

On historical phonology, typology, and reconstruction

Lectures at Charles University, Prague, 19-20 November 2012

1. Stops, the glottis, and laryngeals: the reconstruction of Proto-Indo-European

1. Introduction

Traditional reconstruction of PIE consonant system

| | labial | dental | “palatal” | “velar” | “labiovelar” | “laryngeal” |
|----------------------------|--------|--------|-----------|---------|--------------|---------------|
| stops: voiceless = tenues | *p | *t | *k̑ | *k | *kʷ | |
| voiced = mediae | (*b) | *d | *ǵ | *g | *gʷ | |
| voiced aspirated = asperae | *bʰ | *dʰ | *ǵʰ | *gʰ | *gʷʰ | |
| fricatives | | *s | | | | *h₁, *h₂, *h₃ |
| glides | | | *j = j | | *u = w | |
| liquids | | *l, *r | | | | |
| nasals | *m | *n | | | | |

*h₁, *h₂, *h₃ = h, χ, ʱ (see later)

2. The IE stop system

A. Reconstruction models of PIE stops

The main reflexes of stop series in IE branches, exemplified by dentals

| | Continuation in IE branches | | | | | | | | | |
|----|-----------------------------|-------------|-------|---------|-------|--------|--------|----------|--------------|----------|
| T | Anatolian | Tocharian | Indic | Iranian | Greek | Italic | Celtic | Germanic | Balto-Slavic | Albanian |
| t | t̑ | t | t, tʰ | t, θ | t | t | t/tʰ | θ | t | t |
| dʰ | ḏ | t, ts < *dʰ | dʰ/d | d (θ) | tʰ | f/ð | d | d/ð | d | d |
| d | ḏ | ts < *d | d | d (θ) | d | d | d | t(tʰ/ts) | :d | d |

Balto-Slavic :d = voiced with lengthening/acute effect (Winter's Law)

Models of the PIE stop system, exemplified by dentals

| Traditional | Hopper | Gamkrelidze | Vennemann/Normier | Kortlandt | Haider/Kümmel/Weiss |
|-------------|--------|-------------|-------------------|-----------|---------------------|
| t | t | tʰ~t | tʰ | t | t |
| dʰ | dʰ/d | dʰ~d | ḏ | ḏʰ~ḏ | d > dʰ |
| d | t'/ṭ | t' | t' | ḏ [ʔḏ] | ḏ > d |

(T = “neo-traditional/mainstream”; H = Hopper 1973/1977; G = Gamkrelidze 1973; N = Normier 1977, V = Vennemann 1984; K = Andreev 1957; Kortlandt 1978a, 1985; Haider 1983; Kümmel 2009/2012; Weiss 2009)

Kortlandt's “preglottalized lenis” = “voiceless/glottalized implosive” (cf. Maddieson 1984: 111ff.)

NB: „Voiced aspirates“ phonetically neither voiced nor aspirated, but *breathy voiced*. Interpreted as [+slack vocal folds], [+spread glottis] or rather [-stiff vocal folds], [+spread glottis]? Instead of [spread glottis] rather [(positive) VOT = Voice Onset Time].

B. Data from within the system: alternations of consonants

1) „Final lenition“

Stops series neutralized in word-finally to „mediae“ (at least when followed by a vowel):

*T > *D; *D^h > *D /_# (cf. Goddard 2007: 123f.)

Cf. 3s verbal ending *-t-i > Latin -t vs. *-d > Latin -d

2) Voicing assimilation

Clusters of obstruents must agree in laryngeal features (i.e., voicing, aspiration etc.). Normally assimilation is regressive: voiced stops are devoiced before voiceless stops and *s (but not before laryngeals!), voiceless stops and *s are voiced before voiced stops:

*D > *T /_T,s, cf. *χawg- ⇒ *χwek-s-

*T > *D; *s > *z /_D, cf. *pi-pd- > *pibd-; *si-sd- > *sizd-

Directly attested in IE languages but synchronically productive ⇒ innovations possible

At least for *dk assimilation to *tk not assured, cf. *ui-dkmt- > PIIr. *uinćat-, PCelt. *wikant- ‘20’, *penk^we-dkmt- > PIIr. *pankācat- ‘50’.

3) Bartholomae’s Law

Behind a (stem-final) aspirate assimilation is progressive: voiceless stops and *s become voiced and aspirated (for media after aspirata no evidence is available):

*T > D^h; *s > *z^h /D_

Clearly a productive rule in Proto-Indo-Iranian, Sanskrit, and Old Avestan (with relics in later Iranian), but elsewhere normally lost analogically.

4) Dental assibilation

Dental stops were assibilated preceding (heterosyllabic) dental stops:

*t > *ts /_t; *d > dz /_d; *ḍ > ḍz /_ḍ^h

Sometimes also assumed for the position before velars.

5) Siebs’ Law

Aspirates after initial *s > (allophonically) voiceless aspirates?

a) *sk^hejd- > gr. sk^hid-; *sp^hejg- > gr. sp^higg-; *sp^herH- > OIA sphar-, gr. sp^hur- (but < *tsperH- after Lubotsky); *sp^hraχg- > OIA sphūrj-, gr. sp^harag-

However: No assured s-less cognates!

Ambiguous due to laryngeal: *sk^haχ- > Gr. sk^ha- ~ *g^haχ- ‘to yawn’ > Gr. k^ha-; *sp^heh- > OIA sphā-

b) Certain variation without proof of aspiration: *sterb^h- ~ *d^herb^h-; *bheng- ~ *speng-

6) Distribution in formative types

| | roots | particles | suffixes | endings |
|---------|-------|-----------|----------|---------|
| tenues | + | + | + | + |
| asperae | + | + | (+) | (+) |
| mediae | + | (+) | - | - |

⇒ mediae more “marked”

7) Root structure constraints

Allowed: T_T-, D^h_D^h-; D_T-, T_D-, D_D^h-, D^h_D-; T_ND^h-, sT_D^h-

Forbidden: ~~T_D^h-, D^h_T-, D_D-~~

⇒ T + D^h (sensitive to voicing effects) | D

C. The “implosive” theory

„Aspirates“ = simple explosive stops **b, d, ...

„Mediae“ = implosives, i.e. nonexplosive stops **b, d, ... (not distinctively glottalized)

When these developed to explosives *b, d, ..., the original explosives could remain distinct and developed to breathy voiced “aspirated” stops *b^h, d^h, ...

System typology (Kümmel)

p | b | b most frequent 3 stop system type with two „voiced“ series

⇒ most probable synchronically, nevertheless rather unstable because of tendency d > d

Diachronic parallels (cf. Weiss 2009)

Proto-Thai *b | *b > Cao Bang (Nord-Thai) b | b^h

(in both systems : p, in Cao Bang also : p^h of different origin)

Intermediate stage in other Thai languages, too:

Thai, Lao, Saek *d > *d^h > *t^h | *d > d

elsewhere *d > t | *d > d/d/n/l

Mon-Khmer, viz. *Proto-Mon t | d | d (> Mon t | t | d) > *t | d^h | d > Nyah Kur t | t^h | d.

Austronesian: Madurese *b, *d, *g > *b^h, *d^h, *g^h > p^h, t^h, k^h | preserved *p, *t, *k | secondary b, d, g

Distribution of implosives

Weiss: *b*-lacuna because of **b > *w

Kümmel: rather **b > *m (already Haider 1983 foll. Schindler), cf. possible Uralic cognates with nasals:

PIE **jeg-i/o-* ‘ice’ = PU **jäni*, PIE **dek-* ‘to perceive’ = PU **näki-* ‘to see’?

Rareness of ancient (root-internal) clusters of nasal + media compatible with cross-linguistic tendencies (Kümmel, Opava 2010)

Implications for IE rules

„Final voicing“ = nonexplosive articulation; perhaps also syllable-finally, preserved in **pi-b\$h_3-V* etc. – isolated example(s) of older more general rule?

Cf. allophonies in Munda and SE Asia: final stops > „checked“ = preglottalized and unreleased, in Munda voiced before a suffix (Donegan & Stampe 2002: 117f.)!

Bartholomae’s Law = simple voicing assimilation with secondary aspiration (cf. Miller 1977)

⇒ Shift only post-PIE?

Possible direct reflexes of implosives and the older system

„Aspiration“ of MA but assured in Ilr., Greek, Armenian, Tocharian, Italic, (Germanic?)

⇒ central innovation: sound shift $*d > *d / *d > *d^h$ vs. preservation in peripheral languages?

Sporadically $*d$ (but never $*d^h$) $> *l$ in Luvian:

Hitt. $dā-$ = luv. $lā-$, $lala-$ ‘to take’, Hitt. $pēda-$ = Hluv. $*pala-$ / $*pila-$ ‘place’

Celtic $*d^w > *b > *b$ vs. preserved $*g^w$, $*k^w$?

Secondarily phonologized glottalization in Balto-Slavic (cf. Kortlandt passim)?

3. Laryngeals

A. Preliminaries: General assumptions about IE laryngeals (communis opinio)

PIE had three “laryngeals” $*h_1$, $*h_2$, $*h_3$

Preserved as segmental phonemes: $*h_2$, $*h_3$ in Anatolian, elsewhere indirect evidence

Unspecific developments of all laryngeals:

Loss with compensatory lengthening after tautosyllabic vowels

Baltoslavic lengthening / acute intonation also in /R_C

Resonant gemination before *H: Anatolian and (?) Germanic

„Vocalization“ between consonant and [-syll]: everywhere except perhaps Anatolian; initially only

Greek-Phrygian-Armenian; finally after i/u only Greek-Armenian and Tocharian

Specific developments of different laryngeals:

PIE „colouring“ $*e > [a] / h_2$; $*e > *o / h_3$ (but long $*ē$ more stable $>$ uncoloured, „Eichner’s Law“)

Plosives aspirated by (at least) $*h_2$ in Indo-Iranian, perhaps in Greek

Lenis + $*h_2 > DD$ (or $*T$?) in Anatolian

Sonorization $*ph_3 > *bh_3$?

Only Greek (and Phrygian?) fully distinct vocalic reflexes $*h_1 > e$, $*h_2 > a$, $*h_3 > o$

Tocharian „vocalization“ of $*h_2 = *h_3 > *a / \#_R$ and $/i, u_C$

B. The phonetics of the laryngeals

Distribution: pattern like s (between stops and resonants) ⇒ fricatives

Anatolian $[x-χ-q-k/ϕ-ϕ]$ ⇒ dorsal

Anatolian lowering $u > o$ and PIE “colouring” speak for “faucal” uvular or pharyngeal articulation of $*h_2$ and (probably also) $*h_3$

Aspiration effects point to later $[h]$ easily derivable from $*x/χ/h$

$*h_1$ relatively „featureless“ ⇒ glottal $[ʔ]$ or $[h]$, maybe allophone of velar $[x]$

Voicing effect of $*h_3$ dubious, but weaker status in Anatolian still speaks for „lenis”

rounding effect and general distribution might be taken to point to labialized $*h_3$ (Dunkel 2001),

but missing labialization in Anatolian contradicts this;

distribution (only in roots) might also be accounted for by voicing

Therefore tentatively $*h_1 = *h$, $*h_2 = *χ$, $*h_3 = *ϕ$

[Possibly $*χ$, $*ϕ <$ former uvular stops $*q$, $*g$?]

C. Preservation of laryngeal consonants

1) Anatolian

* χ : > fortis fricative * χ , at least /#_ / V_V, cluster * χw monophthongized > * χ^w (Kloekhorst 2006: 98ff.; 2008a: 76f., 836ff.; Lycian *q*); lenited like fortis stops > * \mathcal{B} , * \mathcal{B}^w , but rules different from stops: e.g., lenited after * \acute{o} in contrast to stops (Melchert, p.c.), viz. * $n\acute{o}\chi ei$ > * $n\acute{o}\mathcal{B}i$ > Hitt. *nāhi* vs. * $d\acute{o}kei$ > * $d\acute{o}k\mathcal{B}i$ > Hitt. *tākki*; perhaps no lenition but rather fortition in other contexts, more similar to * s ?

* \mathcal{B} : preserved as * $\mathcal{B} > \chi$ /#_ V (also Lycian, s. Rasmussen 1992b = 1999: 519-526; Kloekhorst 2006: 85ff., 102f.; 2008a: 75f. contra Kimball 1987), and as * \mathcal{B} /_w (Melchert), cf. *lāhu-* 'to pour' < * $lo\mathcal{B}w-$, and /R_V, cf. Hitt. *sarhie-* 'to attack' < * $sy\mathcal{B}$ - (Greek *rhōomai*) \Rightarrow relative fortition beside * R ? Cf. * $\gamma > x$ /l,r_ in Cornish/Breton vs. loss elsewhere

* h : preserved as ?? (Kloekhorst 2004; 2006: 80f., 95; 2008a: 25, 32, 75f.)

HLuv. *á-* = /ʔ(a)/- vs. *a-* = /a/-, cf. *á-sa-ti* < * $h\acute{e}sti$ vs. *a+ra/i-* 'year' < * $jehro-$

But: Semitic (!) *Aššur-* = *a-sú+ra/i-* written without a glottal stop?

Frequently words with initial *á-* have older writings with „initial *a-* final“ or “aphaeresis” (purely graphic according to Melchert), in earliest documents *a-*

\Rightarrow things much more complicated; rather a difference in vowel quality

(cf. Rasmussen 2007; Melchert 2011):

e.g., *á* = /e/ [æ] or /ə/ vs. *a* = /a/ [ɑ]

2) Armenian

Arm. *h-* < * χ = * \mathcal{B} if not preceding PIE (Ablaut-)* \acute{o} (Kortlandt 1983b; 1984; cf. Beekes 2003: 181ff.) = * $\chi e-$, * $\mathcal{B}e-$ > arm. *ha-*, *ho-*, but * $Ho-$ > arm. *o-* (> *a-*):

* $\chi-$ > arm. *h-*: *han* 'grandmother', *haw* 'grandfather', *hat* 'grain', *haw* 'bird', *hayc'el* 'to seek', *hatanel* 'to cut off', *harawunk* 'sowing, seeds', *hasanel* 'to arrive'

* $\mathcal{B}-$ > arm. *h-*: *hot* 'smell', *?hoviw* 'shepherd', *hac'/i* 'ash tree', *hum* 'raw'

* $\chi-$ > arm. \emptyset :- *ayg* 'morning', *aytnul* 'to swell', *ayc'* 'visit, inspection', *?us* 'shoulder'; *arj* 'bear', *arcat* 'silver', *argel* 'obstacle', *arawr* 'plough'

* $\mathcal{B}-$ > arm. \emptyset :- *orb* 'orphan', *?ost* 'branch', *?oskr* 'bone'; *aygi* 'vineyard', *orjik* 'testicles'

Contradictory data: *hoviw* \leftarrow * $howi-$ < * $\chi owi-$ 'sheep' (cf. * $\chi awi-$ in Toch.B $\bar{a}_u w$, plural *awi*) but *oskr* \leftarrow * $\chi\acute{o}st-$ 'bone' (for * χ^o cf. * $ast-$ in MWelsh *ascwrn* 'bone', *assen* 'rib')

Armenian distribution rather \sim (pre-apocope) syllable structure: *h-* /_V\$CV, \emptyset - /_VC\$C?

Exceptions: *arawr* with original * $r\mathcal{B}$; *hayc'el* 'to seek' influenced by *harc'anel* 'to ask'?

\Rightarrow loss of * h before a coda or rather *h*-epenthesis in onsets of open syllables?

Or conditioned preservation?

3) Albanian

* χ , * \mathcal{B} > *h* /_e; * H > \emptyset /_o Kortlandt (1986: 43ff.; 2010: 329f.) like in Armenian:

* $\chi-$ > alb. *h-*: *hut* 'in vain', *hidhët* 'bitter', *ha* 'to eat', *?hipënj* 'to jump'; * $\mathcal{B}-$ > alb. *h-*: *herdhe* 'testicles'

* $\chi-$ > alb. \emptyset :- *athët* 'sour, sharp', *a(s)* 'or', *arë* 'field', *arí* 'bear', *?enj/ëj* 'to swell'; * $\mathcal{B}-$ > alb. \emptyset :- *amë* 'smell, taste', *?ah* 'beech', *?asht* 'bone'

Good data for * H - > *h-* only with * $\chi e-$, 3 of 4 cases with * \mathcal{B} - have exactly the opposite development as in Armenian! Too little material to conclude anything.

D. Laryngeal “hardening” in PIE and later

*χs > *ks: lat. *senex, senis* ‘old (man)’ < *seneks, *senχ- < **sanax-s, **sanχ-?

Cf. PIIr *sanak-s → *sanaǵ- > OIA sanáj-?

*H+χ > *k: Greek and Toch. k-extensions of *stax- etc., normally not accepted

Germanic *H > *k /R_w, cf. *dajχwer-/dajχur- ⇒ *taikur-, *ṛhw^o > *unk^{wo} ‘us/our (dual)’ (“Cowgill’s Law”, Ringe 2006: 69) and some other cases (*spaikul-, *aikur-); but different explanation by Seebold (1983: 174ff., cf. Müller 2007: 116-119): *w > *g /R_u preceding Grimm’s Law?

also in *k^wik^{wa}- ‘living’ < *g^wiḗwó- (Rasmussen 1994: 435), but cf. *k^wiwa- in Goth. *qius*

*χost-/χast-, *χαγαχ- in CSlav. *kōstь ‘bone’, *kozà ‘goat’?

Rather borrowed ← Iranian *hasti, *hazā-?

E. Aspiration by laryngeals

Aspiration of *T + *H (assured for IIr) ⇒ most probable explanation *H = [h]

Some general and typological facts about aspiration and h (cf. Kehrein 2002):

Aspiration = [+ spread glottis] or rather [+ positive VOT], feature of the onset/nucleus/coda rather than of individual sounds ⇒ all consonants in onset or coda must agree in aspiration

No contrast C^h vs. Ch within one syllable ⇒ C^h vs. Ch implies \$C^h vs. C\$^h

⇒ in a language with /h/ and /C^h/, tautosyllabic Ch must merge with C^h, heterosyllabic need not

Second possibility to explain aspiration: feature spreading: stop[-asp] > stop[+asp] /_fricative[+asp]

Cf. Greek writings like k^hs, p^hs, Vedic kṣ > *k^hṣ > MIA kk^h

Presupposes [+asp] for pre-IIr laryngeals

1) Greek

Difficult and controversial: no Aspiration according to Cowgill (1965), cf. πλατύς < *p^hl^htyú- (analogy after *plataw- < *p^hl^hχw- difficult, since such forms unexpected or at least rare)

2s perfect -st^ha generalized from special clusters

Peters (1991): aspiration before old vowels (in contrast to IIr. never in *THC),

cf. ὄρεσθ-εὺς ~ ὄρέστης < *stχ- ~ *stax-, οἶσθα

nonaspiration from *CHC contexts ⇒ *p^hl^htyú- must have had “non-proterokinetic” allomorph *p^hl^hχw-

Example καθαρός ‘pure’ < *kratharós = OIA *śr^hthirá- > śithirá- ‘loose’ etc. problematic

2) Armenian, Albanian, and Balto-Slavic

*kχ > *k^h > x (> alb. h, balt. k) in some words:

Arm. c’ax (~ c’ak’) = Slav. *soxà = Lith. šakà, cf. OIA śákhā- ‘branch’

Arm. xac- ‘to bite’ = Iranian *xāz- ‘to drink/eat’

Alb. ha ‘to eat’ = OIA khād- ‘to chew’ etc. (cf. Lith. kánd- ‘to bite’)

Instead of *k^h assimilation *kx > x?

But Alb. also *tχ > *t^h > ʒ in rreth, Pl. rrathë ‘ring’, formed like OIA rathí- ‘charioteer’ (see Stifter, HS 121, 2008, 281f. n. 3)

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2. Affricates, sibilants, and laryngeals again: the reconstruction of Proto-Indo-Iranian

1. Introduction

Proto-Indo-Iranian consonant system

| | labial | dental | postalveolar | prepalatal | palatal | velar | glottal |
|------------------|------------------|------------------|--------------|------------------------------------|-----------------------------------|------------------|---------|
| stops: tenues | *p | *t | | *ć [tʃ] | *ć [c] | *k | *H [ʔ]? |
| mediae | *b | *d | | *j [dʒ] | *ǵ [j] | *g | |
| mediae aspiratae | *b ^h | *d ^h | | *j ^h [dʒ ^h] | *ǵ ^h [j ^h] | *g ^h | |
| tenues aspiratae | ?*p ^h | ?*t ^h | | ?*ć ^h | | ?*k ^h | |
| fricatives | | *s [s~z] | *š [ʃ~ʒ] | | | | *h |
| glides | *w | | | | *y [j] | | |
| liquid | | | *r | | | | |
| nasals | *m | *n | | | | | |

NB: Use háček and [ʃ,ʒ] only for „neutral“ postalveolars (as in German or Persian) in contrast to “palatal” ć, ś (= English *ch, sh*, Russian ч, Pastho č, š as well as Polish ć, ź) and distinctly nonpalatal (retroflex) ɕ, ʂ (= Polish *cz, sz*, Russian *u*)

*H non-aspirating laryngeal, *h aspirating laryngeal

Proto-Indo-Aryan consonant system

| | labial | dental | retroflex | prepalatal | palatal | velar | glottal |
|------------|-----------------|-----------------|-----------------|---|---------|-----------------|---------|
| stops | *p | *t | *ṭ | *ć [tʃ-tɕ] | | *k | |
| | *b | *d | *ḍ | *j [dʒ-dʒ] | | *g | |
| | *b ^h | *d ^h | *ḍ ^h | *j ^h >ź ^h [ʒ ^h -z ^h] | | *g ^h | |
| | *p ^h | *t ^h | *ṭ ^h | *ć ^h [tʃ ^h -tɕ ^h] | | *k ^h | |
| fricatives | | *s [s~z] | *ś [ʂ~ʐ] | *ś [ʃ-ɕ] | | | [h]? |
| glides | *w | | | | *y [j] | | |
| liquid | | (*l?) | *r | | | | |
| nasals | *m | *n | | | | | |

Voiced allophones of sibilants were later lost (except in SO dialects after stops)

[h] might have been an allophone of sibilants

*ź^h later became *h* [ɦ]

Proto-Iranian consonant system

| | labial | dental | alveolar | postalveolar | palatal | velar | glottal |
|------------|--------|--------|-----------|--------------|---------|-------|---------|
| stops | *p | *t | *c [tʃ>ʃ] | *ć [tʃ>ʃ] | *ć [cɕ] | *k | |
| | *b | *d | *j [dʒ>ʒ] | *j [dʒ>ʒ] | *j [jʒ] | *g | |
| fricatives | *f | *θ | *s [s~z] | *š [ʃ~ʒ] | | *x | *h |
| glides | *w | | | | *y [j] | | |
| liquid | | | *r | | | | |
| nasals | *m | *n | | | | | |

NB: *h = reflex of aspirating laryngeal, not from *s!

Non-palatal affricates were later simplified to sibilants (or fricatives)

Common Old Iranian consonant system

| | labial | dental | alveolar | postalveolar | palatal | velar | glottal |
|------------|----------|----------|----------|--------------|------------|----------|---------|
| stops | *p | *t | | | *č [cɕ>tʃ] | *k | |
| | *b [b~β] | *d [d~ð] | | | *j [jz>dʒ] | *g [g~ɣ] | |
| fricatives | *f | *θ | *s | *š [ʃ~ʂ] | | *x | *h |
| | | | *z | *ž [ʒ~ʒ̥] | | | |
| glides | *w | | | | *y [j] | | |
| liquid | | | *r | | | | |
| nasals | *m | *n | | | | | |

Distribution of *θ, *d, and sibilants different depending on dialect:

SW θ, d = elsewhere s, z < *c, *j (frequent)

SW s, *z (partly) = elsewhere š, *ž < *č, *j (rare)

2. Affricates and sibilants: Palatals, Ruki, and “Thorn”

1) Traditional reconstruction of PIIr

Primary palatals (PP) > “palatal” sibilants *š, *ž, *žʰ

Secondary palatals (SP) > palatoalveolar affricates *č, *j, *jʰ

Nuristani (and other arguments) shows, however: affricates rather than sibilants for PP

⇒ *č, *j, *jʰ rather than *š, *ž, *žʰ

Cf. PIIr *dáca ‘ten’ > OIA dása, Av. *dasa*, OP *daθā*, Nur. k. *duc* /duts/

PIIr *jánu ‘knee’ > OIA *jānu*, Av. *zəm-*, Nur. k. *jō* /dzō/

PIIr *jʰásta- ‘hand’ > OIA *hásta-*, Av. *zasta-*; OP *dasta-*

post-PIran. *dzasta- > *dasta- in Khot. *dastā*, likewise Nur. k. *dušt* /duʃt/

Counterarguments by Katz (1997) not decisive: Uralic *š in loanwords might come from dialects with

later Indo-Aryan development – or rather, borrowed as *č and simplified within Uralic,

viz. PUr. *čsta > WUr. *šata > Saamic *čuotē, Finn. *sata*, Mordva *šada, Mari *šüdü*, Komi *šo*, Ugric *šzta >

Hung. *száz*, Mansi *ššt/šāt*, Chanty *sat* (with PUr. *č > WUr. *š = Mansi š = MTK *k* vs. PUr. *š > WUr. *š =

Mansi *s* = MTK *s*)

⇒ modern “standard” reconstruction PP = *č, *j, *jʰ vs. SP = *š, *j, *jʰ

Impossible: Secondary palatals must have been less advanced on the path of (de)palatalization than older series (see Lipp 1994; 2009; Kümmel 2000; 2007)

⇒ SP still palatal, not fronted, thus /c/, /j/ and not *č, *j

2) The old sibilants: Ruki and “Thorn”

RUKI-rule: *s/z > (allophonic) *š/ž after all non-anterior sounds,

i.e., *i/y, *u/w, *r, any palatal or velar = retraction, not palatalization!

Phonologized by merger with result of preconsonantal simplification of *č, *j > *š, *ž > *š, *ž

⇒ contrast *s vs. *š in non-Ruki environment

*š > Indo-Aryan „retroflex“ š (articulated like *r* and alternating with it) vs. Iranian “non-retroflex” š?

However: reflexes of *š retroflex in most of East Iranian, too (often merging with š/z < sr/zr)

Even in Avestan, š/ž clearly less palatal than c/j/š: do not cause fronting ə > i

⇒ “retroflex” = distinctly non-palatal character of old *š/ž triggered by contrast to new more palatal sibilants wherever these appear (and remain distinct) in IIR

Sibilants in Iranian

| | Khot. | Waxi | Oss. | Sogd. | Xw. | Bactr. | S-I. | Yazg. | Shgr. | Y-M. | Pto. | P-O. | NW | SW |
|-----|-------|-------|------|-------|------|--------|------|-------|-------|-------|------|-------------------|------|------|
| *št | št | st, t | st | (x)št | t(t) | (x)t | t | ǰt | ǰt | šć/xt | t | št | št | st |
| *rš | rr? | š | rs | rš | š | š? | ? | rǰ | rǰ | rš | rž>ž | ? | (r)š | (r)š |
| *cr | šš | š | s | š | š | š | š | ǰ | ǰ | š | š | š | sr | s |
| *š | *ž | š/ǰ | s | š | h | h | ! | w | ǰ | y/w | ž | h | š | š |
| *xš | šš/kš | š/ǰ | xs | xš | | š | | š | ǰ | xš | š | š | (x)š | (x)š |
| *čy | (ts) | (č) | s | š | s | š | š | š | s | š | š | (č ^h) | š | š |
| *cw | šš | š | fs | sp | sp | sp | sp | sp | sp | sp | sp | sp | sp | s |
| *c | s | s | s | s | s | s | s | s | s | s | s | s | s | θ |

OIA kš, MIA kh/ch = Iranian š = Greek kt, Hitt. tk ... < IE *tk

OIA ýkša- = YAv. arša- = Gr. árktos, Hitt. hart^akka- ‘bear’ < PIE *ǵtko-

OIA kšé-/kši- = Av. šāē-/ši- = Gr. kti- ‘live, settle’ < PIE *tk(e)i-

OIA tákšan- = Av. tašan- = Gr. tékton- ‘carpenter’ < PIE *tétkon-

OIA kšan- ‘hurt’ = Gr. kten-/kta(n)- ~ kan-/kon- ‘kill’ < PIE *tken- (*tken-)?

OIA kš, MIA gh/jh = Iranian ž = Greek k^ht^h, Hitt. Toch. tk ... < IE *d^hǵ^h

OIA kšás, kšám, kšám-i ~ jm-ás; Av. zā, zqm, zami ~ z²mō; Gr. k^ht^hón, k^ht^hóna ~ k^hamái;

Hitt. tēkan, takn-; PToch. *tkæn- ‘earth’ < PIE *d^héǵ^hom-/d^hǵ^hém-/(d^h)ǵ^hm-

OIA kš, MIA gh/jh = Iranian j = Greek p^ht^h < IE *d^hǵ^{wh}

OIA kši- ‘perish, destroy’, MIA jhi- = Av. ji- = Greek p^ht^hi- < PIE *d^hǵ^{wh}(e)i-

OIA ákšiti srávas, srávas ... ákšitam ‘imperishable’ ≈ Gr. kléos áp^ht^hiton

OIA kšáya- = MIA jhāya- ‘burn’, kšāmá- ‘burnt, dried’, MIA jhāma- = Av. jāma- ‘black’

< PIIR *dǵ^hā- < PIE *d^hǵ^{wh}-eh- ← PIE *d^heg^{wh}- ‘burn’

Problematic:

OIA kš, MIA kh/ch = Iranian xš- = Greek < IE *tk?

OIA kšā-, kšáya- = Av. xšā-, xšaiia- ‘rule, reign’ ??? Greek ktā- ‘achieve, possess’

OIA kš, MIA gh/jh = Iranian gž- = Greek p^ht^h < IE *d^hǵ^{wh}? (better *g^{wh}ǵ^h)

OIA kšar- = Av. ýžar- ‘flow’ ??? Greek p^ht^her- ‘perish’

No IE “thorn” /θ/, not even peculiar allophone after dorsal stops; main arguments by Lipp 2009 (following Burrow)

Basic assumption: simplification of (palatal) affricates after stops (Lipp 2009)

Cf. *pk > PrePIIR. *pć [ptǰ] > *pś [pǰ] > *pš, cf. *pku- ‘cattle’ > *pšu- > OIA kšú-, Av. fšū- however, probably not heterosyllabic, cf. OIA virapśá- < *wirap.ćwá- < *wi(H)ra-pćwá-

Cf. *k^{wh}k > PrePIIR. *kć > *kś > *kš?

Ved. cakš- may contain old s in all cases (contra Kümmel 2000, weak perfect stem cakš- from *kákš- < *k^{wh}ek^{wh}k- rather than *kákš- < *kákć- < *k^{wh}ek^{wh}k-); so heterosyllabic preservation, cf. OIA cakhy-, Av. caxs- < *ka-k.ć- (generalized to root *kćā-)

Similarly after dentals $*t̥ > *t̥c > *t̥s > *t̥ʃ$, but here also heterosyllabic $[t.t̥] > [t̥.t̥] > [t̥.t̥] = /t̥ʃ/$, due to greater similarity of $*t$ and $*c$; merged with $*k̥s > *c̥ʃ [t̥.t̥] > [t̥.t̥] *t̥ʃ$.

PIIr $*t̥ʃ > PIA *t̥ʃ > OIA k̥ʃ$, MIA $ch/ch/kh$; PIran. postalveolar affricate $*č$ (distinct from palatal $*ć$) > CIran. $š$ (Persian s ; affricate exceptionally preserved in Kurd. *hirç* 'bear')

PIE $*χ̥t̥ko-$ > $*h̥t̥ca-$ > PIIr $*h̥t̥ša-$ > OIA $f̥k̥sa-$ = PIran. $*h̥ar̥ca-$ > YAv. *arša-*, NP *xirs* 'bear'

PIE $*tk̥éjti > *t̥c̥áiti > PIIr *t̥šáiti > OIA k̥šéti$ = PIran. $*čaiti$ > YAv. *šāēiti* 'settles'

PIIr $*d̥ʒ > PIA *d̥ʒ̥ > OIA k̥ʃ$, $*MIA jh/gh$; PIran. postalveolar affricate $*j̥$ (distinct from palatal $*j$) > CIran. $*ž$, though no clear Iranian examples (since 'earth' generalized simplified anlaut $*j-$)

PIE $*d̥h̥ǵ̥ém-i$ 'on the earth' > $*d̥h̥ǵ̥ámi > PIIr *d̥ʒ̥ámi > OIA k̥šámi$ = PIran. $*jami$ → $*jami$ > YAv. *zəmi*

With secondary palatals similar but slower development > different Iranian outcome

PIIr $*t̥k̥ = [t̥ç] > PIA *t̥ʃ > OIA k̥ʃ$, MIA $ch/ch/kh$; PIran. palatal affricate $*ć$ (merged with old simple $*ć < *k̥$) > CIran. $*č$; no sure examples

PIIr $*d̥ǵ̥ = [d̥j̥h̥] > PIA *d̥ʒ̥ > OIA k̥ʃ$, MIA jh/gh ; PIran. palatal affricate $*j̥$ (merged with old simple $*j < *ǵ$) > CIran. $j̥$

PIE $*d̥h̥ǵ̥w̥h̥i-$ > PIIr $*d̥ǵ̥h̥i-$ $[d̥j̥h̥i-]$ > OIA $k̥ʃi-$, MIA $jhi-$ = PIran. $*ji-$ > Av. *ji-* 'perish'

3. Laryngeals again

Preserved in Old Avestan and partly in Vedic, because of hiatus between vowels shown by metre

⇒ PIIr merger in phonemic *glottal stop* (Beekes 1988: 50, 83ff.)?

However: hiatus $\neq [ʔ] \neq /ʔ/$ (cf. automatic glottal stop in German) ⇒ not conclusive

„Lubotsky's Law“ (Lubotsky 1981) implies dissimilation of $[ʔ]$ preceding $*ʔD\$/math> ⇒ "shortening" = no compensatory lengthening, cf. *pajrá-* 'firm' vs. *pájas-* '(front) side'$

But: Data do not really match (see now Lipp 2009: I 161ff.), best examples may partly be due to „weather-rule“ (see Neri, dissertation)

A. Aspiration effects

1) Assured cases

Indo-Iranian aspiration by following $*h < *χ$ (confirmed by non-IIr. evidence)

OIA *máh-* 'big, great' < $*máj-h-$ < $*még-χ-$, cf. Gr. *méga-*, Hitt. *mekk-*

OIA *prathimán-* < $*pletχ-mon-$, *prthú-* 'broad' etc., cf. Gr. *Platamōn* etc.

OIA 2pl present *-tha* = Av. *-θa* < $*-tha < *-tχa$, cf. Gr. *-stha*, Toch. **-sta* etc.

?OIA *sákhā* 'friend, fellow' = Av. *haxā* < $*sákhā < *sók̥w̥χ-ō(i) < *sok̥w̥-(a)χ-$, cf. Gr. **hopá-*

?OIA *rátha-* 'chariot' = Av. *raθa-* < $*rátha- < *rótχo- < *rot-(a)χ-$, cf. Lat. *rota*

OIA *sthitá-*, *tí-ṣth-a-* 'to stand' < $*sth- < *stχ-$, by analogy *sthā-* ← $*stā- < *stah- < *stax-$

2) Controversial cases

Indo-Iranian aspiration by original $*h$ (Beekes 1988: 87f.)?

Aspiration by $*h$ (already PIE) proposed by Olsen 1988; 1993; 1994), Rasmussen (1992b = 1999: 490-504) but not generally accepted (though rarely explicitly refuted)

If $*h = [h]$ and PIE (or some post-PIE dialects) had $*D̥$, aspiration of $*D$ preceding $*h$ would be unavoidable tautosyllabically ⇒ plausible idea

Grammatical elements: 2nd plural PE OIA *-thá* = Av. *-θa* < **-tha* < **-the*, cf. Greek etc. *-te*?

Aspiration in roots:

Root type **^oeTH-*: **χ* clearly overrepresented in LIV, but reconstruction of **χ* more often than not circularly reconstructed from Ir. aspiration only ⇒ some may have had **h*

Root type **TeH-*: OIA aspiration in *sthā-* < **stax-* as well as in *sphā-* < **speh-* ‘become fat’

Interestingly, **Teh* roots typically have **T = *D^h* (sole exception: **deh-* ‘to bind’) while other **teH* roots may have any **T*

⇒ general situation rather speaks for aspiration by **h*

No good counterexamples! Unaspirated stop + final **H* only in 5 Vedic roots (vs. 15):

OIA *pat(i)-* from **peth-* unsure reconstruction (see EWAia II 71f., Hackstein 2002: 140-143)

ved(i)- secondary laryngeal; *ati-, rodi-, vadi-* laryngeal unknown

3) New arguments

a) Desonorization by **h* in Iranian

Cf. Kümmel, Vienna 2012

Iranian **dh* > **th* > **θ* in some words with **d+*h* < **χ*:

CIran. **θajwár-* ‘husband’s brother’ < **dhaiwár-* < PIIr. **dahiwár-* < **daxiwér-*, cf. OIA *devár-*, Greek *dāér-*, BSlav **dai’wer-*

CIran. **θāw-* ‘to burn’ < **dhau-* < **dahu-/dauh-* < **daxu-*, cf. OIA *du-/dāv-*, Greek *dāu-*
[pace Werba 2006: 265ff. certainly no Elran. innovation]

likewise **f* < **ph* < **b+h*, cf. CIran. *nāf-* ‘navel’ ← **nāb-h-*, OIA *nābhi-* < PIIr. **nāb^hh-* ~ **nab^hah-* > Av. *nabā-* < **nob^h-(a)χ-*

CIran. **waf-/uf-* ‘to weave’ (and ‘to sing?’) < **wabh-*, cf. OIA *-vábhi-* (*ubhná-*?)

**c* < **j+h*, cf. YAv. *mas-*, *masī-* vs. *mazānt-* < CIran. **mac-*, *macī-* ~ *majā-* < **maj-h-(ī)* ~ **maj-āh-* = OIA *mah-*, *mahí-* (~ *mahā-*, *mahánt-*), cf. Greek. *mega-* < **meg-χ-* etc.

[rather not from **maxk-* in Greek *makrós*, *mākos* etc. with no clear reflex in Ir]

maybe also YAv. (+) *isu-* ‘icy cold’ < **icu-* < **j-h-u-* ← **yajā-* ‘ice’ (Wakhi *yaz* ‘glacier’, Nur. k. *yuc* ‘cold’), cf. Hitt. *eka-* ‘ice’ < **jégo-*, *ikuna-* ‘cold’ < **igu-* (or **jegú-*?), Germ. **jekula-* > Icel. *jökull* etc.

Also with original **h*:

cf. “mysterious” YAv. (+) stem variant *daθ-* ‘to put/give’ < **dadh-* vs. *daθā-* < **dádāh-* < **d^héd^h(o)h-*

possibly YAv. (+) *ruθ-* ‘to weep’ < **ruθ-* < **rudh-*, cf. OIA *rodiši*

[also subjunctive **-he/o-* in **waid-ha-* > YAv. *vaēθa-* ‘to know’? Or rather variant derived from 1s **waiθa* < **wáidha* ‘I know’]

⇒ **Dh-* from original **Dahi/u-* or internal **VD\$hV-* = where PIran **Dh* was distinct from **D^h*

presupposes post-PIIr preservation of „aspirating“ laryngeals

Problem: Old Avestan only *maz-*, *dad-*, analogical?

b) Preserved *h-* in peripheral Iranian “proth^{*}etic” *h-*?

Quite some words with Persian *h-/x-*, Kurd. Bal. Khot. *h-* corresponding to Av. = OIA *∅-* < PIE **H-*

Av. *aēm* n. ‘egg’, Khot. *āhaa-* ++ || MP p. *h’dyk*, NP *xāya*, Bal. *hāik*, Kurd. *hêk* < PIIr **hāwya-* < PIE **χōwjo-* (Zair 2011)

Giran. **āhaka-* ‘dust, earth’, Kurd. *ax* || MP p. *h’k*, NP *xāk*, Bal. *hāk*, Zaz. *h(y)āg*, cf. OIA *āsa-* ‘ashes’ < PIIr **hāsa-* < PIE **χāhs-*, cf. Hitt. *hās*, *hass-*

- Av. *arša-* m. 'bear', Khot. *arra-* ++ || MP p. *hls*, NP *xirs*, Kurd. *hirč*, Zaz. *heš*, Xw. *hrs* < PIran. **(h)arča-* = OIA *ḥṣa-* < PIIr **hṣa-* < PIE **ḥtko-*, cf. Hitt. *hart^akka-*, gr. ἄρκτος etc.
- Av. *ast-* n. 'bone', MP m. *'st(g)*, NP *ast(e)*, Khot. *āstaa-* ++ || NP *xastū* 'kernel' ~ *hasta* 'bone', Kurd. *hestî*, cf. OIA *ásthi* < PIIr **hást(h)-* < PIE **ḥóst-/ḥast-(ḥ)-*, cf. Hitt. *hastāi*
- Giran. **arya-* 'possession, thing', MP p. *ʔl*, pth. *ʔr*, arm. *ir* || MP p. *hyl*, m. *xyr/xʔyr*, Khot. *hāra-* (cf. Bailey 1959: 71ff.) < PIIr **hrya-* < PIE **ḥrjo-* (?)
- Av. *aēša-* m. 'plough share' || MP m. *hyš*, NP *xēš* < PIIr **hai(H)š-a-* < PIE **ḥajH-s-*, cf. Slav. **ojes-*, **ḥiHs-áḥ-* > OIA *išá-*, Hitt. *hissā-*
- Giran. **āma-* 'raw' > Pto. *om*, W. *ying* || MP p. *h'm*, NP *xām*, Bal. *hāmag*, Khot. *hāma-*, cf. OIA *āmá-* < PIIr **hāmá-* < PIE **HoHmo-* (**ḥoḥmó-*, Kortlandt 1981: 128?), cf. Arm. *hum*, Gr. ὠμός
- Av. *aēsma-* m. 'fuel', MP p. *ʔzym* ++ || NP *hēzum*, cf. OIA *édhas-* < PIIr **háid^has-* < PIE **ḥáid^h-(e)s-*
- Av. *uši* 'ears', MP m. *'wš(y)* 'mind' || NP *hōš* < PIIr **h(a)uš-* < PIE **ḥaus-*
- Av. *ušāh-* f. 'dawn', MP p. *'wš*, m. *'wšy-* || MP paz. *hōš*, cf. OIA *ušás-* < PIIr **hušás-* < PIE **ḥ(a)us-os-*
- Av. *asru-* n. 'tear', MP p. *'ls*, NP Bal. *ars* ++ || Kurd. *hēsir*, Zaz. *hesri*, cf. OIA *ásru-* < PIIr **hácru-* < ie. **(s)ḥákru-*
- Av. *aspa-* m. 'horse', OP *asa-*, MP *'s-*, NP *(a)s-*, Bactr. *ασπο*, Khot. *aśsa-* ++ || Kurd. *hesp*, (→) Bal. *(h)aps*, cf. OIA *ásva-* < PIIr **(h)ácwa-* < IE **hékwo-*
- Gir. **āsuna-/aswanya-* 'iron': MP m. *'hwn*, NP *āhan*, Parth. *'swn* ++ || Kurd. *hesin*, Khot. *hīśšana-* < PIran. (?) **hācuna-/hācwanya-* < PIIr **hac-wan/un-* < PIE **ḥak-* 'spitz, scharf'? (Skjærvø 1994)
- *arna-* 'to grind' > Khot. *ārr-* || Kurd. *hêr-* < **harmaya-* < PIIr **hrynā-* < PIE **ḥlnéh-*
- *arḡra-* 'millstone', NP *ās*, Kurd. *aş* || Bal. *haš(š)* < PIIr **hárHtra-* < PIE **ḥálh-tro-*

Counterexamples rather few:

- *ḥóp-/ḥap-* f. 'water' > PIIr **háp-* > OIA *áp-* = Av. *āp-*, MP p. *ḡ*, m. *'b*, NP *āb*, Bal. *āp*, Kurd. *av* ++ || but cf. Kumzari *haw*
- *ḥanjó-* 'other' > PIIr **hanyá-* > OIA *anyá-* = Av. *aníia-*, MP m. *'ny*, khot. *aña-* +
- *ḥáuges-* n. 'strength' > PIIr **háuugas-* > OIA *ójas-* = Av. *aojah-*, MP p. *'wc* (Av. LW?), vgl. OIA *ójas-*
- *ḥng^{whi}-* 'snake' > PIIr **hághi-* m. > OIA *áhi-* = jAv. *aži-*, MP p. *'c*, *'cy-*, m. *'z-*, NP *až-* (Av. LW?)
- MP p. *'twr'*, m. *'dwr*, NP *āḍar* 'fire', Kurd. *agir*, Bal. *ās*, Av. *ātər-/āḡr-* < CIran. **ātər-* < PIIr **(H)ātr-* < PIE **(H)aH-tr-*: **ḥah-tr-* | **ḥaḥ-tr-*?, cf. Lat. *āter*, *ātrium*, Alb. *vatër* 'Herd', OIr. *áith* 'oven' or (less probable) **heh-tr-*, cf. Gr. ἦτορ, Germ. **ēpma(n)-* 'breath'?

Areal feature?

Turkic Khalaj (in Northern Iran) only Turkic language preserving Proto-Turkic **h-*

Cf. Khal. *hat* 'horse', *hada-q* 'foot', *hač-* 'open', *här* 'man', *hūat* 'fire', *hūwč* 'point', *hil-/hel-* 'die'

= Turkish *at*, *ayak*, *aç-*, *er*, *ot*, *uç*, *öl-*

|| Khal. *āč* 'hungry', *al-* 'take', *ānd* 'oath', *āt* 'meat', *īar-* 'come', *ič-* 'drink', *ūan* 'ten', *īaz* 'self', *uzāq* 'long'

= Turkish *aç*, *al-*, *ant*, *et*, *er-*, *iç-*, *on*, *öz*, *uzak*

Cf. also Armenian *h-*

B. Prosodic effects: metrical evidence

Laryngeals can leave hiatus I both Vedic and Old Avestan (already mentioned above), most prominently in gen. pl. $-ām / -qm = \{-a'am\}$ (always in OAv., 1/3 in Vedic) \Rightarrow rather late loss in (P)IIr

As per Kuryłowicz (1927); Schindler; Holland (1994); Gippert (1997, 1999), short syllables may still count as long in Vedic, if originally closed by following laryngeal: $a\$C < *aC\H

Brevis in longo scansion = BiL

Cf. *ávasā, savitá* in place of $-\cup \times < *áwHasā, *sawHitá; jánās$ for $-\times < *jánHās$

However (unfortunately): no clear difference in distribution and behaviour between such cases and other words of the same structural type without original $*CH$ (e.g., *ajára-, udára-, manasā* ...)

\Rightarrow difficult to draw conclusion for sound change chronology

C. Vocalization problems

Laryngeals in clusters could be „vocalized“, i.e., were lost after insertion of anaptyctic vowel

Some important words

PIE $*d^hugxtér-$ ‘daughter’ (Gr. *thugatér-*) $>$ PIIr $*d^hughtár-$

$>$ OIA *duhitá, duhitáram; duhitré*

$>$ OAv. *dug^o dā; dug^o drqm*; YAV. *duyda, duydarəm; duydrqm*

$>$ sak. $*duxtā, *duxtaram, *duxθr-$ $>$ Khot. *dutar-, dvīrā*; tumsh. *duḍa, duḍaru*

$>$ Nur. pras. *lūšt*

PIE $*pxtér-$ ‘father’ (Gr. *patér-*) $>$ PIIr $*phtár-$

$>$ OIA *pitá, pitáram; pitré, pitṛbhyas*

$>$ OAv. $p^a tā, p^a tarəm; f^o drōi/piθrē$; YAV. *pita/p^a ta^o, pitarəm/p^a tarəm^o; piθre, ptarəbiio*

$>$ OP. *pitā; piça*; Khot. $*pitā-h, *pitaram, *piθrah$ $>$ *pāte, pātaru, pīrā*

Proposals for rules

$*H > *iH >$ PIIr $*i / C_CC$ Beekes, Klingenschmitt, Rasmussen

OIA *duhit(á)r- < *duǵhit(á)r- < *dugitr- X *dug^htár- < *dugəhtr- < *d^hughtr- < PIE *d^hugxtér-*

Iran. $*dujiθr- < *duǵitr- < *d^hugəhtr-$

Iran. *dugdar- < *dugd^hár- < *dug^htár- < *dug^hhtár- < *d^hughtár- < PIE *d^hugxtér-*

$*H >$ PIE \emptyset / C_CC Schmidt, Hackstein, (pre-IIr) Lipp

modified by Byrd (2010): $*H >$ PIE $\emptyset / T_\$CC$ vs. T\$HC; initially, $*THCC$

Iran. $*duxθr- < *duktr- < *d^huktr- < PIE *d^hugtr- < *d^hugxtér-$

Tichy 1985

$*H >$ PIIr $*iH > i / C_#$; $> *hH$ elsewhere; $*i >$ IA=Iran. *i*; $\check{i} >$ IA (+ Nur.) *i*, Iran. \emptyset

*duhitár- < *duj^hitár- < *duǵ^hitár- < *dug^hitár-*

\Rightarrow PIIr anaptyxis presupposed

Iran. *dugdar- < *dugd^hár- < *dug^htár- < *dug^hitár- < *d^hughtár-*

Lipp 1994/2009

$*H >$ PIIr $*iH > *i / \#C_C, / C_C, > *hH$ elsewhere; lost before unaccented syllable

$*i >$ IA=Iran. *i*; $\check{i} >$ IA *i*, Iran. (+ Nur.) \emptyset

OIA *duhitár-* < **dug^hítár-* with PIr. palatalization

Iran. *dugdr-* < **dugd^hr-* < **dug^htr-* < **dug^hhtr-* < **d^hugtr-*

Iran. *duxtar-* < **duçtar-* (Nur.) < **duǵtar-* < **duǵ^hítár-*

Vedic **CHC#* > *CīC#* (Jamison 1988) presupposes early **CiHC#*, possibly < **CHiC#* via “metathesis”

However: Why not simply *duhitár-* < **dug^hítár-*? Cf. *hitá-* < **d^hítá-*, *ihí* < **id^hí* etc.

– no other example of palatalizing secondary vowel

– no other certain case of preserved *ghi* (OIA *drághīyas-* must be analogical)

Werba 2005

**H* preserved in PIr, lost in Iran., anaptyxis in IA

OIA *duhitár-* < **dug^hítár-* < **dug^hítár-* < **dug^hhítár-* < **dug^hhtár-* < **d^hughtár-* < PIE **d^hugχtér-*

Iran. *dugdar-* < **dug^htar-* < **dug^hhtár-* < **d^hughtár-* < PIE **d^hugχtér-*

Iran. *duxθr-* < **duktr-* < PIE **d^hugtr-* < ***d^hugχtr-*

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3. Dorsal stops: What kind of and how many?

A. Main facts

Avest. *satəm* = Lat. *centum* ['kentom] < PIE **k̑ntóm* '100'

„Satem“: **k̑* > *ś/s/θ* **k* = **k^w* > *k*

„Kentum“: **k̑* = *k* > *k* **k^w* > *k^w* (> *p/t*)

Correspondences of IE dorsal stops (initial position)

| Toch. | Gr. | Ital. | Celt. | Germ. | Hitt. | Luv. | Arm. | Alb. | Balt. | Slav. | Ind. | Iran. | PIE |
|----------------------------------|---|----------------------|-----------------------|----------------------|----------------------|----------------------------|---|----------------------------------|--------------------------|----------------------------------|--------------------------|---------------------------|---|
| <i>k_ɸ</i> | <i>k</i> | <i>k</i> | <i>k^h</i> | <i>x</i> | <i>k</i> | <i>k, c</i> <i>k, ?</i> | <i>s, ts^h</i> <i>k^h, ?</i> | <i>θ, k</i> <i>k, c, ?</i> | <i>ʃ (k)</i> <i>k</i> | <i>s (k)</i> <i>k, tʃ, ts</i> | <i>ʃ</i> <i>k, tʃ</i> | <i>s/θ</i> <i>k, x</i> | * <i>c/k</i> * <i>k/q</i> * <i>k^w</i> |
| <i>k^w_ɸ</i> | <i>k^w>p, t</i> | <i>k^w</i> | <i>k^{wh}</i> | <i>x^w</i> | <i>k^w</i> | <i>k^w</i> | <i>k^h, tʃ^h</i> | <i>k, c, s</i> | <i>k</i> | <i>k, tʃ, ts</i> | <i>k, tʃ</i> | <i>k, x</i> | * <i>k^w</i> |
| <i>k_ɸ</i> | <i>g</i> | <i>g</i> | <i>g</i> | <i>k</i> | <i>g</i> | <i>g, j</i> | <i>ts</i> | <i>ð, g</i> | <i>ʒ (g)</i> | <i>z (g)</i> | <i>dʒ</i> | <i>z/d</i> | * <i>j/g</i> |
| <i>k^w_ɸ</i> | <i>g^w>b, d</i> | <i>g^w</i> | <i>b</i> | <i>k^w</i> | <i>g^w</i> | <i>w</i> | <i>k</i> | <i>g, j, ?</i> <i>g, j, z</i> | <i>g</i> | <i>g, ʒ, dz</i> | <i>g, dʒ</i> | <i>g, dʒ</i> | * <i>g/G</i> * <i>g^w</i> |
| <i>k_ɸ</i> | <i>k^h</i> | <i>h</i> | <i>g</i> | <i>g</i> | <i>g</i> | <i>g, j</i> | <i>dz</i> | <i>d, ð</i> | <i>ʒ (g)</i> | <i>z (g)</i> | <i>ɦ</i> | <i>z/d</i> | * <i>ʃ^h/g^h</i> |
| <i>k^w_ɸ</i> | <i>k^{wh}>p^h, t^h</i> | <i>f</i> | <i>gw</i> | <i>b</i> | <i>g^w</i> | <i>w</i> | <i>g, ?</i> <i>g, dʒ</i> | <i>g, j, ?</i> <i>g, j, z</i> | <i>g</i> | <i>g, ʒ, dz</i> | <i>g^h, ɦ</i> | <i>g, dʒ</i> | * <i>g^h/G^h</i> * <i>g^wɦ</i> |

Examples (in distinctive environments)

ś = *k* < **k̑*/*k*: Arm. *sirt*, Lith. *šird-*, Slav. **sbrd-* : Hitt. *ker*, Gr. *kē̃r*, Germ. **xert-* < **k̑erd-/k̑rd-* 'heart'
OIA *śrī-*, Av. *sraian-* ≈ Gr. *kréont-* < **k̑rejH-/k̑riH-* '(to be) excellent'
OIA *aṣṭá*, Lith. *aštuoni* = Gr. *októ*, Lat. *octō* < *(*H*)*októH(-)* 'eight'
OIA *súnas*, OLith. *šunès* ≈ Gr. *kunós*, OIr. *con* < **k̑unés/-ós* 'of the dog'

k = *k^w* < **k^w*: Av. *ci-/ca-*, Slav. *čb/če-* : Hitt. *kui/kue-*, Lat. *qui-/que-* ... < **k^wi-/k^we-* 'who, what'
OIA *krī-*, ORuss. *krīnj-* : Gr. *pría-*, Welsh *pryn-* < **k^wriχ-, k^wrinχ-* 'to buy'
OIA *nákt-*, Lith. *nakt-* : Gr. *nukt-*, Lat. *noct-* < **nók^wt-* 'night', Hitt. *nekut-* /*nek^wt-*

k = *k* < **k*/*q*: Lith. *kas-*, Slav. **čes-* < **kes-* : Hitt. *kiss-* < **kes-* 'to comb'
OIA *kravíṣ*, Lith. *kraūjas* : Gr. *kréas*, Lat. *cruor* < **kreuχ-* 'blood, raw flesh'
OIA *rukta* = Hitt. *lukta* < **luk-tó* 'became light'
OIA *kup-* 'to shiver' = Lat. *cup-* 'to wish' < **kup-* 'to be excited'

Distributional peculiarities

No "labiovelars" beside **w/u*, no velars before **j/i*

Velars dominate after **s* and before **r*, frequent root-finally

No labiovelars in suffixes, in roots rarely before consonants

frequent delabialization neighbouring rounded vowels and before [-syll]

Threefold reflexes in „small inherited corpus“ languages?

Armenian *sirt* 'heart' < **k̑erdi-*; č'ork' '4' < **k^wetores*; *k'erē* 'scratches' < **kereti*

Albanian *tho(sh)-* 'to say' < **k̑ēs-*; *sorrë* 'crow' < **k^wērsnā-*; *korrë* 'harvest' < **k̑ēr(s)nā-*
dīmër 'winter' < **ḡ^h(e)imon-*; *zjarm* 'warmth' < **ḡ^whermo-*; *gjind-* 'to get' < **ḡ^hend-*

⇒ Palatalization of labiovelars only? (velars in Alb. very late)

Labiovelars more easily palatalized in Greek, Lycian

Luvian (= Lycian and Carian)

zi- /*tʃi-* 'to lie' < **k̑ei-*; *kui-* /*k^wi-* 'who, what' < **k^wi-*; *kīsa-* /*kisa-* 'to comb' < **kes-*

⇒ Palatalization of “palatals” only? Cf. Melchert, talks in Harvard 2008/Opava 2010
 problematic: uncanonical conditioning before *w in HLuv. *asu-* ‘horse’, *suwan-* ‘dog’ (if not loans from Indo-Aryan), before *(ə)R in CLuv. *zurni-* ‘horn’ < *krn-, cf. OIA *śrñ-ga-*, *zanta* ‘below, down’ < *kNta, cf. Gr. *katá*

NB: Exactly one example for nonpalatalized PIE „velar“ in contrastive environment (= before front vowel), namely *kisa-* ‘to comb’ - How to exclude analogical generalization of *k, cf. the athematic verb in Hitt. *kiss-*, or a secondary vowel?

General problem: nonpalatalization may be analogical, cf. irregularly „preserved velars“ in OIA *kampa-*, *kāriṣ-*, *ghas-*, *skambh-*, *skánda-* (as in *kar-*, *gam-* with original labiovelar)

⇒ Counterexamples simply lacking by chance, considering that we know rather few inherited words in just these languages?

Armenian candidates for palatalized “velars” (cf. Pedersen 1906: 393; Woodhouse 1998: 46f. foll. Ĵahukyan):
č’itj ‘bat’, *čim* ‘bridle’, *čmlel* ‘to squeeze’, *čiw* ‘paw, hoof’, *éj* ‘descent’

B. Explanations

A. Three original series

Palatals : velars : labiovelars (traditional)

Diachronically quite improbably

Main problem: palatal > velar in all Centum languages implausible, if not allophonic

⇒ „Palatals“ should continue velars which are simply preserved in Centum
 so „velars“ must have been something else (e.g., uvulars), if distinct

Velars : labiovelars : uvulars

Kümmel 2007

Main problem: uvulars nowhere (!) preserved

B. Only two original series

Problems for all accounts: Contrast root-initially before the vowel slot! Cf. *gemH-, *gem-, *g^wem-
 Artefact of different generalizations?

1) Palatals vs. labiovelars, velars from neutralization, i.e. depalatalization or delabialization

Cf. Steensland 1973, Kortlandt 1978b

Main problem (as always): Distribution not complementary

Additional problem: presumed original system typologically rare (additional uvulars expected!)

a) Neutralization after *s

Excursus: *sK in Indo-Iranian

Standard theory: *sk > PIIr. *śc > OIA *cch*, Iran. *s*

*sq = sk^w > PIIr. *sk > OIA = Iran. *sk*, palatalized PIIr. *śk > OIA *śc*, Iran. *sc*

cf. OIA *chand-* ‘to appear’, *skand-* ‘to jump’, (ś)*cand-* ‘to shine’

But: śc- very rare; sk-presents normally „palatal“ -*ccha-* = -*sa-*, but postconsonantly „velar“ in Av. *ubjūia-*, *θβqzja-*, *srasca-*; OIA *vṛścá-*; *ubjá-*, *bhrjǰá-*; adverbs in -*cchǎ* and -(ś)*cā*

⇒ alternative theory (Zubaty, Lubotsky 2001): *sk > OIA Iran. *sk*, palatalized > *s^hk > OIA *śc*, Iran. *šc* after consonants (stops?), elsewhere earlier palatalization > *s^hc > OIA *cch*, Iran. *sc > s
 counterarguments of Lipp (2009: I 18f. fn. 30) not effective
 Problem (not too grave)=: Motivation of early vs. late palatalization

In other satem languages no clear difference of *sk vs. *sq

*sk^w practically absent in general (cf. doublets like *k^wer- : *sker- 'to cut'), but no phonetic motive for delabialization ⇒ relic of older phonetics, viz. front velar : back velar?

b) Neutralization (delabialization) after *u

Weiss (1995) proved nonexistence of labiovelar vs. velar distinction beside *u

⇒ Neutralization of labialization?

Phonological process: rounding interpreted as coarticulatory rather than phonological, cf., e.g., Yazghulami (Eastern Iranian, Pamir): phonological labiovelars beside unrounded vowels only, with rounded vowels /k/ = [k^w]

According to Steensland also no palatals in this environment – but some (not optimal) counterexamples: PIIr. *kruć-, *yuj-, Iran. *guz-, OIA *tuś-*, Lith. *láuš-*, *pušis*

Arm. generally only „palatals“ after *u*, also in cases of original labiovelars, cf. *ang^w- > *awk^w- > *awc-* 'to' ⇒ palatals = delabialized labiovelars = phonetic velars

Gr. *eĩpon* 'said' < *weyk^wo/e- < *we-wk^wo/e- (cf. PIIr *wawka- > Av. *vaoca-*, OIA *voca-*) shows preservation of *uk^w in Proto-Greek, later /wk^w/ [wk^w] > /wk/

c) Neutralization (depalatalization) before resonants

Before *r (IIr, Balto-Slavic, Alb., Arm.)

Velars: *qr_wχ-/qrux-, *qr_t(u)-, *gr_s-, *g^hr_bχ-

Labiovelars clearly attested, but rare: *k^wr_jχ-, *k^wr_p-, *g^wrómo-?

Palatals: *kr_jH-, *kr_mχ-, ?*kr_tH-, *gr_j- (palatal only in IIr.)

Weise's Law in IIr.? Contra Kloekhorst (2011) palatalization also before *re (at least)

Before other resonants (Balto-Slavic, Alb., Arm.)

IIr. *clu- : Alb. *klu-, BSl. *klau- ~ *clau- 'to hear'

Some analogical redistribution esp. root-finally

2) Velars + labiovelars (preserved in Centum)

Satem split of velars into palatals and velars

a) by „normal“ palatalization before following (resonant +) palatal vowel with analogical generalizations (Lipp 2009 I), viz. *kleu- > *cleu- ⇒ analogical *clu- etc.

Problems:

- implausible analogies necessary: *χok-t^o 'eight' after semantically dissociated *χok-et- ('harrow')
- unexpectedly few root variants with palatal ~ velar in Satem languages

b) contrastive differentiation of velars vs. delabialized labiovelars ⇒ no shift in non-contrastive environments, hence not after *u and *s; early shift in case of earlier delabialization, e.g., before *w, *t etc.?

Exceptions (older Uvularization?) before low back vowels and maybe *r ⇒ „velars“

Advantage: matches actual distribution (at least mostly)

Origin of labiovelars by pre-PIE syncope and monophthongization $*k^w > *k^w_V$ and/or something like $**ko- > *k^we- : **ke- > ke-$; hence but rarely contrast $*k^w : *k^ww < **kVw : **k^wVw$, and never $*ku : *k^wu$; absence of $*sk^w$ because of absence of old cluster $*skw$?

Or rather relic of different distinction (see next)

3) Front velars + back velars

Huld 1997; Woodhouse 1998; Bičovský 2010

Satem: general fronting, but front velars unfronted in some environments

Centum: general backing, strengthening and phonologization of concomitant labialization of back velars; contextual delabialization

Problem also here: actual distribution, otherwise identical to 2b).

Evidence for original labialization in Satem lang. (position after $*u$ in Armenian etc.)

⇒ rather pre-PIE