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## INTRUSIVE CONSONANTS: THE INTERNAL STRUCTURE OF ENGLISH LIQUIDS

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### ABSTRACT

The aim of the paper is to explore the internal structure of English liquids. This is done by analysing some processes, both diachronic and synchronic, in which liquids are the leading actors. Thus we discuss historical liquid vocalization together with the vocalic developments in the pre-liquid position. Moreover, we look at two sandhi phenomena of liquid-zero alternations, i.e. linking and intrusion in two varieties of English recorded in southern England and north-eastern United States. We address the questions concerning the distribution, representation and interaction of liquids with the preceding vowel and explain the mechanics behind the liquid-zero alternations.

KEYWORDS: Linking; intrusion; liquids; vocalization; sandhi.

### 1. Introduction

The phenomenon of linking/intrusive *r*, which is common to many dialects of English, is one of those processes which are well-documented and have been thoroughly discussed but are still poorly understood. Despite the availability of detailed descriptions (Jones 1989; Wells 1982), there is still lack of agreement concerning the explanation of the alternations in question. The majority of the by now classic accounts both in linear and non-linear models are based on deletion or epenthesis (e.g. Kahn 1976; Gussmann 1980; Lodge 1984; Mohanan 1986). More recent accounts include McCarthy (1991), Broadbent (1991), Harris (1994), McMahan et al. (1994), McMahan and Foulkes (1995), Bloch-Rozmej (2008) and Kijak (2009), among others. In the present paper, I look at a similar phenomenon which has been only recently documented and introduced into the discussion of intrusive/linking *r*. The phenomenon in question is known as intrusive *l* and has been discussed in Miller (1993), Gick (1999, 2002), Bermúdez-Otero (2005) and Bloch-Rozmej (2008). Intrusive *l* is a widespread phenomenon in dialects spoken in the Northeast of the United States. It exhibits similar patterns to the aforementioned intrusive/linking *r*. Thus, just like in the case of linking *r*, linking *l* occurs

before any vowel, e.g. *falling* [fɔ:lɪŋ] but *fall* [fɔ:]. Moreover, both liquids occur after non-high vowels in the process known as intrusion. In the majority of cases the lateral follows the back mid-vowel [ɔ:], e.g. *law is* [lɔ:lɪz]; however, it has also been reported to follow [ɑ:] and [ə] (Gick 1999).<sup>1</sup> Finally, again similarly to the intrusive *r* pattern, we can observe related processes associated with *l*-intrusion, which are fixed in the familiar order of vocalization, linking and intrusion. As with *r*, the historical vocalization affected pre-consonantal coda *l* leading to many later vocalic developments, both qualitative and quantitative. This is evident on the example of 15th-century *l*-less spellings, e.g. *behalf* – *behaf* and contemporary pronunciations of words like *stalk*, *walk* and *calve*, etc. Moreover, the process of vocalization has been reported to be active synchronically in the London area (Estuary English). In the latter variety the pre-consonantal coda *l* is vocalized which results in forms like [miok] *milk*. This process resembles another historical development which occurred in the 15th century and has been described as the diphthongization before pre-consonantal *l* (IC), i.e. /a, o, u/ + IC > au, ou, as in *balk* > *baulke* ‘baulk, balk’, *bolster* > *boulster* ‘bolster’, and *shuldre* > *shoulder*.

Although the phenomenon of liquid–zero alternations has been discussed in earlier analyses, e.g. Harris (1994), Broadbent (2001) or Bloch-Rozmej (2008), they differ from the present account either in scope or the proposed solution. Thus, for example, Harris (1994) opts for the floating melody solution while Broadbent (2001) discusses only *r*-zero alternations. And while Bloch-Rozmej (2008) proposes a similar solution to the one advocated here, she does not connect it to the historical liquid vocalization. To the best of my knowledge, the present contribution is the first which explains the problem of liquid–zero alternations in the broader context of historical liquid breaking. In a nutshell, it is proposed here that it is the internal structure of liquids, in particular the presence of the element (U) in the elemental make-up of the velarized lateral and (A) in the trill that is responsible for the appearance of glides before respective liquids and some later vocalic modifications such as lowering, raising, monophthongization and lengthening. Moreover, both linking and intrusive *r* and *l* are explained here as a spreading of the low element (A) from a preceding non-high vowel to the following empty Onset. The fact that in some dialects this element is realized phonetically as [l], while in others as [r] is ascribed to a different status this prime enjoys in those dialects, i.e. it may be licensed either as an operator or head.

More specifically, in this paper I argue that the solution applied to the linking/intrusive *r* phenomenon together with the *r*-vocalization and historical vocalic developments in the pre-*r* position (Kijak 2009) can be extended to account for the intrusive *l* patterns as well as other related phenomena both in the present-day English and at ear-

<sup>1</sup> It has been pointed out to me that it would be interesting to include in the analysis yet another type of *l*-intrusion, i.e. the one found in the Bristol area. In this variety, intrusive *l* occurs after the word-final schwa, irrespective of the following context. I agree with a *PSiCL* reviewer that this pattern is interesting and may even turn out to be problematic for the solution advocated here, nevertheless it requires some more research before one draws tenable conclusions.

lier stages of its development. Moreover, I address the questions concerning the distribution, representation and interaction of the lateral with the preceding vowel. I try to explain the mechanics behind the liquid–zero alternations. Additionally, I explore the problem of the internal structure of English liquids. Intuitively both processes, i.e. linking and intrusion, seem related and as such should be given a uniform account. The intuition, as will be shown below, is confirmed by the results of the analysis. From the point of view of the thematic scope of this paper, the understanding of the historical developments in the pre-liquid position seems both crucial and indispensable. Therefore, we start with the presentation and analysis of some historical facts which are the cornerstone of liquid–zero alternations in various dialects. The analysis of both diachronic and synchronic facts is couched in the recent development of Government Phonology known as the Strict CV model (Lowenstamm 1996; Rowicka 1999; Scheer 2004; Cyran 2010) and Element Theory which deals with the elemental make-up of phonological segments (Harris 1994; Harris and Lindsey 1995; Bloch-Rozmej 2008; and Cyran 2010)<sup>2</sup>.

## 2. Some vocalic modifications in the pre-liquid position

### 2.1. Vowel developments before the lateral

The 15th century is generally believed to be the beginning of the change consisting in the development of a transition glide [u] between back vowels /a o u/ and the velarized *l*, i.e. [ɫ]. The disjunctive context of the modification, i.e. pre-consonantal and word-final *l*, can be informally reduced to the “coda *l*”.<sup>3</sup> Consider first some examples of the modification in question in (1) below. The examples have been adopted from Welna (1978: 192ff).

#### (1) Diphthongization in the pre-lateral position

(1a) ME a + l(C) > LME au + l(C)		(1b) ME o/u + l(C) > LME ou + l(C)	
alter > aulter	<i>altar</i>	colte > coult	<i>colt</i>
malt > mault	<i>malt</i>	gold > gowlde	<i>gold</i>
falle > faul	<i>fall</i>	shuldre > shoulder	<i>shoulder</i>
talke > t[aulk]	<i>talk</i>	folke > f[oulk]	<i>folk</i>
walke > w[aulk]	<i>walk</i>	yolke > y[oulk]e	<i>yolk</i>

<sup>2</sup> A *PSiCL* reviewer asks “why the choice of a strict CV model is necessary for this analysis”, pointing out that the traditional GP model could explain the phenomena as well. Nowhere in the paper do I claim that it could not; the choice of the framework is purely subjective and is based on numerous advantages of Strict CV over GP in other respects.

<sup>3</sup> 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).

In (1a), the diphthongization occurs before / which is followed either by a consonant or nothing. The MoE reflex of this diphthong, especially in the Southern British dialects, is the tense vowel [ɔ:]. The context of the vocalic modification in the examples under (1b) is identical to the one found in (1a) with the only difference that in (1b) the result of the development is a diphthong [ɔu] realized as [əʊ] in contemporary southern British dialects. When confronted with the data under (1), a potential researcher is almost immediately struck with a number of insistent questions. First and foremost, why does the /vocalization/breaking result in the off-glide [u]? Why is it the velarized / that implodes or reacts? Why does the pre-lateral diphthongization affect only back vowels? How to explain the MoE vocalic reflexes of the process in question? Before we address these questions (Section 5), we should first look at some more examples of vocalic developments but this time in a different context, that is, before the trill. This is done in the immediately following section.

## 2.2. Vowel developments before the trill

In Early New English, the phonetic realization of *r* started to change. First, the formerly trilled consonant became more open (an approximant) to be later dropped altogether. Similarly to the lateral described above in Section 2.1, the context in which the trill was affected boils down to the word-final and pre-consonantal position. Crucially, the process of *r* weakening affected the preceding vowels, both short and long, which in effect were lowered and ended up as more central. What is interesting, however, is that some researchers (Welna 1978: 215, after Wright 1924, Kurath 1964 and Prins 1974) assume the appearance of the transition glide [ə] between the vowel and *r*, which resulted in the rise of some kind of diphthong consisting of a vowel plus [ə].<sup>4</sup> The developments occurred in words like *far*, *art*, *arm*, *bark*, etc., and may be schematically illustrated as [far] > [fa<sup>ə</sup>r] > [faə/fə:r] > [fə:]. 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*, e.g. [kord] > [kɔ<sup>ə</sup>rd] > [kɔəd/kɔ:rd] > [kɔ:d]. The stage with the intermediate forms, i.e. those with the glide and *r*, may be confirmed by some contemporary rhotic dialects discussed in Harris (1994: 256). Thus, in certain dialects the forms *far* and *poor* are realized as [fəər] and [pəər], respectively. Furthermore, the high vowels [i, u] and the mid vowel [e], when followed by *r*, coalesced into [ɜ:] in, for instance, *bird*, *first*, *burst*, *nurse*, *person* and *certain*. A similar scenario occurred in the situation when *r* was preceded by a long vowel. Note that in such a case there was no lengthening as the vowel was originally long. Instead, we can observe the loss of tension and diphthongization, hence [i:/u:] + *r* > [ɪə/ʊə] in e.g. *beer*, *cheer*, *deer* and *pour*, *poor*, *door*, etc. Later on, the [ʊə] diphthong in the latter forms underwent further lowering, winding up as [ɔ:] or [ə].

<sup>4</sup> For the opposite view, in which the glide is perceived rather as a replacement sound than a transition glide, see Gimson (1970).

In this way it merged with another pattern characteristic to this period, i.e. [ɔ:] + *r* > [ɔ:r/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, e.g. *sure*, *pure* [ʃɔ:], [pjɔ:] and alternative [ʃʊə], [pjʊə]. And lastly, the front non-high long vowels, similarly to the vowels described above, underwent diphthongization, that is, [ɛ:/æ:] + *r* > [ɛə] in, e.g. *pear*, *tear*, *bare*, *care*, etc. Summing up, in Early New English, the word-final and pre-consonantal *r* was weakened and subsequently lost around the 18th century. Before it disappeared, however, *r* left an audible trace in the form of the realization changes affecting the preceding vowels. Thus, in this context both short and long vowels faced some qualitative and quantitative developments.

### 3. Liquid–zero alternations

Although, as mentioned in the Introduction, the linking/intrusive *l* is nearly a copy of linking/intrusive *r* in that they occur in the same context, the two processes are recorded in different dialects. The latter is characteristic to non-rhotic dialects (henceforth dialects A) involving southern England, Australia, New Zealand but also some parts of the eastern and southern United States. The former, on the other hand, is a widespread phenomenon in the dialects spoken in the Northeast of the United States (dialects B). As mentioned before, both liquids behave identically alternating with zero. This is a typical sandhi phenomenon where the alternating variants depend on whether a vowel or consonant follows (2).

#### (2) Linking liquids

(2a)				(2b)	
<i>hear</i>	[hɪə]	<i>hears</i>	[hɪəz]	<i>hearing</i>	[hɪərɪŋ]
<i>far</i>	[fɑ:]	<i>far below</i>	[fɑ: bɪləʊ]	<i>far above</i>	[fɑ:r əbʌv]
<i>sore</i>	[sɔ:]	<i>sore head</i>	[sɔ: hed]	<i>sore of</i>	[sɔ:r əv]
(2c)				(2d)	
<i>doll</i>	[dɔ:]	<i>dolls</i>	[dɔ:z]	<i>doll is</i>	[dɔ:l ɪz]
<i>Dahl</i>	[dɑ:]	<i>Dahl to</i>	[dɑ: tu]	<i>Dahl is</i>	[dɑ:l ɪz]
<i>fall</i>	[fɔ:]	<i>fall to</i>	[fɔ: tu]	<i>falling</i>	[fɔ:lɪŋ]

In the dialects in question, the linking liquid is not allowed before a consonant and a pause (2a, c); it appears only if followed by a vowel (2b, d). This observation is confirmed by frequent liquid–zero alternations. The liquids show up whenever the conditions are satisfied both across morpheme-boundary, e.g. *hearing* [hɪərɪŋ] and *falling* [fɔ:lɪŋ] and word-boundary, e.g. *hear about* [hɪər ə'baʊt] and *doll is* [dɔ:l ɪz]. The process of linking has an extension in the form of intrusion. The latter consists in the realization of *r/l* in etymologically liquid-less forms again depending on the following context (3).

## (3) Intrusive liquids

(3a) <i>drawing</i>	[drɔ:ɹɪŋ]	<i>draws</i>	[drɔ:z]
<i>idea of</i>	[aɪdɪəʀ əv]	<i>idea to</i>	[aɪdɪə tu]
<i>Shah of</i>	[ʃɑ:ʀ əv]	<i>Shah was</i>	[ʃɑ: wəz]
(3b) <i>drawing</i>	[drɔ:lɪŋ]	<i>draws</i>	[drɔ:z]
<i>law is</i>	[lɔ:l ɪz]	<i>law book</i>	[lɔ: bʊk]
<i>bra is</i>	[brɑ:l ɪz]	<i>bra cups</i>	[brɑ: kʌps]

As Gick (1999: 37) notes, “intrusive *l* usually appears following [ɔ:] though it can also occasionally follow [ɑ:] or [ə] in some dialects”. On the other hand, according to Bermúdez-Otero (2005), intrusive *l* is allowed only after [ɔ:]. Note that the intrusion is blocked whenever the morpheme-final vowel is high or up-gliding, e.g. *see all* or *say again*, etc. In other words, the occurrence of the intrusive liquids depends on the vowel quality in the morpheme final position, i.e., it must be one of the non-high vowels.

## 4. Theoretical background

The discussion of the data illustrating the historical process of English vowel developments in the pre-liquid position, general and rather cursory as it was, is sufficient to make some immediate observations and reach preliminary conclusions. One of such immediate observations is the similar reaction of both liquids to the position they occupy in the syllable structure, i.e. the “Coda” position. The traditional explanation which points to the “Coda” as a weak position triggering lenition processes is purely observational and hence unsatisfactory. The weakness the “Coda” calls for a non-circular explanation which follows from the general theoretical assumptions. Furthermore, the same theory must be able to explain the results of vocalic developments, i.e. 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. Finally, the appearance of [ə] before *r* and [u] before *l* also begs a question.

The internal make-up of liquids we postulate here (see Section 4.2), serves as the explanation of the historical developments illustrated above. The proposal is further strengthened by the analysis of two, this time synchronic, processes, that is, linking and intrusive liquids. Given the close similarity between linking/intrusive *r* and *l*, it seems obvious that they have the same trigger and should be given the same explanation. Furthermore, the intimate relationship between intrusive liquids and the preceding vowels also calls for an explanation. Recall that both intrusive liquids surface after non-high vowels. The immediate questions would be why the non-high vowels are special in that they trigger intrusion? And what is the connection between the non-high vowels and the intrusive liquids?

In the remainder of the paper, we shall address all the research questions accumulated so far. But before we plunge into a detailed analysis and propose a solution to the problems outlined so far, the reader should be acquainted with the basics of the theoretical model applied in the present study. Thus, in the following section we briefly discuss the most important tenets and mechanisms underpinning Element Theory (Section 4.1). We finish this section with a closer look at the internal structure of English liquids (Section 4.2).

#### 4.1. 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 the 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 utilised 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 closed 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 closed 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).<sup>5</sup> Finally, there have been some discussions concerning the representation of the schwa. Representations vary from a totally empty position ( ), or the realisation of the neutral element (@),<sup>6</sup> to a headless structure with one of the resonance elements in the operator position, e.g. (A. ). The findings in the following sections put us in the position of the proponents of the latter option. The three resonance elements

<sup>5</sup> A *PSiCL* reviewer points out to me that the “exact number/identity of elements is subject of debate” and as an example the opposition between lax and tense vowels proposed in Kaye et al. (1985, 1990) is mentioned. This is exactly what I say in one of the footnotes below where I write about the “ongoing discussion”. This paper aims at explaining certain processes and there is not enough space to discuss all the theoretical solutions which have been proposed in Element Theory so far. Moreover, anyone working within this model of segmental structure is perfectly aware of the fact that the ATR element proposed in Kaye et al. (1985) has long been eliminated from the theory.

<sup>6</sup> 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 (Kaye et al. 1985, 1990; Harris 1994; Harris and Lindsey 1995).

(I), (A), (U) defining vocalic segments are active place definers in consonantal systems (4a). However, in order to describe consonants some additional primes are required, that is, manner elements (4b).

#### (4) Melodic primes in Element Theory

(4a) place elements	(4b) manner elements
U – labial, labialised	? – occluded
I – palatal, palatalised	h – noisy
A – coronal, retracted (uvular, pharyngeal)	N – nasal
_ – velar, velarization	H – voiceless aspirated
	L – fully voiced

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 spirantisation, a process often resulting in elision and involving the lenition of a stop to a glottal fricative, usually through a fricative stage, e.g. [t] > [s] > [h] > [Ø] = (A.h.?) > (A.h) > (h) > ( ). Similarly, in vowel reduction, the elemental material is stripped away or the element status is reduced from head to operator, e.g. [o] > [u] = (A.U) > (U) and [i] > [ɪ] = (I) > (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.<sup>7</sup>

#### 4.2. Liquids

Looking at recent studies (van der Torre 2003; Botma 2004; and Scheer 2004, among others), one can notice an intensified effort to prove that sonorants are much more complex segments than they were thought to be in earlier analyses. Take, for example, Scheer (2004: §§48–51) who 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 (?), hence  $r = (A. I)$  and  $l = (? . A. I)$ . Additionally

<sup>7</sup> For more information and an ongoing discussion concerning the elemental make-up of phonological segments, see, for example, Kaye et al. (1985, 1990), 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.

and more interestingly, the same author argues that velarity and roundness are two distinct phonological objects expressed by two different elements. This claim is the result of the observation that [u] and [w] interact both with the labials and velars. Thus, in Scheer (2004: §43), the element (U), which defines velarity, is present in all velars (rounded and unrounded), and the element (B), describing labiality/roundness, is present in all rounded/labial segments (cf. (4) above). More evidence supporting this solution is accumulated in Scheer (1996, 1998, 1999).

Based on the analysis that follows, we propose the following melodic representation of English liquids. The trill is represented as a headless melodic expression containing the element (A), i.e. [r] = (A.    ). The prevocalic lateral is claimed to be composed of the same element but in a different role, i.e. as a head, hence [l] = (A). Headedness, as it will be claimed below, is responsible for occlusion in the lateral. Finally, the velarized version of the lateral, i.e. dark *l*, contains an additional element (U). Since, in the latter, the occlusion effect is lost due to the relaxation of the contact between articulators, it is the element (U) which is the head of the melodic expression, hence [ɫ] = (A. U).<sup>8</sup>

The presence of the element (U) in [ɫ] may contribute to the explanation of the already mentioned historical developments of vowels in the context before dark *l*, and *l*-vocalization.<sup>9</sup> What is also worth mentioning here is the presence of the low element (A) in the internal structure of both liquids.<sup>10</sup> Bearing in mind that the non-high vowels are uncontroversially defined by this element, we are in a position to shed new light on the mysterious, intimate relation between liquid intrusion and non-high vowels.

## 5. Liquid vocalization in the history of English

### 5.1. *r*-vocalization

In section 2.2 we have discussed some vocalic developments which took place in the context of the following *r*. Generally speaking, short vowels were lengthened, while long vowels underwent diphthongization. Note that the loss of *r* is preceded by the appearance of the glide, hence, [far] > [fa<sup>2</sup>r] > [faə/far:] > [fɑ:]. In short, the first step of the lengthening was the weakening of *r* and the glide formation. Now, a solution we propose to the problem of glide formation and further vocalic developments is based on the internal structure of *r*. Uncontroversially, this segment is built of the element (A) as

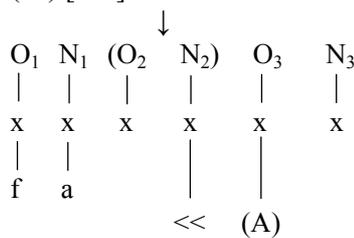
<sup>8</sup> This paragraph is meant as a response to a *PSiCL* reviewer's remark that I do not "take a clear stand on what the composition of the two liquids is".

<sup>9</sup> 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 data concerning *l*-vocalization in Estuary English.

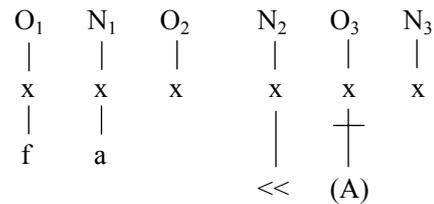
<sup>10</sup> The fact that in other languages liquids interact with high vowels, as mentioned by one of the *PSiCL* reviewers, does not mean that they cannot contain the element (A). They simply may include other elements too, for example (I) (see e.g. Scheer 2004).

confirmed by almost all of the researchers working within the Element Theory. Moreover, the weakening of *r* and consequently further vocalic modifications, occurred in certain context only, i.e. in the word-final and pre-consonantal position. Note that in the Strict CV model these two contexts are unified into one – before the empty nucleus. This position is recognized as a typical lenition site where various lenition processes occur cross-linguistically (e.g. Ségéral and Scheer 2001; Cyran 2003: 30; Scheer 2004: §§110–134; and Kijak 2008: 135). This single fact allows us to establish a direct link between the context and the process, i.e. *r* weakens in a prosodically weak position. Now, coming back to the process in question we have noted that together with the *r* weakening we can observe the development of the preceding glide (5a) and the subsequent loss of *r* (5b) and (5c).

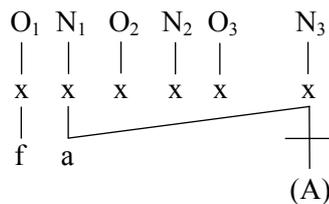
(5)

(5a) [fa<sup>3</sup>r]

(5b) [faə]



(5c) [fa:]



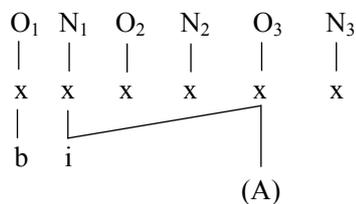
A comment concerning the representations under (5) is in order here. In (5a), the trill *r* occurs in a weak position, i.e. before the empty nucleus N<sub>3</sub>, and in order to survive, it seeks a slot to dock to. Note that the spreading of a consonant to the preceding nuclear position is a typical reaction of sonorants to the weak positions they happen to occur in. This can be observed in, for instance, the formation of syllabic consonants (for example, Scheer 2004: §§240–301; and Kijak 2008: 132–139). Furthermore, the historical innovation concerning the lengthening of short vowels before *r* consists in allocating

the skeletal slot for the elemental make-up of the trill.<sup>11</sup> 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<sub>2</sub>–N<sub>2</sub> sequence in (5a)).<sup>12</sup> The latter restructuring creates new possibilities. Thus, the nuclear position N<sub>2</sub> integrates the whole elemental make-up of the following *r* and the latter is delinked (5b). In the following step the glide gets delinked and the preceding vowel is lengthened as in (5c). Note also that the final sequence, i.e. O<sub>3</sub>–N<sub>3</sub>, 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 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 7b–c below).

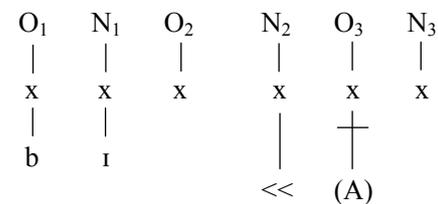
The situation is slightly different in the case of long vowels before *r*. Recall that, in this context, we can observe the loss of tension and diphthongization, hence, [i:/u:] + *r* > [ɪə/ʊə]. It means that there is no restructuring in the form of O–N sequence addition. Instead, the glide is attached to the preceding nuclear position previously occupied by the right branch of the long vowel (6).

(6) *beer* [bi:r] > [bɪə]<sup>13</sup>

(6a)



(6b)



In (6b) the long vowel [i:] is shortened because of the incoming glide which docks onto N<sub>2</sub>. The form [bɪər] which might have been in use for some time in the past and which is found in contemporary rhotic dialects, is identical to the one represented under (6b) with the difference that in the latter dialects the final *r* has never been delinked from the

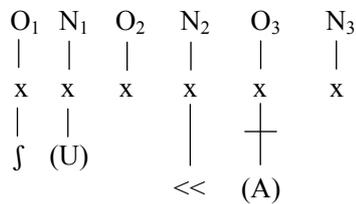
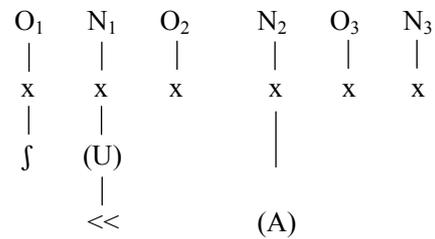
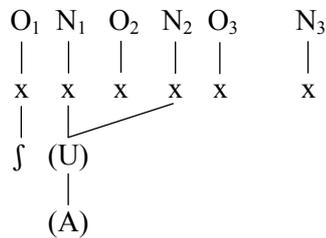
<sup>11</sup> The reason why the CV unit is inserted after short vowels to the exclusion of long ones is the fact that, in the latter case, there is an available vocalic slot for the incoming glide.

<sup>12</sup> In the Strict CV model, the smallest unit that can be manipulated is the Onset followed by the Nucleus. Shortly put, there is no Onset without the following Nucleus and vice versa.

<sup>13</sup> I do not have a ready answer to why the element (A) in (6) ends its journey in N<sub>2</sub> and does not go one step further to merge with the preceding vowel as it is the case in (7b) and (7c).

original position  $O_3$ . Finally, the vowel lowering effect produced by the following  $r$  is best illustrated on the example of the developmental path found in *sure* and *pure*. Thus, both forms covered a long distance from  $[\text{ʃuə}]/[\text{pjuə}]$  via  $[\text{ʃəə}]/[\text{pjəə}]$  to  $[\text{ʃɔ:}]/[\text{pɔ:}]$  (7). The earlier forms  $[\text{ʃuə}]/[\text{pjuə}]$ , as alternative realizations of the standard  $[\text{ʃɔ:}]/[\text{pɔ:}]$ , can still be found in some non-rhotic dialects.

(7)

(7a)  $[\text{ʃuə}]$ (7b)  $[\text{ʃəə}]$ (7c)  $[\text{ʃɔ:}]$ 

In (7a), the material under  $N_2$  comes from the previously weakened  $r$  originally attached to  $O_3$ . Attached to the nuclear slot, it is realized phonetically as the schwa. The form in (7b) represents a situation where the element (A), being attached to  $N_2$ , spreads to the left and merges with the vowel in  $N_1$ , which results in a lowering of the original vowel to  $[\text{ɔ}]$ . And finally, in (7c), we have a situation where the whole material is merged with the vowel under  $N_1$  giving rise to a complex structure, i.e.  $(U.A) = [\text{ɔ:}]$ , attached to two skeletal slots. Similarly to (5c) and (6b) above, the final O–N sequence is lost with time. It should be stressed here that the material from the schwa (and originally from  $r$ ) survives in the elemental make-up of the preceding vowel.

To sum up, in this section we have proposed a solution to developments of historical  $r$ -full forms. All the changes that took place in such forms can be captured in a uniform way, i.e. they were triggered by the weakening of  $r$  in the prosodically weak positions with some later repercussions in the form of different vocalic reflexes. Addition-

ally, this account allows for a direct link between the process and the context. The general conclusion emerging from the analysis is that sonorants are not safe in prosodically weak positions. In a situation when followed by an empty nucleus, they spread to neighbouring positions to escape negative consequences (e.g. deletion). This single observation can explain various phenomena, e.g. the formation of syllabic consonants (Kijak 2007: 191) or partial geminates (Scheer 2004: §§235–239), among others.

## 5.2. *l*-vocalization

Although, as we will see below, there are some differences in the behaviour of the two liquids, it is still possible to explain their influence on preceding vowels by applying identical solutions. However, before we look at the vocalic modifications before the lateral, we should first sweep the floor a bit and answer those questions which at this stage have become pretty trivial. One of such questions is the effect of *l* breaking, i.e. the development of the glide before the liquid, e.g. *malt* > *mault* *malt*, *calf* > *caulf* *calf*, etc. Recall (Section 4.2) that we have proposed to represent the velarized *l* as containing 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. It is clear now why only dark *l* reacts; it is because of its internal structure. What we still do not know is why it reacts in the first place. The answer is again trivial and it follows from the theory-internal reason. In the Strict CV model, the lateral occurs before the empty nucleus which is unable to license it. In consequence, the lateral undergoes disintegration and its elements evacuate from the endangered (weak) position to neighbouring ones. Finally, before we discuss more complex questions, it should be mentioned here that the reason why in the context of the following lateral only back vowels undergo modification is the fact that in English the element (U) defining back vowels does not combine with the element (I) found in the front ones.<sup>14</sup> In other words, the combination of (U.I) in English vocalic system is simply banned.<sup>15</sup>

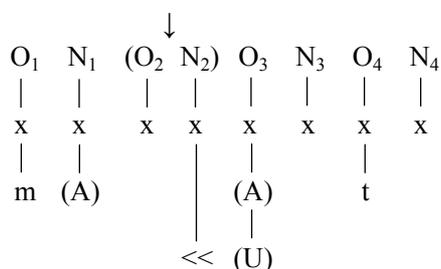
Coming back to the discussion of vocalic developments in the pre-lateral position (1), note that the preceding vowels undergo various modifications. Thus, in (1), we can observe vowel raising and lengthening via the intermediate diphthongization stages: [a] > [au] > [ɔu] > [ɔ:] and diphthongization or lowering and diphthongization: [o] > [ɔu] > [əu] and [u] > [ɔu] > [əu], respectively. Now, the developmental path is almost a copy of

<sup>14</sup> One of the *PSiCL* reviewers points out that since *r* breaking does not necessarily result in the fusion of the elements of the preceding vowel and (A) (see (6) above), the same option should be available for (U) after high vowels. Note, however, that in such a situation we would arrive at a diphthong which is not attested in the language, e.g. \*[ɪu].

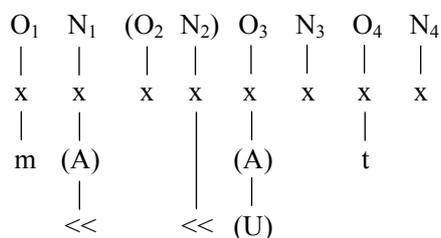
<sup>15</sup> The fact that these two elements do not merge in English (and other languages), does not mean this combination is universally barred. It is present in the vocalic systems of other languages, e.g. German. See, for example, Harris (1994: 102).

the one proposed for the trill. Thus, the lateral occurs in a weak position, i.e. before the empty nucleus, and this unfavourable 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 (5a) above). The situation is illustrated in (8) below.

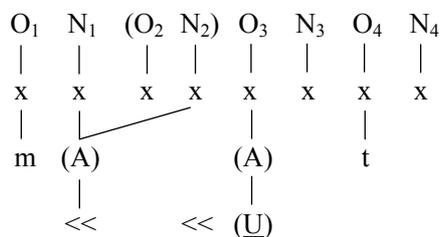
(8)

(8a) diphthongization: *malt* > *mault* [a] > [au]

(8b) raising: [au] &gt; [ɔu]



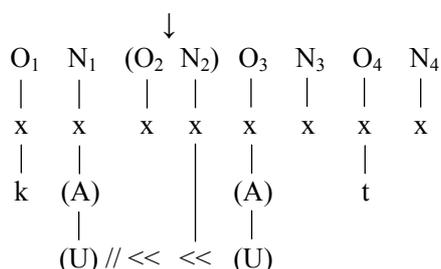
(8c) monophthongization: [ɔu] &gt; [ɔ:]



In (8a), we can observe the first stage of the change, i.e. 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<sub>2</sub>.<sup>16</sup> Note that, just like in the case of *r* above (Section 5.1), we are postulating here the incorporation of the CV unit (O–N sequence) to make room for the incoming glide *u*. This historical restructuring is indicated by the arrow above the (O<sub>2</sub>–N<sub>2</sub>) sequence in (8a).<sup>17</sup> The second stage (8b) illustrates the later modification of the diphthong. The element (U), while still being linked to the Nucleus (N<sub>2</sub>), continues its migration to the left and becomes part of the first vowel containing (A). The fusion of both elements, i.e. (A.U), results in the appearance of the back mid vowel [ɔ]. In the final stage (8c), the element (U) gets delinked from N<sub>2</sub> and is intercepted by N<sub>1</sub> where it merges with the internal composition of the vowel. The whole expression, i.e. (A.U), spreads to the, by now, emptied N<sub>2</sub> and winds up as a long monophthong [ɔː].

Although leading to a different result, the trigger of the vocalic development illustrated in (1b) is identical to the one discussed in (1a), i.e. the reaction of the lateral to the weak position. Thus both modifications can be given the same explanation. Consider again the [o] > [ɔu] development in (1b) illustrated in (9) below.

(9) diphthongization: *colte* > *coulte* [o] > [ɔu]



The initial stage is identical to (8a) above, however, note that the element (U) does not migrate further than N<sub>2</sub> as the (U) line in the vowel under N<sub>1</sub> is not empty. In other words, 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, i.e. N<sub>2</sub>.<sup>18</sup>

<sup>16</sup> A *PSiCL* reviewer asks why it is (U) and not (A) that is unloaded by the lateral and gives one counterexample to (U) unloading, i.e. *feel* [fi:ʔl]. The solution may be the head status of the element (U) which gives it precedence over (A). In the case of *feel*, it is the element (A) that spreads as the combination or merger of (I) and (U) is banned in English, see Section 5.2 above.

<sup>17</sup> Note that historically some of the examples given in (1) contained, at earlier stages of development, complex nuclei (long vowels or diphthongs) so in such cases we should not talk about the O–N incorporation. This fact has been disregarded here as it does not change or undermine the main arguments defended in this paper.

<sup>18</sup> The final stage, i.e. [ɔu] > [ɔː], which is characteristic of conservative RP pronunciation, is explained as a decomposition of the first part of the diphthong.

To sum up the discussion in this section, we have seen that the vowels in the pre-lateral position evolved in different directions. Thus, some were raised others lowered, still others monophthongized or diphthongized. In short, the lateral in a prosodically weak position unloads one of its elements, i.e. (U), which migrates and docks onto the newly created nucleus and then, in some cases, goes even further reaching the first nucleus where it fuses with the element make-up of the original vowel. Of course, the merger with the vowel on the left is possible only in the situation when this vowel is not specified for the element (U). Crucially, the solution proposed here can help to explain the liquid–zero alternations discussed above. Thus, in what follows we focus on the linking and intrusive liquids and try to provide a solution to the problems enumerated in Section 4 above.

## 6. Linking and intrusive liquids

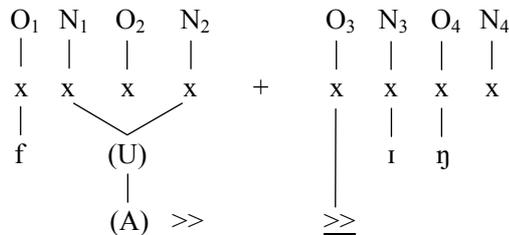
### 6.1. Linking

So far, we have discussed and offered an explanation of liquid vocalization in the history of English. One of the conclusions we have reached there is that in dialects A the elemental make-up of the trill is still present in one way or another in the lexical representation of the etymologically *r*-full forms. For example, in (6b) the material from the historical *r* is attached to the skeleton and surfaces in the clothes of schwa [ə]. What is interesting, however, is that there are dialects (dialects B) where the vocalization affected the lateral. Note that, in those dialects, the lateral is lost in the pre-consonantal and word-final position. Crucially, under certain conditions the liquid-less forms have liquid-full variants (see the examples in (2) above). The alternating liquid variant, recall from (2a–d) above, occurs whenever the following morpheme begins with a vowel. The situation is explained as the spreading of the material from the vowel, which has absorbed (some of) the elements of the vocalized liquid, to the empty Onset position of the following word. Note that in the Strict CV theory the smallest unit that can be manipulated is an O-N sequence. This means that a vowel initial morpheme begins with the empty Onset which is a docking slot for the relevant element, i.e. (A), to anchor in. This situation is illustrated in (10) below.

(10a) linking *r*, e.g. *daring* [dɛərɪŋ]

O <sub>1</sub>	N <sub>1</sub>	O <sub>2</sub>	N <sub>2</sub>		O <sub>3</sub>	N <sub>3</sub>	O <sub>4</sub>	N <sub>4</sub>
				+				
x	x	x	x		x	x	x	x
d	ɛ					ɪ	ŋ	
		(A)			>>			

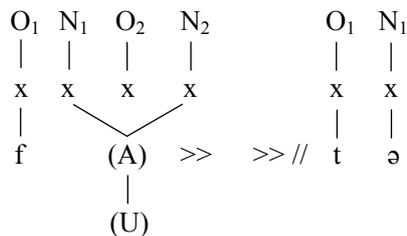
(10b) linking *l*, e.g. *falling* [fɔ:lɪŋ]



The spreading occurs whenever the Onset is made available for the element (A). Note that the spreading in this context is possible because the Onset position O<sub>3</sub> is licensed by the following full vowel N<sub>3</sub>. Recall that the main reason why liquids are weakened in the first place and subsequently spread to the left (merging or not with the preceding vowel) is the inconvenient weak position, i.e. before the empty Nucleus which is a weak licenser. Now, the reason why (A) is realized phonetically as [r] in dialects A and [l] in dialects B is a different function this element plays in both varieties; in the former, it is licensed by the Onset as the operator (A.   ) (10a), while in the latter, it is promoted to the head position (A) (10b). Following Bloch-Rozmej (2008: 264ff), we claim that, in dialects B, it is headedness that is responsible for the occlusion effect in the lateral.

From the above it follows that whenever the following morpheme starts with a consonant, the element (A) does not have a chance to dock onto the Onset position as the latter is occupied (11).

(11) *fall to* [fɔ: tu]

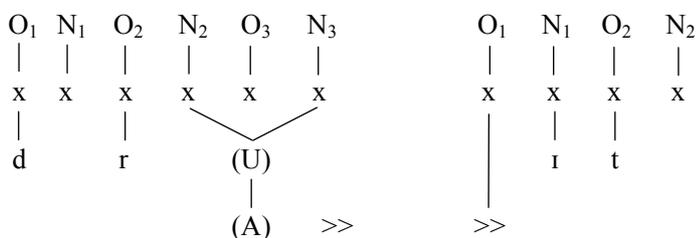


In (11) the element cannot be licensed by the following Onset position, as the latter is not empty, hence there is no phonetic manifestation of the lateral.

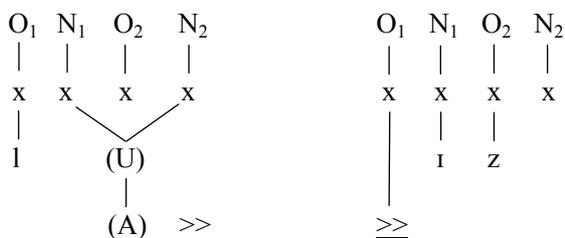
## 6.2. Intrusion

Apart from the linking phenomenon discussed above, most of the speakers in the dialects in question have yet another type of the liquid–zero alternation, the so-called intrusive liquid. These alternations boil down to the realization of *r/l* in etymologically liquid-less forms. The intrusive *r/l* variant, similarly to linking *r/l*, occurs before a vowel-initial morpheme. Crucially, intrusive liquids arise only after non-high vowels (see the examples in (3) above). It would be rather awkward to postulate the presence of *r/l* in the lexical representation of historically liquid-less forms. The explanation of the link between the context and the process, i.e. intrusion, should be sought for in the elemental make-up of non-high vowels. Note that in Element Theory applied in this analysis all non-high vowels contain the low element (A), this is also true for the schwa which is defined here as (A.\_). Therefore, what we claim here is that the process of intrusive liquid consists in the spreading of the element (A) from a non-high vowel including schwa. This solution seems superior to others in that it can do without a somewhat awkward idea of the lexical *r/l* in etymologically liquid-less forms. Moreover, it can explain, in a non-arbitrary fashion, the fact that only non-high vowels participate in this type of liquid-zero alternation. The representation of intrusive liquids is given in (12).

(12a) intrusive *r*, e.g. *draw it* [drɔ:r it]



(12b) intrusive *l*, e.g. *law is* [lɔ:l ɪz]



Similarly to linking, illustrated in (10) above, intrusion consists in the spreading of the element (A) from a non-high vowel to the following empty Onset position. Although in both dialects A and B it is the same element which spreads, the phonetic effect is different. The situation is explained here by a different status of the element (A) in both dialects. Thus, in dialects A, it is licensed as the operator, while in dialects B as the head. To conclude the discussion in this section, note that intrusion is the final stage consisting in the reinterpretation of linking in that all vowels equipped with the right melodic prime react in favourable conditions.

## 7. Conclusions

In this paper, we have looked at one of the well-known phenomena, that of liquid vocalization in English, from a different theoretical perspective. We started working on this problem with a belief that the Strict CV model and, in particular, Element Theory can shed new light on the mechanics of liquid vocalization and can help understand some historical vocalic developments which occurred in this context. It proved a wise choice, as this theoretical model enabled us to answer a number of puzzling questions. We have shown that the internal structure of liquids, in particular the presence of the element (U) in the elemental make-up of the lateral and (A) in the trill, is responsible for the appearance of glides before respective liquids. Whenever they find themselves in prosodically recessive positions, both liquids, in order to survive, evacuate from this uncomfortable context spreading leftward and colonizing neighbouring positions and/or segments. The evacuating elements, i.e. (U) and (A), are allocated to a newly formed nuclear slot (the historical process of glide formation). At this stage, we can observe various diphthongization effects; but this is not the end of the road. The elements may reach as far as the first nucleus and merge with the elemental make-up of the vowels residing in this position. This step results in further modifications such as lowering, raising, monophthongization and lengthening. Moreover, we have explored two phenomena of liquid-zero alternations, i.e. linking and intrusion in two varieties of English recorded in southern England and north-eastern United States. First of all, in both dialects we can observe a similar order of processes, i.e. vocalization > linking > intrusion. In dialects A (non-rhotic), the vocalization affected both liquids, i.e. *r* and *l*; however, it is *r* which alternates with zero in those dialects. On the other hand, in dialects B (which are rhotic and hence *r* is realized phonetically in all contexts), the alternation concerns the second liquid, i.e. the lateral. Both liquids behave identically in yet another process known as intrusion. Liquids participating in the latter alternation are the effect of the same trigger – spreading of the low element (A) from a preceding non-high vowel. The explanation of the question why in dialects B this element is realized phonetically as [l], while in dialects A as [r] lies in the different status this prime enjoys in both dialects, i.e. it is licensed either as an operator or head. Additionally, it has been shown that both liquids are represented by the same element but in a different role. The headless (A) defines the

trill, while the same element, but this time promoted to head, represents the lateral. It follows that, at least in dialects B, headedness is interpreted as occlusion. Finally, we have proposed to represent the velarized lateral as containing the element (U), hence [ɫ] = (A.U).

We hope the findings of the analysis offered here may prove useful in the explanation and understanding of other historical and/or synchronic phenomena. One of them may be the case of lateral vocalization in one of the contemporary varieties of English, i.e. Estuary English.

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