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RICE UNIVERSITY

Problems in the Reconstruction
of Indo-European Stop Consonants

by

Timothy James Pulju

A THESIS SUBMITTED
IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE
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ABSTRACT

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Despite the foundational role of Indo-European studies in historical-comparative linguistics, there are many persistent problems in the reconstruction of IE stops. Unresolved issues include: (1) the number of velar series to be posited for Proto-Indo-European; (2) unexplained variation between voiced non-aspirates and voiced aspirates; (3) irregular correspondences involving /d/ and /l/; (4) the typological naturalness of the reconstructed stop system.

A three-way velar distinction is required for PIE, at least in some phonological environments. Albanian maintains the three-way distinction, while satem languages provide evidence for morphophonemic alternation among three series. However, pre-IE likely had only a two-way distinction, with subphonemic variation between palatalized and non-palatalized allophones of plain velars. This distinction became phonemic by secondary split at the PIE stage.

Many hitherto unexplained examples of variation between *g/*g/*d vs. *gh/*gh/*dh, respectively, result from regular change of voiced non-aspirates plus the
a-coloring laryngeal to voiced aspirates. This early change, which probably happened independently in Sanskrit, Greek, and Germanic, is in accord with the reconstruction of the a-coloring laryngeal as a voiceless fricative. However, not all problematic examples of voiced aspirate vs. voiced non-aspirate can be accounted for by this hypothesis. Some are due to a sporadic process of post-nasal deaspiration in pre-Greek, while others remain unexplained.

Irregular correspondences involving /d/ and /l/ provide evidence for the reconstruction of a rare PIE cluster *dl. This cluster was phonotactically disfavored and was therefore subject to sporadic modification throughout the IE language family.

The traditional reconstructed stop system of PIE has been criticized as being unnatural in synchronic typological terms. The so-called glottalic reconstruction is more typologically natural. However, the glottalic system is not well-suited to account for the historical developments from PIE to its attested daughter languages. For PIE, the traditional reconstruction is to be preferred on the basis of historical and comparative evidence, although the pre-IE system may have been glottalic.
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First and foremost, I must thank the members of my thesis committee for their invaluable advice and assistance. My principal advisor, Sydney Lamb, guided me at each step of the thesis process. His substantive contributions to my research are reflected on every page of this thesis, as is his overall influence on my linguistic education.

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I must also thank Winfred Lehmann, Julius Purczinsky, and especially Andrew Sihler, all of whom gave freely of their expertise as Indo-Europeanists in critiquing portions of my manuscript. Their assistance has led to innumerable corrections or refinements in both the data and the theories presented herein. Lastly, my colleague Aya Katz proofread the entire manuscript and corrected numerous grammatical and stylistic errors.

Insofar as any of my ideas have merit, the credit is largely due to the contributions of the above-named scholars. Any errors, infelicities, or dubious claims remaining are of course my own.
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Chapter 1--Introduction

§1.1. Purpose

The purpose of this thesis is to offer explanations for certain problems in the reconstruction of Proto-Indo-European stops. In particular, it deals with a variety of seemingly irregular stop correspondences and alternations in the Indo-European languages. Research of this type enhances our understanding of the PIE phonological system as well as contributing to our knowledge of the PIE lexicon. The basic approach of the present work is historical; that is, explanations for consonant variation are sought in the diachronic development of PIE and its descendants. Therefore, the analyses presented herein are relevant to the particular histories of IE daughter languages as well as to the synchronic description of PIE.

The explanations proposed in the text are within the framework of established historical linguistic theory. The recognized processes of language development, such as regular subphonemic change, sporadic analogical change, and borrowing, understanding of which has been key to the progress of Indo-European linguistics, are the same ones that must be employed in making further discoveries. To proceed otherwise--to suggest, for example, that consonant variation should be seen as proof that subphonemic change is largely irregular--would be to remove the theoretical basis for all of our previous work and to make the unquestioned results of that work theoretically inexplicable. And since the established principles of historical linguistics correlate well with what we know of the cognitive and articulatory/acoustic realities
of language, it is all the more incumbent upon us to seek explanations for difficult data in terms of the accepted general principles of historical change of language.

The explanations advanced in this thesis are innovative in that, within the general parameters of historical linguistics, they provide new answers for recognized problems. In some cases, the new answers are wholly new, although of course they build upon previous work in Indo-European linguistics. In other instances, elements of the explanations which I offer have been advanced previously, and my contribution is to add to others' suggestions in creating a more comprehensive and convincing explanation for a significant set of data. This is not to say that every suggestion I make in this thesis is absolutely convincing, even to me. Indeed, at some points I make alternate suggestions to explain the same problem, and in some such cases certain of my proposed explanations may be mutually exclusive. Thus, it is plain that I do not pretend in all cases that my hypotheses are unquestionably correct, only that all of them, to varying degrees, are sufficiently possible or plausible to deserve mention in a work dedicated to suggesting answers. Throughout the work, I endeavor to make plain my own degree of confidence in the validity of any particular suggested explanation. More importantly, I make both the data and my arguments as explicit as possible so that the reader may form independent judgments about the validity of each of my hypotheses. It is unlikely that any reader will agree wholly with my conclusions, but the thesis as a whole should function as an advance on what has preceded it and a basis for future advances. Thus, both in its own right and in terms of what use others might make of it, this thesis is meant simply to add to our
cumulative body of knowledge in Indo-European linguistics.

§1.2. Areas of Investigation

The basic area of investigation is stop variation in Indo-European lexical roots. This general topic area is divided into the following sub-areas: (1) palatovelar vs. plain velar vs. labiovelar stops; (2) voiced aspirate vs. voiced non-aspirate stops; (3) *d vs. *l. Variation between aspirates and non-aspirates commands the lengthiest discussion, which is spread over several chapters. Although all of the topics are to some degree independent, they are also interdependent, since ‘chaque altération a son contre-coup sur le système’ (Saussure 1916:124). The order of presentation to some degree reflects the dependence of one chapter on those that precede it; for example, the discussion of *g/*g̪ vs. *gh/*g̪h in Chapter 3 necessarily follows the arguments in Chapter 2 in favor of distinguishing plain velar and palatovelar stop series.

Chapter 8 is devoted to a diachronic assessment of the glottalic theory of PIE consonants. This theory, which takes its name from its reanalysis of the PIE voiced non-aspirate stops as voiceless glottalized stops, was originally developed in answer to synchronic typological considerations. Yet it must be able to account for the historical development of Indo-European languages if it is ultimately to succeed in displacing the traditional reconstruction. Since the research presented in this thesis concerns the historical development of Indo-European stops, it provides exactly the sort of evidence that can help in evaluating the validity of the glottalic reconstruction.
To summarize, I deal with the following issues in PIE consonantism in the following chapters:

Chapter 2. Palatovelar vs. plain velar vs. labiovelar stops
Chapter 3. *g/*г vs. *gh/*гh
Chapter 4. *d vs. *dh
Chapter 5. Non-aspirates vs. aspirates following nasals
Chapter 6. Residual examples of voiced aspirate vs. voiced non-aspirate
Chapter 7. *d vs. *l
Chapter 8. The glottalic theory

In all of the above, I generally restrict myself to consonant variations in roots, leaving out both derivational and inflectional suffixes. For a highly inflected language such as Proto-Indo-European and its early descendants, there is always considerable analogical influence within and across paradigms on inflectional affixes. At the same time, affixes are frequently subject to phonological reduction or other special historical developments, for reasons which include the role of word and sentence accent. It is notoriously difficult to reconstruct full paradigms for a variety of Indo-European inflectional categories even when the cognacy of endings is obvious across the descendant languages. For these reasons, I have excluded variation in inflectional endings from my data, although such data certainly are worthy of future investigation.

The main reason for excluding derivational suffixes is that there is no way to be certain that two similar but phonologically non-correspondent suffixes are in fact cognate. We know that PIE *CVC- roots were frequently suffixed both in the PIE
era proper and in the later histories of the daughter languages. Moreover, while the meaning of any particular suffix is hard to reconstruct, we know that quite a number of different suffixes existed. For example, if we find roots *ghrebh- 'seize' and *ghreib- 'grip' alongside a root *gher-/*gher- 'grasp, enclose', we need not assume that the *bh of *ghrebh- and the *b of *ghreib- are cognate. More likely, these are simply differently suffixed forms of the basic root *gher-. In most cases, I have not included such derived doublets in this work, especially if they are recognized in Pokorny's Indogermanisches Etymologisches Wörterbuch (1959) as differently suffixed forms. While it may be that some forms which seem simply to have different suffixes are in fact cognate, with some other explanation for the later consonant divergence, it is difficult to identify such instances at this distance, and in most cases I do not attempt to do so.

§1.3. Theoretical Prerequisites

§1.3.1. Different types of sound change. The term sound change is defined rather broadly in practice. This terminological fuzziness sometimes leads to a failure to clearly distinguish two quite different types of sound change. These are irregular phonemic replacement or rearrangement, as opposed to regular subphonemic change that eventually becomes phonemicized. The distinction between the two is made clear in some works (e.g., Bloomfield 1933:390), but in many it is not. Therefore, it will be well to clarify and exemplify the distinction here.

Hock (1991:61-147), in his historical linguistics textbook, includes both
irregular and regular developments under the name of sound change. The most widely cited examples of 'irregular sound change' are of course those involving dissimilation and metathesis; Hock, for example, cites the variant Spanish developments of Latin r...r sequences in árbol 'tree' < arbore-, roble 'strength' < róbore-, sastre 'tailor' < sartore-, and prior 'prior' < priore. One of Hock's many examples of regular change is the case of Germanic i-umlaut as reflected in Old English.

Certainly, both of these examples can be seen as sound change in that they involve changes in pronunciation that were motivated by articulatory factors. But there is a very important difference between the two cases. /r/ and /l/ (and /s/) were phonemically distinct in Latin and remained so in Spanish. The change from /arbor/ to /arbol/ in early Hispano-Romance was not a gradual and subconscious shift in the realization of the phoneme /r/ in its second occurrence in the word. It was, rather, a replacement of one phoneme with another, resulting in a new and audibly different pronunciation of the word. Since not all speakers in a community would have made this change at the same time, they must have recognized that the word had variant pronunciations. Indeed, individual speakers may have vacillated between one pronunciation and the other while recognizing that they were distinct. Such variation was easily tolerated because it caused no confusion as to word meaning, there being no other word pronounced /arbol/ with which arbor/arbol could be confused. Eventually, the pronunciation with /l/ won out, but the result was not predetermined, as is shown by Portuguese árvore or by other words in Spanish such as peregrino <
Lat. *peregrīnus*.

In the case of dissimilation, the phonemic interchange is specifically replacement. In metathesis, the interchange can be seen as simple change of position, or alternatively as double replacement. Without attempting to define my terms narrowly, I will subsume both of these examples under the label of interchange. Note, however, that interchange is not limited to dissimilation and metathesis. Any change in which a particular phoneme in a particular word is abruptly replaced by another phoneme can be seen as an example of phonemic interchange.

Quite different from phonemic interchange is regular phonetic change as exemplified by i-umlaut. As is well-known, such change does not, in its earliest stages, involve any change at the phonemic level. During the early stages of i-umlaut, Germanic speakers began to pronounce certain vowels higher and farther forward in the mouth when the following syllable contained an *i* or a *j*. They must have been as unconscious of this habit as modern American speakers are of their habit of pronouncing */k/* toward the front of the mouth before front vowels, but toward the back of the mouth before back vowels. And it is exactly the fact that this variation is subphonemic, below the level of consciousness, that accounts for its regularity. When speakers are aware of a pronunciation, they may sporadically alter it. When they do not notice a pronunciation, altering it cannot even occur to them.

This is not the place to go into how regular phonetic changes result in regular phonemic change. Examples of mergers and splits, both primary and secondary, are well-attested, even if the detailed mechanics of how they arise and spread in a
population are debated. But it is important to note that regular phonemic change resulting from regular phonetic change does result in an alteration of the phonological system of a language. That is, in all cases of regular phonemic change resulting from regular phonetic change, some phonological contrast is lost or gained in some or all phonological environments in a language. Even in the case of so simple a change as loss of /h/ in Late Latin/Common Romance, the distinction between /h/ and zero was lost in prevocalic environments. No doubt this was an originally subphonemic change, as [h] became progressively weaker phonetically, until speakers of a new generation no longer distinguished between its presence and its absence.

Phonemic interchange motivated by articulatory factors is quite different. It involves no change in the phonetic realization of any phoneme. Moreover, in most cases it brings about no change in the phonological system of the language. In a few cases, to be sure, it seems as if phonemic interchange does change a phonological system. In Chapter 8, I will posit that PIE word-initial *dl clusters were eliminated in most of the descendant languages by a process of audible change in pronunciation. Although this change must have proceeded sporadically, once all such clusters were eliminated in a particular language, it would indeed be accurate to say that a phonological change had occurred through the elimination of a particular phonotactic sequence. In a similar vein, one might argue that the loss of /k/ in word-initial /kn/ clusters in Modern English was a case of phonemic interchange between /k/ and zero, since the change seems to have occurred fairly abruptly and since native speakers
probably could always hear the difference in pronunciation between /kn/ and /n/.

The concept of sporadic replacement of certain phonemes by certain other phonemes will be explored in greater detail as it is invoked at various points in this thesis. For now, we can conclude with the following observations. (1) Irregular phonemic interchange is no less natural a process than regular subphonemic change. Both are well-attested in the histories of various languages, and it would be unrealistic to ignore either as a possible explanation for a particular problem in comparative-historical linguistics. (2) The recognition of irregular phonemic replacement does not imply that all sound change is irregular. On the contrary, the strikingly regular results of well-studied subphonemic changes require us to regard the processes involved as fundamentally regular.

§1.3.2. Benveniste’s root theory. Most modern work in PIE reconstruction is to some degree indebted to Benveniste’s theory of PIE verbal roots (Benveniste 1962:147-173). In this highly algebraic analysis of PIE verbal morphology, all verbal roots are regarded as being essentially of the form CVC-. Such a root may take a consonantal suffix and so yield a stem form CVCC-, which cannot then be further suffixed. But some suffixes varied between simple consonantal forms -C and accented forms -VC; these variable suffixes are Benveniste’s suffixes proper, as opposed to invariable consonantal enlargements/determinatives (two alternate names for the same type of element). When a root has an accented suffix, the root-vowel is in the zero-grade, thus yielding a stem form CCVC, which may be extended by addition of a determinative, though not of another suffix.
By way of example, the root *dei- ‘shine’ occurs unsuffixed in Skt. adidet ‘it shone (imperfect)’, where the de of the final syllable directly reflects *dei-. The same root occurs with an unaccented laryngeal suffix in Gk. déato ‘it was seen’ < *deiH-. The root is very widespread with the suffix -u/-éw, found, for example, in Gk. Ζέα ‘Zeus (vocative)’ < *dyéu- vs. OLat. déivos ‘god’ < *děiw-.

Benveniste’s root theory is certainly very helpful to us, but as a characterization of an actual human language, it is too abstract and too regular. The patterning which Benveniste describes was certainly widespread and probably highly productive at a certain period of Proto-Indo-European. However, to insist that all verbal roots at any one synchronic moment conformed to this pattern is to ignore Sapir’s dictum (1921:39) that ‘all grammars leak’. If most PIE verbal roots were biconsonantal, we cannot thereby assume that all were, or that seemingly cognate forms from attested languages that do not fit neatly into the theory are demonstrably of non-Indo-European origin. After all, the comparative data are primary, the hypothetical reconstructions secondary, and the theoretical analysis of the reconstructed system only tertiary.

Moreover, it is precisely the most basic vocabulary items in a language—verbs such as ‘be’ or ‘do’, nouns such as those referring to family relationship or parts of the body—which are most frequently irregular, that is, they do not conform to the dominant morphological patterns of the language. Yet these are exactly the words of whose cognacy across languages we can be most certain. So if, indeed, they seem not to conform to an idealized analysis such as Benveniste’s, we should be most
hesitant to rule them out as actual cognates.

In any case, Benveniste's theory is meant to apply only to verbal roots. For the purposes of reconstructing consonants, nominal roots are every bit as useful. The PIE word for 'daughter', for example, which is treated in §3.2.1 below, is plainly a nominal at the PIE stage regardless of a variety of attempts to derive it from pre-IE verbs with an agentive suffix. In fact, the main use of Benveniste's analysis is in helping to understand IE vocalic ablaut; cf. Lehmann (1952:18), 'to obtain a clear picture of PIE ablaut one must deal with such abstractions rather than with the reconstructions arrived at in the comparison of dialect forms'. To obtain a clear picture of stop variations, however, we must deal with the reconstructions arrived at by comparison rather than with Benvenistean abstractions. This is not to say that I make no use of Benveniste's theory. For instance, I have already used it above in the discussion of *ghrebh-, *ghreib-, and *gher- (§1.2). However, too rigid an application of Benveniste's theory would turn a very insightful and helpful framework for understanding much of our data into a Procrustean bed whose main function would be to fit the data to the theory.

Since I do not entirely conform to the Benvenistean approach, I also use the term root with a different meaning from that assigned by Benveniste. Benveniste's theory gives a central role to the synchronic morphology of PIE and defines roots as the basic CVC- elements which underlie various suffixed or extended forms. The present work, by contrast, accords a central role to diachrony and phonology. Where two or more words in Indo-European languages appear to be cognate, I reconstruct
a root based on all the sound correspondences among the various words. Thus, for a word which appears as a masculine short o-stem noun in all of the languages, I include the stem vowel in my reconstructed root even though, in terms of a synchronic analysis of Proto-Indo-European, the thematic vowel *o is not a part of the nominal root. Root, in other words, is used in the diachronic sense of ‘ancestral form’, as in Pokorny’s or other etymological dictionaries, rather than in the synchronic sense of Benveniste’s verbal roots.

§1.3.3. Laryngeal theory. I make use of three laryngeal symbols, *E, *A, and *O in the present work. In my opinion, the voluminous arguments of Beekes (1969) and the more recent ones of Sihler (1988) leave no doubt that Greek has distinct vocalic reflexes /e/, /a/, and /o/ for laryngeal consonants. There is evidence from Hittite that there were actually two different a-coloring laryngeals in the ancestral language (Sturtevant 1942:35-46). If there were two, they seem not to have differed in their effects on adjacent consonants as considered in this thesis. I therefore use the symbol *A to indicate any a-coloring laryngeal without implying any conclusion as to whether there were one or two such phonemes in PIE.

The phonetic nature of the so-called laryngeals has been much debated (see Beekes [1989] for a discussion of the more prominent proposals). A variety of reconstructions are possible, and rather than prejudge the issue, I use the symbols *E, *A, and *O, since it is easier to know what a laryngeal’s vowel-coloring effects were than to be certain of its phonetic realization. *H is used as a cover symbol for PIE laryngeals in general. But although I use structural symbols, obviously the roles
played by laryngeals in stop variations will provide evidence concerning their phonetic nature. This evidence will be discussed as it arises in the research presented below.

§1.3.4. Glottalic vs. traditional notation. In the main body of this work, I use the traditional system of voiceless, voiced, and voiced aspirate stop orders in presenting reconstructed forms. To do otherwise would be confusing and contrary to the general practice of adhering fairly closely to the forms given by Pokorny, a practice which I follow in this thesis, although at times I modify his reconstructions slightly, especially to bring them in line with the best-established aspects of laryngeal theory. However, in the case of the stop orders, my use of the traditional system is more than a notational convention, in that I discuss the historical phonetics of forms in terms of the phonetic values assigned by the traditional system. In Chapter 8, however, I reexamine these historical developments in terms of the glottalic theory to see whether it can account for them as well as or even better than the traditional reconstruction.

§1.4. Comments on Data

§1.4.1. Problematic evidence. In comparison with the data which exemplify the best established laws of Indo-European, the data which are most important for this thesis are generally marginal and/or recalcitrant. The latter does not necessarily imply the former. The various words for ‘daughter’ discussed in §3.2.1 are plainly cognate, and ‘daughter’ is a basic vocabulary item in semantic terms. Nevertheless, the medial consonant correspondences in the ‘daughter’ cognate set have always been
difficult to account for in Indo-European studies. 'Daughter', then, provides us with recalcitrant but not marginal data. However, other data may be marginal as well as recalcitrant. Gk. _dokhmós_ and Skt. _jihmá-_ (§7.4.4) both mean 'aslan, athwart', and they are very likely cognate. But no other IE languages reflect the same root, which in semantic terms is more marginal than basic.

The reason for reliance on such data is simply that the non-marginal, non-recalcitrant data have already been satisfactorily explained. There is no difficulty, for example, in recognizing the cognacy of such terms words as Skt. _pīḍr_-, Gk. _patér_, Lat. _pater_, OE _fæder_, to cite a canonical example. Nor is there any difficulty in reconstructing the consonants. There was indeed a difficulty prior to Verner's explanation of the secondary origin of the OE _d_, so that this was a recalcitrant root for approximately fifty years prior to 1876. But it was not marginal, and Verner's recognition of a regular sound change affecting the word means that it is no longer recalcitrant, either. One aim of the present thesis is to remove some other roots from the recalcitrant category by demonstrating that seeming irregularities have resulted from normal historical processes of language change.

However, any such demonstrations in this thesis will almost automatically be less convincing than Verner's, simply because most of the data which have yet to be explained are marginal, far more marginal than the data which Verner accounted for. To repeat, the most obvious, most certain, and most frequently represented variations have mostly been dealt with already, leaving those which are less obvious, less certain, and less well-attested by frequent occurrence in many words and languages. Thus,
conclusions based on those data will often be less certain than conclusions based on more certain data.

On the other hand, this thesis has several advantages over research of Verner's era, because it is informed by over a century of work in general and Indo-European linguistics. To cite only two very obvious examples, there now exists a much greater knowledge of languages and of language change outside of Indo-European than was available in the Neogrammarians' day, while within Indo-European linguistics we have witnessed in this century the full flowering of the laryngeal theory, which makes plain much that was previously dark. I therefore do not wish to imply that the hypotheses advanced in this thesis are merely airy speculations based only on a few dubious examples, only that the reader should not expect the evidence in support of those hypotheses to be as strong as that supporting, for example, the merger of PIE *e *a *o in Indo-Iranian.

§1.4.2. Ancient glossaries. One specific type of data which deserves mention is words which are found only in the works of ancient grammarians and lexicographers. Of particular importance here are the Greek lexicon of Hesychius and the Latin lexicon of Festus. Both include numerous citations of words in their respective languages which are either not attested at all elsewhere or which are attested in a somewhat different form from that recorded by the lexicographer. The most useful aspect of Hesychius' voluminous work is that he records versions of words from a great many dialects, whereas most of our Greek texts record either Attic or its later descendants. Festus' work is most important in providing Old Latin forms
of words that often differ from those of Classical Latin. Since dialectal variation and philological research into the oldest attestations of a language are of great importance in historical linguistics, Hesychius and Festus are obviously of great importance as sources of Greek and Latin language data.

However, we should be careful not to place too much reliance on forms found only in Hesychius and Festus. The former’s work, though compendious and probably careful, is mostly based not directly on the numerous papyri that would have been available to Hesychius as a 5th century Alexandrian scholar, but rather on earlier, similar, but less comprehensive lexicons compiled by earlier Alexandrians. In its original form, then, it was third- rather than second-hand information. Moreover, the only surviving Hesychian manuscript is a damaged and much interpolated 15th century copy, the end result of an indeterminable series of copies, each of which likely underwent at least minor changes from the original. Festus’ lexicon is also not an original work. Rather, it is an abridgement of an earlier lexicon produced by the Augustan scholar Verrius Flaccus. Nor is the Festus manuscript complete; only half of it survives, the other being represented only in an 8th century further abridgement of Festus’ work by Paulus Diaconus. And of course, the caveat above about the introduction of errors during copying of manuscripts applies to Festus’ work as well as to Hesychius’.

In the body of this work, therefore, I will mark a form found only in Hesychius with an (H.), in Festus with an (F.), the latter including forms via Paulus Diaconus. It is necessary to be very careful in using such forms. Hesychius sometimes marks
the dialectal origin of an entry in his lexicon, but often he does not. A form whose dialectal origin is not indicated is more difficult of interpretation, given the large amount of variation among Greek dialects, including quasi-Greek languages such as Macedonian. Festus is most reliable when dealing simply with Old Latin variations such as $d$ for $l$ in *lingua* 'tongue'. Regular, recurrent sound correspondences between forms in a lexicon and the usual forms in a language are the ideal. When we find them, we can place considerable trust in the lexicon's evidence. Elsewhere, a variety of factors will help to determine the evidentiary value of a particular entry, and each case will be dealt with independently.

**§1.4.3. Borrowing.** The vocabulary of every Indo-European language contains a number of what can only be loanwords, frequently from unattested languages. Sometimes, several geographically close languages will share a word which for semantic and/or formal reasons appears to be of non-Indo-European origin. In such instances, it is often the case that the words in question are all the result of borrowing. It is frequently a moot point whether all the languages borrowed the word in question independently, or whether it was borrowed at an early post-Indo-European stage into a section of the family and descended regularly into several branches, or whether it was borrowed into one Indo-European branch and from there passed onto others. It is important to be able to identify such words, though, since our primary interest is in the nature and development of the common PIE sound system.

But the fact of borrowing does not give us the right to immediately classify
difficult data as borrowed terms. To do so is to assume that we know all that there is to know about the phonological developments from PIE to any of the attested languages, and that any data that do not fit our theories are of no concern to us. No linguist would accept this position in theory, but in practice, some come perilously close to occasional adherence to it. Beekes' (1969) otherwise excellent monograph on laryngeals in Greek is a prime example of this dangerous tendency—dangerous because all too easy. Yet, although Beekes goes too far in often stating categorically that certain Greek words must be borrowings, it would not necessarily be a flaw in a work such as his to remove such data from consideration without asserting that they must always remain beyond the pale. Beekes (1969) is after all the first-ever comprehensive treatment of laryngeal developments in Greek, and it is better to establish the basics by using the most certain data. As Anttila (1969:24) says in reference to his own work on the basics of another aspect of Indo-European, '[At first] one can use only sure equations. Only after that can one work out to the less and less sure ones.'

In terms of Indo-European consonantism, we are no longer at the beginning stages of study. On the contrary, there have been innumerable essays on specific problems in reconstruction and constant efforts to apply new advances in Indo-European linguistics to the same. In the present work, then, it would be entirely wrong to dismiss as likely borrowings all Indo-European words which have not yet been proven to be of Indo-European provenance. I will therefore not shy away from such data, but will consider each item individually. Some, indeed, will still be best
analyzed as borrowings, but others will be recognizable as inherited words that have undergone entirely normal phonological and/or analogical modification. Many, of course, will remain uncertain, although it will be possible to state probabilities even for these words.

Special mention should be made of the supposed pre-Greek substrate 'Pelagian', which is held to be an Indo-European language. Greek words which look plainly Indo-European but which are difficult to derive by the usual sound laws are often said to be of Pelagian origin. Even if there was an Indo-European language spoken in Greece before the arrival of the Hellenes, which is a highly speculative idea, there would be no reason to assume that all difficult PIE reflexes in Greek were borrowed from the putative Pelagian language. Cowgill (1986:59-61), in a brief discussion of the Pelagian theory, with reference to previous works on the topics, mentions a few Greek words for which he finds the Pelagian theory seductive. These include Gk. *pündaks* 'bottom', but in §4.2.2 I show that it is possible to demonstrate a perfectly natural development of this word in Greek from PIE. Such a demonstration is preferable to resorting to the speculative Pelagian theory. Indeed, even where such a demonstration has not yet been made, I remain dubious about the value of an unverifiable explanation in terms of a hypothetical Indo-European substrate.

§1.5. Previous Research

The principal work dealing with Indo-European consonant variation is Hirt's
Indogermanische Grammatik (1927), specifically Volume 1.2 'Konsonantismus'. Hirt presents a comprehensive treatment of all aspects of IE consonantism, including such specific problems as consonant clusters, consonant variation, the three velar series, and other moot issues in the field. Most of what he presents, however, particularly in the chapters which focus on consonant variation, is descriptive rather than explanatory. That is, he includes lengthy lists of apparent cognate sets that, if valid, would indicate consonant variation, but possible explanations developed by Hirt or others are mentioned briefly if at all, with little if any discussion. What is most commendable about Hirt's approach is that he does not automatically rule out the possible validity of apparent cognate sets which seem to contradict the sound laws. Thus, his extensive collection of evidence is available for later researchers who, by doing more in-depth work on some particular topic than was possible for Hirt in the context of his grammar, can themselves come to well-founded conclusions about the usefulness of each item of Hirt's data.

Another work to which my own is somewhat similar is Lehmann's Proto-Indo-European Phonology (1952). Lehmann's book is a major work in the history of the field, in that it presents a cohesive account of how our reconstruction of PIE phonology must be revised in light of the development of the laryngeal theory. It also applies a more modern understanding of phonological systems than was used by the Neogrammarians, with an emphasis on the difference between the phonemic and the phonetic levels. But more than that, it uses the laryngeal theory in particular to provide innovative answers for specific phonological problems in Indo-European.
While the present work is not as ambitious as Lehmann’s in its scope, it is similar in that it treats a number of separate variations within the guidelines of a unified theory and seeks to add insights gleaned therefrom to our understanding of the PIE phonological system.

Apart from Proto-Indo-European Phonology, work on consonant variation since Hirt has tended to focus on individual variations or on particular cognate sets. The former tendency is certainly a valid approach in Indo-European studies. A focus on individual cognate sets is also defensible in some cases, inasmuch as not every instance of a particular type of variation is necessarily attributable to the same causes. Nevertheless, in light of the methodological importance of recurrent sound correspondences, when explanations for variations are phonologically based it makes sense to look for commonality across at least some out of a group of cognate sets. Moreover, given the inherent interconnectivity of phonological systems, insights gained from the analysis of one problem in consonantism may well shed some light on other phonological difficulties. The present work deals with several different but interrelated types of stop variation in Indo-European. It should therefore help the reader to a generalized understanding of some outstanding issues in Indo-European stop reconstruction, as well as being of use for future research on specific topics in the same way that Hirt’s and Lehmann’s works have been and continue to be of use.
Chapter 2--Palatovelar vs. Plain velar vs. Labiovelar Stops

§2.1. Previous Research

The question of whether PIE had three or only two series of velar stops has been debated for many years. Strict application of the comparative method provides evidence for three series. Examples are given below. A few forms, such as Av. zrazdā- and Lat. änsæ, have diverged from the usual developments for known reasons upon which we need not elaborate here (for the initial consonantism of the words meaning ‘long’ see §7.4.3).

*š
Skt. śraddadhāti, Av. zrazdā-, Lat. crēdō, OIr. crētim ‘believe’

*ğ
Skt. jānas-, Gk. génos, Lat. genus, Goth. kuni ‘race’, OIr. gein, Arm. cin ‘birth’

*gh
Skt. hánsa-, Gk. khēn, Lat. änser, OHG gans, Lith. žąsis ‘goose’, OIr. gēiss ‘swan’

*k

*g
Skt. sthagāyati ‘cover, hide’, Gk. stégō, Lat. tegō, OE þecan, OIr. tuigiar ‘cover’, Lith. stiegti ‘roof (vb.)’ (cf. Gk. stēgos ‘roof’, ModE thatch)

*gh
Skt. dīrghā-, emp. drāghiyās-, Av. darēga-, Gk. dolikhōs, Lat. longus, Goth. lāggs, Lith. ilgas, OCS dlūgǔ, Hitt. pl. dalugaeš, Alb. gjatē ‘long’

*kʷ
Skt. kás/cid, Gk. tís/tí, Lat. quis/quod, Goth. hvas/hva ‘who?/what?’, Lith. kąs ‘who?’
Skt. gáčchati (root gam-) ‘come, go’, Gk. baínō ‘walk, go’, Lat. veniō, Goth. qiman, Toch A kām-, kum- ‘come’


There are relatively few correspondences that establish the existence of a plain velar series. This is surprising, since we would expect the phonetically least marked plain velars to be the most common series. For this reason, it has been variously proposed that PIE had only two velar series, one of them plain velar. Either the labiovelars attested by centum languages or the palatovelars attested by satem languages would be considered a later dialectal development.

Kurylowicz long argued that PIE had only plain velars and palatovelars, and that the labiovelars developed out of the velars in the centum languages by a mixture of sound change and analogy (see Kurylowicz [1973:64-7] for a recent presentation of his views). This theory has won little acceptance and will not be discussed further here; for a detailed criticism, see Miller (1976:47-50).

Far more widely accepted is the theory that PIE had only /k g gh/ and /kw ghw/ with phonemic palatovelars as a later development limited to the satem languages. Hirt (1927:232-241) advances this view, as does Meillet (1937:91-95). Meillet’s brief but insightful analysis of the situation has become a standard treatment, repeated by later authors with some slight modifications (Lehmann
Meillet’s principal arguments against a PIE palatal series phonemically distinct from plain velars are as follows. (1) No one descendant language reflects a three-way distinction in the velars. (2) The plain velars are attested principally before *a, before *r, after *s, and at the ends of roots, especially after *u; palatovelars are rare in all of these environments.

There are two main objections to the first argument above. First, it is probably not true. Albanian shows three different reflexes of the three different velar series in some environments, according to Huld (1984:143-147) and Hamp (1989:209). The details of the developments as explained by Huld are too complex to be outlined here, but we can present the representative example set cited by Hamp, namely Alb. xotē ‘says’ < *kē-ti, kohē ‘time’ < *kēskā, and sorrē ‘blackbird’ < *kʷērsnā. As Hamp points out, these words reflect a distinction between *k and *k even before the front vowel *ē, an important point in relation to Meillet’s second argument, to which we will return below. However, in regard to Meillet’s first argument, Swiggers (1989:184) responds to Hamp’s citation of the Albanian evidence as follows:

The fact remains, however, that with the exception of Albanian, all the Indo-European languages have reduced the three series of gutturals to two... In light of this—and in the absence of conclusive information on the history of the Albanian phonological system—one may well ask whether the traditional tripartition of the gutturals is not the result of a comparative superposition of correspondences (and divergences).
Swiggers concludes that a distinction between palatovelars and plain velars is unnecessary for PIE.

To be certain, less is known about Albanian historical phonology than that of many other IE languages. But since Huld and Hamp no doubt know the Albanian material better than Swiggers (or myself or most other linguists), it is rash to dismiss their judgment. Nevertheless, even if Huld and Hamp have misinterpreted the Albanian evidence, Meillet’s first argument is hardly conclusive. Mayrhofer (1986:103) cites the example of European vs. Syrian Romany, in which the three-way sibilant distinction of Indic has been resolved in two different ways into a two-way distinction, as shown by the data below:

<table>
<thead>
<tr>
<th>Skt. sarpa- ‘snake’</th>
<th>Europ. sap</th>
<th>Syr. sap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skt. širas- ‘head’</td>
<td>Europ. šero</td>
<td>Syr. siri</td>
</tr>
<tr>
<td>Skt. šaṣ ‘six’</td>
<td>Europ. šoṣ</td>
<td>Syr. šas</td>
</tr>
</tbody>
</table>

Compare the resolution of the PIE velar system in languages other than Albanian if we reconstruct three velar series. Sanskrit exemplifies the satem languages, Latin centum.

<table>
<thead>
<tr>
<th>PIE *kred-dhē- ‘believe’</th>
<th>Skt. šraddadhāti</th>
<th>Lat. crēdō</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIE *krew- ‘bloody flesh’</td>
<td>Skt. kravī- ‘raw flesh’</td>
<td>Lat. crōr ‘blood, gore’</td>
</tr>
<tr>
<td>PIE *kʷo-/kʷi- ‘who’</td>
<td>Skt. kās</td>
<td>Lat. quis</td>
</tr>
</tbody>
</table>

If Sanskrit were an unattested language and there were no modern Indic languages apart from Romany, we might have a debate over the existence of three or only two sibilants in Proto-Romany. It is not at all surprising, of course, that the
Romany dialects reduced the three sibilants of Sanskrit to two, nor would a reduction of a PIE three-velar system to a two-velar system be unnatural. On the contrary, if the plain velars were relatively uncommon, and hence the functional load born by a three-way distinction was small, then a change to a two-velar system would be the most expected development. Therefore, if the three-velar theory is correct, it is not surprising that only Albanian reflects the three-way distinction. Rather, it would be surprising if a majority of the languages did reflect all three series.

In short, Meillet's first objection to the three-velar theory is not very potent. However, his second argument is more formidable, since it suggests that the palatovelar vs. plain velar distinction was purely subphonemic at the PIE stage. Leaving the labiovelars out of the picture, Meillet's explanation for the data is as follows. PIE velars would naturally have had palatalized allophones before front vocoids. Meillet suggests that PIE apophonic *o, which seems to be one development of pre-IE *e, could have been a prepalatalized *i̯o, just as Russian /o/ is a development of pre-Russian *e. Velars would naturally have been palatalized before PIE *i̯o as well as before *e. Plain velar allophones would have occurred before *a and before *r, even in sequences such as /kre/, since 'la sonante *r n’est guère sujette à subir l’influence d’une voyelle prépalatale suivante' (1937:94). But a palatovelar allophone would have occurred in /kle/, since ‘*l admet l’influence d’une voyelle prépalatale suivante’. For the lack of palatalization after *s, Meillet compares the failure of post-sibilant /t/ to assimilate in Attic Gk. esti ‘he is’ as opposed to the change of *ti to /si/ found in Attic etsi ‘they are’. Concerning plain velars root-finally
after *u, Meillet’s account is less clear, but plainly this is not a palatalizing environment.

Lehmann (1952:100-102) is more concerned than Meillet with the eventual development of phonemic status for the palatovelars in the satem dialects. In contrast to Meillet, he does not hold that *o was prepalatalized in PIE. Thus, different allophones could show up in different paradigmatic forms of the same word, depending on whether the consonant was followed in a particular form by an e-grade or an o-grade vowel. The consonantal variation would still have been subphonemic in PIE. However, a merging of vowels such as occurred in Indo-Iranian when /e a o/ merged as schwa would cause a secondary split of the originally coallophonic consonant variants. Since the centum languages did not undergo such mergers, at least not at early periods, the variation between palatovelar and plain velar remained subphonemic in them.

An objection to Lehmann’s explanation is that, while it works to some degree for Indo-Iranian, it cannot work for either Balto-Slavic or Armenian, the other satem branches, since in neither of them does *e merge with *o or *a. Balto-Slavic merges *a and *o, but according to Lehmann we should expect plain velar allophones before both of these proto-phonemes, and palatovelars only before *e. Secondary split through vocalic merger therefore cannot be a general explanation for the phonemicization of the palatovelars.

Although his general explanation does not convince, Lehmann does provide a sensible way of accounting for such doublets as Skt. rócate ‘shine’ vs. rúšat- ‘bright’.
If original *k and *k were in morphophonemic alternation, then rášat- could continue a form with *k, while the verbal stem in rácate reflects *k. Presumably, different verbal forms of the root originally varied in having *k or *k, but paradigmatic levelling would be expected if the alternation was originally or at some point became morphophonemic rather than subphonemic. The fact that such doublets are found only in the satem languages would make sense if we posited only two original velars, as Lehmann does, since then only in the satem languages would the palatovelar/plain velar distinction have become morphophonemic and thus subject to analogy. But it would also make sense if we posit an original three-velar system, since any doublets of this type would have become non-doublets in the centum languages when these merged the palatovelar and plain velar series unconditionally.

Miller's (1976:47-54) take on the palatovelar vs. velar problem is again slightly different from that of Meillet and Lehmann. Like them, he sees the development of the palatovelars as a satem change, but he does not believe that there was ever a stage at which there were phonemically three velars in satem dialects. Rather, he states that palatalization of plain velars ‘began in the satem area before front vowels [and] was then generalized to the environment before back vowels because of the e/o alternation’ (1947:50). This is a dubious theory, inasmuch as it involves the analogical extension of a subphonemic variant. A parallel suggestion would be that native speakers of English might begin to pronounce the back [g] of got as a more fronted [g] by analogy with the fronted [g] of get. Such a development cannot be expected as long as the variation is subphonemic and below the consciousness of the native
speaker. Of course, it would be quite normal if the phonetic difference became phonemicized in some way.

Continuing, Miller states that a loss of labialization in the satem dialects prompted a shift from a plain velar-labiovelar system to a palatovelar-plain velar system. That is, he postulates a push chain such that, as the labiovelars became plain velars, the original plain velars became palatalized to avoid coalescing with them. Those plain velars that stood before *e and *o had already become phonetically palatalized, according to Miller, and so had no need to shift any further. However, Miller further states that the push-chain shift of plain velars to palatovelars was irregular, especially before resonants. Baltic and Slavic in particular often show unexpected reflexes of plain velars where the other satem languages reflect palatovelars, although unexpected plain velar reflexes are occasionally found in Indo-Iranian and Armenian as well. A Baltic example is Lith. klausyti ‘hear’ vs. Skt. śṛṇōti, Gk. kλάω. Here, the Baltic form indicates a plain velar and the Sanskrit a palatovelar. The number of such examples, where one or more satem languages diverge from the others, is rather large, as Miller points out (1976:53); Hirt (1927:239-240) lists several dozen. Miller’s answer for all of them is that the shift of plain velar to palatovelar was sporadic, and in some instances, the plain velar remained non-palatalized and so merged with the delabialized labiovelar series.

On theoretical grounds, this stage in Miller’s account is just as problematic as the previous one. Empirical examples of push chains are notoriously hard to find (Hock 1991:157). In the present case, the most likely result of a shift of labiovelars
to plain velars would be not a push chain, but a simple merging with the plain velars, at least with those that were still non-palatalized phonetically. The most likely phonemic result would be a partial merger with primary split; that is, [kʷ gʷ gʰh] and [k g gh] would merge phonemically in all positions, while [k g gh], originally coallophonic with [k g gh], would now be separate phonemes but would occur only in prevocalic environments. However, this is not what happened. The contrast between plain velars and palatovelars is found in satem languages in preconsonantal position as well, as shown by examples cited at the beginning of this chapter.

The most important contribution of Miller's article is his method of accounting for the frequent occurrence of plain velars after *u. Noting that a delabialization in the environment of [u] is common in centum languages, he proposes an early IE loss of labialization after *u in such words as *yugōm 'yoke' (Skt. yugām, Lat. iugum, etc.), which would derive from an earlier *yeugʷ-. This suggestion is in fact briefly mentioned by Brugmann (1888:341), but Miller appears to have developed the idea independently. The idea is probably a correct one, seeing that it is difficult to find good examples of labiovelars following *u in PIE. Therefore, this particular suggestion is incorporated into the account of the three velar series that I advance below.

Overall, the attempts to reduce the palatovelar and plain velar series to a single phonemic velar series are unsuccessful, but they have brought to light a number of important phonetic and structural facts. Where they have failed is in accurately describing the phonological system of PIE, which Lehmann correctly
identifies as the proper goal of phonological reconstruction, even though in this
instance he does not attain it. It is to such a description that we now turn.

§2.2. A Structural Account of the Three-Velar System

The examples given at the beginning of this chapter clearly indicate a contrast
between plain velars and palatovelars before *r. That *kred-dhē- ‘believe’ is
probably related to the root *kerd- ‘heart’, via a semantics of ‘give one’s heart to,
trust’ does not change the fact that for PIE, there is a phonemic distinction between
the *k of *kred-dhē- and the *k of *krew-. Moreover, Hamp’s examples, cited
above, indicate that Albanian maintains a distinction of original *k vs. *k even before
the original front vowel *ē. On the other hand, we cannot dismiss Meillet et al.’s
data which indicate the largely secondary nature of the palatovelars. Furthermore,
if plain velars are phonemically distinct from palatovelars, we must account for the
typologically unusual rarity of the plain velars compared to the other velar series.

The most logical explanation is that at some pre-IE stage, there were only two
velar series, the plain velars and the labiovelars. Accepting Lehmann’s persuasive
suggestion of paradigmatic alternation depending on the following vowel, we can
assume that *e/*o ablaut already existed at this stage. Before the front vowel *e, the
plain velars developed palatal allophones. Elsewhere, including before the *o which
was an ablaut alternant of *e, the plain velars had plain velar allophones. Also at
this stage, both plain velars and labiovelars occurred after *u.

The crucial change which led to a palatovelar vs. plain velar phonemic contrast
was the reduction of some *e vowels to zero, a change probably attributable to a shift from pitch accent to stress accent. The whole question of the nature and origins of PIE quantitative ablaut and stem-formation is too complex to enter into here (see Anttila [1969] for a book-length discussion), but for roots such as *k'leu- ‘hear’ and *kred-dhe- the easiest explanation for the palatovelar is that an ancestral *e following the *k was lost by the PIE stage. Thus, a phonemic contrast was introduced by secondary split, but only in preconsonantal position.

Originally, then, the three-way velar contrast occurred only in a limited environment. This is typologically normal. In Monachi, a Uto-Aztecan language of California, there are two phonemes /k/ and /q/, the latter more back in pronunciation. But they contrast only before /e/ and /a/. Before /i u/, only [k] occurs; before /o/, only [q] (Lamb 1957:35). A more familiar example of the same phenomenon is the lack of voicing contrast in word-final obstruents in German or Russian. Suscendability of contrast is a well-known phenomenon in synchronic phonology, and there is every reason to expect it in the phonology of PIE.

Unfortunately, the desire to set up phoneme inventories of PIE has often led investigators to ignore the principle of suscendability of contrast. A statement such as ‘Indo-European had phonemes *k, *g, and *gh distinct from *k, *g, and *gh’ inappropriately focuses on identification of items and unconsciously promotes the ‘once a phoneme, always a phoneme’ fallacy. It is not units, but contrasts which are fundamental in phonology. The most accurate statement of the PIE system would be that there was a three-way velar contrast in some environments and a two-way
contrast in others.

The question remains, in what environments was there a contrast? It probably first arose in preconsonantal position, as we have seen above. Another source for contrast would be the delabialization of labiovelars following *u, which must have followed the very early development of the palatovelar variety of the plain velar. This stipulation explains the different developments of the words meaning ‘light’ and ‘yoke’. The first was probably pre-IE *leuk-, which would have had some forms in which the *k was followed by *e and others in which it was not. Thus, some forms derived from the root had a [k], others a [k]. ‘Yoke’, on the other hand, was probably originally *yeug⁷-. Thus, it never had a root-final palatovelar, even before front vowels.

The change of labiovelars to plain velars after *u resulted in a loss of contrast between these two series in this environment. That is, it brought about a conditioned merger of the two, with primary split of the labiovelars. But it also brought about a secondary split of plain velars and palatovelars in the same environment. The PIE phonetic sequence [uken] (to use the voiceless order as representative), derived from pre-IE [uk⁷we], was naturally interpreted as phonemic /uken/ in PIE. This meant that [uken] was now phonemically /uken/ rather than /uken/. That is, [k] and [k̚] now contrasted in the environment [ukenV_F]. At this stage, a root such as *yeug- would have been realized phonemically as /yeug/, but pre-IE *leuk- would have varied between /leuk/ and /leuk/. The variation would now be morphophonemic for the native speaker, hence subject to analogical modification.
We have not yet touched on the origins of palatovelars in words such as *dekm 'ten' or *oktō 'eight'. For the first, it is possible that at the pre-IE stage, a preceding *e, like a following one, caused palatalization of the plain velar. This would also account for the palatalization in words such as *ekwos 'horse' and in certain forms of *peku-/peku- 'cattle, wealth'. The latter, although it has a palatovelar reflex in Indo-Iranian, as in Skt. pašu-, has a plain velar one in Baltic, as in Lith. pekus. Given that ‘cattle’ had a paradigmatic variation between *w and *u, while ‘horse’ has only *w, it is possible to hypothesize that a following *u blocked palatalization, but a following *w did not. That is, the PIE paradigm may have had *pekus (nom. sg.), *pekwos (gen. sg.).

However, there is still the problem of accounting for palatovelar stops which are not adjacent to *e. This problem is easy to solve for some roots, such as *akmen/*akmen (with other ablaut variants of the second vowel also attested), exemplified by Skt. aśmān- ‘stone’, Gk. akmē ‘edge, point’, Lith. ašmens (attested only in the plural) ‘cutting edge’, but also by Lith. akmuš ‘stone’. This is plainly a derivative of *aķ- ‘sharp’ (Buck 1949:50-51) and probably referred originally to a sharp stone such as a hand axe. The root *aķ- could easily have acquired its palatalization from case forms with following front vowels, and the difference might have been phonemicized already by the time *akmen was created. Hence, different speakers would use a different base in creating the derivative *akmen or *aķmen.

For other roots, no obvious explanation for the palatalization presents itself. For *oktō ‘eight’, for example, there exists no obvious simpler root, and we must
resort to hypotheses such as positing a pre-IE form with a palatalizing vowel between the *k and the *t. In fact, such a medial vowel could quite easily have been lost in a three-syllable word with an accented ultima. However, since no attested IE language gives any direct evidence for a medial vowel in this word, we are plainly on highly speculative ground here. Ultimately, though, in attempting to reconstruct PIE it is unnecessary, and probably impossible, to determine the pre-IE source of palatalization in all roots which attest it. The main point is that in PIE, palatovelars and plain velars did contrast in some environments, and that the resultant three-way velar contrast was a change from the two-way contrast of pre-IE.

Before summarizing the PIE system, though, we should note an additional likely source for the phonemicization of the difference between palatovelars and plain velars, namely borrowing. PIE, like all languages, must have included a number of borrowings from other languages. Normally borrowings are reshaped to fit native phonological patterns, but when a contrast has become established in some environments in a language, borrowing can often extend it to other positions. For example, Old English exhibited a sub-phonemic variation between voiced fricatives, which occurred between voiced sounds, and voiceless fricatives, which occurred elsewhere. This variation was phonemicized word-medially and word-finally in Middle English through regular phonetic changes. The introduction of contrast in these positions no doubt facilitated its introduction word-initially through borrowing from other languages (e.g. veal from French) and from southern English dialects with regular, i.e. non-contrastive voicing of initial fricatives (e.g. vixen, vat). The
pronunciation of these Middle English borrowings with [v] is in notable contrast to the pattern of Old English borrowings from Latin, such as fers ‘verse’ < versus.

In the same way, borrowings into pre-IE before the palatovelar/plain velar distinction was partially phonemicized would have assimilated to the native phonological patterns. But once the contrast was established in some environments, it could be extended by external and dialect borrowing to other ones, including even word-initial, pre-front vowel position. The three-way word initial contrast before *e that is still reflected in Albanian is a likely result of such borrowing, unless it results from an analogical process.

By the PIE stage, then, we can reconstruct a system with a three-way velar contrast in an indeterminate number of environments, one of which was certainly word-initially before *r or *l (see the examples at the beginning of the chapter). But whatever the number of the environments in which the contrast occurred, its functional load must have been small. Most often, the distinction occurred redundantly in different inflected forms of roots, forms that were fully differentiated by the inflection itself. The number of borrowed words with plain velars in the environment of *e could not have been too great, nor could the number of words with plain velars derived from pre-IE labiovelars. In phonetic terms, the most common PIE contrast would have been between palatovelars and labiovelars, since most of the old plain velars had become palatovelars due to the influence of the very common vowel *e. This contrast—palatovelar vs. labiovelar—therefore carried a high functional load in terms of distinguishing vocabulary, while the respective functional
loads carried by the plain velar vs. palatovelar and plain velar vs. labiovelar distinctions were comparatively small.

§2.3. Reductions to Two-Velar Systems

A three-velar system where the contrastiveness of one series is relatively unimportant functionally is plainly a system likely to undergo reduction to a two-velar system. In PIE, it was the contrast between palatovelars and labiovelars which was important and which was likely to be preserved. But it was only the contrast, and not the actual palatalized articulation or labialized articulation, which was functionally important and hence durable. In fact, in a two-velar system we would expect to find one relatively unmarked, i.e. plain velar series and one relatively marked series such as labiovelars or palatovelars. So for post-IE, we should expect to find a merger of either palatovelars and plain velars or of labiovelars and plain velars. In either case, the phonemic distinction between the palatovelars and labiovelars would remain, although its phonetic realization would change.

Of course, such mergers are exactly what we find in all of the IE languages except Albanian. It is no more surprising that Albanian is conservative in this one matter than it is surprising that English, which like all the Germanic languages is in many ways innovative in pronunciation, has retained to the present day the velar and labial character of the consonant found in queen, in contrast to other centum languages such as Old Irish (ben ‘woman’) and Greek (γυνή ‘woman’). As mentioned before, we would be surprised only if we found that all or most of the IE languages
directly reflected the functionally endangered three-velar system.

Apart from Albanian, the IE languages all follow either the centum or the satem pattern of reduction to a two-velar system. In the 19th century, the centum/satem variation was almost universally regarded as indicative of early dialect grouping in the early post-IE era, especially since known centum languages were geographically western and satem languages eastern. When the discovery of Tocharian invalidated the old centum-west satem-east dichotomy, it was replaced in some scholars' work by the idea that the centum dialects were peripheral and the satem ones central and innovating (e.g., Meillet 1937:92-93). I will return to this theory of a common satem grouping below, but for now, the point is that, even among scholars who maintain the belief that the satem languages went through a period of shared developments, 'centum' is no longer regarded as a valid genetic grouping. Therefore, in what follows, I use the term 'centum languages' simply as a cover term, without implying that similar developments in the individual languages are indicative of a period of common development.

The developmental pattern reflected by the various centum languages is easy to describe. In phonemic terms, it involved a complete merger of palatovelars and plain velars. In phonetic terms, it need not have been so simple as a complete depalatalization of palatovelars. In most of the centum languages, it is more likely that plain velars before front vowels became fronted and merged phonetically with palatovelars. Contrastingly, palatovelars in other contexts did become fully depalatalized and merged with the plain velars. Thus, quite naturally, the plain velar
stops had different allophones, relatively front or back depending on environment. But any old distinctions between palatovelars and plain velars were completely lost.

Because of this merger, the part played by analogy can no longer be determined from the centum evidence. Since it was essentially palatovelars and plain velars which alternated morphophonemically, any levelling or other analogical replacement in these languages would be obscured by the eventual merger of the two series. However, these languages would retain evidence of any earlier alternation between labiovelars and plain velars, and there is at least one example pointing to such an alternation. Gk. phēbomai 'flee in terror' and pheūgō 'flee' certainly seem related. The first is cognate with a variety of Balto-Slavic words such as Lith. bėgti 'run', OCS běžati 'flee' and hence derives from PIE *bhegʷ-. The connections of the second are disputed, beyond the obvious relation to Lat. fugio 'flee', but a relation to Lith. būgti 'be frightened' seems plausible, which points to a proto-form with a plain velar rather than a palatovelar. The reconstructed pair *bhegʷ- and *bheug- thus differ only in the presence of the *u in the latter, since we have seen that delabialization following *u is a regular pre-IE development. Although at present I can offer no regular explanation for the presence or absence of the *u, it is nonetheless possible that these two words are related at the pre-IE level. If they are related, then Miller's delabialization hypothesis as modified above would account for the consonantal difference reflected in phēbomai and pheūgō.

Turning to the satem languages, we must first consider whether a satem grouping is any more valid than a centum one. First of all, Albanian cannot be
considered a satem language (Huld 1984:159-161), since satem languages are those which unconditionally merged the labiovelar and plain velar series. As for the rest of the so-called satem group, it is actually quite difficult to find phonological isoglosses other than the satem changes which unite Balto-Slavic, Indo-Iranian, and Armenian. It is true that Indo-Iranian and Slavic share the so-called 'ruki' change of dental /s/ to a farther back consonant after /r u k i/, but Indo-Iranian also retroflexes dental stops in the same environments, unlike Slavic. Further, the Indo-Iranian /r/ derived from /l/ has the same effect as inherited /r/, making the Indo-Iranian change seem to be a late one. As for the other satem languages, Lithuanian palatalized /s/ after /k r/ but not after /u i/, while Latvian, Old Prussian, and Armenian have no evidence at all of ruki change. Shevelov (1964:128-129) presents this evidence and concludes that ruki change is not a common development across these branches.

As for the development of the velar consonants themselves, changes of palatalized velar stops to alveolar or alveolopalatal sibilants are so phonetically natural that it is unnecessary to assume a period of common development to account for the fact that such changes occur in several different IE languages. Especially since there are few if any other phonological isoglosses that correlate with the satem development of the velars, it is unwise to elevate this shared development of an unstable consonant system to the status of a key diagnostic for grouping the post-IE dialects. In what follows, therefore, I do not mean the term satem languages to imply that these languages developed out of a common, post-IE satem language or dialect, or even that the satem changes exhibited by each language are at all related as a
spreading innovation of the type described by the wave model of historical change. They might well be related in some way, since phonetic innovations can spread over dialect and language boundaries, but they could also be quite independent. The term satem languages, therefore, like the term centum languages, is only a convenient cover term collectively naming several languages which have evidence for a similar reduction of the PIE three-velar system.

We have already seen that analogical levelling must have been common in the PIE period for different forms of the same root that had morphophonemic variation between palatovelars and plain velars. Levelling must have continued throughout the separate developments of the satem languages, until variation within a paradigm became rare. Variation outside of a paradigm would be more common, and of course doublets could result, partly through dialect mixture when different dialects generalized a different velar series. And doublets can also result when two full paradigms with differentiated root meanings are created out of the same original root, as in Lith. akmuō ‘stone’ vs. dūmens ‘cutting edge’.

As the plain velars became less and less common due to replacement by the more frequent palatovelars, the labiovelars in satem languages began to lose their labial quality, which was no longer very important for contrastive purposes. This would only increase the tendency when choosing analogically between palatovelar and plain velar phonemes to choose the palatovelar, since to maintain phonetic distinguishability from the (labio)velars, a palatovelar was more suited than a plain velar. Therefore, the majority of the alternating palatovelar-plain velar roots
developed consistent palatovelar forms. This was particularly true in prevocalic position, since *e was still the most common vowel and since velar consonants are most easily articulated toward the palate before front vowels. At the same time, palatovelars seem not to have been so heavily favored before resonants (Miller 1976:51-54). As a result, unexpected plain velar reflexes show up most often in preresonant position, as in Lith. klausyri 'hear' (cf. Russ. slūšat 'listen'). Of course, such unexpected plain velar reflexes, which result from an atypical generalization of a plain velar allophone, must be carefully distinguished from expected plain velar reflexes. For example, for the root reflected in Skt. kravī-, etc., there is no evidence that there was ever a pre-IE subphonemic or PIE morphophonemic alternation between *k and *k.

There is no certain explanation for why unexpected plain velar reflexes are more common in Balto-Slavic than in Sanskrit and Armenian. Brugmann (1888:343) suggests Balto-Slavic borrowing from neighboring centum languages, an idea rejected by Shevelov (1964:144-145) and Miller (1976:51), the former of whom makes a few observations on the evidence but states that 'no satisfactory general explanation may be offered' (1964:145). Presumably the answer is rooted in the different phonological histories of the languages involved, including the details of articulation of the involved consonants, as well as whether the satem developments spread by wave action from a central location or occurred independently in different areas. But if the explanation for the differentiation by language is unrecoverable, still the phenomenon does not alter the general conclusion: all of the satem languages can show variation internally
and with regard to one another as a result of different analogical processes involving plain velars and palatovelars.

§2.4. Conclusions

A three-way distinction between palatovelars, plain velars, and labiovelars is unavoidable for PIE, though it grew out of a pre-IE two-way distinction between plain velars and labiovelars. Moreover, the distinction between the rare plain velars and the other series in PIE carried a low functional load. Hence, the PIE system was usually reduced to post-IE systems with only a two-way distinction, always preserving the functionally most important palatovelar vs. labiovelar difference. Plain velars merged structurally with either palatovelars or labiovelars in all languages but Albanian; there is no solid basis for making these two types of merger diagnostic of a split of PIE into so-called centum and satem dialects.

The above theory explains two significant types of IE stop variation. Irregular variation between palatovelars and plain velars results from the phonemicization of a pre-IE subphonemic variation. Divergent reflexes are due to the inherently irregular effects of analogical levelling of root forms with palatovelar vs. plain velar morphophonemic variation. Additionally, the less common variation between labiovelar and plain velar reflexes, seen perhaps in Gk. *phabeteōmai vs. *phereugō, can be attributed to a pre-IE delabialization of labiovelars following *u.
Chapter 3—*g/*ğ vs. *gh/*ğh

§3.1. Introduction

The distinction in manner of articulation between original *g/*ğ vs. *gh/*ğh is lost in a number of IE languages. It is preserved, usually with a different phonetic manifestation from the original, as follows. (1) Sanskrit, Greek, Germanic, Armenian, and Oscan-Umbrian preserve the distinction generally. (2) Latin preserves the distinction except next to other consonants. (3) In Iranian, although the distinction is lost in most environments, Bartholomae’s Law allows us to distinguish between clusters of voiced aspirate plus voiceless stop vs. voiced non-aspirate plus voiceless stop. For example, Av. dazdē ‘he makes’ must derive from *dadh-tē > *daddhē, since *dad-tē would have yielded pre-Iranian *dattē by assimilatory devoicing.

The current chapter focuses on some specific examples of variation apparently involving *g/*ğ vs. *gh/*ğh; the next chapter deals with *d vs. *dh. In these cases, I posit that we are actually dealing with the PIE sequences *gA/*ğA and *dA, respectively. In fact, an Indo-Iranian development of *ğH/*ğh to *ğh/ğh has been mentioned in the literature very frequently. However, no exhaustive analysis of the all of the relevant cognate sets has been presented. As a result, there remains considerable disagreement about which laryngeal or laryngeals are involved. At the same time, there have been isolated attempts to demonstrate a similar Indic or Indo-Iranian development of *dH to *dh (e.g. Kuiper 1947:201). But for *dH the examples hitherto presented have been few and weak, so that there is no agreement
that *dH gave Indic *dh regardless of the laryngeal involved.

In this and the following chapter, I attempt to remedy the confusion currently reigning over these proposed developments through a careful examination of both old and new evidence for aspiration of voiced stops by following *H. I will argue that the laryngeal in question should be identified specifically as *A. As a preliminary, therefore, it is necessary to review such evidence as exists concerning the phonetic characteristics and the historical developments of the a-coloring laryngeal(s).

*A is identified first and foremost by the fact that it colors a neighboring *e to *a. At the same time, it does not change the timbre of a neighboring *o. These facts are most easily accounted for if we assume that *A represents one or more guttural spirants, such as velar [x]/[γ] or pharyngeal [h]/[ ]. Such sounds would be likely to retract the front vowel [e] to [a] while leaving the back vowel [o] unchanged (Cowgill 1965:146). Nor can glottal [h] be ruled out, since it has been attested as producing similar vowel-coloring (Bomhard and Kerns 1992:2.16). Still, it produces such effects less commonly than do velars and pharyngeals.

Further evidence for reconstruction of a guttural spirant comes from the effect of *A on adjacent voiceless stops. Following up on a suggestion first made by Saussure (1891), Kurylowicz (1935:46-54) analyzed many of the voiceless aspirate stops of Sanskrit as reflecting PIE sequences of voiceless stop plus laryngeal. This analysis is one of the most widely accepted elements of the laryngeal theory. Lehmann (1952:80-84) further demonstrated that only *A, not *E or *O, is implicated in this development, and that the phonemicization of the stop plus *A
sequences occurred in the Proto-Indo-Iranian period at the latest. Beekes’ recent claim (1989:24) that *E also caused aspiration is based on a single instance, the 2nd plural active ending -tha corresponding to Gk. -te. But the aspiration in Sanskrit could easily be analogous to that of such forms as the 2nd dual active -thas or the 2nd plural middle -dhve. Better supported is Beekes’ argument (1988a:88) that the development of the voiceless aspirates belongs only to Indic, rather than being a common Indo-Iranian change. However, I will not discuss this possibility further, since for our purposes, the important point is that the change of *pA *tA *kA to *ph *th *kh occurred no earlier than the Proto-Indo-Iranian period.

The late date of the change means that it provides only limited evidence for the PIE pronunciation of the a-coloring laryngeal(s). The aspirating effect of *A on voiceless stops indicates that at the Proto-Indo-Iranian or pre-Indic period, *A had developed into a voiceless guttural fricative. Simple glottal [h] is perhaps most likely, especially since *A vanished entirely as a phoneme by the historical Indic period. But we are not required by this evidence to reconstruct [h] as the pronunciation of *A in the PIE period. On the contrary, given the distance in time between PIE and Proto-Indo-Iranian, a development from original [x] or [h] to [h] is quite possible.

Finally, we turn to a theory of laryngeal hardening developed by Martinet. This theory supports the reconstruction of *A as a guttural fricative. Moreover, it plays a key role in the explication of some of the variation within cognate sets dealt with in this and the following chapter. For this reason, I will review it in some detail.

Martinet (1955) argues that the widespread IE suffix -aks derives from earlier
*-eA-s, where the *s is a late masc. nom. singular ending added to what was originally a final suffix *-eA. With hardening of the *A to [k] before [s], we would have nominatives in -aks and other cases in -a; e.g., accusative *-eA-m > *ãm. Within paradigms, analogy would have levelled the alternations in a variety of ways, so that most of the evidence remaining of this change comes from non-paradigmatic alternations such as that of Latin senex ‘old man’ vs. sedatus ‘senate’.

The same suffix *-eA could also be attached to i- and u-stems, with later suffixation by *-s in the nominative singular in most cases. By analogical generalization of the zero-grade before inflectional suffixes, nominative singulars in *-iAs and *-uAs would develop in the paradigms of some words. These would regularly develop to *-iks/*-uks, as opposed to oblique cases such as acc. *-Im/*-ûm < *-iAm/*-uAm. Other forms could also develop, as for example when the zero-grade was not extended to the nominative singular, or when the nom. sg. *-s was never added to a root in the first place. Further analogical levelling continued to occur during the prehistories and histories of the separate Indo-European languages, so that both within languages and across the family as a whole there is considerable local regularity within paradigms of single words but considerable global irregularity in comparison with the original pattern.

This theory obviously favors the reconstruction of *A as a guttural fricative; Martinet opts for velar [x]. In support of his theory, Martinet compares the proposed phonetic developments to those of post-vocalic, pre-consonantal Gmc. *x in English (1955:64). Six shows hardening of the velar fricative before [s], with maintenance of
the short vowel, whereas *night* and *right* show lengthening of a short vowel before [xt] with eventual loss of [x]. In a second article (1956), Martinet extends his theory to include the o-coloring laryngeal, which he regards as a labialized *A, that is, a voiceless labialized velar fricative [x^w]. According to Martinet, this laryngeal could also harden to [k] before [s]; on the other hand, intervocalically it is reflected as [w] in languages which maintain the [w] sound. As it happens, this corollary involving *O plays no role in the arguments regarding aspiration which I develop below. Therefore, without necessarily rejecting the corollary, I shall make no further mention of it in this thesis.

Martinet's theory of laryngeal hardening has been accepted by some (e.g. Watkins 1965:181-183, 186-188), rejected by others (e.g. Cowgill 1965:176-179). A principal objection to it is the lack of paradigmatic interchange between -Ve- and -Ve- in the attested languages. But this objection can hardly be considered fatal. Outside of Hittite, paradigmatic interchange of r and n in nouns is only scantily attested in the various languages, so that if Hittite had never been discovered, we could not be sure of the validity of r/n stems as a PIE category. The case of the r/n stems does not by any means prove that Martinet's hardening theory must be correct, it merely demonstrates that a relative lack of paradigmatic interchange is only a weak argument against the theory.

Watkins (1965:181) states, 'My own opinion is that Martinet's hypothesis is in general well-founded, and provides a relatively simple explanation for a rather impressive body of disparate data. It has furthermore shown itself a productive line
of speculation for other scholars, and has tended to be confirmed by subsequent research. I likewise regard Martinet’s hypothesis as well-founded, and I further have found it productive in my own research. Scholars who reject Martinet’s theory will presumably find some of what I say in this and the following chapter less convincing than those who accept it. However, my own work also functions as a confirmation of the type mentioned by Watkins. Martinet’s original hypothesis was not inspired by the stop variations which I take up in these chapters, but application of the theory to data for which it was not created allows us to make sense of those data. It is therefore to be hoped that even those readers who have previously rejected Martinet’s theory might reconsider it in light of the data and arguments presented below.

§3.2. PIE *ɡH/*ɡH > Indo-Iranian *gh/*ɣh

Several basic vocabulary items of Indo-Iranian show reflexes of PIE *ɡh or *ɣh where their apparent cognates in other languages indicate *g or *ɣ, respectively. A theory advanced by Pedersen (1926:48 n.1) and Kurylowicz (1935:53-54) and widely accepted since then (e.g., Sturtevant 1942:86, Hoenigswald 1965:95) accounts for the Indo-Iranian forms on the basis of a laryngeal which has fused with the preceding *ɡ/*ɣ to give *gh/*ɣh in that branch only. The Sanskrit words typically cited in this connection are given below, along with apparent Greek cognates which reflect non-aspirated *ɡ/*ɣ. Unless otherwise noted, the meaning of each Greek word is the same as that of its Sanskrit counterpart.
Skt. duhitār- ‘daughter’ : Gk. thugātēr
Skt. āha ‘he said’ : Gk. ἔ
Skt. aham ‘I’ : Gk. εγὼ
Skt. hānu- ‘jaw’ : Gk. génus ‘jaw, cheek’
Skt. hāsta- ‘hand’ : Gk. agostós ‘palm of the hand’
Skt. mahānt-, māhi ‘big, great’ : Gk. megál-, méga

One point of dispute is which of the laryngeals would be likely to cause the proposed Indo-Iranian aspiration of a preceding *g or *g. Sturtevant argues for *O, a voiced velar fricative in his analysis (1942:86); Winter (1965a:108-113) argues for *E, Mayrhofer (1986:135-139) for *A, while Beekes (1969:179-181) leaves open the possibility that any of the three could be involved. Puhvel (1959:647-648) goes so far as to claim that three voiceless laryngeals are definitely involved, and that based on this evidence we must posit at least three voiced/voiceless pairs, that is, at least six laryngeals for Proto-Indo-European.

To answer the question of which laryngeal or laryngeals may be involved, it is necessary to examine each of the roots in detail. Such an examination is important in any case, since there are other complications involved in these words, such as a hypothetical devoicing of *g to *k which may be reflected in Armenian, Baltic, and Hittite. Furthermore, the validity of some of the cognate sets is open to question; for example, Mayrhofer (1992-95:1.153) rejects the connection of Skt. āha with Grk. ἔ, for reasons which we will consider below.

Each of the detailed examinations of a particular root which follow begins with
a reconstruction based on Pokorny's, with slight modifications to reflect the current general opinion regarding the root. I do not necessarily endorse each of these reconstructions; rather, I use them as a basis for discussion. Under each reconstructed form I list: (a) forms which seem to reflect earlier voiced aspirates; (b) forms which seem to reflect voiced non-aspirates; (c) forms which could reflect either voiced aspirates or voiced non-aspirates; and (d) forms which appear to reflect neither voiced aspirates nor voiced non-aspirates.

§3.2.1. *dhugHtēr 'daughter'

a. Skt. duhitā r-, Av. dugā dā r-, du yā dā r-

b. Gk. thugā tēr

c. Osc. futū r, Goth. daūhtar, Lith. duk tē, OCS dū sū tī, Toch A ckākar, B tkācer

d. Arm. dustr

In the case of *dhugHtēr, there can be no question as to the cognacy of the words in all of the languages. Hence, the irregular correspondences in the middle of the word constitute a problem to be solved rather than a reason to question the data. In fact, this is also the easiest root to reconstruct out of all of those which we must consider. The long /ā/ of Toch A ckākar, B tkācer certainly reflects a laryngeal, but which one is not plain, since probably any vocalized laryngeal would have given Tocharian /ā/ in this environment (Adams 1988:18). The a-vocalism of Gk. thugā tēr,
on the other hand, indicates that we should reconstruct an a-coloring laryngeal in the
proto-form, with vocalization of the laryngeal in interconsonantal position. Skt.
duhitár- shows both vocalization and aspiration of the preceding *g.

Av. dugədar-/-duyar- reflects earlier *dhugdhēr < *dhughtēr < *dhugAtēr.
The schwa of dugədar- is a purely Avestan anaptyctic sound, a late development
argues that the attested Avestan forms derive via *dhugder < *dhugHdēr <
*dhugHtēr, with a voiced laryngeal causing the following *t to become voiced. But
it seems more likely that there was a common Indo-Iranian development of *gA to
*gh, reflected in both the Avestan and the Indic forms.

The lack of medial /i/ in Avestan, as opposed to Sanskrit, becomes particularly
important in this context. The /i/ of duhitár- must be inherited from Proto-Indo-
Iranian (PIIr.), for the following reasons. Skt. /h/ results either from PIE *gh in all
environments, or from PIIr. *gh (that is, PIE *gh or *gʷh) before a front vowel or
semivowel. In the case of 'daughter', Avestan, Lithuanian, and Old Church Slavic all
agree in attesting a plain velar *gh in this word; the /ś/ of Slavic reflects earlier *k
in this environment (Shevelov 1964:191, 212-213), whereas an earlier *k would have
yielded /ś/ (Shevelov 1964:140). Therefore Skt. /h/ must derive from a secondary
palatalization of PIIr. *gh before the front vowel *i. The secondary palatalization of
PIIr. plain velars is a common development of the PIIr. period, reflected in both
Sanskrit and Avestan. In fact, Sanskrit attests several words such as kim 'what?', used
mostly as an interrogative particle, in which there is no secondary palatalization of
a velar consonant. Such examples are easily and convincingly explained as due to analogy and borrowing, including dialect borrowing, but they point out that secondary palatalization was a pre-Sanskrit process which was no longer productive in the historical period. Thus, based on the Sanskrit evidence, the /i/ must have been part of the PIIr. root. But if so, why is it not attested in Avestan, and why does the Avestan word show no secondary palatalization?

Both Tichy (1985) and Beekes (1988a:86-87) seek answers to these questions in a comparison of the Sanskrit and Avestan words for ‘father’ with those for ‘daughter’. In Sanskrit, the root vowel /i/ < *A is attested in all forms of pītār-, whereas in Avestan there is interchange between forms with and without root /i/; e.g., Gatha Av. nom. sg. pītā versus dat. sg. pītraī. The distribution of stem forms in Avestan, although it has been slightly disturbed by analogy, nevertheless plainly indicates an earlier system in which the laryngeal was vocalized in the weakest cases, where it would have preceded two consonants; e.g., pre-IIr. dat. sg. *pAtraī > pre-Iranian *pitrai. But in the strong and middle cases, where the laryngeal was followed by a single consonant plus a vowel (including vocalic r), the laryngeal was likely lost in the pre-Iranian period. For late pre-Iranian, this would have given forms such as nom. sg. *ptā, dat. pl. *ptfbhyas.

In Sanskrit, /i/ occurs before a single consonant as well as before double consonants. It is true that Sanskrit forms such as nom. sg. pītā could have /i/ by analogical levelling. However, *A is also vocalized before a single consonant in Sanskrit in such words as sthītā- ‘stood’ from *stAtō-. The sequence *A plus two
consonants does not occur in the paradigm of *stAtó-, which demonstrates that in Sanskrit, as opposed to Avestan, *A was vocalized in the sequence *CACV.

There have been a variety of attempts to explain the different conditions of vocalization in Sanskrit and Avestan. Tichy (1985) focuses not on the number of following consonants, but on a hypothetical differentiation between stressed and unstressed allophones of *A, followed by analogy in Avestan from the unattested vocative case of 'father'. This account has won little acceptance and will not be discussed further here; for arguments against it, see Beekes (1988b:59-60, 68 n.2).

Beekes (1988a:87) postulates two separate vocalizations of interconsonantal *A. In the first, common to Indic and Iranian, *A was vocalized before two consonants. In the second, limited to Indic, it was vocalized before a single consonant. Meanwhile, it was lost before a single consonant in Iranian. If, at the same time, we assume a relatively early change of *gA to *ghA, without effacement of the laryngeal, then we can reconstruct the following stages in the Indo-Iranian development of the roots meaning 'father' and 'daughter'. The developments are traced in the nominative singular, a strong case, and the dative singular, a weak case.

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As indicated by the label PIIR. 2, the loss of *A reflected in Avestan and the secondary vocalization of *A reflected in Sanksrit can be seen as early developments
which differentiated dialects within the common Indo-Iranian proto-language, rather than as late developments after the separation of Indic and Iranian into distinct languages. In western dialects, the nominative forms of these two words were *ptē and *dhughtē; in eastern dialects, *pitē and *dhughitē. Of course, the distinction between dialects and languages is an arbitrary one. In the present case, by referring to dialects of a single language, I mean to imply that these dialects were spoken over a contiguous geographic region and that the dialects in question underwent a number of shared developments even after they were distinguished by their treatment of *A before a single consonant.

The shared later developments which are relevant for our purposes would be secondary palatalization and Bartholomae’s Law. Skt. pitá, pitē, duhitā, and duhitē are all regular developments from the forms cited above. For Avestan, only the weak cases of duṣydar- are irregular. Duṣydar- is not attested in the Gathas in the dative singular, but from PI Ir. gen. pl. *dhugitrām we would expect Av. *duṣitrām instead of the attested duṣydrām. But this last form plainly shows analogical levelling based on the regular strong stem duṣydr-. The Avestan ‘father’ paradigm has not undergone such levelling in the Gathas.

It has been necessary to go into the development of this root in Sanskrit and Avestan in some detail, in order to demonstrate that the change of *gA to *gh is a common development of Indo-Iranian rather than being restricted to Indic. In fact, it must be a fairly early development, since it precedes certain other changes that belong to the PI Ir. period at the latest, namely Bartholomae’s Law and secondary
palatalization of PIIR. plain velars. The dating before secondary palatalization is particularly noteworthy in that it contrasts with the dating of change of voiceless stop plus laryngeal to voiceless aspirate. Lehmann (1952:82-3) observes that Skt. /kh/ is not palatalized before original front vowels and semivowels, in contrast to the /h/ which results from *gh and the /c/ from *k in the same environment. His conclusion, now generally accepted, is that at the time of Indo-Iranian secondary palatalization, *kH was a sequence of two phonemes rather than the unitary aspirate stop that it later became in Sanskrit. Thus, in PIIR. *rikHeti 'he scratches', for example, the *k was not immediately followed by a palatalizing sound, hence we have Skt. rikhāti. What is true for the velar series is doubtless true for labials and dentals as well. Therefore, the development of the voiceless aspirates must be a PIIR. development of later date than the PIIR. secondary palatalization.

The difference in date of the developments *gA > *gh and *kA > *kh is important, but not theoretically objectionable. Given that PIE already had a voiced aspirate series, and that this series was retained in pre-PIIR., a change of *gA to *gh would involve no significant change in the phonemic system of the language, and so would be easily accomplished. On the other hand, since PIE had no voiceless aspirates, a change of *kA to *kh (likewise for the other series) would have had the considerable structural impact of adding an entire new stop order. In fact, Kuryłowicz (1935:53-54) argues that the development from voiceless stop plus laryngeal to voiceless aspirate was tied together with the Indo-Iranian shift of *sbh *sdh *sgh to *sph *sth *skh, a development that plainly had nothing to do with the
change of voiced stop plus laryngeal to voiced aspirate. Thus, despite their surface similarities, the changes *gA > *gh and *kA >kh seem to be completely distinct temporally.

We now return to the reflexes of *dhugAtēr- in other languages. Greek has /a/ representing the laryngeal in all case forms, which indicates that Greek vocalized the laryngeal interconsonantally in general, without any aspiration of the preceding consonant. Tocharian has vocalized the laryngeal as well, but if there was any early change in the preceding consonant, it has been entirely obscured by the general merger of all consonant orders in Tocharian. As for the other languages, the one change for which they present no evidence is vocalization. However, we cannot tell whether Goth. dauchtar, Lith. dukte, etc., represent earlier *dhugtēr- or *dhughtēr-. Those who accept Bartholomae’s Law as a PIE rather than a strictly Indo-Iranian process will of course insist on *dhugtēr-. But if, as is more likely, Bartholomae’s Law is not of PIE date, then both *gt- and *ght- would have gone to *kt- in branches other than Indo-Iranian. Thus we cannot tell whether the *A simply dropped out intervocally in most of the branches or whether it caused aspiration of the *g before disappearing.

As noted in the citation of data above, Arm. dustr constitutes a separate problem. In the first place, /s/ is the normal reflex of PIE *k, not of *k, so that Armenian disagrees with the other satem languages as to which velar series is represented here. However, the discrepancy could be attributable to the same sort of morphophonemic fluctuation between plain velars and palatovelars found
elsewhere in the satem languages (see Chapter 2). The fact that Armenian reflects a voiceless stop here is also noteworthy, since the same phenomenon seems to be attested in Arm. asem ‘I speak’ and es ‘I’. If not for these parallels, we might simply state that Armenian shows the same development from *dhugtēr- or *dhughtēr- as is evidenced by Gothic, etc., except that Armenian reflects a palatovelar rather than a plain velar stop. However, it would be quite natural for a voiceless fricative such as [x] or [h] to have a devoicing effect on preceding stops in at least one of the descendant languages. Our judgment of whether Armenian shows that effect in these words must therefore rely on how much faith we put in reconstruction of PIE roots *eHgA- and *egoA/*eɡAom as the ancestors of asem and es, questions to which we will return below (§3.2.2, §3.2.3).

Before leaving dustr, we should make one point which has often been ignored in laryngealist discussions of the word (e.g., Puhvel 1959:646-649, Winter 1965a:111-112), even though it was stated in as basic a source as Brugmann (1888:343). To wit, dustr may have been reshaped in Armenian under the influence of ustr ‘son’, a word of uncertain etymology with which dustr is frequently in collocation. This explanation is particularly cogent as an explanation for why dustr has an s in place of a reflex of a plain velar stop. However, it may be equally cogent as an explanation for any other unexpected variation in dustr, the result being that we cannot place too much trust in dustr as a word which can help reconstruct the PIE etymon.

Aside from dustr, the evidence is clear. The PIE word for ‘daughter’ should be reconstructed as *dhugAtēr. The root provides clear evidence for a pre-Indo-
Iranian or early Proto-Indo-Iranian change of *gA to *gh, a change earlier than that of *pA tA kA to *ph *th *kh but similar to the latter in phonetic terms.

§3.2.2. *eHgH-, *HgH- ‘speak, say’

a. Skt. āha ‘he said’

b. Gk. ἔ ‘he said’, Lat. aīō ‘say’, adagium ‘saying, adage’, negare ‘deny
("say no")’, Goth. afaikan ‘deny’

c. -----

d. Arm. asem ‘I speak’

For this root, only the Sanskrit reflex shows aspiration, and there is considerable doubt as to whether Skt. āha ‘he said’ is indeed cognate with any of the other words listed above. The verb is defective, occurring only in the perfect tense, and in the Vedas it occurs only in the 3rd person; the plural form is āhuṣ'. But from the Brahmanas onward there is an attested 2nd sg. āhuṣa ‘you said’ (Mayrhofer 1992-95:1.153). Though later than āha in attestation, the 2nd sg. form is hardly likely to be analogous, since it is hard to see what it could be modelled on. Based simply on the Sanskrit evidence, it looks as if we have a perfect stem ādh- which became at-before the ending -tha but which underwent deocclusion before the vowel-initial endings. Deocclusion of voiced aspirate /dh/ > /h/, which became regular by the Middle Indic period, already is attested occasionally in the Rig Veda (Burrow 1955:69) and so is not problematic in the present case.
The clinching piece of evidence for the above argument is the existence of Av. 
ādār ‘he says/they say’, which are perfect in form though present in meaning.
These plainly come directly from the same root as the Sanskrit forms, hence we can
reconstruct a PIIr. perfect stem *ādh- (Mayrhofer 1992-95:1.153) which no longer
very closely resembles the *eṅ-/*ēṅ- which supposedly underlies the Greek, Latin,
Gothic, and Armenian words given above. Moreover, it is far from certain that all
of these latter words are all cognate. Lehmann (1986a:2) does not connect Goth. af-
aikan with this group; Tucker (1931:9-10) accepts the connection of the Gothic and
Latin words but doubts the relation of Greek ἔ. Still, the formulas Lat. aiō < *agyō
< *Hgyō and Gk. ἔ < *ekt < *eHgt, with regular loss of word final stops in the
attested Greek word, have seemed reasonable to a number of authorities (e.g. Frisk
1973:1.636; Ernout and Meillet 1951:33-34), often with the addition of other putative
cognates in Latin, Greek, or other languages (especially Walde 1910:21-22). By this
theory, the Greek present tense forms ἔμι, etc., would be late formations based on
ἔ, with endings analogous to those of phēmi ‘I speak’.

All the connections mentioned above are easy to postulate but difficult to
prove. For present purposes, the validity of the proposed relations here is practically
moot. Our main purpose is to determine which one or more of the laryngeals are
implicated in the Indo-Iranian shift of *gH/*gH to *gh/*gh, and in the present case
there seems to be no Indo-Iranian cognate and little evidence for a sequence *gH
at all.

Arm. asem presents the only evidence for a sequence *gH. If it is cognate
with the words which reflect a proto-form *eHg-, then it would seem to show a path of development *HgH- > *Hk- > as-, with a consonant development parallel to that possibly seen in *dhugAtēr > *dhukter- > dustr. Alternatively, one might claim that the laryngeal required in the first syllable of *eHg- to account for the pattern Gk. /e/, Lat. /a/, Arm. /a/ also had some effect on the following consonant. However, since preconsonantal laryngeals are not indicated in the roots meaning 'daughter' and 'I', this hypothesis has little to recommend it. In fact, there is a further problem with positing a laryngeal in the first syllable. Arm. /a/ is the vocalization of either *A or perhaps *O, but never *E (Beekes 1988b:76). However, the Gk. ēmt has /e/ not just in Attic-Ionic, but across the dialects (Liddell and Scott 1968:771). In other words, it must represent PIE *eE, not PIE *eA. This discrepancy renders the cognacy of the Armenian and Greek forms even less certain than it already was.

Even if Arm. asem does belong with the Greek and Latin words, and if it does reflect an Armenian change of *gH to *k, there is still nothing in any of the forms under consideration that tells us which laryngeal would have been involved. Overall, in fact, although the evidence for some sort of relationship among all of the non-Indo-Iranian 'say' words is tantalizing, the data are of little use in helping us to determine what effects adjacent laryngeals may have had on preceding voiced velar stops.

§3.2.3. *eg-, *egHom, *egō 'I'

a. Skt. ahām
b. Gk. ēgō, Lat. egō, Goth. ik

c. Av. azəm, OCS azū, Hitt. uk, Toch A ūuk

d. Lith. aš/eš, Arm. es

Before discussing the consonantal variation, we should mention the variation in the vowel of the first syllable. /e/ is the usual vowel, but /a/ is found in Slavic, Old Prussian, and Lithuanian, although the latter two also have variant forms with the /e/ which is consistently found in Latv. es. Hittite, on the other hand, has /u/, as does Toch A ūuk, which may or may not belong with the words in the other languages. We will not consider the vocalic variation further here. It and other complications associated with this root are treated at length in Schmidt (1978:21-48).

Aside from perhaps Tocharian ūuk, the cognacy of the words from this root could hardly be denied, but it is by no means certain that they all derive from the same form of the root. The *ēgō which underlies the Greek, Latin, and Germanic forms presumably goes back to a form ending in short vowel plus laryngeal. That the laryngeal was *O is an obvious hypothesis, but not a necessary one. For Skt. ahām, Av. azəm, and OCS azū, we can reconstruct *ēgHóm as easily as *ēgOém, while for Greek, Latin, and Germanic *ēgōH is as likely as *ēgēO. This being the case, the word offers no clear evidence for which laryngeal is involved.

However, this word does offer the best evidence for a change of *ēH to *k, not just in Armenian, but in Baltic as well. Arm. es, Lith. aš/eš, Latv. es, and OPruss. as all indicate PIE *k. Hittite orthographic uk, however, could just as easily
represent /ʊg/ as /ʊk/ and so offers no evidence of a devoicing effect of the laryngeal. For Hitt. *ukka ‘and I’, where the orthographic double consonant is open to varying interpretations, see the discussion of Hitt. *mekkiš ‘much’ under the heading *megH- (§3.2.6).

For Baltic ‘I’, on the other hand, Endzelins (1971:186) suggests that ‘the Common Baltic form was probably *ež which before voiceless stops and fricatives was pronounced *es and at a later date this pronunciation was generalized’. This is a questionable solution, especially in light of the apparent Armenian parallel. Moreover, in the case of the Baltic languages, there are no counterexamples to this shift. The Baltic words for ‘daughter’ could certainly derive from *dhuktēr < *dhukAtēr < *dhugAtēr. Lith. *žandas ‘jaw’ next to Skt. *hanu- ‘jaw’ does seem to be a counterexample, but I will show below in the discussion of ‘chin, cheek, jaw’ (§3.2.4) that this impression is mistaken. The same is true of Arm. *cnawt ‘cheek, jaw’; neither it nor *žandas descends from a form beginning with *gger.

Thus, only Arm. *mec ‘big’ remains as a counterexample to the hypothesis that the same laryngeal involved in the Indo-Iranian shift of *gh/gh to *gh/ghH also caused a preceding *g or *g to devoice in Baltic and Armenian. *Mec will be discussed along with its cognates below (§3.2.6); for the moment, the evidence is sufficient only to suggest this sound change for Baltic and Armenian, not to prove it. But the addition of phonetic considerations strengthens the hypothesis somewhat. The evidence seems to indicate that the same laryngeal *A, representing one or more voiceless guttural fricatives, is involved in each of the cases considered so far. It
would make excellent phonetic sense for such a sound to cause aspiration of preceding voiced velar stops in one branch of the language while causing devoicing of the same stops in other branches. It would also be phonetically natural for it to disappear entirely in some languages or become vocalized interconsonantally. That such a natural phonetic explanation exists for the comparative data is encouraging; it leads us to believe that the structural hypothesis based on those data may be correct.

§3.2.4. *ǵHenus 'jaw, chin, cheek'

a. Skt. hánu- 'jaw'

b. Gk. génus 'jaw, cheek', gnáthos/gnathmós 'jaw, cheek', géneion 'chin', Lat. genuīnus 'molar', gena 'cheek', Goth. kinnus 'cheek', OE cinn 'chin', Arm. cnawt 'cheek, jaw'

c. Av. zanu- 'jaw', Lith. žádas 'jaw', OIr. giun 'mouth', Toch A šanwēṃ 'jaws (dual)'

The form *ǵHenus, with an initial *ǵH cluster, is generally supposed to be the immediate ancestor of Skt. hánu-, Av. zanu-, Gk. génus, Goth. kinnus, and OIr. giun. That all of these words descend from the same PIE feminine short u-stem is obvious. OIr. giun is masculine only because Old Irish has no feminine u-stems at all, wherefore this word has been transferred to the masculine class.

If the /h/ of Skt. hánu- is indeed attributable to a following laryngeal, as seems
probable, then there is a problem in that we would expect the a-coloring laryngeal identified above in *dhuhi₃₃-*. However, a form *gAenus should have yielded forms with root-vowel /a/ throughout Indo-European. Instead, an original short *e is reflected wherever this word occurs as a u-stem, except in Toch A sanwem (no cognate in Tocharian B), where short /a/ with palatalization of the preceding stop reflects long *ẹ* (Winter 1965a:110). Although Winter states that ‘this *ẹ* can only be derived from *eE*, since ‘lengthened grade seems impossible to justify’, Adams (1988:110) notes that neuter nouns in Tocharian tend to have root accent with lengthened grade of the vowel. Since sanwem has been shifted from feminine to neuter in Tocharian, the lengthened grade *ẹ* is indeed justified, as against the positing of earlier *eE*.

Nevertheless, the Tocharian word, like its cognates in Greek, Latin, Germanic, and Celtic, simply cannot go back to a proto-form *gAenus with an a-coloring laryngeal in the first syllable. On the other hand, we can demonstrate that an original root form *genHus, with some sort of laryngeal in the second syllable, must underly Goth. *kinnus* and its Germanic cognates. The key is the double *n* found in all the Germanic languages, which is usually attributed to the fact that this word is a u-stem (Lehmann 1986a:218). Since PIE *-nw- goes to Proto-Germanic *-nn-, forms of the noun with accented vocalic suffixes would have naturally had a sequence *-nwV-, leading to *-nnV*. The double *n* could then have been extended throughout the paradigm by analogy.

This explanation seems plausible until we realize that the sequence *-nw-
would have occurred in the u-stems only in a few cases such as perhaps the genitive-locative dual. Moreover, not a single declined form of u-stems retained in Proto-Germanic descends from a form with PIE stem *w (Wright 1954:94). It is rather dubious to claim that a consistent double n is due to analogy from a few forms which may not even have existed in pre-Germanic at the time of the shift of *-nw- to *-nn-. Even if they did exist, the forms in question would certainly have been marginal within the paradigm and hardly likely to cause a remodelling of nominative, accusative, genitive, or dative singular and plural. Doubling of /n/ is also entirely lacking in sunus, the only other Gothic u-stem with a pre-stem n (Wright 1954:54-55). In short, the usual explanation for the double n of kinnus is remarkably unconvincing.

A far more convincing explanation assumes a post-resonant laryngeal causing gemination of the resonant. This is exactly the explanation advanced by Lehmann (1952:36-46) to account for the Germanic Verschärfung, that is, for the Germanic gemination of *w and *y after short vowels in certain words. Lehmann's account of the Verschärfung is now standard. Obvious correlates to the development of *ṼwH, *ṼyH to *Ṽww, *Ṽyy are *ṼrH, *ṼlH, *ṼmH, and *ṼnH to *Ṽrr, *Ṽll, *Ṽmm, and *Ṽnn, respectively. Numerous examples of just such developments have been adduced by Seebold (1966), Eichman (1973), and especially Lühr (1976). The examples are sufficiently numerous, and the historical process itself sufficiently natural, that we can accept the double n of kinnus as the unremarkable result of a regular Germanic sound change involving postvocalic resonants plus laryngeals.

The implications for the reconstruction of the word are significant. Since the
Germanic words are exactly cognate with the short u-stem nouns in the other languages, we must reconstruct a common inflected short-u noun for Indo-European. And since Germanic is hardly likely to have inserted a laryngeal randomly between root and stem, Gk. génus, Lat. genuīnus, etc. must descend from exactly the same root *ǵenHuś. Skt. hánu-, on the other hand, indicates a proto-form *ǵHenus. Since the laryngeal in the first syllable is nowhere indicated outside of Indic, the most reasonable explanation is that the Indo-Iranian forms reflects a simple shift of the laryngeal to the first syllable.

The laryngeal can also be demonstrated in forms of the root other than u-stems. The acute accent of Lith. žándas requires a laryngeal (Watkins 1965:117), while the /a/ quality of the vowel indicates an o-grade form of the root. Fraenkel (1962-65:1289) reconstructs *ǵonH-dh-. Gk. gnáthós, poetic form gnáthmós, meaning primarily 'jaw' but also 'cheek', look very similar to žándas. At first glance, the Greek words would seem to represent *ǵnA-dh-, with vocalization of the laryngeal, which is the analysis accepted by Winter (1965a:111), although this is a problem for him since he mistakenly believes that Tocharian and Armenian require us to reconstruct *E rather than *A for this root. A problem for us is that vocalization of the laryngeal in a root-shape such as *gnAdh- is unexpected. We would expect such a root to have a syllabic resonant followed by a consonantal laryngeal in Proto-Indo-European, which would yield Gk. *gnáthós, Attic Gk. *gnéthós; compare gnésios 'belonging to the race' < *ǵnEs-, connected with génos 'race' < *genE-. Yet we consistently find short /a/ in all dialects in gnáthós. For this reason, Beekes
(1969:190), expanding on Specht (1932:113 n.1), states that *gnathós* is a non-Indo-European word. In support of this conclusion, he mentions a large number of possibly non-Indo-European words in Greek that are only vaguely similar in form and hardly similar at all in meaning to *gnathós*, for example, *knóðon* ‘teeth on a hunting spear’, *knóðálon* ‘wild creature’, and even *knáptō* ‘to card (wool)’.

The fact is that *gnathós* means exactly ‘jaw, cheek’, and that it is far more similar in form and meaning to *génus* than to the other words that Beekes mentions. The only exception is a Hesychian gloss, *kánadoi* ‘cheeks, jaws’. *Kánadoi* does indeed appear to be related to *gnathós*; it may be a Macedonian form despite the voiceless initial. But we can hardly attach much importance to a Hesychian word of uncertain provenance, as compared to the well-attested *gnathós*. In any case, to connect *kánadoi* to *knóðon*, etc., is no more semantically reasonable than to connect *gnathós* to the same words.

We should also reiterate the similarity of Greek *gnathós* to Lith. *žąndas*, a similarity which Beekes dismisses in favor of his far more dubious intra-Greek cognates for *gnathós*. In fact, *gnathós* and *žąndas* are obvious cognates. If *gnathós* ‘jaw’ is semantically close enough to *knóðon* that they must be related, then presumably *žąndas* is also related to *knóðon*. Thus, if *gnathós* is non-IE, then *žąndas* (and its Latvian cognate *zuōds* ‘chin, jaw’) must be non-IE as well. This conclusion is especially to be rejected insofar as the Baltic words are the only reflexes of *ǵenH*- ‘jaw, cheek, chin’ in those languages, while their development from a presumed *ǵonHdh*- is quite regular. Lastly, we cannot forget that words for body parts are
rather basic vocabulary items, not the most likely candidates for borrowing, so that both Gk. *gnathós* and Lith. *žūdas* are far more likely to be inherited words than not. In short, we cannot agree with Beekes' rejection of the Indo-European ancestry of *gnathós* despite the seemingly divergent development of the sequence *CRHC*.

In any case, the development of *CRHC* in Greek is not so clear cut as Beekes (1969) states. Beekes (1988b:74) grants that in anlaut, that is, in the sequence *#RHC*, the laryngeal rather than the resonant was vocalized, as in *mákros* 'long' < *mAkros* compared to *mêkos* 'length' < *meAkos*; this is a reversal of his earlier position on such sequences (see Beekes 1969:183). Moreover, if we accept the Indo-European origin of *glôssa* 'tongue', Ionic *glássa*, as Beekes does (1969:246), then we seem to have an ablaut pattern *CRoAC* > *CRðC*, *CRAC* > *CRaC*. This is of course unacceptable to Beekes, so that he is required to posit a PIE ablaut between *-lô- and *-l-/*-lô- for this root and several others whose Greek reflexes show the same pattern. Yet perhaps the most significant contribution of the laryngeal theory to Indo-European linguistics is that it allows us to reduce the number of ablaut series reconstructed for the proto-language. For example, the /ɔ/-/a/ patterning of Gk. *phônê* 'voice' vs. *phasis* 'utterance' is now understood as simply a regular distinction between o-grade and zero-grade, that is, *bhoA*- vs. *bhA*. The exact same patterning is reflected in *glôssa* vs. *glássa*. If acceptance of such an obvious conclusion requires us to admit that *CRHC* does not always give *CRVC* in Greek, surely this admission is preferable to re-establishment of a PIE *ð* - *∅* ablaut pattern.
*Gnathós*, then, is an Indo-European word descended from a *dh*-suffixed zero-grade form of the root * génA*-. In form it is exactly parallel to Lith. *žandás*, except that the latter reflects o-grade rather than zero-grade in the first syllable. In the Greek word, we finally have a certain indication of the laryngeal color in PIE, and as expected based on the roots previously considered, it is *A*.

Lat. *gena* ‘cheek’, usually attested in the plural, is typically regarded as an analogical formation from pre-Latin *genus*, with influence from *māla* ‘cheek-bone, jaw-bone’ as well as the functional desire to distinguish ‘cheek’ from *genū* ‘knee’. It is true the the u-stem * génAus* is reflected in Latin in the derivative adjective *genuīnus (dēns)* ‘molar’, but while it is still possible that *gena* is an analogical formation, it is no longer necessary to assume that it is. The common core that we have reconstructed thus far is * génA*-, with later suffixes *-u* and *-dh* accounting for various developments. *Gena* could well be the unsuffixed reflex of what would appear to be an original feminine ā-stem.

However, we have not yet finished with the various Greek words. *Géneion* ‘chin’, a word with many derivatives in Greek, is somewhat troubling since it shows no sign of a-vocalism in the second syllable. That is, it looks like a regular development from * génew-yon*, with a full-grade vowel in the second syllable followed by the suffix *-yo*-. From * génAewylon*, on the other hand, we would expect the unattested * génaión*. However, *géneion* and its derivatives, unlike * génus* and *gnathós*, have no formal cognates outside of Greek. We are therefore safe in seeing them as purely Greek formations, with /e/ in the second syllable by analogy with the usual
development of u-stems with the -yo- suffix (Buck and Peterson 1945:47).

The surface resemblance between Arm. cnaître and gnathós is particularly strong, but Gk. th should correspond to Arm. d, not t. The Arm. sequence aw is also problematic, since it could theoretically derive from at least six different sources (Greppin 1978). But not all of these sources are likely in this particular root. In several cases Arm. /aw/ derives from PIE *aw, as in Arm. awćan ‘assistance’ < PIE *aug-. Most modern Indo-Europeanists, including Greppin, would regard the initial *a of *aug- as the reflex of a laryngeal. That is, the root is actually *Aweg-/*Awg-. *Aweg- is reflected in Gk. áēksó ‘to increase’, but awćan must reflect the zero-grade *Awg-. Awćan cannot descend from a different form *Aewg-, since word-initially, this would have given Arm. *hawc- (cf. haw ‘grandfather’ < PIE *Aew-, Greppin 1988:183-184). Thus we are certain that word-medial Arm. /aw/ can derive from either *Aw or *Aew. It follows that cnaître probably derives from PIE *gńAw- or *gńAew- with a dental suffix; in other words, it reflects *gęnAu- with zero-grade in the first syllable. It is therefore more closely connected with the Gk. u-stem génus than with gnathós, but as in gnathós, the a-vocalism of cnaître reflects original *A.

A final word which must be considered is Gk. génuks, a word recorded only by Hesychius, who glosses it as páleκus ‘axe’. The semantic connection between génus and genuks would seem shaky except that génus is attested with the meaning ‘(sharp edge of an) axe’ in as basic an author as Sophocles. Thus the semantic match is exact, leaving us little reason to doubt this particular Hesychian citation. Moreover, on the formal side, génus is twice found in Euripides with a long ü in the accusative
singular *gēnuA- corresponding to *genAu-.

This further change of position on the part of the laryngeal may be disturbing to some readers. Thus far, we have posited a basic root *gēna-, with two basic suffixed forms *g(o)nAdh- and *genAu-. Based on the second of these, we have also posited *gAenu- to account for Skt. hānu- and *genuA- to account for Gk. gēnuks/gēnūn. The vast majority of the forms require no laryngeal movement, while those that do require movement seem to have started from *gēnaU-, where the laryngeal occurs in the sequence -RHR-.

To account for the mobility of the laryngeal, we might, following Winter (1965a:110, 1965c:191-193), turn to a theory of laryngeal metathesis which explains a certain variation in the attested forms of the word ‘fire’ in Tocharian and elsewhere. Briefly, Toch B pāwar, along with such cognates as Gk. pār, can only derive from PIE *puAr. But Toch A por, along with Hitt. pahhrur et al., must be from *peAur. Winter theorizes that in the zero-grade, a *CHR- form like *pAur could be metathesized to *CRH-. Lindeman (1987:65-67), in a critical discussion of this hypothesis, notes that it leaves the short /u/ of forms such as the Greek genitive singular purōs unexplained. Lindeman cites a suggestion of Kuryłowicz’s that purōs
could derive from *pAurós, that is, the non-metathesized zero-grade. If this is correct, then it would indicate that the metathesis posited by Winter would be irregular, sporadic, even within a single branch of Indo-European, as is also indicated by the divergent reflexes in the two Tocharian languages. This irregularity is not a problem, since we are not surprised to find metathesis operating sporadically.

Winter's theory of laryngeal metathesis has neither been generally accepted nor generally rejected in the field. Beekes (1984:7) uses it in explaining Skt. stāra-, Av. hārō (gen.) 'sun' < *suAl- as opposed to the non-metathesized *seAul-/*sAul-attested elsewhere, including within Indo-Iranian (e.g. Skt. svār- 'sun'). But he comments parenthetically, 'I will not discuss the metathesis, which may have been different in the different languages, and which requires a broad investigation'. Similarly, Lindeman (1987:65) heads up his discussion of the theory by noting that 'the material which has led to the assumption of a "laryngeal" metathesis in Indo-European is not very clear and offers many phonologic and morphologic difficulties'.

In the light of these objections, we cannot state incontrovertibly that laryngeal metathesis as reconstructed in detail by Winter is responsible for the laryngeal movement posited above for *gēnA-. Nevertheless, it remains the most reasonable hypothesis. Winter himself applies it to this very root, stating that Skt. hānu- < *gHenu- reflects not the original full-grade form of the root, but a full-grade based entirely on the zero-grade *gnaA- (1965a:110). *gHenu- would have been created by analogy with a set such as *peAur-/*pAcwr-/*puAr-. Winter assumes that the change of *CHR- to *CRH- was a regular one, which in fact seems unlikely, given
the variation attested within languages. But the analogy he posits would still be entirely possible, and is probably the correct explanation here.

As for the metathesis evidenced by Gk. génus/ğenun, it, too, can be explained by Winter's theory. The sequence *-nAus/*-nAum, like *gnA-, is a sequence of *CHR-, and it meets Winter's further conditions (1965c:192) that no vowel immediately precede the laryngeal, that the laryngeal not be in initial position, and that the resonant be followed by a consonant. Thus the shift from *genAus/-m to *genuAs/-m requires no new theoretical apparatus.

A final note on Gk. génus is required before turning to the conclusions which can be drawn from this root. There is good evidence, such as that from thugáter 'daughter', that interconsonantal laryngeals were vocalized in Greek. But in solid examples such as this one, usually at least one, and most often both of the surrounding consonants are obstruents (Beekes 1988b:72). In apparent exceptions such as tolmáq 'dare' < *tolA-m, the laryngeal is most frequently between two resonants. Lindeman (1987:104) points out that in PIE, the resonants *r *l *m *n *i *u were all inherently more sonorous than the laryngeals. Therefore, in a sequence *-VRHR-, we would not expect vocalization of the less sonorous element *H. This observation provides a cogent phonological explanation for the development of words such as tolmáq, which Beekes is unable to account for. The development of *genAus to Gk. génus, with ultimate loss rather than vocalization of the laryngeal, is therefore both regular and phonetically natural.

We turn now to the conclusions to be drawn from the 'jaw, chin, cheek' root.
First of all, there is evidence from Germanic, Greek, Baltic, Italic, and perhaps Armenian that the original form of this root was *ǵenA- and that the laryngeal was maintained in the u-stem *ǵenAu-. Since we have already found evidence that PIE *ǵA > Skt. /h/, the most reasonable explanation for Skt. hānu- is that the laryngeal has been transferred to the first syllable, probably via the mechanism outlined above. The only other ways of accounting for hānu- are as follows. (1) Reconstruct PIE *ǵEenAu-. This is a most unlikely looking root. Moreover, it requires what there is no other evidence for, namely a shift of *ǵE to Skt. /h/. A form *gAenAu- is of course impossible because the non-Indic words do not have a-vocalism. (2) Attribute the Sanskrit aspiration to borrowing from an unknown dialect, or suggest a desire to differentiate ‘jaw’ from ‘knee’, or suggest analogy based on an unknown source, or, most honestly, call the aspiration ‘unexplained’. If, indeed, there were no other signs of a laryngeal in this root, calling the aspiration unexplained probably would be the wisest course. But in the face of abundant evidence for the a-coloring laryngeal in the root, the explanation given here for hānu- is superior to both of the alternatives.

This explanation is particularly important in that hānu- has hitherto been a problem for the theory that *ǵA/*gA give Skt. /h/. Mayrhofer (1986:139) is unable to account for the fact that, as he sees it, the other evidence indicates that *ǵA/*gA give /h/ but that this word plainly indicates *ǵE > /h/. As long as hānu- remained unexplained, it would remain a stumbling block for the theory that only the a-coloring laryngeal had this aspirating effect. Now the stumbling block is removed, and the general theory is much stronger.
A final, and important, conclusion is that this root does not demonstrate that a following laryngeal had an effect on *g and *g in Indo-Iranian alone. On the contrary, this root is irrelevant to the theory developed above (§3.2.3) that *gA/*gA yielded *k/*k in Balto-Slavic and Armenian, since the ‘jaw’ reflexes in those languages do not descend from forms with *A adjacent to *g. The same is true for the other languages. As for other roots, we have concluded that Greek vocalized *A in the sequence *gAt in thugéter; but as previously stated, Goth. daúhtar could represent a pre-Gmc. *dhughtér as easily as *dhugtér. In the words meaning ‘I’, the /z/ of OCS azú could represent either pre-Slavic *gh or *g < *gH, while the Greek, Latin, and Germanic reflexes all derive from *eg-oH, with the laryngeal not adjacent to the stop. Thus, we have not seen any evidence for the development of *gAV/*gAV except in Sanskrit. Av. zanu- and azem also presumably reflect *gAV/*gAV, but since Avestan merges voiced aspirates and non-aspirates prevocally it cannot provide evidence for a development of *gAV/*gAV to *ghV/*ghV. In the case of the root for ‘daughter’, on the other hand, we saw that the change of *gA to *gh had to be a development of the early common Indo-Iranian period at the latest, since it is reflected in both Sanskrit and Avestan and since it antedates the Indo-Iranian secondary palatalization before front vowels. The possibility therefore remains open that this shift, which has long been regarded as a purely Indo-Iranian phenomenon, could be reflected in other Indo-European languages as well, at least in some environments.

In fact, there is one slight indication from *génAus/*gAenus of *gA resulting in Gk. /kh/ , providing we accept that PIE ‘jaw’ and ‘knee’ are related. Without
listing all of the cognates, which can be found in the standard etymological dictionaries, suffice it to say that the ‘knee’ root has traditionally been reconstructed as *ǵenu-, with various reflexes indicating a normal alternation between e-grade, o-grade, and zero-grade for the first syllable. Semantically, the relation between ‘jaw’ and ‘knee’ is the same as that found between ModE ankle and Gk. ankūlē ‘bend of the arm, wrist; bend of the knee’, both of which descend from a root *ang-/*ank-. Semantically as well as formally, then, the resemblance between PIE ‘jaw’ and PIE ‘knee’ is quite strong. As a result, qualified acceptance of the connection (e.g., Buck 1949:22) is more prevalent than qualified rejection (Frisk 1939:1.321).

The conclusion that ‘knee’ is connected with ‘jaw’ will be more secure if we can demonstrate that ‘knee’ should be reconstructed as *ǵenAu- rather than simply *ǵenu-. We begin with Lat. genua, where the long ā might be taken to reflect earlier an *uA resulting from laryngeal metathesis. However, according to the ancient grammarians, long ā was the usual ending for all neuter fourth declension nouns in Latin. Buck (1933:199) and Leumann (1977:441) doubt that the ancient grammarians were correct in this regard, hypothesizing that they extrapolated incorrectly from a few definite cases in verse where the meter assures us that the ā was indeed long. Leumann states that there was a phonological, metrical cause for the lengthening in these cases; Buck, on the other hand, prefers to regard these examples as old duals or collective plurals. The latter would have been originally *ǵenu-H, so if Buck is right, then even if the long ā of genua does indicate an earlier sequence *-uH, still it does not necessarily demonstrate a laryngeal in the root.
Since there are so few neuter fourth declension nouns in Latin (Leumann [1977:355] lists a total of five), and since it is hard to determine the origin of the long \( \textit{a} \) of the nominative singular which may not even be the regular ending, plainly \( \textit{gena} \) cannot be taken as proof that PIE 'knee' must be reconstructed with a laryngeal. In Greek, however, there is somewhat better evidence. The basic Greek word for 'knee' is \( \textit{gonu} \); two related words of interest are \( \textit{gnuks} \) and \( \textit{prokhnu} \), both meaning 'on the knees, kneeling'. \( \textit{Prokhnu} \) also occurs with the meaning 'completely', but this is obviously a metaphorical extension (Chantraine 1968-80:233). \( \textit{Gnuks} \) is usually regarded as analogous to adverbs with regular /ks/, such as \( \textit{puxs} \) 'with the fist' < *pug-s (Schwyzer 1959:620, Frisk 1973:1.317). But if Greek had formed such an analogous adverb from \( \textit{gonu} \), surely it would have been *\( \textit{gonus} \) rather than \( \textit{gnuks} \). It is more likely that \( \textit{gnuks} \) derives directly from earlier *\( \textit{gnaA-s} \), a form with laryngeal metathesis in the zero-grade.

Laryngeal metathesis could also have given *\( \textit{gAnu} \)-. Word-initially, the sequence *\( \textit{gAnu} \)- would presumably have yielded Gk. *\( \textit{gano} \)-, but in \( \textit{prokhnu} \) the sequence occurs postvocally. Moreover, it was probably postvocalic already in PIE, since Homeric \( \textit{prokhnu} \) seems to have exact formal cognates in Skt. \( \textit{prajnu} \)-, Av. \( \textit{fra\'nu} \)-, words whose exact meanings are unclear but which certainly have something to do with the bended knee (Frisk 1973:2.605, Lehmann 1986a:220, Monier-Williams 1899:659). Thus, here we seem to be dealing with PIE *\( \textit{pro\'gAnu} \)-, with a metathesized variant *\( \textit{pro\'gAnu} \)- yielding Gk. \( \textit{prokhnu} \).

If we do not accept *\( \textit{pro\'gAnu} \)- as the origin of \( \textit{prokhnu} \)-, then the aspirated
/kh/ becomes extremely difficult to explain. Chantraine (1968-80:233) mentions a suggestion that it is 'expressive', not a very illuminating proposal. Schwytzer (1959:328) lists other hypotheses, none of which seems to have gained acceptance. But my own explanation remains highly questionable without further support, first in the form of other signs of a laryngeal in the root, second in the form of other examples of a Greek development of voiced non-aspirates to aspirates. The second type of evidence can be found in Chapter 4 of this thesis. As for the first type, Gk. gönta 'corner, angle' has typically been seen as akin to gönu (Liddell and Scott 1968:364, Chantraine 1968-80:233), but as Frisk (1973:1.337) points out, from pre-Gk. *gonwía we would expect Attic *gonta, Ionic *gounta. However, the attested long ō is explained if we assume *gonAwía > *goAnwía. Similarly, the long u of Gk. ignúa/ignúτ ‘part of the leg behind the knee and thigh’ could be explained by a metathesis of *-nAu- to *-nuA-, if this word is descended from *en-gAnu- (cf. Frisk 1973:1.708).

The long /ā/ of Skt. jānu- 'knee' is normally attributed to the action of Brugmann's Law; that is, *gonu- > *jōnu- > jānu-. Jānu- could not derive from *gonAu-, since Sanskrit did not lengthen short *o before two consonants. But it could derive from *goAnu- as easily as from *gonu-, so that the Sanskrit reflex does not preclude the reconstruction of a laryngeal in the root. Tucker (1931:109) cites Arm. cunr 'knee' as definitely reflecting *ō, but in fact Arm. u can also derive from *o before nasal plus consonant (Brugmann 1888:70), so that cunr does not necessarily derive from *goAnu-. As for the /k/ which appears in some of the declined forms of
cunr as well as in MidPers. zanûk ‘knee’, I have too little expertise in these languages to comment on whether they might possibly represent a hardened laryngeal.

Further discussion of IE ‘knee’ words is unnecessary here; the interested reader may refer to Pokorny (1959:380-381), as well as to the sources cited above. Our main interest is in establishing the possibility that *gA/*gA may give /kh/ in Greek. Prōkhnu is one piece of evidence in favor of such a conclusion, and while there are not too many other indications that this root should be reconstructed with the laryngeal *A, there seems to be no counterevidence demanding a non-laryngeal reconstruction. Tentatively, therefore, we can assume for ‘knee’ a root *gelAu-, seemingly identical in the proto-language to *gelAu- ‘jaw’, and subject to the same laryngeal metathesis that is evidenced by the attested words meaning ‘jaw, etc.’ But the postulated development *gA/gA > Gk. /kh/ requires more examples before we can place too much confidence in its validity.

§3.2.5. *gHestos ‘hand, arm’

a. Skt. hást-, possibly Lat. praestō

b. Gk. agóstos ‘palm of the hand’

c. Av. zastō, possibly Lith. pažastis ‘armpit’, OCS grīštū ‘handful’

This root does not appear in Kuryłowicz’s list of examples of *gH yielding Skt. /h/ (1935:53). It was added by Sturtevant (1942:86), who picked up on Saussure’s (1879:53.1) comparison of Gk. agóstos with Skt. hásta- and its Iranian cognates.
Sturtevant reconstructs *AgO(e)stos, in keeping with his theory that it was *O rather than *A which caused aspiration of *g/*g. Hammerich (1969:203), on the other hand, notes the similarity of the pattern of *agostos vs. Skt. hást- to that of Gk. agathós 'good' vs. Gmc. *gōða-. Here he follows Vey (1955:94-95) in reviving the hypothesis that agathós and *gōða- are related, an obvious hypothesis, but by no means an obviously correct one. Other Greek forms meaning 'good' are Hesychius' akathón and khásios, while Laconian khā̄tis is found in Aristophanes, khā̄tis in Theocritus. The loss of intervocalic [s] from earlier [ty] is regular for Laconian (Buck 1955:55), so that khā̄sios, unlike akathón, is not attested solely by Hesychius. Akathón, in fact, is of little use for reconstructing the original form of the word, since it could easily stem from a dialect with regular devoicing (Müller 1977:134).

Thus we are faced in the word for 'good' with an apparent intra-Greek variation between between /ag/ and /gh/. This suggests a variation between *AgAdh- and *gAeAdh-, the first of which would underly agathós, the second khásios, etc., as well as Gmc. *gōða. If this hypothesis is correct, then it provides evidence for (1) word-initial metathesis involving *gA/*Ag, and (2) a development of *gA to *gh common to both Greek and Germanic. But other interpretations of the evidence have been offered (Beekes 1969:49, Müller 1977:134), and the hypothesis advanced above is closer to a suggestion than a definitive proposal. I suggest the hypothesis here mainly because the same ideas may be applicable to agostós, etc., to which we now return.

Beekes (1969:50) mentions the postulated connection between agostós and
hāsta- but comments, ‘The explanation of the h- of Sanskrit by metathesis of the laryngeal, *h₂g- > *gh₂, is an arbitrary one’. This assessment is essentially correct, but the explanation becomes less arbitrary, that is, less ad hoc, if we can find other evidence for it beyond that offered by agostós and hāsta- themselves. The discussion of agathós, etc., has provided one fairly tenuous piece of evidence in the form of a possible parallel phonological development. Any other evidence which we discover may also be tenuous, but a collection of tenuous pieces of evidence still has some validity for reducing the arbitrariness of an explanation.

Sturtevant mentions only the Greek and Indo-Iranian forms which appear to be cognate. Several additional possible cognates have been suggested, including Lat. praestō ‘present, at hand’ < *pra-e-hestōd, Lith. pažastis ‘armpit’ < *pa-žastis, OCS grīstā ‘handful’. Of these, only Lat. praestō would give any information as to aspiration of the voiced velar stop. But the derivation of praestō from *pra-e-hestōd is far from certain; Ernout and Meillet (1951:942-943) call it ‘ingénieuse’ and ‘séduisante’, but conclude for praestō that ‘aucune explication ne s’impose’.

Lith. pažastis ‘armpit’ at first looks more certain as a cognate, pa- being a prefix meaning ‘under’ commonly used in noun formation; cf. pasąulis ‘(place under the sun, i.e.) world’ and palóvē ‘place under the bed’ (Endzelins 1971:275). But Czech paže, Russ. pacha ‘armpit’, cited in Buck (1949:237) as derived from a proto-form *pāg-, cast some doubt on the matter. Pažastis could be the same word with a suffixal or analogical -st-, a cluster common to such Indo-European hand-related words as Skt. gābhati- ‘fork, arm, hand’, Gk. palastē ‘palm’, and OHG fust ‘fist’.
Fraenkel (1962-65:560) is noncommittal about the etymology of *pažastis*, while Frisk (1973:1.14) does not even mention it in connection with *agostós*. We can say that if *agostós* and *pažastis* are related, and if the laryngeal reconstruction posited for *agostós* is correct, then Lith. -*zastis* would appear to stem from *Ağost-* rather than *gAost-*, if it is correct that PIE *gA > *k > /s/ prevocally in Lithuanian. However, there are a great many if’s in the previous sentence, which should serve as some indication of how tentative any conclusions about *pažastis* must be.

OCS grīstā brings up another complication associated with *agostós* and *hāsta-*, a complication which I have hitherto left unmentioned. The /r/ of grīstā is unparalleled in any of the possible cognates which we have considered thus far. However, there are a number of words meaning ‘hand’ in IE languages which reflect an original *għ...r- pattern. These include Gk. kheîr, Arm. je.setAutoComplete(0,1);, Alb. dorë, and perhaps Lat. hīrīr, though the last may not be an authentic Latin word (see Ernout and Meillet 1951:526). In the earlier part of this century (e.g., Boisacq 1916:1054), these words were all compared with Skt. hāras- ‘grasp’ and presumed to derive from the root *għer- ‘grasp’ with an s-extension. But the more recently deciphered Toch A tsar, B šar, and Hitt. kīššar, all meaning ‘hand’, indicate a proto-form *għesr- (with ablaut variation in the second syllable), a form which could also underly Gk. kheîr, etc. (Duchesne-Guillemin 1938, Pedersen 1941:236-237).

Under this analysis, which has become the standard one (Buck 1949:238-239), the various reflexes of *ghesto- can now be connected with those of *għesr- by postulating a simple original root *għes- with different suffixes, or by assuming that
the *-st- of * gàhestos was originally analogical, as was also suggested above for Lith. *pažastis (Duchesne-Guillemin 1938:219). The same explanation has been used to account for the -st- of gríštē; i.e., it is seen as * gàher- plus *-st-. Likewise, agostós has been seen as connected with the verb agetró ‘collect’ (Solmsen 1909:2). If Solmsen’s analysis is correct, then the postulated relationship of agostós to hásta- would be erroneous. And since that postulated relationship was the only reason for supposing that the /h/ of hásta- reflects an earlier * gàA, we could therefore throw out this example of Sturtevant’s and reconstruct for hásta- a proto-form * gàhes-to-. Hásta- would be cognate only with Gk. kher < * gàhes-r-, not with Gk. agostós.

Arm. jern furnishes further evidence against a laryngeal reconstruction. Like Lith. -ätzlichs, jern cannot derive from * gàAes-, not simply because we have hypothesized that prevocalic * gàA should give Arm. /s/, but also because the vowel of jern is not a-colored. Nor can jern reflect a hypothetical metathesized variant previously proposed as underlying agostós, since Armenian, no less than Greek, would have vocalized a word-initial preconsonantal *A as the prothetic vowel /a/.

To summarize, the most reasonable interpretation of the evidence seems to be as follows. (1) There was a PIE root * gàhesr- or * gàhesr-, with a related or variant form * gàhes-to-, which is reflected in Skt. hásta-, Av. zasti, Gk. kher, Arm. jern, Hitt. kisser, Toch A tsar, B sar, and possibly Lat. praesē and hīrīr and Lith. pažastis. (2) Skt. haras-, Gk. agostós, and OCS gríštē are not descended from the same root despite surface similarities of appearance. (3) The /h/ of Skt. hásta- does not reflect an earlier * gàA- sequence.
While this interpretation seems to be the most reasonable one available, it remains vaguely dissatisfying. Among other things, it requires us to reject the semantically and formally appealing connection between *ǵher- ‘grasp’ and words for hand. At the same time, certain forms such as the Doric Gk. nom. sg. khers attested in Timocreon seem to favor the old hypothesis of descent from *ǵhers-. Thus Pokorny (1959:447), without definitely endorsing the idea, notes that Hitt. kiššar and Toch A tsar, B šar could reflect metathesis from an original root form *ǵher-s-, so that ultimately all or most of the words mentioned above would be related to *ǵher-.

If there is any validity to the Nostratic hypothesis, then Altaic, in particular, would support the reconstruction of *ǵher-, since a root *gär(a) ‘hand, arm’ is certainly reflected in Altaic languages. On the other hand, Bomhard and Kerns (1992:2.190-192) reconstruct both Proto-Nostratic *gasỳ-/*g sỳ- ‘to touch, to feel, to handle’ and *gar-/*g r- ‘to take, to take hold of; to take away, to carry off, to remove’. They derive most of the IE ‘hand’ words mentioned above from the former, but kheṯr, jeṯn, and Altaic *gär(a) from the latter. However, *gasỳ- is supported only by IE ‘hand’ words and Semitic words for ‘to touch, to feel, to handle’. If we do treat PIE *ǵhesr- as a metathesized version of *ǵher-s-, then all the ‘hand’ roots would belong to the single Proto-Nostratic etymon *gar-/*g r-, while we would not need to assume that Semitic *gasỳ- was of Nostratic origin at all.

This analysis would reopen the possibility that agóstós and grĩštā are related to the other ‘hand’ roots after all. Grĩštā we need not consider further here, since whatever its origin, it can shed no light on the question of whether a laryngeal was
involved in the consonantal onset. For *agostós*, on the other hand, much depends on what we make of Solmsen’s aforementioned proposal relating *agostós* to *agērō* ‘collect’. *Agērō* itself is a word of uncertain origin, beyond the obvious fact that its immediate ancestor was *agher-*. One obvious possibility is a reconstruction of PIE ‘grasp’ not as *agher-*, but as *Ager-/*ghAer-. The pair *agērō / Skt. hārati* ‘grasp’ would then be phonologically parallel to *agostós / hásta-. We would then have further evidence for the development postulated under the discussion of PIE ‘jaw’, namely *ghA > Gk. /kh/ in certain environments. However, there are several other possible etymologies for *agērō* (see Chantraine 1968-80:9 for details), none of which require a resort to laryngeal metathesis. Explanation in terms of laryngeal metathesis, while certainly possible, frankly does not seem to be the best solution.

Reviewing all of the evidence, what we have arrived at is a terrible muddle. There is a great deal of conflicting or ambiguous evidence, and it seems unlikely that there will ever be a single entirely convincing explanation for all of it. Despite the difficulties outlined above, the claim that *agostós* and *hásta-* are not cognate still seems to be the best supported conclusion. Even if they are cognate, the relation is not so obvious that we can use them as evidence for the shift of PIE *ghH-* to Skt. /h/, or of any related shifts involving laryngeals for which I am arguing. In short, Sturtevant’s addition of *agostós/hásta-* to Kuryłowicz’s original list was ill-advised.

§3.2.6. *meǵH-* ‘great, big’

a. Skt. mahā(nt)-, máhi, etc.
b. Gk. megá(lo)-, méga, Arm. mec, Goth. mikils

c. Av. maza(nt)-, Lat. magnus, OIr. mochtae, Toch A māk, B māka

‘many, much’, Hitt. mekkiiš ‘much’, Alb. madh

For this root, the nominative/accusative singular neuter forms of Sanskrit and Greek, māhi and méga respectively, are the best evidence in favor of a reconstruction *meğA-. The Sanskrit form could have an additional suffix -i (Mayrhofer 1956-80:2.610). It is more likely that the two forms are exact cognates, with both the aspiration and the /i/ of māhi being attributable to the a-coloring laryngeal, just as with Skt. duhitār- < *dhugAṭer- (Mayrhofer 1986:138-139). The latter analysis is supported by the occurrence in the Vedas and Homer respectively of the phrases māhi šrāvas and méga kléos, both meaning ‘great fame’, which are probably inherited collocations on the order of Dyāus pīdā and Zeûs patér. Māhi and méga in this collocation are presumably descended from exactly the same root-form, and since méga has no i-suffix, presumably māhi does not either.

However, it is not essential for the consonant variation that we see the /i/ of māhi as a vocalized laryngeal. Burrow, for example, regards the /i/ as suffixal in origin but nevertheless agrees that the /h/ derives from *gA (1955:228). Indeed, there appears to be a consensus of opinion definitely favoring at least a reconstruction of *meğH- (Hoenigswald 1965:95, Winter 1965a:111, Beekes 1969:153-154, Lehmann 1986a:254-255). However, certain difficulties remain, including uncertainty or disagreement over which laryngeal is involved.
If we accept that vocalized laryngeals show up in Greek as /e/, /a/, and /o/, respectively, then the consistent /a/ of mégas, megále, méga surely requires us to reconstruct *A. This *A is generally regarded as suffixal in origin in keeping with Pedersen's reconstruction of the paradigm for this root (1926:47). Winter (1965a:111) proposes that we reconstruct *megE-A and attribute the aspiration evidenced by Sanskrit to the e-coloring rather than the a-coloring laryngeal. In support of this proposal, he adduces Gk. mégethós 'greatness', which he explains as descending from *megE- without the suffix *-A. The standard explanation (Schwyzer 1959:255) for the medial /e/ of mégethós is that it simply results from assimilation to the accented /e/ of the first syllable. Mégathos, which would be the expected form of the word without assimilation, is in fact the standard Ionic form. Winter explains the /a/ of megathos as due to analogy with méga, etc., which is plausible enough if mégethós really was the original form. But the standard explanation, which takes mégathos as original and mégethós as an innovation, is every bit as plausible. Since (1) the reconstruction *meg*A- explains mégethós just as well as the reconstruction *megE-A-, (2) the former reconstruction is supported by other examples of *gA > Skt. /h/, and (3) there is no evidence beyond mégethós that suggests the latter reconstruction, the former reconstruction is plainly preferable.

The a-coloring laryngeal is therefore strongly indicated by the neuter nom./acc. sg. in Sanskrit and Greek. We must now determine whether there is any other evidence, in these and other languages, for or against the reconstruction *meg-A-. Much of this evidence has already been presented, but here we will consider
especially the implications for the theory that *gA > *gh in Greek and Germanic as well as in Indo-Iranian.

We begin with Indic, largely following Mayrhofer's exposition (1956-80:2.609-611). Two basic forms of the root occur, mahā- and mahā-; the -nt- termination of Classical Sanskrit, though found in both Indic and Iranian, is more often absent than present in the Rig Veda and is plainly a late development. The divergence between mahā- and mahā- indicates an earlier paradigmatic interchange, as outlined by Pedersen (1926:47), between forms with the full-grade laryngeal suffix and forms with the zero-grade; e.g., masc. acc. sg. *meg-éA-m vs. gen. sg. *meg-A-ós. In the Rig Veda, we find acc. sg. mahāṁ and gen. sg. mahās. The expected accusative form, of course, would have been *majām, but the attested /h/ of the accusative is easily explained as the result of paradigmatic levelling.

Mayrhofer further suggests that Av. mazibīṣ ‘with force’ may represent the original instrumental plural *meg-A-bhis, with vocalization of the laryngeal interconsonantally. This hypothesis at first seems superior to that of Beekes (1988a:51), who regards the medial /i/ of mazibīṣ as an epenthetic, non-phonemic vowel which has been assimilated in quality to the /i/ of the final syllable. But accepting Mayrhofer’s analysis presents a problem in that, in the previous discussion of the ‘daughter’ root (§3.2.1), I accepted Beekes’ hypothesis that interconsonantal *A was only vocalized in Iranian when it preceded two consonants. This explained such forms as Av. nom. sg. duγḍa < *dhughtēr < *dhugAtēr. If that analysis was correct, then the laryngeal should not have vocalized in *megAbhis either.
A nearly exact parallel to *megAbhis is *pintAbhis ‘path’ (inst. pl.), which gives Av. pabdīś as opposed to Skt. pathībhis. Obviously, only one of mazibiś and pabdīś can reflect the regular development of the sequence *-CAbhi- in Avestan; the other must have either gained or lost its /i/ by analogy. Based on Beekes’ other examples of *A being lost in word-medial sequences of *-CACV- in Avestan (1988a:85-86), on balance it seems most likely that mazibiś is the irregular form. As a source of pressure for the insertion of /i/, we can invoke analogy from the (unattested) dative plural, where *mazibyō would have been the regular Avestan development of PIIr. *megAbhyas.

All of the Indo-Iranian words considered so far reflect the suffixed root *meg-(e)A; we might wonder whether a non-suffixed *meg- appears anywhere in this branch. Skt. majmān-, normally translated as ‘greatness’ (Monier-Williams 1899:773), appears to be such a word and is accepted as such by Pokorny (1959:708). But Mayrhofer (1956-80:2.550-551) questions whether the usual gloss is correct and remains unconvinced of the connection with *megA-. Since the point is not essential, I will not discuss it further here.

For Greek, the first question is whether we can regard the /l/ which shows up in the stem megal- as cognate with the Gmc. /l/ found in Goth. mikils (see Frisk 1973:2.189-90, Lehmann 1986a:254-255). Appealing though this idea is, the difference between the second-syllable /i/ of mikils and the /a/ of megal- makes it unlikely. Gmc. /l/ can hardly be the reflex of PIE *A, and since the root is attested as an i-stem in Hittite, it is easiest to simply regard mikils as an i-stem to which a
suffixed /l/ was later attached. Since megal- is not an i-stem, the l-suffixation to which it attests must have been independent.

The stem to which the derivational l-suffix was attached in Greek was plainly mega-, which remained unsuffixed in the masc. nom. and acc. sg. forms mégas and mégan as well as in neuter mégα, the last of which has already been discussed. The short /a/ of the masculine forms is somewhat unusual, if we assume proto-forms *mēgēAs and *mēgēAm; the former should have given *megaks, the latter *mēgān (cf. Ved. mahām). Beekes (1985:15-18) argues convincingly against the usual explanation of this unusual short /a/ as due to analogy with the neuter, and suggests instead that the original nominative was *mēgAs and that the accusative takes its short vowel from the nominative. However, the vowel length of the accusative is retained in the the adverb āgān ‘very much’ < *mēgēAm (Meier-Brügger 1979). Thus, along with the development *CA# > Ca# attested by neut. mégα, there is evidence from this root for the previously noted Greek developments *CAC > CaC and *CeAm to Cān.

Goth. mikils and its Gmc. cognates at first could seem to demonstrate that *A had no aspirating effect on *g in pre-Germanic, even in the sequence *gAV. But in fact, there is no real evidence that mikils, etc., descend from a laryngeal-suffixed base. More likely, they simply reflect *mēg-i-, an i-suffixed form of the same fundamental root.

Since both Germanic and Hittite have i-stems for this word, it makes sense to trace them back to a single common base. It has been supposed (Pedersen 1938:36,
Winter 1965a:113, Melchert 1984:88) that the orthographic double $k$ of Hitt. *mekkiš represents a long consonant resultant from a /gH/ cluster; i.e., that we must reconstruct *meği as the ancestor of the Hittite form. In support of this theory, Winter cites Hitt. *ukka 'and I', attributing the consonant length to the *gH attested by Skt. *ahäm. But in *ukka the long consonant is due to the suffix -(y)a 'and' (Held et al. 1987:87), while no doubling is found in Hitt. *uga 'I however', with the adversative suffix -a (Lindeman 1987:93). This leaves *mekkiš standing alone. Given the vagaries of Hittite orthography, a reconstruction *meği- seems just as likely here as *meği-.

Arm. *meći, on the other hand, declines as an a-stem (Mann 1968:76) and so must go back to a base with the laryngeal suffix. It therefore presents a significant challenge to the tentative hypothesis that *gA goes to pre-Arm. *k, Arm. /s/. Since there were certainly proto-forms like the masc. acc. sg. *megēAm in which the laryngeal was not adjacent to the *g, we could regard the /c/ of *mec as the regular reflex of such forms extended throughout the paradigm by analogy. But the evidence in favor of the change of *gA to *k is hardly stronger than that presented by *mec against such a change. Above we noted two seeming examples of this development, dus Türk. < *dhugAtēr (§3.2.1) and es Türk. < *egAom (§3.2.3), rejecting asem 'speak' (§3.2.2) as too uncertain to be used as evidence. However, dus Türk. is problematic not just because other languages indicate a plain velar *g in *dhugAtēr, but also because we cannot rule out influence from Arm. *str 'son'. On balance, then, there is so little evidence one way or another that the pre-Armenian development *gA/*gA > *k/*k
can only be regarded as a possibility. At the moment, it would be too bold even to declare it probable or improbable, although future research may well clarify the situation. Likewise, there is only one example of the putative Baltic change of *gA > *k (Lith. as/eš, Latv. es, OPruss. as ‘I’). Although there are no counterexamples, a single case is not enough to demonstrate a sound law, particularly since the parallel Armenian examples are difficult of interpretation.

For Latin, the key reflex of *meg- is not magnus, where the /g/ before /n/ could derive from any one of *k, *g, or *ğ, but the comparative adverb magis ‘more’, where intervocalic /g/ must derive from voiced non-aspirate *ğ. But the /i/ of magis is not cognate with the /i/’s of Goth. mikils and Hitt. mëkkiš; rather, it simply reflects the zero-grade of the comparative (originally intensive) suffix -*yos, seen in the full grade in the neuter comparative adjective maius < *mag-yos (Sihler 1995:359). This comparative suffix was added directly to the root, rather than to a stem form. Therefore, neither the stem *meg-A- nor the stem *meg-i- underlies magis. For our purposes, this is important in that it means that we have no evidence from this root for the development of *gA in Latin.

The root vowel /a/ of magis is another problem. In magnus, the /a/ has been explained as reflecting schwa secundum, that is, the reduced grade of the root vowel (Pokorny 1959:708). But the comparative suffix -*yos/-is was regularly added to the full-grade form of the root (Sihler 1995:357), so we would expect Lat. *megis rather than magis. The /a/ of magis could be analogous to that of magnus, of course, but in fact the root-vowel /a/ is attested in Celtic and Albanian as well as in Latin: Gall.
Magio-rīx 'Great King (nom. prop.)', MIr. mag-, maige 'great', Alb. madh 'great'. The /o/ of OIr. mochtæ ‘great’ is to be linked with similar sporadic change in Old Irish of *a to /o/ between labial and palatal consonants (Thurneysen 1961:80); thus mochtæ does not provide evidence for an otherwise unattested o-grade of the root.

On the other hand, there is as much evidence for an original root-vowel *a as there is for *e. In seeking an explanation for this variation, we cannot ignore the PIE roots *meAḵ- ‘long, lean’, *mē-/mō- ‘great, magnificent’, and *menēg-/mēṅgh- ‘many’, all of which are formally and semantically similar to *meḡ- ‘big, great’. Two questions immediately arise: are any of these roots related at a pre-Indo-European level, and has there been any mutual influence among them in the development of the descendant languages? Regardless of the answer to the first question, the answer to the second question is probably yes. Given such similarities of form and meaning, some analogical influence is likely to have manifested itself in at least some of the descendant languages.

This existence of so many similar roots both simplifies and complicates the problem of explicating any single form in any one language. For example, it is easy to hypothesize that Lat. magis, Gall. Magio-, and Alb. madh should be traced back to a late PIE by-form of *meḡ- with root-vowel *a by analogy with *māḵ- (the late PIE form of *meAḵ-). However, this hypothesis can hardly be proven definitively. It therefore serves rather to complicate the question of how to account for the aberrant a-vocalism, by adding another competing hypothesis, than to simplify the question by providing a definitive answer.
As an example of the complications caused by bringing in these other roots, we can turn to Toch A māk, B māka 'many, much'. These have usually been taken as reflexes of *megan- (Pedersen 1926:49, Pokorny 1959:709). Indeed, Winter (1965a:111) cites the fact that Toch B māka is inflected as a plural as evidence that the *A attested by Gk. méga is indeed suffixal; i.e., that it was originally the collective suffix -(e)A. But Brock (1971:289-290) argues that the long /ā/ of the Tocharian words requires us to trace them back to *mgh- 'many', which in fact is also a better semantic fit.

I will not delve into these problems any further here. The main point is that they make it quite hard to adduce words such as Lat. magnus and magis as evidence for the treatment of *gA/*gA clusters, since it is far from certain that the consonantism in such items truly reflects an original *gA cluster. But the core comparison of Skt. neut. sg. máhi with Gk. neut. sg. méga is not affected by these complications. Here, the comparison is so exact, right down to the phrase máhi šrávas / méga kléos, that we can regard these words as definite evidence for the treatment of word-final *gA sequences in Indo-Iranian and Greek. For other branches of the family, unfortunately, the evidence furnished by *megan- does not lead to any certain conclusions.

§3.3. Summary

A careful examination of the evidence has shown that the change of *gH/*gH to *gh/*gH is well-supported for Indo-Iranian, and that the laryngeal involved was
definitely a-coloring. Moreover, it is by no means certain that the change was limited to Indo-Iranian, since there is some slight evidence for such a change in Gk. prókhnu and no evidence against it in prevocalic environment. The table below summarizes the developments in specific environments for which there is evidence in Indo-Iranian, Greek, and Germanic.

<table>
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<tr>
<th></th>
<th>Indo-Iranian</th>
<th>Greek</th>
<th>Germanic</th>
</tr>
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<tbody>
<tr>
<td>*gA#</td>
<td>*ghi#</td>
<td>*ga#</td>
<td>no evidence</td>
</tr>
<tr>
<td></td>
<td>(Skt. máhi)</td>
<td>(méga)</td>
<td></td>
</tr>
<tr>
<td>*gAC</td>
<td>*gh(i)C</td>
<td>*gaC</td>
<td>no vocalization</td>
</tr>
<tr>
<td>(C = stop)</td>
<td>(Skt. duhitá,</td>
<td></td>
<td>(Goth. daúhtar)</td>
</tr>
<tr>
<td></td>
<td>Av. duγdā)</td>
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<td></td>
</tr>
<tr>
<td>*VgAR</td>
<td>no evidence</td>
<td>*ghR</td>
<td>no evidence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(prókhnu)</td>
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<tr>
<td>*gAV</td>
<td>*ghV</td>
<td>no evidence</td>
<td>no evidence</td>
</tr>
<tr>
<td></td>
<td>(Skt. ahám, hánu-)</td>
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For the other branches, there is little evidence for or against any developments, except that, apart from Tocharian, they do not seem to have vocalized the interconsonantal laryngeal of *dhugAtēr. The hypothesis that the sequence *gA
sometimes yielded *k in Armenian, Baltic, and/or Hittite must be regarded as unproven.
§4.1. Introduction

In the preceding chapter, we saw that the change *gA/*ґA to *gh/*ґh is well-established for Indo-Iranian in preconsonantal as well as prevocalic environments. In other branches of the family, this change seems not to have occurred before obstruents or word-finally, but there is no good evidence against its occurrence before resonants or vowels. In this chapter, we will consider evidence for a change of *dA to *dh in preresonant and prevocalic environments in Greek as well as in Indo-Iranian, and probably in Germanic as well.

First, we turn to previous efforts to demonstrate a development of *dH to *dh. Pokorny (1959:1115-1116) collects the following forms under the meaning ‘lead; lead in marriage’. Following the example of the previous chapter, I cite data in this chapter by following a reconstruction of the root with (a) forms which reflect earlier *dh, (b) forms which reflect earlier *d, (c) forms which could reflect either *dh or *d, and (d) forms which do not seem to reflect either *dh or *d, if any such forms exist.

*wedh-/*wed- ‘lead; lead in marriage’

a. Skt. vadhū- ‘bride’

b. Gk. hédon, éednon ‘bride price; wedding gifts’, OE weotuma, wituma, wetma ‘bride price’, Burgundian witemo ‘dowry’

‘lead’, OCS vesti ‘lead’, vēno ‘dowry’

Pokorny’s reconstruction naturally lacks the word-initial laryngeal which we would now reconstruct preceding the *w on the basis of the Greek and Hittite evidence. It also lacks the root-final laryngeal which some have seen as an explanation for the *d/*dh variation. Winter (1965a:113) and Hamp (1968) take the aspiration of Skt. vadhā as a sign that we have here a *dH sequence parallel to the *gH/*ğH sequences discussed in the previous chapter. Melchert (1984:88) further takes the orthographic -tt- of Hitt. huettîya- as evidence for the sequence stop plus laryngeal, but as indicated in the previous chapter, I believe that Hittite spelling is too unreliable to guarantee this conclusion. Furthermore, the Germanic forms, e.g. OE weotuma/wetma, unambiguously attest a non-aspirated ancestral form in a preresonant environment, as does Gk. hédon/éednon. We will see below that such reflexes of *dH, or at least of *dA, are not regular for either Greek or Germanic.

A likely explanation for these discrepancies between Sanskrit and the other languages is to relate Skt. vadhā and Av. vaḍā- to PIE *wadh- ‘pledge’, an entirely separate root. The semantic similarity between ‘lead in marriage’ and ‘pledge’ would be obvious even without the example of the Modern English specialization of *wadh- in the verb to wed. Skt. vadhā- / Av. vaḍā- could be derived from *wadh- as easily as from *Hwed(h)-. Or, if they do go back go back to *Hwed(h)-, vadhā- could have developed aspiration by analogy with *wadh- or with *wegh- ‘to carry, bring’. The fact that the Sanskrit reflex vah- of this last root includes as one of its many meanings
‘to take to wife’ proves that in Sanskrit, at least, the semantic similarities were strong enough that the aspiration of vadhu- could well be analogous. If it is analogous in origin, or if vadhu- derives directly from *wadh-, then there is no evidence for a root-final laryngeal in the ancestor of héðnon, etc., which we can reconstruct simply as *Hwed-.

Kuiper (1947:201) compares Vedic sadhásta- ‘place’ with Lat. sédés ‘seat’ and suggests respective ancestral forms *sed-E-es and *sed-eE-s. However, the non-aspirated root *sed-/sēd- is so well attested in the meaning ‘sit’ across Indo-European, including in Sanskrit, that we must attribute that meaning to it for the parent language. Sadhásta- and the synonymous sádhis- probably derive from the separate Skt. root sādh- ‘to reach a goal, go to a place’ (Monier-Williams 1899:1140).

§4.2. *dA > *dh

Previous attempts to demonstrate *dH > *dh are unconvincing. In Chapter 3 of the present work, we saw that it was the a-coloring laryngeal which was responsible for the aspiration of voiceless stops in Sanskrit and voiced *g and *ǵ in Indo-Iranian. This suggests that in searching for new evidence for *dH > *dh, we should especially look for examples involving *A. We can find *dA sequences with the help of Martinet’s theory of laryngeal hardening, which is diagnostic of the presence of *A at the end of a root. In particular, it suggests that Greek -daks often reflects earlier *d-eA-s. Assuming variations between full-grade and zero-grade of the suffix *eA, we would then have PIE variations between *d-eA-s in the nominative
and *d-A- in certain other cases. In Greek, then, variation between -daks and -th- would seem to reflect an original variation between *d-eA-s and *d-A- and to provide evidence for a pre-Greek change of *dA > *dh. Unfortunately, levelling within paradigms will have eliminated most examples of the d/th variation, but we can still expect to find non-paradigmatic evidence, as in doublets derived from a single root.

Two sets of Greek doublets which display the -aks vs. -th- pattern are Attic phiðáknē ‘wine cask’ vs. píthos ‘wine jar’ and púndaks ‘base of a cup, bottom of a ship’ vs. púthmēn ‘bottom or base (esp. of a cup)’. We therefore turn to an examination of each of these doublets, as well as their cognates in other IE languages, to see how much evidence they provide for positing a change of *dA to *dh.

§4.2.1. *g\(^w\)hid-(e)A- ‘jar’


b. Attic Gk. phiðáknē ‘wine cask’

c. Myc. Gk. qe-to ‘a type of jar’, Lat. fidēlia ‘jar, pot’, possibly fiscus ‘woven basket’

In connection with the Greek words, we must explain the variation between Attic phiðáknē and the form pítháknē found in other dialects. We cannot conclude that the latter form is original and that the Attic form is derived from it by metathesis
of aspiration, as suggested by Boisacq (1916:782-783), since simple metathesis of aspiration would have given the unattested form *phitákne, with voiceless /t/. Rather, phidákne must be the original form, and pithákne must have been formed from it by analogy with ptthos. This guarantees a pre-Greek variation between *dh and *d.

Pokorny (1959:153) reconstructs *bhidh- as the PIE form of this root. However, if Myc. Gk. qe-to, which refers to a particular type of jar, is cognate, then we must reconstruct an initial labiovelar (Ventris and Chadwick 1973:493-4). The labiovelar presents no problems for the derivation of the various words. /f/ is the regular Latin outcome of word-initial *gwh (Buck 1933:121-122), while *gwh before *i yields /ph/ rather than /th/ in Attic-Ionic (Sihler 1995:164). As for the Norse words, Seebold (1980) demonstrates that the shift of *gwh to /b/ word-initially in Germanic is attested for a number of roots. But the semantics of the Norse words are troubling, as is the retention of the vowel /i/ in those words with /a/ in the following syllable, since short /i/ was normally lowered in Norse in that environment (Gordon 1957:271). Examples of this lowering are admittedly hard to find, particularly since analogy sometimes eliminated them. All the same, the semantic and formal difficulties together with the late date and the sparseness of attestation make the cognacy of the Norse words somewhat dubious.

If the Norse words are left out of the picture, then we have cognates in only Greek and Latin. Some scholars might want to reject even the relation between the Latin and Greek terms, but while fiscus ‘woven basket’ < *fids-ko- might be rejected on semantic grounds, fidélia ‘jar’ seems secure enough (Walde 1910:288). Still,
attestation in only Greek and Latin in itself suggests borrowing from a Mediterranean source (Ernout and Meillet 1951:414). However, the reconstruction of \(^{\ast}g^{\text{W}}\text{h}\) rather than \(^{\ast}b\text{h}\), necessary if the Myc. \textit{qe-to} is indeed cognate with \textit{pithos}, militates against a borrowing hypothesis. Whatever the exact phonetic character of the PIE labiovelars, they cannot have been typologically common sorts of sounds, and it is unlikely that a Mediterranean substrate would have had phones which would be borrowed into both pre-Greek and pre-Italic as \(^{\ast}g^{\text{W}}\text{h}\). It therefore seems that we are dealing with a genuine PIE root despite its limited attestation.

Above I have reconstructed the \(^{\ast}A\) as suffixal in origin. This seems justified by the fact that the first syllable is attested only in the zero-grade, which implies an accented -\(\acute{\text{e}}\)A. The original forms of the nominative and genitive singular would thus have been \(^{\ast}g^{\text{W}}\text{hid-}\acute{\text{e}}\text{A-s}\) and \(^{\ast}g^{\text{W}}\text{hid-A-\text{\textae}}\). The former developed regularly to \(^{\ast}\text{phid\acute{a}ks}\), the stem of which is manifested in \textit{phid\acute{a}kn\acute{e}}, which was plainly formed through late addition of the suffix -\(\text{\textae}\). The stem form \textit{pi\text{th}-} < \(^{\ast}g^{\text{W}}\text{hidh-}\) < \(^{\ast}g^{\text{W}}\text{hidA-}\), on the other hand, served as the basis for the creation of the \(o\)-stem noun \textit{pithos}, the post-IE origin of which is further indicated by the combination of accent and zero-grade in the first syllable. Transfer to the short \(o\)-class is unremarkable, given that this was the basic productive noun class for masculine nouns in late PIE as well as in Greek.

As for Lat. \textit{fid\text{\textae}lia}, the medial /d/ could derive either from \(^{\ast}d\) or from \(^{\ast}dh\), so the Latin word gives no information regarding a change of \(^{\ast}d\text{A}\) to \(^{\ast}dh\). If the Norse words are cognate, then they would demonstrate one of the two following
developments in Germanic: *ð < *dh < *dA or *ð < *p < *t < *dA. That is, the laryngeal could have had either an aspirating effect, as in Greek, or a devoicing effect. But since the relationship of the Norse words to the Greek ones is uncertain, any further speculation based on them is unwarranted.

We turn now to Gk. *puthméν and *pândaks, whose cognates are at once more numerous, more certainly related, and more phonologically problematic than those of *phidákné and *púthos.

§4.2.2. *bhudAm-, *bhudAn-, *bhundA- ‘bottom’

a. Skt. būchná- ‘bottom, ground’, Gk. puthméν ‘bottom of a cup; base, bottom in general’, OE bodan, OS bodom ‘bottom’, OE bydme ‘bottom of a ship, keel’

b. Gk. púndaks ‘bottom of a cup, bottom of a ship’, ON botn ‘bottom’, bytna ‘to come to the bottom’, OE botm ‘bottom’, bytme ‘bottom of a ship, keel’, Arm. bun ‘trunk, stem, stock, root’ (but this may well be borrowed from Iranian)

c. Av. būna ‘bottom, ground’, Lat. fundus ‘bottom, ground’, MÍr. bond ‘sole (of a foot or shoe)’

d. OE byþne ‘bottom of a ship, keel’, ME botham ‘bottom’, OHG bodam ‘bottom’

The most obvious formal problem concerns both the position within the root
and the labial vs. dental articulation of the nasal which is attested in every single reflex in every language. In Greek the nasal occurs both before and after the dental stop. This may also be the case in Iranian, if Av. būna represents pre-Iranian *budna- (Beekes 1988a:76) and if Mari/Cheremiss pudas ‘bottom’ is a borrowing from Iranian (Pokorny 1959:174). Old English has the nasal only after the stop, but it attests several forms with /m/ and several with /n/. The cross-linguistic variation of the nasal is similarly unruly.

All the same, it is fairly easy to demonstrate that a form with postconsonantal nasal was the original one. Word-medial *-ndh- is widely reflected in the descendant languages, whereas the only evidence in all of the Indo-European languages for a proto-form with medial *-dhm- or *-dhn- is that presented by the very cognate set which we are currently considering (Hirt 1927:271,276). We must agree with Hirt’s conclusion: ‘Die verschiedenen Unregelmäßigkeiten bei diesem Wort weisen wohl darauf hin, dass die Lautgruppe dhn oder dhm, wie wir wol ansetzen müssen, im Idg. unbequem war’. Uncomfortable, and hence subject to phonological reshaping to fit better with the general phonotactic patterns of the language. If we assumed the opposite, that *bhundh- was the original form, we simply could not explain the reshaping of the word into an otherwise unattested Indo-European shape.

The evidence indicates that the reshaping which did occur was sporadic and variable among and even within individual languages. Such irregularity is natural in the case of a metathetic process which eliminates a disfavored sequence. Note, moreover, that no new phonemes were created by the reshaping, and that the variant
pronunciations would have been audibly different to native speakers. Thus, this example fits with the description of irregular change proposed in §1.3.1. That is, it involves rearrangement of phonemes rather than subphonemic changes in pronunciation.

For phonetic reasons, we must conclude that the nasal in this root was originally *m. It is easy enough to explain /n/’s in various languages as original /m/’s which have assimilated in place of articulation to the adjacent dental stop. Of course, such assimilation is especially likely when the nasal precedes the stop, and in fact it has always occurred in this sequence in our examples above. But the /m/’s found postconsonantally in Greek and Germanic can only be explained as original /m/’s which have resisted assimilation.

The conclusion that postconsonantal *m was the original nasal also makes morphological sense. The basic root is *bhudh- / *budhA-, to which the common PIE suffix *-mó- was added. With assimilation of *m to *n, this is exactly the form that is reflected by Skt. budhná-. The accented suffix explains the zero-grade of the root, which, as with *gʰhid-(e)A-, is attested by every one of the reflexes. The -mén of Gk. puthmén is also accented, and in fact it is in part the same suffix as the *-mó- of budhná-. Buck and Peterson (1945:216) state that ‘words in -mén...reflect IE -men-, a conglutinate of m-suffixes with the secondary -en’. Puthmén therefore reflects *bhudhmó- with the addition of an -en suffix. OE bydme is an n-stem and thus an exact cognate of puthmén, showing that the *-mén- form of the root, like the *-mó- form, is of PIE date.
To this point I have avoided the question of whether the exact PIE bases here should be reconstructed as *bhudhmó- and *bhudhmén- or *bhudAmó- or *bhudAmén-. In other word, assuming early PIE *bhudA-, do we regard the change of *dA to *dh as a change which happened during the PIE period, or as a set of separate changes in some but perhaps not all of the separate branches?

The evidence presented in the previous chapter demonstrated that the Indo-Iranian change of *gA/*gA to *gh/*gh happened earlier than the change of *kA to *kh. How much earlier is uncertain, and there was no evidence against a dating as early as the PIE period in some environments. For the specific change of *-VgAR- to *-VghR-, there was no evidence at all in Indo-Iranian. For Greek, to be sure, there was the tenuous example of prókhnu, possibly from *prógAnu-, but the Indo-Iranian cognates need not have had the same *-gAn- sequence in their ancestral forms. The pair *bhudAmó- / *bhudAmén-, on the other hand, provides evidence for a change of *dA to *dh in several branches in an environment parallel to that assumed for the ancestor of prókhnu, provided, as seems eminently reasonable, that the *u which functions as a syllabic peak in *bhudAm- is equivalent to the vowel in a sequence like *-ogAn-.

We surmised above that it was the *-dhm- sequence which was phonotactically disfavored and hence subject to reshaping. Even if this is correct, it does not necessarily imply that the shift of *dA to *dh was of PIE date, since the nasal metathesis attested by various forms in various languages could have been a separate occurrence in each of those languages. On the other hand, we cannot be certain that
it was specifically the sequence *-dhm- which was disfavored. Given that *A was some sort of guttural fricative, the difference between *-dhm- and *-dAm- can not have been too great in phonetic terms. Even if the change of *dA to *dh was not PIE, the reshaping of *-dAm- to *-ndA- may have been. In fact, we have already seen evidence in §3.2.4 that *CHR sequences such as that found in *bhudAm- were subject to sporadic reshaping, *CHR being exactly the sequence in which laryngeal metathesis is attested.

A detailed analysis of pertinent forms is clearly in order. However, we should begin by dispensing with forms which provide no evidence one way or another for the age of the *dA to *dh shift. Skt. budhnā- shows the shift but does nothing to tell us whether it is PIE or only pre-Indo-Iranian. Arm. bun is probably borrowed from Iranian (Pokorny 1959:174), while the exact prehistory of Av. būna is too uncertain to tell us anything. Lat. fundus and Mlr. bond are likewise unenlightening beyond the simple fact of the metathesis, which could easily be of late date in each language.

In Greek, there is a group of words buthōs ‘depth (especially of the sea)’, butháō ‘sink’, bathús ‘deep, high’, báthos ‘depth, height’, bénthos ‘depth of the sea’. Similar in appearance is báthron ‘base’, but this is more likely related, like básis ‘step; base’ and a variety of other words, to Gk. bátñō ‘step, go; (pfc.) stand’, which itself derives from PIE *gʷem- ‘come, go’. As for the other words, they seem to mean more specifically ‘deep’, especially in connection with water, than ‘bottom’. Buthōs may represent a metathesized form of PIE *dheub- ‘deep’ (Chantraine 1968-80:201), but we cannot even be certain that bathós and benthós were originally related to
buthós, given the difficulty of relating Gk. /u/ to Gk. /a/ and /en/. However, the similarity in form and meaning of all these words to puthmén is probably responsible for the existence of the forms buthmós and buthmén, cited by Hesychius as equivalent to puthmén (but also equivalent to antron ‘cave’). Despite the analogy which produced these nonstandard words, it is unlikely that any of the words in the buthós group are actually cognate with puthmén, etc.

We are left with the Greek and Germanic words cited above. Of these, the Greek are easier to deal with. Puthmén of course reflects *bhudAmen- very regularly and demonstrates the change of *-VdAR- to *-VdhR- at some point in the prehistory of Greek. Pándaks is more problematic. In fact, Kretschmer (1934:115) argues that it is a borrowing from Macedonian and that the /d/ would be the regular reflex in Macedonian of *dh in this word. In support of this hypothesis, Kretschmer mentions the Macedonian town of Pândna, site of Aemilius Paullus’ victory in 168 BC, and suggests that its name comes from its location near the base of a mountain range.

The suggestion of borrowing from Macedonian is not unattractive. However, given how little is known about Macedonian historical phonology, it would be preferable to explain the Greek word in purely Greek terms if possible. Such an explanation is possible if we begin with *bhudAm- and assume nasal metathesis to *bhundA-. The latter form, in oblique cases, could have been reinterpreted as having the zero-grade of the *-cA- suffix, leading to the analogical creation of a nom. sg. *bhundeAs alongside gen. sg. *bhundAos. These would have developed regularly
through *bhundaks and *bhundhos into *phundaks and *punthos, respectively.

Pândaks shows the extension of the -ak suffix throughout the paradigm, but it also shows an unexpected unaspirated initial. This /p/ has traditionally been explained as analogous to that of puthmén (Schwyzer 1959:333), which is certainly possible, since the words are formally as well as semantically similar in Greek. However, Sihler (1995:143) points out in connection with Grassmann’s Law in Greek that ‘in roots originally containing two aspirates, the dissimilated π-, κ- is generalized’, as in the comparative of pakhús ‘thick’, where póssón has replaced *phassón. Thus the /p/ of pândaks is best explained as due to the generalization of the /p/ which would have been regular in some oblique cases of the pre-Greek paradigm.

This explanation requires nasal metathesis before the change of *dA to *dh in Greek. That being the case, it may well be that Lat. fundus and MIr. bond are directly derived from the same base *bhundA- as gave rise to pundaks. In any case, the Greek cognates give us no reason to conclude that the shift of *dA to *dh belongs to the PIE period.

The Germanic reflexes of *bhudAm- are the most variable in form. However, we can broadly classify them into two sets: masculine short-o stems, such as OE botm, which are directly cognate with Skt. budhná-; and the n-stems with i-umlaut (the *e of *bhudAmén- passing to Gmc. *i), such as OE byrne, which are directly cognate with Gk. puthmén. The significance of the fact that all of the Germanic words fall into one of these two classes is that we can tell thereby that at the time of Verner’s Law, these words must have had second syllable accent.
This means that forms such as OE byþne, ME botham, and OHG bodam cannot be explained as reflecting post-Verner Germanic voiceless *p. Normally, of course, we would trace OE /ð/ and OHG /d/ in voiced environment to a Germanic voiceless fricative (Prokosch 1938:63). But in voiced environment, when followed by the accent, the pre-Verner *p < PIE *t developed to Germanic *ð and thence to OE /ð/, OHG /t/. In fact, forms of this root with /d/ are attested in OE bodan and bydme, while OS bodom also reflects Gmc. *ð, whether that *ð derives from PIE *t by Verner’s Law or more directly from PIE *dh.

We can explain the English forms with /ð/ by invoking a sporadic interchange between /d/ and /ð/ that occurs throughout the history of English before resonants (Jespersen 1922:208-211). It is well-attested before /ðt/, particularly with /ð/ replacing /d/ rather than vice-versa, as in OE fœder, mōdor, weder, hider > ModE father, mother, weather, hither. Replacement of /ð/ with /d/ is seen in rudder < OE roðor, while there are also numerous examples where no change has occurred, such as adder, ladder, and udder. The same interchange seems to be found before /m/, although data are fewer because there are fewer /dm/ and /ðm/’s than /dr/ and /ðr/’s in English. In OE fæðom, ModE fathom, the fricative is the regular development from PIE *pátmo-. However, Jespersen points out that the word has frequently been pronounced with /d/ as well. He also suggests that the change of /t/ to /p/ in anthem, normally attributed purely to spelling pronunciation, might also have something to do with the following /m/. The same sort of interchange would be expected before /l/ and /n/, and Jespersen lists a few examples of these also.
We now have an explanation for the otherwise inexplicable /ð/’s of OE byþne and ME botham; they must be examples of this sporadic interchange of /d/ and /ð/ before resonants in English. OHG bodam cannot be so explained, but here we can invoke the considerable dialectal variation of Old High German. Since the change of /ð/ to /t/ during the 2nd Consonant Shift was not characteristic of all High German dialects (Robinson 1992:244), OHG bodam could actually reflect Germanic *bodm-. In any case, it is difficult to see how it could reflect *bopm-, since Verner’s Law rules out the existence of the latter form.

Having accounted for the forms which seem, falsely, to reflect PGmc. *þ, we are left with a contrast within Germanic between *t < PIE *d and *ð < either PIE *dh or PIE *t. Given this alternation, it seems likely that the a-coloring laryngeal did indeed have some effect on a preceding *d in Germanic, but whether that effect was aspiration or devoicing is impossible to tell. The former seems more likely, based on the Indo-Iranian and Greek parallels, but without more evidence this is more of an assumption than a conclusion. However, we can attempt to explain why some variation such as that of OE bytime/bydme ‘bottom of a ship’ occurs without any synchronic phonological conditioning factors.

Once again, the phonological conditioning may have resulted from paradigmatic variation. In forms such as nom. sg. *bhudAmē(n), acc. sg. *bhudAménm, the *dA sequence would have been followed by a single resonant plus a vowel. But in forms such as gen. sg. *bhudAmnós, two resonants would have followed the *dA. Perhaps the laryngeal was lost before two resonants sometime
before the aspirating effect attested by Germanic occurred. If so, this would set the Germanic aspiration apart from that of Greek, since in Gk. prókhnu we seem to have aspiration before what was, at the PIE level, a sequence of two resonants.

Naturally, paradigmatic levelling has done much to eliminate the variation between /t/ and /d/ in these words in Germanic. In Old Norse, for example, only /t/ forms are attested. Old English shows more variation, but even there /t/ forms are much more frequent in texts, and of course ModE has only bottom. If the suggestion above involving paradigmatic variation in PIE is incorrect, still the Germanic variation must be explained somehow, perhaps by laryngeal metathesis, for which the *-CHR-cluster in this root is well-suited.

§4.3. Conclusions

The time of occurrence of the change *dA > *dh has not yet been settled. The following facts are relevant. (1) We are not even certain that Germanic reflects a change of *dA to *dh; it may actually reflect a change of *dA to *t, though the former development seems more likely. (2) If *bhudAmnó- gives early pre-Germanic *bhudmnó-, then the Greek and Germanic changes are independent of one another, since *prógAnu- gives Gk. prókhnu. (3) The variation in reflexes of *-CAC- in *dhugAter-, listed in the previous chapter, make it plain that in this environment, at least, there was no one common development of voiced stop plus a-coloring laryngeal. (4) Languages apart from Indo-Iranian, Greek, and Germanic provide no sure evidence for any influence of the laryngeal on preceding voiced stops.
On balance, it seems most probable that *dA to *dh before resonants was not a common PIE change. The same is therefore likely true of *gA/γA to *gh/γh. The Germanic change, whether it involved a shift to voiced aspirates or a shift to voiceless stops, is almost certainly independent of the Greek and Indo-Iranian changes. The Greek and Indo-Iranian developments may also be wholly independent. However, Greek and Indo-Iranian share several phonological innovations, such as Grassmann’s Law and the treatment of syllabic nasals. Thus, we could argue that pre-Greek and pre-Indo-Iranian formed a dialect group with mutual influence through the group, even if we would hesitate to reconstruct a unitary Proto-Indo-Hellenic language. If this view is correct, then the aspiration of voiced stops by *A would be a further example of an innovation common to this geographical grouping. However, it also remains eminently reasonable to suppose that the changes of *dA, etc., were independent innovations in each branch.

Since we have found evidence for aspiration of voiced dentals, palatovelars, and velars in Indo-Iranian and Greek, we would expect to find the same for the labial and labiovelar series. However, I have not found any such examples in a careful examination of IE cognate sets. That instances of *bA are difficult to come by is actually not surprising, since *b was at least rare and possibly non-existent in PIE. In fact, since the voiced stops were the least frequently occurring of the three Indo-European stop orders, it is not too surprising that the total number of examples of voiced stop plus laryngeal yielding voiced aspirate is fairly small. Nevertheless, the evidence is sufficient to state, as the conclusion of this and the preceding chapter,
that in particular environments in particular branches of the family, PIE voiced stops
plus the a-coloring laryngeai developed into voiced aspirate stops.
§5.1. Deaspiration following Nasals in Pre-Greek

It is generally recognized (Schwyzer 1959:333) that a number of Greek words give evidence for a prehistoric process of deaspiration following nasals, at a stage before medial voiced aspirates became devoiced. The best evidence is that provided by the following pairs of apparent cognates:

<table>
<thead>
<tr>
<th>Aspirated Stop</th>
<th>Nasal plus Non-Aspirate</th>
</tr>
</thead>
<tbody>
<tr>
<td>astemphēs ‘unmoved, unshaken’</td>
<td>stēmbō ‘shake, handle roughly’</td>
</tr>
<tr>
<td>Skt. dabhnōti ‘injure’</td>
<td>atémbō ‘maltreat’</td>
</tr>
<tr>
<td>kárphō ‘wither’</td>
<td>krāmbos ‘drying up of grapes’</td>
</tr>
<tr>
<td>koruphē ‘head, topmost point’</td>
<td>kórumbos ‘uppermost point’</td>
</tr>
<tr>
<td>néphos ‘cloud’, aphrōs ‘foam’</td>
<td>ómbros ‘rainstorm’</td>
</tr>
<tr>
<td>puthmēn ‘base of a cup’</td>
<td>púndaks ‘base’</td>
</tr>
<tr>
<td>strēphō ‘turn, twist’</td>
<td>strómbos ‘a thing turned round’</td>
</tr>
<tr>
<td>trēphō ‘congeal’</td>
<td>thrómbos ‘clot’</td>
</tr>
<tr>
<td>táphos ‘astonishment’</td>
<td>thámbos ‘astonishment’</td>
</tr>
<tr>
<td>teǐkhos/toǐkhos ‘wall’</td>
<td>thingánō ‘touch’</td>
</tr>
</tbody>
</table>

The /θ/ vs. /ð/ variation of *puthmēn/púndaks* has been explained in a different way in the previous chapter (§4.2.2), so that in all but one of the examples, the
contrast is between /b/ and /bh/. Moreover, the labials in question seem generally to
derive from proto-labials rather than labiovelars. This is an interesting fact, inasmuch
as it has frequently been supposed that PIE had no voiced unaspirated stop *b.
Under that theory, the variation between [b] and [bh] could have been purely
subphonemic in pre-Greek, if we are dealing with a period before /b/ became a
separate phoneme.

However, there is excellent evidence that no general deaspiration following
nasals was carried through in pre-Greek, not even one limited to the labial series.
There are a number of widely attested roots whose PIE status could hardly be
questioned for which the Greek reflex shows nasal plus aspirate. These include PIE
*ǵómdbhos ‘tooth, fang’ > Gk. gómphos ‘peg, nail’, gomphios ‘molar’, *ambhí ‘on both
sides, around’ > amphí ‘on both sides, around’, *anǵh- ‘tight, narrow’ > ánkhó
‘tighten’, ánkhí ‘near’, and *enebh/ombh ‘navel’ > omphalós ‘navel’. Hardly less
certain are *nu(m)b- > námphé ‘bride’ (cf. Lat. núbó ‘marry (take a husband)’ and
sengwh- ‘sing’ > omphé ‘divine voice’. In the face of this evidence, Miller (1977:137)
attempts to maintain the idea of a regular deaspiration by positing that post-nasal
deastration affected only ‘derived’ sequences, not ‘underlying’ ones. This hypothesis
is unacceptable to me in that it requires a sound change to be conditioned by
morphological information, information, moreover, which the average native speaker
would have been unaware of in a synchronic context. If there is a regular sound
change to be found here, it is incumbent upon us to try to find phonological bases for
its operation.
As a preliminary, we should note that for several of the word pairs cited above, the non-aspirate voiced stop does occur in related words without a preceding nasal, whereas the sequence nasal plus aspirate actually does appear in other related words. Thus, some words that seem to be related to *strēphō and *strōmbos are *strobēō ‘to twirl’, *streblōs ‘twisted’, and *strōngulos ‘round’, which last, if cognate, seems to point to a proto-form *stre(n)gʷ- rather than *stre(m)b(h)-. In *astemphēs/stēmbō we already see nasal plus aspirate; moreover, these words meaning ‘shake, handle roughly’ may be related to *stobāzō ‘scold, abuse’ and *stōmphos ‘bombast’.

Let us confine our attention for the moment to more certain cases. For tāphos and thāmbos ‘astonishment’, Pokorny reconstructs a root *dhābh-, which we would write today as *dheAbh-; the Greek words would reflect the zero-grade. However, these words are only dubiously connected to Goth. *a失信ōn ‘be silent!’ (cf. Lehmann 1986a:3-4) and may be of non-Indo-European origin. Nevertheless, even if borrowed into pre-Greek, this word plainly was nativized to the point that it had both nasalized and non-nasal variants. Probably the nasalization was first added to the root to make a present verb stem thamb- such as is preserved in thambēō, which would imply that thāmbos is a deverbal noun. In any case, the nativization of the root must have taken place early in pre-Greek, both before the devoicing of aspirated consonants and indeed, before the still hypothetical deaspiration which preceded devoicing.

Other clear evidence of a process of deaspiration comes from trēphō/thrōmbos and thingānō/theikhos. Apart from ON drumbr ‘block, lump’, there are no likely cognates for trēphō ‘congeal’ and thrōmbos ‘clot’ in other IE languages, so that we
might question whether the root is truly Indo-European. On the other hand, a root *dheīgh- ‘rub, mold, smear’ is well-attested in Skt. dih- ‘smear, plaster’, dégāhi- ‘smeread’, dehi- ‘mound, wall’; Av. pairi-daēza ‘enclosure’; Lat. fīngō ‘shape’, Osc. felhuss ‘walls (acc.)’; Goth. digan ‘knead, mold’ (attested in participial form only), daigs ‘dough’; ORuss. dēza ‘dough pan’; Arm. dizanem ‘heap up’; and possible other cognates in Celtic, Baltic, and Tocharian (Pokorny 1959:244-245, Lehmann 1986a:90). These cognates also verify the otherwise semantically questionable connection between thingānō ‘touch’ and tēkkhos ‘wall’. Here, then, we have a certain IE root with clear evidence of deaspiration following a nasal. The only difficulty is that the non-nasalized aorist stem thig- of thingānō reflects the same early deaspiration of the second consonant. However, the attested aorist form can easily be explained as analogous to the present stem.

All three good examples of deaspiration following nasals derive from diaspirate roots, *dheAbh-, *dherebh-, and *dheīgh-. Invoking Sapir’s (1921:160-182) concept of drift, we could argue that since Grassmann’s Law occurred in Sanskrit and Greek after they had separated from one another, these two languages both had an inherited tendency in favor of the reduction of diaspirate roots to monoaspirates. It appears that the earlier phenomenon of deaspiration following nasals might result partially from that same tendency in pre-Greek. In contrast to the Grassmann’s Law change, here it was the second of the two aspirates that lost its aspiration, but the effect of reduction to a monoaspirate was the same.

For atēmbō ‘maltreat’ vs. Skt. dabhnōti ‘injure’, also Skt. dambhā- ‘deceit’, Av.
dab- ‘to trick’, Pokorny (1959:240) reconstructs a root *dhebh-. The /l/ of atémbo can be explained as analogous to the unattested aorist. Atémbo is a defective verb in Greek, occurring, or at least attested, only in the present tense. The aorist stem, which may well have existed at some point in time, would have developed regularly into *(a)teph-, since the nasal was a present stem marker. Above, I argued that analogy probably levelled the present vs. aorist doublet thing-/tikh- from the root *dheigh-. Analogy from the aorist could be responsible for the /t/ of atémbo. The initial /a/ is another problem. It may stem from a word-initial laryngeal *A, but there are other hypotheses seeking to explain some or all of the so-called prothetic vowels of Greek. Beekes (1969:18-98) offers the most comprehensive treatment of this issue, which we will not consider further here.

However, even if atémbo represents an original diaspirate and thus patterns with thingánō etc., others of the words listed above plainly do not. Any of the words with initial /s/ clusters must have had simple voiceless stops in those clusters in the prehistoric period. They would probably have been non-aspirated in phonetic as well as phonemic terms, since although later Greek did have clusters such as the /sth-/ of sthēnos ‘strength’, such words as stēmbō have a phonetic non-aspirate historically. As for words without initial /s/, koruphē and körumbos are likely derived from PIE *ker- ‘head’ and are certainly related to Gk. kóruth- ‘helmet’ (Frisk 1973:2.924-927). Kárphō and krάmbos may be related to a wide range of IE words with meanings derivable from a hypothetical root *(s)ker- ‘twist’ (Pokorny 1959:948). In any case, there is no evidence that this was a diaspirate root.
It might be possible to explain these examples away. We noted above that whether /b/ or /ph/ occurs with some words is not dependent on the presence or absence of a nasal; e.g., strēphō/strōmbos/strobēō. If these words are Indo-European at all, they could simply represent differently extended forms of more canonical biconsonantal shape. Thus, as mentioned above, kárphō and krāmbos may derive from *(s)ker- ‘twist’. Further evidence in this case is that a simple root *kerh-, with initial voiceless non-aspirate and root-final voiced aspirate, is not permitted by PIE phonotactic constraints. The same is true of koruphē, which in any case is plainly related to the differently-suffixed kóruth-.

That a single root should develop two different extended forms, one with /b/ and one with /bh/, is unremarkable for Indo-European. However, analogy could also be used to explain the /ph/-/b/ alternation in a number of examples. Buck and Peterson find a total of 65 Greek nouns and adjectives terminating in -mbos, -mbon, or -mbē, as opposed to only 26 terminating in -mphos, -mphon, or -mphē. At the same time, the example of táphos/thámbo, etc., established a pattern of vowel plus aspirate vs. nasal plus voiced stop. It could be argued that the alternation of koruphē/kórumbos, for example, is patterned after the inherited alternation of táphos/thámbo, etc., rather than being due to different early pre-Greek suffixes. Koruphē could have been formed in the pre-Greek period by suffixation to the same root *koru- which must underly kóruth- ‘helmet’; kórumbos might then have been formed from koruphē analogically. Each doublet of the type koruphē/kórumbos thus formed by analogy would only strengthen the basis for further analogical formations
along the same lines. Similarly, strephô/strômbos, where the /m/ of the latter is not
found in strobô or strôbos ‘a whirling’, could be explained by analogy with the regular
and formally very similar doublet trôphô/thrómbos.

The problem with explaining away all of these words in this fashion is that it
would leave us with only a few nasalized roots which show the posited deaspiration.
An even more serious problem involves nasalized diaspirate roots which do not show
the posited deaspiration. I am aware of three such roots, *bheudh > punthánomai
‘perceive’, *dheugh- > tunkhânô ‘happen’, and *bhendh > pêtsma ‘ship’s cable’,
pentherôs ‘relative by marriage, especially father-in-law’. That the first two of these
are both verbs of the -n-ânô class is suspicious. This class was not found in the
proto-language; rather, it was an innovation in Greek whose membership was
constantly increasing (Chantraine 1964:220-223). For *dheugh-, a nasalized form is
nowhere attested except in tunkhânô. We could therefore assume that tunkhânô is
a late formation from the aorist passive stem tukh- of teûkhô ‘to make or cause’
(Liddell and Scott 1968:1833) or from from the cognate noun túkhê ‘action, event,
fate’. In other words, perhaps the reason that we do not have Gk. *thungânô rather
than tunkhânô from *dhuugh- is that tunkhânô is not descended from an earlier
*dhuugh-.

For punthánomai there is a nasalized cognate in Lith. bundû ‘awaken’, but
since n-infixed causatives are a productive type in Lithuanian (Endzelins 1971:229),
the Lithuanian form can hardly be taken as proof of nasalization at the PIE stage.
Elsewhere, the root appears in the non-nasalized full-grade, as in Skt. bôdhati ‘be
awake’, which is also reflected in Gk. peúthomai. This last word is an equivalent of punthánomai used in poetry, i.e., in a conservative register. This, together with the fact that punthánomai occurs only twice in Homer, leads to the conclusion that nasal infix of the latter, like that of tankhánō, is a late innovation (Liddell and Scott 1968:1398). The same is unlikely to be true for thingánō, though. While it is true that apart from thingánō the nasal infix is found only in Lat. ūngō, as opposed to the non-nasalized forms of Sanskrit, Germanic, Slavic, etc., nevertheless there is no non-nasalized present tense cognate *teikhō in Greek, in contrast to the situation with *bheudh- and *dheugh-. Since for semantic as well as phonetic reasons thingánō ‘touch’ could hardly be a Greek denominal formation from teikhos/toi̯khos ‘wall’, we must assume that the nasal infix is inherited in thingánō.

Peîsma and pentherós are less easily dismissed than tankhánō and punthánomai. The basic meaning of PIE *bhendh- appears to have been ‘bind’, as in Goth. bindan, Skt. bandh-. The derivation of peîsma ‘ship’s cable’ < *penth-s-ma presents no phonological or semantic difficulties. Pentherós ‘relative by marriage’ would be less certain on semantic grounds if not for the existence of Skt. bándhu- ‘kinsman’, Lith. beîdros ‘comrade’. It is pentherós that demolishes our already creaking hypothesis that there was a regular phonetic deaspiration of voiced aspirates following nasals in diaspirate roots in pre-Greek. Pentherós represents a diaspirate root with a nasal preceding the second aspirate, yet it very definitely has no deaspiration.

We are left with the following situation. There are a number of words in
Greek which seem to show deaspiration following nasals in pre-Greek, particularly in diaspire roots. At the same time, there are sufficient counterexamples to demonstrate that such a change, if it happened, was not a regular sound change in the Neogrammarians sense, since it certainly admitted exceptions. Beekes (1969:74), surveying the data, is led to conclude that the roots which provide evidence for the deaspiration are non-Indo-European, implying that the consonantal variation attested in Greek reflects something about the source language rather than something about the internal development of the Greek language.

Beekes' conclusion seems unwarranted to me. A number of the words which show the variation have believable IE etymologies, as we have seen above. Even if some are of non-IE origin, I doubt that all are. And since in many cases it is only the consonant variation which makes these words seem foreign, an explanation of this variation in terms of the internal history of Greek would remove the principal objection to regarding all of them as Indo-European. Such an explanation is certainly desirable, then, for the purpose of solidifying the etymologies of these words, as against concluding that they are of unknown and foreign origin.

§5.2. Sporadic Replacement of Non-Aspirates with Aspirates

The most likely internal origin for the variation in question is irregular phonemic replacement, the general characteristics of which have already been outlined (§1.3.1). A historically attested example of this type of change was mentioned in §4.2.2 above, namely the English variation involving dental stops vs.
dental fricatives in the neighborhood of liquids and nasals (Jespersen 1922:208-211). There are far too many examples to list them all, but OE mœðor, furðor, EModE murther/murder, further/furder, ModE murder, further are instructive in showing the ultimate irregularity of the development. They also, like similar examples, involve interchange of what were already two distinct phonemes in the language, /ð/ and /d/. There is no change in the language's phonological system, and the exchange of phonemes does not result in homophony in these or in most words where it occurred.

The pre-Greek deaspiration shares these characteristics. Most notably, it did not bring about the existence of any new phonemes in the language. It is possible that the existing phonological contrast between *b and *bh did not at first exist in post-nasal environment, since *b was so rare in PIE. In that case, the deaspiration of *bh following nasals would bring about the extension of a contrast to a new environment. Still, no entirely new phonological contrasts were created or lost. All that happened was an audible variation in the pronunciation of certain words such that *dhámboş, for example, came to be pronounced as *dhámboş. As with the case of Spanish árbol vs. Portuguese árvore, in some dialects one form may have won out, in some dialects another. And certainly the results varied from word to word.

At the beginning of this chapter, I stated that the fact that the great majority of the examples involved labials might be taken as evidence that the sound change was subphonemic in the labial series at an early period. However, the change was not regular in the labial series, as shown by pairs like gómphos 'nail' vs. thrómbos 'clot' and astemphéis 'unshaken' vs. stímbō 'shake', of which the latter pair even
derive from the same original root. Thus, it can hardly have been a subphonemic change, since subphonemic, unconscious changes are regular. On the contrary, deaspiration following nasals indicates that, at a stage of pre-Greek before the devoicing of the voiced aspirates, there was already a phonemic contrast between /b/ and /bh/ in the language. While this in no way proves that such a contrast existed in PIE, neither does it provide definite evidence against its existence.

At the same time, the preponderance of examples in the labial series does indicate that the phoneme /b/ was rare in pre-Greek, and thus that it was at least rare in PIE, which of course is already indicated by the comparative evidence. Phonemic interchange is naturally most common where it does not result in homophony. Where homophony is likely, speakers naturally avoid using an alternate pronunciation which could lead to confusion, particularly among words whose contexts of use are similar. At the same time, a phonemic distinction which is frequently represented in the language is probably less likely to become involved in phonemic interchange than one which carries a low functional load. In current Modern English, for example, the rather rare phoneme /z/ is starting to be used in some words that historically had /j/, such as garage, adagio, Taj Mahal (Pyles and Algeo 1993:52). The much more robust /ʃ/ has not, to my knowledge, begun to appear in place of /tʃ/, except perhaps in French borrowings as pronounced by those who have studied French in school.

In the Greek deaspiration, we find only one example of deaspiration in the velar series and none in the dentals. This implies that the contrast between aspirate and non-aspirate voiced stops was much more robust in these series than in the
labials. Indeed, the contrastive phoneme /b/ may have been no more frequent at this period in pre-Greek than /ʔ/ was in English a hundred years ago. And just as contrastive /ʔ/ did not exist in the Old and Middle English eras, even though contrastive /z/ did, it seems likely that in the pre- or Proto-IE period, contrastive /b/ did not exist even though contrastive voiced unaspirated stops did exist in the dental and velar series.

In the attested examples of phonemic interchange, an articulatory motivation and a consequent general direction of change are evident. For example, the English replacement of /d(V)ɹ/ with /ð(V)ɹ/ as in father < faeder and weather < weteder is much more common than the reverse change seen in rudder < rʊɹor (examples like murder < mɔɹor are complicated by a competing tendency to replace /ɹ/ with /rd/). In the Greek case, the basic tendency is obviously to replace an aspirate with a non-aspirate. Although the phonetic case for deaspiration specifically after nasals is not immediately obvious, still a general tendency toward the elimination of voiced aspirates is easy to understand in phonetic terms, given the articulatory effort required to produce such sounds and their consequent typological rarity. That such a tendency did indeed exist in Greek is evidenced by the fact that the voiced aspirates were ultimately modified to the more typologically normal voiceless aspirates, just as they were phonetically altered in other ways in all other Indo-European languages except Sanskrit.

The tendency to dissimilate two aspirates also probably served as a phonetic motivation for the interchange of phonemes in some words. Our most certain
examples of post-nasal deaspiration involved diaspirate roots; moreover, the tendency toward elimination of diaspirates in Greek is evidenced by the later occurrence of Grassmann’s Law. Therefore, it is probably correct that the presence of a root-initial aspirate had some influence in bringing about the deaspiration of a post-nasal aspirate stop. In other words, the deaspiration which I am positing was partly dissimilatory in character—and we are not at all surprised to find sporadic, irregular dissimilation.

It is also certainly possible that analogy extended the patterns created by this sporadic sound change. Above, when we were still investigating the possibility that the sound change in question was regular (§5.1), I suggested that the -\textit{Vph}- vs. -\textit{Vmb}-pattern might have been extended by analogy to examples such as \textit{koruphē/kōrumbos}. This is still possible, but it seems neither practical nor worthwhile to determine in every instance whether the alternation results from early phonemic interchange or later pattern extension. It is more important simply to know that some of the examples must be due to phonemic interchange, and that they provide evidence regarding the phonological system of pre-Greek.

A last phonetic detail involves Gk. \textit{táphos} ‘grave’ < *dhmbh- (not cognate with \textit{táphos} ‘astonishment’ < *dhAbh-) and \textit{takhūs} ‘swift’ < *dhngh-. The aspirate stops in these instances indicate that sequences of original syllabic nasal plus aspirate did not undergo deaspiration. Since we are dealing with a sporadic change here, we cannot be certain of this conclusion, especially since there are only two examples to support it and only one of them involves the labial series. Nevertheless, if the
conclusion is correct, then it is most likely that the deaspiration postdates the regular change of syllabic nasals to /a/. This would certainly remove the primary phonetic motivation for the change, which would seem to still be present in sequences such as *dhmbh or *dhnhg. However, given the nature of the evidence, it is perhaps best to speak of this proposed dating as a plausible but unproven hypothesis.

§5.3. Special Problems

The remainder of this chapter will be devoted to two separate words and one pair of words which, for one reason or another, merit special discussion in connection with deaspiration following nasals. These are pândaks ‘bottom of a cup’; ómbros ‘rainstorm; water’; and ábeis ‘adders’, ímberís ‘eel’, the last pair attested only in Hesychius.

§5.3.1. Pándaks. Pándaks alongside puthmén played a crucial role in Chapter 4 in demonstrating the sound law *dA > *dh in Greek (§4.2.2). But according to the current chapter, the /d/ of pándaks could represent *dh which has undergone post-nasal deaspiration. While possible, this explanation of the /d/-/th/ variation of pándaks/puthmén is less likely than the one advanced in the previous chapter. In the first place, there are no examples other than pándaks which seem to show post-nasal deaspiration in the dental series. Moreover, under the deaspiration hypothesis, the /p/ of pándaks in place of expected /ph/ could only be explained as analogous to the /p/ of puthmén. As stated in the previous chapter, under the *dA > *dh hypothesis, the /p/ of pándaks is analyzable as the expected paradigmatic generalization of the
/p/ that would have been regular in forms like genitive *punthós < *phunthós. In short, the /d/-/th/ variation of pándaks/puthmén is best explained by the *dA to *dh hypothesis, not by the deaspiration hypothesis. Therefore, the theory presented in this chapter does not weaken the evidentiary basis of the theory presented in Chapter 4.

§5.3.2. Ómbros. Néphos ‘cloud’ and ómbros ‘rainstorm’ were cited at the beginning of this chapter as evidence for post-nasal deaspiration. These two words, along with many other IE words cited below, apparently derive from a PIE root reconstructed by Pokorny (1959:315-316) under the heading *enebh-, with a number of ablaut variants and suffixed forms.

*nebh-, *embh- ‘cloud’

a. Skt. nábhas- ‘clouds; sky’, ámbhas- ‘water’, Gk. néphos, Arm. amb ‘cloud’

b. Skt. ambu- ‘water’, Arm. amp ‘cloud’

c. Lat. nimbus ‘cloud’, Lith. debesis, OCS nebo, Hitt. nepiš ‘sky’

*(o)mbhro- ‘rain, rainy weather’

a. Skt. abhrá- ‘cloudy/rainy weather’, Gk. aphrós ‘foam’

b. Gk. ómbros ‘rainstorm’

c. Av. awra ‘rain’, Lat. imber ‘rain’

*nebelā ‘mist’

a. Gk. nephélē, OHG nebul ‘mist’, OE nifol ‘dark’
It is notable that not just Greek ὄμβρος, but also Skt. ambu and Arm. amp appear to reflect *b rather than *bh. In the case of ὄμβρος and ambu, the non-aspirate /b/’s have led to suggestions that the words are not actually cognate with the other words listed above. For ὄμβρος, only form and not meaning must be the basis for rejection, since the meaning ‘rain, rainy weather’ is well-attested in Sanskrit, Avestan, and Latin reflexes of the r-suffixed base. Thus Beekes (1969:74), correctly noting that ‘the sound law [emph. mine, TJP] mbh > µβ is not tenable’, mistakenly concludes on this basis that ὄμβρος ‘cannot be considered to be cognate with νέφος or with Skt. abhrā’. On the contrary, since the sporadic replacement of *mbh by *mb is tenable for pre-Greek, ὄμβρος must be considered to be cognate with νέφος and with Skt. abhrā-. 

Bloch (1929:739) suggests rather tentatively that Skt. ambu- ‘water’, which is not attested in the Vedas, may be a borrowing from Dravidian. But he also points out that among the Dravidian languages, only Kurukh amm ‘water’ provides evidence that a suitable source word ever existed in Dravidian. He therefore states the possibility the amm is a word borrowed into Kurukh from Indo-Aryan, rather than vice-versa. 

Beekes (1969:74) questions not only ambu- but also ἀμβάς- ‘water’, on the basis that the semantic relationship between ‘cloud’ and ‘water’ is a tenuous one.
Readers will have to judge the plausibility of the semantics for themselves; I will simply state that, given the impressive formal connections, the semantics seem reasonable enough. Beekes is certainly correct to recognize that ambu- and ámbhas- must be regarded as a pair, since they are so close in both meaning and form. We can therefore try comparing them with the Armenian pair amb/amp ‘cloud’, which are so clearly forms of the same word that no one has rejected amp despite the /p/ which would seem to reflect earlier *b.

Mann (1963:177) points out that the fluctuation between voiced and voiceless obstruents occurs in a few other words in Armenian: xinx/xinc ‘bosom, fold, hollow, bottom’, gindlgint ‘earring’, vang/vank ‘voice, sound, syllable’. Interestingly, every example that Mann cites involves a root-final, post-nasal obstruent. However, the fact that vang/vank is an Iranian loan word makes it seem doubtful that this variation is inherited from Proto-Indo-European. Rather, it looks like an independent development of Armenian; perhaps a dialectal devoicing of word-final stops?

As for Skt. ambu-/ambhas-, I know of no other evidence for deaspiration following nasals in Sanskrit. Since the comparison with Armenian fails to yield a solid parallel example, this seems to be a case where there is too little good evidence to come to any conclusions. I regard both ambu- and ámbhas as cognates of Skt. nabhá- and so of Gk. ómbros, but the non-aspirate /b/ of ambu I can only label ‘unexplained’.

§5.3.3. Ábeis/imbēris. Lastly, we turn to roots meaning ‘snake’ and ‘eel’, the latter derived from the first by suffixation.
*angₜ(h)i-, *egwʰi-, *ogwʰi-, *eɡwʰi- ‘snake’


b. Gk. ábeis (H.) ‘adders’, OHG (early) unc, (late) unch ‘snake’


*engₜ(h)ēri-, *angₜ(h)el- ‘eel’

a. Gk. énkhelus ‘eel’, OHG angar ‘cornworm’

b. Gk. ímβēris (H.) ‘eel’

c. Lat. anguilla ‘eel’, Lith. ungūlys ‘eel’, ankštiraf ‘worms, larvae’, Russ. ug(o)r’, Polish węgorz ‘eel’

To begin with, the various cognates, while too close in form and meaning to be unrelated, nevertheless disagree considerably as to the proto-form. In Greek alone we have ἐκής, ὀφίς, ἄβεις, ἐνκήλες, and ἰμβήρις, which imply respectively *eɡh-, *ogwʰh-, *ngw-, *eɡwʰ-, and *engw-. Even these reconstructions do not fully explain all the peculiarities of the attested Greek forms. For example, the /b/’s of Hesychius’ ἄβεις and ἰμβήρις indicate that these words stem from Aeolic dialects, where the change of *ɡw- to /b/ before mid front vowels is regular (Buck 1955:62). However, the change of /e/ to /i/ before nasals belongs to Arcado-Cyprian (Buck
1955:23), so that *lbēris rather confusingly seems to represent a mixture of two dialectal forms.

Things are no better outside of Greek. Lat. *anguis and *anguilla agree with Lith. *angis perfectly in form and imply initial *A- or *Ae-; the /l/ of Arm. îč is quite exceptional, and OHG unc stands alone among Germanic words in attesting an unaspirated *g or *gʷ. In the face of all this confusion we cannot help but think that the word for snake has undergone frequent taboo deformation, as has also often been supposed for *wlkʷo- 'wolf'.

Because taboo deformation is so likely, *lbēris and *Λbeis need not belong to the same group as the other examples of deaspiration following nasals. That is, although the both plainly show deaspirated /b/, the motivation for the phonemic replacement may not have been primarily phonetic. And we should be particularly careful inasmuch as these are Hesychian words of whose provenance we know nothing. Lastly, we should note that according to the tentative hypothesis advanced above, *Λbeis, in which a syllabic nasal has been vocalized, ought not to have undergone post-nasal deaspiration. Perhaps *Λbeis is a small piece of evidence against that hypothesis, but if so, it is a very weak and suspect piece to which we cannot accord much importance.
Chapter 6–Residual Examples of Voiced Aspirate vs. Voiced Non-Aspirate

§6.1. Introduction

Chapter 3 of the present work dealt with seeming PIE variation between *g/*g and *gh/*gh, Chapter 4 with *d and *dh, while Chapter 5 was principally about variation between *b and *bh. In each case, the apparent variation was explained as due to specific sound changes, regular or irregular, in the histories of particular branches of Indo-European. This made it possible to reconstruct unitary root forms for a number of previously troubling cognate sets.

I do not by any means wish to give the impression that the previous chapters have accounted for all possible examples of variation between voiced non-aspirates and voiced aspirates. On the contrary, there are a number of cases cited by Pokorny (1959) which cannot be accounted for by the analyses which I have presented so far. In the interests of completeness, this chapter will be devoted to these residual examples. Since I am unable to find common phonological explanations for any subset of these roots, I will discuss each cognate set individually and advance possible explanations for the conflicting evidence for original consonantal order.

As a preliminary, I wish to note the existence of one large class of bases which I will not treat in detail, namely suffixed forms of roots which differ as to whether the final consonant is aspirated. I have already mentioned these in §1.2, but a somewhat fuller explication of my reasons for excluding them is in order here. These reasons can best be understood through the examination of an example; the roots
reconstructed by Pokorny (1959:455,457) as *ghrebh- and *ghreib- serve our purpose well.

*ghreb(h)- 'grasp, grab'
  a. Skt. grabh-, grah-, MidDutch grabben
  b. ON grāpa, OE græppian
  c. Av. grab-, Lith grabóti 'grobe', OCS grabiti 'snatch'

*ghreib- 'grasp, grab'
  a. ---
  b. Goth. greipan, ON grīpa, OE grīpan, general Gmc.
  c. Lith. griēbti

Pokorny regards the /p/’s of ON grāpa, OE græppian as secondary, perhaps analogous to the /p/’s attested by the Germanic reflexes of *ghreib-. This is eminently possible, but we still must explain the close semantic and formal similarities between PIE *ghrebh- and *ghreib-. Rather than attribute the *b vs. *bh correspondence of these roots to Proto- or post-Indo-European sound changes, it makes more sense to regard the two roots as differently suffixed versions of PIE *ǵher- ‘hold, grasp’. This hypothesis does require morphophonemic variation between *ǵh and *gh for this root, but it is already attested in yet another extended form *gherdh-/*gherdh- (Pokorny 1959:444), so that positing it here is acceptable.

The numerous similar examples in which the phonological variation is best
analyzed as due to phonologically distinct suffixes will not be dealt with below, there being no need to repeat the same explanation several times. We therefore turn to residual, idiosyncratic cases that require individual analyses, taking them up in alphabetical order of the reconstructed forms.

§6.2. Residue

§6.2.1. *agʷ(h)nos ‘lamb’

a. OIr. ūan, Welsh oen, OE ēanian ‘to lamb’

b. Gk. amnós, probably Umb. habina(f) ‘lambs (acc. pl.)’

c. Lat. agnus ‘lamb’, avillus ‘newborn lamb’, OCS (j)agně

The problems with this root begin with the initial vowel. Sihler (1995:207) reconstructs *Ae-, which accounts for the Greek and Italic short /a/, but Slavic /a/ requires in PIE either *ã or *ō. Celtic attests PIE short *o, Germanic either PIE *o or *a. The best reconstruction, suggested by Pokorny (1959:9), is probably *oA-/*A- with variation between zero-grade and o-grade of the vowel. The Proto-Celtic *o could be due to analogy with *owis ‘sheep’ (Thurneysen 1961:137).

The consonant variation is less tractable. Gk. amnós must stem from a form with non-aspirated *gʷ, since pre-Greek *b went to /m/ before /n/, but *ph remained unchanged in the same environment (Buck 1933:146). If Umb. habina(f) is cognate, then it also attests to *gʷ rather than *gʷh (Buck 1928:94). However, the initial /h/ is unattested elsewhere, which has led to suggestions that habina may be cognate with
OIr. *gabor ‘goat’ (Walde 1910:20) or Skt. *chāga ‘goat’ (Buck 1928:93) rather than Lat. *agnus, etc. A more plausible analysis retains *habina in the *agwhnos set and explains the /h/ as analogous to that of *hēdīnā- ‘kid’ (Kent 1926:190).

OE *ēanian definitely attests to *gwh rather than *gw. The derivation is completely regular: PIE *agwthν- > Proto-Gmc. *awhν- > OE *ēan-. Although the preconsonantal development of *gwh and *gw in Celtic is not clear (Thurneysen 1961:137, Cowgill 1980:74), Pokorny (1959:9) is most likely correct in assuming a Proto-Celtic form *ogwños derived from PIE *ogwhns, not from PIE *ogwños, which most likely would have given Proto-Celtic *obnos.

To summarize, Greek and probably Umbrian attest PIE unaspirated *gw. Germanic and probably Celtic attest PIE aspirated *gwh. Latin and Slavic provide no evidence one way or the other. I can offer no explanation for the variation.

§6.2.2. *algw(h)- ‘earn’

a. Skt. ārhati ‘is worth, deserves’, Gk. alphánō ‘earn’, alphē ‘earnings’

b. Skt. ārjati ‘acquires’

c. Av. arjaiti ‘is worth’, Lith. algā ‘payment’

As Andrew Sihler (personal communication) has pointed out to me, Skt. ārjati, which is not attested in the Vedas, is semantically as well as formally differentiated from the other words in the group and is probably a purely Indic development of the root *ṛj- ‘direct, reach, obtain’. Cognates include Gk. orēgō ‘reach out’, Lat. regō
‘direct, rule’, and ModE reach. Since ārjati does not belong to *algwh-, the latter can be reconstructed with an invariable aspirate.

§6.2.3. *bheug(h)- ‘bend’


c. possibly OFr. fid-bocc ‘wooden bow’, Latv. bauga, baugurs ‘hillock’, Alb. butē ‘soft < *pliable’

For *bheug(h), where Germanic attests both aspirated and unaspirated ancestry while other languages show evidence only of an unaspirated proto-form, I can offer no explanation. Lehmann (1986a:73) offers recent overview of the root and its offspring. Most likely, the variation reflects developments within Germanic rather than a variation in the proto-language.

§6.2.4. *d(h)ews-, *d(h)wes- ‘breathe’

a. Goth. dius, OE dēor ‘animal’

b. Lat. bēstia ‘animal’, bēlua/bellua ‘wild animal’

Contrary to my usual practice, I have not given an exhaustive cognate list here, simply because there are so many cognates (see Pokorny 1959:268-271, Lehmann
The root *dhes-/*dhes- is a suffixed form of *dhew- 'breathe'. It appears in the descendant languages with a variety of meanings derived from 'breathe'. The semantic development to 'animal' is parallel to that seen in Lat. animal < anima; for *dhes-, it not found outside of the branches cited above.

There is overwhelming evidence for the reconstruction of initial *dh- in the root, while only the Latin words cited above provide any evidence for non-aspirate *d-. Since there is no semantic or formal difficulty in deriving the Germanic words from *dhes-, the only question is whether Lat. bēstia and bellua/bellua can be similarly derived from the ablaut variant *dhes-.

Examples for the development in Latin of word-initial *dh- are not as plentiful as they might be. The most certain example is foris 'door' < *dhwor-. However, since pre-Latin *w was lost before *o, foris may represent *dhor- < *dhwor- rather than reflecting *dhwor- directly. All the same, a development of word-initial *dh- to /b/ in bēstia, etc., would be quite extraordinary, since word-initial aspirates consistently give fricatives in Latin. If, therefore, bēstia is to be taken as reflecting *dhes-, it would seem more likely that it represents a deaspirated form *dhes- with regular development of *dw- to /b/.

Walde (1910:87-88) makes just such a suggestion but wins no support from Pokorny, Lehmann, Ernout and Meillet (1951:122-124), or Tucker (1931:33-34). Not just the initial consonant, but also the vowel length of bēstia militates against Walde’s proposal, since *dhes-/*dhes- is elsewhere attested with a short vowel. Tucker proposes that we derive the Latin words from *dews-/*dews- 'tear, hurt, destroy', rather than *dhes-, since bellua/bellua, in particular, refers to wild, ferocious beasts.
rather than to animals in general. The vowel length would seem to be a problem for Tucker's proposal as well as for Walde's, but in terms of the consonants Tucker's suggestion is less problematic. In any case, it is very unlikely that \( \text{b\textipa{s}t\textipa{i}a} \) and \( \text{b\textipa{e}lu\textipa{a}/bell\textipa{u}a} \) represent a deaspirated form of \( *\text{dhwes} \).

§6.2.5. \( *\text{dig}(h)\)– 'she-goat'

a. OHG ziga 'she-goat'

b. OE ticcen 'kid', OHG zick\( \text{i}(n) \) 'kid', possibly Arm. tic 'tube made of animal skin'

c. Laconian Gk. \( \text{d\textipa{i}za} \) 'goat' (H.), Alb. dhi 'she-goat'

Both Laconian Gk. \( \text{d\textipa{i}za} \) and Alb. \( \text{dhi} \) are of uncertain descent (Boisacq 1916:187, Frisk 1973:1.390-391, Huld 1984:59,142). Regardless of their origins, both could have sprung from proto-forms with or without aspiration on the /g/, while Arm. \( \text{tic} \) is sufficiently far removed semantically that we cannot use it as evidence for a root meaning 'she-goat'. Pokorny (1959:222) characterizes the hardened geminate *-kk-attested by the Germanic words for 'kid' words as hypocoristic which would make the *gh original. Whatever the accuracy of this assessment, the consonant variation is best explained as a development within Germanic rather than a reflection of PIE variation.
§6.2.6. *dhelg(h)- ‘wound’

a. ON dolg ‘enmity’, OE dolg ‘wound’, OHG tolc ‘wound’

b. Gk. thélgo ‘enchant, bemuse’

c. Toch A talke, B telki ‘offering, sacrifice, victim’

The semantic distance between the Germanic words meaning ‘wound, enmity’, on the one hand, and Gk. thélgo ‘enchant, bemuse’, on the other hand, is significant. Given also the formal difference between the Germanic and Greek words, I regard a root connection as unlikely. Toch A talke, B telki ‘offering, sacrifice’ may be related to OE dolg etc., but even this is dubious. In any case, the Tocharian forms do not contradict the consonantism attested by the Germanic.

§6.2.7. *d(h)wor-, dhur- ‘door’

a. Gk. thúrã, Lat. foris, Goth. daur, ON dyrr (pl.), Arm. durn ‘gate, court’

b. Skt. dvãr-/dur-

c. Av. dvarœm ‘gate’, Lith. dûrys (pl.), OCS dvîrî, Olr. dorus, Alb. derë

In the Vedas, Skt. dvãr-/dur- occurs only in the dual or plural. Moreover, along with ON dyrr and Lith. dûrys, which occur only in the plural, there are also cognates like Lat. foris and OCS dvîrî which occur most frequently as plurals even in reference to a single gate or door. Since the dual and plural categories merged
in most Indo-European languages, the predominance of the plural forms and rarity of the singularrays is generally accepted as proof that the word originally had no singular forms (Lehmann 1986a:89, Sihler 1995:148). In the dual, it referred to double doors or a two-halved gate; in the plural, it indicated more than one set of double doors.

Given the semantics as well as the fact of the development within Sanskrit of a stem form *dvar-, the deaspiration could be by analogy with *dvāu ‘two’ (Pokorny 1959:278-279). Brugmann (1888:354), on the other hand, notes that the lack of singular forms would result in a greater proportion of *bh-cases, that is, the dual and plural instrumental, dative, and ablative. In these cases, original *dh would go to /dl/ by Grassmann’s Law, and paradigmatic levelling could spread the non-aspirated initial. Quite likely, both of these analogical processes were involved in the irregular development within Sanskrit, which cannot be taken as a reflection of PIE variation.

§6.2.8. *engʷ-, ngʷen ‘swelling; groin’

a. ----

b. Gk. adēn ‘gland’, ON økkr ‘swelling’

c. Lat. inguen ‘groin, swelling in the groin’

*negʷhros ‘kidney’

a. Gk. nephros, Praenestine Lat. nefrōnēs, OHG nioro, ME nēre

b. ----

c. ----
*ngʷen and *negʷhrós may or may not be related IE roots. If they are, then Gk. adén looks at first glance as if it belongs in Chapter 5 as an example of deaspiration following a nasal. However, it would be a non-canonical example in two ways: the stop series involved is not the labial series, and the nasal is syllabic. Moreover, ON 鲆kr, if cognate, also has unexplained deaspiration. Despite these difficulties, it does seem probable that *ngʷen and *negʷhrós are related. However, I have no convincing explanation for the consonant variation.

§6.2.9. *eregw(h)o- ‘pea, legume’

a. OHG araweiz, arwiz
b. Gk. órobos, erébinthos
c. Lat. ervum

OHG araweiz, Gk. órobos, and Lat. ervum all look like borrowings from a common European source for a native vegetable unknown to the Indo-Europeans. Therefore, this is not a PIE root and provides no evidence for PIE consonant variation.

§6.2.10. *swomb(h)os ‘sponge’

a. Gk. somphós, OHG swambes (gen.) ‘sponge’
b. ON svoppr ‘sponge’, OE swamm ‘mushroom’, ModE swamp
*swomb(h)os 'sponge' is certainly not a PIE root. The original word, like ModE sponge, must have designated the typically porous, elastic, and absorbent bath sponges rather than the now more broadly defined zoological phylum of sponges, Porifera. Bath sponges are exclusively salt-water creatures that flourish in the Mediterranean as well as the Caribbean and Gulf of Mexico (Hyman 1989:448). The Indo-Europeans appear not to have dwelt next to any of these places, nor next to any large, oceanlike body of salt water for which a word has been retained in IE languages. Furthermore, Sihler (personal communication) points out that sponges are both useful and easily transported, and so may have been trade items whose name accompanied them from one language community to another. Thus we can assume that the Greek and Germanic words for 'spongy' are borrowed directly or indirectly from some common Mediterranean source. Further words that likely derive from the same source are Gk. sphóngos/spóngos 'sponge', Lat. fungus 'fungus', and Arm. sung/sunk 'fungus', the last two with the same semantic development as is seen in OE swamm 'mushroom'.

§6.3. Summary

The words that have been discussed in this chapter are those which, in my opinion, could most reasonably be seen as attesting original variation between voiced non-aspirates and voiced aspirates; indeed, they have been listed as such in a standard reference work (Pokorny 1959). I did not include cases such as Lat. trahō vs. Gmc. drag-, interesting though they are, simply because the topic under
consideration is strictly voiced non-aspirate vs. voiced aspirate variation. At the same time, I have not included every possible hypothetical cognate set which might be used as evidence for consonant variation of this type. For example, I did not mention Gk. *thēos* vs. Lat. *deus*, etc., since it is universally accepted that these words do not reflect the same PIE root. Of course, other hypothetical cognates which I have omitted may be less certainly spurious than the *thēos/deus* example. Therefore, omission should not be taken to mean that I dismiss any particular hypothetical cognate set out of hand. However, in such cases, I probably would regard the putative relationship as sufficiently dubious, at least at our present stage of understanding, that the putative cognate set could not be regarded as good evidence for any PIE consonant variation.
§7.1. The So-Called Sabine \( l \)

In an early article in *Indogermanische Forschungen*, R. Seymour Conway argued that the \( /l/ \) occurring in Latin in place of expected \(/d/\) in words such as *lingua* ‘tongue’ and *lacrima* ‘tear’ was attributable to lexical borrowing from the Sabine language (Conway 1893). Conway’s thesis has been generally rejected (Leumann 1977:155-156), not least because there is no good evidence of a change of PIE *\(^d\)* to Sabine \( /l/ \) (Buck 1933:123). However, in the absence of any other agreed upon explanation for these divergent examples, the term ‘Sabine \( l \)’ is still used in reference to them despite its inappropriateness.

Other explanations have of course been proposed. Analogy is a favorite suggestion in some cases: thus Walde (1910:433) and Ernout and Meillet (1951:642) state that the \( /l/ \) of *lingua* is analogous to that of *lingō* ‘lick’. The problem with analogical explanations, which are often restated approvingly in later works (e.g. Hilmarsson 1982:356), is that they turn what looks like a single fairly orderly phonological development in Latin into a haphazard group of unrelated analogical changes, all of which only coincidentally involve \(/d/ > /l/\). This strains credulity; and the strain becomes even greater when we note that the very words which show this aberrant development in Latin are very frequently aberrant in the other Indo-European languages as well. Conway’s borrowing theory did treat the change of \(/d/ > /l/\) as a single process, but it did not incorporate data from other branches of IE.
An example of the converse tendency is Hilmarsson’s (1982) investigation of IE words for ‘tongue’, which deals with the evidence for a particular root in all of the IE languages but fails to note that the problems of the initial consonantism in this root are strikingly similar to those of other roots, such as ‘tear’ and ‘brother-in-law’.

Schrijnen (1914) and Lehmann (1986b) stand in sharp contrast to other works. The authors consider a number of roots both in and out of Latin and attempt to discover a common if not unitary explanation for the unusual developments. Schrijnen, who is chiefly interested in rebutting Conway’s article and so deals mostly with the Latin developments, proposes that /l/ is the regular development in Latin of PIE *dl. One result of this approach is that Schrijnen discusses in some detail a number of pairs found only in Latin, such as dautia/lautia (1914:379), which I treat only briefly and as a group below. But this focus on Latin also leads to the principal weakness of his paper, namely, his apparent failure to appreciate how many of the words for which he posits *dl are problematic throughout the Indo-European languages, not just in Latin, even though he does cite comparative data from other languages to support his argument.

Lehmann, on the other hand, recognizes the cross-linguistic nature of the problem and provides a large data set which includes most of the examples that I deal with below. He further recognizes that the alterations involved are sporadic and non-regular, but that they still demand a common explanation. Lehmann’s explanation is based on acceptance of the glottalic theory of Indo-European consonantism, in which either at the PIE stage or perhaps at some pre-IE stage, the
traditional *d would have actually been a glottalized voiceless dental /t/. Lehmann
cites studies showing that glottalized stops are frequently subject to sporadic
modification or loss (1986b:484), particularly in clusters. Hence, the aberrant data
cited above are to be expected with, and in fact are evidence for, a reconstructed
system with *t' in place of *d.

There are several problems with Lehmann’s arguments. Swiggers (1989:180)
states that glottalic stops are typologically very stable, not unstable. However, I will
not delve any further into the typological arguments but will concentrate instead on
the historical and comparative aspects of the problem. One difficulty is how, in
Lehmann’s analysis, we are meant to interpret the attested d vs. l variations of Latin.
Presumably they are supposed to show different dialectal reflexes of *t’, since
Lehmann does not seem to interpret the orthographic d of Old Latin as representing
a long-surviving /t/. If this reading is correct, then for Latin, Lehmann essentially
resurrects the Sabine, that is, dialectal l theory but gives the dialectal divergence a
phonetic rationale. The phonetic basis makes the borrowing theory more respectable,
and in fact I do not necessarily rule out dialect borrowing myself, as will be seen
below. But I suggest what seems to be a better phonetic basis for the dialectal
divergence, as well as suggesting an alternative, non-dialectal explanation for the
Latin variation.

To return to Lehmann’s thesis, the most serious difficulties with it are as
follows. First, if all glottalized stops are unstable, we are surprised not to see the
same sort of modifications with the glottalized velar series throughout Indo-European
as we supposedly see with the dentals. Second, the pattern of dental variations involves mostly /d/, /l/, /dl/, /gl/, /dr/, and zero. We might expect /t/ to interchange frequently with /t/, but only the Celtic words for ‘tongue’ (e.g., OIr. teng) present clear evidence for such an interchange. Third, and this is the most significant objection, there are any number of PIE roots with *d (or *t’) where the *d is reflected normally throughout the family; e.g., *deO- ‘give’ or *deiw- ‘bright sky, god’. In sum, the evidence indicates that it was not the glottalization putatively associated with a certain variety of stops that provoked the widespread and hitherto confusing variety of modifications which we are dealing with here. This is not to say that the dental stop in question could not at some stage have been *t’, only that this supposition ultimately does not explain the variations attested in the data. It is to the data, and an alternative explanation, that we now turn.

§7.2. The Data

The data below are listed in the same alphabetical order as is used in Pokorny (1959). PIE forms are cited essentially according to Pokorny’s reconstructions, with some modifications based on laryngeal theory. A question mark before a form indicates that its relation to the cited base is uncertain.

*dāiwer ‘husband’s brother’

<table>
<thead>
<tr>
<th></th>
<th>#d-w-</th>
<th>#d-g(w)</th>
<th>#l-g(w)</th>
<th>#l-w-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skt.</td>
<td>devár-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OE</td>
<td>tācor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lat.</td>
<td>lěvir</td>
<td>lěvir</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Gk. daēr            OHG zeihur       Lith. làigonas
Lith. dieveris           ‘wife’s brother’
Latv. diēveris
OCS dēveri    
Arm. taigr

Note: the /w/ of Lat. levir could derive from *gʷ or *w.

*daŋru- ‘tear’

<table>
<thead>
<tr>
<th></th>
<th>#d-</th>
<th>#l-</th>
<th>#g-</th>
<th>#dr-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gk. dákru</td>
<td>Lat. lacruma,</td>
<td>Skt. ášru-</td>
<td>OHG trahan</td>
<td></td>
</tr>
<tr>
<td>OLat. dacruma</td>
<td>lacrima</td>
<td>Av. asru-</td>
<td>OS pl. trahni</td>
<td></td>
</tr>
<tr>
<td>(F.)</td>
<td></td>
<td>Lith. ašarà</td>
<td>Arm. artawsr,</td>
<td></td>
</tr>
<tr>
<td>OIr. dēr</td>
<td>Latv. asara</td>
<td></td>
<td>pl. artasuk’</td>
<td></td>
</tr>
<tr>
<td>Goth. tagr</td>
<td></td>
<td>Toch A ãkár,</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>pl. ãkrunt</td>
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</tbody>
</table>

*deleHgh-, dlonghos ‘long’

<table>
<thead>
<tr>
<th></th>
<th>#d(V)l-</th>
<th>#l-</th>
<th>#gl-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skt. dīrghá-,</td>
<td>Lat. longus</td>
<td></td>
<td>Alb. gjatë</td>
</tr>
<tr>
<td>cmp. drāghiyas-</td>
<td>Goth. laggs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Av. darəga-</td>
<td>Lith. ilgas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gk. dolikhós;</td>
<td>Latv. īgls</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
endelekhés  OPruss. adv. ilga
‘continuous’

? Goth. tulgus
‘firm’

OCS dlūgū
Hitt. pl. dalugaeš

*dḤghmós ‘oblique, aslant, athwart’

#d-  #g-
Gk. dokhmós  Skt. jihmá-

*dlikū- ‘sweet’

#dl-  #gl-
Lat. dulcis  Gk. glukús

*dŋhu, *dŋhwä ‘tongue’

#d-  #l-  #ŋ-  other
OLat. dínua  Lat. lingua  OCS języ-ků  Ved. juhú-
Goth. tggō  Lith. liežūvis  OPruss. insuwis  Skt. jihvā-
Toch A kāntu,  Arm. lezu  Av. hizvā-
B kāntwā  Osc. fangvam  OIr. teng
*glag-, *glak-, glakt- ‘milk’

#1-
Lat. lac, lactis

#g(Y)l-
Gk. gála, gálaktos;
poet. glágos
Alb. dhallë
‘buttermilk’

*od- (or *Oed-) ‘smell’

-d-
	-Gk. ózō ‘smell’, Lat. oleō ‘smell
	odmē ‘odor’
	Lat. odefaciō (F.)
	‘smell (trans.)’
	Lat. odor ‘odor’
	Lith. úosti ‘smell’
	Arm. hot ‘odor’

-l-
	-Lat. olfaciō
	‘smell (trans.)’
	Lat. olor ‘odor’
*sed-lo- ‘seat, chair’

<table>
<thead>
<tr>
<th></th>
<th>-dl-</th>
<th>-l-</th>
<th>-ll-</th>
<th>other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goth.</td>
<td>sitls</td>
<td>Lat.</td>
<td>solium</td>
<td>Laconian Gk. hellā</td>
</tr>
<tr>
<td>OE</td>
<td>setl</td>
<td>‘chair of state’</td>
<td>(H.)</td>
<td>ON setr</td>
</tr>
<tr>
<td>NSorb.</td>
<td>sedlo</td>
<td>Lat.</td>
<td>sella</td>
<td>OHG sethali, sedal</td>
</tr>
<tr>
<td>Gall.</td>
<td>sedlon</td>
<td></td>
<td></td>
<td>? OE sadol</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>‘saddle’</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td>? OCS sedulo</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>‘saddle’</td>
</tr>
</tbody>
</table>

In several examples, an Old Latin form with /d/ is attested alongside a Classical form with /l/. Not listed above are a few other examples of such variation in Latin without correspondence in other IE languages. From PIE *ped- ‘foot’ derives Lat. *impedīmentum ‘hindrance, baggage’, also attested by Festus as impellēmentum; possibly from *deru- ‘firm; tree’ is larix ‘larch’; OLat. dautia ‘public entertainment of foreign ambassadors’, a word of uncertain provenance, is lautia in the later language; a few further possible cases are listed in Leumann (1977:155-156). Moreover, sporadic interchange of /d/ and /r/ is also attested in Latin, especially in Old Latin, where /ad/ in unstressed syllables before /l/ seems to have become /ar/ (Buck 1933:123, Leumann 1977:155). And of course, /l/ and /r/ interchange occasionally in Latin as in many languages, particularly for dissimilatory reasons as in Vulgar Lat. *pelegrīnus ‘foreign’ from earlier peregrīnus. Altogether, there are
indications that during the history of spoken Latin, /d/, /l/, and /r/ did indeed sporadically replace one another. But such interchange of various voiced alveodental consonants is more a characteristic of human speech in general than of Latin in particular. The few apparently genuine cases of this interchange in Latin should not keep us from trying to develop a general explanation for the several cases in which /d/ varies with /l/ not just in Latin, but in Indo-European as a whole.

§7.3. Indo-European *dl

The most reasonable explanation for these problematic Indo-European roots is that they contained original /dl/ clusters. The Indo-European languages in general, including Proto-Indo-European, have historically had little tolerance for clusters of alveodental stop plus /l/, particularly in syllabic onsets. In English, for example, the Native American language Tlingit has usually been pronounced /kIkɪt/ and frequently spelled with a {k}. The cluster is less of a problem for English speakers intervocally, as in Tenochtitlán, where the English speaker simply syllabifies the word as /te.noč.titlan/ rather than /te.noč.ti.tlan/. But what is true of English has been generally true of other Indo-European languages as well: clusters of alveodental stop plus lateral are rare or nonexistent in syllabic onsets, particularly word-initially. Greek, for example, has only *tla- ‘endure’ < *tela, *thli- ‘press, rub’, and *thla- ‘crush’. Latin, like most of the other languages, has no such word-initial sequences, although it permits a few instances of word-initial /stl-/ as in OLat. *stlīs ‘strife, dispute, lawsuit’, although this fairly common word was reduced to *līs by the
Classical Latin period. Russian has */#dl-/ in various words related to the core meaning ‘long’ as well as in the very common preposition *dla ‘for’, but even within the Slavic branch, many of the languages have eliminated such clusters since the Common Slavic period, intervocally as well as initially (Shevelov 1964:202).

In any case, Common Slavic would have had few such initial clusters to begin with, since PIE had approximately as little tolerance for them as most of its descendants, as a brief glance at Pokorny (1959) will show. Nevertheless, such clusters must have arisen from time to time in the language when, for example, roots of a form such as *del- received an accented suffix and the zero-grade of the first syllable resulted.

In fact, we have one certain example of a base with initial /dl/, namely the /gh/-suffixed root *del- ‘long’. Various forms of the suffixed base are attested but the consonantal sequence *d-l-gh- remains clear. Of particular interest are the Latin, Germanic, Slavic, and Baltic forms. Lat. longus and Goth. lags are generally accepted as stemming from a nasalized form *dlonghos, with simplification of the initial cluster from /dl/ to /l/. This simplification could be a separate development in Germanic and Italic, but it could also be a development of the PIE stage.

As for the Balto-Slavic forms, they descend, like the Indo-Iranian cognates, from a base with a syllabic resonant followed by a laryngeal whose presence is indicated by the grave accent on Lith. ilgas (Watkins 1965:117). The problem of PIE sequences of the type CRHC- has already been discussed in §3.2.4 in connection with Gk. gnathos ‘jaw’. To repeat the conclusion reached there, we are not justified in
being dogmatic about the pronunciation of a word such as *dlHghós, which begins with a sequence of four phonetically contoidal elements, in either Proto-Indo-European or in Common Balto-Slavic. There was presumably some sort of sonority peak associated with the *IH sequence, but the actual phonetics are unreconstructable and probably varied from one period and area to another, and even from speech situation to speech situation. In the attested Balto-Slavic languages, of course, the *I has ultimately been vocalized, but its different reflexes as VR in Baltic versus RV in Old Church Slavic should make us wary of claiming too much certitude as to its pronunciation in Common Balto-Slavic. We can say, however, that the pre-stress position of the sequence *dlHgh- would reduce the overall phonetic sonority of the first syllable and emphasize the consonantal rather than the vocalic nature of the *I.

If these phonetic speculations seem dubious, it should be remembered that they are simply an effort to make phonetic sense of an undoubted historical fact. That Lith. iltgas and the other Baltic words descend from PIE *d-l-gh- is certain; hence it is also certain that the *d- of Proto-Balto-Slavic *dlHghós has been lost in Baltic. Evidently, Baltic languages have little tolerance for initial /dl/ clusters even when the /l/ in question is called syllabic by historical linguists.

At this point, I should clarify what I mean by saying that these languages have little tolerance for /dl/ sequences. By way of comparison, consider the case of sequences of voiceless fricatives in English. The sequence /fθ/ is disfavored; it occurs in the some pronunciations of the word diphthong, but even for this word, the
pronunciation /pθ/ and the spelling -pth- are common. /fθ/ never occurs word-
initially. Borrowed Greek words spelled with phth- are pronounced by those who
know them with initial /θ/, as in phthisis.

Somewhat less disfavored are the sequences /sθ/ and /sf/. The first occurs in
borrowed Greek words such as sthenia and myasthenia. In both of these learned
technical terms, the pronunciation /sθ/ is the usual one, even word-initially. On the
other hand, the less technical word aesthetic is pronounced by numerous speakers
with /st/ rather than /sθ/, despite its occurrence intervocally. The fact that the
word stress follows this syllable probably contributes to the sequence being treated
as a single onset cluster, rather than a sequence of coda and onset. In the common
words asphalt and atmosphere, by contrast, the /s/ belongs to the preceding syllable,
and the pronunciations /æspalt/ and /ætm spir/ do not occur. In syllable-initial
position, though, /spir/ instead of /sfir/ for sphere is common enough despite the
resultant homophony with spear, while /spIŋks/ can name an Egyptian statue as well
as a family of prizefighters.

All of the above sequences are rare in English and are to varying extents
disfavored. The most usual strategy for avoiding them is a hardening of one of the
phonemes to a stop. In phth- words, though, where a pronunciation with initial /pθ/
would be just as un-English as /fθ/, no effort at all is made to include an initial labial
element. Significantly, different strategies may be used by different speakers, or even
by the same speaker for different words or different phonetic environments. In Latin,
word-initial /tl/ generally became /l/, but intervocalic /tl/ shifted first to /kl/ and then
added an epenthetic vowel (Buck 1933:148). In English, a speaker who refers to the /kll₇gIt/ Indians might also, under the influence of spelling, speak of the Mexican state of /t laškala/, with epenthetic schwa. Nor must all words have some strategy of elimination applied to them. A classicist who says /sθino/ when referring to a certain Gorgon might well speak of the /estɛlɛk/ value of Euripides' plays. Thus, the elimination of disfavored sequences, whether they arise from borrowing or from natural derivational and word-formation patterns in a language, is frequently an irregular process. Such eliminations are an excellent example of sporadic phonemic substitution, as opposed to unconscious, regular phonetic change at the subphonemic level (see §1.3.1).

Of course, disfavored sequences need not be eliminated at all. In Russian, for example, initial /dl/ clusters seem to be perfectly acceptable, although they occur in only a few words. New clusters, like new phonemes, can be added to a language through borrowing as well as through internal development. The /$l/-initial clusters of English, mostly of Yiddish origin, show no signs of being eliminated. In fact, they are sometimes extended to native words, such as smear 'to defeat', as in We really shmeared you guys! Here the optional /$m/ pronunciation emphasizes the totality of the triumph.

Apart from Slavic, though, there is little evidence for toleration of alveodental stop plus lateral clusters in Indo-European languages. Classical Greek $lατ- 'endure' was lost by the Koine period. The aspirated stop of Classical /$#thl/ developed into a fricative /θ/ which remained in Biblical Greek, /θl/ being apparently less of a
problem than /thl/ since at least /θl/, like /l/, is a continuant. Many English speakers, on the other hand, reject even intervocalic /θl/, inserting an epenthetic schwa into *athlete and related words. For Proto-Indo-European, it is most probable that word-initial /dl/ was a highly disfavored sequence if the /l/ was non-syllabic or only mildly sonorant. /dl/ in other positions was also disfavored, but not to as great an extent. In all cases, we should expect some variation from language to language and also within each language in the development of the objectionable /dl/.

§7.4. Individual Developments

We will conclude by tracing the individual historical developments which gave rise to each of the forms in the data table above, in the order in which they are there presented. Each entry begins with a reconstruction that is more accurate than Pokorny’s.

§7.4.1. *dlāiwēr ‘husband’s brother’. Skt. devār-, Gk. daēr, Lith. dieveris, Latv. diēveris, OCS đeveri, and Arm. tāigr present no difficulties—all show reduction of initial *dl- to /d/ before a vowel. For the fact that Slavic reduced the cluster, in contrast to the Slavic treatment of *dlHghōs, note that in *dlāiwēr the /l/ is definitely part of an onset cluster rather than being a syllabic peak.

An explanation for the Proto-Germanic *k(k) of OE tācor and OHG zeihur is given by Lehmann (1952:47-52). Lehmann establishes the existence in several roots of a pre-Germanic paradigmatic alternation between forms with *w and forms with *k(k) or *g. In the case of the root meaning ‘husband’s brother’, Lith. lāigonas
indicates that the alternation was an Indo-European one between *w and *gʷ. For
the purposes of the present chapter, we need not consider the medial consonantism
further, but since the contrasting Lith. lágonas and dieverts are key for the initial
consonantism, I will discuss them in greater detail.

PIE *ai yields either /ye/ or /ay/ in Lithuanian; conditioning is somewhat
related to accent placement, but the change has been irregular in the same way as
that of Middle English /U/ to ModE / / or /U/ as in putt vs. put (Shevelov 1964:286).
Thus lágonas as well as dieverts reflects the original vocalism. The /g/ of lágonas
must be from *gʷ, the /n/ is evidence that this was an original r/n stem, and the /l/ is
a natural reflex of an initial *dl. As for the semantics, the original patrilocal Indo-
European society presumably had a word for ‘husband’s brother’ but not for ‘wife’s
brother’. In later Lithuanian society, a term for the latter became necessary or at
least desired. The development of two distinct but similar words for these two
distinct but similar meanings is exactly parallel to the development of French déjeuner
‘to eat lunch’ and dîner ‘to eat supper’ from the same Latin root. If we reject the
connection of lágonas with dieverts, then lágonas becomes a word of uncertain
etymology which simply happens to resemble other Indo-European words for
‘brother-in-law’.

Lastly, there is Lat. lēvir. Whether it descends from a form with *gʷ or one
with *w is a moot point, since both would give Latin /w/ intervocally. Indeed, if
a paradigmatic alternation between /gʷ/ and /w/ survived to Proto-Italic, it would have
been automatically levelled by regular sound change in Latin, though not in Oscan-
Umbrian. Unfortunately, this root is not attested in Oscan or Umbrian. In any case, the initial *dl cluster was reduced to /l/ in the Latin reflex of this word, which, as we will see, is the most usual result for such clusters in Latin, paralleling the uncontroversial reduction of word-initial *tl- to /l/ (Buck 1933:148).

§7.4.2. *drakru- ‘tear’. This is the proto-form suggested by Hamp (1972) in an insightful article which I discovered only after completing my own analysis. My conclusions are largely, though not entirely, in agreement with Hamp’s. Moreover, in his 1972 article, Hamp mentions an earlier paper, delivered orally at the 1962 LSA convention, in which he argued that Lat. lingua and longus both must stem from forms with initial *dl.

Gk. dákru, Olr. dér, and Goth. tagr all show natural dissimilation of /t/ in two successive syllables. The second /i/, rather than the first, was eliminated to produce OHG trahan, OS trahni, which thus retain the same *dr- onset as underlies Arm. artawsr.

There are several problems with OLat. dacruma, Lat. lacruma, lacrima. One is that the suffix -ma is relatively rare in Latin, leading to the supposition that the Latin word is borrowed from an attested Gk. dákřma (Leumann 1977:319, Lehmann 1986a:338). But dákřma is a rare word in Greek, the usual words for ‘tear’ being dákru and dákruon, and moreover it has a long /ũ/ as opposed to the short /u/ of OLat. dacruma. Furthermore, ‘tear’ is not the most likely candidate for cross-language borrowing. Lastly, Hamp (1972:296) offers a purely Latin explanation for the -ma of dacruma. This explanation is too lengthy to bear repeating here,
especially insofar as at least one other undoubtedly IE word in Latin, \textit{fāma} ‘rumor’, has the \textit{-ma} suffix, as do a number of other words of uncertain origin (Leumann 1977:319). Whatever the origin of the \textit{-ma} on \textit{dacruma}, calling the word a Greek borrowing creates more serious difficulties than the one it supposedly solves.

Having ruled out borrowing, we see that the Latin words are derived most easily from an earlier base *dla\kru-. Here the dissimilation of the \textit{r}...\textit{r} sequence has resulted in an \textit{l}...\textit{r} sequence, a common enough occurrence, but one which in this case has created the disfavored *dl-. There are two plausible explanations for the variation between OLat. \textit{dacruma} and later \textit{lacruma}. First, the *dl- cluster may have developed differently in different Latin dialects. This explanation is not unlike the old ‘Sabine \textit{l}’ theory, except that it explains why certain words, and not others, would develop \textit{l} in some individuals’ speech and \textit{d} in others. The other explanation would be that *dl- had developed by the Old Latin period into a unit phoneme /d\text{\textup{\textcircled{\textbf{l}}}}/ or /d\text{\textup{\textcircled{l}}}/ which was spelled simply as \textit{d} by some speakers, possibly as /l/ by others. Given the scanty attestation of forms such as \textit{dacruma, dingua}, etc., some of which are found only in Festus via Paulus Diaconus, we can hardly be certain of their phonetics. Nor should we be surprised to see a phoneme /d\text{\textup{\textcircled{\textbf{l}}}}/ or /d\text{\textup{\textcircled{l}}} being spelled in the same way as a distinct phoneme /d/. After all, Old Latin writing did not distinguish between /k/ and /g/, despite the fact that the latter phonemic distinction carried a much higher functional load than a /d\text{\textup{\textcircled{\textbf{l}}}}/ or /d\text{\textup{\textcircled{l}}} vs. /d/ distinction would have carried.

\textit{Skt. āscr-, Av. ascr-, Lith. āṣarā, Latv. āsara,} and Toch A ākār show no trace of initial *dr- or *dl-. They have been explained somewhat dubiously as analogous
to *aŋro- ‘sharp, bitter’ (Pokorny 1959:179). More promisingly, they have been connected to Hitt. ışahru ‘tear’ as descendants of a common root *Aeŋru, with s-mobile and assimilation of *k to /h/ in the Hittite word (Mayrhofer 1992-95:1.138). If this idea is correct, then the *dr- of *draŋru- would be a either a prefix or the reduced first half of an ancient compound. On the other hand, Indo-Iranian, Baltic, and Tocharian might all reflect the same base *dlaŋru- as witnessed by Latin, with the complete loss of *dl- found also in Balto-Slavic words for ‘tongue’. This solution is the more plausible one if Indo-European had a period of common development after the splitting off of Anatolian. The Hittite lack of *dr- could represent the original state, but for common, non-Anatolian Indo-European, we would reconstruct the *dr- and account for its loss as a later development.

All of this is uncertain. Probably the best course is that of Hamp, who states, ‘We must simply recognize that the Hittite form is highly ambiguous...though admittedly the congruence is alluring’ (1972:298-299). At least for Greek, Latin, Celtic, Germanic, and Armenian, a reconstruction *draŋru- is well established, with various changes resulting from dissimilation of the r...r sequence.

§7.4.3. *deleHgh-, *dloHnghos or *dleOnghos ‘long’. This word has already been discussed above. Goth. *tulgs ‘firm, steady’ may well be from this root in the form *dlHghós, with a semantic development via ‘long-lasting’ (Lehmann 1986a:349), the latter meaning certainly being represented in Gk. .Syntax: ‘continuous, persistent’. Also possibly belonging here is Lat. *indulge ‘be forbearing, be patient, indulge’, as if from ‘long in patience’ (Ernout and Meillet 1951:563). Both *tulgs and
indulgeo would show a development of *dlHghós in their respective languages
different from that of *dlonghos/*dlOnghos.

Alb. gjatë 'long' is accepted by Huld as a development of *dlHgh- with the
addition of an Albanian suffix -të (1983:68). This probably reflects an early
replacement of *dl- by *gl- followed by the /l/ to /y/ shift typical of postconsonantal
laterals in Albanian (Huld 1984:150).

The unexpected /l/ vowel in Gk. dolikhós might be attributable to metathesis,
a solution which would also account for the otherwise missing laryngeal in the Greek
word. An original form *dlOghós could have developed an epenthetic schwa
secundum between the /d/ and the /l/, which would have led to a pre-Gk. *dilokhós
(see Hirt 1927:79-80 on schwa secundum in Greek). This hypothesis, if valid, would
certify that the laryngeal of this root was o-coloring. It is supported by the short *o
attested by Latin and Germanic, which could result from a proposed regular
shortening of ÆR to VR in prestressed position in Italic, Celtic, and Germanic
(Beekes 1988b:91). But of course, the attested /o/ might simply be apophonic.
Furthermore, Gk. endelekhes would seem to reflect a root *delEghós (cf. Beekes
1969:237-238). The color of the laryngeal therefore remains uncertain, as does the
exact history of dolikhós.

§7.4.4. *dlHghmós 'oblique, aslant, athwart'. The semantic and formal
resemblances of Gk. dokhmós and Skt. jihma- are too great to be attributed to
chance, nor does the word formally look like a borrowing from some non-Indo-
European language. In fact, it bears a strong resemblance to the preceding root,
*deleHgh- 'long', although *deleHgh- has a plain velar final stop as opposed to the palatovelar of jihmä-. The semantic development is natural enough: 'lying lengthwise' to 'lying slanted' to 'oblique, aslant, athwart'. Gk. dokhmós indicates an o-coloring laryngeal, possibly also suggested by Gk. dolikhós, Lat. longus, and Goth. lags, as noted above. Moreover, there exists a Greek word dokhmē/dókhmē 'hand's breadth', connected by Liddell and Scott (1968:447) with dékhomai 'to take', but by Frisk (1973:1.413) with dokhmós. The further connection with *deleHgh- 'long' demonstrates that Frisk's proposal is more nearly correct, though he regards dokhmē as a late derivative of dokhmós. In fact, dokhmē, a measure of length, is much closer semantically to *deleHgh- than are dokhmós and Skt. jihmä-. The relation should therefore be sought at the Indo-European level rather than that of Greek.

As for the phonological developments, the reduction of *dl- to *d- reflected in the Greek words is non-problematic. For Sanskrit j-, a variety of plausible developments could work; e.g., /dl/ > /d̪l/ > /d̪l̪/ > /jl/.

§7.4.5. *dlkā- 'sweet'. Syllabic *l is sometimes represented in both Latin and Greek by /ul/, as also in Lithuanian (Buck 1933:105). Greek syllabic liquids preconsonantally may show up as either /VR/ or /RV/. Gk. glukás has the second of these, as well as a natural change of *dl- to /gl/. The usual suggestion that the /gl/ of glukás results from assimilation to the /k/ of the second syllable (Frisk 1973:1.314) is plainly unnecessary. Lat. dulcis, of course, derives simply from *dlkw-is, with vocalization of the syllabic liquid.

§7.4.6. *dlnghu, *dlnghwā 'tongue'. Of all the words in question, this one has
the most divergent set of reflexes, which has frequently led to the supposition that it has been subjected to taboo deformation (e.g., Mayrhofer 1992-95:1.592; Lehmann 1986a:349). This may well be true, but at least some of the oddities can be explained without resort to such a mechanism. OLat. *dingua, Lat. *lingua, and Goth. *tuugo are easily derived from *dln̥hwā with alternate simplification of the *dl- onset; for the d of OLat. *dingua, cf. the discussion of dacruma above. Toch A kāntu, B kāntwā show simplification of *dl- to *d- followed by metathesis of the *d- and *gh- (Pisani 1937).

An alternative explanation for the l of Lat. *lingua, as well as those of Lith. lietūvis and Arm. lezu is separate analogy in each case with the language’s word for ‘lick’ (Pokorny 1959:223). This is formally as well as semantically plausible, since the respective words for ‘lick’ are Lat. lingō, Lith. liežti, and Arm. lizanem. But the explanation becomes even more plausible if we consider that there was also a phonological impetus for remodelling the onset of ‘tongue’, namely the general tendency to eliminate *dl-. As for the date of the change, we cannot be certain that forms with *l- arose separately in the three languages. They could all represent an Indo-European by-form preserved in these three languages even though close relatives have different forms, such as OPruss. insuvis vs. Lith. lietūvis or Osc. fangvam vs. Lat. *lingua.

In OPruss. insuvis and OCS jézy-kāi, the initial consonant cluster has entirely disappeared, a development also seen in the words for ‘tear’ in several languages. Osc. fangvam seems to have reduction of *dl- to *d- followed by shift of aspiration
from *dṅḥwā to *dṅṅwā (Hilmarsson 1982:356). A further difficulty is the -an- of *fvangvam, which is not the usual preconsonantal reflex of short syllabic *n in Oscan (Buck 1928:64). It might be the reflex of long syllabic *n, that is, of interconsonantal *nH, but there are only a few other suggestions that this root contained a laryngeal.

One such suggestion is in Skt. jihvā-. If jihmā- 'athwart' derives from *dlHńskmōs 'long', as proposed above, then in jihvā- we would have the same development of *dl- to j- and *H to i, the latter of which is the regular Skt. development of laryngeals. But Vedic juhā- does not fit easily into this solution, nor does either Old Indic form reflect the nasal attested elsewhere. Av. hizvā- only complicates the situation, since it seems to point to a proto-form *sṅṅhwā. Taboo deformation may be involved here, but the changes may also partly reflect the articulatory infelicity of a word-initial sequence *dln(H)gh-.

The Celtic initial t as found in OIr. teng is yet another problem. It has no convincing explanation, although several proposals have been advanced (see Hilmarsson 1982:356-357 for details). For Alb. giuhē, Huld (1984:71) mentions a number of proposals, of which the most reasonable are that it was borrowed from Gk. glōssa, that it derives directly from *dṅṅhwā, or that, like the Tocharian words, it derives from a modified and metathesized form *ṅṅndwā. Although Huld settles on the third proposal, the second seems just as likely, insofar as *dl- certainly yielded gi- in giatē 'long'. If the second proposal is correct, then the Albanian development was similar to that in Sanskrit.

Lastly, there is Gk. glōssa (Attic glōttā), which is usually compared to glōktēs
'projecting point' (Liddell and Scott 1968:353); glôssa would be the regular Greek reflex of pre-Greek *glôkhi-a. Pisani (1954) proposes an ultimate connection with PIE *dlngh-. The loss of postconsonantal /w/ is normal for Greek, and the long /ô/ would indicate a laryngeal in the root, as may also be the case with the Oscan and Sanskrit reflexes. All the same, it is a long way from *dlngh- to glôssa.

In the light of Ionic glôssa, in fact, we might be tempted to reconstruct pre-Greek *dloAghi-/*dAgih-, if we accept, as I think we must, that *CRHC- roots could develop into Greek through *CRHÇ as well as through *CRHC- (see the discussion of glôssa/glássa in §3.2.4). With this reconstruction, the Greek words look fairly similar to the root reconstructed above for 'long', although here we would have an indication of an a-coloring laryngeal, whereas for 'long' we saw conflicting evidence for either *O or *E. Semantically, a connection between 'long', 'projecting point', and 'tongue' is not excessively far-fetched. But this is all vague and speculative, and since the focus of this chapter is on PIE *dl- clusters rather than the specific histories of words such as glôssa, I will not delve further into the the latter topic. After all, it remains entirely possible that glôssa is simply unrelated to the words for 'tongue' in other IE languages.

On the whole, the 'tongue' root is an extremely difficult one for the Indo-Europeanist. Hilmarsson (1982) is the most recent attempt to deal with it, and although I disagree with his conclusions, his discussion is clear and comprehensive, as is his bibliography. The article's chief weakness is that it treats the root in isolation despite the similarity of some of the changes to those of other words.
§7.4.7. *dlakt- ‘milk’. The pre-Greek root was most likely *glakt- (Frisk 1973:1.284). Therefore, *dlakt- is the most reasonable form to reconstruct based on the Greek and Latin cognates. The more usual suggestion that Lat. *lac derives from *glakt- requires an inexplicable change of *gl- to Lat. /l/-/. Since both *d- and *g- could develop into Alb. *dh- (Huld 1984:143-144), Alb. dhallë ‘buttermilk’ could come either directly from *dlakt- or from an intermediate form *glakt-, the latter preferred by Huld (1984:57). In any case, the objectionable obstruent plus liquid cluster was eventually eliminated by vocalization of the liquid in Albanian.

There is more to the story of ‘milk’, however, and since the data are given in standard reference texts we should mention them here. Frisk (1973:1.284) and Pokorny (1959:401) note the existence of an Old Chinese word *lac, evidently derived from earlier *glak or *klak, with the meaning ‘kumiss’, which is fermented mare or camel’s milk. Frisk further cites several other Asiatic words of vaguely similar form and meaning. Closer to home, both nouns and verbs meaning ‘milk’ from a root *melğ- or *melk- are very widespread in Indo-European (Buck 1949:385-386); the partial consonantal similarity to *dlakt- is plain. Ruhlen (1994:246-248,308-309) goes so far as to reconstruct a Proto-World root *maliq’a ‘to suckle, nurse; breast’. Although I have little sympathy for Proto-World proposals in general, Ruhlen does list several Afro-Asiatic and Uralic words meaning generally ‘breast, udder’, which is not too far semantically from the Indo-European words. However, while such data may be relevant for pre-Indo-European, we need not consider them further in this paper. As far as the immediate PIE ancestor of Lat. *lac, Gk. *gala, and Alb. dhallë
is concerned, we are safe in reconstructing *dlakt-.

§7.4.8. *Oed- ‘smell’. Here only Latin attests any variation. Furthermore, the variation is essentially between the noun odor with /dl/ and the verbs oleo and olfacio with /l/, since olor is attested only by Varro and olfacio only by Festus. The /l/ of the verbal forms may have arisen first in the compound *od-facio, with a shift of /od/ to /ol/ before /l/ similar to that of /ad/ to /ar/ before /l/ and later anological extension to intransitive oleo. Whatever the explanation, it is best not to reconstruct *Oed- when only Latin shows unexpected reflexes. We therefore reconstruct simply *Oed- and regard the development of /l/ in some forms as a purely Latin innovation.

§7.4.9. *sed-lo- ‘seat, chair’. Alongside this suffixed derivative of *sed- ‘sit’, there seems to have been a similar derivative *sedlo- which underlies certain Germanic words such as OHG sethal ‘seat’. Also, there is disagreement over whether the Germanic words for ‘saddle’ were borrowed from Slavic or vice versa, and further whether these are inherited words in either branch or later innovations. I will not treat these particular Germanic and Slavic words here; the interested reader may consult Pokorny (1959:886) and Lehmann (1986a:306).

Goth. sitls, OE setl, NSorb. sedlo, and Gall. sedan indicate PIE *sedlo- pretty plainly, with no remodeling of the intervocalic *dl. For Latin, intervocalic *dl is said to have yielded /ll/. But the only example of an inherited word with /ll/ < *dl, as opposed to purely Latin formations such alligare ‘to bind’ < ad-ligare, is the very word sella ‘seat’ which stands here in opposition to solium ‘chair of state, throne’ (Leumann 1977:199). Sella is definitely from *sed-lo, solium most likely so. In the
absence of other examples, it is best not to dogmatically state that PIE intervocalic
*dл went only to /ll/ in Latin. Rather, it went to either /ll/ or /l/. If the outcome was
conditioned, we can no longer determine the factors leading to each result.

Laconian Gk. ἡλλά is a perfect cognate for Lat. sella. Attic ἥδρα is also likely
from *sed-lo-, not from an r-suffixed form of sed- as suggested by Frisk (1973:1.444),
since only Old Norse and Greek have forms with /r/ while forms with /l/ are quite
widespread. So Attic ἥδρα and ON sætr both show a shift of this particular *дл to
*дr, plainly a sporadic change since it contrasts with the results in other Germanic
languages as well as in a different Greek dialect.

§7.4.10. *we...- ‘wet’. Lat. áligo ‘moisture’ next to údus ‘moist’ has often been
cited as another example of unexpected Lat. /l/ for *д, but I did not mention this case
above because there is actually little reason to connect áligo with PIE *wed-. There
are quite a number of PIE roots meaning ‘water, wet’, including *wed- (and its r/n-
suffixed derivatives), *wegw-, *welк- or *welг-, *wep-, and *wer-. Similar bases
include *weis- ‘flow’ and perhaps *wleкw-. The existence of a root *wleкw- reflected
in OIr. flлuch ‘damp’ and Lat. liquidus ‘flowing, fluid’ is probably correct (Walde
1910:435), despite its characterization by Ernout and Meillet as ‘médiocre pour le
sens’ (1951:645). It is difficult not to see a pre-Indo-European common root *we-
‘water, wet’. As for áligo, it is most likely connected with the *welг-, *welк-, *wleкw-
group. With so many roots similar in form and meaning, considerable analogical
influence is likely, so that it is probably pointless to try to find a definitive PIE
ancestor for áligo. However, there is plainly no good reason to insist that it be
related directly to ōdus.
§8.1. Typological Evidence

The PIE stops orders that were originally labelled Tenues, Mediae, and Aspiratae are traditionally interpreted phonetically as voiceless, voiced, and voiced aspirate stops, respectively. The fact that this interpretation posits voiced aspirates without voiceless aspirates has always been troubling, especially since Jakobson (1957:528) pointed out the extreme rarity of such systems typologically. Consequently, there have been numerous attempts to reformulate the traditional reconstruction. One of these reformulations, which has become known as the glottalic theory, has attracted considerable support since it was first advanced independently by Hopper (1973, 1977a, 1977b) and Gamkrelidze and Ivanov (1973).

The glottalic theory reconstructs the PIE Tenues as voiceless stops, the Mediae as glottalized ejective voiceless stops, and the Aspiratae as voiced stops. Naturally, there is no complete agreement among glottalic theorists as to the exact phonetic details of the reconstruction, but the system just described captures the essentials of the approach. This is a typologically normal stop system, widely attested in modern languages and therefore typologically more likely than the traditional reconstruction. Moreover, certain phonological facts about PIE have ready explanations under the glottalic theory:

(1) The Mediae were much less common in PIE than the Tenues and the Aspiratae, which implies that the Mediae were the most phonologically marked order.
This is a problem for the traditional reconstruction, since if the Mediae were plain voiced stops and the Aspiratae were voiced aspirates, we would expect the latter, being more phonetically marked, to be less common. However, if the Mediae were glottalized stops and the Aspiratae were voiced, then the more marked status of the former is both typologically and phonetically expected.

(2) The rarity of traditional *b in PIE is typologically normal if *b is reinterpreted as *p'. Greenberg (1970:127) points out that in languages with an order of ejective stops, labial /p'/ is typically rare or non-existent. The same is not generally true of /b/ in languages with voiced stops.

(3) Meillet (1937:173-174) notes that, by and large, the following phonotactic constraints apply to PIE biconsonantal roots. First, no root may both begin and end with a Media. Second, Tenues and Aspiratae do not occur in the same root, except when the Tenuis follows word-initial *s. Under the traditional reconstruction, these constraints result in the following inventories of permitted and prohibited root-shapes (the dental series is used as representative of all five stop series):

<table>
<thead>
<tr>
<th>Permitted</th>
<th>Prohibited</th>
</tr>
</thead>
<tbody>
<tr>
<td>*tet-</td>
<td>*det-</td>
</tr>
<tr>
<td>*ted-</td>
<td>*dhed-</td>
</tr>
<tr>
<td>*dedh-</td>
<td>*dhedh-</td>
</tr>
<tr>
<td>*tedh-</td>
<td>*dtedh-</td>
</tr>
</tbody>
</table>

It is difficult to find a convincing phonetic rationale for the root-structure constraints if we adhere to the traditional stop reconstruction. Consider, however, the inventory of root-shapes according to the glottalic theory:
Permitted

*tet-    *t’et-
*tet’-    *det’-
*t’ed-    *ded-
*t’et’-  *ted-

Prohibited

*det-

Under a glottalic interpretation, the two phonotactic constraints noted by Meillet can be understood as follows. First, no root may contain two glottalized stops, a constraint which is characteristic of languages with a glottalic order. Second, non-glottalic stops within a root must agree as to voice.

Taken together, these arguments for the glottalic theory seem fairly convincing—but each of them has been contested. To begin with the initial motivation for the theory, namely the oddity of the system /t d dh/, Hock (1991:625-626) states that a number of Indonesian languages have just such a system. However, Bomhard and Kerns (1992:2.4) dispute this claim. The issue is obviously one to be settled by specialists in those languages, but we can at least state that, even if the /t d dh/ system does occur, it is nevertheless typologically less usual than the /t’ d/ system posited by the glottalic theory.

Huld (1986:71-72) argues that overall frequency of occurrence of a consonant type cannot be taken as a correlate of markedness. He points out that Tenues and Mediae both occur in word final position in PIE, but that Aspiratae do not. Word-final position is frequently an environment for neutralization in language, and when an opposition is neutralized, it is the more marked phoneme which fails to occur. Thus, there is evidence that the Aspiratae were more phonologically marked than the
Mediae in PIE.

There have naturally been numerous attempts to explain the rarity of PIE *b outside the framework of the glottalic theory. The suggestion that pre-IE *b developed into PIE *w, and perhaps in some environments to *m, is particularly attractive (Sihler 1995:146-147). If the rarity of *b can be explained under the traditional theory as plausibly as under the glottalic theory, then it provides no solid basis for favoring one theory or the other.

To Huld (1986:71), the glottalic explanation of PIE root-structure constraints ‘is little better than Meillet’s original listing of forbidden shapes’. It is particularly significant that no examples have yet been provided of existing languages which manifest both a prohibition against co-occurrence of glottalic stops in a root and a requirement that non-glottalic stops in a root agree as to voice. Each constraint on its own is typologically normal, but the same cannot, at present, be said of a combination of the two constraints.

All of these arguments and counterarguments are synchronic in nature. That is, they are concerned with the system of phonemic contrasts and phonotactic constraints in PIE rather than with how this system developed in the various daughter languages. The importance of reconstructing an articulatorily and typologically plausible proto-system cannot be denied. Indeed, typological considerations have always been present in reconstruction. For example, if we were to posit a separate PIE phoneme to account for every anomalous sound correspondence in the Indo-European languages, we could probably reconstruct a system with several hundred
distinctive segmental phonemes. Naturally, no serious scholar has ever done this, since human languages simply do not have several hundred distinctive segmental phonemes.

The problem with typological considerations in the case of the glottalic theory is that they seem to have revealed as much as they are likely to reveal. The synchronic-typological case for the theory is a strong one, but as we have seen, there are counterarguments to each of the major arguments in the theory's favor. And even if the typological case were stronger, it would still not be decisive without historical support. The traditional reconstruction of PIE stop orders is based essentially on historical rather than typological evidence. That is, the reconstructed manners of articulation are those which seem to be most plausible as the sources of the attested pronunciations in Indo-European languages. The glottalic theory, if it is to be accepted, must be able to account for the developments of stops in the descendant languages as plausibly or more plausibly than the traditional reconstruction. At the same time, it would be helpful, although not absolutely necessary, if the glottalic theory could provide plausible explanations for developments which cannot be easily explained under the traditional approach.

Lehmann's (1986b) attempt to explain the so-called Sabine \textit{l} is a notable example of the extension of the glottalic framework to historical problems. It represents exactly the sort of argument which is necessary to win ultimate acceptance for the theory. However, as I have indicated in §7.1, I do not find Lehmann's glottalic explanation of the Sabine \textit{l} to be convincing. On the other hand, my
reconstruction of *dl clusters is not in any way incompatible with glottalic theory, since *t'l clusters could just as easily be subject to modification as *dl clusters. But my explanation does demonstrate that the Sabine l cannot be taken as positive evidence for the glottalic theory.

The remainder of this chapter will be devoted to an evaluation of the glottalic theory in historical terms. The relevant historical developments include, but are not limited to, some of the changes that have been outlined in this thesis. Note that I do not mention Hittite in what follows, since it is not clear to what extent spoken Hittite may have maintained distinctions in manner of articulation among the stops. In my opinion, Hittite orthography does not make any distinctions as to manner, although some scholars have held that voiced vs. voiceless stops are sporadically differentiated (Held et al. 1987:9-10). But even if Hittite orthography does not consistently represent distinctions of manner, this does not necessarily mean that spoken Hittite had no such distinctions, since Hittite orthography is at best a highly inexact representational system. In the face of such uncertainty, it seems unwise to try to use Hittite evidence in determining the phonetics of PIE distinctions between stop orders.

§8.2. PIE *b or PIE *p'?

The rarity of PIE *b is explained under the glottalic theory as a typologically normal rarity of the glottalized ejective *p'. One *b/*p' which is well attested is the medial stop common to Skt. *pibati, Lat. bibō, OIr. ibim ‘drink’. These are reduplicated presents of the widely-attested root *pō-(i)-. The Gk. past participle
potós < *pHtós shows that we must reconstruct a basic root *peO- rather than *poH-(Beekes 1969:175-177); that is, the laryngeal *O rather than qualitative ablaut is responsible for the vowel quality.

Kurylowicz (1935:54-55) explained the medial /b/ of pštati, etc., as due to the influence of the laryngeal which would have been adjacent to the original *p in the zero-grade, thus pštati < *pi-pO-eti. Since the change of *pO to *b is found in Latin and Old Irish as well as in Sanskrit, it is presumably to be attributed to the PIE stage at the latest.

Hopper (1977a:70) notes that under the glottalic theory, the change of *pO to *b would be reinterpreted as a change of *pO to *p'. If *O was a glottal stop, then the root would have been *pe -, zero-grade *p -. The phonetic difference between a biphonemic sequence *p and a single phoneme *p' is obviously minimal, so that the change of *pO to *p' would be very phonetically natural, especially in a language which already had a glottalic stop order.

This analysis seems attractive, but it requires a very unlikely assumption that *O was a glottal stop. It is difficult to understand phonetically why a glottal stop would have colored an adjacent *e to *o. In fact, it is *E which has generally been interpreted as a glottal stop in laryngeal theory, because *E has no qualititative effect on any adjacent vowels. Bomhard and Kerns (1992:2.15) therefore reconstruct the 'drink' root as *peE- rather than *peO-. But the Greek evidence makes this impossible; nor is there any evidence at all for the full-grade *pē- < *peE-.

If the formula *pO > *b/*p' is correct, then it militates against the glottalic
theory rather than supporting it. *O was probably not a glottal stop, so that *pO > *p' is unlikely. This leaves us with Kurylowicz's original hypothesis, that *O was a voiced sound and that the preceding *p became voiced in contact with it. Of course, there is no guarantee that the basic development *pO > *b is correct. For example, it has been suggested that early PIE *b was devoiced word-initially (Beekes 1985:215 n.1). Although this explanation seems less likely to me than Kurylowicz's, it too favors the traditional over the glottalic reconstruction, since word-initial position is a natural environment for devoicing but is less obviously an environment for deglottalization.

PIE *b/*p' is firmly attested in the example just considered. However, in some other cases where it is attested across several branches, the root in question is probably not of PIE origin. One such cognate set comprises the words meaning 'apple' in a number of north European branches of Indo-European: OIr. aball, Welsh afal; Crimean Goth. apel, ON epili, OE æppel, OHG apful; Lith. obuols, Latv. abuols; OCS Jabli̇ko, general Slavic. Also possibly related is the name of the Campanian town Abella, mentioned in the Aeneid (7.740) as matišera 'apple-bearing', although in fact Abella seems to have been better-known for its hazel nuts than for its apples, since the Latin word for 'hazel nut' is the eponym Abellana.

The cited 'apple' words almost certainly do not reflect a common PIE root, for the following reasons. (1) The mere fact that the reconstructed root would have to contain the phoneme *b/*p' makes it non-canonical for PIE. (2) More significantly, there is no agreement across all the languages as to the vowel of either
the first or the second syllable. (3) The word is found only in a geographically contiguous set of languages in northern and western Europe; if *abella* is left out, then we are limited to northern Europe. (4) A word meaning 'apple' is semantically quite well-suited for borrowing. All of this makes it seem quite likely that the various words were all derived from a local, pre-Indo-European word meaning 'apple'.

The conclusion that the 'apple' words were borrowed creates a problem for the glottalic theory. Although the various IE branches are not uniform in their phonological representations of the word, neither are the representations terribly different. In particular, the correspondence between Germanic /p/ and Celtic and Balto-Slavic /b/ is a perfect one, exactly matching the other voiceless vs. voiced correspondences among those languages. From this evidence, the medial consonant in the source word must have been either *b* or *p*, depending on which reconstruction of PIE we favor.

Under the glottalic theory, then, we are required to assume the existence of a pre-Indo-European substrate in northern Europe which possessed glottalized voiceless labial stops, whereas the traditional theory requires only a substrate with voiced labial stops. The latter is plainly more likely. Not only are voiced stops in general far more common typologically than glottalized stops, but glottalized labials are even less common than other glottalized stops. Accepting the glottalic theory therefore forces us to propose a typologically less likely reconstruction of the substrate word for 'apple'.

A further difficulty involves the time of borrowing. The non-exactness of the
vowel correspondences across branches makes it unlikely that the 'apple' word was borrowed into a hypothetical Celto-Germano-Balto-Slavic dialect group. On the other hand, the close correspondence of forms within each branch makes it seem likely that the 'apple' word was borrowed during the common pre-Celtic, common pre-Germanic, and common pre-Balto-Slavic periods, rather than later into individual attested languages. Therefore, if we accept the glottalic theory, we are required to accept that PIE glottalic consonants were still phonetically glottalized in all three of these branches, since according to this theory only pre-Celtic *p’, pre-Germanic *p’, and pre-Baltic *p’ could yield Proto-Celtic *b, Proto-Germanic *p, and Proto-Slavic *b. In other words, we must assume that the glottalized stops remained in existence in these northern European branches of Indo-European, but that each branch then rather abruptly experienced a sound shift that eliminated the glottalization before the breakup of each branch into separate languages.

The coincidental nature of the elimination of glottalization becomes even more suspicious when we consider that we are required to posit several independent instances of the change of glottalized voiceless stops to voiced non-glottalized stops. Such a change is far less likely in phonetic terms than a change of glottalized voiceless stops to non-glottalized voiceless stops. We will return below to the question of whether [p’] > [b] is in fact attested in the history of any language. For the present, we simply note that if we assume persistence of the glottalized stops into the separate branches, as the 'apple' word seemingly requires us to do, then we must posit several separate occurrences of the unusual change *p’ > *b.
In the glottalic framework, the best means of escape from these unpalatable implications is to assume that the 'apple' root is PIE after all. Then the shift of *p' to *b could be a single dialectal shift represented in several branches of the family, whereas Germanic, which did not belong to the *p' > *b dialect, would simply show an unremarkable shift of *p' to *p. Of course, this would be a problem for those who hold that *p' was non-existent in Proto-Indo-European, but not for those who hold that *p' was simply very rare. We could even satisfy the former by reconstructing a phonemic sequence *p rather than a unitary glottalized stop *p'.

Thus, it is possible to account for the northern European 'apple' words in a glottalic framework. However, we have to strain to do so. On the other hand, there is no difficulty at all in accounting for them in the traditional framework. A substrate word with *b was borrowed into pre-Celtic, pre-Germanic, and pre-Balto-Slavic. The *b was retained as /b/ in Celtic and Balto-Slavic and shifted regularly to /p/ in Germanic. The relative simplicity and plausibility of this analysis is obvious. In short, north European 'apple' words constitute one piece of historical evidence in favor of the traditional reconstruction of Indo-European stop orders, as opposed to the typological evidence in favor of the glottalic theory.

§8.3. From Voiceless Glottalics to Voiced Non-Glottalics

The glottalic theory requires us to assume a development of voiceless glottalics to voiced non-glottalics in Indo-Iranian, Balto-Slavic, Hellenic, Albanian, Italic, and Celtic. Hopper (1977a:68) recognizes the difficulty:
The most serious obstacle in the way of the ejective interpretation of the Plain Voiced stops is undoubtedly the necessity to posit a widespread change in the Indo-European dialects from ejective to voiced stop. The loss of the glottalic feature is not an uncommon event in languages which possess ejectives (Greenberg, 1970:140), but by far the usual change is to a plain voiceless, rather than a voiced, stop.

Of course, we can imagine a series of phonetic changes that would lead from voiceless glottalics to voiced non-glottalics. Hopper mentions a possible though unattested path [t'] > ['d] > [d]. This path is plausible since a shift from ejective to preglottalized articulation entails a concomitant shift from voiceless to voiced (Greenberg 1970:125), and preglottalized voiced stops can develop into simple voiced stops. However, it is important to determine whether a change from ejective to plain voiced stops is actually attested in the history of any languages. Gamkrelidze and Ivanov (1973:154) state that it has occurred in some Caucasian languages. But Job (1989:129-130) notes that this claim is based on a disputed reconstruction of ejective stops in Proto-Nakh (Northwest Caucasian); it has been argued that a reconstruction of plain voiced stops better accounts for the sound correspondences involving voiced stops and glottalics in the Nakh languages. In other words, the Caucasian example of voiceless glottalic > voiced non-glottalic is just as hypothetical as the Indo-European one, and can hardly be regarded as a documented case of this phonetically dubious shift.
This is not to say that the sound change in question is impossible; the fact that a phenomenon is not known ever to have occurred does not mean that it cannot ever have occurred. However, the same caveat applies to the fundamental typological argument against the traditional IE stop reconstruction. The fact that a system with voiceless, voiced, and voiced aspirate stops is not known ever to have existed (since there is disagreement about the Indonesian examples) does not mean that such a system cannot ever have existed. Of course, the typological oddity of such a system makes it less plausible as a reconstructed proto-system. But the typological oddity of the change of voiceless glottalics to voiced non-glottalics makes us doubt that it would have occurred independently in the prehistories of the majority of the attested branches of PIE.

One obvious response to these doubts is to assume that the change did not occur independently, but rather, that a single change of glottalics to plain voiced stops occurred in a central region of the PIE dialect continuum. This proposal, mentioned above in connection with the north European ‘apple’ words (§8.2), is presented in Hopper (1981). If it is correct, then Germanic, Armenian, and Tocharian, which all have voiceless stops as reflexes of the PIE mediae, would be seen as peripheral dialects which did not undergo the single change to voiced stops of the central area. Later, each of these relic dialects underwent an independent and quite natural deglottalization of the ejectives to plain voiceless stops.

If there was a shift of ejectives to plain voiced stops in a central innovating dialect, then that dialect would have had the following stop system.
The aspiration in the third order could have been nondistinctive at an earlier stage, but as the glottalics shifted to voiced stops, this aspiration would have come to be the essential contrastive feature distinguishing the second and third orders.

The system posited for this dialect group is identical to that traditionally posited for PIE as a whole. The problem with it is, of course, that it is typologically abnormal. But if we assume a common stop system ancestral to Indo-Iranian, Balto-Slavic, Hellenic, Albanian, Italic, and Celtic, then the above system is unavoidable, since Indic, Hellenic, Italic, and Celtic all maintain the distinction between voiced non-aspirates and voiced-aspirates in at least some places of articulation. Thus, the original argument in favor of the glottalic theory, namely that it avoids positing the typologically bizarre system of voiceless, voiced, and voiced aspirate stops, appears not to be true, at least if we believe that there was a common shift of voiceless glottalics to voiced non-glottalics rather than several independent shifts.

A further weakness of the common shift analysis has already been discussed; namely, it requires us to accept that the north European words for ‘apple’ represent a genuine PIE root. Yet another difficulty is that the shift in question seems to be a lone isogloss for the hypothetical central dialect group. It is worth noting that there appears to be no consensus among glottalicists in favor of either the single-shift or the multiple-shifts analysis of the origins of attested IE voiced stops. Hopper (1981)
is devoted to arguing for a single-shift approach, as opposed to the multiple-shifts analysis tentatively suggested in Hopper (1973:162-163). But Bomhard (1981:357) strongly favors Hopper's original analysis:

The development of the glottalics into voiced stops in Indo-Iranian, Baltic, Slavic, Albanian, Italic, Celtic, and Greek must have taken place in the early prehistory of these branches themselves and not in the parent language. That is to say that we are dealing here with parallel developments and not a common innovation.

We need not delve any further into arguments for either of these analyses within the glottalic framework. The fundamental point is that if we adopt either of these two analyses as required by the glottalic theory, we are faced with difficulties that do not exist under the traditional theory of the PIE stop system, difficulties which revolve around the typological rarity of a shift of voiceless ejectives to plain voiced stops.

§8.4. Phonemic Mergers of Two or More PIE Orders

The arguments in the previous section were phonetic; that is, they revolved around the issue of the typological/phonetic naturalness of a hypothetical sound change. Phonemic developments also favor the traditional over the glottalic reconstruction. The Mediae and Aspiratae merged in Iranian, Slavic, Baltic, and Albanian, while remaining distinct from the Tenues. In Celtic the Mediae and Aspiratae merged in all series except the labiovelars, in Latin they merged word-
medially in most series under particular conditions which need not be spelled out here (Buck 1933:121,126).

By contrast, no branch of the family underwent a general merger of Tenues and Mediae to the exclusion of Aspiratae. Likewise, no branch experienced a general merger of Tenues and Aspiratae to the exclusion of Mediae. In Germanic, to be certain, Verner’s Law did bring about a partial, conditioned merger of reflexes of PIE Tenues with reflexes of PIE Aspiratae. But even under the glottalic theory, this must be interpreted as a late development, occurring after the spirantization of original PIE stops in pre-Germanic. It therefore cannot be taken as proof that the Tenues and the Aspiratae were particularly similar phonetically in the PIE period.

Tocharian is a special case. For the most part, it merges all three consonant orders into a single voiceless order. However, in the dental series, *t and *dh apparently merge in some circumstances to the exclusion of *d. Unfortunately, there is little agreement among experts as to what these circumstances were or how the synchronic Tocharian data reflect the prehistory of Tocharian (Winter 1962, Adams 1988:47 n.39, Ringe 1990:405). One development which is agreed upon is that *dy became simple /y/. Later, all three orders merged into a voiceless order. As part of this later change, the distinction between *dhy and *ty was lost, and both are eventually reflected as /ts/. This chain of events does not imply that there was any particular phonetic similarity between the voiceless stops and the voiceless aspirates. Rather, it simply implies that both were different from the voiced non-aspirates. If *d had not been lost before *y, the sequence *dy would also presumably have
developed to /ts/. Thus, the Tocharian merger of *t and *dh in this environment to the exclusion of *d results from a particular post-IE sound change in a prepalatal environment, not from any general phonetic similarity of PIE *t and *dh as opposed to *d.

As already mentioned, most other examples of Tocharian merger of *t and *dh to the exclusion of *d are disputed. Any which are valid may well be attributable to secondary developments like the one described above, since the general pattern of Tocharian is to merge all three orders unconditionally. Thus Tocharian, like Germanic, shows a partial, conditioned merger of Tenues and Aspiratae to the exclusion of Mediae only because of special circumstances arising from post-IE sound changes.

To recap, the pattern of phonemic mergers is as follows. Mediae and Aspiratae frequently merge to the exclusion of Tenues. Tenues and Mediae do not merge to the exclusion of Aspiratae, and Tenues and Aspiratae only merge to the exclusion of Mediae due to post-IE developments in a couple of branches. The obvious conclusion is that in PIE, Mediae and Aspiratae were more phonetically similar to each other than either was to Tenues. The glottalic theory simply cannot accommodate this conclusion. In fact, the glottalic theory posits exactly the opposite, namely that Tenues and Mediae shared the characteristic of being voiceless while Tenues and Aspiratae shared the characteristic of being non-glottalized, but that Mediae and Aspiratae differed in both voice and glottalization.

The patterns of phonemic merger are entirely in accord with the traditional
reconstruction, which states that Mediae and Aspiratae differed only in a single feature, aspiration. The fact that the distinction between Mediae and Aspiratae was less diachronically stable than that between Mediae and Tenues also makes sense; that is, a contrast between voiced stops and voiced aspirates could well have been less phonetically stable than a contrast between voiced stops and voiceless stops. And voiced aspirates would be particularly unstable in a language which had no corresponding voiceless aspirates. In fact, the Aspiratae do seem to have been the least stable order in PIE; at least, they have undergone the widest variety of developments in the descendant languages. This question of phonetic stability is an important one and will be discussed in detail in the next section. As for the phonemic developments of the PIE stop system in the descendant languages, they definitely provide evidence favoring the traditional over the glottalic interpretation of the system's phonetics.

§8.5. Diachronic Stability

Hopper (1973:157) cites Greenberg (1970:134) as stating that it is common for glottalic consonants to become deglottalized (Hopper [1977a:68] mistakenly cites page 140 of Greenberg [1970] for this observation). Greenberg does indeed state that glottalics 'undergo characteristic developments which often result in loss of the glottalic feature'. However, he goes on to say that his discussion and examples are 'basically limited to the injectives [emphasis mine, TJP], with some attention also to laryngealized sonants'.

If the glottalic theory is correct, then the low frequency of the labial glottalic requires that the Mediae be interpreted as post-glottalized, voiceless ejective stops, not as pregglottalized, voiced injectives/implosives. In languages with ejectives, the labial is always the most marked ejective stop and is frequently absent entirely. In languages with implosives, on the other hand, the velar implosives are the most marked series, the labials the least marked and most common. Among the PIE Mediae, the labials were plainly the least frequent series and may not have occurred at all, whereas velars are well-attested. Thus, the glottalic theory makes synchronic phonological sense only if the glottalized stops are interpreted as ejectives (Gamkrelidze 1989:119, 120 n.2). In keeping with these facts, Hopper has always assumed an ejective rather than an injective articulation for the PIE glottalics (e.g., 1973:155-156).

Since Greenberg’s discussion and evidence for loss of glottalic character are limited to injectives, the relevance of his article to the phonetic instability of the PIE glottalics is questionable. Lehmann (1986b:484) cites Greenberg (1978:257, 270) and Trubetzkoy (1969:145-146, 152ff., 155, 236, 264) alongside Greenberg (1970) in support of his statement that ‘glottalics are commonly subject to modification or loss’. However, the passages cited by Lehmann deal with certain specific synchronic facts about glottalics; e.g., they do not occur in clusters with voiced obstruents, they are typologically rarer than plain voiced and plain voiceless stops. The most relevant synchronic fact seems to be that glottalics are frequently neutralized synchronically in clusters, unaccented syllables, and non-initial syllables. But this synchronic fact
about the limited distribution of glottalics does not necessarily imply anything about the diachronic stability of glottalics in those positions where they do occur. In fact, Swiggers (1989:180) states that ejective articulation is typologically very stable, although he cites neither examples nor references in support of this assertion.

The question of stability is important because none of the attested Indo-European languages consistently reflects the PIE Mediae as ejectives. Some modern dialects of eastern Armenian do have ejectives as reflexes of Mediae, but this is due to the areal influence of Caucasian languages in which ejectives are common (Pisowicz 1976:38-39 quoted by Swiggers 1989:194-195 n.34). It can be argued that areal influence caused the retention of PIE glottalics in eastern Armenian (Hopper 1973:162). However, it seems more plausible that areal influence brought about glottalization of early Armenian plain voiceless stops in particular dialects.

If glottalics are stable sounds, then the fact that IE languages do not reflect the PIE Mediae as glottalics would seem to indicate that the Mediae were not glottalized in PIE. On the other hand, if glottalics are unstable sounds, then the attested languages still offer little support for a glottalic reconstruction of the Mediae. The IE languages reflect the Mediae in two ways: as plain voiced stops (Indic, Iranian, Hellenic, Italic, Baltic, Slavic, Celtic, Albanian) or as plain voiceless stops (Germanic, Armenian, Tocharian). We might have expected unstable sounds to develop in more than two directions in so many different languages. The difficulty increases if it is true that modifications to glottalics are typically sporadic, non-regular changes, as Lehmann (1986b:484) suggests. Aside from cognate sets whose
irregularities can be explained as due to disfavored *dl sequences, the evidence indicates that the Mediae developed quite regularly in the separate IE languages.

The PIE Aspiratae, in contrast to the Mediae, have quite a variety of reflexes in IE languages. In Sanskrit they appear principally as voiced aspirate stops or a murmured glottal fricative; in Iranian, Baltic, Slavic, Celtic, Armenian, and Albanian mostly as plain voiced stops; in Greek as voiceless aspirates; in Italic as voiced stops or as the voiceless fricatives /β/ and /h/; in Germanic as voiced fricatives or voiced stops; and in Tocharian as voiceless stops. This greater variety of reflexes could well indicate that the Aspiratae were less stable phonetically than the Mediae. At the same time, it would seem to indicate that the Aspiratae were more marked as an element in the PIE phonological system. That is, if the stop system of PIE was fundamentally imbalanced in terms of its manners of articulation, then that order which by its existence created the imbalance would seem to be the best candidate for phonetic alteration.

The traditional reconstruction has been criticized for positing voiced aspirate stops without corresponding voiceless aspirates, since such a system would have been imbalanced. But the historical evidence indicates that the PIE stop system was, in fact, imbalanced, and it further indicates that the Aspiratae were the principal cause of the imbalance. If we reconstruct voiceless non-aspirates, voiced non-aspirates, and voiced aspirates for PIE, then it makes perfect sense that the phonetics of the last order would have been altered everywhere but in Sanskrit, where the imbalance was addressed by the addition of a voiceless aspirate order to the system. But if we
reconstruct voiceless stops, voiceless glottalics, and voiced stops for PIE, then it is hard to understand why this essentially stable system has been altered in every attested IE language. It is especially difficult to understand why the plain voiced stops have undergone so many different alterations, while the presumably more marked glottalics have developed simply into voiceless stops or voiced stops in every language. In short, the relative instability of the Aspiratae compared to the Mediae, as well as the overall instability of the PIE stop system, support the traditional reconstruction of the stop orders.

§8.6. PIE Mediae + *A

In the previous two sections, we have seen: (1) that the PIE Mediae and Aspiratae were more similar to one another than either was to the Tenues; (2) that the Aspiratae were probably more phonetically marked than the Mediae, since they were more likely to undergo phonetic modification. These conclusions imply that the traditional reconstruction of the Mediae and the Aspiratae is correct; i.e., that the Mediae were plain voiced stops, and that the Aspiratae were voiced stops with a secondary articulation such as aspiration.

Evidence presented in Chapters 3 and 4 of this thesis indicates that the secondary articulation which characterized the Aspiratae was indeed aspiration, as per the traditional reconstruction. PIE Mediae plus the a-coloring laryngeal developed into Aspiratae separately but in parallel fashion in Greek and Indo-Iranian, and also probably in Germanic. *A can be identified as one or more
guttural fricatives by its vowel coloring effects, by the aspiration of voiceless stops that it produces in Sanskrit, and by its hardening to *k before *s. The development of Proto-Indo-Iranian *pA *tA *kA to Skt. /ph th kh/ indicates that *A was voiceless by PIIr. times, but it need not have been in PIE. In fact, it might not have been distinctively voiced or voiceless in PIE; note that *s, the only PIE fricative of whose phonetic realizations we are fairly certain, had both voiced and voiceless allophones depending on environment. In any case, the development of PIE voiced stops plus guttural fricatives to Aspiratae strongly indicates that the Aspiratae were aspirated voiced stops.

The changes described in Chapters 3 and 4 are difficult to comprehend if the glottalic theory is correct. A voiceless glottalized stop plus a guttural fricative does not seem likely to become a plain voiced stop. For Greek and Indo-Iranian, the development is only explicable under the glottalic theory if we assume an intermediate stage for each language's prehistory in which the system /t d dh/ existed. Note that we cannot assume /t th d dh/ for this stage of pre-Indo-Iranian, since the development of voiceless aspirates occurred after the change of *dA *gA *gA to *dh *gh *gh. Once again, in order to square the glottalic theory with the diachrony of separate branches of IE, it is necessary to assume the very stop system that the glottalic theory seeks to avoid.

The Germanic data are not quite as problematic for the glottalic theory. The Germanic /s/ reflected, for example, in OE bydme 'bottom of a ship' could stem from either a PIE Aspirata or, by Verner's Law, a Tenuis. For pre-Germanic, we could
easily assume under the glottalic theory an intermediate stage with the system /ʰ t d/; that is, the Tenues have become aspirated and, in a characteristic pull-chain development, the Mediae have become deglottalized and moved to fill the gap left by the shifted Tenues. If *A still survived as guttural fricative at this stage, then a change of Media to Tenuis would be an entirely natural change of voiceless stop plus guttural fricative to voiceless aspirate stop. On the other hand, it is possible to account for the Germanic development of Mediae plus *A just as well under the traditional theory by regarding it as entirely parallel to the changes in Greek and Indo-Iranian. The latter approach seems marginally superior, since it avoids positing an unparalleled change for a single branch of the family. But this consideration cannot be regarded as a decisive reason to reject the glottalic explanation for the development of Media plus *A in Germanic.

For Greek and Indo-Iranian, on the other hand, the development of Media plus *A provides positive evidence in favor of reconstructing the Aspiratae as voiced aspirated stops. The evidence also requires us to posit for each of these languages an earlier system with a three-way distinction among voiceless, voiced non-aspirated, and voiced aspirated orders.

§8.7. Interchange of Mediae and Aspiratae following Nasals

In §5.2, we noted that a phonetic rationale for specifically post-nasal deaspiration of voiced aspirates is not immediately obvious. A general tendency toward deaspiration of voiced aspirates is perhaps to be expected, and many of the
examples in Chapter 5 also seemed to show dissimilatory loss of aspiration in diaspirate roots, but why preceding nasals should have played a role was unclear.

Here, at last, is a case where the glottalic theory might provide a slightly better explanation of a historical phenomenon. Greenberg (1970:132) notes that in languages with glottalic stops, 'the unvoiced ejective occurs freely after a homorganic nasal and in some languages replaces an expected plain unvoiced stop or affricate in that position'. Hopper (1973:163) suggests as a possible pre-Greek consonant system one in which glottalics are retained, but the Aspiratae have developed into voiceless aspirates; i.e., in the dental series, we would have /t t' th/.

If this system existed in pre-Greek, then we could see the replacement of Aspiratae with Mediae documented in Chapter 5 as a typologically normal replacement of voiceless stops with ejectives following nasals. Granted, voiceless aspirates are not exactly the plain voiceless stops or the voiceless affricates specified by Greenberg as subject to replacement, but the difference is minimal. More troubling is the fact that pre-Greek plain voiceless stops do not seem to have undergone the same replacement. Still, the replacements which do occur can be attributed to a general phonetic/typological tendency under the glottalic theory. Perhaps there is also a typological tendency to deaspirate voiced stops following nasals, but I know of no evidence in favor of this hypothesis. On the other hand, I know of no evidence against it, either, and the general typological rarity of voiced aspirates suggests that such evidence as exists may not be statistically significant. Nevertheless, it appears that in the case of a single sporadic development in a single
language, the glottalic theory does offer a slightly better account than is currently available within the framework of the traditional reconstruction.

§8.8. Conclusions

On the whole, the historical evidence weighs heavily against the glottalic theory. This is certainly the case for all of the languages which reflect the PIE Mediae as voiced stops, including Greek, despite the interchange of Mediae and Aspiratae following nasals in this language. In fact, a system identical to the system traditionally posited for PIE seems unavoidable as an ancestral stage for all of the IE branches except Germanic, Armenian, and Tocharian (and Hittite). For all of the languages which do require identical ancestral systems, it is obviously best to reconstruct a single proto-system common to them all.

Whether Tocharian, Germanic, and Armenian reflect the same proto-system is another question. Since Tocharian has merged all of its stops into a single voiceless series, it provides little basis for a decision one way or another and will not be considered further here. Germanic and Armenian, on the other hand, keep all three orders distinct, and they do not reflect the PIE Mediae as voiced stops. As a result, some of the arguments presented above against the glottalic theory do not apply to Germanic and Armenian. The Mediae and Aspiratae do not merge in Germanic and Armenian, so that there is no particular evidence that Mediae and Aspiratae were phonetically similar in pre-Germanic and pre-Armenian. The Mediae appear in Germanic and Armenian as simple voiceless stops, which would be an
expected development from voiceless glottalics.

While derivation of the Germanic and Armenian stop systems from a dialectically separate stop system is plausible, it is not especially more plausible than derivation from the traditional system. Taking the familiar First Germanic Consonant Shift as an example, the first step under either reconstruction is a shift of Tenues, interpreted as voiceless stops, to voiceless fricatives, or perhaps first of all to voiceless aspirates and only later to fricatives. This change must have preceded the second step, the shift of Mediae to voiceless stops, whether the Mediae are regarded as glottalics or as voiced stops. Moreover, the principal motivation for the second step is the same in either theory, namely the gap created by the earlier shift of voiceless stops to voiceless aspirates/fricatives. In other words, we have here a classic example of a pull chain.

The shift of Aspiratae to voiced stops and voiced fricatives, with manner of articulation dependent on environment, is perfectly plausible whether we reconstruct the Aspiratae as voiced aspirates or as voiced non-aspirates. If the former, we can well understand the development to fricatives intervocally, while the natural shift to plain voiced stops word-initially would have been further motivated as the last step in the previously initiated pull chain. If the Aspiratae were originally plain voiced stops, then of course we would simply need to posit intervocalic spirantization, which is no more and no less plausible than the changes required by the traditional reconstruction.

In historical terms, then, there is no particular evidence in favor of the glottalic
reconstruction for Germanic and Armenian. On the other hand, there is little
evidence against it, and such evidence as exists, e.g., north European ‘apple’ words,
can hardly be regarded as decisive. As an additional argument against the theory, we
might note that Germanic and Armenian do not seem to be particularly similar
outside of their treatment of the stop system (Djahukian 1980). But isoglosses need
not overlap, especially if Germanic and Armenian were simply relic areas to which
this particular innovation did not spread.

The ambiguous position of Germanic and Armenian allows two possible
answers to the question of the validity of the traditional reconstruction of PIE stop
orders. The first is that the traditional system, which is required for languages other
than Germanic and Armenian, should be posited for Germanic and Armenian as well.
The second is that PIE proper should be reconstructed according to the glottalic
theory, and that the traditional reconstruction should be regarded as an intermediate
proto-system underlying languages other than Germanic and Armenian.

The second no less than the first of these options requires positing the
traditional system as ancestral to at least some IE languages. Thus, although the
glottalic theory was originally motivated by the desire to avoid positing such a system,
such a system is still required under the glottalic theory. However, the oddity of the
traditional reconstruction was not the only typological argument in favor of the
glottalic reconstruction. The rarity of the Mediae in PIE, the particular rarity of the
labial Media, and the constraints on root-structure all found reasonable explanations
under the glottalic theory. Examination of the historical evidence has not cast any
doubt on these latter arguments.

To summarize: the typological evidence supports the glottalic theory, but the historical and comparative evidence supports the traditional reconstruction. The likeliest explanation for this discrepancy is that pre-Indo-European had a glottalic system which shifted to the unstable Proto-Indo-European system as traditionally reconstructed. While this explanation does require an unusual shift from the stable glottalic system to the unstable PIE system, we have already seen that such a shift is necessary for some languages even if we posit a PIE glottalic system. Since there is no particular historical evidence in favor of the glottalic reconstruction as directly ancestral to Germanic and Armenian, and since there are a few indications that they, too, directly reflect the traditional system, it therefore seems best at our present state of knowledge to regard the shift from glottalic to traditional system as applying to PIE as a whole, not just to a central area excluding Germanic and Armenian. This is also the simpler hypothesis, and unless we find a cogent reason to reject the traditional reconstruction for Germanic and Armenian, simplicity requires that we assign the same proto-system to them as is common to all other IE languages.

Assumption of a pre-IE glottalic system might also account for seeming synchronic irregularities in PIE. For example, many linguists are convinced that a phoneme *b did exist in PIE, although it was rare (e.g., Mayrhofer 1986:99-100). This is not necessarily a problem for the glottalic theory, since the theory does not demand that *p' be entirely absent, although it often is entirely absent in languages with glottalized dentals and velars. However, if we assume a pre-IE glottalic system,
we can also hypothesize that *p' was entirely absent at that stage. The few examples of *b in the PIE system could then be attributed to borrowing. Assumption of a pre-IE glottalic system might also account for some recalcitrant examples of Indo-European consonant variation. Some of these might be cases of morphophonemic variation at the PIE level resulting from environmentally conditioned splits and mergers during the shift from the pre-IE glottalic system.

It remains to be seen whether the assumption of a pre-IE glottalic system will be a productive hypothesis for diachronic research. For PIE, on the other hand, assumption of a glottalic system is diachronically counterproductive. For the most part, the glottalic theory does not account for the historical development of the Indo-European languages very well, certainly not as well as the traditional reconstruction does. Where the glottalic theory does provide a satisfactory account, it is generally no better than that available under the traditional theory. Therefore, for PIE, the traditional reconstruction of the three stop orders is to be preferred to that posited by the glottalic theory.
Chapter 9—Conclusions

The principle goals of this thesis have been to enhance our understanding of the PIE consonant system and of the diachronic developments linking this system to those of the attested IE languages. It is customary in reconstructing PIE phonology to draw up charts such as the consonant inventory below.

| Stops: voiceless | p | t | k | k | kʷ |
| voiced           | (b) | d | ġ | g | gʷ |
| voiced aspirates | bh | dh | ġh | gh | gʷh |
| Fricative        | s |
| Laryngeals      | E | A | O (point of artic. uncertain) |
| Resonants        | nasals | m | n |
|                 | liquids | l,r |
|                 | semivowels | w | y |

Charts such as this one can plainly be only part of a phonological description, since they do not include information about phonotactics or subphonemic realization. Moreover, I have argued in §2.2 that phoneme inventories are in general problematic. Among other difficulties, they focus on units rather than contrast and reinforce the ‘once a phoneme, always a phoneme’ fallacy. Nevertheless, if we keep the weaknesses of the phoneme chart in mind, it can be useful as a reference point for
the discussion of particular issues in the reconstruction and later development of the proto-system.

Several particular issues have been dealt with in this thesis. The first of these, treated in Chapter 2, was the question of whether three or only two velar series should be posited for PIE. It is here that the phoneme inventory is most plainly inadequate in descriptive terms. If we limit ourselves to the listing of phonemes, then the chart given above, with three different velar series, is required. However, a more accurate description of the PIE system would be: (1) There was a three-way contrast in point of articulation among velar stops in certain environments in PIE, such as before liquids. (2) The contrast between palatovelars and plain velars was probably suspended in some other environments, such as before *o, where only the plain velar occurred alongside the labiovelar. (3) The contrast between plain velars and labiovelars was suspended following *u, where only the plain velar occurred alongside the palatovelar. (4) Plain velars and palatovelars were often in morphophonemic alternation with one another, indicating that the phonemic distinction between them had been subphonemic in pre-IE. (5) Plain velars were relatively rare, and the contrasts of plain velars vs. palatovelars and of plain velars vs. labiovelars carried a low functional load. The contrast of palatovelars vs. labiovelars, on the other hand, carried a relatively high functional load.

The above description is not only in accord with the comparative evidence; it also accounts for the developments of the velar consonant system in the Indo-European daughter languages. Since the distinction between palatovelars and
labiovelars was functionally significant, it was this distinction that was maintained when the system of three-way contrast was reduced to a system of two-way contrast in all of the descendant languages except Albanian. In some cases plain velars merged with palatovelars, in other cases plain velars merged with labiovelars, but in no language did labiovelars and palatovelars merge while plain velars remained distinct.

The second problem investigated in this thesis involved manner rather than place of articulation. Specifically, we looked at examples of variation between what are traditionally labelled as voiced unaspirated and voiced aspirated stops. The results of this investigation can be summarized as follows: (1) Variation between these two stop orders is well-attested, indicating that there was a fairly strong phonetic similarity between the two orders in Proto-Indo-European. (2) The specific nature of the phonetic similarity is indicated by the fact that sequences of voiced stop plus the a-coloring laryngeal were resolved into voiced aspirates in the prehistory of several IE languages, as demonstrated in Chapters 3 and 4. Since *A represents one or more guttural fricatives, probably pharyngeal or velar, the development *dA *gA *gA > *dh *gh *gh provides strong evidence in favor of the traditional phonetic interpretation of both the voiced non-aspirate and the voiced aspirate orders of PIE. A development of voiced stops plus guttural fricatives to voiced aspirate stops is very plausible in phonetic terms, all the more so in a language where voiced aspirates already existed as separate phonemes.

However, not all cases of variation between voiced non-aspirates and voiced
aspirates can be attributed to the influence of the guttural fricative *A. It was shown in Chapter 5 that there is good evidence for a sporadic interchange of voiced aspirates and voiced non-aspirates following nasals in pre-Greek, especially in the labial series. The investigation here bore on the question of whether a phoneme *b should be reconstructed for PIE. Although the results were not conclusive, the following findings can be reported: (1) The interchange of pre-Greek *b and pre-Greek *bh does not prove that the distinction between the two was subphonemic in pre-Greek and therefore subphonemic in PIE. On the contrary, the sporadic interchange between the two indicates that they were phonemically distinct in pre-Greek, although it does not follow that they definitely were phonemically distinct in PIE. (2) The fact that replacement of aspirates by non-aspirates was much more frequent in the labial than in the dental or velar series indicates that the contrast between *b and *bh carried a low functional load in pre-Greek. This confirms what we already knew, that *b was rare in pre-Greek and likewise rare or nonexistent in PIE.

The treatment of voiced non-aspirate vs. voiced aspirate variation concluded in Chapter 6 with a discussion of residual examples of the variation, those not explained under the analyses presented in Chapters 3, 4, and 5. Some of the examples were explained as involving spurious cognates, post-IE lexical borrowing, or recognizable sporadic sound changes in a single branch of IE. However, a few examples, such as PIE *agʷ(h)nos 'lamb', remained unexplained. Future research may clarify the problems connected with such roots, but at present, we can at least
note that, like the roots treated in Chapters 3 through 5, roots like *agw(h)nos indicate that voiced non-aspirates and voiced aspirates were phonetically similar in PIE.

The data analyzed in Chapter 7 exhibited a type of consonant variation that provided evidence regarding PIE phonotactics. Unruly alternation involving /d/, /l/, zero, and other phonemes or clusters across the Indo-European family in a small group of cognate sets led to the reconstruction of *dl sequences in the PIE roots in question. We concluded: (1) that the homorganic sequence *dl was present but uncommon in PIE; (2) that this sequence was disfavored in PIE as well as in most of its descendants, and that as result, words containing the disfavored sequence were usually reshaped phonologically so as to eliminate it.

Finally, Chapter 8 dealt with the implications of the findings summarized above and of other historical developments for the proposed glottalic reconstruction of PIE stop orders. We found that the glottalic theory, while it is well-motivated in synchronic/typological terms, is not diachronically well-motivated. That is, the diachronic developments from PIE to the descendant languages require the traditional rather than the glottalic reconstruction. The traditional theory, however, while it is well-motivated diachronically, remains typologically problematic. The implication is that PIE had the stop system proposed by the traditional reconstruction, while pre-IE had the system proposed by the glottalic theory. This hypothesis in its turn may prove fruitful for future research; for example, pre-IE may have lacked the phoneme *p', whereas PIE perhaps had a few genuine examples of
*b due to lexical borrowing.

As the preceding summary indicates, all of the investigations undertaken here support the reconstruction of the PIE consonant system as per the inventory given above. But these investigations are relevant not merely to the phoneme inventory of PIE, but also to the phonetics, the morphophonemics, and the phonotactics of the language. The fullest sense of the term phonology implies a multifaceted, interconnected system. It is hoped that this thesis advances our understanding of the full phonological system of PIE, as well as of some of the developments that ensued in the individual histories of the daughter languages.
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Bibliography

Note the following abbreviations for journal titles:

BSL = Bulletin de la société de linguistique de Paris
IF = Indogermanische Forschungen
JIES = Journal of Indo-European Studies
KZ = Zeitschrift für Vergleichende Sprachforschung auf dem Gebiete
der indogermanischen Sprachen (aka Kuhn's Zeitschrift)
MSS = Münchener Studien zur Sprachwissenschaft


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