Hierarchical restructuring in the creation of verbal morphology in Bengali and Germanic: Evidence from phonology

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1. Introduction

The term 'grammaticalisation' has been adopted to denote a content word becoming a function word or grammatical word, which may in due course lead to cliticisation and affixation. In the process, the content word may be considerably reduced phonologically to as small a unit as a segment, or a feature, or, eventually, zero. The term 'fusion' is very apt for the phonology of grammaticalisation. A phonological word is reduced and fused to a different lexical item to form another phonological word. Bybee, Pagliuca and Perkins (1990: 19), in a short paragraph referring to phonological aspects of grammaticalisation, state that the grammatical element having lost its independence becomes 'phonologically dependent upon surrounding material'.

Although this process of fusion has distinct phonological consequences, there is very little serious discussion of them in the literature. Hopper and Traugott (1993) propose the following cline: function word > clitic > affix. Translated into phonological terms, grammaticalisation seems to entail the reduction of a phonological word to a unit which then attaches to another phonological word: $[\text{WORD}]_\omega$ $[\text{WORD}]_\omega$ > $[[\text{WORD}]_\omega \text{CL}]_\omega$ > $[\text{WORD AFFIX}]_\omega$. Hence grammaticalisation crucially involves phonological word (PWord) formation. Most cliticisations are considered synchronically to be PWord formations (cf. Inkelas and Zec 1990, Lahiri et al. 1990, and references therein): Dutch *ik zoek de krant* 'I am looking for the newspaper' > *zoekte*. The determiner is attached to the preceding word to form a single phonological word. However, the question is whether the diachronic process is a single step from clitic to an affix and whether there is any phonological evidence to support this assumption. In most examples in the literature, the target of the fusion is an existing phonological word or a phonological stem (cf. Inkelas 1988; Fitzpatrick-Cole 1996) such that the output is always a

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phonological word. Moreover, in Hopper and Traugott's formulation, there is an implicit assumption that once a function word is reduced to an affix, it is treated as a single morpheme. That is, there is no further morphological reanalysis of this word. This, however, need not always be the case. When the fused element is being reanalysed by the language learner as an affix, it is posssible to reinterpret the segments (or features) as different morphemes. This paper focuses on changes of this type.

The central thesis is that when auxiliaries become affixes, they continue to be morphologically complex, though with morphological structures reanalysed. In the process of grammaticalisation, a phonologically reduced content word can be analysed as a sequence of morphemes, via a process of cliticisation, in the following ways:

(1) Phonology of grammaticalisation

$[\text{WORD}]_\omega\ [\text{WORD}]_\omega > [[\text{WORD}]_\omega\ \text{CLITIC}]_\omega >$

(a) $[\text{ROOT} + \text{MORPHEME}_1 + \text{MORPHEME}_2]_\omega$

or (b) $[[\text{ROOT} + \text{MORPHEME}_1] + \text{MORPHEME}_2]_\omega$

The scenario in (1a) is easily conceivable if the second word which becomes a clitic was an inflected word itself. That is, if the clitic originally consisted of a root plus person or number affixes, it would be no surprise if it is reinterpreted as two grammatical morphemes. However, it is the second possibility which is of interest in this paper. The reanalysis converts an inflected auxiliary into more than one morpheme, but the morphological structure is richer than a mere linear concatenation. The base of the auxiliary is attached closer to the root, with the inflectional morphemes attached to the entire structure. Evidence for such hierarchical structure comes from phonological processes which are usually not taken into consideration in the grammaticalisation literature. The validity of the hierarchical structure in (1b) requires the existence of phonological processes and constraints which apply only to the internal $[\text{ROOT} + \text{MORPHEME}_1]$ domain and not to the entire string as in (1a). Additional evidence comes from the fact that the internal morpheme patterns with other morphemes in the language which are known to be closely attached to the root.

In this paper, we discuss two diachronic processes of grammati-

calisation—the introduction of the dental preterite in Germanic and the new formation of the progressive and perfect in Bengali—both of which at a first glance look as if they are straightforward instances of reducing auxiliaries like 'to do' and 'to be' to inflectional endings, which in the modern languages are attached to the stem to form phonological words. However, this was not always the case. Instead, in Germanic, the dental preterite passed through a stage where the consonantal segment representing an erstwhile root was treated on a par with stem formatives and the rest as an inflectional ending. Bengali underwent a similar process with the auxiliary 'to be', and in the modern language it behaves both as a stem formative which is added to the root as well as a clitic which attaches to a phonological word. We will claim that both in Bengali and in Germanic, the grammaticalised auxiliary was initially reanalysed as a class marker plus person and number endings. Several phonological processes provide supporting evidence for these analyses.

The consequence of this claim for morphology is that the cline of grammaticalisation often assumed is not quite as simple as it seems. It is not that a phonological word is reduced both in form and in status to an affix which attaches to the nearest convenient phonological word. The grammaticalised word continues to be more than one grammatical morpheme, though with a reanalysed hierarchical structure. The focus of this paper is to show that evidence for such grammaticalisation comes from phonology—not merely the phonology of reduction as usually assumed, but the phonology of the entire grammatical system. We will draw upon evidence from apparently conflicting analogical levelling in Germanic and partial levelling in Bengali to show that in both instances the phenomenon is related to a restructuring of morphological structures.

2. The Bengali auxiliary /ɑʧʰ-/

Other than distinguishing tense and aspect, the Bengali verb is inflected for person. There is no distinction in number. Since our discussion leans on diachronic processes, we will differentiate between 'literary' and 'colloquial' speech, where the former reflects an earlier stage of the

language. Literary Bengali (ʃadʰu bʰɑʃɑ 'cultured language'), the style regularly used in prose,[1] reflects an earlier stage of the present spoken language which is known as Standard Colloquial Bengali (SCB: ʧolit bʰɑʃɑ 'current language'). In its fuller forms and archaic inflections, particularly for the verbs, Literary Bengali represents the Bengali spoken about 500 years ago. Only the simple present and the imperative have the same forms in the literary and colloquial varieties. Henceforth when we refer to the literary language we are assuming a stage prior to the spoken language of today.

We are concerned here with the verb /ɑʧʰ-/ 'to be', a reduced form of which is added to the progressive forms (present and past) and the perfect forms (present and past).[2] Although there are superficial similarities, the progressive and the perfect differ in significant ways. We will claim that for the progressive, the affricate is reanalysed as a separate grammatical morpheme, and in SCB it is now underlyingly a geminate affricate. For the present and past perfect, however, the verb is cliticised to the root with a perfective marker which constitutes a single phonological word. Before discussing the grammaticalisation of the verb 'to be' we need to consider the basic properties of Bengali verbs.

2.1. Basics of the Bengali verb

The verb /ɑʧʰ-/ is irregular and is inflected only in the simple present and past tense. For all other forms, another root /tʰɑk-/ is used. A further irregularity is that unlike other verbs its past tense does not differentiate between literary and colloquial speech. For the sake of comparison, the parallel forms of a regular verb 'to sit' /bɔʃ-/ are presented along with the forms for /ɑʧʰ-/ in (1). As we mentioned above, verbs are marked for person but not for number. Bengali lost number distinction in verb conjugation at an earlier period. With regard to person marking, there are three forms of the second person pronoun: the familiar form [tui], the ordinary form [tumi], and the polite or honorific form [ɑpni]. For the third person pronoun, there are two forms, the honorific [tini] and otherwise [ʃe].

(2) Present and past tense forms of /ɑʧʰ-/ and /bɔʃ-/

		Present	Simple Past	Present	Simple Past (literary)	Simple Past (coll.)
ɑmi	1	ɑʧʰ-i	ʧʰ-i-l-ɑm	boʃ-i	boʃ-i-l-ɑm	boʃ-l-ɑm
tui	2FAM	ɑʧʰ-iʃ	ʧʰ-i-l-i	boʃ-iʃ	boʃ-i-l-i	boʃ-l-i
tumi	2	ɑʧʰ-o	ʧʰ-i-l-e	bɔʃ-o	boʃ-i-l-e	boʃ-l-e
ɑpni	2HON	ɑʧʰ-en	ʧʰ-i-l-en	bɔʃ-en	boʃ-i-l-en	boʃ-l-en
ʃe	3	ɑʧʰ-e	ʧʰ-i-l-o	bɔʃ-e	boʃ-i-l-o	boʃ-l-o
tini	3HON	ɑʧʰ-en	ʧʰ-i-l-en	bɔʃ-en	boʃ-i-l-en	boʃ-l-en

There are several points to be noted. First, the personal endings are not all the same in the two tenses: 1 (-i/-ɑm), 2 (-o/-e), 2FAM (-iʃ/-i), 3 (-e/-o) etc. Second, there is a vowel alternation in the stem for the verb 'to sit'. This is typical for all the verbs of the language. Other than the vowel /ɑ/, all non-high stem vowels are raised in certain morphological circumstances giving rise to the following alternations: /o-u/, /ɔ-o/, /e-i/, /æ-e/. We will discuss this in more detail later. Third, /-l-/ is clearly a marker of the past tense. It appears both in the literary and colloquial forms. Fourth, although the morpheme /-i-/ also appears in the simple past (except in the colloquial forms of /bɔʃ-/), it is not entirely clear from these forms alone what role it plays. As we shall soon see, it is the non-present (past, past habitual and future) marker of the simple tenses in the literary language. This /-i-/ is one of the sources of the raised vowel in verb roots. Compare the past habitual and the future to see how the /-i-/ behaves in (3), where /-t-/ and /-b-/ are the markers of the two tenses.

(3) Past habitual and future of /bɔʃ-/

		Future (literary)	Future (coll.)	Past habitual (literary)	Past habitual (coll.)
ɑmi	1	boʃ-i-b-o	boʃ-b-o	boʃ-i-t-ɑm	bos-t-ɑm
tui	2FAM	boʃ-i-b-i	boʃ-b-i	boʃ-i-t-iʃ	bos-t-iʃ
tumi	2	boʃ-i-b-e	boʃ-b-e	boʃ-i-t-e	bos-t-e
ɑpni	2HON	boʃ-i-b-en	boʃ-b-en	boʃ-i-t-en	bos-t-en
ʃe	3	boʃ-i-b-e	boʃ-b-e	boʃ-i-t-o	bos-t-o
tini	3HON	boʃ-i-b-en	boʃ-b-en	boʃ-i-t-en	bos-t-en

Again, the medial /-i-/ is present in the early literary forms but not in the colloquial forms. Note that the root contains the raised vowel [o] rather than [ɔ] in both sets. Even after /-i-/ is deleted, the raised vowel remains in the verb root. Thus, vowel raising, which was phonologically transparent earlier, is now opaque. There is a further phonological change in the past habitual colloquial forms: the [ʃ] of the root assimilates to the following dental [t] leading to the surface cluster [st].

Since the /-i-/ is not deleted in the past forms of /ɑʧʰ-/ in (1), we can assume that these are equivalent to the literary forms of the other verbs. Why is it that this verb does not have colloquial forms in the past that differ from the literary forms? If the /-i-/ were deleted, the ensuing word initial cluster /ʧʰl/ would be an impossible one for the language. Of course, had the verb root been /ɑʧʰ-/ and not /ʧʰ-/, the deletion of the [i] would have been possible: *aʧʰ-i-lam* > *aʧʰ-l-am*; cf. *muʧʰ-i-lam* > *muʧʰ-l-am* 'wipe' IPAST. Dialects of Bengali do have the full forms like [ɑʧʰ-i-lɑm], but the standard language has lost the initial vowel in the past.

Now we turn to the simple past and past habitual of verbs where the root vowel is /ɑ/. As we mentioned above, this vowel is not raised in the context of /-i-/. There is, however, a curious asymmetry when we compare the past and past habitual of verbs in open and closed syllables after the /-i-/ is deleted. The simple present is also given for the sake of comparison—see (4). The root final /ɑ/ combines with a following vowel in an open syllable to form a diphthong as in [pɑi̯lɑm] IPAST, [pɑi̯] IPRES, [pɑe̯] 3PRES. If the following vowel is in a closed syllable, it is deleted: [pɑn] 2/3HON. In the simple past and the past habitual, after the deletion of the medial vowel /-i-/, the root vowel /ɑ/ is fronted in the vowel final roots but remains unchanged in the closed syllables; cf. *pai̯lam* > *pelam*, but *marilam* > *marlam*. One could argue that although the vowel /-i-/ has no effect on the root vowel /ɑ/, if the root is an open syllable, then the two vowels coalesce to /ɑi̯/ which later becomes /-e/. However, this solution does not work if we compare the forms in the future tense given in (5).

(4) Present, past and past habitual of /pɑ-/ 'get' and /mar-/ 'beat'

		Past habitual (literary) -i-t-	(coll.) -t-	Simple past (literary) -i-l-	(coll.) -l-	Present
ami	1	pɑ-i-t-ɑm	pe-t-ɑm	pɑ-i-l-ɑm	pe-lɑm	pɑ-i̯
tui	2FAM	pɑ-i-t-iʃ	pe-t-iʃ	pɑ-i-l-i	pe-li	pɑ-ʃ
tumi	2	pɑ-i-t-e	pe-t-e	pɑ-i-l-e	pe-le	pɑ-o̯
ɑpni	2HON	pɑ-i-t-n	pe-t-en	pɑ-i-l-en	pe-len	pɑ-n
ʃe	3	pɑ-i-t-o	pe-t-o	pɑ-i-l-o	pe-lo	pɑ-e̯
tini	3HON	pɑ-i-t-en	pe-te-n	pɑ-i-l-en	pe-len	pɑ-n
ɑmi	1	mɑr-i-t-ɑm	mɑr-t-ɑm	mɑr-i-l-ɑm	mɑr-l-ɑm	mɑr-i
tui	2FAM	mɑr-i-t-iʃ	mɑr-t-iʃ	mɑr-i-l-i	mɑr-l-i	mɑr-iʃ
tumi	2	mɑr-i-t-e	mɑr-t-e	mɑr-i-l-e	mɑr-l-e	mɑr-o
ɑpni	2HON	mɑr-i-t-en	mɑr-t-en	mɑr-i-l-en	mɑr-l-en	mɑr-en
ʃe	3	mɑr-i-t-o	mɑr-t-o	mɑr-i-l-o	mɑr-l-o	mɑr-e
tini	3HON	mɑr-i-t-en	mɑr-t-en	mɑr-i-l-en	mɑr-l-en	mɑr-en

(5) Future of /mar-/ and /pɑ-/

		Literary -i-b-	Coll. -b-	Literary -i-b-	Coll. -b-
ɑmi	1	mɑr-i-b-o	mɑr-b-o	pɑ-i-b-o	pɑ-b-o
tui	2FAM	mɑr-i-b-i	mɑr-b-i	pɑ-i-b-i	pɑ-b-i
tumi	2	mɑr-i-b-e	mɑr-b-e	pɑ-i-b-e	pɑ-b-e
ɑpni	2HON	mɑr-i-b-en	mɑr-b-en	pɑ-i-b-en	pɑ-b-en
ʃe	3P	mɑr-i-b-e	mɑr-b-e	pɑ-i-b-e	pɑ-b-e
tini	3HON	mɑr-i-b-en	mɑr-b-en	pɑ-i-b-en	pɑ-b-en

These forms in (5) are very puzzling. Had the solution to the past been vowel coalescence leading to a front vowel, the same result should be obtained in the future. That is, we would expect [pɑi̯bo] to become *[pebo] and not [pɑbo].[3] We believe that this fronting is a consequence of the quality of the consonantal ending and not due to vowel coalescence. The consonantal markers of the simple past, the past habitual and the future are [l], [t] and [b] respectively. The first two consonants are [coronal] which causes the [ɑ] to front. The future marker, on the

other hand, is a [labial] and does not have any such effect. We will informally state this fronting as follows:

(6) Vowel fronting: the root vowel [ɑ] is raised when immediately followed by a coronal suffix.

The discussion so far has been confined to the simple tenses without the addition of the auxiliary. Before we discuss the development of the compound forms, let us summarise the main points until now. So far we have established the following:

- Simple tenses are marked with consonantal morphemes: [l], [t] and [b] mark the simple past, the past habitual and the future respectively.
- The verb /ɑʧʰ-/ 'to be' has only two tenses, the present and the simple past. It has two allomorphs: /ɑʧʰ-/ in the present and /ʧʰ-/ in the past.
- At an earlier stage of the language, the non-present tenses were marked by the vowel /-i-/ which was attached to the root. This vowel /-i-/ raised the root vowels /æ, e, ɔ, o/ to /e, i, o, u/ respectively. The low root vowel /ɑ/ is not affected.
- The morpheme /-i-/ does not occur at a later period, i.e. in the colloquial language. The deletion, however, did not cause the raised root vowels to be lowered.
- However, in vowel final roots, syncope of [i] led to the fronting of /ɑ/ in the context of coronal consonants.

We now turn to the grammaticalisation of /ɑʧʰ-/ in the progressive and perfect tenses.

2.2. *The verb /ɑʧʰ-/ in the progressive*

There are two types of compound or periphrastic tenses which are formed with the auxiliary /ɑʧʰ-/, the progressive and the perfect. We will first examine the present and past progressive forms. In literary Bengali, the typical progressive is made with the verbal root plus the participial /-ite-/ to which the fully inflected auxiliary is then added. The only hint that the auxiliary is a clitic rather than a full verb is that the initial /ɑ/ has disappeared, as in [boʃ-ite-ʧʰi] 'sit' IPRES.PROG. In

some eastern dialects, the full forms occur: [korite ɑʧʰe] 'do' 3PRES. PROG (Chatterji 1926: 1019). Below we give examples of literary and colloquial Bengali forms in the present and past progressive. Since there are complex alternations with roots ending in vowels, the progressive forms of an additional verb /pɑ-/ 'to get' have been added.

(7) Present and past progressive forms

	Literary *sit* (C)VC-	Coll.	Literary *get* (C)V-	Coll.
Present progressive				
ɑmi 1	boʃ-ite-ʧʰi	boʃ-ʧʰi	pɑ-ite-ʧʰi	pɑ-ʧʧʰi
tui 2FAM	boʃ-ite-ʧʰiʃ	boʃ-ʧʰiʃ	pɑ-ite-ʧʰiʃ	pɑ-ʧʧʰiʃ
tumi 2	boʃ-ite-ʧʰo	boʃ-ʧʰo	pɑ-ite-ʧʰo	pɑ-ʧʧʰo
ɑpni 2HON	boʃ-ite-ʧʰen	boʃ-ʧʰen	pɑ-ite-ʧʰen	pɑ-ʧʧʰen
ʃe 3	boʃ-ite-ʧʰe	boʃ-ʧʰe	pɑ-ite-ʧʰe	pɑ-ʧʧʰe
tini 3HON	boʃ-ite-ʧʰen	boʃ-ʧʰen	pɑ-ite-ʧʰen	pɑ-ʧʧʰen
Past progressive				
ɑmi 1	boʃ-ite-ʧʰilɑm	boʃ-ʧʰilɑm	pɑ-ite-ʧʰilɑm	pɑ-ʧʧʰilɑm
tui 2FAM	boʃ-ite-ʧʰili	boʃ-ʧʰili	pɑ-ite-ʧʰili	pɑ-ʧʧʰilli
tumi 2	boʃ-ite-ʧʰile	boʃ-ʧʰile	pɑ-ite-ʧʰile	pɑ-ʧʧʰile
ɑpni 2HON	boʃ-ite-ʧʰilen	boʃ-ʧʰilen	pɑ-ite-ʧʰilen	pɑ-ʧʧʰilen
ʃe 3	boʃ-ite-ʧʰilo	boʃ-ʧʰilo	pɑ-ite-ʧʰilo	pɑ-ʧʧʰilo
tini 3HON	boʃ-ite-ʧʰilen	boʃ-ʧʰiilen	pɑ-ite-ʧʰilen	pɑ-ʧʧʰilen

The colloquial forms of both verbs lack the medial suffix /-ite-/. The deletion of the entire sequence /-ite-/ is rather odd. This change does not conform to any other phonological deletion process in the language. Chatterji (1926: 1020) claims that although /-ite-/ occurred in Middle Bengali, and exists now in the literary language, this is not the source of the colloquial forms. Had this been so, we would have expected [boʃteʧʰe] from [boʃiteʧʰe] rather than [boʃʧʰe]. The form [boʃteʧʰe] does occur in dialects of East Bengal but not in the standard colloquial language. Chatterji (1926) argues that the colloquial Bengali forms come from another morpheme /i/, the source of which is not clear. Forms like [boʃiʧʰe] occur in early Middle Bengali and become more frequent in the fifteenth and sixteenth centuries. Based on this evidence,

we will assume that the earlier stage of the progressives of the colloquial language was not the literary version with /-ite-/ but with medial /-i-/. A few crucial forms repeated here illustrate the two stages:

(8) Progressives in earlier and present colloquial Bengali

		Pre-coll. *sit* (C)VC-	Coll.	Pre-coll. *get* (C)V-	Coll.
Present progressive					
ami	1	boʃ-i-ʧʰi	boʃ-ʧʰi	pɑ-i-ʧʰi	pɑ-ʧʧʰi
tui	2FAM	boʃ-i-ʧʰiʃ	boʃ-ʧʰiʃ	pɑ-ite-ʧʰiʃ	pɑ-ʧʧʰiʃ
Past progressive					
ami	1	boʃ-i-ʧʰilɑm	boʃ-ʧʰilɑm	pɑ-i-ʧʰilɑm	pɑ-ʧʧʰilɑm
tui	2FAM	boʃ-i-ʧʰili	boʃ-ʧʰili	pɑ-i-ʧʰili	pɑ-ʧʧʰilli

Several points of interest arise. First, in the past progressive the endings are identical to the past forms of /ɑʧʰ-/ given in (1). The present progressive endings are different—they lack the initial vowel [ɑ]. Second, as in the past, past habitual, and future, the medial /-i-/ is syncopated in the colloquial forms. Third, unlike in the past and past habitual, but similar to the future, the root vowel [ɑ] is not raised in any of these forms. Finally, after the syncope, in the colloquial forms of /pɑ-/ the affricate of the auxiliary is geminated. This is true for all vowel final roots not just /ɑ/: [ʃu-i] 'sleep' IPRES, [ʃuʧʧʰi] 'sleep' IPRES.PROG; [ni-i] 'take' IPRES, [niʧʧʰi] 'sleep' IPRES.PROG; etc. Summarising the phonological changes discussed so far, we have the following:

(9) Phonological changes (informally stated)
   a. Raising: vowels are raised when /i/ follows.
   b. Syncope: medial /i/ is deleted.
   c. Gemination: syncope leads to the leftwards spreading of the following consonant when the root ends in a vowel.
   d. Fronting: the low vowel /ɑ/ is fronted in the context of coronal consonants.
   e. Sibilant assimilation: the palatoalveolar /ʃ/ assimilates to a following dental consonant.

Our purpose here is to examine the progressive forms in the light of their development from a syntactic construction consisting of two phonological words till the present colloquial language where it appears to be a suffix. That the progressive forms were earlier a participial form of the verb to which the fully inflected auxiliary was added is evident from Middle Bengali literature and present-day dialects. The first stage of cliticization is observable in pre-colloquial Bengali. The only obvious effect of grammaticalisation is that the initial vowel of the present tense allomorph /ɑʧʰ-/ is deleted. Otherwise the entire verb is simply added to the root plus the participial /-i-/. At a later period there are further changes. In colloquial Bengali, when the medial /-i-/ disappears and /ʧʰ-/ is added to a vowel final root, the affricate is geminated. Why should that be? The deletion of [i] in the past or the future had no effect on the consonant. The future tense of the verb /pɑ/ changes from /pɑ-i-bo/ to /pɑ-bo/ but not */pɑbbo/. Further, as noted earlier, after the loss of [i] the low vowel [ɑ] was fronted in the context of coronal consonants in the simple and habitual past. However, the affricate /ʧʰ/ which is also coronal had no influence at all and the vowel remains low. Finally, when we look at the progressive and the other forms purely from a synchronic perspective, the progressive morpheme is best analysed as a geminate affricate /-ʧʧʰ-/. Our claim is that the discrepancies and asymmetries between the progressive morpheme and the other morphemes with regard to the phonological alternation of the roots are all due to the fact that the reanalysis of the auxiliary has led to a hierarchical morphological structure rather than a linear string.

Thus, grammaticalisation was not a matter of simply reducing the auxiliary to a suffix. We claim that grammaticalisation consisted in a reanalysis of the verb /ɑʧʰ-/ with its inflectional ending. The affricate /ʧʰ/ of the auxiliary is now interpreted as a marker of the progressive to which the former person endings are added. But the concatenation is not linear. The progressive marker does not have the same status as the other tense markers [t], [b] and [l] since they are sensitive to different types of phonological processes. Instead, the reduced auxiliary /ʧʰ/ is closer to the root than the tense and person suffixes. There must be two levels of morphological analysis, which implies that grammaticalisation has worked in the stages depicted in (10):

(10) Grammaticalisation of the progressive

	[/ROOT + i /]$_{\omega}$ + [/ɑʧ^{h}-/ + person affix]$_{\omega}$	⇒
Stage I	[[ROOT + /i/]$_{w}$ + [/ʧ^{h}-/ + person affix]$_{clitic}$]$_{\omega}$	⇒
Stage II	[[ROOT + /i/ + /ʧ^{h}-/] + [person affix]$_{affix}$]$_{\omega}$	⇒
Stage III	[[/ROOT + ʧʧ^{h}-/] + [person affix]$_{affix}$]$_{\omega}$	

To support this analysis, we must look at the stages in detail. In Stage I, i.e. the pre-colloquial stage, the progressive is still a clitic. Here the participial /i/ still surfaces. Next, the affricate /-ʧ^{h}-/, now being a suffix, is treated on a par with the participial suffix and the non-present suffix, but separate from the other tense and person/number suffixes. We show Stage II, where the syncope rule has also been added in Level I.

(11) Reanalysis of the progressive: Stage II

Level I : non-present marker, participle, progressive markers (syllabification is indicated with a dot)

	PRES	NON-PRES			PARTICIPLE/PROGRESSIVE		
	bɔʃ	bɔʃ-i	mɑr-i	pɑ-i	bɔʃ-i-ʧ^{h}	mɑr-i-ʧ^{h}	pɑ-i-ʧ^{h}
Raising	–	bo·ʃ-i	–	–	bo·ʃ-i-ʧ^{h}	–	–
SYNC & GEM	–	boʃ	mɑr	pɑ	boʃ(ʧ^{h})	mɑr(ʧ^{h})	pɑʧ(ʧ^{h})

Level II (tense markers, person endings)

	1PRES	3FUT		3HAB.PAST		
	bɔʃ-i	mɑr-be	pɑ-bo	boʃ-to	mɑr-to	pɑ-to
Fronting	–	–	–	–	–	pe·to
Raising	boʃi	–	–	–	–	–
ʃ-Assimilation				bos·to		
SURFACE	*boʃi*	*marbe*	*pabo*	*bosto*	*marto*	*peto*

	3PRES.PROG		
	boʃ·ʧ^{h}-e	mɑr·ʧ^{h}-e	pɑʧ·ʧ^{h}e
Fronting	–	–	–
Raising	–	–	–
ʃ-Assimilation			
SURFACE	*boʃʧ^{h}e*	*marʧ^{h}e*	*paʧʧ^{h}e*

The crucial points in the analysis are as follows. First, the grammaticalisation of /ɑʧʰ-/ means the reanalysis of the affricate as an aspect marker having the same status as the non-past marker and hence added independent of the person endings. Second the loss of the medial [i] in Level I frees a segment position. This can be filled by leftwards consonant spreading, but this is only possible if there is no other preceding consonant. Gemination or consonant spreading is automatic but is blocked if there is a preceding consonant. This is due to general syllable constraints which prohibit syllable final consonant clusters in Bengali. Thus, /pɑ-i-ʧʰ/ becomes /pɑʧʧʰ/, but */mɑrʧʧʰ/ is ill-formed. Final consonants when not preceded by a vowel are extrasyllabic in Level I. Here is another piece of evidence that syncope must occur on a different level from the tense morphemes like the past habitual [t]. Had this been the case, /pɑ-i-t/ would have become /pɑt.t/. Since the /-t-/ is added in the next level, syncope does not lead to gemination. Third, the fronting of the vowel occurs only in open syllables and in Level II. Since the progressive contains a geminate morpheme, the syllable is closed and the fronting is blocked. Note that raising occurs again in Level II, this time triggered by the first person suffix.

The above phonological alternations, therefore, support the view that the grammaticalisation of the verb 'to be' was not merely that it became a suffix, but that it was reanalysed and split into a consonantal progressive suffix plus person endings, each added at a different level. The resulting morphological structure was not linear but hierarchical. What was the motivation for the hierarchical structure? Recall that the progressive has its own past and present tense forms. The other tense markers, along with their person suffixes, are added separately. Hence, for the language learner, the base of the auxiliary, now treated as a progressive suffix was better analysed as being closer to the root and independent of tense/person suffixes.

We now move to Stage III, that is a stage where syncope is no longer active and the language learner has no further evidence for the existence of the synchronic participial and non-present class marker /i/. Instead, the progressive morpheme is better analysed as an underlying geminate /ʧʧʰ/ and degemination occurs after consonantal stems. In fact, the verb roots in all probability have been reanalysed as having raised vowels as the underlying root vowel which is then lowered in the present or

in the verbal noun when followed by a non-high vowel. We can assume the following two processes:

(12) Changes in SCB
   a. Degemination: postconsonantal geminates are degeminated.
   b. Vowel Lowering: root vowels in open syllable are lowered when followed by a non-high vowel in the next syllable (inflectional endings).[4]

The analysis for current colloquial Bengali would be as follows:

(13) Current Bengali—progressive Stage III

	3PRES	IPRES	3HAB.PAST		
	boʃ-e	boʃ-i	boʃ-t-o	mɑr-t-o	pɑ-t-o
Fronting	–	–	–	–	pe-to
Lowering	bɔ·ʃe	–	–	–	–
Degemination	–	–	–	–	–
SURFACE	*bɔʃe*	*boʃi*	*bosto*	*marto*	*peto*

	3PRES.PROG		
	boʃ-ʧʧʰ-e	mɑr-ʧʧʰ-e	pɑ-ʧʧʰ-e
Fronting	–	–	–
Lowering	–	–	–
Degemination	boʃ·ʧʰe	mɑr·ʧʰ-e	–
SURFACE	*boʃʧʰe*	*marʧʰe*	*paʧʧʰe*

There is no evidence here that we need to distinguish between tense markers like /t/ and the progressive /-ʧʧʰ-/ and add them on different levels. Since the geminate progressive morpheme automatically closes the syllable for the vowel final roots like /pɑ-/, the fronting of the low vowel is blocked. However, evidence that there are still two levels comes from the perfect, where again the auxiliary plays a role. Here, the verb /ɑʧ-/ is also added, but with a difference.

2.3. The perfect in Bengali

The perfect was formed in Middle Bengali with the past passive participle /iyɑ/ (Chatterji 1926: 1002, 1021, 1028).[5] The present and past tense forms are obtained by adding the inflected forms of /ɑʧʰ-/. The person endings are, therefore, the same as those of the progressive. However, the development has not been identical. In colloquial Bengali, /iyɑ/ is reduced to /e/. The present and past perfect forms of two verbs are given in (14).

(14) Perfective forms of /boʃ-/ and /pɑ-/

	Literary	Colloquial	Literary	Colloquial
Perfect				
	boʃiyɑ	boʃe	paia	pe(y)e
Present perfect				
ami	boʃiyɑʧʰi	boʃeʧʰi	paiaʧʰi	pe(y)eʧʰi
tui	boʃiyɑʧʰiʃ	boʃeʧʰiʃ	paiaʧʰiʃ	pe(y)eʧʰiʃ
tumi	boʃiyɑʧʰo	boʃeʧʰo	paiaʧʰo	pe(y)eʧʰo
apni	boʃiyɑʧʰen	boʃeʧʰen	paiaʧʰen	pe(y)eʧʰen
ʃe	boʃiyɑʧʰe	boʃeʧʰe	paiaʧʰe	pe(y)eʧʰe
tini	boʃiyɑʧʰen	boʃeʧʰen	paiaʧʰen	pe(y)eʧʰen
Past perfect				
ami	boʃiyɑʧʰilam	boʃeʧʰilam	paiaʧʰilam	pe(y)eʧʰilam
tui	boʃiyɑʧʰili	boʃeʧʰili	paiaʧʰili	pe(y)eʧʰili
tumi	boʃiyɑʧʰile	boʃeʧʰile	paiaʧʰile	pe(y)eʧʰile
apni	boʃiyɑʧʰilen	boʃeʧʰilen	paiaʧʰilen	pe(y)eʧʰilen
ʃe	boʃiyɑʧʰilo	boʃeʧʰilo	paiaʧʰilo	pe(y)eʧʰilo
tini	boʃiyɑʧʰilen	boʃeʧʰilen	paiaʧʰilen	pe(y)eʧʰilen

There are several differences between the perfect forms and the other tenses. First, the medial morpheme /iyɑ/ from Middle Bengali is not deleted, but coalesces to an [e] in both vowel final and consonant final roots. Second, although the initial vowel of the auxiliary /ɑʧʰ-/ is deleted, there is no gemination of the affricate in the colloquial language; compare the verb 'get', [peyeʧʰilam] IPAST.PERF, but [pɑʧʧʰilam]

IPAST.PROG. Third, surprisingly the low vowel [ɑ] is raised in the colloquial language, and in fact the vowel is raised even when the root syllable is closed: 'beat' [mereʧʰilɑm] IPAST.PERF, but [mɑrʧʰilɑm] IPAST.PROG. We attribute the difference between the perfect forms and the progressive to the fact that in the former the auxiliary /ɑʧʰ-/ has not as yet become a suffix. Rather it is still a clitic, attached to the perfect which itself is suffixed (and not the bare root) and hence a prosodic word. Thus, contrary to the progressive, the perfect tenses are still one step behind total grammaticalisation. To indicate the differences, the stages proposed for the development of the perfect are labelled A and B.

(15) Grammaticalisation of the perfect

$$[/\text{ROOT} + \text{iyɑ}/]_{\omega} + [/\text{ɑʧ}^{\text{h}}\text{-}/ + \text{person affix}]_{\omega} \Rightarrow$$

Stage A $[[/\text{ROOT} + \text{iyɑ}/]_{\omega} + [/\text{ʧ}^{\text{h}}\text{-}/ + \text{person affix}]_{\text{clitic}}]_{\omega} \Rightarrow$

Stage B $[[/\text{ROOT} + \text{e}/]_{\omega} + [/\text{ʧ}^{\text{h}}\text{-}/ + \text{person affix}]_{\text{clitic}}]_{\omega} \Rightarrow$

In the process of cliticisation, the initial vowel of the auxiliary [/ɑʧʰ-/ is lost in Stage A, and in Stage B the morpheme /iyɑ/ coalesces to /e/. But that is all. The auxiliary has not reached the level of a suffix in colloquial Bengali and still behaves like a clitic. Thus, Stage A of the perfect and Stage II of the progressive are at the same period in the history of Bengali. Comparing the progressive and the perfect, we get the picture in (17) with the additional phonological changes listed in (16).

(16) Additional changes

a. Vowel coalescence: /iyɑ/ > /e/.

b. Vowel harmony : /ɑ/ > /e/ when followed by /e/.

(17) Perfect Stage A, progressive Stage II

Level I (non-present class marker, present and past participle, progressive, perfect)

	PRES	PERF (PAST PART)		
	pɑ-i	bɔʃ-iyɑ	mɑr-iyɑ	pɑ-iyɑ
Raising	–	bo.ʃ-iyɑ	–	–
Syncope + gem.	þɑ	–	–	–
/iyɑ/ > /e/ coalescence	–	boʃ-e	mɑr-e	pɑye
Vowel harmony	–	–	mere	peye

	PRES/PART PROGR		
	bɔʃ-i-ʧʰ	mɑr-i-ʧʰ	pɑ-i-ʧʰ
Raising	bo.ʃ-i-ʧʰ	–	–
Syncope + gem.	boʃ.ʧʰ	mɑr.ʧʰ	pɑʧ.ʧʰ
/iyɑ/ > /e/ coalescence	–	–	–
Vowel harmony	–	–	–

Level II (tense marker, person endings)

	PRES		IHAB.PAST	PERF		
	pɑ-i	bɔʃ-i	pɑ-to	boʃe	mere	peye
Fronting	–	–	pe-to	–	–	–
Raising		boʃ-i	–	–	–	–

	3PRES.PROG		
	boʃ.ʧʰ-e	mɑr.ʧʰ-e	pɑʧ.ʧʰ-e
Fronting	–	–	–
Raising	–	–	–

Word level (Cliticisation of auxiliary)

	PERF + AUX 3PRES		
	boʃe=ʧʰe	mere=ʧʰe	peye=ʧʰe
SURFACE	*boʃeʧʰe*	*mereʧʰe*	*peyeʧʰe*

Vowel coalescence has striking results. The root vowel /ɑ/ is fronted to /e/ when the perfective suffix follows. Since it is unaffected when

the person endings /e/ or /i/ follow, we must assume that this fronting (we will call it vowel harmony to distinguish if from fronting and raising) is realised in Level I.

Recall that the other root vowels were reanalysed as being underlying raised vowels at Stage III of the progressive. Similarly, in Stage B, for the perfect, all root vowels are now raised. There is, moreover, no additional evidence for the language learner that the past participial suffix is anything other than /e/. Comparing again the progressive and the perfect, the analysis for the present-day Bengali is as follows.

(18) Present-day analysis of the perfect (Stage B) and progressive (Stage III)

Level I (participles and progressive)

	PRES		PERF (PAST PART)		
	boʃ	pɑ	boʃ-e	mɑr-e	pɑ-e
V-harmony	–	–	–	mer-e	pe-e

Level II (tense marker, person endings)

	3PRES		3HAB.PAST		PERF		
	boʃ-e	pɑ-e	mɑr-to	pɑ-to	boʃe	mere	pee
Fronting	–	–	–	pe-to	–	–	–
Lowering	bɔʃ-e	–	–	–	–	–	–
Degem.	–	–	–	–	–	–	–

	3PRES.PROG		
	boʃʧʧ^{h}-e	mɑrʧʧ^{h}-e	pɑʧʧ^{h}-e
Fronting	–	–	–
Lowering	–	–	–
Degem.	boʃʧ^{h}-e	mɑrʧ^{h}-e	–

Word level (cliticisation of auxiliary)

	3PRES PERF + AUX		
	boʃe=ʧ^{h}e	mere=ʧ^{h}e	pee=ʧ^{h}e
SURFACE	*boʃeʧ^{h}e*	*mereʧ^{h}e*	*peeʧ^{h}e*

Notice that there is a difference between the participial ending of the perfect /-e/ and the 3PRES suffix /-e/. The perfect triggers vowel harmony, but the person suffix has no effect on the root: 'beat'/'get' [mere], [pee] PERF; [mare], [pae] 3PRES. Similarly, for all the other vowels, there is a difference in the root vowel although the surface form of the suffix is identical: 'sit' [boʃ-e] PERF, [bɔʃ-e] 3PRES.

At the word level the auxiliary is cliticised and the /a/ deleted. The affricate is not geminated. One could argue that the participle for the perfect is added at word level along with the cliticised auxiliary. There are however, other arguments in support of the analysis that unlike the progressive tenses, the auxiliary has not been grammaticalised to a suffix, at least not yet, and that the perfect ending /-e/ behaves like a suffix rather than a clitic.

- First, the perfect forms [boʃe] etc., are morphological and prosodic words and can stand on their own. For example, they appear in nonfinite clauses and as the non-inflected verb of a complex predicate: [boʃe por-i] 'sit-PERF fall-1, I sit down'.
- Second, phonological clitics [o] (ALSO) and [i] (indicating emphasis) which cannot add to anything smaller than a prosodic word, can attach to the perfect: [boʃe=o por-i] 'sit-PERF=ALSO fall-1, I also sit down' (Bayer and Lahiri 1990; Lahiri and Fitzpatrick-Cole 1996; Fitzpatrick-Cole 1999).
- Third, the clitic can also be added to any inflected verb: [pʰeli=o] 'throw-1PRESENT ALSO'. When the verb is in the progressive the clitic can only come after the suffix: [pʰelʧʰe=o] 'throw-3PRES.PROG'. However, when the verb is a present perfect or past perfect, the clitic can be inserted after the perfect marking and the auxiliary ending. The following possibilities are attested: [pʰele=ʧʰe=o], [pʰele=o=ʧʰe] 'throw-3PRES.PERF, ALSO'. With the progressive no insertion is possible between the root and the affricate in the ending: [pʰelʧʰe=o] but *[pʰel=o-ʧʰe].
- Finally, the perfect ending /e/ behaves like a suffix rather than a clitic with respect to the placement of the clitic. Just as we can get [pʰele=o] 'throw-3PRES', *[pʰel=o-e], the clitic can come after the perfect (as also above), [pʰele=o] 'throw-PERF', but not *[pʰel=o-e].

Thus, the perfect ending /e/ behaves as a suffix and not a clitic, but it

does not trigger the same rules as the person suffixes. Hence, standard colloquial Bengali still requires two morphological levels as well as a word level.

2.4. Summary

Our analysis shows that the verb /ɑʧʰ-/ 'to be' has been grammaticalized in two ways in Bengali. A grammaticalized form of the verb is now part of the progressive and the perfect forms. However, although superficially the two cases look similar, the grammaticalisation process is not identical. For the progressive, grammaticalisation has led to suffixation. For the perfect, the auxiliary is not so closely fused to the root and bears similarity to a clitic.

More significant is the process of decomposition, given in (10), which we claim is also a part of grammaticalisation. The auxiliary as a suffix maintains its morphological parts, but the concatenation to the main verb root is not linear. For the progressive, the affricate /ʧʰ/ from the base of the auxiliary is first reinterpreted as a progressive marker and adheres closer to the root than the person suffixes. The affricate is on a par with the original present participle ending, and kept separate from the other tense suffixes. We argued that this was possible for the language learner since the progressive had its own tense/person inflections which were then on a par with the other tense/person suffixes. It is only at a later stage that the affricate is reanalysed as an underlying geminate and treated in the same way as the other tense markers. This claim is supported by several phonological alternations.

In the case of the perfect, the grammaticalisation has only proceeded to clitic formation, as shown in (15). Again, if we compare the forms closely, we find that a number of phonological alternations differ between the progressive and the perfect, lending support to this claim. The perfect marker itself is attached closer to the root than the person or tense endings.

In the next section we will examine the dental preterite in Germanic which, we shall claim, has undergone similar grammaticalisation and decomposition stages.

3. The dental preterite in Germanic

In the Germanic languages, there exists a class of verbs, usually referred to as the 'weak' verbs, which are almost exceptionlessly derived from nouns, adjectives, and other verbs by the addition of the derivational suffix /j/. The past tense of these verbs is marked by the addition of a dental/alveolar obstruent. The origin of this preterite is controversial. The consonant has survived in all the modern languages as an anterior coronal stop, the source of which must be an IE *$\underline{d}^h$ or *t-. The main problem is that although the coronal element is constant, the consonant may be a voiced or voiceless stop or a fricative: Gothic IPRET.INDIC. SG/INF *sōkida/sōkjan* 'seek', *þāhta/þagkjan* 'think', *wissa/*witan* 'know', *kunþa/kunnan* 'know'. A survey of the various theories concerning the source of the preterite is given in Tops (1974).[6] We will argue that the most convincing source of the preterite is the initial consonant of the IE verb *$\underline{d}^h\bar{e}$-/$\underline{d}^h\bar{o}$- 'to do', PGmc *$d\bar{o}n$-. The claim is that the fully inflected form of 'do' was added to the weak verbs along with the suffix /j/ to mark past tense. Later, due to grammaticalisation and reanalysis, the verb root became a suffix and is now present as the productive tense marker in all the Germanic languages.

Although we believe that the most plausible source of the dental preterite is the verb 'to do', the central issue in this paper is not the actual Indo-European source, but rather the status of the coronal stop in Germanic at a stage after the initial reanalysis. Like Bengali, our claim is that the consonantal element (in this case the coronal stop) is fused closer to the root than the person/number suffixes, and the resulting morphological structure is hierarchical. The crucial point is that the evidence for this structure is based on the entire morphological system of the various languages and not just on the weak verbs. To establish our claim, the discussion is structured as follows: (a) the nature of the weak verbs and why a novel way of forming the preterite was necessary, (b) the source of the person/number inflectional endings, and (c) the morphological status of the verbal root before grammaticalisation.

3.1. The nature of the weak verb

In discussing the source of the dental preterite, we have to address the causes behind this formation. One reason for the interest in the dental preterite is because this way of forming the past tense is novel among the Indo-European languages. Four classes of weak verbs exist, but we will focus on the Class I verbs which are by far the largest group.

When a verb is derived from another word class, it would not be unusual for it to take on the inflectional endings of the regular verbs. Constructing an entirely different past tense form is certainly untypical. Insofar as the present tense is concerned, the person/number/mood suffixes of the weak verbs are very similar to the strong verbs. An example of the inflectional endings of the present tense (indicative and subjunctive) of two Old English verbs illustrates this point.

(19) Present tense

		Strong (*beran* 'to bear')	Weak (*nerian* 'to save')
Indicative			
Singular	1	bere	nerie
	2	bir(e)st	ner(e)st
	3	bir(e)þ	nereþ
Plural		beraþ	neraþ
Subjunctive			
Singular		bere	nerie
Plural		beren	nerien

Thus, to form the present tense of weak verbs, the person/number/mood endings of the strong verbs may be added to the root plus /j/ without any problems. The concatenation is simple. It is only the past tense which introduces a new formation. The strong verbs, which could be considered as the regular class of verbs in Germanic, form the preterite by ablaut involving a qualitative and/or quantitative change in the stem vowel, the result of the original Indo-European system. The ablaut classes are given in (20).[7]

(20) Ablaut classes in Gothic, Old English, and Old High German

Class I					
Gothic	beidan	báiþ	bidum	bidans	'await'
OE	bídan	bād	bidon	biden	'await'
OHG	bítan	beit	bitun	gibitan	'wait'
Class II					
Gothic	-biudan	-báuþ	-budun	-budans	'to command'
OE	bēodan	bēad	budon	boden	'to command'
OHG	biotan	bōt	butun	gibotan	'to offer'
Class III					
Gothic	bindan	band	bundun	bundans	'to bind'
OE	bindan	band	bundon	bunden	'to bind'
OHG	bintan	bant	buntun	gibuntan	'to bind'
Class IV					
Gothic	baíran	bar	bērun	baúrans	'to bear'
OE	beran	bær	bǣron	boren	'to bear'
OHG	bëran	bar	bārun	giboran	'to bear'
Class V					
Gothic	mitan	mat	mētun	mitans	'to measure'
OE	metan	mæt	mǣton	meten	'to measure'
OHG	mezẓan	maẓ	māẓun	gimezẓan	'to measure'
Class VI					
Gothic	faran	fōr	fōrun	farans	'to go'
OE	faran	fōr	fōron	færen	'to go'
OHG	faran	fuor	fuorun	gifaran	'to go'

Extrapolating from the individual qualitative differences across the three languages we find that the prosodic shapes of the roots and the vocalic quantity of the different ablaut classes are very similar. In almost all instances, the vowel quality in the individual languages is the result of regular phonological changes from Proto-Germanic. The issue here is not the etymology of the various ablaut grades but whether a new verb can fit into any of the existing patterns. Since the weak preterite is of

Germanic origin, we must examine the reconstructed Proto-Germanic ablaut grades to review the possibility of adopting one pattern for the past tense of the derived verbs. Only the infinitive and the two past forms are relevant since the vowel quality of the past participle depends on other factors.

(21) Proto-Germanic ablaut grades

	Infinitive	Past Sing.	Past Pl.	Root
Class I	[ī]	[ai]	[i]	–C
Class II	[eu]	[au]	[u]	–C
Class III	[i]	[a]	[u]	–[+son]C
Class IV	[e]	[a]	[ǣ]	–[+son]
Class V	[e]	[a]	[ǣ]	–[–son]
Class VI	[a]	[ō]	[ō]	–C

The consonants under [+son] include liquids and nasals. It is immediately noticeable that other than in Class VI, the vowels differ in the front/back dimension between the infinitive and the two past forms. In fact, all the vowels in the 1/3PAST.SING forms are back in Proto-Germanic as well as in the later stages of Gothic and Old High German. Only because Proto-Germanic */a/ > OE [æ] except before nasals, Old English has a front vowel in Class IV and V. Vowel quantity is not predictable either within an inflectional class nor within an ablaut class. Only in Class III, where the root is closed by a nasal plus obstruent, all vowels are short. Thus, in all the ablaut classes, the root vowel in the infinitive (which also represents the present) differs from the two past forms either in backness or in quantity and sometimes in both.

The crucial question we must now ask is why the derived verbs did not form their past tense by ablaut. We believe there are two main reasons, both of which are linked to the non-concatenative nature of ablaut. Let us take OE as an illustration. First, consider the quality of the vowels in the different morphological categories. The glide /j/ which is added to all the roots causes umlaut in the West Germanic languages. Hence *all* the root vowels in Old English weak verbs are front vowels.[8] However, as we saw in (20) and (21), to fit into an ablaut pattern, the vowel quality must change. Changing the vowel into a back vowel to

fit into a particular ablaut class (e.g. Class I) would be phonologically very odd in this assimilatory context. The only class with all front vowels is Class V, and indeed, when a verb analogically shifts from weak to strong in OE, it often falls into this ablaut pattern: cf. OE *biddan*, *sittan* etc.

Second, vowel quantity is a further restriction. The glide /j/ causes gemination when the preceding syllable is a stressed light syllable.[9] This means that the roots of the weak verbs were either heavy as in (C)VCC, $C\bar{V}C$ or light CVC + j > $CVC_{\alpha}\ C_{\alpha}$ by gemination. Thus, only the $C\bar{V}C$ roots could match the Class I and II infinitives, while the others CVCC and $CVC_{\alpha}\ C_{\alpha}$ could fit the other classes. But again, the vowel quality constraint allows only one ablaut class to be suitable.

Thus, the derived weak verb roots are incompatible with the non-concatenative characteristics of the past tense formed by ablaut. The above arguments concerning the vowel quality and quantity hold for all the West Germanic languages. Gothic, however, did not undergo either gemination or umlaut and if we assume that the weak verbs obtained their preterite right from the Proto-Germanic period, one might argue that the concerns regarding gemination and umlaut are moot. But the central reason remains the same: the weak verb roots do not match the existing ablaut grades. If we summarize the Gothic ablaut grades we come to (22).[10]

(22) Gothic vowel alternations in the strong verbs

	Infinitive	Past Sing.	Past Pl.	Past Part.	Root
Class I	V: [ī]	V: [ai]	V [i]	V [i]	–C
Class II	V: [iu]	V: [au]	V [u]	V [u]	–C
Class III	V [i/ɛ]	V [a]	V [u]	V [u]	–[+son]C
Class IV	V [i/ɛ]	V [a]	V: [ē]	V [u]	–[+son]
Class V	V [i/ɛ]	V [a]	V: [ē]	V [i]	–[–son]
Class VI	V [a]	V: [ō]	V: [ō]	V [a]	–C

The infinitive gives the full range of vowels allowed in the Gothic strong verb roots—essentially four. The derived verbs, on the other hand, have a wider range of vowels: *sōkjan* 'to seek', *maúrjan* 'to murder', *mēljan* 'to write', *hráinjan* 'to make clean' etc. Only those that

match the quality of the four vowels could fit into the ablaut schema like *liuhtjan* 'to light'. Further, the strong verb roots are in general monosyllabic with the following structures: CVC (*niman* 'to take'), CV:C (*beidan* 'to await'), or CVCC (*bindan* 'to bind'). In contrast, the derived verb roots can be heterosyllabic and even the monosyllabic roots can be more varied. For example, Gothic *swōgatjan* 'to sigh', *maúrþrjan* 'to murder', *mikiljan* 'to magnify' deviate from the strong verb pattern. Finally, the derived verbs in Proto-Germanic had the structure /root+j/. The daughter languages show different manifestations of this /j/. In Gothic the glide appears everywhere in the present tense. The Proto-Germanic root corresponding to Gothic *nasjan* 'to save' (OHG *nerien*, OE *nerjan*) is **nazij*. In contrast, a strong verb like Gothic *niman* (OHG *neman*, OE *niman*) is derived from the Proto-Germanic present tense root **nem-*. Thus, even if the base from which the weak verb is derived is similar to a strong verb, the verbal root would be different, and cannot be part of the normal ablaut formation.

The fact that the derived weak verbs had a different structure from the strong verbs would be of no consequence if inflectional marking involved the addition of suffixes which did not care about the structure of the root. But since expression of past tense formation by ablaut is crucially dependent on the phonological structure of the root, another way of forming the past tense was chosen, namely to add an auxiliary verb 'do'. In the next section, we consider the consequences of this hypothesis.

3.2. The endings of the weak preterite

The arguments for and against the source of the preterite being IE **d̪ʰe-* are both phonological and morphological. Phonologically, the arguments are often linked to the particular coronal attestation in the various languages and the likelihood of their being derived by the consonantal changes due to Grimm's Law and Verner's Law. There is no difficulty in explaining the development of IE **d̪ʰ* to PGmc **d*. This would be the normal change due to Grimm's Law. The subsequent changes in the different languages (Gothic *d*, OE *d*, OHG *t*) are also accounted for. However, there are some other variations among the coronal preterite

forms. Although the largest number of verbs have the PGmc **d* as the past marker, there are other variations.

(23) Various dental occurrences in the weak preterite

	Gothic	OE	OHG
a.	nasida	nerede	nerita
b.	þūhta	þūhte	dūhta
c.	kunþa	cūþe	konda
d.	wissa	wisse	wissa (wësta)

We will concern ourselves with (a) since this is the largest class of verbs which all clearly had a glide as their derivativational suffix. And in this class there is no difficulty to assume that the preterite marker could have come from PGmc **d* by accepted phonological changes. If we then assume that the inflected past tense of the verb 'to do' was added to some non-finite form of the derived root to express past tense (at least for this set), the next issue is the source of the endings of the preterite forms of the weak verbs.[11] One logical possibility is that they are identical to, or were derived from, the vocalic endings of PGmc **dōn-* itself. A second possibility is that they are related to the endings of the strong verbs. The inflectional (person/number/mood) endings of the indicative forms of the strong and weak preterite in Gothic, OE and OHG are given in (24).

(24) The endings of the strong and weak preterite

		Gothic[12]		OE		OHG	
		Weak	Strong	Weak	Strong	Weak	Strong
SG	1, 3	-a	Ø	-e	Ø	-a	Ø
	2	-ēs	-t	-es(t)	-e	-ōs	-i
PR	1	-ēdum	-um	-on	-on	-um/-ōm	-umēs/-um
	2	-ēduþ	-uþ	-on	-on	-ut/-ōt	-ut
	3	-ēdun	-un	-on	-on	-un/-ōm	-un

The singular forms of the strong and the weak verbs are quite different. In the plural, however, the endings are identical in OE and OHG,[13] while in Gothic the last part of the ending is the same. In the 2/3SG,

since there is a zero ending in the strong verbs, the ablaut grade alone marks the inflectional category. It is not surprising, therefore, that the singular endings for the first and third person are different for the two classes. In the weak verbs, given that ablaut is not possible, some suffix is added; the question is where does it come from?

Compare now the past tense paradigm of the verb 'to do' in OE and OHG. IE **dhē-/*dhō-* showed reduplication in the paradigm, retained in Sanskrit *dadhāmi* and Greek *tithēmi*. This reduplication is also found in the preterite forms of the Germanic languages. There are however, no extant forms of this verb in Gothic.

(25) Past tense paradigms of the verb 'to do'

		OE	OHG
		dōn	tuon
SG	1, 3	dyde	teta
	2	dydes(t)	tāti
PL	1	dydon	tātum
	2	dydon	tātut
	3	dydon	tātun

We can see from the West Germanic languages that the plural endings for the weak preterite in Gothic are clearly part of the original verb 'to do', indeed in all probability the entire form. The OE forms of 'to do' match exactly the endings of the weak preterite, and except for the second person singular, the same holds for OHG. We can assume, therefore, that the past tense of the verb 'to do', inflected for person, number and mood, was used to express the past tense of the derived verbs.

The question arises whether at the initial stage this auxiliary verb was added directly to the verb root derived from a basic morphological category by the addition of a suffix, or to a non-finite inflected form of the verb root. Most of the proponents of the claim that the source of the dental preterite is the verb 'to do' assume that the weak preterite was initially a syntactic construction (see Tops 1974 for detailed discussion). The first part, that is the part before the preterite marker, is either assumed to be a verbal noun (Sverdrup 1929, following Streitberg 1896,

and others), or an infinitival construction (von Friesen 1925, and others). Since the various positions have been discussed in enormous detail in the last century, we will not favour any particular position here. We will assume that there was an initial syntactic construction and focus on the subsequent development of the grammaticalisation of 'to do'.

3.3. Grammaticalisation of PGmc *dōn

All scholars have assumed that the coronal stop was interpreted as an exponent of the past tense. This could not have been the case in the initial stage where pastness was expressed by 'do' plus its own preterite inflection, contrasting with the present where there was no 'do'. The initial stages were therefore the following:

(26) Preterite formation in weak verbs: early stage

Stage I [ROOT + j + /X/]$_{\omega}$ + [/'do'/ + past infl. suffix]$_{\omega}$
(where ROOT < verb, noun, adjective; X=infinitival, case/number or nominalising suffix)

Stage II [[ROOT + j + /X/]$_{\omega}$ + [/'do'/ + past infl. suffix]$_{clitic}$]$_{\omega}$

Stage III [[ROOT + j + /CORONAL STOP/] + [past infl. suffix]$_{suffix}$]$_{\omega}$

When we look at the synchronic stages of OE, Gothic and OHG, we can observe that the coronal stop is a common factor in all the past tense forms and can therefore be analysed as a past tense marker, independent of the person/number/mood suffixes (cf. Lass 1994: Sect. 7.3). At first glance there appears to be no evidence which stage of (26) is reflected in these languages. Our claim is that Gothic reflects Stage II where the auxiliary is cliticised, while Old High German, Old English and Old Norse provide evidence for Stage III. At Stage III, the morphological structure is hierarchical such that the root plus derivational suffix /j/ plus the coronal stop are fused closer together and separate from the person/number/mood suffixes of the past tense. Like Bengali, the concatenation is not linear. Recall that the inflectional suffixes of the present and past tense of Germanic verbs are different (see (19) and (24)). Thus the suffixes themselves incorporate tense marking. Hence, at Stage III, when the coronal stop is on a par with the root and the

derivational suffix, it behaves like the marker of a class of verbs rather than an exponent of tense.

To support this claim, we will draw on phonological alternations within the weak verb paradigms as well as in the nominal paradigms. It is necessary to look at the entire morphological system to understand the complex interactions.

3.3.1. Stem formatives and /j/

There are two types of monosyllabic roots in Germanic: light (C)VC and heavy (C)V̄C, (C)VCC, (C)V̄, and less frequently (C)V̄CC. The CC sequences may be geminates or consonant clusters. There are no roots of the type (C)V in any of the Germanic languages. Further, Germanic has both long and short vowels and long and short consonants. Closed syllables with long vowels and consonant clusters do exist, but rarely long vowels plus geminates.

Stem extensions (also labelled stem formatives or theme vowels) were normal in Germanic (as in other Indo-European languages) and are commonly used to distinguish nominal classes. Although strictly speaking they are extensions of the root, following traditional terminology we will refer to them as stem extensions and when alluding to the weight of the roots, they will be called light and heavy stems. These stem extensions could be vocalic or consonantal. Our interest here is in comparing the *ja*- and *i*-nouns, which are marked by a high front sonorant segment with the derivational suffix /j/ which formed the weak verbs. In most languages the alternation between moraic /i/ and non-moraic /j/ would be based on syllable position. However, we claim that both exist as underlying stem extensions in Germanic (cf. Lahiri 1982).[14] Evidence comes from the synchronic alternations within both noun and verb paradigms. Of particular importance is the comparison between the nominal stem extension /j/ and the original derivational suffix /j/ which formed weak verbs. As we mentioned earlier, this suffix triggered gemination in West Germanic and umlaut in West and North Germanic. Both processes were constrained by prosodic structures of the stem. Compare the following paradigms in Old English, Old Norse and Old High German. Only the forms relevant for the phonol-

ogy/morphology interaction are given. The 3SG.PRES patterns like the 2SG indicative and imperative while all other present forms are like the infinitive. And the 3SG.PAST represents all indicative and subjunctive forms in the preterite.

(27) Phonological alternations in weak verbs

		OE	ON	OHG
		/fram+j/	/tal+j/	/zal+j/
Light stems	infinitive	fremmen	telja	zellen
	3SG.PRES.IND	fremeþ	telr	zelit
	3PAST.IND	fremede	talða	zelita
		/dōm+j/	/dōm+j/	/stall+j/
Heavy stems	Infinitive	dēmen	dœ̄ma	stellen
	3SG.PRES.IND	dēm(e)þ	dœ̄mir	stellit
	3PAST.IND	dēmde	dœ̄mða	stalta

Superficially the languages look very similar, but there are major differences.

- First, in OE and OHG, there is no gemination in 3SG and in the past tense of the light stems.
- Second, umlaut occurs in the present and the infinitive of the light stems of all three languages, but no umlaut occurs in the past tense of these verbs in ON.
- Third, the umlaut pattern is different in the past tense of the heavy stems. Here, there is no umlaut in the OHG heavy stem *stellen* either, and the underlying geminate consonant is degeminated. OE and ON show umlaut in the heavy stems throughout.

The presence and absence of umlaut in OHG and ON is exactly reversed with respect to the underlying quantity of the stem. In OHG, the heavy stem shows no umlaut in the past tense, while in ON it is the light stem that lacks umlaut in the past. The complications increase, however, if we look at the nominal paradigms with the stem extensions /j/ and /i/. There are many apparent discrepancies, which we will argue are easily accounted for if we assume hierarchical structure in the morphology with the weak preterite treated on a par with the stem extensions. We

first examine Old Norse and then Old High German, sometimes drawing on Old English for additional evidence.

3.3.2. Interaction of umlaut and syncope in Old Norse

As is obvious from the examples in (27), Old Norse umlaut is constrained by metrical structure: the light stems do not show umlaut in the past while the heavy stems do. Umlaut in Old Norse is an extremely controversial issue. The difficulty arises in accounting for the fact that heavy stems, nouns and verbs with /j/ or /i/ extension undergo umlaut, likewise the light *ja*-stem nouns and the present tense of the weak verbs, but the light *i*-stem nouns and the past tense of the weak verbs resist umlauting. Consider the nominal forms in (28).

(28) Umlaut in ON nouns

Light stems		Heavy stems	
ja-stem		*ja*-stem	
/bað/	(MASC) 'bed'	/māk/	(MASC) 'sword'
beðr	(NOM.SG)	mækir	(NOM.SG)
beðjar	(NOM.PL)	mækjar	(NOM.PL)
/kun/	(NEUT) 'kin'	/rīk/	(NEUT) 'kingdom'
kyn	(NOM/ACC SG/PL)	rīki	(NOM/ACC SG/PL)
kyni	(DAT.SG)	rīki	(DAT.SG)
kynja	(GEN.PL)	rīkja	(GEN.PL)
i-stem		*i*-stem	
/stað/	(MASC) 'state'	/bekk/	(MASC) 'bench'
staðr	(NOM.SG)	bekkr	(NOM.SG)
staðir	(NOM.PL)	bekkir	(NOM.PL)
staði	(ACC.PL)	bekkja	(GEN.PL)

As we can see, only the light *i*-stems have no umlaut in spite of the presence of an overt /i/. Surface differences between NOM.SG *staðr* vs. 2SG.PRES.INDIC *telr*, but ACC.PL *staði* vs. 3SG.PAST *talði* do not help. The interaction of umlaut and syncopation has led to considerable

bafflement in the literature. Generally it has been assumed that syncope of high vowels occurred after heavy syllables (cf. for instance Prokosch 1939: 135). The chronology of umlaut relative to syncopation led to the term 'Rückumlaut' by Jacob Grimm, suggesting that wherever *i* was deleted before the period of umlaut, the stem vowel had to remain unchanged. In other words, syncope was the direct cause for 'Rückumlaut'. This proposal was relevant for all *i*- and *ja*- nouns and particularly the preterite of weak verbs.[15] There have been several proposals to account for the problematic interaction of umlaut and syncope in Old Norse. They include Kock's (1888) classic account of positing different umlaut periods, morphologisation (Iverson 1978; Voyles 1982, 1992), reanalysis of stems (Cathey and Demers 1972, 1975, 1977) and level ordering (Kiparsky 1982a).[16]

Our claim is that all the Old Norse forms can be accounted for if we assume that umlaut is restricted to heavy syllables and that the weak preterite behaves on a par with the nominal stem extensions. However, we first begin by assuming that there is no level ordering. Umlaut is defined as in (29).

(29) Umlaut in ON: back vowels are fronted in heavy syllables in the context of a front high vowel or glide.[17]

A further phonological process that needs to be mentioned is syncope, which deletes medial unstressed vowels before a syllable beginning with a lax dental (Orešnik 1978; Kiparsky 1983). Assuming syncope and umlaut, the past tense in Old Norse can be analysed as follows:

(30) Umlaut and syncope in ON past tense
/dōm+j+ða/ > /dō.mi.ða/ > umlaut /dœ̄.mi.ða/ > syncope [dœ̄mða]
/tal+j+ða / > /ta.li+ða / umlaut does not apply > syncope [talða]

However, this cannot be the complete story. Although this accounts for the lack of umlaut in the past tense of light stems, the asymmetry in umlaut between all *ja*-nouns (which always showed umlaut) and light *i*-stems which never underwent umlaut is not accounted for.

The critical cases are *staðir* and *staði* where the suffix *-i* does not trigger umlaut. Thus, neither the stem extension /i/ which is syncopated

in the singular, nor the suffix causes umlaut.[18] If we take the surface forms, the stem vowel is in an open light syllable or closed by [r] in which context syncope would have deleted the [i]. This is parallel to the past tense forms where in the presence of the consonantal past marker the glide is vocalized making the stem syllable light. But so are *kyni* and *beðr* and they still undergo umlaut. The solution rests on the assumption that the stem extensions are different and are added on a different level from the inflectional endings.

(31) Deriving umlaut in ON

Level I (with stem extension)

	bað-j	bakk-j	stað-i	māk-i	tal-j
Syllabification	bað(j)	bak(kj)	sta.ði	mā.ki	tal(j)
Umlaut	beð(j)	bek(kj)	–	mæ.ki	tel(j)

Level II (with inflection)

	beðj-r	bekkj-a	staði-r	leiki-r	telj-a	telj-ða
Syllabification	be.ðir	bek.kja	sta.ðir	lei.kir	tel.ja	te.li.ða
Syncope	beðr	–	staðr	leikr	–	*telða
SURFACE	*beðr*	*bekkja*	*staðr*	*leikr*	*tel.ja*	**telða*

Assuming level ordering and different stem extensions is, however, still not enough. Umlaut correctly applies to *beðr* and not to *staðr*. For the former, the glide is unsyllabified, and the root syllable remains closed and heavy, thereby being sensitive to umlaut. The *i*-noun *staðr*, on the other hand, has an open syllable right from the beginning and umlaut is blocked. But under these conditions, the past tense of *telja* undergoes umlaut incorrectly just like *beðr*. These are the sort of facts which have made researchers resort to the assumption that umlaut was morphologically constrained. But even if one assumes umlaut is morphologised, the constraint on where umlaut fails to apply is phonologically transparent, namely when the coronal preterite forces the vocalisation of the glide. The solution rests on the status of the coronal preterite at this stage. In the above derivations it was assumed that the coronal stop is part of the inflectional ending. If we assume instead that the coronal stop has the same status as the stem extension /j/, we have the situation depicted in (32).

(32) Preterite marker as class marker in ON (earliest stage)

Level I (stem extension and preterite marker)

	tal-j	tal-jð	dōm-j	dōm-jð	stað-i	bað-j
Syllabification[19]	tal(j)	ta.lið	dō(mj)	dō.mið	sta.ði	bað(j)
Umlaut	tel(j)	–	dœ̄(mj)	dœ̄.mið	–	beð(j)

Level II (inflectional endings)

	telj-a	talið-a	dœ̄mj-a	dœ̄mið-a	staði-r	beðj-r
Syllabification	tel.ja	ta.li.ða	dœ̄.mja	dœ̄.mi.ða	sta.ðir	beðir
Syncope	–	talða	–	dœ̄mða	staðr	beðr
Glide deletion[20]	–	–	dœ̄ma	–	–	–
SURFACE	*telja*	*talða*	*dœ̄ma*	*dœ̄mða*	*staðr*	*beðr*

There are many consequences of interpreting the dental preterite as having the same morphological status as the stem extension. The /j/ is syllabified such that the root final consonant is the onset of the second syllable: /tal-jð/ > / ta.lið/. The stem syllable is light and therefore is not fronted by umlaut. Else, the glide is unsyllabified in Level I and remains as an appendix, allowing the root final consonant to close the syllable and undergo umlaut: /tal-j/ > /tal(j)/ > /tel(j)/. Thus we get the correct present and past forms for the light weak verbs: the present with umlaut and the past without umlaut. In the present, since the glide remains extrasyllabic, the root final consonant closes the syllable thereby allowing umlaut to apply. And in the past when followed by the coronal stop the glide is vocalised and the initial syllable becomes light just like the *i*-stem forms, and umlaut is blocked. With this analysis we can see why the *i*- and *ja*-stem nouns differ in their umlaut patterns and why there is allomorphy of the root for the light stem weak verbs but not in the heavy stems.

Thus, the phonological evidence supports the analysis that the coronal stop marks the class of derived weak verbs and is on a par with derivational suffixes and nominal stem extensions. In Section 4, we discuss in greater detail the precise nature of the weak class marker. It creates a domain for phonological rules, to the output of which inflectional suffixes are added. Grammaticalisation of Proto-Germanic **dōn* created a hierarchical morphological structure. In the next section we look at two minor analogical changes in Old Norse and Old High

German which show that in a few instances a further reinterpretation has taken place and the coronal stop now patterns with the inflectional suffixes.

3.3.3. Analogical levelling: Reinterpretation of the dental preterite in Old Norse

A handful of the light stems in Old Norse and Old High German show a change in the past tense with respect to umlaut. These changes look as if there is a levelling within the paradigms, where in both languages the light stems follow the examples of the heavy stems. In ON, the umlaut is extended, in OHG the umlaut is revoked.

(33) Analogical levelling in ON *selja* and OHG *zellen*

3PAST.IND	ON	OHG
Light	**salða > selða**	**zelita > zalta**
Heavy	dœ̄mþa	stalta

The analogical levellings seen in these forms go precisely in opposite directions. In ON, the light stems acquire umlaut, while in OHG, it is the light stems which lose umlaut. These changes are perceived as levelling since forms become 'similar' to other parts of the paradigm or to other members of the paradigm. ON *selða*, with the umlauted vowel, is closer to the present tense, while OHG *zalta* takes on the unumlauted vowel of the heavy stems. It is worth noting that there was no general levelling of the present tense. For instance, the 3SG in OHG remained ungeminated and did not follow the examples of the majority of the forms. Neither were the heavy stems affected. Our claim here is that this analogy is restricted only to these forms and goes the way it does due to a further reanalysis of the weak dental preterite.

As mentioned above, the past tense of a few light stems like *selja* began to surface with umlaut. The traditional explanation is that they changed in analogy to the heavy stems. The two stages are given below:

(34) ON analogy of weak verbs

		/sal/	/dœ̄m/
Stage I:	past tense	salþa	dœ̄mþa
	infinitive	selja	dœ̄ma
Stage II:		**selða**	dœ̄mþa

The change affected only the preterite indicative. Otherwise the paradigms remained as they were. If it was merely a question of paradigm levelling, one would have expected the entire paradigm to have levelled. Our alternative proposal is that the coronal consonant changed its status again and became part of the inflection. It is, therefore, no longer added in Level I.

(35) Further reanalysis in ON: tense marker is now becoming part of the inflection

Level I (only stem extension)

	sal-j	sal-j
Syllabification	sal(j)	sal(j)
Umlaut	sel(j)	sel(j)

Level II

	selj-a	selj-ða
Syllabification	selja	seliða
Syncope	–	selða
SURFACE	*selja*	*selða*

It is important to note that no other part of the grammar is affected by this change. The nouns show the same asymmetry in umlaut and the rest of the verbal paradigm remains the same. That is, the light *i*-stems remain without umlaut and the *ja*-stems show no changes either. The only change was in the reanalysis of the coronal stop. However, only a handful of verbs show this development. Thus, in Old Norse, the preterite generally remained a Level I suffix.

3.4. The preterite in Old High German

Additional support for our proposal comes from OHG. The weak verbs in OHG show the exact same pattern—the coronal stop was originally attached in Level I along with stem extensions and the derivational suffix. Again, in the process of grammaticalisation, the language learner parsed the coronal stop on a par with stem extensions. The phonological processes are not quite the same, but the patterns of alternations across the grammar provide the same sort of evidence as in ON. In addition, a similar analogical levelling took place, except that in OHG the light stems in the preterite matched the heavy stems as a result of which both verbal paradigms had two distinct stem forms in the surface.

As we saw in (27), the Old High German weak verbs show the opposite pattern of alternation with respect to umlaut than Old Norse. In Old High German, the light stems show umlaut while the heavy stems do not. The alternations in the *i*- and *ja*-stem nouns are also different. The crucial forms are given in (36).

(36) OHG /j/–/i/ alternations in nouns and verbs

Light stems				
ja-nouns	/bat/	betti	NOM.SG/PL.NEUT	'bed'
i-nouns	/mar/	meri	NOM.SG/PL.MASC	'lake'
Weak verbs	/zal/	zellen	INFINITIVE	'tell'
		zelit	PRES.INDIC.3SG	
		zelita	PAST.INDIC.1SG	
Heavy stems				
ja-nouns	/ant/	enti	NOM.SG/PL.NEUT	'end'
i-nouns	/gast/	gast	NOM.SG.MASC	'guest'
		gesti	NOM.PL	
Weak verbs	/stall/	stellen	INFINITIVE	'lay'
		stellit	PRES.INDIC.3SG	
		stalta	PAST.INDIC.1SG	

Just like Old Norse, the *i*-stems in Old High German vary in umlaut. Unlike Old Norse, the heavy stems like *gast* show no umlaut in the singular, but have a front vowel in the plural. The light stems show

umlaut in both singular and plural. Umlaut occurred in all stem forms in the *ja*-nouns. The fact that only the plural *gesti* undergoes umlaut, but both singular and plural of the *ja*-nouns have umlaut, are added evidence to the underlying difference in stem extensions. Again, at first glance, it looks as if umlaut is morphologised (cf. Voyles 1992). However, all the patterns of alternations fall into place if we assume that the stem extensions and the coronal stop are added in Level I.

The crucial phonological processes in OHG are umlaut, gemination and syncope. Umlaut was triggered by front vowels and glides and was not sensitive to syllable structure as in ON. Both gemination and syncope are constrained by foot structure. The West Germanic gemination was still a synchronic process in Old High German and Old English. This is a process by which all consonants except *r* are doubled when followed by a front glide /j/. It is constrained only when the head of the foot becomes trimoraic or the weak branch is strengthened.[21] There is another instance where gemination fails to apply. It does not apply to the light stems in the 3SG.PRES whose ending is itself an /i/, and as a result of which we see a contrast between *zelit* and *stellit*. Here, a sequence of non-moraic and moraic high sonorants as in /ji/ reduces to a moraic /i/. Finally if the glide is vocalised by normal syllabification, then gemination is blocked. This may happen if the glide is followed by a consonant as in the past tense: /zal+j+ta/ > /za.li.ta/ > [zelita].

Syncope was essentially deletion of high vowels in the weak branch of a foot. The high vowels resulting from syllabification of /j/ are also subject to deletion and can bleed umlaut.

(37) Syncope in OHG
/stall+j+ta/ > /stal.li.ta/ > SYNCOPE /stall.ta/ > simplifying impossible syllable structure [stalta]

Our claim is that the analysis of OHG is parallel to that proposed for Old Norse, where the coronal obstruent of the preterite and the stem extensions are class markers. Although superficially the languages look as if they have opposite patterns of alternation, the hierarchical morphological structure with the necessary phonological rules accounts for the entire set of data.

(38) OHG: coronal stop on a par with stem extensions

Level I (stem extension and preterite marker)

	PRES		PRET	
	zal-j	stall-j	zal-j-t	stall-j-t
Syll.	zal(j)	stal(lj)	za.lit	stal.lit
	ja-nouns		*i*-nouns	
	bat-j	ant-j	gast-i	mar-i
Syll.	bat(j)	an(tj)	gas.ti	ma.ri

Level II (inflectional endings)

	INF		3SG.INDIC	
	zalj-en	stallj-en	zalit-a	stallit-a
Gemination	zal.ljen	stal.ljen	za.li.ta	stal.li.ta
Syncope	–	–	–	stall.ta
Umlaut	zel.ljen	stel.ljen	ze.li.ta	–
Other	*zellen*	*stellen*	*zelita*	*stalta*
	NOM.SG		NOM.PL	
	batj+Ø	antj+Ø	gasti+Ø	gasti+i
Gemination	bat(tj)	an(tj)	gas.ti	gas.ti.i
Syncope	–	–	gast	gas.ti
Umlaut	bet(tj)	en(tj)	–	ges.ti
Other	*betti*	*enti*	*gast*	*gesti*

The above scenario is what we assume to be the correct earliest stage of OHG when the consonantal element of the cliticised form of 'do' has been converted into a suffix which is attached at the same level as stem extensions and derivational suffixes. This assumption suggests an earlier level of morphological affixation where syllabification forces the preterite to enter Level II as /zalit/ while the present remains /zal(j)/. The final glide remains extrasyllabic until the end of the lexical level and is then vocalised if no suffix follows. The glide however, is also available for gemination in Level II. We have indicated that gemination applies automatically to forms like /zalj+en/ and also /bat(j)/ > /bat(tj)/ but not to /stal(lj)/. In actual fact it could lead to a representation like /stal(llj)/ but it would not survive ultimately since at the end of the word level a trimoraic head would be not permitted: *[stall.li].

A further reanalysis of the preterite occurs in some dialects where a few of the light stem verbs surface without umlaut: i.e., *zalta* occurs instead of *zelita* as in Old Norse, the weak verbs underwent analogical levelling, but the curious fact is that the analogy went in the opposite direction. In Old Norse, the past of the light stems retained the umlauted allomorph, while in OHG light stems lost the umlauted form. Our assumption is that exactly the same grammaticalisation process of the dental preterite was responsible for the seemingly opposite change, i.e., as in Old Norse, in OHG the preterite was reanalysed as an inflectional ending. The Old High German analysis for *zalta* would be as follows:

(39) OHG coronal stop as part of the inflectional suffixes

	INF		3SG.INDIC	
	zalj+en	stallj+en	zaljt+a	stalljt+a
Gemination	zal.ljen	stal.ljen	zal.li.ta	stal.li.ta
Syncope	–	–	zallta	stallta
Umlaut	zel.ljen	stel.ljen	–	–
Other	*zellen*	*stellen*	*zalta*	*stalta*
	NOM.SG		NOM.PL	
	batj+Ø	antj+Ø	gasti+Ø	gasti+i
Gemination	bat(tj)	an(tj)	gas.ti	gas.ti.i
Syncope	–	–	gast	gas.ti
Umlaut	bet(tj)	en(tj)	–	ges.ti
Other	*betti*	*enti*	*gast*	*gesti*

Again it is difficult to explain this change only with the notion of paradigm levelling. The rest of the paradigm remained the same. For instance, the second and third person singular of the light stems show no gemination: *zelis*, *zelit*. None of these forms were affected by the levelling process. We can understand this only as a consequence of the reanalysis of the dental preterite. The endings of the 2/3SG.PRES were /is/ and /it/. The stem extension /j/ + the /i/ in the suffix were not tolerated and were reduced to [i]. This blocked gemination in all the forms regardless of whether the past tense was *zelita* or *zalta*. Note that in the later stage, where the glide triggers gemination in the past tense of light

stem and feeds syncope thereby blocking umlaut (/zal+j+ta/ > GEM /zal.li.ta/ > SYN /zalta/), the endings with /i/ prevent gemination but allow umlaut. This is because a sequence like /zal+j+it/ is rightaway reduced to /zalit/ and then after umlaut becomes [zelit]. And this is precisely why the /t/ in the earlier stage had to be in Level I along with the stem extension.

The forms with *zelita*, i.e. the stage where the coronal stop is in Level I, is the most frequently attested, except in Tatian. At least some of these forms must have been present when open syllable lengthening occurred in Middle High German, lengthening the first stressed syllables: cf. Modern German *erzählen*. If we take the original underlying geminates like *stellen*, none of these verbs have an initial long vowel in present-day German. We take one more look at the early stage to see exactly how the coronal consonant interacted in the preterite as compared to the 3SG and for comparison 2PL *zellet*.

(40) OHG early stage (1/3SG.PAST, 3SG.PRES, 2PL.PRES)

Level I (with stem extension and preterite marker)

	PRES		PRET	
	zal-j	stall-j	zal-j-t	stall-j-t
Syll.	zal(j)	stal(lj)	za.lit	stal.lit

Level II (inflectional endings)

	3SG.PRES		2PL.PRES	
	zalj+it	stallj+it	zalj+et	stallj+et
Gem. (with syll.)	za.lit	stal.lit	zal.ljet	stal.ljet
Syncope (with syll.)	–	–	–	–
Umlaut	ze.lit	stel.lit	zel.ljet	stel.ljet
Other	*zelit*	*stellit*	*zellet*	*stellet*

	3SG.PAST	
	zalit+a	stallit+a
Gem. (with syll.)	za.li.ta	stal.li.ta
Syncope (with syll.)	–	stalta
Umlaut	ze.li.ta	–
Other	*zelita*	*stalta*

In the same dialects where *zelita* changed to *zalta*, the forms *zelit* and *zellet* had remained unchanged. This meant that there was no change in gemination. This applied (along with concomitant syllabification) as usual. The difference was that there was no independent level where the preterite marker applied leading to syllabification which would give /zelit/ and block gemination.

3.5. Summary

We have claimed that the past tense of the verb 'to do' was added to all derived verbs, known as the weak verbs. The present tense of the weak verbs had the regular inflectional endings of the strong verbs. However, since the strong verbs formed their past tense by ablaut, which involved prosodic constraints on stem-vowel quality and quantity, this method of forming the past tense was excluded for the derived verbs. Thus, a novel method of forming the past was required, and the verb 'to do' was used for this purpose. It is assumed that initially a regular syntactic construction with a non-finite form of the derived verb along with the past tense of 'do' served to express pastness. Later, the verb 'to do' lost its independent word status and was cliticised to the derived verb. The consonantal segment of the auxiliary was then reanalysed and treated on the same level as stem extensions and derivational suffixes. The process just described suggests the following stages:

(41) Gradual stages of decomposition in grammaticalisation
[{Lexical category + /j/ +X}$_{\text{DERIVED WEAK VERB}}$]$_{\omega}$ + ['do'+past inflectional suffixes]$_{\omega}$
where perhaps X=infinitive or nominalising suffix
$\Rightarrow$ [[ROOT + /j/ +X]$_{\omega}$ + ['do' + past inflectional suffixes]$_{\text{CLITIC}}$]$_{\omega}$
$\Rightarrow$ [[ROOT + /j/ + /CORONAL STOP/] + [person/number/mood]$_{\text{SUFFIX}}$]$_{\omega}$
and in a few instances
$\Rightarrow$ [[ROOT + /j/]$_{\text{derived weak verb}}$ + [/CORONAL STOP/]$_{\text{PAST}}$ + [person/number/mood]$_{\text{SUFFIX}}$]$_{\omega}$

Thus, in the process of grammaticalisation, the auxiliary becomes a suffix, maintaining all along its own inflectional endings. But in the

process of reanalysis the resulting structure is hierarchical rather than linear. The evidence comes from phonological processes operating on the entire morphological system and not restricted only to verbs.

4. Conclusion

The principal thesis is that in the process of grammaticalisation when auxiliaries become affixes, they continue to be morphologically complex, though with morphological structures reanalysed. The inflected auxiliary is interpreted as consisting of more than one affix, which is not surprising. The more interesting claim is the way in which these reanalysed affixes are attached to the root. In the process of reanalysis, the base of the auxiliary is detached from its inflectional endings and fused closer to the root. The end product is a hierarchical morphological structure rather than a linear concatenation of root plus affixes.

The evidence comes from phonology, in particular the way in which phonology interacts with complex morphological structures. We argued that in the process of grammaticalisation, a word can lose its phonological word status and be analysed as a sequence of morphemes, via a process of cliticisation in the following way: $[\text{WORD}]_\omega\ [\text{WORD}]_\omega > [[\text{WORD}]_\omega\ \text{CLITIC}]_\omega > [[\text{ROOT} + \text{MORPHEME}_1] + \text{MORPHEME}_2]_\omega$. The morphological structure is richer than a mere linear concatenation, and the phonological processes and constraints which operate on each morphological domain are different. The evidence comes from the reductions of two auxiliaries, 'be' in Bengali and 'do' in Germanic, where a host of phonological processes support the hierarchical structures. In examining the grammaticalised structures, other puzzling phonological phenomena are also accounted for. For instance, the fronting of vowel final roots in the context of coronal suffixes other than the progressive /ʧʰ/ in Bengali, or the surprising lack of umlaut in nominal classes marked with front vowels in Old Norse and Old High German are no longer problematic.

There are other claims implicit in the restructuring analysis. First, our assumption that after cliticisation, the morphological structure was hierarchical means that the language learner encountering OHG *zelita*,

analyses this string as underlying [[zal+j+t]a]. Similarly, the Bengali child half a century ago analyses *poriʧʰe* as [[por+i+ʧʰ]e]. Would it not be 'simpler' or 'less marked' for the child to assume a linear structure like [zal+j+t+a] or [por+i+ʧʰ+e]? Not necessarily, because neither structure is inherently more or less marked. The analysis or reinterpretation depends on the rest of the grammar. In discussing the weak preterite, we alluded to the fact that the coronal stop was being treated as a class marker and not merely as a tense marker, very much as ablaut was a class marker. Let us consider Old Norse as an example to clarify this point.

With the strong verbs, the Germanic roots need to have three basic categories: ROOT, $\text{ROOT}_{\text{PAST1}}$ and $\text{ROOT}_{\text{PAST2}}$. For a verb like *bera* 'bear', the three versions would be /ber/$_{\text{IV}}$, /ber/$_{\text{IVPAST1}}$ and /ber/$_{\text{IVPAST2}}$. The vowels in the roots would change according to the ablaut grade and the inflectional suffixes are added to the relevant roots. Of course another possibility is that the ablaut grades are already noted on the roots: /bar/$_{\text{IVPAST1}}$ and /bār/$_{\text{IVPAST2}}$. The two alternatives are not relevant here. The important point is that a past indication has to be part of the form. What of the weak verbs in class I, the ones that we have been focusing on? Here the root includes the derivational suffix: *telja* /tal+j/. To be parallel to the strong verbs a past marker is required as well which would then be /tal+j+ð/$_{\text{PAST WEAK}}$. Recall that the past and present person/number/mood suffixes are different, and hence these suffixes themselves include tense indication. Thus, given the organisation of the strong verbs, the child reanalysing the inflected auxiliary 'do' as separate morphemes associates the coronal stop of the base as a class indicator marking the past root of the weak verbs, to which then the rest of the inflectional suffixes are added. The consonantal part of the auxiliary is reinterpreted by the language learner as a separate morpheme to be treated as a Level I suffix. Existing phonological processes immediately treat these sequences as they ought depending on the rest of the grammar.

A possibility which we did not consider in our discussion of the hierarchical morphological structures is the assumption of allomorphy. For instance, in Old High German, we could have assumed that the heavy stems of the weak verbs have two allomorphs /stall/–/stell/ while in Old Norse the allomorphy would be restricted to the light

stems /tal/–/tel/. This sounds at first plausible but not when the entire grammar is considered. Recall that the infinitives of both forms in Old High German have the same pattern: *stellen*, *zellen*. But there is evidence from the past tense and the 2/3SG and imperative that confirm that the roots are different. Faced with alternations like *stellen–stalta* and *zellen–zelita*, it would be obvious to the language learner that there is a difference in the root, but not necessarily that one verb has root allomorphy and the other not. The child does not only learn verbs. In learning the nominal patterns, it encounters similar alternations distinguishing the heavy and light patterns: *gast–gesti*, *meri–meri*. Again, if underlying allomorphy is assumed it would be for the heavy stems. Given enough evidence of the prosodic conditioning of different rules in both nouns and verbs, and faced with regular patterns of alternations in the strong and weak verb paradigms, it is not difficult to consider a coherent morphological and phonological analysis of the entire system without taking recourse to underlying stem allomorphy.

A final point is the notion of paradigm that we have just alluded to. In discussing the diachronic process of grammaticalisation, we have seen that both in Bengali and in Germanic there has been a change in paradigms. Particularly with respect to Old Norse and Old High German, in a few isolated instances, the weak verbs have levelled in opposite directions. Our claim was that in these forms the preterite marker was now treated on the same level as other inflectional endings. One could argue that surface allomorphy in stems increases the markedness of the grammar and hence the mechanical procedure of paradigm levelling comes into force to reduce markedness. It induces the umlauted vowel to be either removed from the short stems in Old High German or introduced in Old Norse. Thus in Old High German, all the past tense forms of these words in these dialects surface without umlaut, thereby introducing surface allomorphy in the light stems which had previously been uniform. But another source of surface allomorphy remains, viz. the lack of gemination in the 2/3SG forms. This is equally true for Old Norse. In the few forms where the umlaut was introduced in the past tense of the light stems, although the distinction between the past tense forms disappeared, the light–heavy distinction was maintained in other forms of the present particularly in the context of glide deletion:

1SG.PRES.INDIC *tel-heyri*, etc. It seems that a levelling in one part of the verbal system causes another part to maintain or increase allomorphy. Levelling as an explanation for the isolated changes is highly unsatisfactory. We therefore claim that levelling alone is not the governing force. Earlier in Lahiri (1982) and Lahiri and Dresher (1983/84) we have argued that such analogy crucially depends on the interpretation of data by the language learner. In these instances of grammaticalisation, the same holds true. The analogical levelling depends on the grammar the child is building at that moment. The child interprets the coronal stop as an inflectional suffix and only part of the verbal paradigm is levelled. The surface levelling is the effect rather than the cause of the change.

In a sense, the language learner uses the existing morphological pattern when reanalysing the base of the auxiliary to be either a progressive marker in Bengali or a class marker of the weak verbs in Germanic. In Bengali, the /ʧʰ/ is treated on a par with other suffixes like the non-present and the participle. This fits into the existing pattern where the tense and person suffixes are separate. The progressive itself distinguishes between present and past, and hence these are added in Level II where the other tense suffixes belong. In Germanic, the language learner uses the structure of the strong verbs and extends it to the weak verbs when reanalysing the coronal stop as a class marker. Given the traditional classification, any change other than sound change would fall under the rubric of analogy. And as analogy, the restructuring processes we have discussed do not contradict Kiparsky's notion of analogy as grammar simplification (Kiparsky 1982b, 1983, 1988 and this volume). The morphological system permitted such hierarchical restructuring and since the phonological system deals with the entire grammar, it tackled the new structures appropriately.

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Notes

1. This style is used less frequently in modern novels. However, it is routinely used in scholarly writing as well as in newspapers.
2. See Chatterji (1926) for a detailed discussion of Bengali verb morphology.
3. This sort of vowel alternation is also observable in other vowel final roots: 'sleep' [ʃo-bo] 1FUT, but [ʃu-to] 3HAB.PAST; 'take' [ne-bo] 1FUT, but [ni-to] 3HAB.PAST. In the earlier stage, the vowels were all high: [ʃui-bo], [ʃui-to]. The analysis for colloquial Bengali is not the same as [ɑ]-fronting. As we shall see, all vowels other than /ɑ/ in verb roots were later reanalysed as having underlyingly the raised vowel. Hence the verb /ʃu/ is the root in the colloquial language and here it is a case of lowering in the future. Few verbs with vowel final roots have kept the medial /i/ in present Bengali: 'tolerate' [ʃo-i-bo] 1FUT, [ʃo-i-to] 3HAB.PAST, verb root /ʃɔ/.
4. There is a better way of accounting for this lowering assuming underspecified representations. For our purposes here it is sufficient to make the context partially morphological.
5. The form /-iyɑ-/ in Middle Bengali represented the past (passive) participle as well as the conjunctive. It still indicates 'a succession of actions or events done by or with reference to the same subject' (Chatterji 1926: 1003); for example, *ami dekʰiya gelam* 'I having seen, went'.
6. The literature on this topic is vast. Although there are more recent publications than Tops (1974), this is probably the best survey. Other than the 'do', suggested sources include the verbal adjective in **þ*, IE **-t-* (?), generalisation of a 2SG personal ending IE **-thēs*, intensive suffix IE **-t-*, and a deictic particle (see Collitz 1928; Meid 1971; Bammesberger 1986; Shields 1982). Most theories, however, concern themselves with details which are not relevant for the overall picture. And even when a different source for the preterite is assumed, as Shields (1997) suggests, "they do not lead to a rejection of the most traditional explanation . See also Section 3.2.
7. The Class VII reduplicated verbs are not considered here.
8. All Old High German weak verbs are umlauted as well. However, the glide is deleted after heavy roots in the preterite; we discuss the interaction of syncope and umlaut in Section 3.5.
9. This is a simplified version of the gemination. See Lahiri, Riad and Jacobs (1999) for a longer discussion.
10. Gothic digraphs are considered to have the following phonetic values: *ei*=[ī], *aú*=[ɔ], *aí*=[ɛ], *ai*=[ɛ̄], *au*=[ɔ̄]; *áu*, *ái*, and *iu* are diphthongs.

11. This claims that the word order was such that the finite form of the auxiliary came after the main verb.
12. The dual forms in Gothic are omitted since for our purposes they do not add any further information.
13. The vowel alternations in OHG reflect dialect differences.
14. Kiparsky (this volume) argues that the vocalic stem extensions in Gothic were floating melodies which surfaced in appropriate contexts. He does distinguish between *ja-* and *i-* nouns. For *ja*-nouns, he assumes an underlying non-floating /i/ (or /ii/, depending on allomorphy) with a floating /a/. The *i*-nouns are demarcated with a floating /i/. This is a very attractive proposal but does not work for all the Old High German forms. Therefore, for this paper, we will distinguish the two classes by assuming an underlying moraic and non-moraic distinction.
15. Prokosch's (1939: 200–201) comment on this matter is revealing: "If in a given dialect and a given type of verb umlaut preceded syncopation, the preterit is mutated; if syncopation took place sooner, rückumlaut resulted. In general, therefore, we should expect rückumlaut in long stem verbs but not in short stem verbs, but the actual conditions are far more complicated than that . Continuing about literary Old Norse, he says, "Long-stem verbs have umlaut in all forms, short-stem verbs only in the present, that is they show rückumlaut. This apparently paradoxical situation finds its explanation in Axel Kock's umlaut theory.
16. • Kock (1888, 1889):
    - Umlaut stage I (600–700 AD): umlaut carried out on long root syllables, after which the *i* disappeared; also umlaut triggered by *j*.
    - Umlaut stage II (700–800 AD): *i* was deleted after a short syllable and no umlaut occurred; ex. *talða.*
    - Umlaut stage III 850 AD: Umlaut reoccurred by the *i* and *j* that were still around.

    • Iverson (1978):
    i-umlaut is essentially morphologically conditioned; the important fact is that the plural of short *i*-stems did undergo umlaut and then regularized in favour of non-alternating *a*-stem; originally **steðir* > *staðir.*

    • Cathey and Demers (1972, 1975, 1977):
    Umlaut is triggered by both /j/ and /i/, but original monosyllabic *i*-stems are analysed as disyllabic: /bekke/ and /staþe/, but /kynj/, /domj/ and /talj/, thus preventing /staþe/ from undergoing umlaut.

    • Voyles (1982, 1992)
    Four rules:
    /i/ → /j/ if unstressed and immediately followed by a vocalic segment
    Ø → [i] / V̆C/VCC__j (among other contexts)
    /i/ → Ø in weak verbs past tense
    Umlaut by [i] not [j]: Later extended to /j/
    Short [i] stems did undergo umlaut (in some forms) but later restructured to have "the non-umlauted forms as the basic (as in Iverson).

- Kiparsky (1983):
  First stage: Level I (stem extensions): i-umlaut (long stems)
  Level II (inflection): syncope, i-umlaut (long stems)
  Later: Level I (stem extensions): i-umlaut (long stems)
  Level II (inflection): i-umlaut (all), syncope (reordered)
  Accounts for *talþa* and *dœmþa*, but same problem remains for *staðr, staði* (dative) if syncope is ordered after i-umlaut.

17. Our claim is that umlaut was always restricted to heavy stems—i.e., light stems *never* underwent umlaut. Paul Kiparsky (SFB International Colloquium, Univ. of Konstanz 1998) in a response to an earlier version of the paper assumed that the light *i*-stems like *staðr* must have had umlaut at an earlier period and then levelled out the vowel. Support comes from attested forms like *staðr* in related dialects like Old Gutnish (cf. Noreen 1923: §392,1). Moreover, given Kock's periods of umlaut, many scholars have assumed that at some point at least the plural of the light *i*-stems had an umlauted vowel as *steðir*. However, our position is that given the overwhelming tendency of the attested light *i*-stems *never* showing umlaut in Old Norse, it seems that forms like *steðr* are more likely to be the innovations rather than the other way around.
18. A study of all the nouns confirm that stem extensions, although not always evident on the surface, are part of the nominal system. For instance *staðr* cannot be an *a*-noun like *harmr*, since the plural of this class is *harmar*. If we assume stem extensions, then the inflectional classes are reduced considerably.
19. Syllabification is not to be viewed as an active process which may vary in its ordering with different rules. It applies automatically to a prosodic domain. If deletion or any other process affects it, it reapplies according to the syllabic principles of the language. Here it is spelt out only to point out that extrasyllabic elements remain unresolved till the end of the word level.
20. The front glide disappears after a heavy syllable except when preceded by a velar.
21. The foot relevant for Germanic was a resolved moraic trochee, which is essentially a binary quantity sensitive trochee, where the head must branch (Dresher and Lahiri 1991; Lahiri et al. 1999). The effect of gemination in synchronic Old English is more complex and we can illustrate how gemination is constrained better with examples from this language:

(i) Gemination blocked:

(x .)	(x .)
[[μμ] μ] μμμ μ	[[μ μ] μ] μ μμ μ
wí tje > *wítte	æ þe lje > *æ þel le
'punishment-DAT.SG'	'noble-DAT.SG'

(ii) Gemination permitted:

(x .)	(x)	(x .)	(x)	(x .)
[[μμ] μ] μ	[[μμ]]	[[μμ] μ]	[[μ μ]]	[[μμ] μ]
wē ste nje >	wē sten ne		cy nje >	cyn ne
'desert-DAT.SG'			'race-DAT.SG'	

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