

## Chapter 12

# Convergence in the Formation of Indo-European Subgroups: Phylogeny and Chronology

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### 1. Introduction

In this chapter I address two interrelated problems. The first is the problem of Indo-European (IE) phylogeny: How is the early filiation of the IE language family best modelled, and if our models are tree-like what should the trees look like? I will suggest that conventional models of IE phylogeny are wrong. Their basic presupposition is that IE has a set of ten or more familiar subgroups — Anatolian, Indo-Iranian, Greek, etc. — which can in turn perhaps be organized into higher-order subgroups such as ‘Italo-Celtic’ or the non-Anatolian subgroup I will call *Nuclear IE* (NIE). The latter is now widely accepted (Melchert 1998; Ringe *et al.* 2002; Jasanoff 2003), but most higher-order subgrouping proposals are controversial, because the shared innovations said to justify them are far less robust than those defining the well-established subgroups. There is, in short, an essential difference in linguistic profile between the familiar IE subgroups and proposed higher-order subgroups. No model whose sole mechanism of filiation is simple branching seems well suited to capture this basic difference.

I will suggest an alternative model: the familiar branches arose not by the differentiation of earlier higher-order subgroups — from ‘Italo-Celtic’ to Italic and Celtic, and so on — but by convergence among neighbouring dialects in a continuum. Dialect continua are typical in shallow-time-depth language families; in its early history, I will suggest, there were also IE continua from which the familiar branches emerged by mutual assimilation as adjacent dialects came to occupy and define new linguistic and socio-cultural areas (Celtic, Germanic, etc.). The adjacent dialects from which new groups emerged may not have formed subgroups within an earlier continuum; dialects may even have shared innovations with neighbours that eventually fell into other linguistic groups. Convergence, together with loss of intermedi-

ate dialects in the prehistoric continuum, has created the historical mirage of a branchy IE family with its many distinctive subgroups.

If this model is right, it also has ramifications for the problem of IE chronology: When (and where) was Proto-IE spoken, and what processes led to its spread across a wide Eurasian territory by 1000 BC? I will suggest in section 3 that a convergence model of IE phylogeny adds to the dossier of evidence against the early chronology proposed by Renfrew (1987), and in favour of the traditional view. I should add as a caveat that what follows is in part speculative and programmatic; further linguistic work is certainly needed. One reason the convergence processes I describe have eluded discovery is that their nature is to erase the evidence for earlier dialect continua. Our evidence for the IE languages mostly begins with the results of the processes I describe here; only in rare cases, like that of Linear B and Mycenaean Greek, do the accidents of archaeological discovery offer a clear window on the formation of an IE branch.

### 2. Phylogeny: the formation of Greek

Work by Alice Kober, Michael Ventris, and John Chadwick led fifty years ago to the discovery that the Linear B writing system, used on Crete and the Greek mainland in the second millennium BC, was a system of writing Greek. It is now well established that the dialect of the Linear B texts, Mycenaean, though documented over four centuries prior to the first significant attestation of other Greek dialects, must be treated as a Greek dialect and not as Proto-Greek or a separate IE dialect. This is because Mycenaean shares innovations with individual Greek dialects, such as the assibilation of *\*-ti > -si* (as in *ehensi* ‘they are’), shared with Arcado-Cyprian, East Aeolic, and Attic-Ionic (vs West Greek *enti*). Based on shared innovation patterns, the scholarly consensus is that Mycenaean is most

closely affiliated with Arcado-Cyprian (Morpurgo Davies 1992).

It is also well established that there are linguistic changes found in all first-millennium Greek dialects, including Arcado-Cyprian, that are not found in Mycenaean. Before the decipherment of Linear B such changes were assumed to be Proto-Greek, but now it is clear that they reflect areal diffusion across the Greek-speaking area. The masculine-neuter active perfect participle presents a typical case. All first-millennium dialects reflect a suffix *\*-wot-*, as in Homeric *arērot-* ‘fashioned’ < *\*arār-wot-*, but this is a Greek development; the corresponding NIE suffix was *\*-wos-*. Yet Mycenaean has forms like neuter plural *arārwoha* < *\*arār-wos-* and none with *-wot-*. An apparent Proto-Greek innovation is unreconstructible for the ancestor of all Greek dialects. How general is this pattern, and does it affect our overall view of Proto-Greek? In this context Morpurgo Davies (1988, 102n4) writes that ‘it would be a useful exercise to collect all the features which we would have attributed to Common Greek before the decipherment of Linear B’.

### 2.1. The evidence for Proto-Greek

This is not the place to present in detail the results of the exercise Morpurgo Davies advocates, but I can summarize its findings. I have examined features attributed to Proto-Greek by Meillet (1913), well before the decipherment of Linear B, excluding those that are not unique to Greek. It turns out that little remains of Meillet’s Proto-Greek; excluding post-Mycenaean innovations, few unique changes distinguish Greek phonologically or morphologically from NIE.<sup>1</sup>

In inflectional morphology it is well known that the Greek verb system is quite archaic, but the first-millennium system of noun inflection has undergone significant change. Meillet (1913) stressed the loss of the spatial (ablative, instrumental, and locative) cases, which he called ‘one of the traits that characterize Common Greek’ (1913 [1975], 46); these categories survived in no Greek dialect known in 1913. While the Mycenaean case system is still controversial in part, Hajnal (1995) argues that the instrumental and locative cases both survived and that in a major inflectional class, animate athematic consonant-stem nouns, the only case-marking change from PNIE to Mycenaean was a dative-locative plural syncretism. The new ending *-si* (vs earlier loc. pl. *\*-su*) shows the only clear nominal form-change that is both unique to Greek and pan-Greek, but it is a trivial adaptation based on loc. sg. *-i* and instr. pl. *-p<sup>hi</sup>i* with final *i*. The loss of the ablative had begun in IE inasmuch as its forms were parasitic on the genitive in the singular and on the dative in the plural; since the Greek geni-

tive expresses ablative functions, the loss of the ablative can be viewed as an extension of the singular syncretism into the plural. The inflectional system of the Proto-Greek noun thus differed only marginally from that of its PNIE ancestor.

In phonology, the discussion is usefully divided into three areas: segment inventory, syllable structure, and word structure. In the area of segment inventory, the question is what the sounds of PIE were and how they have changed. Since the Greek vowel system is famously conservative, this amounts to examining the consonants and syllabic sonorants. To begin with the latter, it is well known that PIE *\*l̥*, *\*r̥*, *\*m̥*, and *\*ŋ* mainly did not survive in IE languages; their loss is a major cause of the collapse of the inherited morphological ablaut system. In Greek, reflexes of *\*l̥* and *\*r̥* show *a* and *o* vocalism varying across dialects; no pan-Greek development can be reconstructed. The nasals *\*m̥* and *\*ŋ* become *a* in first-millennium dialects but instead often show *o* in Mycenaean when preceded by labial consonants, as in *\*spermn* > *spermo* ‘seed’. The IE syllabic sonorants would therefore still have been distinct phonological categories in the ancestor of Mycenaean and other Greek dialects.

Among other segment types, Mycenaean also retains the labiovelar stops *k<sup>w</sup>*, *g<sup>w</sup>*, *k<sup>wh</sup>*, as well as *y* and *w* in most positions; indeed, the change of *y* > *h* before sonorants is recent and ongoing in Mycenaean. Associated with the general loss of *y* is palatalization of many consonant types in *Cy* clusters; the First Palatalization affecting *\*t<sup>(h)</sup>y* occurred before Mycenaean, but the Second Palatalization affecting a broader range of *Cy* clusters was arguably at least still ongoing.

In segmental terms, then, any Proto-Greek ancestral to Mycenaean and the first-millennium dialects must have had the relatively archaic segment types *k<sup>w</sup>*, *g<sup>w</sup>*, *k<sup>wh</sup>*, *y*, *w*, *l̥*, *r̥*, *m̥*, and *ŋ*. In fact the only IE segment types missing in Proto-Greek would have been the laryngeals *\*h<sub>1</sub>*, *\*h<sub>2</sub>*, and *\*h<sub>3</sub>*, segments lost in all NIE languages and probably already at least partly in PNIE. On a purely segmental level, the most significant changes to have preceded Mycenaean seem to have been the First Palatalization and the conditioned change of *\*y* and *\*s* to *h*. The segmental changes that distinguish PNIE and Proto-Greek look less substantial than those differentiating English, French, or German dialects (not all of which are always mutually intelligible, of course).

Under the syllable-structure rubric can be grouped various changes simplifying original CsC and obstruent-sonorant clusters in first-millennium dialects. As shown by Mycenaean forms like *aiksmā* ‘spear’, *hehrap<sup>h</sup>menā* ‘sewn’, and *dleukos* ‘sweet wine’, these innovations cannot be reconstructed for Proto-

Greek even where they affect all later dialects. Steriade (1993) has shown that such cluster changes reflect a basic change in syllable structure: Mycenaean retained an IE syllable structure canon allowing many more onset types than the relatively impoverished set of clusters (such as stop + liquid) of later Greek dialects.

Finally, under the word-structure rubric I consider a set of changes not often seen as related. With characteristic insight, Meillet (1913) wrote that ‘the end of the word is distinct; without presenting any constant particularity it was felt in a precise manner’ (1913 [1975], 26). He meant by this that several Greek changes conspired to demarcate word ends: the accentual *Dreimorengesetz*, the loss of final stops, and the merger of the nasals. I would extend this approach, and suggest that it is an organizing feature of a number of Greek innovations that they serve to demarcate prosodic words both at the left and the right edge.

At the left word-edge, two Greek changes can be seen as by-products of the development of aspiration as an initial-syllable prosody. One is aspiration metathesis, by which an *h* in a second-syllable onset sometimes migrated to the beginning of the word, as in *\*euhō* > *héuō* ‘sing’ (Lejeune 1982, 95–6, 137–8). This is clearly post-Mycenaean, since ‘wheel’ is spelled <a-mo> in Linear B and must be interpreted as *arhmo*, not *tharmo*, which would be spelled <a<sub>2</sub>-mo>; aspiration metathesis is seen in later *háрма*.

The second left-edge change is Grassmann’s Law, by which an initial aspirated stop is deaspirated when an aspirate follows in the word, as in gen. sg. *\*t<sup>h</sup>rik<sup>h</sup>ós* > *trik<sup>h</sup>ós* ‘hair’. The Linear B script does not distinguish aspiration, but Grassmann’s Law must postdate Mycenaean because it must postdate the post-Mycenaean *\*p<sup>h</sup>m* > *mm* change (compare *hehrap<sup>h</sup>menā* ‘sewn’ above). This in turn is shown by later forms like *tet<sup>h</sup>ramménos* ‘having been nourished’ without Grassmann’s Law, from the root *\*t<sup>h</sup>rep<sup>h</sup>-* (*trép<sup>h</sup>ō* ‘nourish’). If Grassmann’s Law preceded Mycenaean we would expect *ttetrap<sup>h</sup>ménos* > *ttetramménos*, like Homeric *epépit<sup>h</sup>men* ‘we had been persuaded’ from the root *\*p<sup>h</sup>eit<sup>h</sup>-* (*péit<sup>h</sup>ō* ‘persuade’).

Underlying both aspiration metathesis and Grassmann’s Law is a single pattern: aspiration is a temporally extended phonetic feature stretching across the entire first syllable. A dissimilatory loss of aspiration of this type occurs when aspiration associated with the first stop is reinterpreted (due to its extended duration) as a coarticulatory effect of the second stop, while a metathesis as seen in *héuō* or *háрма* arises when the phonological source of extended-duration aspiration is phonetically obscure (Blevins & Garrett 1998; 2004).

At the right word-edge, a set of changes occurred that can be related not just phonologically as demarcative but phonetically via the inverse of initial aspiration: final laryngealization. These changes are a shift of the position of the accent, which originally could occupy any syllable of the word but in Greek is restricted to the last three syllables; the loss of all final stops; and the merger of word-final *\*m* and *\*n* as *n*. The defects of Linear B, which writes neither accent nor coda consonants, make it hard to tell whether these changes had occurred in Mycenaean. But an indirect suggestion can be made that the final nasal merger may not have taken place, since the transfer of historical *m*-stem nouns into the class of *n*-stems had not happened, as shown by the dative singular *hemei* ‘one’.<sup>2</sup> That transfer is in turn a consequence of the merger of word-final *\*m* and *\*n* as *n*. If it is plausible that the three right-edge sound changes are interrelated, it is also plausible that none had taken place in Mycenaean. Note that the tradition in Mycenaean studies is to interpret Mycenaean so as to be as similar as possible to first-millennium Greek, even where Linear B gives us no evidence. The opposite strategy may be as appropriate even if to some extent speculative.

The relationship among the three right-edge changes can be understood as follows. It is likely in Greek, as in many languages, that final stop loss had an intermediate stage with glottalized stops ([ʔp], etc.). The retention of stops before word-final *s* (as in *t<sup>h</sup>riks* ‘hair’) supports this view, since stops before *s* would articulatorily have a spread glottis, preventing glottalization. I suggest that the Greek accent shift regularized falling pitch at the right edge of the word; previously there was no correlation between the right word-edge and postaccentual falling pitch. This facilitated word-final stop glottalization, perhaps as a reinterpretation of the ambient laryngealization often associated with falling pitch. Merger of word-final stops as [ʔ] > ∅ and neutralization of word-final nasal place contrasts may then have been the same change: loss of distinctions cued by final VC transitions. As I have suggested, it is reasonable to speculate that these changes all occurred in the centuries after Mycenaean.

In sum, especially if we allow that at least a few post-Proto-Greek changes must already have affected Mycenaean before its attestation (it is after all a Greek dialect), detailed analysis reduces the dossier of demonstrable and uniquely Proto-Greek innovations in phonology and inflectional morphology to nearly zero. Proto-Greek retained the basic NIE noun system, verb system, segment inventory, syllable structure, and arguably phonological word structure. In all these areas of linguistic structure, Greek was not yet Greek early



in the second millennium. But if so, it hardly makes sense to reconstruct Proto-Greek as such: a coherent IE dialect, spoken by some IE speech community, ancestral to all the later Greek dialects. It is just as likely that Greek was formed by the coalescence of dialects that originally formed part of a continuum with other NIE dialects, including some that went on to participate in the formation of other IE branches. With this in mind it is possible to see external links for some Greek dialect patterns. For example, the first-person plural endings *-mes* and *-men* are distributed such that *-mes* occurs in West Greek, across the Adriatic from Italic (with *s* in Latin *-mus*), while *-men* occurs elsewhere, across the Aegean from Anatolian (with *n* in Hittite *-wen*). The isogloss separating prepositional variants *protí* (as in Homer) and *potí* (West Greek) likewise corresponds to the Indo-Iranian isogloss separating Sanskrit *práti* and Avestan *paiti*.

If Proto-Greek did not exist as such and Mycenaean phonology and inflection are minimally ‘Greek’, what makes Mycenaean Greek? Chadwick, seeing the essence of the problem, has written that ‘there must have been a time when the ancestral language could not fairly be described as Greek’, adding that the best evidence that Mycenaean is Greek ‘comes from the vocabulary, which contains numerous words which are ... specific to Greek’ (1998, 27). In short, Greek in the second millennium already had a distinctive derivational, lexical, and onomastic profile. It might not overstate the case to say that Mycenaean was a late NIE dialect with Greek vocabulary; a distinctively Greek phonological and inflectional profile was largely a development of post-Mycenaean history.

### 2.2. *Systems collapse and linguistic innovation*

The finding that numerous linguistic innovations spread across the Greek dialect area in the centuries after Mycenaean makes sense both historically and sociolinguistically. Two points are key. First, archaeological evidence points to massive population shift and economic change during the Greek Dark Age c. 1200–800 BC. Morris (2000, 195–6) writes of ‘gigantic upheavals all across the east Mediterranean around 1200’, including the destruction of the Mycenaean palaces, migration, famine, disease, ‘economic disaster’, and massive depopulation. The archaeological data, according to Dickinson (1994, 87), ‘surely reflect considerable social changes’. The linguistic effects of these changes have been noted before; for example, during the Dark Age, nearly ‘the whole of the terminology connected with the systems of land-tenure seems to have disintegrated’ (Morpurgo Davies 1979, 98).

Second, toward the end of the Dark Age and subsequently there is a wealth of evidence for emerg-

ing systems of interaction that linked the Greek world economically, socially, and politically. In this context Snodgrass (1980) mentions arable farming, metallurgy, colonization, panhellenic sanctuaries, ship-building and navigation, *polis* rivalries (in architecture, athletics, etc.), and writing and literacy, though it must be said that some at least of these systems emerged only later in the relevant period.

In short, prototypical examples of two patterns are seen between the Mycenaean period and the re-emergence of Greek writing in the first millennium: a systems collapse (Tainter 1988, 10–11) and the emergence of a new system also based on peer-polity interaction (Renfrew & Cherry 1986). A salient feature of the new system is the well-known sense of Greek ethnic identity, which by defining the boundaries of a Greek dialect area must have favoured the diffusion of innovations across that area and no farther.

These historical phenomena are important sociolinguistically because they let us fit Greek into a broader picture of language change. Linguists studying social structure have found that tight social networks are

an important mechanism of language maintenance, in that speakers are able to form a cohesive group capable of resisting pressure, linguistic and social, from outside the group ... One important corollary to the link between language maintenance and a close-knit territorially-based network structure is that linguistic change will be associated with a break-up of such a structure (L. Milroy 1987, 182–90).

By contrast, loose social networks, those with many ties outside their networks, ‘are likely to be generally more susceptible to innovation’ (J. Milroy 1992, 181).

Ethnographic sociolinguists mainly study local social contexts, but extrapolating to a broader scale and *longue durée* few historical settings could more aptly be called ‘the break-up of a close-knit territorially-based network structure’ than the Greek Dark Age. Complex systems collapse should yield rapid linguistic change; citing the well-known case of the Algonquian languages Arapaho and Gros Ventre, Bakker (2000, 586) writes that ‘[i]n situations of great social upheaval and changes one can witness phonological change which takes place much faster than otherwise’. For Greek, the period between the end of Linear B documentation and the re-emergence of writing in the first millennium should have been a period of relatively rapid linguistic innovation. This change, I submit, was the formation of Greek as we know it.

### 2.3. *The origin of Indo-European phylogeny*

Does the model presented above apply only to Greek, or can it be generalized? In an earlier article (Garrett

1999) I suggested that Greek may be typical of IE subgroups, and that the reason we see the pattern clearly in Greek is that we have Mycenaean.<sup>3</sup> For no other IE branch do we have comparable data — an Italic dialect of 1000 BC, or an Indo-Iranian variety documented early in the second millennium. But the coherence of other IE branches can be doubted too. The question of Italic unity has been debated by linguists for at least 75 years. Even for Indo-Iranian, not a long-standing problem like Italic, the Nuristani languages show that the *ruk* sound change postdated Proto-Indo-Iranian, and the patterning of early loans into Uralic has suggested that Indo-Iranian was already dialectally differentiated c. 2000 BC (Carpelan *et al.* 2001).

If the formation of Greek was a local event facilitated by local interaction patterns and ethnic identity, it is also relevant that IE branches like Indo-Iranian, Slavic, Celtic, and even the poorly attested Venetic show evidence of a collective sense of ethnic identity. In such cases, as Nichols (1998, 240) puts it, ‘a complex native theory of ethnicity and a strong sense of ethnic identity can be reconstructed, and both the theory and the identity were based on language’.

I have argued that a Mycenaean systems collapse precipitated a period of rapid innovation in Greek dialects and the creation of a characteristic Greek phonological and morphological profile, but the collapse was no mere parochial event of the eastern Mediterranean. According to Cunliffe (1997, 41),

[t]he impact of the Aegean systems-collapse on the European hinterland was considerable. Existing exchange systems broke down or were transformed. Some communities, once part of European-wide networks, found themselves isolated and new configurations emerged.

It is thus possible that the dynamics behind the emergence of Celtic, Italic, and other IE branches of Europe refract the same history as those behind the emergence of Greek. In Asia, though there can hardly be direct evidence, we may imagine similar processes at play in the formation of Indo-Iranian after the collapse of the Bactria-Margiana Archaeological Complex c. 1750 BC (Parpola 2002, 91–2).

If this framework is appropriate for IE branches generally, we cannot regard IE ‘subgroups’ as subgroups in a classical sense. Rather, the loss or ‘pruning’ of intermediate dialects, together with convergence *in situ* among the dialects that were to become Greek, Italic, Celtic, and so on, have in tandem created the appearance of a tree with discrete branches. But the true historical filiation of the IE family is unknown, and it may be unknowable.

I conclude section 2 by noting a pattern in need of an explanation. Early in the second millennium, I have

suggested, IE branches such as Greek had acquired much of their lexical and derivational profile, while their grammatical apparatus continued to have its basic NIE character. Speaking in the broadest terms, early IE language spread was thus a two-phase process. In the first phase, local IE dialects acquired their specific lexical, derivational, and onomastic features; in the second phase, late in the second millennium in some cases, changes that gave dialect areas their characteristic phonology and morphology swept across those areas. What sociolinguistically plausible scenario could give rise to such effects?

### 3. Chronology: the dispersal of Indo-European

Phylogenetic reconstructions may also contribute to the debate between the two chronological frameworks posited for the initial IE dispersal. In what I will call the *first-agriculturalists* framework (Renfrew 1987), PIE was spoken around 7000 BC and IE spread with the diffusion of agriculture from Anatolia into Europe in the seventh millennium. On this view the modern IE languages have diverged for about 9000 years. In what I will call the *secondary-products* framework, the time depth of IE is some three millennia shallower: PIE was spoken and IE language dispersal began in the fourth millennium. This chronological framework is traditional; general presentations from this point of view include that of Mallory (1989). The name I use alludes to the *secondary products complex*. Under this rubric Sherratt (1981; 1983; 1997) has identified several emergent uses of domesticated animals — ploughing, carting, wool, and dairy — that arose in Europe in the late fourth and early third millennia; he refers to a ‘revolution’ that ‘marked the birth of the kinds of society characteristic of modern Eurasia’ (1981 [1997, 161]). New property transmission systems, land-use practices, and social network patterns are said to be aspects of the transition.

#### 3.1. Implications of convergence

Insofar as the formation of IE branches was a local process, and their characteristic innovations took place later than usually supposed, their phonological and morphological structures must have been closer in the centuries around 2000 BC than has been thought. Table 12.1 shows reflexes of five PNIE numerals in three intermediate protolanguages and representative modern descendants: Greek; Spanish; and Waigali (Nuristani, Indo-Iranian: Turner 1962–6).

The similarity of the intermediate protolanguages is obvious, and clearly also fewer changes occurred *en route* to each intermediate protolanguage than subsequently. Modern Greek is the most phonologi-

Table 12.1. Five numerals in PNIE and three NIE branches.

	‘three’	‘five’	‘seven’	‘eight’	‘nine’
PNIE	*treyes	*peŋk <sup>w</sup> e	*septm̥	*oktō	*h <sub>1</sub> newŋ
Proto-Greek	*treyes	*peŋk <sup>w</sup> e	*heptm̥	*oktō	*ennewŋ
Modern Greek	tris	pente	efta	oxto	eñja
Proto-Indo-Iranian	*trayas	*pañča	*sapta	*actā	*nawa
Waigali	tre	pūč	sot	ošt	nū
Proto-Italic	*trēs	*k <sup>w</sup> eŋk <sup>w</sup> e	*septm̥	*oktō	*newŋ
Spanish	tres	siŋko	siete	ocho	nweve

cally conservative language in the sample of Heggarty (2000), and even for Greek Table 12.1 shows only four sound changes *en route* to the intermediate protolanguage ( $h_1 > e$ ,  $\acute{k} > k$ ,  $s > h$ , irregular *nn* in ‘nine’) but at least eleven historically distinct later sound changes: syllabic nasals  $> a$ ;  $k^w > t$  before *e*; losses of *y*, *w*, and *h*;  $ee > \bar{e}$ ;  $\bar{e} > \bar{i}$ ;  $ea > ja$ ; loss of vowel length; stops  $>$  fricatives before stops; and a shift from pitch to stress accent (not shown). In the other languages the later changes are plainly numerous, also including pitch-to-stress shifts, while Proto-Italic and Proto-Indo-Iranian each show only four changes.<sup>4</sup> The Greek reconstructions follow §2.1, and it is worth adding that the Indo-Iranian and Italic forms may be too innovatory precisely because we do not have the equivalent of Mycenaean Greek proving the presence of areally diffused changes. If anything, the extent of phonological changes in the modern languages is understated.

The time depth from the intermediate protolanguages to their modern descendants is on the order of 4000 years (Proto-Italic may be somewhat younger), and during this period significantly more phonological change has taken place than occurred *en route* from PNIE.<sup>5</sup> Note that all three intermediate protolanguages retain the basic PNIE system of nominal cases and inflection, and in the verbal system the three-way PNIE aspect contrast among present, aorist, and perfect (Meiser 2003). None of this survives in the modern languages.

The first-agriculturalists model posits a span of 3000–4000 years between PNIE and 2000 BC. This means assuming two typologically incomparable periods, each three or four millennia long: a period marked by less phonological or inflectional change than is observed in any documented language, followed by a period when all IE languages were transformed by accumulating waves of phonological and morphological change. That is, the model requires the unscientific assumption that linguistic change in

the period for which we have no direct evidence was radically different from change we can study directly.<sup>6</sup>

There is nothing new in a conclusion that linguistic evidence favours the secondary-products chronology over than the first-agriculturalists chronology (Nichols 1998, 254–5; Darden 2001), though I hope new light is shed on the question if IE subgroups are products of secondary convergence. Other types of relevant linguistic evidence include especially the evidence of

linguistic palaeontology, a method with well-known pitfalls whose results in this case have been challenged; I will consider this issue in section 3.2. Most importantly, as Renfrew (1987) has reminded us, it behooves a proponent of any view of IE dispersal to situate that view in a plausible model of ancient social dynamics. The central questions have always been: What caused the spread of Indo-European, and why did it spread over its broad Eurasian territory? I will sketch an approach to these questions in section 3.3.

### 3.2. Linguistic palaeontology

In essence, the argument from linguistic palaeontology is that IE is reconstructed with words for secondary products (plough, wool, yoke) and wheeled transport (axle, nave, thill, wagon, wheel); since these technologies did not arise before 4000 BC, the IE dispersal cannot be associated with the diffusion of agriculture several millennia earlier. In the first-agriculturalists framework, PIE and even PNIE date from before 5000 BC, neither language could have had secondary-products or wheeled-transport terms, and the entire terminological ensemble must be a linguistic mirage if it seems reconstructible to PIE or PNIE.<sup>7</sup> How then are the data explained? Even the advocates of linguistic palaeontology recognize that the method has general pitfalls, but the specific data must be scrutinized critically.<sup>8</sup>

One alternative account is independent formation: apparent cognates do not reflect common inheritance from a single ancestral prototype, but were separately formed in several languages. For example, perhaps the apparent PIE *\*h<sub>2</sub>wergis* ‘wheel’ (based on *\*h<sub>2</sub>werg-* ‘turn around’) reflects independent formation in Hittite and Tocharian. But such an account is hardly possible for PNIE *\*k<sup>w</sup>ek<sup>w</sup>los* ‘wheel’ (in Germanic, Greek, Indo-Iranian, Tocharian, also borrowed early into Uralic): though derived from *\*k<sup>w</sup>elh<sub>1</sub>-* ‘turn’, a reduplicated  $C_1e-C_2o-$  noun is so



unusual morphologically that parallel independent formation is excluded. Likewise, for PIE *\*yugom* ‘yoke’ (*\*yeug-* ‘harness, join, yoke’), with reflexes in Anatolian and almost all other branches, while neuter thematic nouns are common in some IE languages, they are quite rare in Anatolian and it has long been known that the category was not very productive in PIE. It is unlikely that *\*yugom* was independently created in Anatolian and other branches, all the more so because the form is morphologically invariant; had it been created independently we might expect other formations in some cases. Other words pose a different problem: PIE *\*h<sub>2</sub>erh<sub>3</sub>-* ‘plough’ (everywhere but Albanian and Indo-Iranian) is a root and PNIE *\*aks-* ‘axle’ (in Baltic, Celtic, Germanic, Greek, Indo-Iranian, Italic, Slavic) is not transparently based on a root; therefore neither can be the result of any re-formation. In almost all cases, the forms of secondary-products and wheeled-transport terms must be reconstructed for PIE or PNIE.

For their meanings, secondary semantic shift is a possible alternative account. Thus Renfrew (2001, 46) suggests that PIE *\*h<sub>2/3</sub>wlh<sub>1</sub>neh<sub>2</sub>* ‘wool’ (in Anatolian, Baltic, Celtic, Germanic, Greek, Indo-Iranian, Italic, Slavic) might originally have referred to ‘the fiber from the sheep’, perhaps used for rugs, clothing, or felt, shifting its meaning later as sheep were bred for wool. Indeed, for morphological reasons, it is clear that the word referred originally to fiber that was used in some way: *\*h<sub>2/3</sub>wlh<sub>1</sub>neh<sub>2</sub>* is derived via the suffix *\*-neh<sub>2</sub>* from the root *\*h<sub>2/3</sub>welh<sub>1</sub>-* ‘to pluck or pull hair’ (Latin *vellere*). The word cannot simply have referred to hair; it must have arisen at a time when sheep had coats whose hairs were plucked. But there is no reason to believe that such a practice existed before the breeding of woolly sheep: the earliest uses of the sheep’s coat were in felting, for which there is no evidence before the third millennium, and spinning into thread for weaving, known for wool from the fourth millennium in the Near East and later in Europe.<sup>9</sup> In short, *wool* makes no morphological sense on the first-agriculturalists IE chronology.

Arguments involving secondary semantic shift can be envisioned for other terms, like those for ‘nave’ and ‘thill’, which refer generally to poles in some languages; the shift to a vehicular context could be independent (Specht 1947, 100–102). But in other cases it is hard to see how secondary semantic shift can explain the data. Perhaps *\*yugom* ‘yoke’ originally referred to another joining result, but what? and why was the original meaning lost throughout IE? In the case of words for ‘wheel’, what did they originally designate if not wheels? A semantic shift from concrete ‘wheel’ to abstract ‘circle, cycle’ is plausible but the reverse

shift (abstract > concrete) is unusual at best (Sweetser 1990; Traugott & Dasher 2001).

It remains to comment on the possibility of vocabulary diffusion or borrowing after the relevant technology arose. Borrowing ordinarily betrays itself phonologically; if ‘yoke’ had been borrowed from Indo-Iranian into other IE branches, it would have taken the form *\*yugam* after the Indo-Iranian change of *o* to *a*. One could suggest that vocabulary diffusion took place before the phonological changes of individual branches, but given the overall requirements of the first-agriculturalists chronology this would mean that IE history first had a period of several thousand years with just vocabulary change and diffusion, and that linguistic change as it occurs in clearly documented languages would only have begun with the secondary-products complex; as noted in section 3.1, this idea is unrealistic. A possible alternative account invoking ‘etymological nativization’ (Hock 1991, 392–3) would founder on the divergent profiles of that process and the IE data.

It is worth adding in conclusion that linguistic reconstruction yields not just isolated words but a terminological ensemble in a coherent semantic field. The explanatory strategy forced by the first-agriculturalists framework misses the big picture by invoking an unsystematic jumble of *ad hoc* alternatives.

### 3.3. The dispersal of Indo-European

Renfrew (1987) originally articulated the first-agriculturalists framework using the mechanism of demic diffusion, the slow movement of peoples over many centuries as one farmer after another moves a few miles to clear new farmland. This means of language spread is clearly documented in many cases (Bellwood & Renfrew 2002; Diamond & Bellwood 2003). For IE itself Renfrew (2000) has largely abandoned the idea, allowing in response to critics that demic diffusion was not the mechanism of IE language spread in western and northern Europe and instead invoking language shift (a term that labels a phenomenon without offering a sociolinguistic mechanism or model to explain it). For Indo-Iranian, a connection between the spread of farming and language dispersal in an area comparable in size to Europe has been abandoned altogether (Renfrew 2000, 423–4).

As recently as 2001 Renfrew has written that ‘the only process or event of sufficiently general significance for the whole of Europe to account for the Indo-Europeanization of almost an entire continent was the coming of farming’ (Renfrew 2001, 37). Such a statement hides two misleading assumptions. First, Sherratt and others contend that the secondary products ‘revolution’ was a watershed in European social history; the difference

between a chronology based on farming and one based on secondary products is just what is at stake. Second, in this context calling Europe ‘an entire continent’ is distractingly Eurocentric. Europe is also ‘a small peninsula of the Eurasian landmass’ (Richards 2003, 142), and the IE spread is a broad Eurasian phenomenon that should be seen as such. An interpretation that sets aside half the IE area, offers an explanatory model of language spread (demic diffusion) only for part of Europe, and mainly dismisses linguistic evidence cannot be regarded as a satisfactory account of what is after all a linguistic process: the dispersal of IE languages across Europe and Asia.

I take it that PIE was spoken *c.* 3500 BC, perhaps somewhat earlier, in a part of what Mallory (1989, 239) calls the ‘circum-Pontic interaction sphere’; the PIE area could not have been larger than that of ecologically comparable languages, for example the size of Spain (Anthony 1995). It is traditional to situate PIE in the Pontic-Caspian steppe, though a western Pontic PIE may suit dialect geography better (Sherratt & Sherratt 1988 propose a circum-Pontic PIE not long before 4000 BC). It is important to bear in mind that PIE may have had linguistically related neighbours; we cannot know how the ensemble would appear in the archaeological record.

The oldest IE split, between Anatolian and NIE, may have begun as a small-scale collapse of the PIE speech community with a sociocultural reorientation of its northern and southern halves. Perhaps the southern half of the community was drawn into the interactional sphere of the late fourth-millennium Aegean, or the northern half was drawn into the Balkans. In any case, Pontic IE speakers came to be oriented towards the Balkans and the steppe, while others were oriented socioculturally towards the Aegean and Anatolia.

In the Pontic area NIE began to differentiate, with Tocharian its easternmost dialect along the Black Sea and the first known IE language to make its way to Central Asia. The second was Indo-Iranian, whose spread on the steppe and *c.* 2000 BC to Bactria-Margiana is widely accepted (Mallory 1998; 2002; Parpola 1988; 1998; 2002; Renfrew 2000, 423–4). Tocharian had perhaps separated from the NIE area by *c.* 3000 BC, with Indo-Iranian spreading eastward on the steppe during the third millennium.

The European expansion, even if it represents only part of IE dispersal, is a crucial problem. Renfrew (1999; 2000; 2001) suggests that NIE dialects had a long episode of mutual convergence in what he calls ‘Old Europe’, following Gimbutas (1973) — a Balkan and East-central European interactional sphere that flourished in the fifth and fourth millennia before fragmenting. In his view this period was marked

by diffusion across most NIE dialects; at its end ‘the strong cultural interactions marking the “Old Europe” episode discussed by Gimbutas came to an end, and the various sub-regions tended to go their own separate ways’ (Renfrew 2001, 42).

Renfrew (1979) has strongly emphasized the consequences of systems collapse. These include linguistic diffusion as in post-Mycenaean Greek (section 2.1), or linguistic replacement as discussed by Renfrew (1987, 133–7) for several state collapses. But not all complex societies subject to systems collapse are states; some are networks of the Old Europe type. In his analysis of the collapse of complex societies, including societies of several organizational types, a general pattern emphasized by Tainter (1988, 191) is that ‘[i]n each case, peoples on the periphery ... rose to prominence after the older society had collapsed’.

In the scenario I have sketched NIE dialects were spoken on the periphery of Old Europe, and I suggest, in what I hope is not an unholy alliance of the doctrines of Gimbutas and Renfrew, that it was the *collapse* of the Old Europe interactional system that facilitated the initial spread into Europe. Like Gimbutas, I see IE dispersal as related to what Mallory (1989, 238) summarizes as mid-fourth millennium ‘cultural chaos’ and ‘something of a Balkan ‘dark age’’. But I agree with Renfrew that it is not necessary or desirable to imagine invasions by warrior Indo-Europeans; systems collapse naturally led to rapid dispersal of the speech of its periphery.<sup>10</sup> In a complex system IE speakers must already have interacted with more central participants in roles we cannot know (perhaps some were specialist wainwrights, weavers, or herders). The point is that an IE spread into the Balkans and East-central Europe, in the late fourth and early third millennia, would be a natural aspect of the collapse of Old Europe. As argued in section 2.3, the later emergence of European IE languages that were distinctively Celtic, Italic, and so on may have followed the Aegean systems collapse of the late second millennium.

Viewing the IE dispersals broadly, it is possible to discern three major patterns. One is the steppe spread that led to the dispersal of Tocharian and Indo-Iranian. A second pattern is characteristic of the IE spread into Europe and linguistic changes that took place there: dispersal was associated with systems collapse (Old Europe, the late-second-millennium Aegean) and the social reorganizations of the secondary products complex. The Indo-Iranian spread into Iran and South Asia after the collapse of the Bactria-Margiana Archaeological Complex can also perhaps be assimilated to this pattern.

The third pattern is not widely noted but seems quite robust: a north–south spread into the interac-



tional spheres of the urbanized zone that runs from the Aegean through Anatolia and the Near East to Bactria-Margiana. This significant Eurasian pattern has at least four instantiations:

- the initial split of PIE, insofar as it was associated with a reorientation of Proto-Anatolian towards the Aegean and Anatolia, with the subsequent eastward spread of Hittite;
- the spread of Greek dialects into Greece and the Minoan sociocultural world;
- the Indo-Iranian spread into the oasis citadels of Bactria-Margiana;
- the spread of the Mitanni Indo-Iranian dialect into Syria.

In each case the resulting sociocultural profile shows significant continuity with indigenous patterns, respectively Hattic (in the case of Hittite), Minoan, Bactria-Margiana, and Hurrian.

Mallory's analysis of the Indo-Iranian spread may be broadly applicable here. Mallory & Mair (2000, 267) comment as follows on the interaction of Andronovo-culture steppe Indo-Iranians and the urban oasis dwellers of Bactria-Margiana c. 2000 BC:

[T]he Andronovans would have come into contact with the oasis-dwellers, adopted items of their material culture, some of their religious beliefs and cultural practices (such as the fire cult and consumption of the hallucinogenic *\*sauma*), but not the language of the oasis-dwellers. Rather, the language of the steppe-dwellers would have operated as the *lingua franca* of exchange between regions, then perhaps within the settlements themselves until some variety of Indo-Iranian had become the main language of West Central Asia ....

Mallory (2002, 39) writes further:

Indo-Iranian tribes from the steppelands entered into the political sphere of the BMAC [Bactria-Margiana Archaeological Complex] and absorbed from it a suite of religious institutions and their names as well as the concept of a superordinate tier within their social organisation. This tier ... provided a system of coordination between the different elements both within the BMAC and the mobile units outside. It linked oasis dwellers and steppe nomads in Central Asia and ... it could also bring together people practising different settlement and economic strategies on the northern steppe.

For Greece, Palaima (1995, 127) describes

a process whereby the established Helladic/Aegean and Indo-European features of mainland culture were transformed and made part of the Late Helladic palatial culture through a strong, selective adaptation of diverse elements of Minoan material culture and Minoan social, political and religious ideology.

Across Eurasia generally, I suggest, IE language

spread may be interpreted partly as a result of such interactions between a northern periphery and a southern urban zone.

To speculate further, the same pattern of interaction may well lie behind the two-stage process identified in section 2. The first stage of IE language spread is characterized by a distinctive lexical, derivational, and onomastic profile; this corresponds to urbanization and the use of indigenous sociocultural traditions by speakers of IE languages. In Anatolia, Greece, and Bactria-Margiana respectively, compare the 'dominant role of Hattic elements in Old Hittite religion and cult and ideology of kingship' (Melchert 2003, 17), including Hattic loanwords like *halmaššuit*- 'throne'; the elite semantic profile of 'Minoan' loans in Greek (Renfrew 1998), including the vocabulary of kingship (Mycenaean *wanaks* > *ánaks*, perhaps *g<sup>w</sup>asileus* > *basiléus*); and the dossier of borrowed Indo-Iranian social and religious vocabulary, including important terms like *\*indra-* 'Indra' and *\*dāsa-* '(hostile) people' (Lubotsky 2001).<sup>11</sup> In such circumstances, we expect significant lexical change as well as changes in more socioculturally embedded aspects of morphology, such as onomastics and ways of deriving occupational terms, ethnic adjectives, and the like. What is responsible for this first stage of IE dispersal is thus the sociocultural continuity we see in Anatolia, Greece, and Bactria-Margiana as IE languages arrive.

The second stage with its phonological and inflectional transformations corresponds, on this view, to the emergence of local ethnic identities and networks. In some cases this may have been a long, gradual process; in others a systems collapse may have facilitated rapid innovation, as in Greek, Indo-Iranian (if a Bactria-Margiana collapse c. 1750 BC played a role in the emergence of distinctive Indo-Iranian phonology and morphology), and perhaps some European IE languages.

#### 4. Conclusion

I have made two main arguments in this chapter. In section 2, based on a new analysis of Mycenaean, I argued that the apparent features of Proto-Greek mainly diffused throughout Greece during and after the Mycenaean period. It follows that Proto-Greek — or if this did not exist, IE speech of c. 2000 BC that was to become Greek — was linguistically closer to IE than has been supposed. I suggest more generally that we should contemplate models of IE phylogeny that assign a greater role in the formation of IE branches to convergence *in situ*.

In section 3, I explored the chronological consequences of this view of IE phylogeny. If the linguistic

changes in various IE branches took place relatively late in their histories, then it is unlikely that PIE was spoken *c.* 7000 BC as in the first-agriculturalists framework. Speculatively but I hope constructively, I briefly sketched a scenario for IE dispersal that fits the linguistic facts and may perhaps answer what Renfrew rightly asks of Indo-Europeanists, that any account be situated in a plausible model of linguistic change and social dynamics.

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### Notes

1. For information about Mycenaean Greek readers may consult the handbook of Bartoněk (2003) and the lexicon of Aura Jorro (1993), both with full references to other literature. A change in the verb system that should be noted because it is seen in Mycenaean is the development of thematic 3 sg. *\*-eti* > *-ei* (which, I would argue, is indirectly related to the First Palatalization mentioned below).
2. On this view <ko-to-na-no-no> (PY Ea 922) cannot be interpreted as haplography for <ko-to-na-na-no-no> with acc. sg. *ktoinōn* (Morpurgo 1963 s.v.), and the epigraphically uncertain form at PY Eq 146.11 cannot be interpreted as <ī-qō-na-to-mo> with gen. pl. *hik<sup>w</sup>k<sup>w</sup>ōn* 'horses' (Chadwick 1979, 25). As far as I know, unambiguous Mycenaean forms where a final nasal is written in sandhi have not yet been found.
3. See Zimmer (2002) for discussion of related perspectives.
4. The Indo-Iranian changes are laryngeal loss, palatal stop affrication, the Law of Palatals, and the merger of non-high vowels and syllabic nasals as *a*. The Italic changes are laryngeal loss, *y* loss, *ee* > *ē*, and the *p* > *k<sup>w</sup>* change in 'five'. For Proto-Italic I follow Meiser (2003, 30–31) except that I take *ew* > *ow* as a secondary development in light of early Latin forms like *neuma*. In any case, among the Italic changes only laryngeal loss is secure: *y* loss is precisely a change formerly reconstructed for Proto-Greek before the decipherment of Linear B, *ee* > *ē* contraction is dependent on *y* loss, and the *p* > *k<sup>w</sup>* change is only weakly reconstructible.
5. Note that the Reader (referee) of this volume objected that if we had additional information from otherwise unknown languages descended from PNIE (and such languages certainly existed), our changed PNIE reconstructions might amplify the changes en route to

the attested daughter languages; the relative closeness of PNIE and the intermediate proto-languages might represent a mirage. In principle, of course, this is a fair point. However, on the one hand, something of this general sort did indeed happen with the discovery of Anatolian, and by now a major effect has been the widely accepted redrawing of the IE family tree; on the other hand, it is just as true that newly discovered languages or dialects (like Mycenaean Greek) can change one's reconstructions of the intermediate proto-languages and there would be no *a priori* reason for these new discoveries to have a systematic effect on the overall differences under discussion.

6. To be sure, in a widely publicized study, Gray & Atkinson (2003) have suggested that computational phylogenetic analysis may support the first-agriculturalists chronology. But even setting aside methodological questions, and doubts about linguistic reconstruction from lexical data, the specific results of Gray & Atkinson's research are likely to be in error as a result of a bias in the underlying data (Dyen *et al.* 1997). Modern IE branches show examples where, in a particular semantic slot, their known common ancestor (Latin, Sanskrit, etc.) has one word which has been replaced by a different word in all or most descendant languages. Thus Latin *ignis* 'fire' has been replaced by reflexes of Latin *focus* 'hearth' throughout Romance, and archaic Sanskrit *hanti* 'kills' has been replaced by reflexes of a younger Sanskrit form *mārayati* throughout Indo-Aryan. This process especially targets words of IE antiquity, which are more often irregular and therefore prone to replacement. This pattern creates the illusion of a slower rate of change in the internal histories of modern branches: it seems in retrospect (say) that Latin *focus* replaced an IE word for 'fire' in the prehistory of Latin and not later in Romance. Because the overall rates of change posited in Gray & Atkinson's model are based on apparent rate of change in modern branches with known histories, the overall rates of change assumed will be too slow. Over the evolution from PIE to Proto-Italic, Proto-Indo-Iranian, etc., the time depth calculated will thus be too long. I cannot assess the precise effects of this bias, but to speculate, if 5 per cent of the data is like *focus* a 'true' average lexical retention rate of 80 per cent over 1000 years will instead look like 85 per cent; this is equivalent to 23 per cent retention over 9000 years, while an 80 per cent rate is equivalent to a similar figure (26 per cent) over 6000 years. Precisely this 3000-year difference distinguishes the first-agriculturalists and secondary-products models.
7. It is not true, as alleged by Renfrew (2000, 432–4; 2001, 45), that the morphology of such vocabulary shows that it is post-PIE, nor is this suggested by Specht (1947) or Lehmann (1993), whom he cites. Rather, the argument is that because athematic nouns are older than thematic nouns *within the prehistory of PIE*, wheeled-transport terms were relatively new *in PIE*.
8. For an excellent review of the evidence see now Darden (2001). The sensibly skeptical assessment of Clackson (2000) treats mainly the weakest evidence in the dossier,

and in a crucial case he offers an inconsistent analysis, rightly noting that ‘thill’ and ‘yoke’ terms ‘do not need the reconstruction of a chariot, but could also apply to a plough’ (445), but then suggesting that ‘claims linking Indo-European to ... the “secondary products revolution” ... can also be challenged in much the same way’ (447). If the apparent secondary-products vocabulary is illusory then it should not be used to explain other vocabulary.

9. See Barber (1991, 24–5, 221) and Sherratt (1983 [1997, 203]). According to Barber (1991, 24n8), ‘the kempier type of wild sheep’ have ‘virtually unspinnable’ coats. Because wool was plucked or torn before it was shorn (Barber 1991, 21), *\*h<sub>2</sub>welh<sub>2</sub>-* gives the right sense where a verb root ‘cut’ would not. Outside Latin the verbal forms of this root are harder to judge; for relevant material see now Rix (2001, 674–9), and see Darden (2001, 196–204) on the archaeological evidence.
10. For a review of archaeological data see Whittle (1996), who notes ‘extensive and profound changes throughout south-east Europe’ c. 4000–3500 BC and suggests that IE languages ‘may have spread after these changes were underway, not as their primary cause’ (126–7).
11. It is important to emphasize that Hattic linguistic influence on Hittite has been overstated in the past and that the case is stronger for Luvian linguistic influence (Melchert 2003). For Greek, Renfrew’s (1998) otherwise lucid treatment is marred by a failure to distinguish two processes of contact-induced language change, borrowing via maintenance and interference via shift (Thomason & Kaufman 1988; Thomason 2001); the two leave distinct linguistic ‘footprints’, and the Greek data show borrowing.

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