Title: Internal structure of liquids : the history of liquid vocalization in English

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Internal structure of liquids: The history of liquid vocalization in English

Abstract: The aim of the paper is twofold: to explain the process of liquid vocalization in the history of English and some accompanying vocalic developments and to explore the internal structure of liquids taking part in the process. In order to achieve the aim, we look at some historical processes in which the liquids are the leading actors. Thus, we discuss the historical liquid vocalization together with vowel developments in the pre-liquid position such as raising, lowering, lengthening or diphthongization. Moreover, we address the questions concerning the distribution and representation of liquids and we look at the interaction of liquids with the preceding vowels. Finally, we provide the explanation for both the inconsistent behavior of the lateral in that it has survived only in certain clusters and the intimate relationship between the context and the process of liquid vocalization.

Keywords: liquids, diphthongization, vocalization

1. Introduction

Around the 15th and 16th century English vowels faced massive qualitative and quantitative developments which resulted in the appearance of a new set of diphthongs. The new diphthongs were transitional as they were soon monophthongized or affected by further qualitative changes. The developments we discuss here concern the vowels in the pre-liquid position only as they differ in a systematic way from other lengthenings characteristic of that period in that the former, unlike the latter, were preceded by the glide formation phase.[1] Thus, it is generally accepted that the first step of the modifications in question was the formation of the off-glides [u] and [ə] before the lateral *l* and the trill *r*

[1] Vocalic modifications of the 15th and 16th century are a rich and complex phenomenon the analysis of which would require a thick book not an article.

respectively. Note that the off-glide development is quite a common phenomenon found both in diachronic and synchronic systems of various dialects and languages and it is known in the literature as the pre-liquid breaking or liquid vocalization.

In the following pages we discuss historical vowel developments in the pre-liquid position and follow through their various reflexes up to the contemporary English. More specifically, we try to understand various changes affecting the vowels in question such as diphthongization, monophthongization, lengthening, lowering, and raising. Additionally, we address the questions concerning the context of liquid vocalization, the internal structure of liquids and their role in the abovementioned processes. Moreover, we try to explain the mechanism of the liquid vocalization and its various effects. Finally, we explore the problem of the inconsistent behavior of the lateral in that it usually disappears before the velars and labials but is safe before alveolars.

The analysis is couched in the recent development of Government Phonology known as the Strict CV model (Lowenstamm 1996; Rowicka 1999; Scheer 2004; Cyran 2010) and the Element Theory which deals with the elemental make-up of phonological segments (Harris 1994; Harris and Lindsey 1995; Bloch-Rozmej 2008; Cyran 2010). We start the discussion by presenting some basic historical facts concerning liquid vocalization in English.

2. Vocalic modifications in the transition period between Late Middle and Early New English[2]

2.1 *Vowels before the lateral*

The beginning of the change consisting in the development of the transitional glide [u] between back vowels /a o u/ and the velarized *l*, that is, [ł], is dated back to the 15th century. Similarly to present-day English, ME dark *l* occurs in two positions: pre-consonantally and word-finally and this disjunctive context can be informally reduced to the traditional ‘Coda’ constituent.[3] Consider first some examples of the modification in question in (1) below. The examples have been taken from Wełna (1978: 192ff).

[2] In this section and the one that follows we draw on some earlier findings discussed and presented in Kijak (2010).

[3] We should bear in mind that the Strict CV model does not recognize ‘Coda’ as a syllabic constituent and hence the term is used informally here. In this model the traditional Coda is simply a consonantal position before the empty nucleus (see also: the Government Phonology arguments against ‘Coda’ in Kaye (1990) and Harris (1994)).

(1) Diphthongization in the pre-lateral position

ME a + l (C) > LME au + l (C)		ME o/u + l (C) > LME ɔu + l (C)	
a.		c.	
alter > aulter	*altar*	colte > coult	*colt*
malt > mault	*malt*	gold > gowlde	*gold*
scalde > scauld	*scald*	bolle > boul	*boll*
calle > caul	*call*	pultrie > poultry	*poultry*
falle > faul	*fall*	shuldre > shoulder	*shoulder*
b.		d.	
talke > t[aulk]	*talk*	folke > f[oulk]	*folk*
walke > w[aulk]	*walk*	yolke > y[oulk]e	*yolk*
almand > aulmond	*almond*	holm > h[oulm]	*holm*
calf > caulf	*calf*		

A word of explanation concerning the division of the data in (1) is in order here. In (1a) the diphthongization occurs before *l* which is followed either by an alveolar obstruent or nothing. The MoE reflex of this diphthong, especially in the Southern British dialects, is the tense vowel [ɔː]. In (1b) the dark *l* is followed by a velar or labial consonant and in this position the lateral is subsequently lost and the newly formed diphthong undergoes monophthongization to either [ɔː] or [ɑː] leading to MoE [tɔːk] and [kɑːf]. The context of the vocalic modification in the examples under (1c) is identical to the one found in (1a) with the only difference that in (1c) the result of the development is a diphthong [ɔu] realized as [əʊ] in contemporary southern British dialects. Finally, in (1d), similarly to (1b), the lateral is lost before the velars and labials but, unlike in (1b), the modification results in the diphthong formation identical to (1c), that is, [əʊ]. Even a cursory look at the developments in (1) brings up a number of insistent questions which any researcher aspiring to account for them should respond to. First of all, why does the *l* vocalization result in the off-glide [u]? Why does only the velarized *l* vocalize? Why does the pre-lateral diphthongization affect only back vowels? How to explain the MoE vocalic reflexes of the process in question? And finally, why has the velarized *l* been lost before the velars and labials but is safe before alveolars? Before we address these questions (Section 4), we should first provide a reader with some more data exemplifying vocalic developments, but this time in a different context, that is, before the trill.

2.2 *Vowels before the trill*

Similarly to the lateral described above, the trill is responsible for some modifications of the preceding vowels. The beginning of these various vocalic modifications triggered by *r* is dated back to the late 15th and early 16th century.

It can be schematically illustrated in the following way. First, the phonetic realization of *r* started to change in that the formerly trilled consonant became more open (an approximant). Then, the process of *r* weakening affected the preceding vowels, both short and long, which in effect were lowered and ended up as more central. The final stage of this development was a total disappearance of *r* in certain contexts. Note that the context in which the trill was affected is once again the traditional 'Coda' position. Crucially, some researchers (Wełna 1978: 215, after Wright 1924; Kurath 1964; and Prins 1974) assume the appearance of the transitional glide [ə] between the vowel and *r*, which resulted in the rise of some kind of a diphthong consisting of a vowel plus [ə]. If the latter claim is true, forms like *far*, *art*, *arm*, *bark*, etc., evolved in the following way: *far* [far] > [faᵊr] > [faə/faːr] > [fɑː]. In the same fashion, the vowel [o] before *r*, in words like *cord*, *fork*, *north*, and *short*, was diphthongized and eventually lengthened with the subsequent loss of *r*, for example, [kord] > [kɔᵊrd] > [kɔəd/kɔːrd] > [kɔːd]. Note that the stage with the intermediate forms, that is, [faᵊr] and [kɔᵊrd], are confirmed by some contemporary rhotic dialects (Harris 1994: 256). Thus, in certain dialects the forms *far* and *poor* are realized as [fɑər] and [pɔər] respectively. Furthermore, in the same context the high vowels [i, u] and the mid vowel [e] in, for example, *bird*, *first*, *burst*, *nurse*, *person*, and *certain*, evolved into [ɜː]. In the situation when the trill was preceded by a long vowel, we cannot talk about lengthening as the vowel was originally long. Instead, we can observe the loss of tension and diphthongization, hence, [iː/uː] + *r* > [ɪə/ʊə] in, for example, *beer*, *cheer*, *deer* and *pour*, *poor*, *door*, etc. Note that the diphthong [ʊə] in the latter forms underwent further lowering winding up as [ɔː] or [ɔə]. As a consequence, it merged with another pattern, that is, [ɔː] + *r* > [ɔːr/ɔə] in forms like *lore*, *more*, and *boar*. The former lowering phenomenon can be observed in contemporary English where two competing forms exist side by side, for example, *sure*, *pure* [ʃɔː], [pjɔː] and alternative [ʃʊə], [pjʊə]. Finally, the front non-high long vowels, similarly to the vowels described above, underwent diphthongization, that is, [ɛː/æː] + *r* > [ɛə] in, for example, *pear*, *tear*, *bare*, *care*, etc. To sum up, around the 15th century the word-final and pre-consonantal *r* was weakened and subsequently lost in the 18th century. However, before it disappeared completely, *r* left an audible trace in the form of the vocalic changes affecting the preceding vowels. In other words, in this context both short and long vowels faced some qualitative and quantitative developments.

2.3 *Research roadmap*

Let us stop the discussion at this point for a while to take stock of what has been done so far and lay out the research roadmap. Note, first of all, that both liquids react identically in the same context, that is, in the 'Coda' position. Since a traditional explanation, which attributes 'Coda' a weak position triggering lenition, is purely observational, we need a theory which can provide us with a non-circular explanation which follows from the general theoretical assumptions. The same theory must be able to explain the results of vocalic developments, that is, the modern reflexes of the vowels in the pre-liquid position, together with various changes affecting the vowels in question: diphthongization, monophthongization, lengthening, lowering, and raising. Moreover, what calls for explanation is the fact that vowels are usually lowered before *r* but raised in front of *l*. Finally, we should explain the appearance of glides [ə] and [u] before their respective liquids.

Before we address all the research questions accumulated so far, the reader must be acquainted with the theoretical model applied in the present analysis. In the immediately following sections, we briefly discuss the most important tenets and mechanisms underpinning the Strict CV model (Section 3.1) and the Element Theory (Section 3.2). We finish Section 3 with a closer look at the internal structure of English liquids (Section 3.3).

3. Theoretical framework

3.1 *Strict CV*

The Strict CV model views syllable structure as strictly alternating sequences of non-branching onsets and non-branching nuclei, hence there are no branching constituents, no rhymes, and no codas. This, among many other things, means that empty positions must play an indispensable role in this approach. Note that each consonant cluster is separated by the empty nuclear position and word-final consonants are not final at all but followed by the empty nucleus. One of the conditions on the distribution of empty nuclei in phonological representation is that they cannot occur in sequences (*ø–ø). Moreover, nuclei distribute prosodic licensing within the phonological word. This means that at the constituent level each onset must be licensed by a nucleus.

In the Strict CV model syllabification follows from the asymmetrical relations between two segments. Thus in a sequence of an obstruent (T) and a sonorant (R) both consonants must contract a dependency relation where the more complex segment (the governor) governs a less complex one (the governee).[4] We should bear in mind that the governing relations between consonants are contracted across melodically empty nuclei. Such nuclei, as locked within governing relations, are not visible to phonological processes and do not violate the constraint on sequences of empty nuclei (*ø–ø). For a meticulous discussion

[4] Segments are composed of elements and complexity is gauged from the number of elements a given segment contains (see the discussion in Section 3.2).

and presentation of the Strict CV model, along with the comparison with other theories (including Government Phonology) the reader is referred to Szigetvári (1999), Rowicka (1999), Scheer (2004), and Cyran (2010).

3.2 *Element Theory*

In Element Theory phonological segments are built out of privative cognitive units called elements. Elements, unlike the traditional features, are large enough to be phonetically interpretable when they occur alone in a segment. The only condition an element is required to satisfy in order to be pronounced is that it must be linked to a skeletal slot. It follows that a single element |I|, for instance, linked to a nuclear slot is realized as the vowel [i]. The same element attached to the onset position is pronounced as the approximant [j]. It does not mean that elements do not combine with one another, quite the contrary, they can appear together in a single segment forming a complex structure. Thus, the two mid vowels [e] and [o] are combinations of |A I| and |A U| respectively. Furthermore, in richer vocalic systems maintaining the opposition between lax and tense vowels, it is headedness that is utilized to mark this contrast. Thus, a single-element tense vowel [i] is represented as headed |I|, while its lax counterpart [ɪ] as headless |I|. A similar asymmetric head-operator relation is found in the phonological compounds of close and open mid vowels, that is, [e] and [ɛ] respectively. Thus, a headless compound |A I| defines the open mid vowel [ɛ], the same compound headed by |I|, that is, |A I |refers to the close mid vowel [e]. Note that in such a system the front open vowel [æ] can be represented by the same compound headed by the element |A|, which yields |I A|. Finally, there have been some discussions concerning the representation of the neutral vowel, that is, schwa. The representations vary from a totally empty position |_|, or the realization of the neutral element |@|,[5] to a headless structure with one of the resonance elements in the operator position, for example, |A|. The findings in the following sections put us in the position of the proponents of the latter option. The three resonance elements |I|, |A|, |U| defining vocalic segments are active place definers in consonantal systems (2a). However, in order to describe consonants some additional primes are required, that is, manner elements (2b).

(2) Melodic primes in Element Theory

a. place elements	b. manner elements
U – labial, labialized	ʔ – occluded
I – palatal, palatalized	h – noisy
A – coronal, retracted (uvular, pharyngeal)	N – nasal

[5] It has been suggested that there is a fourth element, that is, 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).

_ – velar, velarization
L – fully voiced
H – voiceless aspirated

The elemental make-up of phonological segments can be affected in phonological processes which boil down to two operations. Thus, spreading or composition consists in the addition of elements, while the result of delinking or decomposition is the deduction of elements. Both operations must have a local trigger or source and can be observed in vocalic as well as in consonantal systems. This can be illustrated by spirantization, a process often resulting in elision and involving the lenition of a stop to a glottal fricative, usually through a fricative stage, for example, [t] > [s] > [h] > [ø] = |A h ʔ| > |A h| > |h| > |_|. Similarly, in vowel reduction the elemental material is stripped away or the element status is reduced from head to operator, for example, [o] > [u] = |A U| > |U| and [i] > [ɪ] = |I̲| > |I| respectively.

Summing up, vocalic as well as consonantal segments are composed of elements which may be affected by the position they occupy in the syllable structure. The elemental make-up of a segment may be altered by adding a locally present element or by reducing the internal composition of a segment.[6]

3.3 *Liquids*

Working on earlier studies (van der Torre 2003; Botma 2004; Scheer 2004; Backley & Nasukawa 2009, among others) and the findings of the analysis that follows, we propose the following melodic representation of English liquids. The approximant is represented here as a headless melodic expression containing the element |A|, that is, [r] = |A|. The prevocalic lateral is claimed to be composed of the same element but in a different role, that is, the head, hence [l] = |A̲|. Headedness, as proposed in Kijak (2010), is responsible for occlusion in the lateral. Finally, the velarized version of the lateral, that is, dark *l*, contains an additional element |U|. Crucially, in the velarized version of the lateral the occlusion effect is lost due to the relaxation of the contact between articulators, hence it is the element |U| which is the head of the melodic expression. Thus, what we get is [ɫ] = |A U̲|. It is worth pointing out here that the presence of |U| in [ɫ] may contribute to the explanation of both already mentioned phenomena: vocalic developments before dark *l* and *l*-vocalization.[7] Note also that

[6] For more information and an ongoing discussion concerning the elemental make-up of phonological segments see, for example, Harris and Lindsey (1995), Charette and Göksel (1996), Ploch (1999), van der Torre (2003), Botma (2004), Scheer (2004) Bloch-Rozmej (2008), and Cyran (2010) among others.

[7] The presence of |U| in the elemental make up of the velarized lateral may also explain some contemporary vocalic developments before this segment in Estuary English and Cockney. See Przedlacka (2001) for the data concerning *l*-vocalization in Estuary English.

the presence of the low element |A| in the internal structure of both liquids and the fact that the non-high vowels are uncontroversially defined by this element shed new light on the mysterious, intimate relationship between intrusive liquids and non-high vowels (see Kijak 2010). With the intrusive liquids put aside, the following sections concentrate on selected vocalic developments in the pre-liquid position. The proposal offered in the sections below will enable us to provide satisfactory, we hope, answers to the questions raised in the first part of this paper (see Section 2.3).

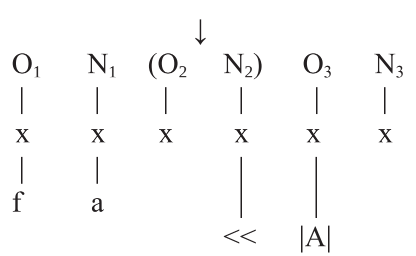
4. The analysis of liquid vocalization in the history of English

4.1 *r-vocalization*

As illustrated in Section 2.2, at a certain stage of development English vowels underwent various modifications triggered by the following trill. The modifications in question boil down to two general patterns, that is, (a) lengthening of short vowels and (b) diphthongization of long ones. Although promising at first glance, the former phenomenon cannot be ascribed the compensatory lengthening status. This is because the loss of *r* is preceded by the appearance of the glide, hence, [far] > [fa^{ə}r] > [faə/fa:r] > [fɑː]. In short, the first step of the lengthening was the weakening of *r* and the glide formation (diphthongization stage). The solution we want to propose here is based on the internal structure of *r*. Uncontroversially, this segment includes the element |A| as confirmed by almost all of the researchers working within the Element Theory. Recall that together with the *r* weakening we can observe the development of the preceding glide (3a) and the subsequent loss of *r* (3c) and (3d). In (3b) the representation of the alternative, intermediate form is given, that is, with a long vowel before *r*.[8]

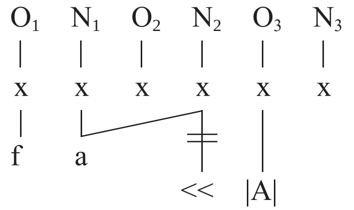
(3)

a. [fa^{ə}r]

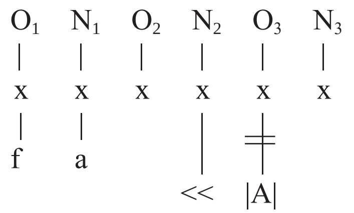


[8] For our purposes the representation of the schwa in (3) has been simplified. This segment, we hold, is empty headed but may contain one of the resonance elements functioning as the operator (see Section 3.2).

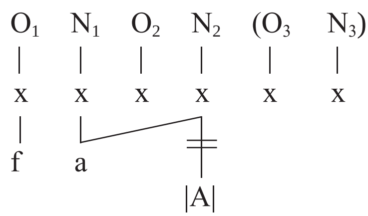
b. [fa:r]



c. [faə]



d. [fɑː]



In (3a) the previous trill undergoes approximation (weakening) before the empty nucleus N_3 and starts to be realized together with the glide [ə]. Consonant spreading to a neighboring nuclear point is a typical reaction of sonorants to a weak position as confirmed by, for example, the formation of syllabic consonants (Scheer 2004: §§ 240–301 and Kijak 2008: 132–139). Crucially, we claim that the historical innovation concerning the lengthening of short vowels before *r* consists in allocating the skeletal slot for the schwa. In other words, what we are faced with here is simply the addition of the Onset–Nucleus (O–N) sequence (the arrow above the O_2–N_2 sequence in (3a).[9] The latter restructuring creates new possibilities. Thus, the nuclear position N_2 integrates the whole elemental make-up of the following *r* and the latter is delinked (3c). In the following step the glide gets delinked and the preceding vowel is lengthened with or without the loss of *r* as in (3d) and (3b) respectively. Note also that the final sequence, that is, O_3–N_3, once the migration of the element |A| is done, becomes useless and as such may be reduced with time. The lengthenings of high and mid vowels before *r* are offered identical explanation. Note that in the latter case the

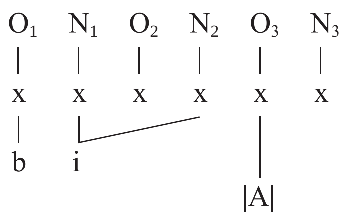
[9] In the Strict CV model the smallest unit that can be manipulated is the Onset followed by the Nucleus. To put it briefly, there is no Onset without the following Nucleus and vice versa.

lengthening is accompanied by vowel lowering and centering. This is a welcome result as in our representation both *r* and the schwa contain the low element |A| which may spread to the left and merge with the original vocalic material (see the representations in (5b, c)). It should be noted here that the weakening of *r*, just like *l* vocalization discussed in the following section, took place in certain contexts only, that is, in the word-final and pre-consonantal position. In the Strict CV model these two contexts are unified into one – before the empty nucleus. Since empty nuclei are typically weak licensors, the consonantal position followed by the empty nucleus is recognized as a standard lenition site where various lenition processes occur cross-linguistically (e.g., Cyran 2003: 30; Scheer 2004: §§ 110–134; and Kijak 2008: 135). This single observation allows us to establish a direct link between the context and the process, that is, *r* was vocalized in a prosodically weak position.

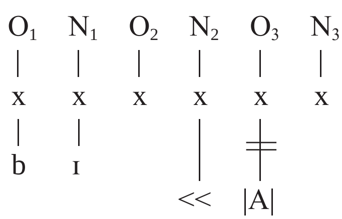
Now, let us look more carefully at the reaction of long vowels in the pre-*r* position. As noted above, in this context the long vowels are laxed and diphthongized, that is, [iː/uː] + *r* > [ɪə/ʊə]. It follows that the restructuring consisting in the addition of O–N sequence is absent in the case of long vowels. Instead, the glide is attached to the preceding nuclear position previously occupied by the right branch of the long vowel (4).

(4) *beer* [biːr] > [bɪə][10]

a.



b.

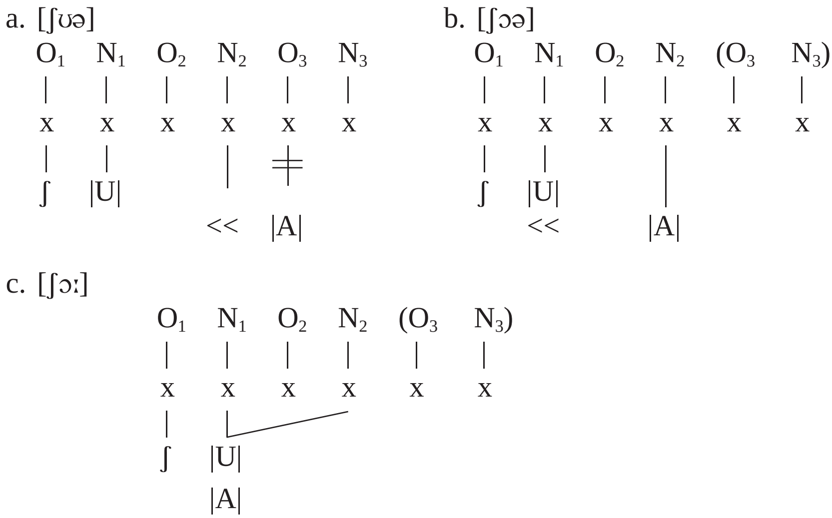


The long vowel [iː] in (4b) is shortened because of the incoming glide which docks onto N_2. Note also that the form [bɪər], which might have been in use for some time in the past and which is still found in contemporary rhotic dialects,

[10] It is still not clear to me why the element |A| in (4) ends its journey in N_2 and does not go one step further to merge with the preceding vowel as it is the case in (5b) and (5c).

would have nearly identical representation to the one under (4b) with the difference that in the rhotic dialects the final *r* has never been lost from its onset, that is, O_3 point. Having discussed the role of *r* in the vocalic modifications of the 15th century, we are ready to follow through the developmental path of two forms *sure* and *pure*. The discussion below is planned to give a full picture of vowel developments in the pre-*r* position. The starting point of the development illustrated in (5) is the post-vocalization form covering a long distance from [ʃʊə]/[pjʊə] via [ʃɔə]/[pjɔə] to [ʃɔː] / [pjɔː]. Note that the earlier forms [ʃʊə] – [ʃɔə], as alternative realizations of the standard [ʃɔː], can still be heard in some non-rhotic dialects.

(5)



In (5a) the material under N_2 comes from the previously weakened *r* originally attached to O_3. Since the element |A| docks on to the nuclear slot, it is realized phonetically as the schwa. The form in (5b) represents a situation where the element |A|, being attached to N_2, spreads further to the left and merges with the vowel in N_1, which results in a lowering of the original vowel to [ɔ]. And finally, in (5c) we have a situation where the whole material is merged with the vowel under N_1 giving rise to a complex structure, that is, |U A| = [ɔː], attached to two skeletal slots. Similarly to (3c, d) and (4b) above the final O–N sequence is lost with time. It must be borne in mind that the material from the trill survives in the elemental make-up of the preceding vowel.

Summing up, the solution we have proposed in this section can capture in a uniform way all the vocalic changes that took place in the historical *r*-full forms. What we claim here is that such changes were triggered by the weakening of *r* in the prosodically weak positions with some later repercussions in the form of different vocalic reflexes. This conclusion is in line with the results of earlier studies preoccupied with the behavior of sonorants in prosodically weak positions, for example, the vocalization of *j* and in the word-final and pre-consonantal position, the formation of syllabic consonants (Kijak 2007: 191) or partial geminates (Scheer 2004: §§ 235–239), among others. Moreover, the solution proposed here can help to explain two widespread phenomena appearing in non-rhotic dialects, that is, *r*-zero alternations in etymologically *r*-full forms (linking *r*) and *r*-less forms (intrusive *r*) (Kijak 2009).

4.2 *l-vocalization*

When confronted with *r*, the behavior of *l* in the identical context, that is, before the empty nucleus, is at first glance irritatingly inconsistent. This is mostly because the lateral is fluctuating between the preservation and loss without any overt pattern. Now recall the data in (1), repeated under (6) for reader's convenience.

(6) Diphthongization in the pre-lateral position

ME a + l (C) > LME au + l (C)		ME o/u + l (C) > LME ɔu + l (C)	
a.		c.	
alter > aulter	*altar*	colte > coult	*colt*
malt > mault	*malt*	gold > gowlde	*gold*
scalde > scauld	*scald*	bolle > boul	*boll*
calle > caul	*call*	pultrie > poultry	*poultry*
falle > faul	*fall*	shuldre > shoulder	*shoulder*
b.		d.	
talke > t[aulk]	*talk*	folke > f[oulk]	*folk*
walke > w[aulk]	*walk*	yolke > y[oulk]e	*yolk*
almand > aulmond	*almond*	holm > h[oulm]	*holm*
calf > caulf	*calf*		

It becomes clear that the lateral has survived in forms under (6a, c) but it has been dropped in (6b, d). It should be noted here that the latter observation is true in some varieties only, for example, the RP pronunciation. Note that outside the conservative RP pronunciation some of the examples in (6b, d) are reported to have alternative forms in which the lateral is phonetically realized, for example, *almond*, *folk*, and *yolk* (Wells 1990). As the discussion unfolds, such alternative pronunciations will also be mentioned. Another intriguing observation concerning the vocalic modifications in the pre-lateral position is that they vary to a very large extent. For instance, the low vowel [a] has been diphthongized and later monophthongized, winding up as the back, mid vowel [ɔː] in contemporary standard pronunciation. This development is illustrated in

(6a) and in some forms under (6b). The mid vowel [o] has undergone diphthongization only (6c, d), similarly to the high vowel [u] (the last two examples in 6c). Finally, the low vowel [a], after the diphthongization phase, has been monophthongized to [ɑː] as confirmed by the last two forms in (6b). However, before we look more carefully at the data under (6), we should first answer the questions which at this stage have become pretty trivial. For example, the question concerning the effect of *l* breaking, that is, the development of the glide before the liquid, for instance, malt > mault *malt*, calf > caulf *calf*, etc. Recall (Section 3.3) that the velarized *l* contains the element |U|. Now, this element when attached to the nuclear slot is realized phonetically as the back vowel [u]. Simply put, the element |U|, which defines velarity in [ɫ], spreads to the left and docks onto the preceding nuclear slot. The question of the context of *l* breaking is again easy to answer. Note that in the model of syllable structure advocated here, the target, that is, velarized *l*, occurs before the empty nucleus which is unable to license it.[11] It means that the lateral, occurring in a prosodically unfavorable context, undergoes disintegration and its elements evacuate from the endangered position to neighboring ones. Finally, the reason why only back vowels are affected by *l* breaking is the fact that in English the element |U|, which is found in back vowels, cannot combine with the element |I| present in the front ones. In other words, the combination of |U I| in English vocalic system is simply banned.[12]

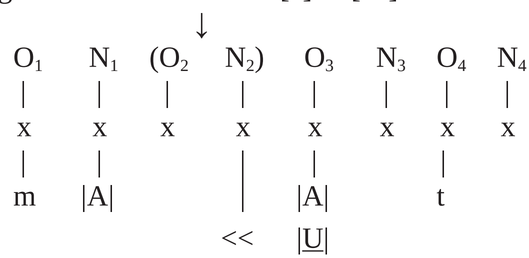
Having swept the floor a bit, we are in a position to analyze the data in (6). First note that in (6a, c) the vowels undergo various modifications but the lateral is stable, namely, it is realized phonetically. Thus, in (6a) we can observe vowel raising and lengthening via the intermediate diphthongization stages: [a] > [au] > [ɒu] > [ɔː] and in (6c) diphthongization or lowering and diphthongization: [o] > [ɔu] > [əʊ] and [u] > [ɔu] > [əʊ] respectively. Now, we claim that the reason why *l* in (6a, c) is stable is twofold: first, because it is followed by a coronal consonant (an alveolar plosive) and second because it is word-final. As for the former, note that *l* itself is a coronal, hence both consonants constitute a partial geminate cluster, that is, they share the element |A|. Such structures, as pointed out by Scheer (2003), are generally recognized as more stable, geminates being the most stable structures of all (see Kenstowicz & Pyle 1973; Schein & Steriade 1986; McCarthy 1986; Honeybone 2002). Shortly put, the lateral survives because it shares the place element with the

[11] In the Coda Mirror, the lenition theory introduced by Ségéral and Scheer (1999) and later developed by Ziková and Scheer (2010), there are two types of empty nuclei: internal and final. While the former are totally devoid of licensing/governing actorship, the licensing/governing abilities of the latter are parameterized (cf. Cyran 2010).

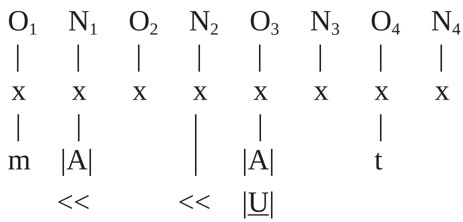
[12] The fact that these two elements do not merge in English (and other languages), does not mean this combination is universally barred. It is present in the vocalic systems of other languages, for instance, German. See, for example, Harris (1994: 102).

following plosive. In the second scenario, that is, in the word-final position, the lateral survives as it occurs before the final empty nucleus (FEN) and this context in English is not as detrimental as the one before internal empty nucleus (see note 11). Summing up, the lateral occurs in a weak position, that is, before the empty nucleus, and this unfavorable position makes the lateral disintegrate its internal elemental make-up. As a result the element |U| extracted from the lateral spreads leftward and docks onto a newly created (O–N) sequence (see Section 4.1 above). The situation is illustrated in (7).

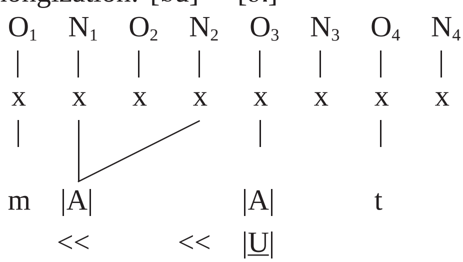
(7) a. diphthongization: *malt* > *mault* [a] > [au]



b. raising: [au] > [ɒu]



c. monophthongization: [ɒu] > [ɔː]



First note that for expository purposes the representations under (7) have been considerably simplified as otherwise they would be overloaded with information. For example, we must bear in mind that the consonants in the coronal cluster [lt], as mentioned above, share the element |A|.

The representation in (7a) illustrates the preliminary stage of the change, that is, the formation of a new diphthong. The element |U|, which is part of the lateral, spreads leftwards and docks onto the preceding nuclear slot N_2.

Similarly to (3a) above, the diphthongization is explained here as the example of incorporation of the CV unit (O–N sequence). It simply makes room for the incoming glide *u*. This historical restructuring is indicated by the arrow above the (O_2–N_2) sequence in (7a).[13] In (7b) the newly formed diphthong undergoes further modifications. Thus, the element |U|, while still being linked to the Nucleus (N_2), continues its migration to the left and becomes part of the first vowel containing |A|. The fusion of both elements, that is, |A U|, results in the appearance of the back mid vowel [ɒ]. Finally, in (7c) the element |U| gets delinked from N_2 and is intercepted by N_1 where it merges with the internal composition of the vowel. The whole melodic expression, that is, |A U|, spreads to the, by now, empty N_2 and winds up as a long monophthong [ɔː].

Similarly to (6a), the vocalic modifications in (6c) are triggered by the disintegration of the lateral which in turn is a reaction to positional weakness. Consider the [o] > [ɔu] development illustrated in (8).

(8) diphthongization: colte > coult [o] > [ɔu]

```
                  ↓
O1    N1   (O2   N2)   O3    N3   O4   N4
|     |     |     |     |     |    |    |
x     x     x     x     x     x    x    x
|     |           |     |          |
k    |A|          |    |A|         t
     |U|//  <<    <<   |U|
```

Unlike in (7a), in (8) the element |U| cannot migrate further than N_2 as |U| is already present in the melodic unit under N_1. To put it differently, just because the element |U| is present in the vowel, the same element coming from the lateral must end its journey in the immediately preceding nuclear position, that is, N_2.[14] Note also that the explanation of the last two examples in (6c), that is, pultrie > poultry *poultry* and shuldre > shoulder *shoulder*, representing the [u] > [ɔu] modification, is slightly more complex but still plausible in this account. What is important here is that the lateral contains (at least) two elements: |U| and |A|. The former element invades the immediately preceding nuclear position, while the latter one merges with the elemental composition of the first vowel giving rise to [ɔ].

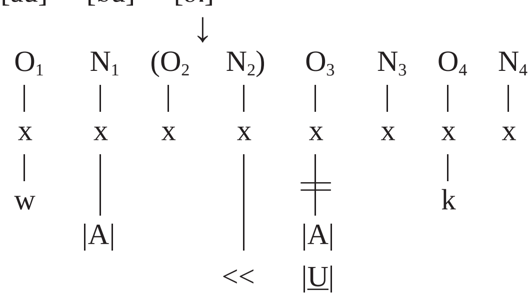
[13] Note that historically some of the examples given in (6) contained, at earlier stages of development, complex nuclei (long vowels or diphthongs) so in such cases we cannot postulate the O–N incorporation. This fact has been disregarded here as it does not change or undermine the main arguments defended in this analysis.

[14] The final stage, that is, [ɔu] > [əʊ], which is characteristic to conservative RP pronunciation, is explained as a decomposition of the first part of the diphthong.

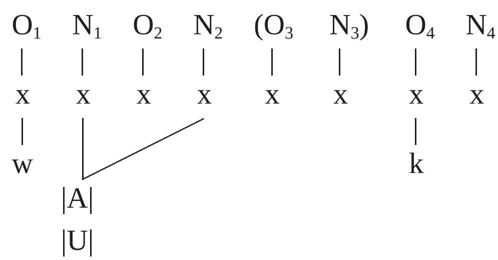
As already mentioned, the vowels in the pre-lateral position evolved in different directions. Thus, some were raised, others lowered, still others monophthongized or diphthongized. Moreover, the lateral itself also behaves inconsistently, that is, it is either preserved or lost. The former situation has already been discussed (6a, c), while the latter scenario is illustrated in (6b, d). If it is true, as we claim above, that the reason why the lateral survives is the formation of the partial geminate cluster with the following coronal consonant, the explanation why it is lost must reside in the fact that in (6b, d) it is followed by a non-coronal consonant (either velar or labial). Note that even though it has recently been pointed out by, for example, Backley and Nasukawa (2009) and Kijak (2012) that labials, velars, and also velarized consonants plus [u] and [w] contain the element |U|, the forms in (6b, d) do not set up a partial geminate relation. The reason behind it is that the element |U| in the velarized lateral functions as the head. The heads of sonorants appearing in a weak position seem to have a greater propensity to spread to the left rather than to the right (see Kijak 2008, 2010). It follows that both consonants, that is, the lateral and the following labial or velar, do not share the element |U| and hence they are not partial geminates hence the lateral is not backed by the following segment. In this situation the lateral is dropped while the head element, that is, |U|, evacuates to the preceding nuclear position. This is illustrated in (9).

(9) *walk* [a] > [au] > [ɒu] > [ɔː]

a.



b.



Since the lateral in (9a) occurs in a weak position, it is disintegrated and the head element |U| spreads to the left and docks onto the nucleus N_2. Moreover, having been deprived of |U|, the lateral cannot strike a relation with the following consonant and is consequently dropped. Note also that the whole (O_3–N_3) sequence in (9b), as totally empty, may have been lost over time. Interestingly, the theory of segmental structure advocated here predicts yet another possibility – the element spreads in two directions simultaneously. It means that we should find some forms in which the lateral is preserved before labials or velars but, at the same time, it exerts some influence on preceding vowels. Now, consider again the examples in (6d) above, some of these forms, for example, *folk* and *yolk*, have alternative, non-standard pronunciation where the lateral has been preserved (Wells 1990). It follows that the velarized lateral is able to establish communication with the following *k* as the latter is a velar consonant. Note that the reason why the sharing relationship between *l* and *k*, in opposition to coronal clusters, is largely optional may be the fact that in the former case |U| must spread in both directions, to the left to become part of a diphthong/vowel and to the right to enter into the relationship with the following velar consonant. In the coronal scenario, on the other hand, there are two different elements involved, that is, |U| spreads leftward to merge with the preceding vowel and |A| spreads in the opposite direction to form a geminate cluster.

In light of the immediately preceding discussion, the most problematic examples are the last two forms in (6b) above, that is, almand > aulmond *almond* and calf > caulf *calf*. Note that while the first stage is regular in that it is identical to the rest of the examples in (6), the second stage is quite exceptional. Thus, the part of the lateral, that is, the element |U|, spreads and docks onto the newly formed (O–N) sequence but then, quite surprisingly, disappears altogether (cf. *holm* in (6d)).[15] The only trace of the development in question is the length of the preceding vowel and some non-standard forms like [ɒlmənd]. Thus, although we can explain the disappearance of the lateral, the question we are not ready to answer yet, at least at this stage, is the reason why the element |U|, which is a part of the lateral, has stopped halfway through and has not delivered the final blow, that is, the fusion with the preceding vowel. We predict the situation must have something to do with the following labial consonant, but to provide any conclusive answers requires further analysis.

To sum up the discussion in this section, we have seen that there are two general patterns of vocalic development before the lateral. In the first scenario, the lateral is safe as part of the partial geminate coronal cluster but it unloads one of its elements, that is, |U|, which migrates and docks onto the newly created nucleus. Then, in some cases, this element goes even further reaching the first nucleus where it fuses with the elemental make-up of the original vowel. The second scenario concerns vocalic modifications before non-coronals. In the

[15] Note that there is a number of optional, non-standard pronunciations of *almond*, for example, [ɑːlm-], [ælm-] or [ɒlm-] (Wells 1990).

latter situation the lateral gets delinked more easily and the element |U| spreads leftwards and fuses with the elemental structure of the preceding vowel. Of course, the merger with the vowel on the left, in both scenarios, is possible only in the situation when this vowel is not specified for the element |U|.

5. Conclusions

Although liquid vocalization in the history of English 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 shed new light on the mechanics behind liquid vocalization and various vocalic modifications closely connected with this process. The theoretical model chosen for the analysis proved wise as it enabled us to answer a number of puzzling questions.

We have offered the explanation for the context and the effects of liquid breaking. The findings of the analysis helped us understand, among many other things, the reason why the pre-lateral breaking affected only back vowels or why the lateral is dropped more readily before velars and labials but is quite stable before alveolars. The solution advocated here boils down to the observation that sonorants must evacuate to neighboring positions in order to survive in a weak context. However, evacuation often means colonization and merger with the local material. In a nutshell, liquids in prosodically recessive positions are disintegrated and seek for a place to dock on to. Hence the historical process of glide formation in the pre-liquid position is explained here as the allocation of a newly formed nuclear slot to the evacuating elements, that is, |U| and |A|. This stage witnesses various diphthongization effects and this is not the end of the road. The evacuating elements may reach as far as the first nucleus triggering further modifications such as lowering, raising, monophthongization or lengthening. We hope that the theoretical solutions applied in the discussion prove useful in the explanation and understanding of other historical and/or synchronic phenomena.

References

Backley, Ph. & Nasukawa, K. 2009. Representing labials and velars: A single ‘dark’ element. *Phonological Studies* 12. 3–10.

Bloch-Rozmej, A. 2008. *Melody in government phonology*. Lublin: Wydawnictwo KUL.

Botma, B. 2004. *Phonological aspects of nasality: An element-based dependency approach*. University of Amsterdam Ph.D. dissertation.

Charette, M. & Göksel, A. 1996. Switching and vowel harmony in Turkish. In H. Kardela & B. Szymanek (eds.), *A Festschrift for Edmund Gussmann from his friends and colleagues*, 29–55. Lublin: Wydawnictwo KUL.

Cyran, E. 2003. *Complexity scales and licensing strength in phonology*. Lublin: Wydawnictwo KUL.
Cyran, E. 2010. *Complexity scales and licensing in phonology*. (Studies in Generative Grammar 105). Berlin–New York: Mouton de Gruyter.
Durand, J. & Katamba, F. (eds.). 1995. *Frontiers of phonology: Atoms, structures, derivations*. London & New York: Longman.
Durand, J. & Laks, B. (eds.). 1996. *Current trends in phonology. Models and methods*. Salford, Manchester: European Studies Research Institute, University of Salford.
Harris, J. 1994. *English sound structure*. Oxford: Blackwell.
Harris, J & Lindsey, G. 1995. The elements of phonological representation. In J. Durand & F. Katamba (eds.), *Frontiers of phonology: Atoms, structures, derivations*, 34–79. London & New York: Longman.
Honeybone, P. 2002. Another difference between prosody and melody: Patterns in process inhibition. Paper presented at the 9th International Phonology Meeting, Vienna.
Kardela, H. & Szymanek, B. (eds.). 1996. *A Festschrift for Edmund Gussmann from his friends and colleagues*. Lublin: Wydawnictwo KUL.
Kaye, J. 1990. 'Coda' licensing. *Phonology* 7. 301–330.
Kenstowicz, M. & Kisseberth, Ch. (eds.). 1973. *Issues in phonological theory*. The Hague: Mouton.
Kenstowicz, M. & Pyle, Ch. 1973. On the phonological integrity of geminate clusters. In M. Kenstowicz & Ch. Kisseberth (eds.), *Issues in phonological theory*, 27–43. The Hague: Mouton.
Kijak, A. 2007. Sonorants conspiracy: A unified solution to vowel syncope and bogus clusters in English. *Linguistica Silesiana* 28. 179–204.
Kijak, A. 2008. *Polish and English consonantal clusters: A contrastive analysis within the Strict CV framework*. Katowice: Wydawnictwo Uniwersytetu Śląskiego.
Kijak, A. 2009. Non-rhoticity or where is the historical *r* lurking? *Linguistica Silesiana* 30. 43–57.
Kijak, A. 2010. Intrusive consonants: The internal structure of English liquids. *Poznań Studies in Contemporary Linguistics* 46(4). 407–427.
Kijak, A. 2012. *Love triangle: labials – /u, w/ – velars*. In J. Błaszczak, B. Rozwadowska & W. Witkowski (eds.), *Generative Linguistics in Wrocław No. 2. Current Issues in Generative Linguistics: Syntax, Semantics and Phonology.*
Kurath, H. 1964. *A phonology and prosody of Modern English*. Ann Arbor: University of Michigan Press.
Lowenstamm, J. 1996. CV as the only syllable type. In J. Durand & B. Laks (eds.), *Current trends in phonology. Models and methods*, 419–441. Salford, Manchester: European Studies Research Institute, University of Salford.
McCarthy, J. 1986. OCP effects: Gemination and antigemination. *Linguistic Inquiry* 17. 207–263.
Ploch, S. 1999. *Nasals on my mind: The phonetic and the cognitive approach to the phonology of nasality*. London: SOAS Ph.D. dissertation.
Prins, A. A. 1974. *A history of English phonemes. From Indo-European to Present-day English* (2nd ed.). Leiden: Leiden University Press.

Przedlacka, J. 2001. Estuary English and RP: Some recent findings. *Studia Anglica Posnaniensia* 36. 35–50.

Rowicka, G. 1999. *On ghost vowels: A strict CV approach.* Leiden: University of Leiden Ph.D. dissertation.

Scheer, T. 1999. A theory of consonantal interaction. *Folia Linguistica* 32. 201–237.

Scheer, T. 2003. What sonorants do in positional plight. Paper presented at the 11th Manchester Phonology Meeting, Manchester.

Scheer, T. 2004. *A lateral theory of phonology. Vol. 1: What is CVCV, and why should it be?* Berlin: Mouton de Gruyter.

Schein, B. & Steriade, D. 1986. On geminates. *Linguistic Inquiry* 17. 691–744.

Ségéral, Ph. & Scheer, T. 1999. Is the Coda Mirror a phonological object? Paper presented at the First Annual Meeting of the GDR 1954 "Phonologie" on Lenition and Fortition, Nice.

Szigetvári, P. 1999. *VC Phonology: A theory of consonant lenition and phonotactics*. Budapest: Eötvös Loránd University Ph.D. dissertation.

Torre, E. J. van der. 2003. *Dutch sonorants: The role of place of articulation in phonotactics*. Leiden: University of Leiden Ph.D. dissertation.

Wells, J. C. 1990. *Longman pronunciation dictionary*. Harlow: Longman.

Wełna, J. 1978. *A diachronic grammar of English. Part One: Phonology*. Warszawa: PWN.

Wright, J. & Wright, E. M. 1924. *An elementary historical New English grammar*. London: Oxford University Press.

Ziková, M. & T. Scheer 2010. The Coda Mirror v2. *Acta Linguistica Hungarica* 57. 1–21.