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Generalizing vs. Particularizing Methodologies
in Historical Linguistic Analysis

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Colette Moore and Don Chapman **Introduction**

1 Overview

The opposition between generalizing and particularizing methodologies is an enduring tension in examining source material in English language history. Indeed, it is a methodological dilemma in any field of study: should one focus on the large or the small? Does investigating the forest help us to understand the trees or does examining the trees aid in our models of the forest? Surely, as we know, it is both. Scholarship recognizes divisions between these kinds of study, the micro and macro, and acknowledges that there are important critical methods for zooming in and zooming out on the object of investigation. This volume incorporates different takes on these questions of scale as they relate to the historical study of the English language.

In language study, the types of data used and the assumptions that motivate their collection and interpretation determine the contours of the analyses. To examine methodology in linguistic research, then, is to pursue the opportunities and the limitations posed by the different subfields and investigational techniques of linguistics (Coffin, Lillis, and O'Halloran 2010; Dörnyei 2009; Ender, Leeman, and Wälchi 2012; Johnson 2008; Litosseliti 2010). For inquiry in the history of the English language, these methodological questions take slightly differing forms (articulated in Bergs and Brinton 2012: 1421–1657; Biber and Reppen 2015; Busse 2012; Nevalainen and Traugott 2012; Taavitsainen and Fitzmaurice 2007). Sample methodological questions include: how should historical English research integrate statistical models? What kinds of evidence are necessary for diachronic conclusions? How should linguistic evidence be contextualized through the cultural and material features of text production?

This volume continues the conversation on the methodological dynamics in examining the historical record of English: methodologies of the general and the particular. Generalizing perspectives permit linguistic features to be removed from context and to inform collective conclusions; these include lexicography, corpus studies, and theoretical linguistics. Particularizing approaches, on the other hand, underscore the defining role of context in considering these linguistic features and include philological perspectives, historical pragmatics, discourse analysis, and certain kinds of grammatical and lexical approaches to language change.

Donka Minkova

From stop-fricative clusters to contour segments in Old English

1 What is at issue?

The evolution of the English consonantal system is hardly the most captivating topic in historical phonology; it is the vowels that usually take the center stage.¹ Yet the consonants are also an excellent testing ground for reconstructing sound-spelling relationships and for comparing different sources of diachronic evidence. Consonantal histories that have attracted the most attention are fricative voicing, h-dropping, the vocalization of the rhotics, and initial cluster simplification. This study turns to one equally deserving topic that gets mentioned rarely, if at all: the development of the Present-Day English (PDE) affricates /tʃ/ and /dʒ/. It is quite surprising that Old English and Old Frisian are the *only* older Germanic languages for which these affricates have been reconstructed (Robinson 1992: 159). Where did they come from, and when can we posit the first contrastive affricates in English? Do affricates fit the pattern of singletons vs. geminates in the Old English system? Do /tʃ/ and /dʒ/ develop in tandem, or is there a lag time depending on voicing?

The paper starts with a brief introduction to the structural and functional differences between simple, complex, and contour segments. The Old English consonantal inventory is presented in section 3, which also looks at the possible sources and mechanisms of affrication in Old English. The next section addresses the question of singleton vs. geminate (pre-)affricates in Old English. Section 5 surveys the metrical treatment of Old English <c>, <cc>, and <cg> in alliterative verse. Section 6 discusses the different trajectories of the voiceless and voiced palatalized velars. The relation of the metrical evidence to orthography is covered in section 7. Section 8 offers concluding remarks and proposes a revision of the inventory presented in section 3.

2 Contour, complex, and simple segments

The two endpoints in the history of the affricates – from pre-Old English to Present-Day English – are uncontroversial: in Proto-Germanic there may have

¹ I am very grateful for the careful editorial reading of this study and especially for a much appreciated, peerlessly erudite and eagle-eyed peer review, belying the term “blind” review.

been velar geminates due to assimilation, but there were no affricates.² Present-Day English has affricates, though their realization and the way they are syllabified do raise some questions. For some items there is rivalry between [ʒ] and [dʒ]: I say [gə'rɔʒ], you say ['gærndʒ]. Is the syllabification of medial affricates (e.g., *Thatcher* vs. *catcher*, *pigeon* vs. *bridges*) equally susceptible to morphological boundaries as other sounds resulting from cluster simplification (e.g., *finger* with medial cluster [ŋg] vs. *singer* with a medial singleton [ŋ])? Such issues highlight some of the uncertainties in the treatment of affricates, which will be bypassed here in favor of a brief introduction to the characterization of the affricates in the overall consonantal system with focus on the structural and functional differences between simple, complex, and contour segments.

First, consider the similarities and differences between (1a) and (1b):

- (1) a. *Why choose*
[waɪ. tʃu:z]
- b. *white shoes?*
[waɪ.tʃu:z]
- Examples from Cruttenden (2008: 307)

A slow and careful pronunciation of the question in (1) will distinguish between (a) and (b) by inserting a boundary before [tʃ] in (1a) and by separating the stop and the fricative in (1b). In fast speech this difference can be neutralized, yet the phonemic content is distinct: *choose* has the voiceless palato-alveolar affricate /tʃ/, while the similar-sounding *white shoes* is a sequence of a voiceless alveolar stop [t] plus a voiceless palato-alveolar fricative [ʃ].

Phonetically, affricates are stops in which the release of the constriction produces a prolonged friction, creating a *contour* segment unrecognized in the IPA consonantal chart. Ladefoged and Maddieson (1996: 90) describe the phonetic nature of affricates as “an intermediate category between simple stops and a sequence of a stop and a fricative”.

Crucially, affricates are phonological *single* units whose complexity is captured with reference to their autosegmental features (see Clements and Hume 1995: 251–257). The basic tenets of that theory are that autosegmental features have a

² The possibility of voiceless velar geminates based on assimilation of velar stop + [ŋ] in Proto-Germanic is noted in Prokosch (1939: §22) and Krahe-Meid (1969: §99). Both sources remark on uncertainties of the reconstruction, but neither one identifies the most serious problem in positing assimilation of [kn] to [kk], namely that both voicing assimilation and place assimilation are typically regressive, targeting the first consonant (i.e., in intervocalic C₁C₂ clusters, C₂ is the expected trigger; see Jun [2011]).

degree of functional independence and that these features may be hierarchically structured. In terms of place of articulation, contour segments involve sequences of articulations within a single contrastive unit: *choose* contrasts with *twos*, *shoes*, *lose*, and *booze*. Contour segments are “single slot” occupants represented on a separate level as “roots”. If the articulation involves more than one place, segments are “complex”, as in *wheel*, *whale*, where the initial [M-] is both labial and dorsal (Hayes 2009: 97); Ladefoged and Maddieson (1996: 328–329) call them “doubly articulated”.³

In terms of segmental representation, features are linked to the segmental slots by association lines. They occupy their own tier and can be independently “active”. (2a) represents a contour segment, while (2b) and (2c) are combinations of simple segments that can have different functional properties: (2b) is a geminate, and (2c) is just an accidental concatenation of two autonomous speech sounds.⁴

- | | | |
|------------------------|--------------------------|--------------------|
| (2) a. [-cont] [+cont] | b. [-cont] | c. [-cont] [+cont] |
| | | |
| [t] [ʃ] | [t] | [t] [ʃ] |
| \ / | / \ | |
| /tʃ/ | [t] [t] | /t/ ʃ/ |
| <i>choose</i> | OE <i>bitte</i> ‘bucket’ | <i>white shoes</i> |

A relevant phonetic property of English contour segments, which distinguishes (2a) from (2c), is their reduced duration.⁵ In principle, all consonants are shortened in clusters. However, the affricates are far shorter than the effect of shortening in clusters can account for: if [dʒ] and [tʃ] were bisegmental clusters, their durations would be around 207 milliseconds for [tʃ] (Sagey 1986b) and 192 milliseconds for [dʒ]; the drop in duration is comparable to Lavoie’s (2009) measurements:

³ Strictly speaking, “doubly articulated” does not distinguish between contour and complex segments. Since the affricates discussed here share place of articulation, the difference between contour and complex segments will not be pursued further.

⁴ The most appropriate phonological representation of affricates is still under discussion. See Hall (2012) and references therein.

⁵ Closure duration is the most salient acoustic indicator of consonantal length/gemination. “In languages with a phonological contrast between long and short consonants, long stops have between one and a half to three times the acoustic duration of short stops in careful speech” (Ladefoged and Maddieson 1996: 92).

(3) Duration of PDE contour segments vs. bisegmental sequences in milliseconds.⁶

		Sagey	Lavoie		Sagey	Lavoie
<i>Bisegmental:</i>	tʃ	207	n/a	dʒ	192	157
<i>Contour:</i>	$\widehat{tʃ}$	159	133	$\widehat{dʒ}$	133	92
<i>Simple</i>	t	91	36 ([r])	d	88	71
	ʃ		121	ʒ		86
<i>Compare</i>	s		113	z		75

Sagey (1986a: 82–83) reports an experiment comparing the length of affricates in English to English stops, fricatives, and stop-fricative bisegmental clusters. She found that the affricates /tʃ/ and /dʒ/ in English are significantly shorter than the stop-fricative clusters [ts, ps, gz, ks]. While all consonants are shortened to some extent in clusters – in her data, consonants in stop-fricative clusters are shortened to between 90–98% of their durations in VCV context – the affricates are far shorter than the effects of shortening in clusters alone could explain. On the other hand, while the duration of contour segments is shorter than the combined cluster duration, English $\widehat{tʃ}$ and $\widehat{dʒ}$ are still significantly longer than the simple segments in their respective subgroups of voiceless (longer) and voiced (shorter) durations.

The phonetic duration of affricates raises the question of the criteria on which they are assigned a single-unit status. Cruttenden (2008: 182–184) identifies four such criteria: distribution, possibilities of commutation of the elements, native speakers' reaction and speech errors, and glottalization. First, in terms of distribution, the affricates fare best in comparison to the distribution of other bisegmental clusters that could be potentially treated as units, such as [tr, dr, ts, tz]. English /tʃ/ and /dʒ/ can be word-initial and word-final (e.g., *cheap, jeep, clutch, fudge*), and they can be preceded by /l/ and /n/ (e.g., *inch, binge, mulch, and bulge*). They contrast between two types of word-medial realization: “close-knit” (e.g., *butcher, aged*) vs. “disjunct” (e.g., *lightship, ground-joint*). The possibilities of commutation (=substitution) of the components are limited: the voiceless affricate word-initial [tʃ] commutates only with zero (e.g., *choose, shoes*) while the [ʃ] can be substituted by /r, j, w/ and zero (e.g., *cheese, trees, Tuesday, tweet, and tease*). For the voiced affricate the substitution options are even more limited, not least due to the marginality of initial [ʒ] in English, while

⁶ Measurements are cited from Sagey (1986a: 82–83) and Lavoie (2009: 36). Lavoie's measurements are averaged across all speakers and all positions. Lavoie does not include [t] in her chart; it is included only as a flap [ɾ] at 36 ms. The timing of perception (after another segment) is most localized for affricates – it is almost entirely in the release, see also Warner et al. (2014).

the components of the clusters [tr] and [dr], especially the stops, are much more freely commutable. On the third criterion, native speakers' reaction, Cruttenden (2008: 183) writes that “it seems that the native speaker does not regard /tʃ/ and /dʒ/ as composite sounds”, though no further specifics are offered. Another test of unitary treatment which he cites, first explored in Fromkin (1971), is the coherent behavior of the affricates in sound transposition: *play the game* may become *pay the glame*, but *chop the wood* will not become **shop the twood*. On all three of these counts the Present-Day English affricates align best with singleton phonemes.⁷

On the other hand, affricates typically display “edge” effects, which are the basis for determining the featural composition and the allophonic patterning of the components of the affricates (see Sagey 1986a; Hall 2012). By definition, such effects are diagnostics for the independent function of the components.

- (4) Edge effects of the components of $\widehat{tʃ}$ and $\widehat{dʒ}$:
- Feature [-continuant] for [t] independently active in aspiration: [t^hɪp] – [tʃ^hɪp]
 - Glottal reinforcement and replacement of [t]: [[ti:ʔtʃɪn], [kauʔʃ]]
 - Feature [+strident] for [ʃ] and [ʒ] independently active, matching [s] and [z]
 - Omission of [t, d], but not of [ʃ, ʒ] in adjacent affricates
 - No initial C + $\widehat{tʃ}$, $\widehat{dʒ}$ or $\widehat{tʃ}$, $\widehat{dʒ}$ + C

One parameter on which the compositionality of the affricates is identifiable is that they pattern together with voiceless stops; both are aspirated word-initially and in the onset of stressed syllables, thus [tʃ^hɪp] ‘chip’, [tʃ^hɪɾˈpɑtli] ‘chipotle’, and [əˈtʃ^hɪv] ‘achieve’ (see Hammond 1999: 221–224). This justifies the independent inclusion of the feature [-continuant] in representations such as (2a). (4b) addresses two other allophonic variables (Cruttenden 2008: 180, 183). In British English $\widehat{tʃ}$ is subject to glottal reinforcement (e.g., [ti:ʔtʃɪn] ‘teaching’). This type of allophonic realization occurs in the environment of [p, t, k] + another

⁷ Although Cruttenden does not include this in the criteria for unitary analysis of the affricates, his comments on the acquisition of affricates (2008: 187) are also relevant in this context: “It might be expected that, being composed of a homorganic sequence of plosive plus fricative, their [the affricates] acquisition would depend on the prior acquisition of the plosives and fricatives of which they are composed. However, this does not always seem to be the case; in particular, the fricative /ʒ/ may be of later occurrence than the affricate /dʒ/, perhaps due to its comparative low frequency of occurrence in the adult language.”

consonant; thus [ti:ʔtʃɪn] ‘teaching’ identifies the second component of the affricate as an autonomous consonant. Also, the [t] before [ʃ] can be fully replaced by the glottal stop, as in [kaʊʔʃ] ‘couch’. (4c) addresses a very familiar pattern in English morpho-phonology: affricate-final stems pattern with [ʃ]- and [ʒ]-final stems in inserting schwa before plural and third person singular present tense forms: *bats* vs. *bashes*, *batches*; *pads* vs. *barrages*, *badges*. The feature responsible for this alignment is [+strident]: an acoustic feature bundling together sibilants, but not stops. A further indication of the autonomy of the components is the behavior of affricates when they appear in sequence as shown in (4d): *much choice* can be realized as [mʌʃ tʃɔɪs] and *large jar* as [lɑ:ʒ dʒɑ:], but omission of the fricative element is unacceptable.⁸ Finally, there is the consideration that while the inventory of word-initial clusters in English is quite rich, it does not include affricates – there are no affricate + C or C + affricate initial clusters in English (Hammond 1999: 101; Cruttenden 2008: 254–257). In stem-final position, /tʃ/ and /dʒ/ cannot be followed by another consonant except for inflectional /t/ and /d/.⁹

Edge effects notwithstanding, the unitary treatment is the analysis adopted in the standard accounts of the Present-Day English phonological system. It fits the contour analysis of single-slot fillers with independently acting components, and provides a relatively clear endpoint in the evolution of these segments, to which their earlier history can be compared. One should be reminded, however, that the analysis is language specific: compare the treatment of PDE /tʃ/ and /dʒ/ to Modern German, where the phonemic status of /tʃ/ and especially of /dʒ/ is controversial, and the voiced segment is found only in loanwords.¹⁰ Among all the other Germanic languages, only the newer contact languages, Yiddish and Afrikaans, have palato-alveolar affricates. The complexities associated with the affricates in the modern language extend all the way back to Old English.

⁸ This comment appears under “Advice to foreign learners” in Cruttenden (2008: 188), from where the second example is cited.

⁹ It should be added that [tʃr-] for [tr-], as in *tree*, *true*, and [dʒr] for [dr-] as in *dry*, *dress*, is a common allophonic possibility. Note, however, that the “Priorities and Tolerances” section in Cruttenden (2008: 331) includes the advice that “/tʃ, dʒ/ should be kept distinct from /tr, dr/”, though he also recognizes the acceptability of [tʃ, dʒ] or [ç, j].

¹⁰ In some analyses of German, only [ts] and [pf] are fully phonemically contrastive affricates. Kohler (1990) treats them as allophones, while Prinz and Wiese (1991) argue that *all* stop-fricative combinations in German are potential phonological affricates. For a commentary on Prinz and Wiese, see Rákosi (2014).

3 The consonantal inventory of Old English

By way of a reminder, the standard consonantal inventory of Old English is shown in Table 1:

Table 1: The late Old English consonant system (Lass 1992 in *CHEL* 2, 41)

		Labial	Lab-Den	Dental	Alveolar	Palatal	Velar
Obstruent	STOPS	p(:) b(:)			t(:) d(:)		k(:) g(:)
	AFFRICATES				tʃ(:) dʒ(:)		
	FRICATIVES		f(:)	θ(:)	s(:)	ʃ	x(:)
Sonorant	NASALS	m(:)			n(:)		
	Approximants	Lateral			l(:)		
		Central	w			r(:)	j

The shaded cells enclose *tʃ* and *dʒ*, explicitly identified as “the new phonemes” in Old English (Hogg 1992b: 107).¹¹ Parentheses indicate the existence of phonemic singleton-geminate contrasts. In that reconstructed system, only /ʃ/, /j/, and /w/ have no geminate counterparts. The direct inference from the inventory is that except for length/gemination, the affricates have been the same for eleven centuries. In modern editions of Old English texts, in textbooks and many essential sources (e.g., Campbell 1959; Hogg 1992a; *CHEL* I; and *CHEL* II), but *not* in the *Dictionary of Old English*, the reconstructed voiceless affricate is written with an over-dotted <č>, the geminate with <čč>, and the reconstructed voiced affricate is written <čǵ>.¹²

3.1 Sources of affrication in Old English

As noted in section 1, neither the western Indo-European languages nor Proto-Germanic languages had affricates in their consonantal systems, and of the older Germanic languages, only Old English and Frisian developed palato-

¹¹ The phonemic status of the affricates in Old English has mostly been considered a “closed” matter since at least Kuhn (1970), who posits contrastive affricates /tʃ/ and /dʒ/ as far back as ca. 700 Mercian Old English. His phonemic slashes refer to “the allophone which occurs in initial position” (1970: 18).

¹² This transcription will be preserved here only when it is relevant to the discussion.

alveolar affricates.¹³ The first orthographic indication of a difference between a stop and an assibilated allophone for the alveolar stops [t] and [d] are spellings appearing in the second half of the ninth century.¹⁴

(5) Early orthographic indication of assibilation:

<i>(ge)fetian</i>	~	<i>(ge)feccan</i>	~	<i>(ge)fecgan</i> ‘fetch’ ¹⁵
<i>ort-geard</i> (×1)	~	<i>orce(a)rd</i> (×17)	‘orchard’	
<i>cræftiga</i>	~	<i>cræftca</i> (ÆG1), <i>cræftigena</i> ~ <i>cræftcena</i> ‘workman’ ¹⁶	(ÆGram MSS DFHhR)	
<i>micgern</i>	<	<i>*mid-gera</i> ‘fat’ (Campbell 1959: 176)		
(×6, glosses only)				
<i>bryttian</i>	~	<i>brycian</i> (Bede MS CaO) ‘to distribute’ (a single attestation)		

The first three examples are cited in Luick (1914–1940: §667). The last form, *bryttian*, recorded in the *Dictionary of Old English*, is a single attestation. The *Dictionary of Old English* is only up to <g> (January 2016), and “wild card” searches don’t show alternative consonant spellings, so maybe there are some examples that have remained undiscovered. However, nineteenth and twentieth century researchers were very thorough, and it seems likely that *fetch* and *orchard* are indeed isolated cases of surviving Old English words in the Present-Day English vocabulary that show affrication of dental stops + /j/.¹⁷

¹³ Old High German developed the voiceless affricates [pf], [ts], and [kx]; see Robinson (1992: 233, 240). The areal restriction of the Old English affricates within older Germanic might suggest that language contact may be at play (i.e., Celtic), but the only affricate tentatively reconstructed for Celtic is /ts/ (Watkins 1955).

¹⁴ *Assibilation* is a term widely used in the literature for the creation of affricates from non-sibilant stops. It therefore includes all contour segments, not just the ones posited for Present-Day English. On the potentially misleading use of assibilation as a separate stage between palatalization and affrication, see CoNE (under VP = Velar palatalization): “Cross-linguistically, palatal stops do commonly have affricated release, which would seem to make an extra change unnecessary; but such releases are palatal, not palato-alveolar or alveolar, which would be required for the output to be called ‘sibilant’”. This is, unfortunately, not testable in Old English. I am keeping the term because it is common in the literature (e.g., Hogg 1992a), and because the sibilant association of the Present-Day English affricates seems beyond dispute.

¹⁵ The past tense forms (*fette*, *fetod*, *fetodon*) are attested only on the basis of earlier *fetian*.

¹⁶ The evidential value of this item may be disputed; see the comments in Hogg (1992a: 271, n.2).

¹⁷ It should be noted that the variant form *fetian* is found in late Old English; for example, ChronD (C): 1017.8: & þa toforan kalendas Augusti het se cyng feccean him [...] (EF feccan, C *fetian*). Commenting on the history of the Present-Day English *fetch*, the *Oxford English Dictionary* editors note that “no other instance is known in which the change of *ti* into *cc* (= /tʃ/) has occurred”.

A more sustained source of Old English forms that developed affricates is the assibilation of velar stops subject to West Germanic Gemination, triggered by /j/, as in (6):

(6) West Germanic Gemination of velars and assibilation:

PrG	<i>*pakjan</i>	OE	<i>þecc(e)an</i> ‘cover’
PrG	<i>*klukjan</i>	OE	<i>clucc(e)an</i> ‘clutch’
PrG	<i>*hakja</i>	OE	<i>hæc(c)</i> ‘hatch, gate’
Goth.	<i>bugjan</i>	OE	<i>bycgan</i> ‘buy’
PrG	<i>*xrugjaz</i>	OE	<i>hrycg</i> ‘ridge’
PrG	<i>*agja</i>	OE	<i>ecg(g)</i> ‘edge’

The propensity of Germanic velar stops towards gemination is well-known; gemination is shared by all West Germanic languages, but in North Germanic, only the velars were affected by gemination (Robinson 1992: 250).¹⁸ In Old English, West Germanic Gemination affects consonants (other than /r/) positioned after a short vowel and before an original /j/ – before it is dropped, the palatal glide triggers anticipatory palatal assimilation and the palatal umlaut of the short vowel. In terms of syllabification, the geminates straddle the syllable boundary, making the stop to the right an onset; at an early stage of the process, the stop and the palatal are tautosyllabic.

Another environment in which stem-final velars behave in a parallel fashion is after a nasal, as in *drench* and *singe* in (7):

(7) Post-nasal velars and assibilation:

PrG	<i>*drankjan</i>	OE	<i>drenčan</i> ‘cause to drink, drench’	
Comp.	PrG	<i>*drinkan</i>	OE	<i>drincan</i> ‘to drink’ ¹⁹
	PrG	<i>*sangjan</i>	OE	<i>senčan</i> ‘singe’
Comp.	Goth.	<i>singwan</i>	OE	<i>singan</i> ‘sing’

¹⁸ Denton (1998: 221) writes: “The velars show a strange affinity for gemination, [...] [V]oiceless velars were the only segments geminated by all of the glides in West Germanic. [...] [T]here is good reason to believe that if there was a clear progression of gemination in its early stages, voiceless velars were the first segments to be affected”.

¹⁹ The *Dictionary of Old English Corpus* has instances of *drinccan* ‘to drink’, also *drunccan*, *druccende*, but they are ambiguous. The noun *drenc* ‘drink’ (Old Germanic **dranki-z*) appears as *drencg* (BenRG1, Mem), *drencg* (PsG1F), *drenhc* (CollG1). There are no <ch> spellings for ‘drench’. The earliest <ch> spelling for *bench* < Pr.G **banki-z* is thirteenth century.

The phonetic substance and the phonological status of such items is untestable in the verse; /n/ + any consonant sequence is not a possible word-initial sequence and will therefore always be separated by a syllable boundary within the word, making the resolution test inapplicable. It is only consistent Middle English (ME) spellings that provide more reliable evidence that affrication has occurred.

A third source involving input velar stops is affrication in specific palatal/front environments, as in (8):

- (8) Palatalization of velar singletons: (Campbell 1959: 174–175):²⁰

Input	*/k/	*/ɣ/
a. V [+front] C V [+front]	<i>diċes</i> ‘ditch, gen.sg.’	<i>dægges</i> ‘day, gen. sg.’
b. V (I-Umlaut) C (V)	<i>læċe</i> ‘leech’	<i>dryġe</i> ‘dry’

In this case the results for the voiced and the voiceless inputs diverge; in the voiceless set, the input palatal stop resulted in an affricate regularly after /i/ and umlauted vowels, as in (8a) and (8b). The voiced velar, which had remained a fricative in this position, was lenited to a palatal glide.²¹ The */k/ results are context-specific; an adjacent back vowel or a consonant blocks the assibilation. One therefore finds paradigmatic alternations that can affect the Present-Day English outcomes, as in (*be*)*seech* < OEngl. *sēcan* vs. *seek* < *sēcþ*, third pers. sg.; *stitch*, n. ‘a stab’ OEngl. *stiċe* < **stiki-z*; *stick*, v. OEngl. *stician*, p.t. *sticode*, < **stik-*, the root of ‘to pierce’. Also, the results are often influenced by competing Old Norse forms, where no palatalization occurred, so that we get the well-known pairs such as *kirk-church*, *brig-bridge*, *birk-birch*, and so on.²²

²⁰ Representing the input PrG voiced velar singleton orthographically as <g> in the sets in (6) and (7) is a shortcut; in both instances the input is a voiced velar fricative that remains a fricative in all positions other than in gemination, as in (6), and after [n] as in (7); see Prokosch (1939: §31). The different proposals on the paths of affrication in (9) reflect the uncertainties regarding the exact manner of articulation of the velar inputs.

²¹ Additionally PrG */ɣ/ was palatalized in the environment V [+front] C + syllabic sonorant, as in *næġl* ‘nail’, *reġn* ‘rain’, *fæġr* ‘fair’. The most extensive coverage of Old English palatalization is found in Hogg (1992a: 258–266). On the phonemic split of */ɣ/ after the mid-tenth century, see Minkova (2014: 82–88).

²² See Luick (1914–1940: § 690) for more instances of paradigmatic leveling of forms; see also Campbell (1959: 177), who is more emphatic about the importance of the Scandinavian element in the /k/ forms.

3.2 The mechanism(s) of affrication

The unifying initial step in the process of affrication is clearly palatalization, which has to be dated after Anglo-Frisian fronting of /a/ to /æ/ but prior to I-Mutation at the end of fourth century and the beginning of the fifth century (Luick 1940: § 637; Hogg 1979: 120–122; Hogg 1992a: 267–269). In the account proposed by Campbell (1959: 176), the development of the palatal stops [c] and (possibly – he does not spell it out) the palatal fricative [j] went through [tj] and [dj] as an intermediate stage, merging with the palatalized dentals in (5), as in *fetian* ~ *feccan* ‘fetch’, *ortgeard* ~ *orceard* ‘orchard’. Lass and Anderson, who provide a detailed rule-based account of the palatalizations of the velars in Old English, forgo a gradual formulation because of lack of synchronic justification for it (1975: 132), and instead assume a synchronic one-step shift from a palatal stop to an affricate “whatever the actual historical process was”. They do, however, allow for gradualness in their representation of the development of the historical geminates (Lass and Anderson 1975: 147; see also Lass and Laing 2013: 91); the latter point out that “[n]one of the major handbooks treat this as a single change”.²³ Hogg (1992a: 267–270) assumes a gradual change involving palatalization of the velar stops. Those three paths overlap fully only in the endpoints. The proposed pathways are summarized in (9):

- (9) Paths of affrication:²⁴

a. [*k(k)]	>	[c(c)]	>	[tj]	>	[tʃ]	(Campbell 1959: 176)
? [ɣ]	>	[j(j)]	>	[dj]	>	[dʒ]	
b. [c(c)]	>	[tʃ]	(Lass and Anderson 1975: 132)				
[j(j)]	>	[dʒ]					
c. [c(c)]	>	[cʰ]	>	[tʃ]	(Hogg 1992b: 270)		
? [*g(g)]	>	[jʰ]	>	[dʒ]			

²³ Note also the Corpus of Narrative Etymologies discussion: “[W]e take the palatalisation + assibilation cluster as ‘unitary’ for the sake of etymologies, but with the background assumption that there was at least one ‘intermediate stage’ that we need to reconstruct”; see http://archive.ling.ed.ac.uk/ihd/cone_scripts/view_CCchangeC2.php?chabbr=%28%28VP%29%29&prmtopt=no

²⁴ [c] is a voiceless palatal stop; [j] “barred dotless j” is a voiced palatal stop; [j] “curly-tail j” is a voiced palatal fricative.

In terms of articulation, the process starts with fronting: “The more front the vowel, the more front the velar” (Keating and Lahiri 1993: 89). The articulatory similarity between velars and the palato-alveolars before front vowels is also the basis of acoustic similarity.²⁵ Since there is no orthography-based evidence for the intermediate stages, and in light of the synchronic phonetic facts, any path in (9) is plausible; they all start and end at the “right” place. The least secure reconstruction is of the nature of the voiced velar input: stop or fricative, though voiced velar fricatives figure in all proposals. All three accounts assume, explicitly or not, a parallel shift to affricates in voiced and voiceless inputs, at least post-nasally and in geminates.

The triggering mechanism, front vowels, is no mystery. But there are other loose ends in the account. The first one is dating in relation to structural position. Affrication in stressed syllable onsets was a relatively late phenomenon. The evidence for this is the continuing identification of palatalized and non-palatalized voiceless velars in alliteration in the entire poetic corpus, irrespective of date of composition, as illustrated in (10):²⁶

(10) Identification of palatalized and non-palatalized voiceless velars in alliteration:

<i>cynedom</i> ‘kingdom’	: <i>ciosan</i> ‘choose’	<i>Beowulf</i> 2376 (ca. 725)
<i>acennedne</i> ‘born’	: <i>cildes had</i> ‘childhood’	<i>Guthlac B</i> 1361
<i>cohhetan</i> ‘to cough’	: <i>cirman</i> ‘chirm’	<i>Judith</i> 270 ²⁷
<i>cafne</i> . . . <i>cynne</i>	: <i>Ċeolan</i> ‘Ceola’	<i>Maldon</i> 76 ²⁸
‘nimble’	‘kin’	
<i>clene Cudberte</i>	: <i>cildhade</i> ‘childhood’	<i>Durham</i> 16 (ca. 1100, emended Holthausen)
‘pure Cuthbert’		

²⁵ Guion (1998) offers a good discussion of the issue; see also Wilson (2006) for a survey of the literature on acoustic similarity. Of significance is that Guion (1998) also found that the voiceless velars and palato-alveolars were more similar than the voiced consonants, a result which is in line with the affrications in Old English: “[T]here were more [k]/[tʃ] than [g]/[dʒ] confusions. About 15% of the [g] tokens were heard as [dʒ], whereas around 26% of the [k] tokens were heard as [tʃ]” (Guion 1998: 35).

²⁶ For an extensive discussion of the voiceless velar alliteration in Old English, see Minkova (2003: 3.2, 3.5).

²⁷ Detailed arguments for the tenth century origin of the poem (ca. 930–937) are presented in Timmer (1978: 6–11).

²⁸ *cafne mid his cynne, þæt wæs Ċeolan sunu* ‘vigorous as his kin, he was son of Ċeola’ (*Mald* 76). The notation on *Ċeola* is used in all editions that mark affricates in that way (e.g., Pope-Fulk [2001]).

Another consideration is that if the consonant was the affricate [tʃ-], one should expect some indication of at least initial bisegmental treatment, so that *cild* would alliterate with *[tʃil-], for example. But there are no such instances in the Old English poetic corpus. Negative evidence is not very useful, but for comparison, note in (11) that the practice of the fourteenth-century Middle English alliterative poets allows for occasional [t-] : [tʃ-] pairing:

(11) Compositional treatment of [tʃ-] in Middle English alliteration:²⁹

<i>time</i> . . . <i>he tok</i>	: <i>child</i>	<i>William of Palerne</i> 4674
<i>telle</i> and <i>teche</i>	: <i>charite</i>	<i>Piers Plowman C</i> XIX. 2
<i>chese</i>	: <i>turnen</i>	<i>Chevelere Assigne</i> 357
<i>chiftanis</i>	: <i>twin</i>	<i>The Scottish Prophecy</i> 122

The voiced affricate did not appear stem-initially until after the Conquest. The simplification of the Old French affricate /dʒ/ to /ʒ/ was in progress in the thirteenth century in Continental Old French, but the parallel change appears to have been delayed in Anglo-Norman (Pope 1961: 93–94, 450). That lack of symmetry is recognized in the standard accounts, yet it does not affect the phonemic reconstructions discussed above; phonemic status is compatible with distributional restrictions. However, if onset affricates are not part of the phonological system, how solid is the assumption regarding medial affricates? Is the medial voiced affricate, always derived from a CC sequence, treated as a unit or as a sequence? There are no reliable tests for the affrication word finally, but the stages of intervocalic affrication are testable with reference to Old English meter.

4 Singleton and/or geminate (pre-)affricates in Old English?

Before we turn to the metrical evidence for affrication, we need to address one more issue: the existence and stability of phonological geminates in Old English. As shown in Table 1, geminate affricates are posited in the descriptions of the Old English consonantal system. The minimal pairs in (12) show that Old English singletons and geminates could be contrastive word-medially:

²⁹ The examples are cited in Schumacher (1914: 155). As rightly pointed out by an observant reviewer, the *Piers Plowman* example is ambiguous because *charite* could be stressed on the final syllable. *The Scottish Prophecy* is dated to the first quarter of the fifteenth century. For the phonetic nature of the identification, see Hardcastle et al. (1995): “[T]he place of articulation of /tʃ/ can be predicted from that of independent /t/”.

(12) Singletons and geminates in Old English:

<i>bitela</i> 'beetle'	<i>bitter</i> 'bitter'
<i>bite</i> 'bit, morsel, cut'	<i>bitte</i> 'bucket'
<i>cyle</i> 'chill, fever'	<i>cyll(e), cyllan</i> 'wineskin'
<i>hopian</i> 'to hope'	<i>hoppian</i> 'to hop'
<i>reċe</i> 'narrate!'	<i>reċċe</i> 'narrate, present subj. sg.' ³⁰
? /d̥z/	??/dd̥z/

The assumption in the textbooks is that with the exception of the approximants /w/ and /j/, all Old English non-initial consonants could appear as either singletons or geminates.³¹ Specifically for the affricates, Campbell (1959: 175) assumes a (non-dated) merger of *ċ* and *ċċ* into [tʃ] and of *ġ* (after a nasal consonant) and *ġġ* into [dʒ]. Weřna's (1986) extensive survey of the various positions on the dating and the question of singleton vs. geminate affricates concludes that both short and long affricates were present in Old English word-medially, but not word-finally (1986: 761). Hogg (1992a: 36–37) posits a stable singleton-geminate contrast for [tʃ], using the example *reċe* 'narrate!' – *reċċe* 'narrate, present subj. sg.' cited in (12), and also for [dʒ], though he recognizes the doubtful status of the /d̥z/ singleton vs. geminate status. He retains the voiced geminate affricate "for the sake of clarity [...] without distributional justification" (Hogg 1992a: 37). Since these positions are contradictory – and, as far as I know, no study of affrication in English draws on arguments from the behavior of the relevant segments with respect to syllabification, I checked their treatment in verse.

5 The metrical treatment of assibilated velars in Old English verse

Spelling and general theoretical considerations make it plausible that the palatalized velars in coda positions (e.g., *dic* 'ditch', *pic* 'pitch') had fully palatalized

³⁰ Cited in Kuhn (1970: 49); Hogg (1992a: 37).

³¹ However, see the discussion of the geminates in section 3, Table 1, where the palatal sibilant /ʃ/ is also listed as appearing only as a singleton; similarly Lass (1992: 60), but not Hogg (1992a: § 7.37). Positing a geminate [ʃʃ] (or something like [ssç]) even for late Old English is questionable at best; there is no way of showing that it existed, since there is no possible evidence from resolution – the <sc> digraph is treated as a cluster; see Hucheson (1991: 52); see also the examples in (21) in section 7. I have not been able to find an example of a potential geminate [ʃʃ]/[ssç] contrasting with a singleton.

surface realizations; the voiceless velars in that position would have been phonetically very similar to the realization of the dental stops +/j/ (e.g., <feccan> 'fetch') by the beginning of the ninth century, but there is no independent justification for that reconstruction other than hindsight based on the Present-Day English pronunciation. The status of the onset pre-affricates was already covered, so now we turn to <VcV>, <VccV> and <VcgV>.

Establishing the status of medial "future" affricates is not a straightforward exercise. One evidential source that has not been brought into the discussion of the early history of the affricates is their treatment in verse. Hucheson (1991: 51–52) identified the problem, comparing Old English with classical Greek, where "the affricates are treated metrically as double consonants". He assumed that word-medial /tʃ/ in Old English functioned as a single phoneme, but he cited no evidence supporting the assumption and he did not comment on the status of the voiced affricate. Sections 5.1–5.3 try to fill the gap of our empirical knowledge by presenting data on the behavior of inherited intervocalic velar stops with respect to resolution.

5.1 Singleton <c> and the evidence of resolution³²

Most of the potential Old English inputs to the Present-Day English affricates go back to geminates, but in the case of the voiceless velar /k/, there are some cases of palatalized and later affricated singletons (e.g., Present-Day English *ditch*, *leech*; see also (8)). The majority of the potential examples have a long vowel in the stressed syllable, which renders them ineligible for metrical testing. However, there are some lexical items which can be used as test cases for the treatment of singleton /k/ in palatal environments. In such items the stressed syllable and the following syllable fill a single metrical position (i.e., there is metrical resolution). Without the application of resolution, the verses become unmetrical (i.e., they violate the norm of four positions per verse).³³

³² Old English resolution can affect only stressed open syllables with a short vowel in the peak, that is, (C)V-syllables. The metrical treatment of such syllables allows the equivalence of (C)V + any syllable to a single heavy syllable – (C)VV(C), (C)VC(C) syllables, thus metrically the whole word *my.cel* 'big, much' could fill a single strong/ictic verse position in the same way as first syllable in *mē.tan* 'to meet', or the first syllable in *win.tra* 'of winters' function in the meter.

³³ Adjacent weak syllables unaffected by resolution (i.e., unattached to a stressed light syllable) count as a single weak (non-ictic) metrical position. Non-ictic positions can, therefore, accommodate either a single syllable or a string of weak syllables. Strong, or ictic positions, can be filled only by a stressed heavy syllable or a resolved sequence of a light syllable + any syllable.

The treatment of some common lexical items in the verse is shown in (13):³⁴

- (13) The status of <c> in *reced* 'hall', *mycel* 'big, much', *bryce* (1) 'breaking',³⁵
(2) 'use':

æfter recede wlāt	(w w S-w w s)	<i>Beo</i> 1572b
wið þæs recedes weal	(w w S-w w s)	<i>Beo</i> 326b ³⁶
on þam micelan bēc	(w w S-w w s)	<i>SnS</i> 6a
and þin micel e miht	(w w S-w w s)	<i>Lord's Pr</i> 2:33a ³⁷
for micel nysse	(w S-w s w)	<i>Judgment Day II</i> 186b ³⁸
þæt he micel āge	(w w S-w s w)	<i>Exhortation</i> 38b
wudafæstem micel	(S-w s w s-w)	<i>Durham</i> 6b ³⁹
ne sy him bānes bryce	(w w w S w S-w)	<i>GuthA</i> 698a 'breaking'
ond him bryce heoldon	(w w S-w s w)	<i>GuthA</i> 729b 'did service' ⁴⁰

A close inspection of the metrical use of these items shows that the intervocalic velar represented by orthographic <c> is consistently treated as a single consonant. The <c> is aligned with any other singleton in the system, though its exact phonetic nature is irretrievable; typologically in this position it was most likely a voiceless palatal stop [c]. While its phonetic value is a matter of conjecture based on our current knowledge of phonetics, its systemic-phonemic value is unambiguous: it is functionally a singleton. Moreover, the singleton in

³⁴ All items discussed in this section are marked with an over-dotted <c̣> in the Word Indexes in Campbell (1959), Hogg (1992a), or both. Only the scansion of the relevant verses is shown here. The notation is as follows: w = weak syllable, S = stressed and alliterating syllable, S-w = resolved light syllable, s = stressed unalliterating syllable.

³⁵ The *Oxford English Dictionary* identifies the etymology of Present-Day English *breach* as "Middle English *breche*, partly perhaps repr. Old English *bryce*, *brice* . . . partly < French *brèche*". The long vowel is due to open-syllable lengthening in the base *brek*.

³⁶ Other instances of *reced* 'hall' resolved: **receda** under *roderum* (S-w w w w s-w w) *Beo* 310a; *singan* on *ræcede* (s w w S-w w) *Rid* 31:3b; and his **recedes** *hleow* (w w S-w w s) *Gen* 2443b; *Loth* on **recede** (S w s-w w) *Gen* 2463a; *rum* **recedes** *muð* (S S-w w s) *Max II* 37a, see also *Gen* 1584a, *Beo* 720a, *Beo* 728a.

³⁷ Same line in *Gloria* 1:32a.

³⁸ *Judgment Day II*, as well as *Exhortation to Christian Living* are "demonstrably late" (Fulk 1992: 264).

³⁹ Ca. 1100.

⁴⁰ The headword *bryce* has three separate entries in the *Dictionary of Old English*, all with a short stressed vowel. The line *GuthA* 729b has also been interpreted as 'they kept injury from him' (DOE, under *bryce*²). The other attestation of *bryce* allows ambiguity: *bryce* on *feorweg* 'breakable, fragile' *PPs* 119.5b. Another item showing resolution is *þecen* 'roof' in *anre þecene Riddle* 84: 40b.

question is *not* a contour affricate yet. Unless we posit a saltatory change from the voiceless palatal velar [c] directly to [tʃ], which is unlikely because of the continuing bisegmental perception of <ch> in Middle English (as illustrated in the alliterative matching in (11)), the orthographic <c> in palatalizing environments is still [c].

5.2 The medial voiceless geminate (pre)-affricate: [tʃ], [tʃ tʃ] or [tʃ̥] [tʃ̥tʃ̥]?

The geminate pre-affricate in intervocalic position was the result of West Germanic Gemination of the voiceless velar stop /k/, the first column of examples shown in (6).

The first item I tested, (*be*)*þeccan* 'cover, thatch', qualified in the *Dictionary of Old English* as "disproportionately frequent in the verse", is not recorded in any positions where resolution has to apply to maintain the four positions in the verse. This applies both to the verb and to the derived noun *þeccend* 'protector'.

- (14) Unresolved <VccV> in *þeccan* 'cover' and *þeccend* 'protector' in Old English verse:⁴¹

a. æled þeccan	<i>Beo</i> 3015a	comp.:	earne <i>secgan</i>	<i>Beo</i> 3026a
'flame to cover'			'to eagle tell'	(S w s w) Type A
		also:	<i>discas lāgon</i>	<i>Beo</i> 3048a
			'dishes lay'	
b. þu eart þeccend min	<i>Psalm</i> 70: 16b	comp.:	under <i>gēapne hrōf</i>	<i>Beo</i> 836b
'you are my protector'			'under gaping roof'	(w w S w s) Type B
		also:	æt his <i>selfes hām</i>	<i>Beo</i> 1147b
			'at his own home'	
		or:	under <i>heofones</i>	<i>Beo</i> 2015a
			<i>hwealf</i>	
			'under heaven's arch'	

Verse-finally, as in (14a), the placement of the verb is uninformative because of Kaluza's Law, whereby resolution is suspended if the post-stressed syllable is heavy. However, in non-final positions one would expect the syllable in the first strong position in (14b), filled by the word *protector*, to be either heavy, as in

⁴¹ The notation for this word in sources that mark affrication with over-dotting is consistently <čč>.

the metrical analogs *gēapne* ‘gaping’ in *Beo* 836b, *selfes* ‘of self’ in 1147b, or resolved (or syncopated), as in *heofones* in *Beo* 2015a. The syllable containing a short vowel followed by <cc> is treated as heavy/closed (i.e., the realization is bisegmental). Therefore, (14b) is an indication of the continuing treatment of the historical geminate as such, and not as a contour segment. This precludes [tʃ], leaving [cj] or [tj] as most likely, but other bisegmental realizations such as [cc], [tʃ], or even [tʃ tʃ] cannot be ruled out.

The results from another potential candidate, *wæccende* ‘watching’, are shown in (15):

- (15) Unresolved <VccV> in *wæccan* – *wæccende* ‘watching’
- | | | | | | |
|----|---------------------------------------|-----------|--------|--|--|
| a. | þæt ge wæccende
‘that he watching’ | Jul 662b | comp.: | þæt he Hrōþgāres
‘that he Hrothgar’s’ | Beo 717a ⁴²
(w w S s w) Type C |
| | | | also: | þā ðe syngāles
‘those that always’
æt ðam æðelinge
‘in that nobleman’ | Beo 1135a

Beo 2374a
with resolution |
| b. | wæccendne wer
‘watching warrior’ | Beo 1268a | comp.: | sārigne sang
‘sorrowful song’ | Beo 2447a
(S s w s) Type E |
| | | | also: | murnende mōd
‘mourning mind’
lifigende lād
‘living loathed’ | Beo 50a

Beo 815a
with resolution |
| c. | weras wæccende
‘warriors watching’ | Jud 142a | comp.: | sunu Ecglāfes
‘son of Ecglaf’ | Beo 590b
(S-w S s w) Type D |
| | | | also: | gifen gēotende
‘ocean gushing’
hwatum Heorowearde
‘to bold Heorowearde’ | Beo 1690a

Beo 2161a
with two resolutions |

In (15a), a Type C, the stressed syllable of *watching* is unresolved, treated in the same way as *Hrōþ-* in *Beo* 717a or *syn-* in *Beo* 1135a. In (15b), a Type E, the parallel between *watching* in the first column and *sorrowful*, *mourning*, and *living* in the comparison column suggests that the first syllable is treated as heavy, blocking resolution. In (15c), a Type D, the same parallels apply. In the last items in (a), (b), and (c), which show resolution in the comparable metrical positions, the resolvable syllable is light.

42 Similarly, ‘ac he wæccende’ *Beo* 708a; ‘gif he wæccende’ *Beo* 2841a.

For comparison, the metrical behavior of *fetch*, to the limited extent that it is testable in the verse, also suggests non-resolution (i.e., heavy stressed syllable), as shown in (16).

- (16) Treatment of (ge) *feccan* ‘fetch’:⁴³
 life gefecce Dr R 138a⁴⁴ comp.: gūþe gebēodan Beo 603a (S w w s w)
 bēagas gefeccan Maldon 160a also: ganges getwæman Beo 968a

It is of interest to compare the metrical treatment of the variant form *fetian*. In *Beo* 2190b (*Hēt ðā eorla hlēo*) / *in gefetian* ‘in to fetch’ (S w s-w w), resolution must apply (vowel alliteration). The use of the *fetigan* variant in a late poem, *Judith* 35b: *ofstum fetigan* ‘in haste to fetch’ (S w s-w w), also requires resolution. There is nothing surprising about the variable pronunciation of one and the same lexical item synchronically; the only reason to bring up these parallel examples is to point out that the coexistence of the *fetian* variant might have been an inhibiting factor in the reanalysis of <cc> as a sequence of two full-fledged affricates.⁴⁵

The alignment of the first syllables of words such as *þeccan*, *wæccan*, *feccan* with heavy syllables or resolved stressed syllables in a metrical system that requires rigid onset-maximal syllabification with respect to resolution confirms the continuing bisegmental treatment of the medial voiceless palatals derived from West Germanic Gemination. The exact phonic content of the components of the <cc> sequence is beyond recovery, but the parallels between (13) and (14–15) suggest that the very first stage proposed in all three accounts in (9) – [c(c)] – is correct. What the contrast between (13) and (14–15) highlights is that an assumption of a merger of palatalized etymological voiceless velar singletons

43 There may be some ambiguity in the scansion of *gefeccan under foldan, Solomon and Saturn* 75a: (x) S w w s w, Type A with anacrusis marked (x), no resolution, or (x) S-w w w s w – Type A with resolution (possible because of the competing form *fetian*, but not obligatory). Both types are rare; Hucheson (1995: 194) has thirty-three cases of Type A a-verses with anacrusis and double alliteration in the corpus vs. twenty-one cases in Type A a-verse double alliteration with resolution. Similarly, *gefetian on fultum Elene* 1052a could be construed ambiguous: (x) S w w w s w, or (x) S-w w s w though the second scansion seems the more likely one.

44 Cited from *Eight Old English Poems*, Pope-Fulk (2001); ms. *ge-fetige*, which would require resolution. Admittedly, therefore, the evidence from this example is inconclusive. As a reviewer points out, “[S]ince this poem is attested also on the Ruthwell Cross, it is far from unlikely that *gefecce* in the Exeter Book is a late scribal Saxonization of the earlier form”.

45 The two variants exist side by side in early Middle English too, though the affricated form appears to be gaining ground by the beginning of the fourteenth century. *LAEME* lists eighty-one tokens of *fetch* where the consonant is intervocalic – the spelling is with <t(t)V> in thirty-four instances and forty-seven <(c)hV> spellings.

and etymological voiceless velar geminates, as suggested by Campbell (1959: 175), cannot be sustained.

5.3 The medial voiced affricate: [ʃ], [dʒ], [dʒ], [dʒ], [dʒ dʒ] or [ddʒ]?

This section looks at the treatment of the precursor of Present-Day English /dʒ/, Old English orthographic <cg> in intervocalic position in the meter. Recall from section 3 that the only systematically attested Old English source of the Present-Day English intervocalic voiced affricate was West Germanic Geminatation. The singleton voiced velar */ɣ/ is palatalized to [j] when adjacent to palatal vowels, as in *drȳge* ‘dry’ as in (8), so the parallelism to [k] > [c] is lost. The development of the voiced velar after a nasal, as in PrG **sangjan* > OE *sengan* ‘sing’ in (7), is not testable in the verse because the stressed syllable is always heavy. That leaves us with the intervocalic geminates due to West Germanic Geminatation, the type shown in (6) as in Goth. *bugjan* > OEngl. *bycgan* ‘buy’. The treatment of such words in the verse is unsurprisingly consistent. For the sake of the philological record, in (17) I list all items and all instances with a medial <cg> in *Beowulf*. Where possible and relevant, the words are shown in a metrical context.

(17) <VcgV> words in *Beowulf*:

a. Verbs and verbal forms

<i>bicgan</i>	<i>bicgan scoldon</i> 1305b
‘to buy’	
<i>licg(e)an</i>	<i>lāðne licgean</i> 3040a
‘lie’	also 966a, 1427b, 1586b, 2886a, 3082a, 3129a
<i>secgan</i>	<i>secgan hȳrdon</i> 273b
‘to say’	also 51a, 344a, 391a, 411a, 473a, 582b, 590a, 875b, 880b, 942b, 1049a, 1346b, 1700a, 1724b, 1818b, 1997b, 2795b, 2864a, 3026a, 3028b
<i>forhycgan</i>	435a
‘reject’	also <i>hicgend-</i> : <i>heardhycgende</i> ‘hard-minded’ 799a, also 394a, 919a, 1016a, 2235a also <i>bealhycgendra</i> ‘intending evil’ 2565a, 2716b
<i>(ge)fricgan</i>	<i>fægre fricgean</i> 1985a
‘ask, inquire’	also 1826a, 2889a, 3002a also <i>felafricgende</i> ‘well-informed’ 2106a
<i>ðicgean</i>	<i>ðicgean ofer þā niht</i> 736a
‘devour’	also 1010b

b. Inflected forms of nouns

<i>ecg</i>	<i>ecge cūðe</i> 1145b
‘edge’	also 483b, 805a, 1168a, 1287a, 1549a, 1558b, 1772a, 1812a, 2140, 2485a, 2564a, 2614a, 2683b, 2828b, 2876a, 2939b, 2961b
<i>mæcg</i>	<i>Ōretmecgas</i> 332a,
‘warrior’	also 363b, 481b, 491a, 799b, 829a, 2379b
<i>secg</i>	<i>Forðam secgum wearð</i> 149b
‘man’	also 213b, 490a, 633b, 684a, 842b, 996a, 1672b, 2019a, 2530a, 3128a
<i>wicge</i>	<i>wicge ridan</i> 234b
‘horse’	also 286b, 1045a

All of these items scan as two-positional, no resolution. The date of the poetic compositions does not have an effect on the treatment of <cg>. In the later verse, intervocalic <cg> continued to block resolution; it continued to be perceived as bisegmental, as is evident from the examples in (18):

(18) Unresolved <VcgV> words in the later verse:

<i>sweordes ecgum,</i>		<i>þæs þe us secgað bec</i>	<i>Brun</i> 68 ⁴⁶
<i>meca ecgum</i>	<i>Meters</i> 9:29b	<i>secga swate</i>	<i>Brun</i> 13a
<i>on þa briçge stop</i>	<i>Maldon</i> 78b	<i>Ic eow secgan mæg</i>	<i>Judith</i> 152b
<i>stiðhycgende</i>	<i>Maldon</i> 122b	<i>niðhycgende</i>	<i>Judith</i> 233a
<i>wið þas secgas feaht</i>	<i>Maldon</i> 298b	<i>licgan þence</i>	<i>Maldon</i> 319b

In concluding this section: the consonant sequence derived from West Germanic Geminatation of the voiced velar is structurally the same as any other consonant sequence which does not appear word initially. As for the phonetic nature of orthographic <cg>, since there is no singleton [dʒ] in intervocalic position, positing a geminate /ddʒ/ in that position would make for an unusual phonemic inventory.⁴⁷ Any other sequence which will straddle the syllable boundary and make the first syllable heavy, such as [ʃj], [dʒ], [dʒ], [dʒ dʒ], cannot be ruled out.

⁴⁶ This text has survived in four copies, the earliest of which is 937. A very detailed comparison of the copies shows no variation in the metrical treatment of <cg>; see Orton (2000: 57–59).

⁴⁷ A reviewer points out that intervocalic <hh> survives in Old English, though the singleton had been lost in that position (though note Northern *ēher* ‘ear’, *tæher* ‘tear’), and that <hh> blocks resolution. This is a question of implicational universals, and I am doubtful if it can be tested reliably on the material we have available. Blevins cites one case (Finnish) as having a geminate *engma*, but no singleton, but she highlights it as unexpected; see https://www.eva.mpg.de/lingua/conference/08_springschool/pdf/course_materials/blevins_evening_lecture.pdf (online only, as far as I know).

A rather flat and unsurprising conclusion at this point is that the difference between the examples in (13), (14–15), and (17–18) rests on a genuine quantitative difference between singletons and geminates in intervocalic position. As adumbrated in section 4, with the exception of Campbell (1959: 175), this is the accepted view in the scholarship on this question. However, the metrical attestations discussed in 5.1–5.3 still call for a reassessment of the phonetic and phonological nature of the sounds represented by <c>, <cc>, and <cg> in Old English.

6 Trajectories of palatalization and assibilation of the Old English velar stops

The alliterative practice illustrated in (10) (i.e., the sustained identification of [k] and the palatalized [c] in Old English in onset position) indicates that the two sounds were still most likely allophones of the voiceless velar stop. The degree of palatalization of [c] is unknowable; all we can say is that it was still classified as a voiceless velar stop, since Old English alliteration is consistently based on phonemic identity. What is more, the identification of the palatal pre-affricate with the voiceless velar stop continued into early Middle English:

- (19) Non-contrastive onset [k-] and [c-] in *Lagamon's Brut*:⁴⁸
 Heo bigunnen to **ch**iden; cnihtes come riden 4064
 þa þet **ch**ild wes iboren. wel wes **C**laudiene þer-foren; 4794
 & ladde þes **ch**ildes moder. for **q**uene nauede he oðer; 4807

Such, arguably intuitive, reaction to the similarity of the relevant onsets suggests that a reconstruction of a singleton voiceless velar stop in initial position, possibly followed by [j], is preferable to reconstructing a singleton phonemic affricate. This contradicts Kuhn's 1970 analysis, where it is precisely the initial-position allophone that is taken as the basis for positing a phonemic voiceless affricate in early Middle English.⁴⁹

⁴⁸ The examples are from the earlier manuscript Cotton Caligula A IX (C). The composition of the text is dated between 1189 and the first half of the thirteenth century; see Minkova (2003: 74–75).

⁴⁹ It is likely that the late Old English alliterative tradition preserved the alliteration of all stressed syllables with a <c> onset as an archaism, as one reviewer points out, yet it is also clear that the Middle English poets' and scribes' choices of alliterating pairs continued to be guided by phonetic similarity. See Schumacher's (1914: 3) inventory of incomplete and

In medial position the reconstruction of a singleton voiceless velar stop continues to be the most plausible analysis, as evidenced by the metrical practice in late Old English verse; for example, *wudafæstern micel* (S-w s w s-w) in the ca. 1100 poem *Durham* (see section 5.1). Further, as the attestations in (11) show, the cluster that developed into a voiceless affricate in Present-Day English could still be perceived as compositional as late as the middle of the fourteenth century, with the first element occasionally identified as a voiceless dental stop.

This leaves the coda position as the only position of potential realization of the palatalized voiceless velar as an affricate. The likelihood of such a realization cannot be rejected, nor can it be tested, especially in view of paradigm-internal variability with respect to palatalization and the different dialectal pathways of word-final Proto-Germanic /-k/, as very revealingly covered in Lass and Laing (2013).⁵⁰

Since minimal pairs of the type *kin-chin* would contradict the alliterative evidence, and since affrication involves a bisegmental stage precluded by the metrical evidence (and suggested by the fourteenth-century examples in [11]), the new proposal here is that there was no phonemic singleton voiceless palato-alveolar affricate in the Old English consonantal system. This is a significant departure from the traditional descriptions of the Old English consonantal system.⁵¹

Turning to the historical voiceless velar geminates, the metrical evidence in section 5.2 tells us only that medial <cc> cannot stand for a singleton /tʃ/. Moreover, if the voiceless singleton in, for example, *mycel* 'big, much', *bryce* 'breaking' is not a contour /tʃ/, then positing a voiceless contour geminate /tʃtʃ/, as implied in Table 1, is not the right reconstruction. Though not theoretically impossible, syllabification of [tʃtʃ] as [t.tʃ] is questionable in the absence of

questionable alliterations of singletons that differ in any other feature except voicing (*p* : *b*, *d* : *t*, *g* : *k*, etc.). The only pair that would differ in manner of articulation is [t] : [tʃ], if the latter was a genuine affricate. There is also a remarkably long list of what Schumacher labels "eye alliteration" involving <c> and <ch> (1914:163–170). That the matching was more than simply "scribal" is suggested by the much shorter list of Germanic <g> [g] matched to Old French <g> [dʒ] (1914:162).

⁵⁰ An observation that is relevant but cannot be pursued here is that [tʃ] may be a factor in triggering shortening (e.g., Old English *dīc* 'ditch', *lic* 'body', compare *dike*, *like*).

⁵¹ An alternative, which I will not pursue, is that even if [tʃ] was positionally restricted to the coda, it was phonemic, and the non-affricated realizations elsewhere were allophonic. This is non-viable unless one reconstructs a bisegmental sequence [-t + C], but that is no longer a phonemic contour segment /tʃ/. Finding relevant minimal pairs in Old English is also problematic; do we know that Old English *pic* 'black resin, pitch' and Old English *pic*, *pic* 'pick' were not homophones?

word-initial /tʃ/, and syllabification as [tt, ʃ] is unlikely because of the instability of coda geminates (Ladefoged and Maddieson 1996: 92–93). This leaves us with the option of reconstructing a bisegmental sequence: [cʃ]/[tʃ], [cc], [tʃ] (see 5.2). Crucially, even if we posit [tʃ] in that position, it remains a sequence and not a contrastive singleton.⁵²

The status of the voiced counterpart is less clear because the only possible Old English source of the Present-Day English affricate /dʒ/ testable in the verse is gemination. As (17) and (18) show, the metrical treatment of the intervocalic geminates precludes unitary treatment. No further phonetic details can be reconstructed with certainty. The most likely reconstruction would be a voiced palatal stop [j] + [+continuant], either [j] or [ʒ]. Note that the deliberately vague medial sequence does not automatically rule out a /dʒ/ in word-final position, but typological considerations would make it unlikely. In addition to the lack of contrast in intervocalic position, it is also unlikely that the system will have a voiced phonemic affricate unless there is a voiceless phonemic affricate. The use of <cg> spelling in Old English can be ambiguous – for example, *ecgan* ‘harrow’ < *ecg* ‘edge’ is spelled *egede*; *egide*, or <flacg> for ‘flag(stone)’ (x1), Old Icelandic *flaga*, MEngl. *flag(ge)* – which also gives one pause. As for the geminate vs. singleton, the position taken here supports Kuhn’s (1970: 48–49) analysis, namely that a geminate /ddʒ/ need not be postulated, contra the “established” view. As in the case of the voiceless counterpart, this entails that a singleton phonemic geminate is also not viable.

7 Spelling and the evidence based on resolution

The burden of proof, or at least the core new evidence for suggesting a revision of the Old English consonantal inventory, lies with the data on metrical resolution in sections 5.1–5.3. The geminates going back to the velar stops regularly block resolution, and they are also digraphs. One might ask therefore whether the metrical treatment could be a response to the orthographic shape of a word, unrelated to the phonological status of the medial consonant.

The only solid argument against considering the number of letters as the guiding factor for resolution in the verse is that letter <x> is treated consistently as bisegmental:

⁵² I leave the question of the later history of the word-medial geminate in Middle English open.

(20) Single letter blocking resolution in Old English verse:

unweaxenne / wordum lærde	<i>Elene</i> 529
‘not grown-up / with words taught’	
and he tofylleð / feaxes scadan	<i>Paris Psalter</i> 67. 68
‘and he breaks to pieces / the top of the head’	
comp.: nu ic fitte gen / ymb fisca cynn	<i>Whale</i> 1
‘Now I sing again / of the fishes’ kin’	

The presence of two consonant letters intervocalically appears to prevent resolution systematically, but a single consonant can have the same blocking effect. Disappointingly, a search for further possible clues proved unproductive. The *Old English Dictionary Corpus* database (<http://tapor.library.utoronto.ca/doecorpus/>) shows no medial <ch> spellings for the resolvable items covered in section 5.1.⁵³ The treatment of word-medial <ph> is untestable because the only eligible items I found, *Stēphanus*, *Iōseph*, have stressed long vowels. It may be worth noting in this context that the statistics of word division in Old English (Wetzel 1981: 466) indicate that <VccV> and <VcgV> words in the manuscripts (8212 cases) are divided <Vc-cV> and <Vc-gV> in 99% of the cases.⁵⁴

The palato-alveolar fricative [ʃ], commonly posited as part of the Old English contrastive singleton inventory, blocks resolution, as in (21).

(21) Non-resolution of <sc> in Old English:

discas lāgon	(S w s w)	<i>Beo</i> 3048a
on þære ascan bið	(w w S w s)	<i>Phx</i> 231a
bisceop bremran	(S w s w)	<i>Men</i> 104a

Once again, the most plausible reconstruction for medial <sc> is bisegmental. Hogg (1992a: 272–273) proposes a pathway of palatalization of /*sk/ via gradual assimilation of [s] and [c] > *[sç] > [ʃ]; “[I]t is necessary also to note that in the first instance the result of this shift was the geminate consonant [ʃʃ], which naturally always simplified in initial position and would also simplify finally. . . . But medially a geminate remained.” Hogg considers singletons and geminate [ʃ] to be in complementary distribution. Metathesis of <sc> ~ <cs> (e.g., *axian* ~ *ascian* ‘ask’) and spelling variants for <sc> (e.g., *axe*, *acxe*, *acse*, *ahse*, *asce* ‘ash’;

⁵³ There are relatively few <ch> spellings for *much*, by far the most common item, in the DOE; out of the forty or <mych-> spellings, none are in the verse corpus.

⁵⁴ A line of research that is still open is the psycholinguistic status of contour segments (i.e., whether orthography has an effect on a speaker’s decision to treat phonetic signals as contour segments or as sequences of phonemes); see Hayes (2009: 68) and the references there.

waxan, wascan, awahxe, awlse 'wash'), however, make it doubtful that the medial sequence was the geminate counterpart of a singleton [ʃ]. All one can assert is that in medial position the spelling <sc> did *not* represent a singleton. Thus the question posed in this section remains, not least because of the conservative nature of the Old English poetic texts. In the absence of more testable material, it is reasonable to stay with the traditional view of the linguistic rather than orthographic motivation for the consistency of Old English resolution.

8 Concluding remarks

Table 1 showed late Old English reconstructed as having a fully developed set of affricates. Luick (1921–1940: § 687) dates affrication of [c] > [tʃ] to the second half of the ninth century on the basis of the earliest spellings of <fetian> as <feccan> 'fetch'. Hogg (1992a: 272) offers a comprehensive survey of the earlier opinions and writes: "Of course a precise chronology can never be obtained, but general phonological principles would suggest an earlier rather than a later date for the development of affricates."

The data presented in section 5.1 challenge the reconstruction of an initial and intervocalic voiceless affricate based on a palatalized velar stop, and support a reconstruction of a continuing allophonic relation between the singleton [k] and a singleton palatalized stop [c] into the eleventh century or even later. The metrical data in sections 5.2 and 5.3 do not confirm or disconfirm Luick's early dating for phonetic intervocalic assibilation or incipient affrication of the sequence represented by <cc>, yet what Hogg called "general phonological principles" suggest that a bisegmental realization in that position is uninformative with respect to the existence of a singleton phonemic contour segment /tʃ/. The reanalysis of [c] to /tʃ/ is therefore a process that was still under way in early Middle English. Phonetically it is plausible to assume a chain of input [k] > palatal [c] and bisegmental [c] ~ [tj] ~ [tʃ], and the possibility of a bisegmental [t] + [ʃ] analysis into the fourteenth century suggests that contour /tʃ/ is even later.

Dating the affrication of the voiced velar is equally complex. Here again "general phonological principles" lead to a rejection of a phonologically contrastive contour /dʒ/ in Old English.⁵⁵ The dating of the full phonemicization of

⁵⁵ A singleton voiced velar affricate in final position would be in complementary distribution with its counterpart geminate in medial position; such distribution runs against their full phonemic status.

the voiced affricate cannot be posited independently of the phonemicization of /tʃ/: first, because in coda position one would expect voicing neutralization, and because in initial position, [dʒ] is the result of Old French loan phonology after the thirteenth century in words such as *jay, jangle, jargon, juice, jealousy*.

The problematic nature of positing finite and invariable phonemic inventories based on written sources has been recognized for a long time. In 1930 van Lagenhove surveyed the literature on the assibilation of Old English palatal stops, pitched two venerable philological traditions against each other, and sided with Sweet, Wyld, Kaluza, and others in concluding that "[e]ven with regard to the XIth c. it seems to me that the indications at our present disposal are momentarily not sufficient to admit as an indisputable fact the beginnings of dentalization + assibilation of OE palatal stops" (van Langenhove 1930: 75). Then came the wave of strict phonemic interpretation, most explicitly articulated in Penzl (1947) and now firmly ensconced in the textbooks, within which the unpredictable velar /k/ before a palatal vowel due to I-Umlaut, as in *cynn* 'kin' alongside inherited palatalized /c/ in *cinn* 'chin' < PrG Germanic **kinnjo*, compels a phonologization analysis. Bringing metrical arguments to bear on the history of the affricates in early English prompts a revision of the traditional strict phonemic categorization of the precursors of the Old English affricates.

As Kiparsky (2014: 83) writes: "The classical phoneme has turned out to be something of a straitjacket and has not been helpful for understanding the rise and merger of phonological contrasts." The patchy evidence, the apparent contradiction between the loss of conditioning environment for palatalization of the velars, and the stubborn continuing perception of the voiceless palatalized velars as sufficiently identical with the non-palatalized /k/ has been a conundrum in English historical phonology, and it seems a perfect case study for the long trajectory in the rise of phonological contrasts. Kiparsky (2014, 2015) proposes a more discriminating approach to phonemicization, separating the structural notion of contrastiveness from the perceptual notion of distinctiveness. In that schema the Old English palatalized voiceless velar singletons start out as non-contrastive and non-distinctive in initial and medial positions (i.e., they are allophones), but in final position and in gemination in late Old English they are closer to being perceptually distinctive, though not yet contrastive (i.e., quasi-phonemes). The reanalysis from quasi-phonemic to a full-fledged phonemic status is a Middle English process, possibly related to the loss of singleton-geminate contrasts and, for the voiced velar fricative, definitely related to the borrowing of new lexical items with initial /dʒ/.

Departing from the established inventory of contrastive consonants in Old English, I propose an inventory of the late Old English consonants as shown in Table 2.

Table 2: The late Old English consonant system revised

		Labial	Lab-Den	Dental	Alveolar	Palatal	Velar
Obstruent	STOPS	p(:) b(:)			t(:) d(:)		k(:) g(:)
	AFFRICATES						
	FRICATIVES		f(:)	θ(:)	s(:)	ʃ(:)	x(:)
Sonorant	NASALS	m(:)			n(:)		
	Approximants	Lateral			l(:)		
		Central	w			r(:)	j

Old English did have intervocalic geminate palatal stops, or pre-affricate bi-segmental clusters, but it did *not* have contour affricate phonemes with the properties that these phonemes show in Present-Day English. For the conscientious or finicky teacher and reader of Old English, the [cj] ~ [tj] and [jj] ~ [dj] we articulate in reading Old English aloud are both phonetically and phonologically distinct from their Present-Day English counterparts.

In a September 19, 2015 e-mail exchange on assimilation and affrication, Roger Lass wrote to me: “I think there are more clines and fuzzy spectra than there are Aristotelian boxes”. More boxes relating to the later history of the affricates remain locked. Contrary to the appealing idea that the voiced and the voiceless velar affricates developed in a parallel fashion, the two changes have to be treated separately – at least until after the entry of initial voiced affricates in Middle English, that is, after ca. 1250.⁵⁶ The contribution of intervocalic affricates to syllable weight in ME is another open question. Not least, there is the puzzling problem of velars vs. dentals with respect to affrication: Why did PrG *sitjan, OEngl. *sittan* ‘sit’ not become *sitch (compare *future*, *bet you*)? Why did PrG *bidjan, OEngl. *biddan* ‘bid’ not become *bidge (compare *soldier*, *bid you*)? The lack of velar affrication and the blossoming of dental affrication in later English, the problem of *procure* [prəˈkju(ə)r] vs. *mature* [məˈtʃu(ə)r], is also on the long list of questions deserving further attention.⁵⁷ On a broader scale, a more detailed picture of the phonemicization of affricates in English may contribute to the debate on what type of phonological change affrication represents, lenition or fortition.⁵⁸

⁵⁶ See Hogg’s skeptical comments (1992a: 260, n.3) on Luick’s and Campbell’s views on the parallelism between the changes of the voiced and the voiceless velar.

⁵⁷ This is a problem identified by Liberman (2007, 2012), but his suggestion of merger avoidance does not entirely solve it, in my opinion.

⁵⁸ Buizza and Plug (2012) discuss two mutually exclusive theoretical interpretations: plosive affrication is lenition vs. plosive affrication is fortition.

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