PIE phonology
History

* Heinrich Schleicher, 1860s, three vowels (a i u) and fifteen consonants

* 19th century: 25 consonants and 10 vowels

* PIE sounds are similar to IPA (International Phonetic Alphabet), but not identical
Consonants

* Formed by partially or completely blocking the flow of air through the vocal tract

* The place in the vocal tract where air flow is obstructed is called the place of articulation.

* Consonants are classified according to where the obstruction takes place, how it takes place (manner of articulation), and whether there is a vibration of the vocal cords (voicing).
Stops (plosives)

* Produced by completely blocking, the releasing the flow of air through the mouth.

* IE daughter languages suggest that PIE was rich in stops.

* Stops can be:
  * labial \((p, b, b^h)\)
  * dental \((t, d, d^h)\)
  * palatal \(k', g', g'^h\)
  * velar (pure velar, \(k, g, g^h\))
  * labiovelar \(k^w, g^w, g'^{wh}\)
Some things to be aware of:

* The apostrophe after *g and *k, i.e. *g' and *k', indicates there is a palatalization of the velar (e.g. 'Tokyo' and 'argue').

* The superscript w, i.e. *k\text{"}{w} and *g\text{"}{w}, indicates labialization of the velar (rounded velars).

* The superscript h, i.e. *b\text{"}{h}, indicates an aspiration.

* Only voiced stops are aspirated in PIE.
Labial and Dental Stops

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<tbody>
<tr>
<td>*p</td>
<td>p</td>
<td>p</td>
<td>p</td>
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<td>f</td>
<td>h</td>
<td>p</td>
<td>*p</td>
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<td>*t</td>
<td>t</td>
<td>t</td>
<td>t</td>
<td>t</td>
<td>th</td>
<td>t^c</td>
<td>p</td>
<td>*t</td>
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<td>*b</td>
<td>b</td>
<td>b</td>
<td>b</td>
<td>b</td>
<td>p</td>
<td>p</td>
<td>b</td>
<td>*b</td>
<td></td>
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<tr>
<td>*d</td>
<td>d</td>
<td>d</td>
<td>d</td>
<td>d</td>
<td>t</td>
<td>t</td>
<td>d</td>
<td>*d</td>
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* *p (labial stop), *t (dental stop) are voiceless stops; *b (labial stop), *d (dental stop) are the corresponding voiced stops
**Velars (gutturals): plain (pure), palatal, labio-**

* k’s and g’s produced with the back of the tongue raised to touch the soft palate.

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<tbody>
<tr>
<td>k</td>
<td>k</td>
<td>k</td>
<td>k</td>
<td>k (c)</td>
<td>c</td>
<td>h</td>
<td>k^c</td>
<td>k</td>
<td>*k</td>
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<tr>
<td>ś</td>
<td>s</td>
<td>k</td>
<td>k</td>
<td>k (c)</td>
<td>c</td>
<td>h</td>
<td>s</td>
<td>š</td>
<td>*k'</td>
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<tr>
<td>k</td>
<td>k</td>
<td>p</td>
<td>qu</td>
<td>p</td>
<td>wh</td>
<td>k^c</td>
<td>k</td>
<td>*k^w</td>
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<tr>
<td>g</td>
<td>g</td>
<td>g</td>
<td>g</td>
<td>g</td>
<td>k (c)</td>
<td>k</td>
<td>g</td>
<td>*g</td>
<td></td>
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<tr>
<td>j</td>
<td>z</td>
<td>g</td>
<td>g</td>
<td>g</td>
<td>k (c)</td>
<td>c</td>
<td>ž</td>
<td>*g'</td>
<td></td>
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<tr>
<td>g</td>
<td>g</td>
<td>b</td>
<td>u (or v)b</td>
<td>qu</td>
<td>k</td>
<td>g</td>
<td>*g^w</td>
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* palatal stops: k' = Tokyo  g' = argue

* labiovelar stops: k^w (voiceless)  g^w (voiced)
Velars

∗ ‘Although the term velar normally refers specifically to k or g, all six sounds we have just reconstructed—*k, *g, *k’, *g’, kʰ, gʰ—are collectively referred to as “velars” in Indo-European Studies (or “gutturals” in older literature; occasionally they are also called dorsals and tectals. To avoid confusion, *k and *g are often called the plain velars to distinguish them from the others (which, as we have seen, are called palatal velars and labiovelars)’ (Fortson 50).
Voiced Aspirated Stops

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<tr>
<td>bh</td>
<td>b</td>
<td>ph</td>
<td>f</td>
<td>b</td>
<td>b</td>
<td>b</td>
<td>d</td>
<td>b</td>
<td>*bʰ</td>
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<tr>
<td>dh</td>
<td>d</td>
<td>th</td>
<td>f</td>
<td>d</td>
<td>d</td>
<td>d</td>
<td>d</td>
<td>d</td>
<td>*dʰ</td>
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<tr>
<td>h</td>
<td>z</td>
<td>kh</td>
<td>h</td>
<td>g</td>
<td>g</td>
<td>j</td>
<td>ž</td>
<td>*gʰ</td>
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<tr>
<td>gh</td>
<td>g</td>
<td>kh</td>
<td>h</td>
<td>g</td>
<td>g</td>
<td>g</td>
<td>g</td>
<td>*gʰ</td>
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<tr>
<td>gh</td>
<td>g</td>
<td>ph</td>
<td>f</td>
<td>g</td>
<td>b</td>
<td>g</td>
<td>g</td>
<td>*gʰ</td>
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- Voiced stops followed by a puff of breath or a brief breathiness (murmur); still preserved in Hindi and Bengali
- Aspiration was originally present, but was lost in the daughter languages that do now exhibit aspiration of these consonantal sounds
Here is a summary that you may find helpful

- Stops can be labial, dental, palatal, velar, labiovelar.
- Palatal velars, pure/plain velars, and labiovelars are velars.
- There are voiceless stops, voiced stops, and voiced aspirated stops.
Here is the same information in a chart: PIE stops (labial, dental, and velar; voiceless, voiced, voiced aspirated)

<table>
<thead>
<tr>
<th></th>
<th>labial</th>
<th>dental</th>
<th>palatal</th>
<th>velar</th>
<th>labiovelar</th>
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<tbody>
<tr>
<td>voiceless</td>
<td>p</td>
<td>t</td>
<td>k'</td>
<td>k</td>
<td>kw</td>
</tr>
<tr>
<td>voiced</td>
<td>b</td>
<td>d</td>
<td>g'</td>
<td>g</td>
<td>gw</td>
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<tr>
<td>voiced aspirated</td>
<td>bʰ</td>
<td>dʰ</td>
<td>gʰ</td>
<td>gʰ</td>
<td>gʰw</td>
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</tbody>
</table>
Exercise #1: identify the PIE sound correspondence

- Vedic Sanskrit: pad-
- Luvian: pata-
- Greek: pod-
- Latin: ped-
- Armenian: hotn-
- English: foot-
- Tocharian A: pe
Exercise 2

* Hittite: kiss- (comb)

* Greek: késkeon (<kes-kes-o, course flax prepared for spinning)

* Middle Irish: cír (<kes-ra, comb)

* Old English: heord (hair)

* Old Church Slavonic: kosa (hair)

* Lithuanian: kasa (hair)
Exercise 3

- Hittite: *kuit* (what)
- Vedic Sanskrit: *kás* (who)
- Avestan: *ko* (who)
- Greek: *ti* (what)
- Latin: *quid* (what)
- Welsh: *pwy* (who)
- Armenian: *k’ani* (how much)
- Old Church Slavonic: *ku-to* (who)
- Lithuanian: *kas* (who)
- Albanian: *ke* (whom)
Exercise 4

* Hittite: kard
* Sanskrit: śrád-dha (putting one’s heart in, trust)
* Greek: kardia
* Latin: cord-
* Old Irish: criddle
* English: heart
* Armenian: sirt
* Old Church Slavonic: srǐd-ǐce
* Lithuanian: širdis