Kluge’s Law: chronology, limits on co-articulation, geminate fortition
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Kluge’s Law (KL) of Proto-Germanic (PGmc) is traditionally described as the total assimilation of a pretonic nasal to a preceding voiced obstruent. It chronologically follows acts 1 and 3 of Grimm’s Law (GL; spirantization of plain stops and de-aspiration of voiced aspirates, respectively), as well as Verner’s Law (VL), and precedes Occlusivization and act 2 of GL. Table (1) (adapted from Kroonen 2011:50) illustrates the derivations from Proto-Indo-European (PIE) to PGmc for the combinations of plain stop + n, voiced aspirate + n and voiced stops + n (the three types of stop in PIE) respectively:

<table>
<thead>
<tr>
<th></th>
<th>Dutch wit</th>
<th>English bottom</th>
<th>Middle High German stutzen</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIE</td>
<td>*kuit-nò-</td>
<td>*b’ud̩-nó-</td>
<td>*studd- nêh₂-</td>
</tr>
<tr>
<td>GL, acts 1 &amp; 3</td>
<td>*hwið-ná-</td>
<td>*bud-ná-</td>
<td>N.A.</td>
</tr>
<tr>
<td>VL</td>
<td>*hwið-ná-</td>
<td>*bud-ná-</td>
<td>N.A.</td>
</tr>
<tr>
<td>KL</td>
<td>*hwiðdā-</td>
<td>*buddā-</td>
<td>*studdō-</td>
</tr>
<tr>
<td>Occlusivization</td>
<td>*hwidda-</td>
<td>*buđda-</td>
<td>N.A.</td>
</tr>
<tr>
<td>GL, act 2</td>
<td>*hwitta-</td>
<td>*butta-</td>
<td>*stuttō-</td>
</tr>
<tr>
<td>PGmc</td>
<td>*hwitta-</td>
<td>*butta-</td>
<td>*stuttō-</td>
</tr>
</tbody>
</table>

These traditional derivations are problematic, because:
(i) acts 1 and 3 of GL are chronologically separated from act 2, although GL is widely seen as a chain shift;
(ii) there is a complicated detour via spirantization, voicing, occlusivization and devoicing (tn>ðn>ðn>dd>tt>tt instead of tn>tt);
(iii) in practice, n only assimilates to preceding voiced stops, whereas phonetic research shows that voiced geminates (especially voiced fricative geminates as in *hwiðdā-) encounter aerodynamic difficulties (Dmitreeva 2012, Hayes & Steriade 2004, Jaeger 1978, Ohala 1983, Westbury & Keating 1986);
(iv) original PIE sibilants do not assimilate to preceding obstruents and do not occlusivize either; this puts into question the validity of the fricative detour in the derivations of *hwitta- and *butta-.

Kortlandt (1988, 1991) presents an analysis of KL under the Glottalic Theory of PIE (where T, D, D have been replaced by T, D, T respectively (upper case characters generalize over place of articulation). In Kortlandt’s analysis, KL precedes GL but follows VL. For the PIE > PGmc derivation of *hwitta-, there is no more a detour via spirantization and occlusivization, but there still is one via voicing and devoicing. Furthermore, problem (iii) remains. Because of the postulated order VL>KL>GL, Kortlandt’s analysis is also incompatible with the recent insight that under Glottalic Theory, VL and GL can be analyzed as a single process (GVL; Perridon 2007, 2008; Noske 2009, 2012).

I will present here arguments in favour of the chronology: KL > GVL instead of the order VL > KL > GL as proposed by Kortlandt. The upshot is that all four problems mentioned above then disappear. I will also show that KL was not really an assimilation conditioned by the fact that a following vowel is stressed, but by fact that a preceding vowel is un-stressed, and thus has the same conditioning as Verner’s Law. This conditioning can be grounded in phonetic research, e.g. by De Jong et al. (1993), showing that co-articulation effects are reduced or blocked in (post-)stress environments. This view can be formally captured in a view of phonological processes as being output-driven, where constraints are separated from the processes they determine.
Under Glottalic Theory, the PIE forms in table (1) are: *kuit-nó-, *bud-nó- and *stut-néh-. Because act 2 of GL (D > T) no longer exists under the same theory, a separate process of geminate fortition needs to be postulated for the derivation PIE *bud-nó- > *budda > PGmc *butta-. Such a process is straightforward and present in many languages (e.g. Japanese, Kawahara 2006).

References