

Proto-Indo-European Obstruents

1. In 1973 Gamkrelidze and Ivanov suggested on typological grounds that the reconstructed voiced occlusives of the Indo-European proto-language were actually glottalic.¹ In 1976 Winter pointed out in his contribution to the Ustronie conference on historical phonology that a Proto-Indo-European short vowel before an unaspirated voiced stop became long and acute in Balto-Slavic, while a short vowel before a voiced aspirate remained short, e.g. Lith. *ėsti* 'to eat', OCS. *jasti*, Skt. *ádmi* 'I eat', Gr. $\acute{\epsilon}\delta\omega$ vs. Lith. *vėsti* 'to lead', OCS. *vesti*, Skt. *vadhūh* 'bride', OIr. *fedim* 'I lead'.² Elsewhere I have shown that Winter's law provides immediate comparative evidence for Gamkrelidze and Ivanov's theory if one takes the historical laws of Baltic and Slavic accentuation into account.³ Thus, the glottalic articulation of the vowel in Latvian *pēds* 'footstep', *nuōgs* 'naked' directly continues the glottalic articulation of the following consonant in the reconstructed roots **ped-*, **nog^w-*. Moreover, a strictly comparative analysis of the Common Armenian system of obstruents on the basis of the modern dialects leads to the reconstruction of a series of glottalic consonants, which correspond to the unaspirated voiced stops of the Indo-European proto-language.⁴ A strict application of the comparative method now yields the following reconstruction of the Proto-Indo-European system of obstruents:

	aspirated	plain	glottalic
lenis	dh		d
fortis		t	

Though it would be more correct to write *t:*, *t'*, *t̥* instead of *t*, *d*, *dh*, I will stick to the traditional transcription. A similar

¹ *Phonetica* 27, 150ff.

² Recent developments in historical phonology (1978) 431ff.

³ *Baltistica* 13 (1977) 319ff.

⁴ *Studia Caucasica* 4 (1978) 1ff.

system must be reconstructed for the labial, palatovelar, and labiovelar orders.⁵ In this article I intend to show how the loss of aspiration and glottalization provoked a number of consonantal mutations in the separate branches of Indo-European.

2. In the dialects from which Sanskrit, Greek, and Latin evolved, glottalization was lost at an early stage. As a result of this development, the opposition between **t* and **d* was re-evaluated as an opposition of voiceless vs. voiced:

	aspirated	plain
voiced	dh	d
voiceless		t

The voicedness of the aspirate is a redundant feature in this system. Thus, the classical reconstruction remains valid for these dialects with respect to a stage which can be labelled dialectal Indo-European, i.e. a stage when varying groups of dialects were capable of carrying through common innovations. The asymmetrical character of the resulting consonant system makes it probable that it did not exist for a long period of time. The further development proceeded along divergent lines and therefore belongs to the history of the separate languages.

3. In Sanskrit, the resulting empty hole was filled by *th* from **tH*, e.g. *ráthah* 'chariot', so that we arrive at the following system:

	aspirated	plain
voiced	dh	d
voiceless	th	t

This system has been preserved in the majority of Indo-Aryan languages.

⁵ I shall not discuss the absence of PIE. **b* here. On the two velar orders cf. my contribution to Recent developments in historical phonology, 237 ff. Neither the PIE. fricative **s* nor the pharyngeal resonants **H₁*, **H₂*, **H₃* can be incorporated in the system of occlusives in a meaningful way.

4. In Greek, stability was achieved by the loss of voicedness in the aspirate:

	aspirated	plain
voiced		d
voiceless	th	t

This system developed later into the following:

	fricative	occlusive
voiced	ð	
voiceless	θ	t

The empty hole in the latter system has been filled in modern Greek.

5. In Latin we find a voiceless fricative as the reflex of a word-initial aspirate, e.g. *fūmus* 'smoke', Skt. *dhūmáh*. Two hypotheses have been put forward with respect to the intermediate stages: either the loss of voicedness was anterior to the loss of occlusion, or the reverse chronology holds. If the former solution is correct, the system of classical Greek once existed in pre-Latin. If the other position is the right one, we have to assume the following intermediate system:

	fricative	occlusive
voiced	ð	d
voiceless		t

The voicedness of the fricative is phonemically redundant in this system. Meillet has shown that the latter hypothesis must be accepted because it accounts for the dissimilation in *formīca* 'ant', where *f* continues a voiced bilabial fricative which replaced earlier **m*.⁶ The assibilation of **dh* and its subsequent devoicing in initial position were shared by Oscan, Umbrian, and Venetic.

⁶ MSL. 20 (1918) 115.

6. In Baltic and Slavic, aspiration was lost at an early stage and the opposition between **t* and **dh* was re-evaluated as an opposition of voiceless vs. voiced:

	plain	glottalic
voiced	d	'd
voiceless	t	

The voicedness of the glottalic stop is a redundant feature in this system. At a stage which can be labelled late Balto-Slavic, the glottalic stops dissolved into a laryngal and a buccal part. The former merged with the reflex of the PIE laryngeals and the latter with the reflex of the aspirates. Thus, from the Indo-European point of view we can say that **d* and **Hdh* merged in Baltic and Slavic.⁷

7. The Armenian system of obstruents which can be reconstructed on the basis of the modern dialects is the following:

	aspirated	plain	glottalic
voiced		d	
voiceless	t ^h		t'

This system arose from its Indo-European ancestor as a result of three developments: the aspiration of **dh* was lost and the opposition between **t* and **dh* was re-evaluated as an opposition of voiceless vs. voiced, lenis **d* was reinterpreted as voiceless while it remained glottalic, and the occlusion of **t* was weakened when its fortis character was lost as a distinctive feature. If this analysis is correct, we may assume that Armenian shared the loss of aspiration with Baltic and Slavic and that the early Balto-Slavic system (before the dissolution of the glottalic consonants) once existed in pre-Armenian as an intermediate stage. The developmental difference between Armenian and Balto-Slavic after the loss of aspiration bears a certain resemblance to the difference between Greek and Indo-Aryan after the loss of glottalization: the tendency toward stability occasioned the paradigmatic re-

⁷ For the chronology I refer to my discussion of Winter's law in *Baltistica* 13, 319ff.

interpretation of the unpaired voiced stop as voiceless in Greek and Armenian, whereas the triangular system was eliminated as a result of a syntagmatic reinterpretation in Indo-Aryan and Balto-Slavic. The Common Armenian system later developed along divergent lines in the separate dialects.⁸

8. The Germanic material requires some discussion because I do not agree with the usual reconstruction of the late Proto-Germanic system of obstruents, which is the following:

	fricative		occlusive
voiced			d
voiceless	θ		t

The voiced obstruent has a twofold origin. First, it continues the PIE aspirate. Second, it represents the voiced variant of the fricative, which had arisen in accordance with Verner's law and became phonemically distinct from the voiceless fricative as a result of the loss of free stress. The question whether the voiced obstruent was a stop or a spirant cannot be considered in isolation from the chronology of the merger which its twofold origin implies. In word-initial position, where no merger took place because the fricative never became voiced in Proto-Germanic, the evidence points unambiguously to a stop, as was first indicated by Meillet.⁹ This leads us to suppose that the voiced obstruent represents the phonemic merger of a stop which continued the PIE aspirate and a fricative which had become voiced as a result

⁸ Cf. *Studia Caucasica* 4, 1 ff.

⁹ *Les dialectes indo-européens* (1908) 89f. On the Scandinavian evidence cf. especially Einarsson's discussion in the *Journal of English and Germanic Philology* 40 (1941) 43ff. In his well-known article in *Language* 30 (1954) Moulton incorrectly assumes on the basis of the Old Saxon and Old English evidence that initial /g/ was a spirant (p. 42). "For initial position there is no OS spelling evidence at all; the assumption of a spirant is based on the evidence of Middle Low German and of the modern dialects", as Moulton points out himself (p. 32). For Old English Moulton assumes that initial /g/ was a stop before consonants and back vowels (p. 24), so that the rise of a spirant before front vowels must have been posterior to the palatalization. I conclude that there is no evidence for word-initial voiced fricatives in Proto-Germanic.

of Verner's law. When did the merger take place? The divergent reflexes in the various languages suggest that it was posterior to the disintegration of Common Germanic. In the dialect from which Old High German evolved, the voiced fricatives became stops at an early stage. The same holds in the other West Germanic dialects for the dental order only. On the other hand, the voiced stop became a fricative in Gothic *anabauþ* 'ordered', Old Norse *bauþ*, PIE **bhoudhe*. The attested reflexes are apparently the result of two conflicting tendencies at the time of disintegration. The Scandinavian internal evidence suggests that the phonemic distinction between a voiced dental stop and a voiced dental fricative was preserved intervocally and after a nasal up to the beginning of the 8th century A. D.

9. In Old Norse, the preterit suffix of weak verbs with a stem ending in *l* or *n* is a dental stop if the preceding syllable is heavy and a dental fricative if the preceding syllable is light, e.g. *deilda* 'divided', *kenda* 'taught' (inf. *kenna*), *valþa* 'chose', *vanþa* 'accustomed'. The simplest way to account for the difference is the assumption that an intervocalic **d* became **ð* at the stage between the first and the second syncope. Thus, we arrive at the following relative chronology:

1. Syncope after a heavy syllable in **dailidō* yields **dāildō*.
2. Spirantization of intervocalic **d* in **walidō* yields **waliðō*.
3. Syncope after a light syllable in **waliðō* yields **walðō*.
4. Shortening of final vowels yields the attested forms *deilda*, *valþa*.

10. Intervocalic **ð* is lost before **r* when the intervening vowel is syncopated in Proto-Norse, e.g. *fiórer* 'four', *huárer* 'which', Gothic *fidur-*, *hvaþarai*. Since the cluster was not simplified in *veþr* 'weather' < **wedra* < **uedhrom*, Russ. *vědro*, the dental obstruent in the latter word had apparently not yet become a fricative at the time of the syncope. For the fricative in *leþr* 'leather' < **leþra*, OIr. *lethar*, there are two possibilities: either it had not yet become voiced at that time, or it had already become voiced at an early stage and merged with the reflex of **dh*. Both the preservation of the dental obstruent in dat. sg. *feþr* 'father' and the chronology which has just been established for the loss of

the distinction between intervocalic $*d$ and $*ð$ suggest that $*ð$ had become $*d$ before $*r$ at the time of the younger syncope. The fricative in *iþre* 'inner', OHG. *innaro*, had not yet come into existence, cf. Eggjum (700 A.D.) *maR* 'man', later *maþr*. Thus, we arrive at the following relative chronology:

1. Voicing of postvocalic $*θ$ in **leθra*, **hwaθar-* yields $*-ð-$.
2. Shortening of $*ð$ in **leðra*, **faðri* yields $*-dr-$.
3. Syncope in **fiður-*, **hwaðar-* yields a new sequence $*-ðr-$.
4. Loss of $*ð$ before $*r$ and compensatory lengthening in *fiórer*, *huórer*.
5. Spirantization of postvocalic $*d$ in *veþr*, *leþr*, *feþr*.¹⁰

11. Old Norse *enn* 'still' does not show the d of *endr* 'again', Gothic *andizuh*, OE. *end*, OHG. *enti*. The generally accepted view that it represents a Verner variant of the other forms is not supported by any piece of evidence. Its unique development must rather be attributed to the word-final position of $*ð$, just as the unique development of *fimm* 'five' can be explained by the word-final position of $*f$. If this suggestion is correct, the distinction between $*ð$ and $*d$ after a nasal had been maintained at the time when final obstruents became unvoiced, cf. *batt* 'bound' < **bant* < **band* < **bhondhe*, imp. *bitt* < **bhendhe*. Thus, we arrive at the following relative chronology:

1. Unvoicing of word-final obstruents yields **änθ*, **bant*, *helt* 'held'.
2. Loss of the distinction between $*ð$ and $*d$.
3. Restoration of the distinction between $*ð$ and $*d$ as a result of syncope.
4. Assimilation of $*f$, $*θ$ to a preceding resonant in *fimm*, *enn*, *fell* 'covered the head'.¹¹

¹⁰ Similarly, the Old English d has become a fricative in present-day *father*, *weather*. In contrast with Proto-Norse, the voicing of postvocalic $*θ$ was posterior to the development of $*ð$ to $*d$ in the West Germanic dialects.

¹¹ Cf. Gothic *haihald* vs. *faiþalþ*. Old Norse *hell* and *felt* are analogical formations. The stages have been numbered in such a way that they can be identified with the corresponding stages in the two preceding sections.

12. We have now arrived at the following reconstruction of the late Proto-Germanic system of obstruents:

	fricative	occlusive
voiced	ð	d
voiceless	θ	t

This system developed as a result of Verner's law from the following:

	fricative	occlusive
voiced		d
voiceless	θ	t

The latter system is almost identical to the one which has been reconstructed for Proto-Armenian. It originated from the PIE system as a result of the loss of the aspiration of **dh*, the reinterpretation of lenis **d* as voiceless and the loss of its glottalic character, and the weakening of the occlusion of **t* when the latter had lost its fortis articulation as a distinctive feature. The similarity of the sound shift in Germanic and Armenian now receives a natural explanation if we assume that the loss of the aspirates was a shared innovation of the Indo-European dialects from which Germanic, Baltic, Slavic, and Armenian evolved. The subsequent development which this common innovation evoked in Germanic and Armenian was arrested in Balto-Slavic by the dissolution of the glottalic stops into a sequence of a laryngeal and a buccal part, which merged with the reflex of the laryngeals and the reflex of the aspirates.

13. Between the area where glottalization was lost at an early stage and the area where aspiration was lost first we find a string of dialects where both developments took place: Celtic, Illyrian, Albanian, Thracian, "Macedonian", Phrygian, Anatolian, Iranian, Tocharian. The geographical distribution suggests that the two developments more or less simultaneously reached these dialects and thereby neutralized each other's tendency toward asymmetry in the system of obstruents. One may wonder if the relative chronology of the two developments in the separate dialects can be established.

14. The Iranian system of obstruents is the following:

	fricative	occlusive
voiced		d
voiceless	θ	t

The close resemblance between Iranian and Indo-Aryan suggests that this system must be derived from the Sanskrit system which was cited in section 3 above. If this is correct, the loss of glottalization was anterior to the separation of Indo-Iranian from the other Indo-European dialects, while the loss of aspiration was posterior to the Indo-Iranian period. There are several arguments against this point of view. First, the loss of aspiration in **dh* yielded an occlusive whereas its voiceless counterpart became a fricative. The reason for the different treatment remains unclear. Second, PIE **t* yielded Iranian *θ* before a consonant. This development can hardly be separated from the rise of *θ* in those cases where it correlates with Sanskrit *th*. Third, the loss of aspiration in Iranian must be separated from the same development in the contiguous Indo-European dialects from which Slavic and Armenian evolved if the Iranian merger of **d* and **dh* was posterior to the Indo-Iranian period. Alternatively, I would regard the loss of aspiration as a dialectal Indo-European innovation and deny the existence of a phoneme **th* at any stage in the development of Iranian. The fricative in *raθa-* 'chariot' developed from PIE **tH* as a result of the spirantization of **t* before a consonant and the subsequent loss of the laryngeal.

15. In Celtic, the distinction between the glottalic and the aspirated series has been preserved in the labiovelar order. The original state of affairs is obscured by the secondary loss of labialization in Goidelic. In Welsh we find *b* for the glottalic and *gw* for the aspirated labiovelar stop, e.g. *bwyd* 'food', *gweddi* 'prayer', Gr. βίος 'life', ποθέω 'I wish'.¹² The lenited reflex of the intervocalic aspirate merged with the reflex of the labial, e.g. *nyf* 'snow'. In Irish, **w* was lost after a stop, e.g. *dau* 'two', *sesc* 'dry',

¹² Cf. Binchy's discussion of Welsh *gwar* 'dutiful' in *Celtica* 3 (1956) 228 ff.

Welsh *hysb*, fem. *hesb*, Avestan *hiškvi*, so that the loss of the labial element in Irish *snigid* 'rains' is not surprising, cf. also *grís* 'fire', Welsh *gwres* 'heat', Skt. *ghramsáh*. The glottalic labiovelar stop became *b* in Irish, e.g. *beo* 'living', *bró* 'millstone', Skt. *jíváh*, *grāvā*. Intervocally, it apparently merged with **gw*, e.g. *nigim* 'I wash', Skt. *nénejmi*. Thus, we have to assume that the aspirated labiovelar dissolved into a velar and a labial part at an early stage, while the other two stops of the same order remained single phonemes. The voiced labiovelar merged with its labial counterpart in late Proto-Celtic whereas the voiceless one was preserved up to Ogamic times. The different treatment of the glottalic and the aspirated stop suggests that the articulation of the latter was more complex at the time of its dissolution into a sequence of a velar and a labial part. It is therefore probable that glottalization had already been lost at that stage. I conclude that the loss of glottalization, which determined the development of the obstruents in Greek and Latin, reached Celtic earlier than the loss of aspiration, which is shared with Germanic and Balto-Slavic.

16. When the Indo-European proto-language disintegrated, pre-Albanian was a transitional dialect between pre-Slavic and pre-Armenian.¹³ It could therefore be suggested that all of these languages shared the early loss of aspiration and that Albanian lost the glottalization at a more recent stage. I find no evidence to support this view, however.

17. In the languages which have been discussed so far, the phonological opposition between voiced and voiceless occlusives originated from the loss of either glottalization or aspiration. The original absence of voicedness as a distinctive feature was preserved in the Anatolian and Tocharian branches of Indo-European. Unfortunately, the philological study of these languages has not yet yielded a complete picture of their historical relationships. The traditional view that the three PIE series of obstruents

¹³ On the earliest relations between Albanian and Armenian cf. my forthcoming article in *KZ*. Unlike Georgiev, *Trakite i tehniat ezik* (1977), I think that Thracian and Albanian continue the same Indo-European dialect. There is no linguistic evidence for any particular connection of Phrygian with either Thracian or Armenian.

merged at an early stage cannot be maintained.¹⁴ It is possible that the pre-Tocharian dialect shared the early loss of aspiration with its pre-Slavic neighbour because we find no trace of the PIE distinction between **t* and **dh*.

18. There are two reasons why the glottalic feature of the Proto-Indo-European “*mediae*” was not established until the 1970’s. First, glottalization was lost at an early stage in Sanskrit, Greek, and Latin, which are the languages on which classical reconstructions are based. Second, Winter’s law has only recently been discovered and receives a natural explanation only if it is viewed in connection with the development of the PIE laryngeals in Baltic and Slavic and their relation to the so-called acute intonation. We must now examine if the glottalization has left any traces in those languages where it was lost at an early stage. Such traces can be expected in the reflex of clusters if some kind of assimilation had taken place at a stage which was anterior to the rise of voicedness as a distinctive feature. I see two developments which may indeed be connected with the glottalic feature of the “*mediae*”, viz. Lachmann’s law in Latin and Bartholomae’s law in Indo-Iranian.

19. In Latin we find a long root vowel in *āctus*, *lēctus*, where the velar stop belongs to the PIE glottalic series, and a short root vowel in *factus*, *vectus*, where it belongs to the fortis or aspirated series. The Balto-Slavic development shows that the glottalic feature characterized the initial part of the occlusive, whereas the aspiration characterized its final part in view of the Indo-Aryan development. When voicedness became phonemic, the aspiration in the cluster **-ght-* was simply lost, but the glottalic articulation in **-gt-* was preserved as a feature of the preceding vowel. Thus, Lachmann’s law in Latin is analogous to Winter’s law in Balto-Slavic.

20. In Indo-Iranian, too, the distinction between the glottalic and the aspirated stops is preserved in the passive participle,

¹⁴ On Anatolian cf. Čop, IF. 75 (1970) 92ff. and Eichner, MSS. 31 (1973) 79ff. On Tocharian cf. Winter, IF. 67 (1962) 16ff. and Schindler, IF. 71 (1966) 236ff.

e.g. Skt. *yuktáh* 'joined', *dugdháh* 'milked', Avestan *yuxta-*, Ossetic *duyd*. The aspiration, which characterized the medial part of the cluster, weakened the following fortis stop, and the whole sequence became voiced in a voiced environment. On the other hand, the combination of initial glottalization and a following fortis stop prevented *g from becoming voiced. An intervening laryngeal eliminated the effect of the preceding glottalization and weakened the following stop in Avestan *dugdar-* 'daughter' < *gHt-, but was itself subject to unvoicing in Persian **duxθrī*, Turfan *duxš*, and in Skt. *vásuttiḥ* 'enrichment' < *dHt-, as opposed to *vásudhitiḥ* 'gift' < *dhHt-. When the glottalization characterized the medial part of the cluster, it weakened a preceding fortis stop and the whole sequence became voiced in a voiced environment, e.g. *-pd- in Skt. *upabdáh* 'trampling', Avestan *frabda-* 'forefoot'.

Note added in proof: See also my forthcoming article on Sindhi in the *Indo-Iranian Journal* (1980).

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