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WHAT LINKS LIQUIDS AND THE VELAR FRICATIVE: THE CASE OF OLD ENGLISH BREAKING

The aim of the paper is to explore the process of diphthongization which is known in the literature as Old English Breaking. After the discussion of some earlier solutions proposed by researchers working in different theoretical frameworks, we propose a new solution couched in Element Theory (Backley 2011). The main questions we address in this paper concern the context, the effect of breaking and the interaction between the consonants and the preceding front vowels. Additionally, we explore the internal structure of the consonants triggering breaking and try to find the element which links liquids and the velar fricative. The solution proposed here can help to understand the behaviour of velars and liquids in various phonological processes (both historical and in Modern English).

1. Introduction

In this paper we consider one particular example of vocalic development in the Old English (OE) vowel system traditionally called breaking or fracture. First we provide some generally recognized facts concerning both the data and context of the shift. Then we look at some available solutions proposed by researchers working in various theoretical frameworks, e.g. Lass and Anderson (1975), Gussenhoven and van de Weijer (1990) and Huber (2007). The discussion is necessarily brief as the OE Breaking is a well described and exhaustively studied phenomenon in the literature (see, for example, Campbell 1959, Lass and Anderson 1975, Howell 1991, Hogg 1992a and Bergs and Brinton 2012, among many others)[1]. Yet, recent theoretical findings in Element Theory (ET) (Backley

[1] I am grateful to an anonymous reviewer for valuable comments and suggestions concerning both the content of the article and bibliographical data. However, it is not possible to address all the points raised by the reviewer mainly due to space limitations but also the complexity of some of the phenomena like, e.g. phonological quantity of the diphthongs produced by Old English Breaking, whose detailed discussion would far exceed the compass of this paper.

2011) allow us to look at OE Breaking from a slightly different perspective and put forward a new solution. It will be pointed out that this new solution is able to flesh out the conjectures of some previous researchers concerning the breaking and shed new light on the phonological behaviour of the velar fricative in the history of English.

2. Old English Breaking

Old English Breaking (henceforth OEB) is a general term circulating in the literature which covers a bunch of vocalic developments affecting front vowels occurring before certain consonants and consonant clusters in Old English. More specifically, the traditional view on breaking presupposes the development of a back vowel between front vowels (both short and long), i.e. [æ]/[æː], [i]/[iː] and [e][2] and the voiceless velar fricative /x/, plus the liquids /r/ and /l/ if they stood before another consonant including /x/. Note that the development of [e] and [i] results in identical reflexes, i.e. [e] > [eo] and [i]/[iː] > ([io/īo]) > [eo]/[eːo]. The change is reflected in the spelling in the form of digraphs <ea>, <eo> and <io> in the place of the previous <æ>, <e> and <i> respectively – the last two digraphs, i.e. <eo> and <io>, were later usually spelled identically as <eo>. Traditionally, breaking is interpreted as epenthesis of a protective back glide vowel between the preceding front vowel [æ], [e] or [i] and the back segment or cluster: /x/, /l/+C, /r/+C and /x/+C, the glide vowel agreeing in height with the preceding vowel, (Campbell 1959:54). Thus breaking of short vowels is assumed to produce a new class of short diphthongs qualitatively identical but quantitatively different from the existing ones. On the other hand, breaking of long vowels results in the appearance of long diphthongs identical with the original long diphthongs. For example, breaking of [iː] results in a new diphthong <ēo> as in **līxt* > *lēoht* 'light' which is identical to the original diphthong in Þēod, but quantitatively different from the short diphthong in *weorpan* (Lass and Anderson (1975: 75). Now, consider some examples of breaking given in (1) which have been adopted from Gussenhoven and van de Weijer (1990: 315) and Huber (2007: 139). Note that the glide is represented in the OE spelling and, as mentioned above, the length of the original vowel is left unchanged which means that a short vowel evolves into a short diphthong.

(1) Old English Breaking

a. [æ]/[æː] > [æa]/[æːa] <ea>		b. [e]/[i]/[iː] > [eo]/[eːo] <eo>	
ceald	*cold*	eolh	*elk*
healdan	*to hold*	seolh	*seal*

[2] Note that the long, mid, front vowel [eː] does not feature in breaking as it is claimed to be just a dialectal variant of Primitive Germanic [æː] (see Campbell (1959: 54) and Huber (2007:137).

wealh	*foreigner*	weorpan	*to throw*
bearn	*child*	steorra	*star*
mearh	*horse*	feohtan	*to fight*
seah	*knife*	feoh	*cattle*
hleahtor	*laughter*	hweowol	*wheel*
nēah	*near*	lēoht	*light*

The examples in (1) demonstrate that front vowels are regularly broken before both a single velar fricative /x/ and consonant clusters /x/+C, /r/+C and /l/+C including /rx/ and /lx/. Note that in a few cases the velar fricative was dropped. It was a later development, after the operation of breaking, and it affected the velar fricative following a broken long vowel, e.g. *slēan* 'to strike', *lēan* 'to blame', *nēar* 'nearer' and *fēolan* 'to press on' (Huber 2007: 141). Furthermore, as noted by Lass and Anderson (1975: 92) and Huber (2007: 139), the regularity of breaking is only apparent as there are some evident gaps or restrictions in the pattern. Thus, for example, [e] and [æ] are regularly broken before /x/, /x/+C, /rx/, /lx/, and /r/+C, and although the short vowel [æ] also regularly reacts in the context before /l/+C, the mid-front vowel [e] does not, unless the consonant is /x/, e.g. *eolh* 'elk'. Note, however, that [e] may be broken before /l/+C if there is a preceding /s/, e.g. *aseolcan* 'to become languid' and *seolf* 'self', but *melcan* 'to milk' and *delfan* 'to dig'. Such restrictions on the operation of breaking were collected by Huber (2007:142) and the consonants which trigger breaking were built upon a hierarchical scale (2). Quite predictably, the most widespread effect on breaking had /x/ and /x/+C which affected practically all front vowels. Next in a line are liquids followed by the velar fricative which affected most of the front vowels and then liquids followed by other consonants, the most limited being /l/+C clusters. In short, /x/+C, /r/+C, and /l/+C clusters trigger breaking in the following order: /x/+C affects virtually all front vowels, /r/+C some, and /l/+C affects only very few front vowels.

(2) Clusters potential for breaking (Huber 2007: 142)

vowel before:	/x/	/x/+C	/rx/	/lx/	/r/+C	/l/+C
[æ]	+	+	+	+	+	+
[æː]	+	?				
[e]	+	+	+	+	+	
[i]	?	+	+			
[iː]	+	+				

It is also mentioned (Campbell (1959: 54) and Huber (2007)) that breaking, with some restrictions, may affect front vowels before geminates /xː/, /rː/ and /lː/. Similarly to a single /x/, the geminate velar fricative regularly breaks preceding front vowels. Although there is a scarcity of forms containing the geminate /rː/, mainly due to the absence of /r/ in West-Germanic Gemination

(henceforth WGG), there are some examples of /r:/ and breaking does occur before it, e.g. *steorra* 'star' and *fierr* 'farther' (with umlaut) (Huber 2007: 141). Finally, while some researchers (Campbell 1959: 54) maintain that breaking is not possible before the geminate /l:/ and provide examples like *tellan* 'to tell' and *hell* 'hell', to prove their point, some others (Quirk and Wrenn 1957: 145) claim that breaking is not possible only in a situation when the geminate /l:/ is the result of WGG, in other cases the geminate breaks the preceding vowel, e.g. *eall* 'all', *weall* 'wall'. The reason why /l:/, which arises due to WGG, does not trigger breaking is that it originally comes from the cluster **-lj-* preceded by a back vowel [a], e.g. Go *saljan*, *taljan*. It follows that the geminate /l:/ which is the result of WGG, together with a single /l/ occurring after a mutated vowel, has a palatal realization. Similarly, Hogg (1992b) discussing the exceptions to an otherwise general rule of breaking points out that it can be inhibited by the palatal nature of the consonant following the liquid. Thus, apart from the regular diphthongization in *nearwe* 'narrow' nom.pl. < **næwe* and *sealde* 'he gave' < **sælde*, there are forms in which the vowel remains unbroken due to the palatal consonant following the liquid, e.g. *nerian* 'save' < **nærjan* and *sellan* 'give' < **sælljan*. The latter are affected by *i*-mutation but not breaking. The palatal *j* in **sælljan* is claimed to inhibit breaking by palatalizing the *-ll-* cluster, in **sælde*, on the other hand, [l] is velarized and hence triggers breaking.

Huber (2007: 141) wonders what exactly palatality has to do with the lack of breaking but does not give any answer. Later on it will be pointed out (section 3.1) that this fact is crucial in the explanation of the absence of breaking after a palatal/palatalized velar fricative. Similarly puzzling for him is the absence of back vowels in breaking even more so as in Modern English there are examples of breaking of back vowels before /r/.[3]

Finally, note that Gussenhoven and van de Weijer (1990: 315) add /w/ to the group of consonants which trigger breaking. This is depicted in the example *hweowol* 'wheel' given in (1) above and some other forms like *nēawest* 'neighborhood' or *niowul* 'prostrate' Gussenhoven and van de Weijer (ibid.).

Now, having introduced the basics of OEB, we are in a position to look at the explanation offered in some previous analyses. Crucially, in the majority of them the solution is sought in the assumption that the consonants which are responsible for breaking share a certain feature. For example, in search for unified features in consonants and vowels Gussenhoven and van de Weijer (1990) analyze some historical processes (including OEB) which illustrate a close relationship between vowels and consonants. The solution they propose is a modification of the SPE solution in that the unordered bundle of distinctive features are replaced in their account by tree geometric model which advocates the ordered and grouped features, e.g. Sagey (1986) and Clements (1989). Technical details

[3] We will briefly allude to some vocalic developments before /r/ and modern breaking before [ɬ] later on in this section.

put aside, the authors claim that OEB is a case of spreading which involves the feature [+dorsal]. Crucially, they argue that the front vowels are broken in the context of the following /x/ as it is [+dorsal] just like the labio-velar /w/ and the velarized /l/. Furthermore, following Lass (1983), they assume that /r/ was a velar or even a uvular consonant or that it had secondary velarization just like [ɬ]. As not directly relevant to their analysis, however, they do not decide on one particular solution, rather they confine themselves to a mere assumption that /r/, just like /x l w/ must have been [+dorsal]. They further argue that breaking had no effect on vowel quantity. In other words, when the affected segment was a short vowel, the segmental accretion caused by spreading resulted in short diphthongs. This is confirmed, they maintain, by the fact that instead of merging with long diphthongs the short ones were later on, when breaking became inoperative, reinterpreted into short monophthongs and left no trace in the phonology of English. This view is also advocated in Campbell (1959: 139) who claims that <ea> and <eo> represent short diphthongs parallel to long <ēa> and <ēo>. On the other hand, Lass and Anderson (1975: 82) assume that breaking of both short and long vowels result in sequences which are phonetically identical. It means that, for example, *ea* stands for the diphthong derived by breaking from a short and a long vowel and it is identical to the original diphthong in *bēad*.[4]

What is crucial for us here, however, is the explanation of the environment of breaking proposed by Lass and Anderson (1975). They point to the fact that in the traditional SPE-like model of segmental structure the consonants which trigger diphthongization do not have much in common. This may lead to a view that in order to account for breaking one needs two separate processes. Thus, they consider the option which assumes the existence of two processes: breaking before /x/ and breaking before /r/ and /l/. In this scenario the two processes may have nothing in common except diphthongization. Moreover, it may be the case that the epenthetic vowel is different in the two processes and the quality of it depends on the disjunctive context. Front vowels assimilate to /x/ and as a result we can observe a back-vowel epenthesis; in the second process, which functions quite independently from the previous one, vowels undergo sonorancy assimilation before liquids plus a consonant. Lass and Anderson (1975:89) explain it as a process which "copied out or segmentalized some feature of the liquid, not necessarily back". This hypothesis may be confirmed, they argue, by the epenthesis phenomena observed in some New York City dialects where the glide vowel of the type [ɨ] evolves between front vowels and apical /r/ but [ə̯] occurs between back vowels and /r/ plus all other vowels and [ɬ]. Then, they provide a point-by-point refutation of this and some other similar views to finally incline into a hypothesis saying that breaking was an entirely natural (assimilatory) process and all the consonants causing it had some common specification, which for some reason has escaped the researchers. More specifically, Lass

[4] See Lass and Anderson (1975: 75) for a detailed discussion of some other solutions proposed in the literature.

and Anderson (1975) assume some kind of 'back-coloured' or velarized /r/ and /l/. Note that while the latter is hardly controversial as the pre-consonantal /l/ is velarized in most of the varieties[5], it is not the case with velarized /r/. Thus, they define /r/ as a uvular continuant consonant [ʁ] leaving some minor phonetic details like fricative or trill unspecified. In order to prove their point, they provide some evidence from Modern Scottish and northern English dialects. In short, they note that there are uvular /r/'s in at least some dialects of every Germanic language except Icelandic. They sum up by pointing out that [ʁ] can prove helpful not only in regularizing the context for breaking but in explanation of some other phenomena like, e.g. West Germanic Gemination. As for dark /l/, it occurs in most dialects of Modern English both British and American. The latter may fluctuate between a slightly/heavily velarized /l/ and a vocoid glide depending on the dialect, e.g. in Scottish and some Northern England dialects /l/ being realized with a very clear [ɯ], [ɣ] or [o] resonance. Their argument goes like this: if there is one process called breaking and [+back] is the trigger-feature responsible for the epenthesis of a back vowel, then in order to unify the context /r/ must be [+back]. As for the effect of breaking, Lass and Anderson (1975: 91) incline towards the solution based on spelling, i.e. breaking results in the development of the vowel [u] with some other features copied from the preceding vowel through Diphthong Height Harmony. Finally, if /x/ alone can trigger breaking while /l/ and /r/ only if followed by a consonant, it must be, they suggest, a function of some kind of strength hierarchy. It is worth to mention here that the idea of uvular /r/ in OE stirred up some criticism voiced by Fred Householder in a personal communication with Lass and Anderson (1975: 89, footnote1). It is pointed out there that for the purposes of breaking it suffices to recognize /r/ as an apical somewhat retracted or retroflexed segment, just like in most of the modern American varieties. Hosholder provides some more evidence, e.g. in Greek and Latin the vowels which develop before /r/ are more open, or back or rounded. In Sanskrit /r/ alternates with [ur] in many roots containing apical /r/. He adds that apical /r/ also occurs in many Turkic languages, and is much more common cross-linguistically than uvular [ʁ]. Finally, Householder indicates that retracted /r/ and dark /l/ share similar acoustic properties and articulator shapes. On top of that, other researchers (Charles Jones in a personal communication with Lass and Anderson 1975:89) point out that modern dialects containing uvular /r/, those which descent directly from Old Northumbrian, are the dialects in which breaking was rather unproductive. Even if Lass and Anderson (1975) accepted the idea of the retracted apical /r/, it would not help them to explain the relationship between /r l/ and /x/. In other words, they are not able to explain why the former pair only with /x/ and no other segment. This is a part and parcel of the phonological model chosen for the analysis as it lacks

[5] As pointed out in a footnote (Lass and Anderson 1975: 89) pre-consonantal dark /l/ is a characteristic feature of Indo-European languages; it occurs not only in Germanic but also in other languages like Italic and Greek.

a common feature that would characterize the three segments in question. In consequence, Lass and Anderson (1975) preserve the velarized /r/ solution and express some doubts about [+back] specification of the apical /r/ pointing out that the retraction concerns the blade of the tongue rather than its body.

Huber (2007:146), on the other hand, only briefly considers the option of the [+back] specification of consonants triggering breaking. He points out that in such a case breaking is nothing more than the approximation of front vowels before [+back] consonants including /x/, velarized /l/ and the velar rhotic /r/. The phonetic specification of the latter could be confirmed by the velar articulation of /r/ in, for example, modern German or French. Furthermore, this solution could explain the absence of back vowels in the process as they, being back, do not require any back assimilation. However, as noticed by Huber (ibid.), this solution does not answer the question why other velars like /k/ and /g/ do not trigger breaking.

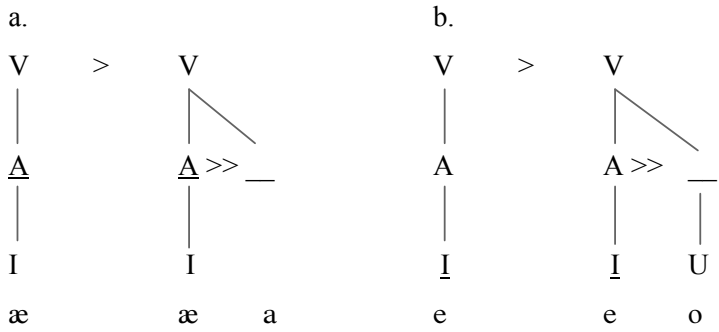
The analysis proper offered by Huber (2007), however, is couched in a different theoretical model, that is, Element Theory. Without going into details, he follows the idea proposed by Quirk and Wrenn (1957) and Cassidy and Ringler (1971) according to which breaking consists in the development of a vowel glide due to the influence of some velar qualities of the following segments, e.g. *fex > *feux > *feox > [feəh] = <feoh> 'life'. In other words, the phonetic realization of the broken part is not [a], [ɔ] or [u], which may be suggested by spelling, instead the development results in the appearance of [ə] as the second part of the diphthong. This simply means that breaking is responsible for the appearance of new diphthongs, i.e. [æə] and [eə], which may be either short or long. Now, the main objective of Huber's (2007) dissertation is to show that velars are empty headed – they do not contain any resonant elements at all. Furthermore, it is velars and not coronals, which are special in that they are prone to various modifications (Paradis and Prunet 1991). Note that the idea that velars are empty-headed is not new and is rather generally accepted by most of the Element Theory researchers, e.g. Harris (1994), Bloch-Rozmej (2008) and Cyran (2010) among others. This single assumption, Huber (ibid.) claims, provides the explanation of the peculiar behavior of velars not only in the history of English but also in modern English and cross-linguistically, e.g. the loss of /x/ in English, palatalization of velars, or susceptibility to various lenition processes, among many others. It is also responsible for OEB in that the lack of a place element in /x/ triggers a development of a second, contrastive portion following front vowels. Since the reduced vowel [ə] is often represented as a realization of an empty segment, i.e. no resonance elements[6], it means that both the schwa

[6] Representations of the schwa vary from a totally empty position | |, through the postulation of the neutral element |@|, which is present in all vocalic representations but only shows up if the other elements are absent (Harris 1994, Harris and Lindsey 1995), to structures with a single non-headed resonance element. For example, Backley (2011:50) represents [ə] as a single non-headed |A| while the weak vowel [ɪ] is defined by |I|.

and /x/ share this "no-resonance" property. It follows that the second part of the diphthong which arises through breaking is simply an empty slot and the breaking itself is understood as "the approximation of front vowels to the placelessness of /x/, by creating an empty slot between the vowel and the consonants" (Huber 2007: 145). This proposal, however, raises some serious problems some of which have been enumerated by Huber (2007:146) himself. Firstly, it is not clear why back vowels are excluded from breaking, i.e. there is no formal obstacle which would inhibit the development of a reduced second part of the diphthong after back vowels. Huber (ibid.) points out that this possibility is actually borne out by a similar process in modern English, (see also Wells 1982: 213). It is similar to the extent that it occurs in the context before the liquids /r/ and /l/. Thus, although breaking before the modern English /l/ affects only front glides, e.g. [fiːəɬ] *feel*, [seɪəɬ] *sail*, [faɪəɬ] *file*, and [bɔɪəɬ] *boil*,[7] both front and back vowels are diphthongized before /r/ in the process known as 'pre-*r* breaking' which results in [ɪə], [ʊə], [eə], [aɪə], [aʊə] [ɔɪə]. Secondly, the lowering of OE [ɪə] > [eə] remains unexplained, i.e. there is lack of a donor in the close neighborhood. Thirdly, and more importantly, why only the velar fricative, to the exclusion of the velar plosives, causes breaking. What the pre-consonantal position of liquids has to do with breaking? These questions are left unanswered.

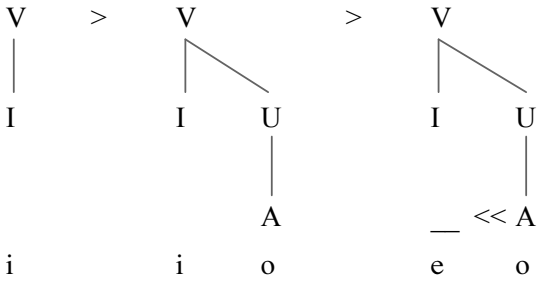
Huber (2007: 143) considers one another option – diphthongization as the spreading of the non-palatal element. It produces contour structures of two vowels similar in height but different in backness. Note that this scenario assumes that the second part of the diphthong is a phonetic back vowel [a] or [o]. Consider the development of short vowels illustrated in (3) below.

(3) Breaking as the spreading of the non-palatal element (Huber 2007: 143).



7 Wells (1982: 258-9) mentions also a process he calls '*l* vocalization'. It consists in /l/ velarization in the context similar to that in OE and resulting in vocalization, e.g. *milk* is pronounced [miok] rather than [milk]. As for 'pre-*r* breaking', Wells (1982: 214) explains that it is a natural phonetic development: "to pass from a 'tense' close or half-close vowel to the post-alveolar or retroflex posture associated with /r/ requires considerable movement of the tongue. If this is somewhat slowed, an epenthetic glide readily develops…"

c.



The problem with this solution is that the development of the second part of the diphthong is pretty much unmotivated in that there is no a local donor of the elements involved in the process here. In short, apart from (3a) where |A| spreads from the preceding vowel [æ], there is no motivation for the presence of the elements |U| in (3b) and |A U| in (3c). Huber (2007: 144) observes that although it would be possible to explain the presence of |A| as a spreading from the elemental make-up of the consonants triggering breaking, i.e. /r/, /l/ and /x/, the appearance of |U| must remain unanswered in such an analysis. That is why he does not push this line of thought any further, following instead the empty slot and the schwa solution mentioned above. Finally, note that the development, which is illustrated in (3c), may be further weakened by the fact that the vowel [e], which is the final stage of the development, contains two headed elements, i.e. the head element of [o], that is |A|, is appended to the original vowel [i], most probably defined as |I|, which gives a representation containing two heads |A I|. The structure of this kind may be problematic unless we claim that the element |A| spreads as a non-head or it loses its headedness.

Summing up, all the solutions briefly discussed above are based on the assumption that OE /r/ shared some feature with the rest of the consonants which triggered breaking, i.e. /x l w/. This is a reasonable assumption if one wants to capture and unify the context of the process in question. Although the exact nature of this feature may vary depending on the theoretical approach ([+back], [+dorsal] or empty headedness), it is almost unanimously accepted that OE /r/ must have been some kind of a 'back-colored' consonant specified as velar, uvular, velarized or simply retracted. Be as it may, the above analyses face a common difficulty, i.e. how to explain the nature of the diphthongs which are the effect of breaking. This and other questions will be addressed in the following sections in which we put forward a new solution and present the analysis of breaking and some related processes. Although the theoretical model chosen for the analysis is the same as in Huber (2007), that is Element Theory, we, in opposition to him, assume velars to contain a resonance element.

3. Velars and velarized segments

Cross-linguistic findings unquestionably point to the fact that velars interact more readily with labials than coronals. The close phonological relationship is even more peculiar as both categories are quite distant articulatorily. These and other observations have induced Kijak (2014) to collect and discuss a considerable amount of cross-linguistic evidence which illustrate the intimate relationship of velars and labials. Without going into details, this relationship is evident in some diachronic alternations between velars and labials in Germanic languages (Bonebrake 1979), Irish and Rumanian (Hickey 1984, 1985), some varieties of spoken Spanish (Brown 2006), or dialectal variation in Swedish (Backley and Nasukawa 2009) among many others. Moreover, the examples of the relationship can also be found in some more exotic languages . For example, Ohala and Lorentz (1977) bring to light some data from Melanesian languages, e.g. Ulawa, Common Melanesian, Fiji, and Uto-Aztecan and some dialects of Yoruba.[8] The main question Kijak (2014) addresses, however, is why it is labials and velars that are persistently involved in such alternations. To put it differently, why velars and coronals do not interact on the same scale as velars and labials. Why are the alternations /k/ > /p/ and /p/ > /k/ much more common than /k/ > /t/ or /t/ > /k/? What are the phonological properties labials and velars share? Interestingly, in ET, a current model of segmental structure, both labials and velars are represented by different primes (Kaye *et al.* 1985, 1990, Harris and Lindsey 1995). Thus, labials, together with the high back vowel /u/, contain the element |U|. Velars, on the other hand, are proposed either to be represented by a neutral element (Harris and Lindsey 1995:29) or they are simply empty-headed, i.e. they do not contain any resonance element at all (Huber 2007, Cyran 2010). Note that if we accepted the latter solution there would be no logical link that would favor velars and labials over labials and coronals. Moreover, the fact that the vast majority of processes mentioned in Kijak (2014) contains labials and velars and not coronals would have to be treated as a pure coincidence. It means that the explanation could not lie in the absence of place element in velars as in this situation they could in principle interact with any other consonant or vowel including coronals which is actually a very rare case, indeed. Therefore in what follows we agree with Huber (2007) that velars are empty-headed; however, we also claim here, following Backley and Nasukawa (2009) and Backley (2011), that velars contain the resonance element |U| defining velarity. What links labials and velars is the very element |U| which plays a different function in the two categories, i.e. it is a head in labials but an operator in velars. Additionally, this representation may explain a particularly active phonological role of velars. They are susceptible to weakening and easily affected by neighboring segments, e.g. labialization, palatalization, etc. Moreover, the solution advocated here can

[8] For more cross-linguistic evidence, a thorough discussion and the analysis of the English data see Kijak (2014).

also account for their common alternations with labials. If we agree that the empty headedness contributes to a general weakness of a segment, all the above phenomena are explained straightforwardly. Thus, velars are weaker than other plosives (being empty-headed) and hence undergo more readily the weakening and/or deletion in weak positions; the empty-headedness also means they are easily affected by assimilation processes like palatalization; and finally they contain the operator |U| which can be promoted to the head position resulting in labials. Note that this representation can also explain some vocalic developments before velars/velarized segments like OEB.

Now, the propensity of velarized /l/ and labio-velar /w/ to flock together with velars is not a potentially problematic issue for most of the models of segmental phonology. What seems to be much more challenging, however, is to incorporate the rhotic into this group. Hence it what follows we look in more detail at the internal structure of English liquids.

3.1. The shared element(s) of velars and liquids

In recent studies (van der Torre 2003, Botma 2004, Scheer 2004 and Backley 2011, among others), we can notice a tendency to represent liquids as complex segments. For example, Scheer (2004:§§48-51) proposes to represent liquids by two elements |A| and |I| with the difference that the lateral, as containing a firm contact between articulators, is also defined by the occlusion element |ʔ|, hence /r/ = |A I| and /l/ = |A I ʔ|. Backley (2011: 178), on the other hand, argues that the lateral is a combination of either |A I| or |A U| depending on the language and the context in which it occurs. More crucially for us here, he proposes that in the varieties of English which support the alternation between clear and dark /l/, the distinction boils down to the context in that clear /l/ specified as |A I| occurs before front vowels and /j/, while the dark variant, i.e. |A U| occurs in all other positions. In other words, the English lateral is specified as |A U|. In the context before a front vowel or a semivowel, however, the element |U| is replaced by |I| spreading from the vocalic segment. The reason for it is that |I| and |U| are not easily mingled in English. What is important here, however, is that the representation of dark /l/ as a combination of |A U|, and particularly the presence of |U|, may contribute to the explanation of various phenomena both historical, e.g. pre-[ɬ] diphthongization in ME with some later vocalic developments, e.g. *balk* > *baulke* 'baulk/balk' (Kijak 2010), and contemporary, e.g. *l*-vocalization in Estuary English (Wells 1982, Przedlacka 2001). What still remains to be found is the link between velars/velarized segments and the rhotic /r/. Let us recall that all these consonants (excluding the velar stops) form a homogeneous class which triggers OEB. Now, Backley (2011: 168) argues that all the different variants of the rhotic in various languages, e.g. the trill [r], the approximant [ɹ], the flap [ɾ], the retroflex [ɽ] and even the uvulars [ʀ ʁ] are simply the realization of the single element |A|. However, in systems which possess more than one variant of the rhotic some additional elements or the concept of headedness need to be

applied to differentiate between them. Crucially, when discussing the melodic make-up of uvulars, Backley (2011: 98) points to their strong inclination to pattern with velars. An immediate conclusion one can draw from this observation is that uvulars just like velars must contain the element |U|. Now, bearing in mind the previous research findings concerning /r/, we make a proposal that the pre-consonantal and word-final rhotic in OE was uvularized and as such specified for two elements |A| and |U|.[9] Furthermore, what differentiates the liquids is the mere headedness, i.e. the element |A| plays the function of the head in /l/ but it is just an operator in /r/, which gives the following specifications: velarized /l/ |A U| and uvularized /r/ |A U|.[10] It follows that the shared element which links all the consonants responsible for breaking is non-headed |U|. It is found in the velar fricative /x/, velarized /l/ and uvularized /r/. Moreover, liquids are additionally specified for |A| and there are certain facts in the history of English which show that the same representation may actually be needed for the velar fricative. For example, the vowel development before the glide [w] in ME, which originally comes from the spirant, that is [w] < [x], is predominantly spelled <o>, e.g. OE *furʒe* (furh) > ME *furowe* 'furrow', OE *sorʒe* (sorh) > ME *sorowe* 'sorrow', etc. Now, since the mid vowel [o] is a combination of two elements |A| and |U|, it is possible to argue that the source of these elements is the following velar fricative. If true, it means that OE /x/ was slightly uvularized and contained both |A| and |U| plus the element responsible for friction, that is, |H|. To sum up the discussion so far, we assume the following structure of the consonants which trigger breaking:

(4) Melodic make-up of OEB triggers

[x]	-	|A U H|
[r]	-	|A U|
[ɬ]	-	|A U|
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[w]	-	|U|

First, note that [w] is separated from the rest of the consonants as only some researchers mention it in the context of breaking (Gussenhoven and van de Weijer 1990) and its internal structure is slightly different from the consonants

[9] Backley (2011: 170) briefly discusses the idea of lip rounding as a form of enhancement in the articulation of the English approximant. It means that /r/ is not specified for |U| and the lip rounding is used merely to enhance the contrast between /l/ and /r/. It leads to a common replacement of [r] by [w] in children language, e.g. *train* [tweɪn].

[10] The assumption that English liquids are specified for the element |A| may be confirmed by the process of liquid intrusion (both [r] and [l]) in some varieties of English. It takes place only after non-high vowels and since the latter uncontroversially contain the element |A|, we have a direct link between the context and the process of intrusion and, additionally, the confirmation of |A| presence in liquids. For more information and the analysis of liquid intrusion in English see Kijak (2010).

represented above the line in (4) in that it contains a single element |U|. More crucially, the main class, i.e. /x/, /l/and /r/, share the same elements |A| and |U|, which explains their common activity with respect to breaking. Finally, note that the main class has suffered a similar fate in the history of English, in many cases they were affected by the reduction in the form of vocalization and/or complete deletion. For example, the velar fricative has gone through various stages of reduction (including vocalization) to be finally deleted leaving some imprints on the preceding segments. Similar fate met /r/ which has been vocalized in the final and pre-consonantal position or reduced to approximant /r/ represented as single |A|. By the same token, dark /l/ was responsible for various vowel modifications, it underwent vocalization and was deleted in many cases. However, just because it contains the headed element, the dark /l/, when compared to /x/ or /r/, should demonstrate a much bigger possibility to resist decomposition and/or deletion which is actually the case (Kijak 2010).[11] Note further that the representation of consonants we have proposed in (4) can help to explain some peculiarities connected with OEB. Let us recall that breaking can be inhibited by the palatal nature of the consonant following the liquid, e.g. *sellan* 'give' < **sælljan*. As mentioned in section 2, the traditional explanation draws on the nature of the glide /j/ which palatalizes the preceding *-ll-* cluster and in this way inhibits breaking. The question, however, remains how to logically combine these two facts: palatality, on the one hand, and the lack of breaking, on the other. Note that if we accept the representation in (4), the answer is pretty much straightforward. The palatalized /l/ does not trigger breaking as the element |U| has been replaced by |I| coming from the following palatal /j/. And, as it will be argued in the following section, breaking takes place when the element |U|, sometimes accompanied by |A|, spreads from the consonant to the preceding vowel.

Having established the internal structure of consonants which trigger breaking, we can now move on to look closer at the context and the result of the process in question. This is done in the immediately following section.

4. What really happened in OEB?

In this section we address two general questions: a) what triggered OEB in the first place and why in this particular context and b) why OEB results in diphthongization and why of this particular type. As the discussion unfolds, we look at some additional problems like the absence of back vowels in breaking or the diversified potential of clusters which trigger breaking (see table (2) above). Let us begin with a) first. Most of the researchers agree that breaking was responsible for the appearance of diphthongs both short and long. What we do not know, however, is whether the vowel gets restructured in the form of a diphthong

[11] It should be mentioned here that the velar stops, which just like the consonants in (4) contain the non-headed |U|, are also the target of similar processes, e.g. /g/ deletion in *king*.

because it occurs in this particular context or the vowel gets modified by some of the phonological material coming from the following consonant which itself undergoes some modification. We assume that the second option is correct and OEB is simply the result of the weakening process affecting certain consonants in a prosodically weak position. Looking again at the examples demonstrated in table (1) above, we can notice that breaking occurs before pre-consonantal /x/, /l/ and /r/. It also takes place before single /x/ but only if word- or syllable-final. This is a cross-linguistic and cross-theoretical observation that consonants which occur in these two contexts suffer from various lenition processes. Therefore they are rather uncontroversially recognized as two main lenition sites.[12] It follows that OEB was triggered by a class of segments containing the non-headed |U|, that is, /x/, uvularized /r/ and velarized /l/ which happened to occur in a prosodically weak position. In order to escape the positional plight the consonants evacuated some of their phonological material to the preceding vocalic position which in turn resulted in diphthongization. This explanation leads us directly to question b) mentioned above, namely why the spreading of |U| and |A| winds up with diphthongization and not with some sort of modification of the original vowel like, for example, lowering. The scenario in which the vowel is modified by means of spreading from the following segment is theoretically plausible and actually borne out by cross-linguistic data. Yet in OEB the spreading results in a long or a short diphthong. The reason for it might be the difficulty of |U| and |I| to sit together in one segment. Note that although front rounded vowels, which are the combination of |U| and |I| (plus some other elements), were present in the vocalic inventory of OE, they were most probably already in retreat as they were totally lost in ME. Therefore, diphthongization seems the most probable effect in a situation when front vowels meet velar/velarized segments in a weak position.[13] In other words, OEB is the consequence of the inability of |U| and |I| to fuse within one segment. Moreover, if, as we claim here, OEB is the spreading of the non-headed |U| (plus |A|) from consonants in a weak position, we have a ready explanation for the absence of back vowels in breaking. The elements |U| and |A| do not have a chance to spread to back vowels as the latter are already specified for these elements. The absence of back vowels in OEB is therefore treated here as imposed by the *Obligatory Contour Principle*, which enforces the avoidance or simplification of sequences of identical segments.

The explanation for OEB proposed here can additionally combine two disparate hypotheses concerning the effect of the process. On the one side, there

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[12] This is also true in the Strict CV model; the consonants which occur in these two contexts suffer from lenition because they are licensed by the empty nuclear position which, by definition, is a weaker licenser. For more information concerning the lenition theory in Strict CV see Ziková and Scheer (2010).

[13] The absence of the velar plosives /k/ and /g/ from the class of consonants which trigger OEB might have something to do with the fact that they are stops and as such contain additional prime, i.e. the occlusion element |ʔ|. Some more research is definitely needed here.

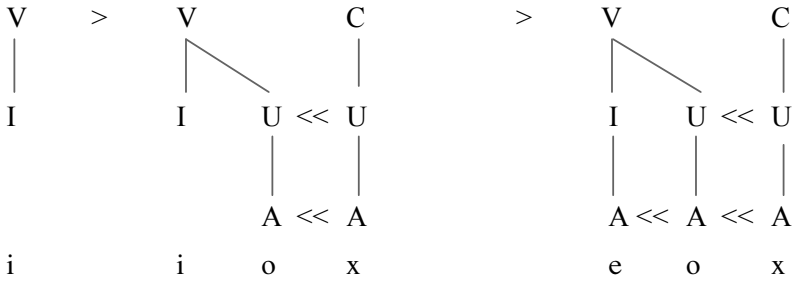
are those who draw on the spelling and hold that the second element of the new diphthong was a full vowel. Thus, what they argue for can be schematically represented as *ea* = [æ]/[æː] > [æa]/[æːa], *eo* = [e] > [eo] and *io* later *eo* = [i]/[iː] > [io]/[iːo] > [eo]/[eːo]. The other camp advocates the solution according to which the second part of the diphthong was a reduced vowel, i.e. the schwa, hence *ea* = [æ]/[æː] > [æə]/[æːə], *eo* = [e] > [eə] and *io* later *eo* = [i]/[iː] > [iə]/[iːə] > [eə]/[eːə]. However, it is also plausible to assume that the immediate consequence of the spreading was a full vowel – a scenario in which ideally both elements |U| and |A| spread. With time this vowel could be reduced to the schwa [ə] (containing the single element |A|). It must be noted here that both options are actually available in Modern English. Thus breaking before the modern English [ɬ] results in the glide formation in the form of the schwa, e.g. [fiːəɬ] *feel*, [faɪəɬ] *file*, and [bɔɪəɬ] *boil*. It can also result in a full vowel, e.g. [miok] *milk*. We may note in passing that in the latter vocalization the velarized /l/ winds up as [o] which is a combination of |U| and |A|. This further confirms the proposed structure of [ɬ] (see (4) above). Similarly, pre-*r* breaking may result in the schwa (generally in the British variety of English) or the *r*-colored vowel (in the American variety). Finally, note that what is an unmotivated lowering of OE [ɪə] > [eə] in Huber's (2007: 146) analysis, is a natural consequence of spreading in the solution proposed here. If we agree that the schwa is represented by the non-headed |A|, the lowering can be explained as a simple fusion of |A| from the schwa and |I| of the original vowel which gives [e] |A I|.

One final issue which calls for a comment is Huber's (2007:142) hierarchical scale which represents clusters potential for breaking (see table (2) above). The mere assumption that headed elements spread more reluctantly may contribute to the explanation of the fact that /l/ is the least active trigger on this scale. Note that /l/ is the only segment from the three involved in breaking which contains the headed element, i.e. |A|, and so it can dump the non-headed |U| only.[14] Now, the utter lack of [i]/[iː] breaking before /l/ may be explained as a difficulty to fuse |I| of the original vowel [i]/[iː] with |U| which spreads from the following /l/. Let us recall that these two elements sit rather inconveniently within one segment in languages like English. This is not the case with /x/ and /r/ which can evacuate both elements to the preceding vocalic position occupied by |I|. The immediate result of this spreading is the diphthong [io] – the element |I| of the original vowel plus |A| and |U| from the following consonant. Later on the element |A| spreads further left and gets fused with the original |I| which gives [eo] (|A I| + |A U|). This is represented in (5a) below.

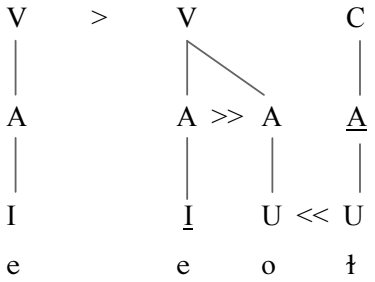
[14] There are at least two consequences of this assumption. First, we must postulate two different schwa vowels: the |U|- and |A|-quality schwa – an idea which is not indefensible (see footnote 5 above and Cyran (2010: 7) and Backley (2011: 50)). Second, to defend the full vowel solution, we must agree that in the situation when [æ] breaks into [æa] before [ɬ], the element |A| of the second part of the diphthong, that is, [a] comes from the original vowel [æ] and not from [ɬ].

(5) Selected examples of OEB

a. [i] > [io] > [eo] before [x]



b. [e] > [eo] before [ɬ]



The rare cases when [e] breaks before [ɬ] are explained by the bi-directional spreading, i.e. the element |U| spreads from the velarized /l/, while the element |A| comes from the original vowel [e]. The situation is depicted in (5b). However, it must be noted here that the ban on the spreading of the headed element |A| form /l/ is a solution we have proposed just to explain the lack of [i]/[iː] breaking before /l/. Since the literature abounds in examples where it is a head that spreads, the above solution is nothing more than a mere hypothesis which requires more research in the future. Finally, the developments in (5) illustrate the possible stages of OEB in the full-vowel scenario, i.e. the solution which assumes that breaking results in a diphthong with a full vowel as a second part. As mentioned above, it is also very plausible that the second part of a new diphthong was simply a schwa vowel. In the latter scenario the non-headed |U| or |A| spread leftward, i.e. from a consonant to a preceding front vowel, in the form of the |U|- or |A|-quality schwa.

5. Conclusions

Although OEB is a well-recorded and thoroughly studied phenomenon, we decided to look at it again but from a different theoretical perspective. Our ambition was to find the link between liquids and the velar fricative – the consonants which are responsible for breaking. Building on the idea that the pre-consonantal liquids were velarized in OE, we proposed to unify the group of consonants which trigger breaking by means of the element |U|. In short, we have argued, contrary to Huber (2007), that while they are empty-headed velars and velarized liquids contain the resonant element |U|. Interestingly, the representation advocated here also accounts for the common alternations between labials and velars (see Kijak 2014). Apart from providing some robust evidence for the presence of |U| in the velar fricative and the velarized liquids, we explained the context, the effect of breaking, i.e. diphthongization, and addressed some additional problems like the lack of back vowels in breaking or the evident pattern of consonants potential to break the preceding vowel. Finally, note that this solution may prove useful in the explanation and understanding of many other historical phenomena in English, e.g. liquid vocalization, diphthongizations before the velar fricative or the vocalization of /x/ and contemporary processes like vocalic developments before [ɬ] or liquids intrusion.

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