

## Clackson Indo-European Linguistics

### Answers to Exercises

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### Exercise 2.1

The material can be sorted into two groups as follows.

Group 1. Correspondences with Sanskrit *bh*, Greek *ph*, English *b* and Latin *f* when initial and (in this case) *b* when medial. This correspondence set leads to the reconstruction of the PIE ‘voiced aspirate’ *\*bʰ*.

Sanskrit	Latin	Greek	English	Meaning
<i>bhár-</i>	<i>ferō</i>	<i>pherō</i>	<i>bear</i>	'carry'
<i>bhrātar-</i>	<i>frāter</i>	<i>phrātēr</i>	<i>brother</i>	'brother'
<i>bhrū-</i>		<i>ophrūs</i>	<i>brow</i>	'eyebrow'
<i>bhū-</i>	<i>fu-</i>	<i>phúomai</i>	<i>be</i>	'become'
	<i>flōs</i>		<i>blossom</i>	'flower'
<i>nabh-</i>	<i>nebula</i>	<i>nephelē</i>		'cloud'
<i>vábh- / ubh-</i>		<i>huphaínō</i>	<i>web</i>	'weave'

Group 2. Correspondences with Sanskrit *dh*, Greek *th*, English *d* and Latin *f* when initial and *b* or *d* when medial.

<i>dhūmá-</i>	<i>fūmus</i>	<i>thūmós</i>		'breath'
<i>dhā-</i>	<i>faciō, fēci</i>	<i>títhēmi</i>	<i>do, deed</i>	'do'
<i>dhā-</i>	<i>fēlō</i>	<i>thēlús</i>		'suck'
	<i>fore-s</i>	<i>thurā</i>	<i>door</i>	'door'
<i>mádhya-</i>	<i>medius</i>	<i>mésos</i>	<i>middle</i>	'middle'
<i>édha-</i>	<i>aedēs</i>	<i>aíthō</i>		'burn' / 'house'
<i>rudhirá-</i>	<i>ruber</i>	<i>eruthrós</i>	<i>red</i>	'red'

### Exercise 2.2

The phoneme split has taken place in the prehistory of English. Original  $*t$  has become a fricative [p] except after  $s$ .

### Exercise 2.3

In exercise 2.1 two phoneme splits have occurred in Latin. First, an original  $*b^h$  has become  $f$  when initial position and (in this exercise)  $b$  when in medial position. Second an original  $*d^h$  has become  $f$  when initial position and  $b$  or  $d$  when in medial position. Note that a phoneme merger between  $*b^h$  and  $*d^h$  has also taken place in Latin.

### Exercise 2.4

An original  $*s$  develops to a retroflex sibilant, transcribed  $\$$ , in Sanskrit, when it follows the phonemes  $r$ ,  $u$ ,  $k$  and  $i$ . This is the *ruki* rule of Table 2.3.

### Exercise 2.5

All the words in the table derive from roots which are reconstructed with two ‘voiced aspirates’ (i.e.  $*b^h$ ,  $*d^h$  etc.), one at the beginning of the root, the other at the end. Hence the first correspondence set is derived from a root  $*b^h e i d^h -$ , the second from a root  $*b^h u d^h -$ . In both Greek and Sanskrit the normal developments of voiced aspirates have been affected by the sound changes known as *Grassmann’s Law*. The first aspirate in a word containing two successive aspirate has been lost. Hence, rather than *pheithomai* Greek has *peíthomai* from the root  $*b^h e i d^h -$ , and rather than *bhudh-* Sanskrit has *budh-* from the root  $*b^h u d^h -$ .

### Exercise 2.6

a) The Latin stop system has the following equivalences (using the dental stops as an example):

PIE  $*d^{(h)}$  (traditional  $*d^h$ ) = Latin  $f$  when in initial position,  $d$  or  $b$  when in medial position.

PIE  $*t'$  (traditional  $*d$ ) = Latin  $d$

PIE  $*t^{(h)}$  (traditional  $*t$ ) = Latin  $t$

The development of PIE  $*d^{(h)}$  (traditional  $*d^h$ ) in Latin is not straightforward. Scholars have generally viewed that the development in initial position represents a shift from an aspirate to a fricative (a similar shift has taken place in the history of Greek, Modern Greek has fricatives where the ancient language had aspirates). The development in medial position, with a phoneme split between  $d$  and  $b$  can be best explained if the phoneme went through a fricative stage there as well, since in many languages there is evidence for a change from inter-dental to labial or labio-dental fricatives (compare the pronunciation of English  $th$  as  $f$  or  $v$  in many dialects of British English). It therefore seems that at one stage of development *all* instances of PIE  $*d^{(h)}$  (traditional  $*d^h$ ) were aspirated in Latin. It is possible that in initial position these sounds were devoiced at an early period (as the Latin reflex of them is voiceless). If this is the case then when this devoicing took place, the aspirated allophones of  $*t^{(h)}$  cannot have been present in initial position, otherwise they would have merged with the reflex of devoiced  $*d^{(h)}$ ; in other words, there must have been a stage when the language had  $*d^h$  in initial position, but not  $*t^h$ .

The development of the Latin consonant system is discussed in detail in a number of works. The following are recommended: J. Stuart-Smith (2004) *Phonetics and Philology: Sound Change in Italic* Oxford: OUP, Brian Joseph and Rex Wallace 'Proto-Indo-European Voiced Aspirates in Italic: A Test for the Glottalic Theory' *Historische Sprachforschung* 107 (1994) 244-261. Available online at <http://www.ling.ohio-state.edu/~bjoseph/publications/1994glottalictest.pdf>

b) The Greek stop system has the following equivalences:

PIE  $*d^{(h)}$  (traditional  $*d^h$ ) = Greek  $dh$

PIE  $*t'$  (traditional  $*d$ ) = Greek  $d$

PIE  $*t^{(h)}$  (traditional  $*t$ ) = Greek  $t$

In order for these Greek developments to take place, at some stage all the allophones of original  $*d^{(h)}$  must have developed as aspirates, and all the allophones of  $*t^{(h)}$  must have lost their aspiration. The loss of aspiration of the  $*t^{(h)}$  series must have preceded the devoicing of the  $*d^{(h)}$  series since otherwise they would also have undergone the loss of aspiration.

## Exercise 2.7

Rewriting the reconstructed roots  $*b^h eid^h-$  and  $*b^h ud^h-$  with their glottalic equivalents gives  $*b^{(h)} eid^{(h)}-$  and  $*b^{(h)} ud^{(h)}-$ . Allowing for Grassmann's Law as operating in PIE they would be realised as  $*beid^h-$  and  $*bud^h-$ . This causes no problems for the Sanskrit development, but it assumes that in Greek an original  $*b$  was devoiced to  $p$  to give e.g. *peíthomai*. If Grassmann's Law did operate at PIE, we have further to explain how the result of an original  $*beid^h-$  in Latin, for example, shows the development of initial  $b-$  to  $f$ .

### Exercise 2.8

The correct reconstructions are given below:

PIE	Sanskrit	Greek	Latin	English	Meaning
$*k^w e$	<i>ca</i>	<i>te</i>	<i>que</i>		'and'
$*derk'-$	<i>dárs-</i>	<i>dérkomai</i>			'see'
$*g^w mti-$	<i>gáti-</i>	<i>básis</i>	<i>-uenti-ō</i>	<i>gait</i>	'going'
$*g'enu$	<i>jánu</i>	<i>gónu</i>	<i>genu-</i>	<i>knee</i>	'knee'
$*d^h eg^{wh}-$	<i>dah-</i>	<i>teph-</i>	<i>febris, fou-</i>		'burn'
$*leik^w-$	<i>rik-</i>	<i>leípō</i>	<i>linquō</i>		'leave'
$*rgro-$	<i>rjrá-</i>	<i>argós</i>			'quick'
$*ng^w en$		<i>adēn</i>	<i>inguen</i>		'gland'
$*dek'm$	<i>dása</i>	<i>déka</i>	<i>decem</i>	<i>ten</i>	'ten'
$*leig^h-$	<i>réh-</i>	<i>leíkhō</i>	<i>lingō</i>	<i>lick</i>	'lick'
$*g^{wh} en-$	<i>hán-</i>	<i>theínō</i>	<i>-fendō</i>		'kill'

### Exercise 2.9

These ablaut series can be rewritten as follows:

zero-grade	e-grade
$*g' nh_1-$	$*g' enh_1-$
$*b^h uH-$	$*b^h ewH-$
$*k' rh_2-$	$*k' erh_2-$

$*g^w rh_3-$	$*g^w erh_3-$
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### Exercise 2.10

Using the results of the last exercise, these Sanskrit forms no longer derive from a form with *o* in an open syllable: Sanskrit *jána-* derives from  $*g' onh_1-o-$ , and Sanskrit *-gara-* derives from  $*-g^w orh_3-o-$ . The laryngeal counts as a consonant, and hence in each of these forms *o* is in a closed syllable.

### Exercise 3.1

The basic derivational process is that a root of the shape  $*C_1eC_2-$  will form a verbal stem of the shape  $*C_1iC_1C_2-$ .

The Greek verb *tíkt-ō*, derives from a stem  $*titk-$  with a subsequent metathesis of the consonants  $*-tk-$  to  $-kt-$ .

The Greek verb *ískh-ō* derives from a stem  $*sisg^h'-$ . In Greek this would develop by regular changes to *hiskh-* and then by the operation of Grassmann's Law the initial aspirate is lost before a following aspirated consonant.

The Sanskrit verb *tíṣṭh-ati* derives from a stem  $*stisth_2-$ , the initial *s* is dropped, and  $*tisth_2-$  develops regularly to Sanskrit *tíṣṭh-*. Note that *s* develops to *ṣ* after *i* according to the *ruki* rule; *t* develops to *ṭ* regularly after *ṣ*, and in Sanskrit when the laryngeal  $*h_2$  occurs after a consonant and before a vowel, the consonant is aspirated.

The Sanskrit verb *īj-ati* derives from a stem  $*h_2ih_2g^h'-$ . In Sanskrit, when the laryngeal  $*h_2$  occurs at the beginning of a word before a vowel it is lost without any trace, when it occurs after a vowel before a consonant, the vowel is lengthened.

The Greek verb *híz-d-ō*, Sanskrit *sīḍ-ati*, and Latin *sīd-ō* all derive from a stem  $*sisd-$ . In Sanskrit and Latin *s* is lost before *d* with resulting lengthening of the previous vowel. The retroflex *ḍ* of Sanskrit *sīḍ-ati*, is explained through assuming that before it is lost, the medial *s* is changed to a retroflex sound by the *ruki* rule, and the following *d* undergoes the same change when next to a retroflex sibilant.

### Exercise 3.2

Sanskrit *nīḍá-*, Latin *nīdus*, Armenian *nist*, and English *nest* all derive from PIE  $*nisdó-$  'nest'. The Sanskrit and Latin words have undergone the same changes as the

verbs *sīḍati* and *sīḍō* discussed in Exercise 3.1. It is possible to analyse *\*nisdó-* as a compound of an element *\*ni-*, meaning ‘down’ (and still used as a verbal prefix in Sanskrit) and the zero grade of the root *\*sed-* ‘sit’; a ‘nest’ is something a bird sits in.

### Exercise 3.3

The words *\*dyew-* ‘sky / god’, and *\*g<sup>w</sup>enh<sub>2</sub>* ‘woman’ are normally reconstructed as kinetic paradigms, *\*néb<sup>h</sup>os* ‘cloud’ as a proterokinetic paradigm, and *\*yek<sup>w</sup>* ‘liver’ as acrostatic.

### Exercise 3.4

There are several different ways in which this can be done. One possibility would be to construct an extra rule saying that when both S and D are accented, the word accent falls one place to the right of where it would be otherwise.

### Exercise 4.1

	PIE
nominative	<i>*k’wō &lt; *k’won-s</i>
accusative	<i>*k’won-m</i>
genitive	<i>*k’un-es</i>
dative	<i>*k’un-ei</i>

Note that the nominative singular *\*k’wō* appears to represent a regular development of the loss of final *n* after a long vowel. Hittite has remarked the nominative singular with a final *-s*, regular in non-neuter nouns, and Greek has remarked the nominative with the final *-n* which occurs elsewhere in the stem.

The vowel *\*o* in the reconstructed nominative and accusative singular is unexpected; a kinetic paradigm would regularly show the vowel *\*e* instead. It is possible that the preceding *\*w* has led to a rounding of the original *\*e* to *\*o* in this word.

### Exercise 4.2

	PIE
nominative	<i>*g<sup>h</sup>’yē &lt; *g<sup>h</sup>’yem-s</i>
accusative	<i>*g<sup>h</sup>’yem</i>

genitive	<i>*g<sup>h</sup>'im-es</i>
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The nominative singular has undergone a similar development to that found in the word for 'dog', discussed in Exercise 4.1. Note that in Greek the paradigm has changed in two ways. Firstly, the regular development of final *\*m* (restored to the nominative singular on the basis of the rest of the paradigm) to *\*n* has led to the generalisation of the *n* throughout the word. Secondly, the productive pattern of words with a suffix *-ōn / -on-* has encroached upon this paradigm.

### Exercise 4.3

The root of the word for 'cow' is *\*g<sup>w</sup>ew-*. The two rival reconstructions offered are as follows:

	kinetic	acrostatic 2
nominative	<i>*g<sup>w</sup>ew-s</i>	<i>*g<sup>w</sup>ow-s</i>
accusative	<i>*g<sup>w</sup>ēm &lt; *g<sup>w</sup>ew-m</i>	<i>*g<sup>w</sup>ōm &lt; *g<sup>w</sup>ow-m</i>
genitive	<i>*g<sup>w</sup>w-es</i>	<i>*g<sup>w</sup>ew-s</i>
locative	<i>*g<sup>w</sup>ew-i</i>	<i>*g<sup>w</sup>ew-i</i>

The acrostatic 2 paradigm has the advantage that the *\*o* in the root is explained, but this may not be necessary, if we envisage a conditioned change of *\*e* to *\*o* in some environments, such as after *\*w* in PIE, as was discussed in Exercise 4.1.

### Exercise 4.4

The reconstructed plural endings of the noun are as follows:

nominative / vocative	<i>*-ōs</i>
accusative	<i>*-ons</i>
genitive	<i>*-ōm</i>
dative / ablative	<i>*-omos (?)</i>
locative	<i>*-oisu</i>
instrumental	<i>*-ōis</i>

In Greek, Latin and Lithuanian there are different endings for the nominative / vocative plural, and many languages have altered the genitive plural. The reconstruction of the dative / ablative ending is less than certain.

#### **Exercise 4.5**

Where the thematic plural endings of the noun differ from athematic endings, they can be explained as borrowings from the pronominal declensions. The interchange between the two paradigms can be partly explained by the fact that there is overlap in some cases, such as the accusative plural (and singular).

#### **Exercise 4.6**

In the masculine paradigm Sanskrit and Greek have regularised the accent on the final syllable of the word (from an earlier hypothetical mobile accent), and they have generalised the full grade of the root in all cases.

The feminine of the word for ‘sweet’ in Sanskrit must derive from a paradigm as follows:

nominative \**sweh<sub>2</sub>dw-ih<sub>2</sub>*

genitive \**sweh<sub>2</sub>dw-yeh<sub>2</sub>-s*

But in Greek the paradigm seems to have had the full grade of the suffix:

nominative \**sweh<sub>2</sub>dew-ih<sub>2</sub>*

genitive \**sweh<sub>2</sub>dew-yeh<sub>2</sub>-s*

It would be possible to explain the different forms by reconstructing a hysterokinetic paradigm with the root in zero grade (and explaining the subsequent full grade of the root through analogy with the masculine singular of the adjective \**sweh<sub>2</sub>du-s*), i.e.:

nominative \**suh<sub>2</sub>dew-ih<sub>2</sub>*

genitive \**suh<sub>2</sub>dw-yeh<sub>2</sub>-s*

But it is also possible that the development of the feminine of these adjectives is in fact a late development in Indo-European.

#### **Exercise 4.7**

The Latin adjective seems to reflect a form with a stem \**sweh<sub>2</sub>dw-i-*, which may have been abstracted or influenced by the feminine form.

### Exercise 5.1

	PIE
1.	*g <sup>wh</sup> en-mi
3.	*g <sup>wh</sup> en-ti
6.	*g <sup>wh</sup> n-énti

### Exercise 5.2

	PIE
1.	*h <sub>1</sub> éy-m-i
2.	*h <sub>1</sub> éy-s-i
3.	*h <sub>1</sub> éy-t-i
4.	*h <sub>1</sub> i-mé
5.	*h <sub>1</sub> i-té
6.	*h <sub>1</sub> y-é/ónt-i

Note that there is nothing in the forms of the daughter languages here given which necessitates the reconstruction of the initial \*h<sub>1</sub> in this root.

### Exercise 5.3

Sanskrit *dhókṣi* derives from \*d<sup>h</sup>eug<sup>h</sup>-si, via an intermediate stage \*d<sup>h</sup>euk-si (with assimilation of \*g<sup>h</sup> to \*s in voice and aspiration). The sequence \*ks triggers the change of s to ś (the ‘ruki rule’) and the diphthong \*eu develops to o.

Sanskrit *dógdhi* derives from \*d<sup>h</sup>eug<sup>h</sup>-ti, via an intermediate stage \*d<sup>h</sup>eug<sup>h</sup>-d<sup>h</sup>i (with assimilation of \*t to \*g<sup>h</sup> in voice and aspiration). The initial aspiration is lost through a process known as Grassmann’s Law, whereby the first of a sequence of two aspirated consonants in a word loses its aspiration.

Sanskrit *duhánti* derives from \*d<sup>h</sup>ug<sup>h</sup>-enti.

Sanskrit *ádhoḥ* derives from \*e-d<sup>h</sup>eug<sup>h</sup>-t. In Sanskrit all final consonant clusters are simplified, and final consonants are devoiced and de-aspirated when not occurring before another word.

Sanskrit *áduhan* derives from \*e-d<sup>h</sup>ug<sup>h</sup>-ant.

### Exercise 5.4

	Present	Imperfect
1.	<i>*h<sub>2</sub>eg-oH</i>	<i>*e-h<sub>2</sub>eg-o-m</i>
2.	<i>*h<sub>2</sub>eg-e-si</i>	<i>*e-h<sub>2</sub>eg-e-s</i>
3.	<i>*h<sub>2</sub>eg-e-ti</i>	<i>*e-h<sub>2</sub>eg-e-t</i>
4.	<i>*h<sub>2</sub>eg-o-me</i>	<i>*e-h<sub>2</sub>eg-o-me</i>
5.	<i>*h<sub>2</sub>eg-e-te</i>	<i>*e-h<sub>2</sub>eg-e-te</i>
6.	<i>*h<sub>2</sub>eg-o-nti</i>	<i>*e-h<sub>2</sub>eg-o-nt</i>

### Exercise 5.5

In the verbal paradigms one possible motivating factor for the realisation of the thematic vowel as *\*o* is when it occurs before a nasal consonant. In nominal paradigms however, the thematic vowel appears as *\*o* except when in absolute final position, when it has the value *\*e*.

### Exercise 5.6

The first person singular endings in Tocharian and Greek show *\*m* from the active endings. In Gothic the third person endings have spread to the first person singular and to the whole of the plural. The second person singular endings of Sanskrit, Greek, Latin and Gothic all show the influence of the active endings.

### Exercise 5.7

The verb is normally reconstructed as follows:

1.	<i>*li-né-k<sup>w</sup>-mi</i>
2.	<i>*li-né-k<sup>w</sup>-si</i>
3.	<i>*li-né-k<sup>w</sup>-ti</i>
4.	<i>*li-n-k<sup>w</sup>-mé</i>
5.	<i>*li-n-k<sup>w</sup>-té</i>
6.	<i>*li-n-k<sup>w</sup>-énti</i>