

## Indo-European Stop Reconstructions

### 1. The ‘classic’ Brugmann reconstruction

- A fairly strict adherence to the comparative method yields 15 distinct stop phonemes. The classic Neogrammarian reconstruction, proposed by Karl Brugmann in 1886, involves three series (voiceless, voiced, voiced aspirated), four points of articulation (labial, coronal, palatal, velar), plus a series of labio-velars:

(1)	<i>labial</i>	<i>coronal</i>	<i>palatal</i>	<i>velar</i>	<i>labio-velar</i>
<i>voiceless</i>	*p	*t	*k̑	*k	*k <sup>w</sup>
<i>voiced</i>	*b	*d	*g̑	*g	*g <sup>w</sup>
<i>voiced aspirated</i>	*b <sup>h</sup>	*b <sup>h</sup>	*g̑ <sup>h</sup>	*g <sup>h</sup>	*g <sup>hw</sup>

- The centum languages merged the palatal and velar stops, while the satem languages merged the velar and labio-velar stops. Furthermore, the palatal stops are realized as some kind of palatal or palato-alveolar affricates/fricatives in the satem languages.
- Sanskrit underwent a subsequent ‘secondary palatalization’ (the Law of the Palatals), which palatalized both plain and labio-velars before front vowels. Because Sanskrit mid-vowels merges with \*a (yielding a single low vowel), the environment for this secondary palatalization is opaque in Sanskrit.
- This is referred to as the ‘three-velar’ analysis (palatal velars, plain velars, and labio-velars)

### 2. Meillet’s Alternative

- Antoine Meillet (1894) argued against the three-velar analysis and proposed an alternative two-velar analysis:

(2)	<i>labial</i>	<i>coronal</i>	<i>velar</i>	<i>labio-velar</i>
<i>voiceless</i>	*p	*t	*k	*k <sup>w</sup>
<i>voiced</i>	*b	*d	*g	*g <sup>w</sup>
<i>voiced aspirated</i>	*b <sup>h</sup>	*b <sup>h</sup>	*g <sup>h</sup>	*g <sup>hw</sup>

- This analysis simplifies the Brugmann system, but requires a more speculative account of the satem/centum distinction.
- According to this account, in satem languages, some plain velars palatalized, while others didn’t – the environments are complex.
- Subsequent merger of plain and labio-velars yield a system where some roots alternate between palatals and velars – those that originally had plain velars, and those that have only velars – those that came from labio-velars.
- The complex phonological environments became opaque and was further obscured by analogical leveling, yielding a system that is essentially unreconstructable.

## 2.1. Arguments for a two velar analysis

- Under the three velar analysis, plain velars are rare. Note that one almost never finds them participating in Sanskrit secondary palatalization (Law of the Palatals).
- The alternation between palatals and velars within a root varies between the different satem languages. This is consistent with analogical leveling.
- Early palatalization suggests that satem languages were in close contact at one time – this is consistent with the wave theory of the satem palatalization.
- On the other hand, the three velar analysis suggests that the centum languages, which all underwent the merger to the palatal and plain velars, should have been in early contact – this is at odds with the wave theory of the satem-centum contrast.
- It is odd that palatal and plain velars would have merged, as this is not a natural sound change; palatals often develop from velars, not *vice versa*.

## 2.2. Counter-arguments in favor of the three velar analysis

- The variable nature of palatals in satem languages (particularly in Baltic) may be due to the variable nature of the original palatalization change – Baltic, on the periphery of the satem area may have had contact with centum dialects.
- Evidence from Luwian – an Anatolian centum language for a three-way distinction (Melchert 1985):

- (3) a. zart ‘heart’ (<\*k̑)  
 b. kars ‘cut’ (<\*k)  
 c. kui ‘who’ (<\*k<sup>w</sup>)

- Root constraints that prevent the co-occurrence of palatal velars and labio-velars or two plain velars; no constraint that prevents a palatal and plain velar. If palatal and plain velars were originally the same, the second constraint couldn’t be formulated (Ringe 2006).
- An alternative formulation of the three velar analysis is to reconstruct velar and uvular series:

(4)	<i>labial</i>	<i>coronal</i>	<i>velar</i>	<i>uvular</i>	<i>labio-velar</i>
<i>voiceless</i>	*p	*t	*k	*q	*k <sup>w</sup>
<i>voiced</i>	*b	*d	*g	*G	*g <sup>w</sup>
<i>voiced aspirated</i>	*b <sup>h</sup>	*d <sup>h</sup>	*g <sup>h</sup>	*G <sup>h</sup>	*g <sup>hw</sup>

- In satem languages, the velars palatalize, leading to a pull-chain, where the uvulars become plain velars.
- In centum languages, the velars and uvulars merge – this is entirely natural, given the typological rarity of uvulars – may also account for the relatively small number of plain velars (small number of uvulars). It also makes independent development in centum languages more likely.

### 3. Glottalic Theory

- The problems with the traditional reconstruction of voiceless, voiced, and voiced aspirated series:

- (5) a. \*b is rare – this is odd typologically.  
 b. Few languages have voiced aspirates without also having voiceless aspirates. Even fewer have a voiced/voiced aspirate contrast. Hence the reconstruction is of a typologically rare language  
 c. Root constraints:

- \* C<sub>[voiced]</sub> ... C<sub>[voiced]</sub>
- \* C<sub>[voiced aspirated]</sub> ... C<sub>[voiceless]</sub> (or *vice versa*)

However, the following are fine:

- C<sub>[voiced]</sub> ... C<sub>[voiced aspirated]</sub> (or *vice versa*)
- C<sub>[voiced]</sub> ... C<sub>[voiceless]</sub> (or *vice versa*)

- Hopper (1973) proposed a Glottalic Theory which posited a different three series:

- (6)
- |                         |   |
|-------------------------|---|
| Traditional             | Glotalic  |
| <i>voiceless</i>        | <i>voiceless ~ voiceless aspirated (allophonic)</i> |
| <i>voiced</i>           | <i>ejective (glottalized)</i>                       |
| <i>voiced aspirated</i> | <i>voiced ~ voiced aspirated (allophonic)</i>       |

- Rarity of \*b is not rarity of \*p', which is typologically sound
- Typological issues in (5b) addressed – no contrast between voiced and voiced aspirates (allophonic), both voiced and voiceless aspirates exist (as allophonic variants).
- Root constraints:
  - \* C' ... C' (typologically common)
  - non-glottalic stops must agree in voicing
- Grimm's Law becomes fricativization of voiceless stops, de-glottalization, and loss of allophonic voiced aspirates – all typologically sound
- A major objection is how other daughter languages developed from this system – if it was a typologically stable system, why would it change? For example, why would the typologically rarer Sanskrit develop from it?