

Greek numerals and PIE glottalic consonants

GAMKRELIDZE and IVANOV have suggested on typological grounds that the reconstructed voiced occlusives of the Indo-European proto-language were actually glottalic<sup>1)</sup>. Elsewhere I have argued that this hypothesis is supported by immediate comparative evidence from Latvian<sup>2)</sup>, Armenian<sup>3)</sup>, and Sindhi<sup>4)</sup>, and by indirect evidence from Balto-Slavic (Winter's law)<sup>5)</sup>, Latin (Lachmann's law), and Indo-Iranian (Bartholomae's law)<sup>6)</sup>. Additional evidence from Indo-Iranian has been adduced by A. LUBOTSKY<sup>7)</sup>. Elsewhere I will argue that the new theory provides a possible explanation for the rise of preaspiration in Icelandic and the so-called *vestjysk stød* in Danish. In this paper I intend to show that it offers an explanation for several problems in connection with the formation of the numerals in Greek.

The PIE word for '100' is usually reconstructed as *\*k<sub>m</sub>tóm*. This reconstruction does not account for the initial vowel of ἑκατόν. The initial vowel is usually derived from *\*sem-*<sup>8)</sup> or *\*sm-*<sup>9)</sup> if its origin is not simply called "unknown"<sup>10)</sup> or left out of consideration altogether<sup>11)</sup>. These explanations meet with several difficulties. There is no support for the ad hoc hypothesis that the final nasal of *\*sem* was dissimilated before *\*k<sub>m</sub>tóm*. The alleged substitution of ἑκατόν for *\*ἀκατόν* < *\*sm-* cannot be compared with the replacement of ἄτερος with ἕτερος because the latter is limited to a part of the dialects. Above all, the assumption of a composite form 'one hundred' is at variance with the indeclinability and the syntactic behaviour of ἑκατόν. The original character of the indeclinability is evident both from the preservation of the final nasal in composition and from the impossibility of using *\*κατά* after τρία etc. If

such a construction had been possible at an earlier stage, it would hardly have been replaced with a derivative formation in *-io-*. Thus, I think that the Greek form and its syntax are more archaic than is generally assumed.

The hypothesis that the unaspirated voiced stops of the Indo-European proto-language were glottalic offers a straightforward explanation for the initial vowel of ἑκατόν. If we start from *\*dk̑m̑tóm*, we can assume that the buccal features of the initial consonant were lost while its glottalic feature merged with the reflex of the PIE laryngeal *\*H<sub>1</sub>* and yielded *\*e-*: *\*ἑκατόν*. The aspiration was apparently taken from *ěv*<sup>12)</sup>. The ending of *\*dk̑m̑tóm* can be identified with the gen.pl. ending *\*-om*, not because the numeral represents an original gen.pl. form<sup>13)</sup> but because the gen.pl. must be derived from an uninflected PIE form<sup>14)</sup>.

The explanation put forward here has the additional advantage of simultaneously accounting for the long vowel in the decades, a traditional analysis of which leads to the following reconstruction<sup>15)</sup>:

'20'	<i>*wīk̑ntī</i>	εἴκοσι	<i>vīgintī</i>
'30'	<i>*trīkont-</i>	τριάκοντα	<i>trīgintā</i>
'40'	<i>*k<sup>w</sup>etw̑kont-</i>	τετταράκοντα	<i>quadrāgintā</i>
'50'	<i>*penk<sup>w</sup>ēkont-</i>	πεντήκοντα	<i>quīnquāgintā</i>
'60'	<i>*swēkskont-</i>	ἑξήκοντα	<i>sexāgintā</i>
'70'	<i>*sept̑m̑kont-</i>	ἑβδομήκοντα	<i>septuāgintā</i>
'80'	<i>*okt̑kont-</i>	ὀγδοήκοντα	<i>octōgintā</i>
'90'	<i>*new̑kont-</i>	ἑνενήκοντα	<i>nōnāgintā</i>

I now reconstruct *\*d* instead of the vowel length in the proto-forms, e. g. *\*penk<sup>w</sup>edk̑omt*<sup>16)</sup>. I agree with SZEMERÉNYI that originally there was no final vowel in '30' through '90', especially because Indic *-śat* would otherwise be very difficult to explain. The assumption that *\*d* was also

present in *\*swek'sd'kōmt*, where it lost its glottalic feature and was assimilated to *\*t* before *\*k'*, provides an explanation for the rise of the Indo-Iranian suffix *-ti-* in the higher decades if it is correct that the final *\*k'* of the cluster was lost in this branch of IE. Greek eliminated the cluster by introducing *-ē-* from πεντήκοντα into ἑξήκοντα.

It can be objected against the theory advanced here that the long vowel is absent from ἑπτακόσιοι etc. The objection does not hold because the latter formation is limited to Greek and must apparently be dated to the period after the reanalysis of *\*ἐκατόν* as ἑ-κατο-ν. The IE proto-language had no names for the hundreds.

In the case of *\*septmd'kōmt*, the hypothesis that *\*d* yields the same reflex as *\*H<sub>1</sub>* accounts for the difference between *-ē-* in ἑβδομήκοντα and *-ā-* in the corresponding Latin form. It may also account for the irregular voicing in Greek. The alleged development of PIE *\*septmōs* to *\*ἐβδομός* rather than *\*ἑπταμός* lacks parallels and can hardly be correct. More probably, the voicing arose in *\*ἑβδομήκοντα* after the development of the syllabic nasal at a stage which was posterior to Sievers' law, cf. θνητός < *\*dhw̥H<sub>2</sub>tōs*, στρωτός < *\*str̥H<sub>3</sub>tōs*<sup>17)</sup>. It then spread to ἑβδομος, from there to ὄγδοφος, which replaced *\*ὀκτοφός* < *\*H<sub>3</sub>k'tH<sub>3</sub>wōs*, and finally to *\*ὀγδφήκοντα*, which replaced *\*ὀκτώκοντα* < *\*H<sub>3</sub>ek'toHd'kōmt*<sup>18)</sup>. The introduction of the medial vowel from the ordinals into ἑβδομήκοντα and ὀγδοήκοντα is probably late.

The form *\*H<sub>1</sub>newnd'kōmt* yielded *\*ἔνεφνήκοντα*, in which *\*w* was apparently lost at an early stage because of the aberrant syllable structure<sup>19)</sup>. The usual derivation from *\*enwen-* cannot be correct because that would yield *\*\*εἴνενήκοντα* in Ionic, cf. εἴνατος < ἔνφατος.

The theory advanced here also provides an explanation for the coexistence of εἴκοσι < \*έFίκοσι and Fίκατι, both of which represent PIE \**dwidk̑mti*. Partial dissimilation of the initial consonant yielded \**H<sub>1</sub>widk̑nti*, from which the southern form must be derived, whereas total dissimilation yielded the northern form<sup>20</sup>).

The long vowel of τριάκοντα cannot represent an original plural ending -ā, as is often assumed, because it is absent from τρία < \**triH<sub>2</sub>*. I think that the form continues \**triaHk̑onta*, which developed from PIE \**triH<sub>2</sub>dk̑omt* under the influence of τρία. Indeed, this is the form where in my view the final vowel of -κοντα originated on the analogy of \**dwidk̑mti* and from where it spread to the higher decades. The difference between \**dwi-* and \**triH<sub>2</sub>-* has been preserved in Old Irish *fiche* < \**wikent-* versus *trícho* < \**trík̑ont-* and in Tocharian B *ikām* < \**wik̑nt* versus *täryäka* < \**triaka*, with Proto-Tocharian \**a* as the phonetic reflex of PIE \**H<sub>2</sub>*<sup>21</sup>). The initial part \**dwi-* is apparently the PIE neuter form \**dwoi* of the root \**du-* '2' with zero grade in composition, and \**triH<sub>2</sub>-* is similarly the neuter form with zero grade of the root \**tri-* '3'.

While \**d* merged with \**H<sub>1</sub>* in πεντήκοντα, έβδομήκοντα, and ένενήκοντα, it apparently merged with \**H<sub>3</sub>* in τετρώκοντα, which was preserved in West Greek and regularized to τετφαράκοντα elsewhere. I think that τετρώκοντα developed regularly from \**k<sup>w</sup>etw̑rd̑omt* and that the rounding of the medial vowel represents the lost \**w*, as is the case with the rounding of the epenthetic vowel in τρουάλεια < \**k<sup>w</sup>tw̑r-*. The combined evidence of τριάκοντα, τετρώκοντα, and πεντήκοντα allows us to date the merger of \**d* with the laryngeals to a stage which was posterior to the rise of coloured epenthetic vowels, but anterior to the eventual

loss of the laryngeals (which had merged as a result of the previous development): *\*triH<sub>a</sub>Hkont*, *\*k<sup>w</sup>etwr<sub>o</sub>Hkont*, *\*penk<sup>w</sup>eHkont*. Since the development of coloured epenthetic vowels is specifically Greek, it follows that the PIE glottalic consonants were preserved up to a stage which was posterior to the separation from the other languages. This result is in accordance with what has been demonstrated earlier for Indo-Iranian<sup>22)</sup>, Armenian, Balto-Slavic, and Germanic<sup>23)</sup>. I think that the same holds for Albanian, Italic, and Celtic.

The Albanian material is difficult to interpret, as it usually is. The initial consonant of *-zet* '20' must be derived from *\*ǵw-* because it requires the simultaneous presence of labial, palatal, and velar articulation<sup>24)</sup>. It probably originated from assimilation in *\*dwiǵnti* < *\*dwidk<sub>m</sub>ti*, with *\*ǵ* combining the glottalic feature of *\*d* with the palatovelar articulation of *\*k'*.

A similar explanation could be put forward for the voiced stop in Latin *vīginti* if the voicing were not absent from the ordinal *vicesimus* and from Old Irish *fiche*. Moreover, Lachmann's law suggests that a glottalic consonant dissolved into a sequence of a laryngeal and a voiceless buccal part, the former of which merged with the reflex of the PIE laryngeals, when it was preceded by a vowel and followed by a voiceless stop<sup>25)</sup>. One therefore expects *\*dk'* to develop into *\*Hk*, not into *\*g*. However, it is probable that the cluster became voiced after a nasal<sup>26)</sup>. In my view *\*septmdk<sub>o</sub>mt* and *\*H<sub>1</sub>newndk<sub>o</sub>mt* developed into *\*septm<sub>h</sub>gont* and *\*newn<sub>h</sub>gont*, which subsequently yielded *\*septmāgont* and *\*newnāgont* in Italo-Celtic<sup>27)</sup>. Together with *\*k<sup>w</sup>etwrākont*, these forms are the source of the final vowel in Latin *-gintā*, which was introduced on the analogy of *vīginti*. Thus, the

ultimate origin of the difference between Greek *-a* and Latin *-ā* is the different vocalization of the laryngeals in the two languages.

After the disintegration of Italo-Celtic, the influence of '70' and '90' first affected *\*swekskont*, which was preserved in Irish *sesca*, and *\*oktōkont*, where Latin preserved *-ō-* and Celtic adopted *\*-mā-*. The preservation of the difference between the short vowel of Old Irish *fiche* < *\*dwidkmt-* and the long vowel of *tricho* < *\*triH<sub>2</sub>dkomt-* suggests that the *\*d* was simply lost after a vowel in Celtic. If the length in Latin *vīginti* is correctly attributed to the glottalic feature of the lost *\*d*, it shows that the elimination of the glottalic obstruents was posterior to the disintegration of Italo-Celtic. Note that the difference between *fiche* and *vīginti* corresponds with the difference between Old Irish *recht* 'law' and Latin *rectus*, where the long vowel originated from Lachmann's law<sup>28</sup>).

#### Footnotes:

- 1) *Phonetica* 27 (1973), 150 ff. A similar argumentation was put forward earlier by H. PEDERSEN, *Die gemeinindoeuropäischen und die vorindoeuropäischen Verschlusslaute* (1951), 14.
- 2) *Baltistica* 13 (1977), 319 ff.
- 3) *Studia Caucasica* 4 (1978), 9 ff.
- 4) *Indo-Iranian Journal* 23 (1981), 15 ff.
- 5) *Recent Developments in Historical Phonology* (1978), 431 ff.
- 6) *IF* 83 (1978), 107 ff.
- 7) *MSS* 40 (1981), 133 ff.
- 8) E. RISCH, *IF* 67 (1962), 132.
- 9) P. CHANTRAINE, *Morphologie historique du grec* (1967), 150.
- 10) R. S. P. BEEKES, *The Development of the PIE Laryngeals in Greek* (1969), 53.

- 11) O. SZEMERÉNYI, *Studies in the IE System of Numerals* (1960).
- 12) Thus, I agree with H. FRISK's prudent variety of the above hypotheses that initial  $\acute{e}$ - "muß irgendwie mit  $\acute{e}$ v 'eins' oder idg. \* $s_m$ - (gr.  $\acute{\alpha}$ -) zusammenhängen" (*Griechisches etymologisches Wörterbuch*, s. v.).
- 13) This is SZEMERÉNYI's view (o.c., 140), which RISCH has effectively rebutted (o.c., 135).
- 14) Cf. *Lingua* 45 (1978), 294 f. The original meaning of \* $dk_m t\acute{o}m$  was "pertaining to the category of portions of reality which carry the feature 'consisting of 10 members'". As E. LAROCHE remarked on the Hittite genitive in *-an*, *Revue hittite et asianique* 23 (1965), 40, the ending is characteristic of "êtres ou catégories allant par groupes".
- 15) SZEMERÉNYI, o.c., 24.
- 16) This view has been put forward a number of times in the earlier literature, as SZEMERÉNYI points out (o.c., 136). It has never been explained, however, that \* $d$  merged with the laryngeals in this environment. SZEMERÉNYI's reference to a chronological difference begs the question because he does not discuss the origin of the IE lengthened grade.
- 17) This is in agreement with SZEMERÉNYI's view (o.c., 8).
- 18) On the neutralization of the timbre opposition between the laryngeals in the neighbourhood of PIE \* $o$  see *Lingua Posnaniensis* 23 (1980), 128. Vedic  $\acute{a}śītī$ - developed by dissimilation from \* $HaštHti$ -, which reflects \* $H_3ek_tHdkomt$  with medial zero grade from the ordinal \* $HaštHa$ - < \* $H_3ek_tHo$ -.
- 19) At a later stage, \* $w$  was assimilated or became  $u$  before a following resonant, cf. M. LEJEUNE, *Phonétique historique du mycénien et du grec ancien* (1972), 181 f.
- 20) Unlike SZEMERÉNYI (o.c., 24), I assume that Indo-Iranian and Greek faithfully reflect PIE short  $-i$ , which was lengthened in Latin and British by the addition of the dual ending \* $-H_7$ . In Armenian, partial dissimilation of \* $dw$ - yielded a voiceless bilabial glide which merged with the reflex of \* $sw$ -, cf. my forthcoming article in *Studia Caucasica* 5 (1982).
- 21) The ending  $-a$  < \* $-H_2$  is the regular Proto-Tocharian plural ending, which replaces \* $-ont$  in the decades. The short vowel which is reflected in Breton *tregont* is doubtless of analogical origin. British  $\ddot{u}$ - in OW. *uceint* and Breton *u gent* also points to a short vowel: it represents \* $wi$ - before a syllable with a front vowel, cf. W. *ucher*

- 'evening', Lat. *vesper*. The development of *ü-* from *\*wi-* is not due to umlaut but to the preservation of the palatal feature in this environment.
- 22) LUBOTSKY, o.c.
- 23) IF 83 (1978), 110 - 114.
- 24) Cf. KZ 94 (1980), 249. The rule was first established by H. PEDERSEN, KZ 36 (1900), 338.
- 25) IF 83 (1978), 117.
- 26) Cf. R. THURNEYSEN, KZ 26 (1883), 313. The neutralization of the opposition between glottalic and aspirated stops in the position after a nasal accounts for the absence of Lachmann's law in *strictus* and *pictus*, which adopted the short vowel of *fictus* and *mictus*, cf. *stringō*, *pingō* < *\*-g-* and *fiŋgō*, *miŋgō* < *\*-gh-*. The glottalic feature was apparently absorbed by the preceding laryngeal in *lassus* < *\*lH<sub>2</sub>dtos*, just as the laryngeal was absorbed by the following glottalic obstruent in Vedic *pajrā-* 'firm' < *\*peH<sub>2</sub>ǵro-* (LUBOTSKY, o.c.). The initial syllable of *sedeō* was prefixed to *\*sdtos* in *-sessus*, where the glottalic feature had been lost at an early stage, cf. the zero grade in *nīdus* < *\*nisdos*.
- 27) SZEMERÉNYI's view that the introduction of zero grade in Latin *-gintā* was anterior to the elimination of the long resonants (o.c., 169) cannot be correct because the latter development was Italo-Celtic and the former was not, cf. Ériu 32 (1981), 14. Note that Old Irish *sechtmogo* can represent either *\*septmāgont* or *\*septmākont*, with medial *o* for *a* under the influence of the preceding labial (cf. R. THURNEYSEN, A Grammar of Old Irish, 50). The former reconstruction is more probable because *-ach-* seems to have resisted the voicing of voiceless fricatives between unstressed vowels (ibidem, 82). The form *nōcha* '90' was apparently modelled after *trīcho* '30', while *cethorcho* developed regularly from *\*k<sup>w</sup>etwrākont*. For *coīca* '50', Mod.Ir. *caogad*, I assume metathesis of *\*kōgexo* to *\*kōwego* and voicing of *\*x'* after the syncope (ibidem, 80). The rounded vowel of the initial syllable is due to the original labiovelar environment, as it is in *guidīd* < *\*g<sup>w</sup>hedh-* and *gonaid* < *\*g<sup>w</sup>hen-*, cf. W. COWGILL, Lautgeschichte und Etymologie (1980), 49 ff.
- 28) I am indebted to Professor C. J. RUIJGH for commenting upon my proposals. - This paper was presented to the 15th annual meeting of the Societas Linguistica Europaea in Athens, September 1982.