Pharyngealization and the three dorsal stop series of Proto-Indo-European

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"Make the questions good, though; the answers may well be baloney." Quercer & Janath

Abstract

To cover the various reflexes in the daughter languages, Proto-Indo-European is commonly assumed to have had three series of dorsal stops for which Kümmel's (2007: 319) notation *K : *Q : *Kʷ will be used, *K being the series that underwent fronting and frication in the satem group of languages.

Kümmel's (: 314) phonotactic statistics suggest that *Q and *Kʷ may not have occurred in the same contexts at some stage prior to reconstructed Proto-Indo-European, i.e. they were in complementary distribution, and could be regarded as allophones of a single phoneme series. In most of the daughter language families these variants were redistributed to give reflexes exhibiting two rather than three series of dorsal stops.

Prescott (2012) proposed pharyngealization both of Proto-Germanic *r, *w, *χ, *χʷ to account for lowering/retraction of preceding vowels in early Germanic dialects and also of *r, *u, *k, *i in Baltic, Slavic and Indo-Iranian to account for retracted articulations of following reflexes of PIE *s (the RUKI Rule), suggesting that at least PIE *r, *ᵽ, *q were also pharyngealized.

Kümmel's phonotactic statistics are here narrowed to exclude *K which can occur in any context and widened to include contexts separated from the dorsal by *e.

PIE *a, *ᵽ, *s, at least, seem to condition the occurrence of *Q rather than *Kʷ, so it is proposed that they were already pharyngealized in the parent language and that this phonological feature, RTR, was implicated in the allophony, *Q being also pharyngealized and partly continued in the pharyngealized χ of Germanic and *k of the RUKI group. A corollary is that the RUKI rule must now be inverted to read:

PIE *s lost RTR unless preceded by one of the pharyngealized *r, *u, *Q and, in an innovation, *i.

A change from pharyngealized Qˤ to Kʷ is typologically sounder than the reverse, so it is proposed that PIE had originally two dorsal series, *K and *Qˤ, and that this was continued in the RUKI group, which is thus conservative in this respect. Elsewhere Qˤ > Qʷ > Kʷ except in pharyngealized contexts, giving the three series *K : *Q : *Kʷ. The labial reinforcement Qˤ > Qʷ is supported by Watson's (1999) account of Yemeni Arabic, and there may be relics of intermediate qʷ in Germanic and Latin. The further stage, lenition Qʷ > Kʷ, finds support in developments in Moroccan Arabic.

PIE appears not as a theoretical point source, but as a real language with variation in space and time.
1 Three dorsal series

The Proto-Indo-European dorsal series are described as:

'palatals', \( K = k, g, g^h \) in Kümmel's notation, which gave fricatives and sibilants in the satem languages, which preserved the \( K/Q \) distinction;

'velars', \( Q = q, c, c^h \), which gave velars or uvulars generally;

'labio-velars', \( K^w = k^w, g^w, g^{w^h} \), which gave labio-velars in the centum languages, which merged \( K \) and \( Q \), but velars in that subset of the satem languages with a pure RUKI rule, i.e. Baltic, Slavic and Indo-Iranian which have retracted reflexes of PIE *s following *r, *u, *k, *i.

In the following extract from Clackson's (2007: 50) table, Latin exemplifies the centum languages, Lithuanian the RUKI satem languages.

<table>
<thead>
<tr>
<th>dorsal</th>
<th>PIE</th>
<th>Latin</th>
<th>Lithuanian</th>
</tr>
</thead>
<tbody>
<tr>
<td>k</td>
<td>k</td>
<td>š</td>
<td></td>
</tr>
<tr>
<td>*kerd- 'heart'</td>
<td>cor</td>
<td>širdis</td>
<td></td>
</tr>
<tr>
<td>q</td>
<td>k</td>
<td>k</td>
<td></td>
</tr>
<tr>
<td>*qrewh- 'flesh, blood'</td>
<td>cruor</td>
<td>kraūjas</td>
<td></td>
</tr>
<tr>
<td>k(^w)</td>
<td>k(^w)</td>
<td>k</td>
<td></td>
</tr>
<tr>
<td>k(^w^o)- 'who, what'</td>
<td>quod</td>
<td>kās</td>
<td></td>
</tr>
</tbody>
</table>

Table 1

Beekes (1995: 112) suggests that [Q] are allophones of both /K/ and /K\(^w\)/. The distribution evidence in table 2 suggests that the 'palatal' series, [K], can occur in any almost any context and so does not alternate with [Q].
2 Kümmel's phonotactic statistics

Kümmel (2007: 314) provides counts from LIV, Rix (2001), of the occurrence of the three dorsal series in verbal roots in various contexts. His figures where the attribution of the dorsal is unequivocal, omitting generalized contexts like /#_eR, are given in Table 2, with updated counts for the context _u from Kümmel (pc).

<table>
<thead>
<tr>
<th></th>
<th>*K</th>
<th>*Q</th>
<th>*Kʷ</th>
</tr>
</thead>
<tbody>
<tr>
<td>/#_ei</td>
<td>10</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>/#_eu</td>
<td>7</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>/#_eh</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>/#_e</td>
<td>58</td>
<td>57</td>
<td>28</td>
</tr>
<tr>
<td>/#_a</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>_u</td>
<td>4</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>_u̯</td>
<td>10</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>i̯</td>
<td>21</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>_i̯</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>s̯</td>
<td>8</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>_s</td>
<td>4</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>_r</td>
<td>5</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>_l,N</td>
<td>8</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>ẖ</td>
<td>6</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>ẖ̱</td>
<td>4</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>_ẖ</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>ẖ̱̱</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>_ẖ̱</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 2
As mentioned above, \(^*K\) can occur in almost any context, but this is not the case for \(^*K^\wedge\). There are some striking zeroes in this column: in the contexts /\#_e\_u, /\#_a/, adjacent to \(^*u\) and \(^*s\), before \(^*l\), \(^*m\), \(^*n\). There are also no occurrences of \(^*Q\) before \(^*i\). This suggests the possibility that \(^*Q\) and \(^*K^\wedge\) were in complementary distribution and thus allophones of a single phoneme series at some time. As there are contexts where all three series occur, this time may well have been earlier than Proto-Indo-European.

The most significant promiscuous context is /\#_e. But there are hints that drilling down to see whether the following consonant may influence the choice of dorsal may shed some light on this. /\#_e\_u/, for instance, conditions \(^*Q\).

3 Pharyngealization in Germanic and the RUKI dialects

A new relationship was proposed in Prescott (2012) between Germanic, which shows lowering and retraction of vowels before \(^*r\), \(^*w\), \(^*\chi\), \(^*\chi^\wedge\), and the RUKI dialects of Indo-European: Baltic, Slavic and Indo-Iranian, which have a retracted \(^*s\) following \(^*r\), \(^*u\), \(^*k\), \(^*i\). There are two aspects to the relationship: the Germanic segments correspond directly to three of the four RUKI segments, and the effects on vowels in Germanic and on \(^*s\) in the RUKI dialects may be attributed to the spread of a common phonological feature, Retracted Tongue-root, [RTR]. To illustrate this, examples are given from Old High German for Germanic and Sanskrit for the RUKI group:

3.1 Old High German monophthongization of \(^*ai\)

/ai/ > /\v/ before /\t/, /\w/ and Germanic /\x/.

First the /a/ is raised to /\v/ by i-umlaut before /i/, and then the /i/ is lowered to /\v/ before /\t/, /\w/ and Germanic /\x/.

Examples from Voyles: 9.1.3a The Changes in [ai]:

/\t/ \(^*saira\) > sèr 'pain'
/\w/ \(^*saiwaz\) > sèu 'sea'
/\x/ \(^*aixtiz\) > èht 'wealth';

but there is no lowering before OHG \(h\) from Germanic /k/: /k/ \(^*aik\) > eih 'oak'
3.2 Sanskrit /ṣ/

Sanskrit preserved the retracted allophone of /s/ as the retroflex /ṣ/. Examples from Burrow (1965: 79):

/r/ \vardashman-'summit'
/u/ \muś-'mouse'
/k/ \kṣudrā-'small'
/i/ \vīṣa-'poison'

3.3 Critique of Prescott (2012)

The RUKI rule in Baltic, Slavic and Indo-Iranian, where an *s following *r, *u, *k, *i appears as retracted to ŝ, x, ʂ, but generally [s] elsewhere, was compared to "emphasis" spread in Arabic. Emphatic consonants in Arabic are characterised by RTR, Retracted Tongue-root or Pharyngeal Constriction (described by Jan Katlev (pc) as "with an ʕayin co-articulation" and by Tur-Sinai (1937: 12) as "with swallowing" in Laufer & Baer's (1988:185) translation), and this RTR feature can spread to following consonants, converting them into emphatics and also having a lowering/retracting effect on vowels. So it was suggested that at the time the RUKI distinction was made the emphatic segments were rˁ, uˁ, kˁ, iˁ and the following /s/ became [sˁ].

The model of emphasis spread in Arabic led to the assumption that there was no need to extend the RUKI segments from /k/ to include all velars. Andersen's (1968: 188) Lithuanian example of /š/ after /g/ in áugštas 'high' could then be seen as action at a distance by the preceding RUKI segment /u/, possibly mediated by an allophonically pharyngealized /g/, and the same explanation could account for Mayrhofer's (1989: 9) Old Persian example aogz̃a "du sagtest". There was no explanation of why only *s was affected in the RUKI rule, just a hint that, improbably, only for the pharyngealized allophone of /s/ did phonemes evolve that it could merge with and be preserved.

Consideration of the dorsal series question in Proto-Indo-European will vindicate Andersen and Mayrhofer's extensions of the RUKI rule, thus weakening slightly the connection of the RUKI dialects with Germanic where of the 'velars' only χ̃, χ̃w̃ < q̃, q̃w̃ give evidence of pharyngealization. It will also lead to an inversion of the RUKI rule, making the Arabic model of emphasis spread inappropriate.
4 Pharyngealization in Proto-Indo-European

Because Kümmel’s counts show an unrestricted distribution for K, counts have been made, again from LIV, comparing only unequivocal Q and Kʷ in the contexts: xe_, x_, _x, _ex. Contexts where x = mobile s have been ignored and rows which have only one or zero examples in all contexts are not shown.

<table>
<thead>
<tr>
<th>x</th>
<th>xeQ</th>
<th>xeKʷ</th>
<th>xQ</th>
<th>xKʷ</th>
<th>Qx</th>
<th>Kʷx</th>
<th>Qex</th>
<th>Kʷex</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h₂</td>
<td>1</td>
<td>0</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>i</td>
<td>1</td>
<td>2</td>
<td>8</td>
<td>6</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>l</td>
<td>1</td>
<td>0</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>0</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>m</td>
<td></td>
<td>1</td>
<td>0</td>
<td></td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>0</td>
<td>1</td>
<td>11</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>r</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>10</td>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>s</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>t</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>u</td>
<td>2</td>
<td>3</td>
<td>17</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 3

These figures show a preference without exception of *a, *s, *u for Q rather than Kʷ in the contexts x_, _x, _ex, e.g.

*qamp-krümmen, biegen'  
*sqend-(los)springen, davonspringen'  
*qeup-‘(innerlich) beben’
*r, *l, *h show a tendency to prefer Q in the contexts xe, x, x, e.g.

*bʰerɡʰ- ‘beachten, bewahren’

*qlep- ‘(heimlich) stehlen, verbergen’

*pleh₂ɡ- ‘schlagen’

*i shows a preference for Kʷ in the contexts _x, _ex, e.g.

*kʷiḥᵉh- ‘ausruhen’

*kʷeį- ‘wahrnehmen, bemerken’

This suggests the possibility of a complementary distribution of *Q and *Kʷ at some time prior to Proto-Indo-European i.e. as allophones [Q] and [Kʷ] of a single phoneme series. Since it is proposed that r, u, Q, i and s were pharyngealized in the RUKI dialects and r, w, χ in early Germanic as well, it is suggested that RTR was also the active feature in this distribution of the dorsal series.

5 Variation in space and time

A change from pharyngealised Qˤ to Kʷ is typologically sounder than the reverse. Suppose we start with two ‘dorsal’ series, velar K and pharyngealized Qˤ, and other pharyngealised segments including at least *a, *s, *u.

This two-way distinction may be continued in Baltic, Slavic and Indo-Iranian and we can see these dialects as preserving the pharyngealized quality of Qˤ at least until the operation of the RUKI rule. They also preserve original pharyngealized sˤ following rˤ, uˤ, Qˤ and a newly pharyngealized iˤ, thus inverting the RUKI rule.

For the other dialects, allow Qˤ to acquire labial reinforcement to Qˤʷ. Watson (1999), using (:289)

“data from Ṣanṭānī, a dialect of Yemeni Arabic, in which emphasis has two articulatory correlates, pharyngealization and labialization”,
shows the labialization of the emphatics in their effect on short high vowels e.g. (296) γāliyih ‘expensive f.s.’ vs. ṭayyubuh ‘good f.s.’

This change occurred only in non-pharyngealized contexts. There may be relics of the pharyngealized qˤʷ stage in Germanic e.g. Gothic laïxʷum ‘we lent’ quoted by Wright (1954: §69) as an example of Germanic i broken to e, and in the Latin spelling <qu> which seems to imply a retracted stop different from <c> at the time the spelling was adopted.

The lenition Qˤʷ > Kʷ may find support in developments in Moroccan Arabic. Heselwood and Hassan, in their editorial introduction (2011: 16) to a volume on Arabic phonetics, draw a phonological conclusion from phonetic data in a paper by Zeroual et al. that ‘emphasis’ in Moroccan Arabic is realised as pharyngealisation on coronals but as labialisation on dorsals. e.g. [tˁab] ‘to cook’ contrasts with [tab] ‘to repent’ but [χʷdama] ‘knives’ with [χdajm] ‘works’.

It seems likely that *h₂ was originally pharyngealized because of its power to convert *e into *a but that it was losing RTR under the general lenition of laryngeals, (perhaps /h/ becoming /h/?). Maybe *r, on the other hand, was on the way to becoming pharyngealized, as seen later in Latin, Germanic and the RUKI group.

PIE appears not as a theoretical point source, but as a real language with variation in space and time. Further, Bellem’s (pc) remark that “Arabic emphatic consonants are adapted by their labialised counterparts in Bantu and Uzbek languages” opens the intriguing possibility that the PIE dialects that developed labio-velars might have been spoken by adopters of PIE.

6 Support for retracted Proto-Indo-European *s

6.1 Retracted reflexes

Some modern IE languages with a retracted, but not necessarily pharyngealized, reflex of *s are Spanish, Dutch, Albanian, German in some contexts:
paraphrasing König (1978: 151), in early High German, Germanic s had an š-like sound, shown by German loanwords: Polish żold ('Sold') and place-names: Žatec ('Saaz'), Griže ('Greis'). Conservative Walser and some Bavarian dialects preserve an š-like sound even before vowels, while this quality is lost in an increasing number of contexts, the more northerly the dialect.

Braune/Eggers (1987: §168) support this view that OHG <s> represents an š-like sound, citing the Slavic Freisinger Denkmäler with <s> for Slavic š, ż, <z> for s,ž.

If the monophthongization of Germanic *ai to ē before r, w, h alone in OHG is due to the pharyngealization of these consonants as Prescott (2012) suggests, this š-like sound cannot have been still pharyngealized at the time of the monophthongization.

In a more comprehensive survey Vijūnas (2010) concludes that PIE *s was a post-alveolar "shibilant" with a retracted articulation compared to alveolar [s]. His reasons include the retracted articulation of /s/ in some modern IE languages where it is the only sibilant and does not have to contrast with e.g. /ʃ/, and a painstaking review of the fricatives that may be reconstructed for Anatolian languages and their Semitic neighbours. This retracted PIE *s seems entirely compatible with the pharyngeal co-articulation proposed here.

6.2 Rhotacism

Further support for IE /sʰ/ may be seen in Germanic and Latin r < s.

In Sanskrit it is only the retroflex reflex s (<r> sʰ) word-finally (after i, u) which becomes r before voiced segments, where plain s does not (Burrow (1965: 100)) and Olsen (1989: 5-15) demonstrates a similar rule in Armenian of -ir < -is, -ēs and -ur < -us, -ōs in any word-final context. This suggests Armenian participation in the RUKI rule, at least in respect of i and u, and the corresponding lowered realization of i and u may have facilitated the merger of ē with i and ō with u.

If only pharyngealized s is subject to rhotacism in Sanskrit and Armenian, the more general r < z ( < s by Verner's Law) in North and West Germanic and r < z < s intervocally in Latin suggest that all z < s remained pharyngealized in these languages at least until the operation of the rhotacism rules.
Parker (1988: 230) sees vowel lowering in Latin equally before *r and r < *s, both exemplified in *peparisam > *pepiriram > pepereram 'I had brought forth', which suggests pharyngealization of r from either source.

7 Summary of the argument

7.1 Vowel lowering/retraction in early Germanic dialects could be attributed to a pharyngealized quality in proto-Germanic r, w, χ, χw.

7.2 The role of the largely corresponding r, u, Q, i in the distinction of retracted versions of a following s in the RUKI dialects may also be ascribed to an RTR quality of these segments.

7.3 The 'velar' series of proto-IE which was neither labialized nor subject to satem fronting, Q, seems to be in complementary distribution with Kw, in proximity to *a, *s, *u, and to some extent *r, *l, *h₂. Now *r, *u, *s correspond to two of the ruki segments and the distinctive retracted s of these dialects, so the hypothesis is that the feature RTR characterised pharyngealized phonemes, Qʰ, aʰ, sʰ, uʰ, rʰ, h². In many areas Qʰ, when not in a pharyngealised context, was labialized to Qʰw, which in most cases then lost pharyngealisation to give Kw.

7.4 If the pharyngealized *s was preserved into the RUKI dialects, the RUKI rule should be inverted:- *s lost RTR unless following pharyngealized r, u, Q, i.

Acknowledgments

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