primary” long vowels, as in *\*käxli* ‘tongue’ > Proto-Samoyedic *\*kexy* = *\*keøi* vs. Finnic *\*ke:li* = *\*keeli*. In this correspondence it is difficult to deny the existence of a laryngeal segment in the protolanguage. The intervocalic laryngeal is, however, diachronically more elusive, since it is reconstructed for the cases in which Proto-Samoyedic monosyllabic vowel stems (*\*CV*) correspond to Finnic monosyllabic vowel stems with a long vowel (*\*CVV*), as in *\*süxi* ‘fibre’ > Proto-Samoyedic *\*ti* vs. Finnic *\*sü:* = *\*süü*. To some extent, the traditional reconstruction reflects the assumption that Proto-Uralic significant words (nouns and verbs) had to be bisyllabic (*\*(C)V(C)CV*). For this reason, the validity of the intervocalic laryngeal in Proto-Uralic reconstructions is often called into question (cf. e.g. Helimski 1984 passim).

As an alternative to the intervocalic laryngeal it has been proposed that Proto-Uralic could also have had monosyllabic vowel stems (*\*(C)V*), which are normally reconstructed only for the pronouns. The most serious argument against this proposition is the fact that the intervocalic laryngeal actually has a segmental representation in two branches of Uralic, Saamic and Ugric (assuming here that the latter is a single node in the family tree). In Ugric, the representation is somewhat diffuse, varying between different spirant or glide values (Sammallahti 1988: 510), but one of the reflexes of the laryngeal is still a velar consonant, which may even synchronically be classified as a “laryngeal” (*\*g*). Even in Hungarian, the laryngeal is represented by a hiatus-filling glide, though the quality of the latter depends on contextual factors, as in *\*toxi* ‘lake’ > <*tó*> : <*tava-*>. In Saamic, the laryngeal appears as *\*k* in several verbal stems, as in *\*suxi-* ‘to row’ > Northern Saami <*suhka-*> (in basically the same way Pre-Proto-Saamic *mäxi-* ‘to give’, *\*yuxi-* ‘to drink’, *\*wixi-* ‘to take’, *\*toxi-* ‘to bring’). The weak grade of *\*k* is realised as a velar spirant, suggesting that the merger of *\*x* with *\*k* may have taken place in connection with the phonologisation of consonant gradation in Pre-Proto-Saamic.

Although the postulation of a laryngeal segment seems to be the simplest explanation of the correspondences concerned, there is a curious problem connected with the distribution of the laryngeal, namely, that it can be reconstructed

only for words ending in the high (reduced) vowel *\*i*. For items with an intervocalic laryngeal, the vowel of the second syllable can be reliably reconstructed only on the basis of the above-mentioned Saamic data, but Samoyedic, which shows a complete loss of both the laryngeal and the following vowel, also suggests that the vowel was *\*i*, which in Samoyedic is regularly lost after single consonants in stem-final position. Possibly, the loss of the vowel took place first (*\*i* > Ø), after which the laryngeal, now in final position, was also lost, e.g. *\*toxi* > *\*tox* > *\*to*. However, this does not explain why the laryngeal could not occur before a low vowel of the second syllable. In the absence of relevant etymological data we do not even know what words ending in a laryngeal followed by a low vowel (*\*(C)Vxa*) would look like in the comparative material.

One possibility is to speculate that the distribution of the laryngeal reflects its origin. Like the laryngeals of living languages, the Proto-Uralic primary laryngeal is likely to have originated from some other segment, or segments. In intervocalic position, a rather obvious source of the laryngeal would seem to have been the velar stop *\*k*, for the latter is more or less unattested in *\*i*-stems. In fact, there is a large number of *\*i*-stems with an intervocalic *\*x* (at least: *\*Vxi* ‘to swim’, *\*IVxi* ‘bone’, *\*cVxi* ‘throat’, *\*kVxi* ‘moon’, *\*mVxi* ‘to give’, *\*näxi* ‘woman’, *\*ñoxi* ‘to chase’, *\*pexi* ‘to cook’, *\*püxi* ‘to search’, *\*pVxi* ‘tree’, *\*suxi* ‘to row’, *\*süxi* ‘fibre’, *\*toxi* ‘lake’, *\*yixi* ‘to drink’, *\*yVxi* ‘pine’), while there is not one example of *\*k* in this stem type in the Proto-Uralic reconstructed lexicon. In Proto-Samoyedic there were some *\*k*-stems (like *\*zuk* ‘worm’), and in Proto-Finno-Ugric there were several *\*i*-stems with an intervocalic *\*k* (the type *\*näki* ‘to see’, *\*teki* ‘to do’, *\*luki* ‘to count’), but in view of their distribution these may involve Post-Proto-Uralic innovations. By contrast, there seem to have been no restrictions for the occurrence of *\*k* in intervocalic position in Proto-Uralic *\*a*-stems (as in *\*muka* ‘back’, *\*yuka* ‘river’). A secondary change of the stem consonant may have taken place in Finnic *\*koki* ‘to try’, often compared with Samoyedic *\*ko-* ‘to see’, which presupposes an original shape with a laryngeal (Proto-Uralic *\*kVxi* ‘to see’, provided that the comparison is valid).

In terms of statistical probability, the data would suggest that the intervocalic occurrences of *\*x* derive from an earlier *\*k* (as also implied by Koivulehto 1991: 17–19). The opposition may still in Proto-Uralic have been close to allophonic, but it was corroborated by lexical innovations in the Post-Proto-Uralic period. Theoretically, the opposition between *\*x* and *\*k* could also be reconstructed as one between *\*k* and *\*kk* (geminate), for no examples of *\*kk* are otherwise known from the data (though there is an example of *\*pp* in *\*ippi* ‘parent-in-law’). The question is, however, why intervocalic *\*k* was spirantised into *\*x* only in *\*i*-stems. The answer must be connected with a phenomenon of the so-called

consonant stems, that is, the tendency of stem-final *\*i* to alternate positionally with zero (*\*i* : *\*∅*). Consonant stems occurred even in Proto-Uralic, as is evident from derivatives such as *\*pid-ka* ‘long/tall’, from *\*pidi-* ‘to be long/tall’. Stems ending in Pre-Proto-Uralic *\*ki* would, in principle, also have had consonant stems, in which the intervocalic *\*k* stood in syllable-final position. It is easy to imagine that the spirantisation development of *\*k* was primarily active syllable-finally, though by way of morphological analogy it could also have spread secondarily to intervocalic position.

The assumption of a syllable-final spirantisation of *\*k* into *\*x* is also potentially valid for the stem-internal pre-consonantal occurrences of *\*x*. In the cases in which *\*x* precedes a sonorant (as in *käxli* ‘tongue’, *\*jixmi* ‘bird-cherry’, *\*sexyi* ‘pus’), no contrast with *\*k* can be reconstructed, meaning that *\*x* could also be analysed as an allophone of *\*k*. The cases in which *\*x* precedes an obstruent are conspicuously few, apparently only two, and one of the etymons (*\*uxti* ‘road’) might also involve a secondary spirantisation in Samoyedic (in Ugric possibly *\*ukti*, if it is not a question of a loanword from Samoyedic to Ugric or vice versa). The remaining example (*\*kaxsi* ‘fir-tree’) contains the cluster *\*xs*, which does seem to contrast with *\*ks* (as in *\*piksi* ‘cord’, *\*siksi* ‘cedar’, *\*suksi* ‘ski’, and also in the *\*a*-stem *\*miksa* ‘liver’), but even in this environment *\*x* might have been allophonically conditioned by the difference in the vowels (low vs. high vowel). It may be concluded that the reconstructable loading of the opposition between *\*k* and *\*x* was very low also in pre-consonantal position, and there is a high probability that *\*x* had developed from an original *\*k*.

It is more difficult to explain why the occurrence of *\*x* in the position before consonants was also confined to *\*i*-stems. In an earlier model of Uralic diachronic phonology, in which the items concerned were explained as containing “primary” long vowels, it was easier to assume that the primary “length” had been preserved, or a secondary “lengthening” had taken place, only before the relatively “light” second-syllable high vowel *\*i* (cf. e.g. Erkki Itkonen 1969: 98–101). In a model operating with a segmental laryngeal, however, it is more natural to assume that the occurrences of a pre-consonantal laryngeal cannot have been conditioned by the quality of the stem-final vowel. Very probably, *\*x* was, as soon as it had become a separate phoneme, able to occur in both *\*i*-stems (*\*(C)VxCi*) and *\*a*-stems (*\*(C)VxCa*). For various reasons the occurrences of *\*x* in *\*a*-stems have become obscured to the extent that they cannot be reconstructed. This is especially true of the cases in which no morpheme boundary followed *\*x*, while in certain derivatives it is still possible to restore the pre-consonantal *\*x* even in stems which end in the low vowel *\*a*.

## 6. The Uralic laryngeal in derivation

Several Proto-Uralic stems containing a laryngeal are attested in derivatives that are so old as to have resulted in atypical phonological correspondences and synchronically irregular paradigmatic stem alternations in the modern languages. In all of these cases it is a question of consonant stem formation, that is, of adding a derivative suffix to the consonant stem of the primary nominal or verbal root. Depending on the morphological and phonological circumstances, it is possible to distinguish at least five derivative types in the etymological material. Each type is represented by two or more examples, making conclusions relatively reliable.

- (1) *\*kax-li-* ‘to die’, *\*ñax-li-* ‘to lick’. These two items are probably the most problematic of all. Although the Finno-Ugric data are clearly based on the derived shapes (> *\*kooli-*, *\*ñooli-*) or, in some cases, their secondary developments (irregularly: *\*kooli-* > *\*kola-* on the analogy of *\*ela-* ‘to live’), the Samoyedic cognates are ambiguous and contain a stem-final laryngeal at least in *\*kax-* = *\*kaø-* ‘to die’ (verifiable), probably also in *\*ñax-* = *\*ñaø-* ‘to lick’ (in which the laryngeal is technically difficult to verify). These are not the only examples of a stem-final laryngeal in Proto-Samoyedic, for there are other cases, e.g. *\*yax* = *\*yaø* ‘earth’, but this stem type is not typical of the Uralic elements of Samoyedic, suggesting that it could involve a Post-Proto-Uralic innovation. Since a stem-final laryngeal is normally lost in Samoyedic (the type *\*toxi* > *\*tox* > *\*to*), it cannot be ruled out that the laryngeal segment in Samoyedic *\*kax-* and *\*ñax-* simply represents a separate morphological element (cf. Janhunen 1981: 263–264), i.e. *\*ka-x-* resp. *\*ña-x-*. At the current stage of research it appears, however, more likely that *\*kax-* and *\*ñax-* are the regular developments of *\*kax-li-* resp. *\*ñax-li-*. After vowels other than *\*a*, a final *\*l* following a laryngeal is represented as *\*y*, as in *käxli* ‘tongue’ > Proto-Samoyedic *\*kexy* = *\*keøi*, but after *\*a* it seems to have been lost, e.g. *\*kaxl-* > *\*kax-*. To be more exact, we are here probably dealing with what may be termed a secondary laryngeal in Samoyedic, for the basic process seems to have been the development of *\*l* into *\*x*, followed by the simplification of the laryngeal cluster (*\*xx* > *\*x*), as is suggested by Proto-Samoyedic *\*ax-* = *\*aø-* ‘to be’, which could well be a more or less regular cognate of Finno-Ugric *\*w/oli-* id. Irrespective of this issue, it is likely that the items *\*kax-li-* and *\*ñax-li-* are ultimately derivatives from the primary roots *\*kaxi-* resp. *\*ñaxi-*, just as *\*w/o-li-* is a derivative from the primary root *\*w/o-*, as is confirmed by Finnic *\*o-ma* ‘being’. (Note that the root *\*w/o-* is a monosyllabic vowel stem without a laryngeal.

Its structure, resembling that of the verb of negation *\*e-*, is connected with its grammatical role.)

- (2) *\*kaxl-ma* ‘death’, *\*ñäxl-ma* ‘tongue’. These two deverbal nouns are based on *kaxli-* ‘to die’ resp. *\*ñäxli-* ‘to swallow’ (Janhunen 1992). Both derivatives are attested only in Finno-Ugric, and it is possible that they were formed in the Post-Proto-Uralic period from stems in which the laryngeal had already been lost in favour of a long vowel (*\*kaal-ma*, *\*ñääl-ma*). The long low vowel in both cases was regularly shortened because of the following internal cluster (*\*lm*) and the low vowel (*\*a*) of the second syllable, while in the corresponding verbal stems it was raised (*\*aa* > *\*oo*, *\*ää* > *\*ee*), yielding modern paradigmatic alternations like <*kuole-*> : <*kal-ma*> in Finnish and <*njiella-*> : <*njálbmi*> in Northern Saami. However, it is also possible that the derivatives had already actually been formed in Proto-Uralic, in which case they would imply that the laryngeal was really a glide, phonemically distinct from the velar stop *\*k*. Although Proto-Uralic did not have medial clusters of three consonants (*\*(C)VCCCV\**), it may well have had clusters of two consonants after a glide. Such clusters cannot be reconstructed for any concrete lexical items, but they can theoretically be postulated for inflected forms, e.g. forms of the type Finnish (plural translative) <*joiksi*> <*\*yo-y-ksi*> from the stem *\*yo-* [pronoun]. (It goes without saying that the reconstruction and dating of such morphological constructions remains hypothetical.)
- (3) *\*pexl-ka* ‘thumb’, *\*tuxl-ka* ‘feather’, derived from *\*pexli* ‘side’ and *\*tuxli* ‘feather’, respectively. In these cases, too, the derived forms are attested only in Finno-Ugric, but the derivative type may well date back to Proto-Uralic, the phonotactic circumstances being similar to the preceding type (2). As in the preceding type, the long vowel resulting from the vocalisation of the laryngeal has been shortened at some relatively early stage, yielding e.g. Finnish <*sulka*> and Northern Saami <*bealgi*>. Also as in the preceding type, the root-final consonant following the laryngeal is *\*l*. The fact that *\*l* is so common in “laryngeal derivatives” may be due to accidental and/or non-phonological factors, such as the presence of the deverbal derivative suffix *\*-li-* in *\*kax-li-* ‘to die’, possibly also in *\*ñäx-li-*. It may also reflect the phonotactic preferences of the laryngeal, which may have favoured the position before *\*l*, possibly due to still earlier phonotactic patterns (if *\*xl* < *\*kl*). Finally, it is possible that some other original root-final consonants are not visible in the etymological material because of distorting developments in the Post-Proto-Uralic period.

- (4) *\*ñox-ma* ‘hare’, *\*sex-ma* ‘tooth’, derived from *\*ñoxi-* ‘to chase’ and *\*sexi-* ‘to eat’, respectively. These two items seem to be deverbal nouns based on stems containing an intervocalic laryngeal. Unlike *\*kaxl-ma* ‘death’ and *\*ñäxl-ma* ‘tongue’, which belong to the same form class (deverbal nouns in *\*-ma*), *\*ñox-ma* ‘hare’ and *\*sex-ma* ‘tooth’ are attested in Samoyedic, where they appear as Proto-Samoyedic *\*ñoma* resp. *\*timä*. The fact that the Samoyedic data do not contain any trace of the laryngeal (*pace* Janhunen 1981: 242–243) is not surprising, for a stem-final laryngeal was apparently lost also in medial position (before suffixes). Of the two items, only *\*ñox-ma* ‘hare’ is attested in Finno-Ugric, where it is represented by the derivative *\*ñoma-IV*. Interestingly, the Finno-Ugric data do not show any reflex of the laryngeal, either, but here it is a question of the regular shortening of the “primary” long vowels in *\*a*-stems (i.e. *\*ñoxma-* > *\*ñooma-* > *\*ñoma-*). The derivational origin of both Proto-Uralic *\*ñox-ma* ‘hare’ and Proto-Samoyedic *\*timä* has occasionally been questioned, but without reason. In the case of *\*timä* ‘tooth’ < *\*sex-mä* ‘eating’ (an etymology first proposed by Abondolo 1996: 57–58), the semantic explanation is strongly supported by the well-known Indo-European parallel (as also mentioned by Aikio 2002: 34–36).
- (5) *\*ñox-ta-* ‘to retrieve’, *\*sux-ta-* ‘to ferry’, derived from *\*ñoxi-* ‘to chase’ and *\*suxi-* ‘to row’, respectively. The special feature of these items is that the derivatives *\*ñox-ta-* resp. *\*sux-ta-* show a change of *\*x* to *\*w* in Finno-Saamic, as is suggested by Finnic *\*nouta-* resp. *\*souta-* and Saamic *\*suwte-* (> Northern Saami <*suvdi-*>). This may well be connected with the influence of the preceding rounded vowel, but it is exceptional that the laryngeal in these cases has a segmental representation also in Finnic. If it were a question of very old derivatives (of the Proto-Uralic level), we would expect the laryngeal to have disappeared without trace on the Finno-Ugric side (yielding something like *\*su-ta-\** resp. *\*no-ta-\** in Finnic), as has happened in Proto-Samoyedic *\*ño-ta-* (> Tundra Nenets *nyoda-*), which may or may not date back to Proto-Uralic *\*ñox-ta-*. On the other hand, if the derivatives were very young (of the Proto-Finnic level), we would expect the laryngeal to be reflected in a long monophthong (yielding *\*suu-ta-\** resp. *\*noo-ta-\**). Since this is not the case, the derivatives were most probably formed at some intermediate level (between Proto-Uralic and Proto-Finno-Saamic), in which the laryngeal was still preserved as a distinct segment. In fact, there are also other examples of the same type of derivative (causatives in *\*-ta-*), notably Finnic *\*püütä-* ‘to try, to ask’ and *\*leütä-* ‘to find’, derived from *\*pVxi-* ‘to search’ (> Samoyedic *\*pü-* >

Tundra Nenets *pyu-* id.) resp. *\*lexi-* ‘to hit’ (Terho Itkonen 1970: 11–16). It is not impossible that Finnic *\*kaata-* ‘to kill, to fell, to pour’ also belongs to this type, in which case it would ultimately derive from *\*kax-ta-*, a derivative of *\*kaxi-*, the primary root of *\*kax-li-* ‘to die’. Since, however, the root *\*kaxi-* is otherwise not attested in Finno-Ugric, we have to reckon with other possibilities, which are that Finnic *\*kaata-* might derive irregularly from either *\*kal-ta-\** < *\*kaxl-ta-\** (vocalisation of *\*l*) or *\*ka-ta-\** < *\*kaata-\** < *\*kax-ta-* (re-lengthening of the shortened vowel). The derivative *\*kax-ta-* seems to be present also in Samoyedic, where the syllable-final laryngeal has regularly been lost, yielding Proto-Samoyedic *\*kata-* ‘to kill’. It is important to note that *\*kata-* ‘to kill’ in Samoyedic has no direct relation to *\*kax-* ‘to die’, for the two items are correlative derivatives based on Proto-Uralic *\*kax-li-* : *\*kax-ta-*. On the other hand, Proto-Samoyedic *\*kax-sa* = *\*kaø-sa* ‘man, human being’ (< ‘mortal’), must be a Post-Proto-Uralic derivative based directly on *\*kax-* < *\*kax-li-*.

The most important conclusion from the “laryngeal derivatives” discussed above is that they appear to confirm that the intervocalic and syllable-final occurrences of the laryngeal involve the same paradigmatic unit *\*x*. Moreover, the occurrence of the laryngeal in syllable-final position was not confined to *\*i*-stems, for examples of a syllable-final laryngeal are well attested also in *\*a*-stems. Although we can demonstrate this only for the limited number of derivatives surviving in the etymological corpus (the stem type *\*(C)Vx-Ca*), stems of the same type must also have existed among the underived lexical items of the protolanguage. The problem is that we cannot detect these items, since any traces of the laryngeal segment have been erased on both the Finno-Ugric and the Samoyedic side due to parallel (but unrelated) phonological developments.

## 7. The laryngeal and the age of Uralic

The Proto-Uralic primary laryngeal is also of at least potential importance for the dating of the language family and its branches. The absolute age of the Uralic language family has recently come under discussion, and it has been argued, with good reasons (Kallio 2006), that the conventional datings should be “modernised” by a factor of perhaps as large as several thousand years. At the same time, it has been suggested that, instead of the conventional binary division into Finno-Ugric and Samoyedic, the Uralic family should be seen as a “comb” or “rake” of several parallel branches, perhaps as many as seven to nine (Saamic, Finnic, Mordvinic, Mariic, Permian, Hungarian, Mansic, Khantic, Samoyedic). In

fact, it has become obvious that at least two of the traditionally established sub-branches of Uralic, “Volga-Finnic” and “Ob-Ugric”, are obsolete constructions and do not represent valid nodes of the family.

The problem has, however, many aspects. The critique against the hierarchic family tree model of Uralic is mainly based on the apparent scarcity of unambiguous phonological innovations in the traditionally postulated intermediate protolanguages. Lexical evidence, by contrast, separates Samoyedic from Finno-Ugric beyond any question, and it also allows an internal hierarchy to be seen within Finno-Ugric, though the picture is perhaps slightly more diffuse than has been traditionally assumed (Michalovec 2002). A particularly important indicator of genetic distances in the lexicon is formed by the basic numerals, which unambiguously reveal a hierarchic system suggesting a consistently westward-branching expansion of the family (Janhunen 2000: 60–61), that is, a system in which the branchings become increasingly recent the farther we move from the east (Samoyedic) to the west (Finno-Saamic).

Lexical evidence is also of crucial significance when we try to estimate the chronological depth (time level) and locate the original centre of expansion (homeland) of Proto-Uralic. It cannot be without relevance in this context that the total size of the reconstructible lexical corpus of Proto-Uralic is conspicuously small compared with other widespread language families in Eurasia, notably Indo-European. Although this is partly due to the binary tradition of Uralic (Finno-Ugric-Samoyedic) comparisons, even the application of stricter taxonomic principles to the Indo-European (Indo-Hittite) comparative material would not make the two language families compatible in the lexical respect. The situation is also not altered by information on the mutual contacts between the two families (layers of Indo-Uralic lexical parallels), when correctly analysed. Indeed, we have to accept the fact that the Proto-Uralic lexical corpus reflects a basically Neolithic, if not a Mesolithic, stage of cultural development in an essentially Boreal environment. As a language family, Uralic is not very far from the absolute limit of the comparative method.

What does, then, the laryngeal tell us of Uralic chronology? As is shown by diachronic information from a variety of language families, laryngeals are short-lived segments in the history of languages. They may be characterised as minimally marked segments that are on their way out of the consonant paradigm. The branches of Uralic show that even secondary laryngeals (like Finnic *\*h*) have tended to be lost in a relatively short time, first positionally and then paradigmatically. The Proto-Uralic laryngeal also had distributional restrictions which might suggest that it was already losing ground, though the restrictions may also simply reflect the positional circumstances under which the laryngeal had been formed. In any case, it is no wonder that the Proto-Uralic primary laryngeal has

been so widely lost in the modern languages. The question is how long it survived in the intermediate protolanguages of the family.

On the Samoyedic side, the history of the laryngeal is relatively straightforward. A precondition for the subsequent evolution of the segment was the restricted positional loss of the high (reduced) vowel *\*i* in non-initial syllables, a feature that had its roots in the Proto-Uralic phenomenon of consonant stem formation. After this development, the laryngeal was segmentally lost (*\*x* >  $\emptyset$ ) in all (both primary and secondary) syllable-final positions, both word-finally (before a pause, the type *\*toxi* > *\*tox* > *\*to*) and medially (before another consonant, the type *\*ñox-ma* > *\*ño-ma*), but it was segmentally preserved when followed by another syllable-final consonant or glide (the type *\*käxli* > *\*kexy*). A secondary syllable-final laryngeal segment, possibly from a different consonantal source (*\*l*), was formed in Pre-Proto-Samoyedic under certain positional circumstances (the type *\*w/oli-* > *\*al-* > *\*ax-*). However, with these modifications, the laryngeal (of either origin) seems to have survived until the Proto-Samoyedic stage as a distinct member of the segmental paradigm. Phonotactic criteria suggest that the laryngeal functioned as a glide.

On the basis of external evidence (in particular, Bulghar Turkic loanwords), Proto-Samoyedic may be dated to the last centuries before the Common Era. Proto-Uralic, on the other hand, must have been separated from Proto-Samoyedic by a minimum of 2,000–3,000 years. This is also a reasonable life-span for the laryngeal, for empirical experience from other language families suggests that laryngeals rarely survive longer than a couple of thousand years. It should be recalled, however, that the laryngeal in Proto-Uralic may have been a recent innovation, based on a specific consonantal source (probably *\*k*). It is also possible that the laryngeal was lost from the paradigm even before the Proto-Samoyedic stage, for its consonantal (*\*x*) and vocalic (*\*ø*) representations are technically difficult to distinguish in the reconstructions. It is well known that the vocalisation of the laryngeal (*\*x* > *\*ø*) is most systematically observed in Nganasan. There are, however, traces of the development also in other Samoyedic languages. Tundra Nenets *to* ‘feather’, for instance, presupposes the earlier stage *\*tuo*, which derives from Proto-Samoyedic *\*tuoi* = *\*tuxy* (< Proto-Uralic *\*tuxli*), with the same vocalic development as accusative plural forms of the type *myado* ‘dwelling’ < *\*mät-o* < *\*mät-ø-i* = *\*mät-ø-y*.

Proto-Finno-Ugric must have been chronologically and structurally much closer to the Proto-Uralic level than Proto-Samoyedic was. In spite of this, there seem to have been innovations that affected the laryngeal in the immediate Post-Proto-Uralic period. The laryngeal was preserved in intervocalic position (the type *\*toxi*). In pre-consonantal position, however, it merged with the preceding vowel, yielding the “primary” long vowels (*\*Vx* > *\*VV*). It has also been sug-

gested (Sammallahti 1988: 486, 490) that the long vowels thus formed were, already in Proto-Finno-Ugric, shortened in *\*a*-stems (the type *\*ñox-ma* > *\*ñooma* > *\*ñoma*). After this shortening, the low long vowels *\*aa* and *\*ää* were raised (*\*aa* > *\*oo* resp. *\*ää* > *\*ee*), which occasionally resulted in paradigmatic vowel alternations (the type *\*kooli-* : *\*kalma*). This amounts to as many as three concrete innovations, a counterargument to the frequent claims maintaining that Proto-Finno-Ugric cannot be distinguished from Proto-Uralic.

The dating of the Post-Proto-Uralic laryngeal developments in Finno-Ugric is, however, not completely uncontroversial, for it is possible that the positional shortening of long vowels and the raising of the low long vowels took place only in the Finno-Permic period, which otherwise does not seem to have involved any innovations connected with the laryngeal. In the Post-Finno-Permic period, however, there was a merger between the long vowels *\*iī* and *\*oo*, as in *\*jix-mi* ‘bird-cherry’ > *\*jümi* > *\*joomi* (> Finnic *\*toomi*), a development apparently shared by all the western (non-Permic) branches of Finno-Permic. It has to be assumed that the laryngeal was at this stage still preserved in intervocalic position, and it probably also had secondary syllable-final occurrences (the type *\*suxi-* : *\*sux-ta-*). In Proto-Finno-Saamic, the new syllable-final laryngeal seems to have undergone a positional development and become a labial glide (*\*x* > *\*w*, the type *\*sux-ta-* > *\*suw-ta-*). Finally, in Finnic, the intervocalic laryngeal yielded a new set of secondary long vowels (the type *\*süxi* > *\*süü*), while in Saamic it merged paradigmatically with *\*k* (the type *\*suxi-*; it should be recalled here that the difference between *\*x* and *\*k* is still observed in the qualitative development of the high vowels *\*u* and *\*i* in Saamic). Altogether, in spite of occasional doubts (Salminen 2002: 48), the history of the primary laryngeal confirms the hierarchy of the conventional family tree.

In terms of absolute chronology, Proto-Finnic and Proto-Saamic lie at about the same distance from Proto-Uralic as Proto-Samoyedic. While it is not surprising that the laryngeal resisted the destructive forces of linguistic evolution at two opposite extremities of the language family, the laryngeal does provide an argument for not dating Proto-Uralic too far back in time. Less ancient datings for the early stages of Uralic are also suggested by an increasing consensus on that the expansion of Uralic in marginal areas (including Finland and Lapland) has taken place more recently than conventionally assumed (cf. e.g. Aikio 2004). There is clearly a controversy between these arguments and the conspicuously archaic look of the reconstructible Proto-Uralic lexicon. Somehow this controversy will have to be solved, and the Proto-Uralic primary laryngeal is one parameter that should not be neglected in this context.

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