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## The Envelope of Variation for /l/ Vocalisation in Philadelphia English

### Abstract

One noteworthy feature of Philadelphia English is widespread variable /l/-vocalisation, even in intervocalic contexts. This study constitutes an attempt to circumscribe the contexts in which /l/-vocalisation is possible in Philadelphia English, with reference to the other commonly attested allophones; light and dark /l/. Ultimately, it appears that /l/ vocalisation is limited to phrase-, word-, or stem-final position, or to post-tonic position. We do not observe stem-medial, non-post-tonic /l/ vocalisation, such as in the word 'gelato'. These environments are a subset of those in which we observe /l/ darkening, which in turn are a subset of the contexts in which light /l/ is found. This supports the view that the allophones of /l/ form a continuum, from light to dark to vocalised. Moreover, when we limit our data to just those contexts in which /l/ vocalisation is possible, a clear diachronic picture of the increasing frequency of /l/ vocalisation emerges even with a small pool of speakers.

# The Envelope of Variation for /l/ Vocalisation in Philadelphia English

Ruaridh Purse\*

## 1 Introduction

English laterals canonically involve two lingual constrictions: one anterior and one dorsal (Gick et al. 2006). However, native English speakers exhibit complex variation in their execution of this tongue shape. Broadly, the variants can be separated into three audible categories—‘light’, ‘dark’, and ‘vocalised’—according to the timing and degree of the two relevant constrictions. A light /l/ occurs when the anterior constriction precedes a dorsal constriction of reduced magnitude and is acoustically characterised by a distant F1 and F2. A dark /l/, on the other hand, is when the anterior constriction follows the dorsal constriction, and it is characterised by a close F1 and F2. In a vocalised /l/, the anterior gesture is delayed and reduced in magnitude to the extent that there is no coronal contact at the alveolar ridge. Vocalisation is often accompanied by lip rounding, and while it does not have consistent and well-attested acoustic cues, linguists reliably agree on auditory judgments for vocalisation (Hall-Lew and Fix 2012).

Allophonic patterns of light and dark /l/ have received a great deal of classic (Chomsky and Halle 1968) and contemporary (e.g. Turton 2016, 2017) exploration. In general it has been observed that light /l/ tends to occur in onset position and dark /l/ in codas (Giles and Moll 1975). But overapplication of darkening is attested in several dialects, such that dark /l/ is found in surface onsets in word-final position (e.g. *heal it*) stem-final position (e.g. (e.g. *heal-ing*). This means that /l/ darkening is sensitive to morphosyntactic structure (Bermúdez-Otero 2007).

Much less attention has been paid to the distribution of /l/ vocalisation, in which apical contact is lost altogether (Kahn 1976, Browman and Goldstein 1995). Vocalisation is commonly characterised as an extreme end of a continuum of weakening of the coronal gesture in /l/, with light /l/ at the other end of the continuum. It has been noted that /l/ vocalisation is particularly prevalent in Philadelphia English (Ash 1982). Here, the phenomenon has even been observed in intervocalic contexts such that the words *balance* and *bounce* can form quasi-homophones. The present study examines all three types of surface /l/ in attempt to circumscribe where /l/ vocalisation is possible across data from nearly a hundred years of Philadelphia English in apparent time.

## 2 Methods

Recordings from 8 white interviewees, 4 female and 4 male, were taken from the Philadelphia Neighbourhood Corpus (PNC) of sociolinguistic interviews (Labov et al. 2013). This selection was made without reference to the speakers’ linguistic performance, with the only other consideration being that they cover a wide range of birthyears, resulting in a span from 1895 to 1979. These interviews yielded 4058 tokens of /l/ in all positions. Tokens were handcoded as light, dark or vocalised based on auditory and spectrographic cues. Figures 1 and 2 are examples of the word *eleven* with a light and a dark realisation of /l/ respectively. Red lines indicate the first and second formants during the period of time corresponding to /l/ in each case, illustrating how these formants are far apart in a light /l/ and close together in a dark /l/.

Vocalised /l/ closely resembles dark /l/. At present, there is no straightforward and reliable way to distinguish these variants spectrographically, but they are auditorily distinct in a way that has proved robust across multiple researchers (Hall-Lew and Fix 2012). Thus, vocalised /l/ was primarily identified according to its auditory profile, in which it typically sounds like a mid to high back vowel. Tokens of /l/ were also coded in detail for their position in syllabic and morphological structure.

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\*Thanks to the attendees of NWAV47 for their thoughtful comments. All errors or omissions are my own.

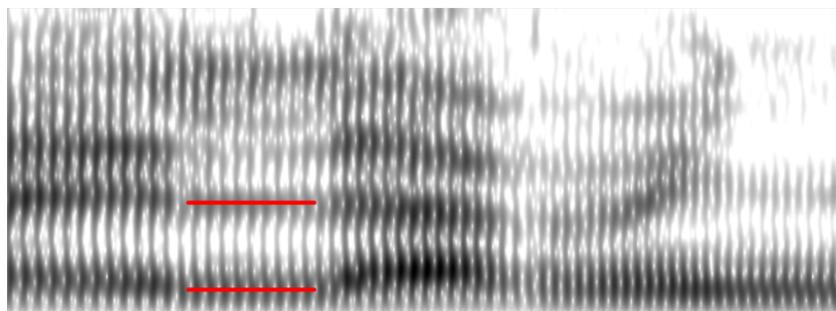


Figure 1: Spectrogram for an instance of *eleven*, produced with a light /l/. Red lines indicate the positions F1 and F2 for the period where this segment is produced.

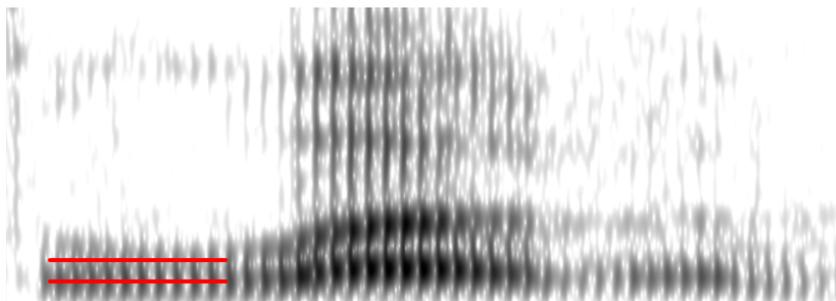


Figure 2: Spectrogram for an instance of *eleven*, produced with a dark /l/. Red lines indicate the positions of F1 and F2 for the period where this segment is produced.

### 3 Results

#### 3.1 /l/ Allophony across Linguistic Environments

Generally speaking, light /l/ occurs in syllable onsets and dark /l/ in syllable rimes, so these positions are a natural place to start to explore how a three-way alternation between light, dark, and vocalised fits into that picture. Figure 3 shows proportions of light, dark, and vocalised /l/ that appear in surface onsets and surface codas. These positions were coded with respect to the phrase level environment, according to a straightforward application of the Maximal Onset Principle. That is, an /l/ is part of a surface onset if it is followed by a vowel, regardless of whether there is an intervening word boundary. Prepausal /l/ and /l/ before consonants were included in the ‘surface coda’ category

In line with previous work, the frequency of light /l/ is greatly reduced in surface coda position, as opposed to in surface onset position. However, light /l/ is relatively infrequent in the data overall. Unexpectedly, dark /l/ is also slightly less frequent in surface coda position than surface onset position. However, this effect could be attributed to the fact that vocalised /l/ is several times more frequent in surface coda position than surface onset position. We can still see the attested pattern whereby the surface coda position attracts non-light /l/ allophones. However, in this case they are generously distributed between dark and vocalised variants.

It is perhaps surprising that there is so much dark and vocalised /l/ in surface onset position, which is canonically the environment for light /l/. In the present data, light /l/ allophones are in the minority in surface onset position, despite this being a much more favourable context for light /l/ than surface coda position. However, it should be noted that this category comprises tokens with a number of different structures underlying the phrase level, according to which the surface position was coded. Figure 4 shows proportions of /l/ types in various different types of ‘surface onset’.

Of all onset types, light /l/ appears most frequently in absolute word-initial position. On the other hand, surface onset vocalised /l/ is limited to just the word-final and intervocalic contexts. It

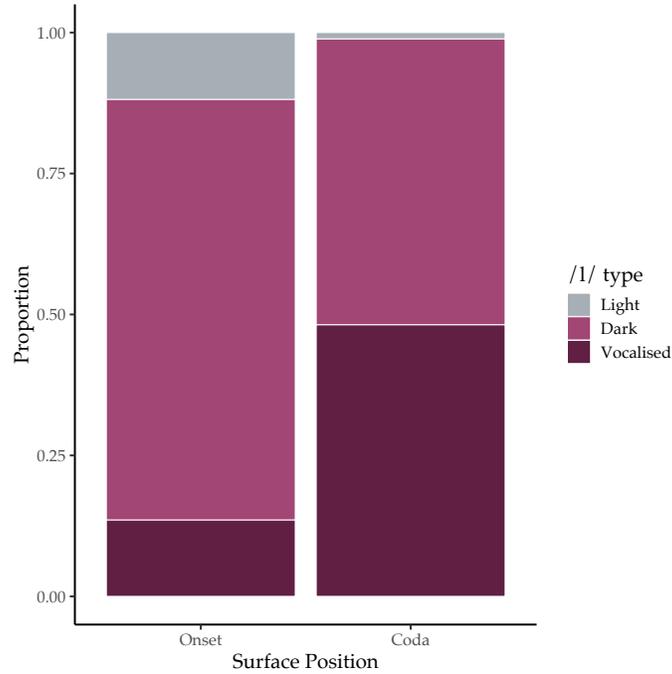


Figure 3: Proportion of /l/ allophones in surface onsets versus surface codas.

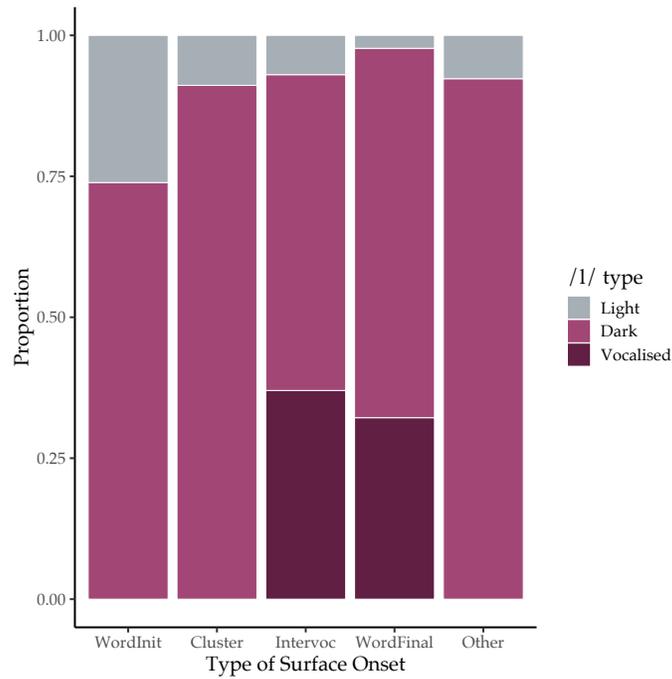


Figure 4: Proportion of /l/ allophones in different types of surface onset.

never appears in word-initial position or in onset clusters. This suggests a restricted environment in which /l/ vocalisation is possible, much like the canonical expectation for light and dark /l/ realisations. Both word-final and intervocalic /l/ have preceding vowels. Indeed, given a stratal phonology (e.g. Kiparsky 1982, 2000, Bermúdez-Otero 2010) and aggressive syllabification on every stratum,

word-final /l/ before a vowel-initial word could even be described as a coda before it reaches the phrase level and is resyllabified as an onset. The same cannot necessarily be said of intervocalic /l/. Figure 5 further divides intervocalic /l/ into subtypes and shows the proportion of different /l/ allophones that occur in each.

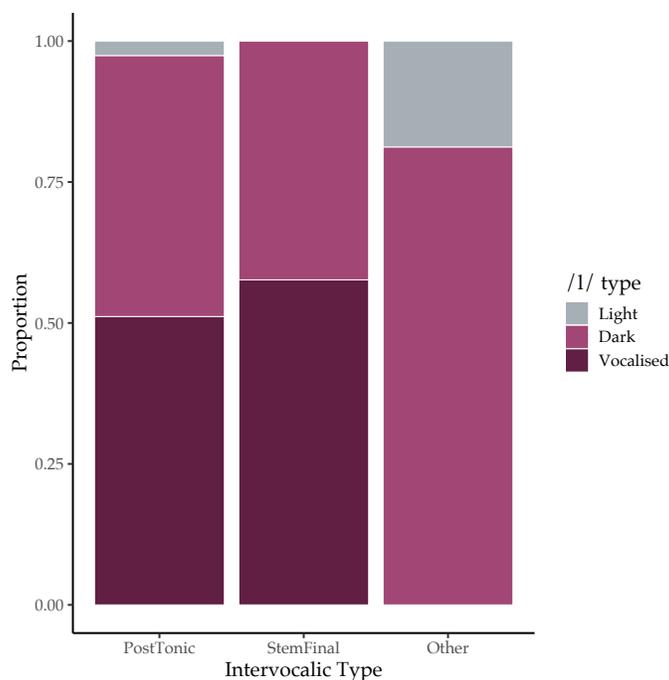


Figure 5: Proportion of /l/ allophones in different types of intervocalic position.

As far as intervocalic /l/ goes, the data only contains instances of vocalisation in post-tonic position, or when the /l/ immediately precedes a morphological boundary at the end of a stem. Much like how word-final /l/ could be eligible for /l/ as a coda up until the phrase level phonology, stem-final /l/ could be eligible as a coda up until the word-level phonology. For example, in *healing*, /l/ is eligible to be vocalised because of its position at the end of *heal*. Given aggressive syllabification at each level of phonology, this /l/ is placed in a coda until the suffix *-ing* is attached. While it is a coda, there is the potential for vocalisation.

It remains to be explained why vocalisation is licensed for post-tonic, intervocalic /l/. One possible explanation comes in the form of ambisyllabicity. This is the property of a consonant such that it is linked to both a preceding syllable as a coda and a following syllable as an onset (Kahn 1976). If we were to invoke ambisyllabicity, these cases of intervocalic /l/ vocalisation could be linked to codas and also be variably realised as allophones that are restricted to coda position. This would be neatly symmetrical with the other cases of /l/ vocalisation in stem-final, word-final and surface coda position in that all cases of vocalisation are codas at some level of analysis. However, ambisyllabicity is not uncontroversial. An alternative is a process of vocalisation that targets foot-medial /l/s. All the cases of post-tonic vocalisation in this data fall in the middle of trochees, and so would also be captured by this analysis. Moreover, this resembles aggressive foot-medial /l/ darkening process that Turton (2016) describes for mainstream American English.

### 3.2 Diachronic Patterns in /l/ Allophony

In the previous section, I have circumscribed the environments where /l/ vocalisation is observed. These are surface codas, word-final position, stem-final position, and intervocalically in post-tonic position. It is true that there is no negative evidence that /l/ vocalisation cannot occur outwith these environments. However, these environments are just like those described for the most aggressive

/l/ darkeners in Turton's (2016) study based on acceptability judgment data from (Hayes 2000). Light and dark /l/ are also produced in all of the where light /l/ is possible, albeit rarely for light /l/. Thus, vocalised /l/ can occur in a subset of the environments where dark /l/ is possible, and dark /l/ can occur in a subset of the environments where light /l/ is possible. By limiting the data to just the envelope of variation in /l/ vocalisation, where all three /l/ types are possible, we can observe diachronic patterns in /l/ realisation. Figure 6 shows /l/ realisation types from each speaker, arranged according to their birthyear.

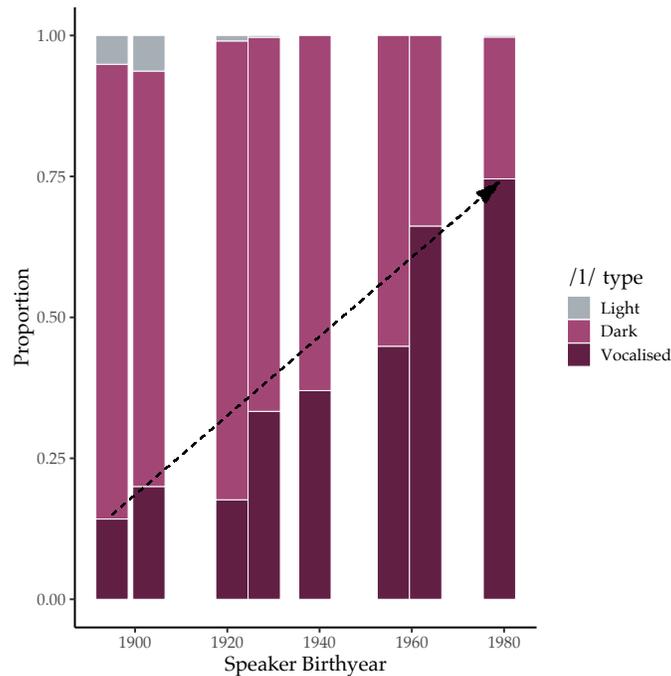


Figure 6: /l/ realisation in only positions where vocalisation is attested, across apparent time

Rates of /l/ vocalisation have increased greatly in apparent time. The speaker born before 1900 vocalises a little under 15% of tokens eligible for vocalisation. On the other hand, the speaker born in 1979 vocalises almost 75% of all tokens eligible for vocalisation. Moreover, the production of light /l/ in these contexts vanishes over the same stretch of apparent time. This demonstrates the importance of defining the envelope of variation for a given variable. Only by doing so can such clear patterns of change be observed.

Interestingly, there is no trajectory of domain narrowing of /l/ vocalisation in apparent time. That is, even the oldest speaker exhibits some /l/ vocalisation intervocalically and stem-medially. The only speaker that does not produce any stem-final or stem-medial /l/ vocalisation is the speaker born in 1924, who ultimately produces less vocalisation overall than the pattern of change in apparent time would predict. However, this speaker still produces /l/ vocalisation in word-final and other surface coda position. As such, an implicational relationship between positions for /l/ vocalisation is suggested: speakers that vocalise stem-finally will also do so word-finally and in surface codas.

## 4 Discussion

Compared to binary alternations between variants, with which research in variationist sociolinguistics more commonly concerns itself, a three-way contrast is potentially complex in terms of the envelope of variation. Different environments may trigger competition between different combinations of the variants. In other words, across environments where a particular variant is possible but not required, it may not have a consistent alternative. In the case of Philadelphia English /l/, how-

ever, contexts where dark /l/ can occur are a subset of contexts for light /l/, and in turn contexts where /l/ can be vocalised are a proper subset of contexts for dark /l/. In other words, there are no contexts in which vocalised /l/ alternates with light /l/ but not dark /l/. This is noteworthy because it suggests that something of a hierarchical relationship between the three allophones has been maintained.

The hierarchical relationship between /l/ allophones might best be explained in terms of phonological feeding, such that only an /l/ that has been darkened can in turn be vocalised. This kind of derivation is most evident for the oldest speakers, who variably produce light /l/ even in surface codas, and therefore exhibit the sequential nesting of contexts for possible /l/ darkening and /l/ vocalisation observed at the community level. However, the picture is a little more complicated for younger speakers, who each produce only a handful of light /l/ tokens, and only ever in surface onsets. These speakers must nonetheless acquire light /l/ as the underlying form. This light /l/ is perhaps categorically darkened in some contexts, which is the input to a subsequent—variable—process of /l/ vocalisation in the contexts where that is possible.

It should be noted that a limitation of using corpus data to answer questions about the envelope of variation is a lack of negative evidence. Whilst we can observe cases in which /l/ vocalisation does not occur, it is not possible to say that it is impossible.

#### 4.1 Ambisyllabicity

In Philadelphia English, /l/ can be vocalised even in stem-medial intervocalic position, so long as the /l/ is also post-tonic. Previously in this paper I suggested that this could be an effect of ambisyllabicity (Kahn 1976), such that an /l/ like this is simultaneously an onset in the following syllable and a coda in the preceding one. This follows the theoretical proposal that English onsets to unstressed syllables are additionally linked as codas to a preceding stressed syllable, creating ambisyllabicity (Rubach 1996). An ambisyllabic structure is illustrated for the medial consonant in a CVCVC skeleton in figure 7.

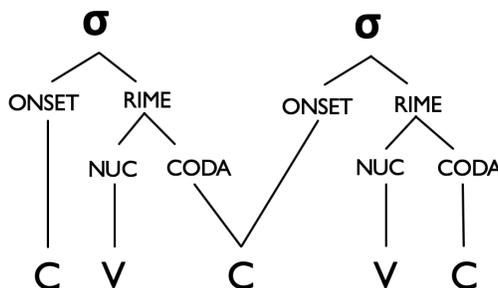


Figure 7: Syllable structure for CVCVC skeleton with ambisyllabic medial consonant.

According to Rubach (1996), a number of different allophonic patterns in Received Pronunciation English can only be explained by invoking ambisyllabicity. These include /t/ tapping, linking /r/, schwa insertion and—relevantly—/l/ darkening. Similar cases have also been made for American English /t/, which is flapped in potentially ambisyllabic contexts, but glottalised in absolute coda position (Kahn 1976, Gussenhoven 1986).

A similar structure to that in figure 7 is commonly held to underlie geminate consonants in languages where there is contrastive consonant length (Leben 1980). In that kind of analysis, geminate consonants are doubly linked to higher syllable or prosodic structure, often motivated by some underlying weight specification in these consonants. That these geminate consonants are realised with a long constriction duration is then justified by the extra structure that dominates them. Herein lies a major inconsistency in the expectations for the consequences of ambisyllabic structure. On one hand, ambisyllabic structure accounts for gemination: a strengthening phenomenon. But simultaneously, ambisyllabicity is almost exclusively used to account for lenition or weakening phenomena

in English. The case of /l/ vocalisation, in which an anterior gesture is reduced or perhaps removed entirely, would constitute yet another example of this kind of lenition.

A strong alternative to ambisyllabicity is found in Jensen's (2000) work using prosodic phonology. Jensen argues that we can independently motivate many levels of prosodic structure above the syllable-level, and that we can make reference to any of these levels of structure to explain allophonic patterns. Following from this, when Turton (2016) finds post-tonic, intervocalic /l/ darkening, she analyses this as an aggressive process of darkening that applies in foot non-initial position. This accounts for all consonants that would otherwise be ambisyllabic, since these consonants will also fall in the middle of English trochaic feet. Since we observe Philadelphia /l/ vocalisation to occur in these same contexts, this foot-based analysis is also applicable here. Since there is currently no data to determine the best option, I remain agnostic as to whether a foot-based or ambisyllabic analysis is preferable to explain the distribution of /l/ vocalisation in Philadelphia English.

## 5 Conclusions

Philadelphia /l/ vocalisation is extremely common, and occurs in a wide variety of contexts. However, we observe that it is actually constrained to the following contexts: surface coda, word-final, stem-final, and word-internal post-tonic intervocalic position. These contexts are a proper subset of the contexts in which /l/ darkening can occur, which are themselves a subset of the contexts for light /l/. This suggests a hierarchy between allophones, or a phonological feeding relationship between processes of /l/ darkening and subsequent /l/ vocalisation, that has been acquired even by speakers who barely use any light /l/ at all.

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