Underlying Schwas in English

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Lee, Yongsung. 2006. Underlying Schwas in English. Korean Journal of English Language and Linguistics 6-2, 329–349. This paper deals with the phonemic status of English schwa. The basic claim is that a schwa is a formal member of English phonemic inventory, though they are historically derived from full vowels reduced in the stressless position. We look into three different phonological aspects in English, {-ic} suffixation, syllable weight and syllable extrametricality, to support the idea that there is a phonemic, and thus underlying, schwa in English. In each of these areas, there are many problems and exceptions left unexplained. Unexpected vowel deletion in {-ic} affixation, lack of generality on the weight of word final xVC(C) syllables, and exceptions to syllable extrametricality are matters of great controversy. But the introduction of underlying schwas allows us to see the problems and exceptions from a different angle, and to present consistent explanation to the apparent exceptions. These phonological aspects, therefore, strongly argue for the necessity to recognize a schwa as a full-fledged phoneme in English.

Key words: underlying schwas, vowel reduction, {-ic} suffixation, syllable weight, syllable extrametricality, stress assignment.

1. Introduction

Schwas in English have been regarded as reduced forms of full vowels. Ahn (2001) summarizes that "the schwa sound is the
result of gradual development in the history of the English language over a thousand years," based on his observation from Kenyon (1966), Hogg (1992) and Gimson (1972). Schwas, from this perspective, are variants of full vowels that show up in stressless syllables. Being related to full vowels and being limited in distribution, i.e. only in stressless position, a schwa is traditionally regarded as an allophone of a vowel. Giergerich (1992: 69) observes that since schwa does not contrast with any other vowel except [i], it is not qualified as a phoneme in English.¹

But there are other views on the phonemic status of a schwa vowel. Chomsky & Halle (1968: 37 fn. 27) for example, recognizes the need for putting a weak vowel, /以色列/, in the underlying representation to represent the second vowel in effort. Kahn (1976: 122-123) argues against deriving schwas from underlying full vowels, though he suggests putting syllabic consonants instead of schwa in the input. Hayes (1995: 15) moves his focus to vowels from the syllable final consonants and captures the generality that a syllable headed by a schwa is never stressed. This is the reverse interpretation of the traditional view that vowels in the stressless position are phonetically realized as schwas, thus opening a possibility to view schwas as the cause of stress assignment, not its result. Jensen (1993: 35) focuses on the complementary distribution of /ə/ and /æ/ and concludes that /æ/ is basic and /ə/ is the stressed variant of a schwa. Further, Hammond (1999: 170 and thereafter) assumes schwas to be underlingly present for his stress theory without any specific argument.

Against the backdrop of these conflicting and contradictory views, this paper attempts to answer, at least partly, to the question about the underlying status of schwas in English.

¹I thank Professor Ahn, Soo-woong for directing my attention to this reference.
Though traditionally schwas have not been regarded as phonemes in English, we find many interesting synchronic data from morphological operation to stress assignment where we find convincing arguments for an underlying schwa.

More specifically, this paper argues that a non-alternating schwa is a full-fledged phoneme in English. The argument is theoretically based on the observation of Kiparsky (1968: 11) that "if a form appears in a constant shape, its underlying representation is that shape, except for what can be contributed to low-level automatic phonetic process." The exception clause is added perhaps because of the existence of alternating schwa in English. If a surface schwa does not alternate with other vowels at all, then we would simply put the schwa in the underlying representation, eliminating the exception clause of Kiparsky's observation. The similar approach is also found in Chomsky & Halle (1968: 37):

(1) A note from SPE (37, fn 27)
In the case of effort there is no way of determining the phonological quality of the underlying vowel, which need not therefore, be specified in the lexical entry for this formative.

Different scholars may put forth different interpretations, but surely it may be interpreted to mean that we need to recognize the need to put an unspecified vowel (which is a schwa) in the underlying representation.

Kiparsky (1968: 11) also argues that the underlying form should be recoverable from the surface forms. This recoverability condition is not satisfied in case of non-alternating schwa. For example, consider the stressless vowels of effort and sófa. Both are schwas and since these schwas never alternate with full vowels, we cannot say that the first schwa is
underlyingly /o/ and the second schwa is /a/ other than perhaps by tracing back to the history (as reflected in the spelling). As a matter of fact, we do not have to posit non-schwa full vowels for these words. One step further, we find that putting a schwa in the underlying phoneme inventory actually solves some of the mysteries of contemporary English phonology. This paper focuses on finding such data to support the underlying status of the schwa sounds in English.

In Section 2, we will look into {-ic} suffixation that involves non-alternating schwas to show that without an underlying schwa, {-ic} suffixation is not fully accounted for. In Section 3, we will show that consonant extrametricality with all the known exceptions are, as a matter of fact, the interaction of syllable weight with underlying schwa and the phonological nature that schwas should not be stressed. Section 4 deals with another exception-ridden aspect of syllable extrametricality. It will be shown that we do not have to divide English lexicon into multiple subgroups as in Kager (1989) and that syllable extrametricality is applied only to one group not to the other. Section 5 summaries the discussion and sums up the paper.

2. {-ic} Suffixation

One of the supporting evidence for the underlying schwa comes from {-ic} suffixation. Consider the following data that involve schwa-final words in {-ic} suffixation:

(2) Suffixation of {-ic} to stem-final schwas
   a. Vowel deletion
      aorta + ic    aórt[ø]ic
      vanilla + ic  vaníll[ø]ic
Putting aside other irrelevant aspects of {-ic} affixation, we find an interesting contrast between the data given in (2a) and (2b). In (2a), the word final schwa is simply deleted, while in (2b), the schwa is lengthened and appears as a diphthong. This seems to suggest that the word final schwas in (2a) and (2b) are from different sources. If they are all together derived from underlying full vowels, we cannot explain the difference at all. Why the final vowels in (2a) delete simply remains as a mystery.

What is common here in {-ic} suffixation is that any syllable that comes before the suffix takes the primary stress. Lee (2000) views this as the work of a constraint, Align-ic, that requires that the suffix (-ic) be added to a stressed syllable. In the meantime, there is another constraint that schwas are not found in stressed position. This constraint is responsible for the appearance of full vowels, with subsequent lengthening in (2b). Then the question is why there is no lengthening in words listed in (2a).

This paper seeks to find a solution in the different nature of the stem final schwas. For words in (2b), the final schwas are the reduced forms of full vowels. Therefore they are represented as full vowels in the underlying representation. But those in (2a) have underlying schwas. In (-ic) suffixation, the

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2 Though not dealt with in this paper, the very constraint Align-ic is employed in explaining vowel shortening before (-ic) in Lee (1998).
syllable that immediately precedes the suffix must take the primary stress. But since that syllable is headed by underlying schwas, it cannot be stressed. Therefore, it is deleted altogether to avoid any critical violation.

To see the result more clearly, consider the following constraints and their ranking:

(3) Constraints and their ranking
      The suffix {-ic} is added to the head syllable of a prosodic word.
   b. NonHead(ø) (Féry 1999: 15, Cohn & McCarthy 1994: 21)
      Schwas do not come in the head position of a foot.
   c. WeakOnset (Lee 1998: 69)
      A syllable in a weak position of a foot must have an onset.
   d. Ranking
      NonHead(ø), Align-ic, WeakOnset >> Ident-ø
      Max-V >> Dep-µ

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*One of the reviewer pointed out that we may posit a diacritic mark, [-stress] in the vowel represented here as an underlying schwa. I would agree and suggest that one way to mark it in the underlying representation is to posit underlying schwa. But there may be some technical aspects to consider. First we may have to posit a very abstract vowel in the underlying representation, in the sense that it is always realized as a schwa, along with the diacritic mark. And simple diacritic marks may not help in explaining the deletion of vowels as is discussed in this section.

*It should be noted that the constraint, Ident-ø, is a tentative constraint that will serve only for the purpose of simplicity. A fuller analysis may involve a combination of Ident-Feature constraint groups that does not allow any change of an underlying schwa. Further, we may need other constraints that guarantee the change of a full vowel into a schwa, vowel weakening, which is ranked higher than the proposed Ident-ø.
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(3c), *WeakOnset*, needs more explanation. This is a crucial constraint that is directly responsible for the vowel lengthening along with *Align-ic* and *NonHead(α)*. If the final vowel is stressed and the following (*-ic*) is forced to be in the weak position, then it incurs the violation of *WeakOnset*. In order to avoid *WeakOnset* while obeying the prosodic subcategorization constraint, *Align-ic*, the stressed syllable, by itself, must form a foot. Since the mono-moraic foot is not allowed due to the high ranking nature of the constraint *Foot Binarity*\(^5\), a mora is inserted in violation of *Dep-μ*. As such the ranking, *Max-V >> Dep-μ*, results in vowel lengthening. Consider the sample evaluation below:

(4) Sample evaluation

a. aorta + ic

<table>
<thead>
<tr>
<th></th>
<th>aorta[æ] + ic</th>
<th>Align-ic</th>
<th>NonHead(α)</th>
<th>Weak Onset</th>
<th>Ident-α</th>
<th>Max-V</th>
<th>Dep-μ</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>aor(t[ə]ic)</td>
<td>⬠</td>
<td></td>
<td>⬠</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii)</td>
<td>aor(t[éy]ic)</td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii)</td>
<td>a(ortic)</td>
<td>⬠</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv)</td>
<td>a(ort[ə]ic)</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b. stanza + ic

<table>
<thead>
<tr>
<th></th>
<th>stanza[æ] + ic</th>
<th>Align-ic</th>
<th>NonHead(α)</th>
<th>Weak Onset</th>
<th>Ident-α</th>
<th>Max-V</th>
<th>Dep-μ</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>stan(z[æ]ic)</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii)</td>
<td>stan(z[éy]ic)</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii)</td>
<td>(stánzic)</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv)</td>
<td>(stánz[æ]ic)</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There are other constraints involved here, and for a full picture, we will have to put more constraints and their ranking

\(^5\)The constraint *Foot Binarity* (*FtBin*) is assumed to be undominated following Lee (1999), and we will not consider candidates that violate *FtBin*. 
must be defined. We see that in (4a), the underlying schwa is deleted, violating Max-V. Other candidates, however, are fared worse since they violate higher constraints. Crucially, the candidate with a lengthened vowel in (4aii) violates Ident- and thus ruled out in the presence of (4aiii). In the meantime, in (4b), the final vowel is not a schwa and therefore a better solution than deleting a vowel is to change the phonetic value by adding one more mora.

What concerns us here is the different behavior of surface schwas in the stem final position. The only way that I know of in differentiating these two types of schwas is to assume two different sources of schwas. One is underlying and the other is derived from full vowels. Once the assumption is accepted, then we can fairly straightforwardly capture the difference of stem-final schwas in these words.

3. Syllable Weight

Some word final xVC(C) syllables are considered to be light, for the purpose of stress assignment. It is known as consonant extrametricality (Hayes (1980)) or coda extrametricality (Davis (1987)). It literally says that the final consonant (or consonant cluster) is ignored in syllabification, which renders the word final xVC(C) syllable light. This consonant extrametricality proposal is one of the most controversial issues in stress literature. Ever since Ross (1972), there have been many different proposals to explain the basic nature of consonant extrametricality. The most recalcitrant aspect of the

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6The analysis here is very sketchy. Refer to Lee (1998) for a detailed analysis. One would argue against the dubious nature of underlying /æ/ for the final vowel in stanza. It is, however, understood from the vowel shortening data such as Sp[ey]ne~Sp[æ]nish, n[ey]lion~n[æ]ional.
extrametricality is that there are exceptions left unexplained in each of these proposals. Kager (1989) proposes that there are at least three different subgroups in English lexicon and different rules or principles govern the different subgroups. Alcántara (1998) focuses only on the Latinate words, thereby tacitly assuming that non-Latinate verbs must be treated separately. In other words, these proposals claim that the lexicon is divided into subgroups and that different principles hold in different sublexical groups.

We believe that such division is very problematic in that it is not sufficiently constrained and in that it gives rise to multiple processes within one language thereby marring the consistent and systematic explanation. Instead, we will look into the nature of these problems from a different perspective to propose a solution employing underlying schwas. Let's begin by considering Ross' generalization of the weight of final xVC(C) syllable:

(5) Ross' (1972) generalization on final xVC(C) syllable.

a. A syllable that ends in two consonants will attract stress unless it is one of the following clusters: nt, st, ts, ns, rt, rd, rn. For words ending with these clusters stress cannot be predicted.

b. If a word ends in a non-dental obstruent, it must be stressed in final position. If the final syllables end with a dental obstruent or a sonorant, then stress cannot be predicted.

Ross's generalization has two parts. The first part is about final xVCC syllables, i.e. syllables with final coda consonant clusters, and their relation to stress. Ross generalizes that the final consonant clusters make the syllable heavy and such syllables attract stress, if they are not one of the seven specified
clusters. To check the reality of his generalization, I have checked through the word list that contains 109,582 words available at University of Oregon website. My focus was to see the token number of liquid–consonant clusters and their relations to stress. Multi–syllable words are collected\(^7\) and the result shows that, except for the 7 clusters, the tokens are very few indeed, and still there are exceptions to Ross' generalization. Consider the following table.\(^8\)

(6) Final liquid–consonant clusters and stress

<table>
<thead>
<tr>
<th>(C_1)</th>
<th>p</th>
<th>b</th>
<th>t</th>
<th>d</th>
<th>k</th>
<th>g</th>
<th>tf</th>
<th>d3</th>
<th>m</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>l</td>
<td>0(0)</td>
<td>0(0)</td>
<td>6(8)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>2(0)</td>
<td>1(1)</td>
<td></td>
</tr>
<tr>
<td>r</td>
<td>1(0)</td>
<td>3(0)</td>
<td>Ross</td>
<td>Ross</td>
<td>10(2)</td>
<td>5(0)</td>
<td>0(0)</td>
<td>2(0)</td>
<td>2(0)</td>
<td>Ross</td>
</tr>
</tbody>
</table>

\(^7\)Monosyllable content words are excluded because they are always stressed due to culminativity in total disregard to the final consonant types. (cf. Hayes (1995: 24–25)) Following the same line of thought, compound words and prefixed words are excluded in the statistics.

\(^8\)In the table, the total number of tokens are presented followed by the number of words that have unstressed final syllable in the parenthesis. "Ross" means the syllables with unpredictable stress according to Ross. The following is the exhaustive list of the tokens marked in table (6):

- a. lt gestalt difficult catapult basalt asphalt (Roosevelt)
- b. ld Canfield Chesterfield Daneel gold Garfield kobold piebald
  (Arnold cuckold Donald Gerald herald Herold ribald Ronald)
- c. lm napalm, Stockholm
- d. ln (Lincoln)
- e. rp Antwerp
- f. rb acerb rhubarb superb
- g. rk aardvark berserk Bismarck bulwark Denmark hauberck ostmark
  shagbark (Selkirk Newark)
- h. rg cyborg Hamburg Johannesburg Luxembourg Petersburg.
- i. rd3 concierge auberge
- j. rm alarm chloroform

One may argue that -burg in (h) can be analyzed as part of foreign compound. Notice, however, it will only strengthen the argument presented here.
The table in (6) shows two things. First, the actual examples, though extracted out of more than 100,000 words, are too few to make any significant generalization about the relationship between CC clusters and the stress. Second, Ross's generalization is incorrect in that syllables with \(lt, ld, lm, ln, rk\) clusters are not always stressed. These simply mean that Ross' generalization is not true. The consonant cluster composition does not tell us anything about the syllable weight.

Even in the case of (5b), we find that many of the xVC\# syllables that have non-dental obstruent coda consonants fail to take stresses as the examples in (7) show:

(7) Final xVC weak syllables with non-dental codas
   a. labials: développ, gâllop, chérub, Jâcobb
       môtive, câ tôiff, mástiff, târriff
   b. palatals: spînach, sândwich, côurage, knôwledge
   c. velars: eûnuch, tûssok, hámmmock, Tagâlog

The examples in (7) clearly illustrate that Ross' generalization has too many exceptions to be a proper generalization. The data in (7), as such, show that we cannot predict the weight of word-final syllables purely by referring to the coda consonant composition. Surely it is not just a Ross' problem. Almost all the researchers dealing with consonant extrametricality have made their own ill-fated attempt to explain syllable weight of word final xVC syllables.

What is common in the final xVC weak syllables, however, is that they contain a non-alternating schwa sound. Hayes (1995: 15) considers English stress data and concludes that if a syllable contains a schwa, it is never stressed. Now let's consider again the data given in (7) (and the examples in the parentheses in footnote (7)), we also find that the final syllables have non-alternating schwas and that may explain the lack of stress in
the final xVC syllable. We have already seen that we need the
c constraint, $NonHead(x)$ to explain vowel changes in {-ic} affixation
in English. With the shift of the locus of explanation, from coda
clusters to the vowels, we can easily see that the words in (7)
have non–alternating schwas in the final syllable. $NonHead(x)$,
ranked at the top, strictly prohibits these syllables to be the
head of a foot, which, in turn, means that no stress can be
assigned to these syllables. This explains the exceptional lack of
stress on the final syllable of these words.

Now we can turn to the unpredictability that Ross conceded
in (5). Again the correlation between coda consonant clusters
and stress is not predictable, but if we take a look at the vowels
in the final syllable, we come to clearly see that those vowels
are non–alternating schwas. Consider the data given in (8):\footnote{Parentheses in (8) represent foot structures. Though different
frameworks come up with different foot structures, they are not
theoretically important at this point. The important observation
is that the final syllables in (8a) are stressed, while those in (8b)
remain stressless.}

(8) Stress of underived words

<table>
<thead>
<tr>
<th>a. Final xVC heavy</th>
<th>b. Final xVC light</th>
</tr>
</thead>
<tbody>
<tr>
<td>(rán)(párt)</td>
<td>(yó)gurt</td>
</tr>
<tr>
<td>(Mó)(zár)</td>
<td>(éffort)</td>
</tr>
<tr>
<td>(mán)(sárd)</td>
<td>(hággard)</td>
</tr>
<tr>
<td>(gým)(nást)</td>
<td>(témpest)</td>
</tr>
<tr>
<td>a(ghást)</td>
<td>(inte)rest</td>
</tr>
</tbody>
</table>

Previous studies do not present any significant generalization
about the asymmetry found in (8). The usual interpretation of
consonant extrametricality is that the final consonant, not the
final consonant cluster, is ignored in assigning syllable weight. It
fails to explain the lack of stress in (8b). Davis’ (1987) coda
consonant extrametricality may explain (8b). Still he has
problems in explaining the presence of final stress in (8a), since these are all nouns and still exceptional to coda extrametricality.

Once we recognize the underlying schwa in English, however, we can put forth a very meaningful and exceptionless generalization. Examples in (8b) have underlying schwas in final syllables. And since NonHead(a) is very high in English, these words end up with stressless final syllables. Crucially, it does not matter whether the final syllables have just one consonant or a consonant cluster. Consonants are not the decisive factors in determining the weight of a syllable that contains a schwa vowel. And a schwa–headed syllable, no matter how many consonants are found in the coda, cannot be heavy.

As such, by moving our focus from the consonant cluster to the nature of the vowels, following the line of thought presented in Hayes (1995), we can explain the exception–ridden aspect of consonant extrametricality in English stress assignment.

4. Syllable Extrametricality

Syllable extrametricality, a.k.a. Noun extrametricality or Latin extrametricality (Hayes (1982)), is another aspect of complication in stress assignment. Though this is a topic for serious further research, we may peek into the findings so far and get the reality of extrametricality in English stress assignment. One of the crucial aspects to consider is the footing of #HLL# strings, where H represents a heavy syllable and L, a light syllable. With extrametricality in effect, we would expect (H–L)L\(^{10}\) parsing, which results in the initial main stress. Without syllable extrametricality, we would expect (H)(LL) parsing and the

\(^{10}\)H–" means a light syllable that is derived from a heavy syllable by moraic underparsing as in Prince & Smolensky (1993: 60–65).
primary stress would be placed on the second syllable.

To see the reality of syllable extrametricality, 6,463 tri-syllabic non-compound words that do not contain words with Class II affixes are analyzed and 348 words with HLL structure are separated out. The statistical result is shown in (9):

(9) Stress patterns of #HLL# words

a. Statistics

<table>
<thead>
<tr>
<th></th>
<th>word count</th>
<th>sSw</th>
<th>Sww</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>total words</td>
<td>348</td>
<td>77</td>
<td>256</td>
<td>25</td>
</tr>
<tr>
<td>underived words</td>
<td>109</td>
<td>47</td>
<td>53</td>
<td>9</td>
</tr>
</tbody>
</table>

b. Examples

i) sSw patterns
(Al)(páca) (Mánda)la
(án)(ténna) (Gólgo)tha
(bán)(dána) (Gíngi)va
(scin)(tilla) (córho)ra
(Úr)(bána) (rétsi)na
(Rò)(gállo) (timpá)ni

ii) Sww patterns
(Mánda)la
(Gólgo)tha
(Gíngi)va
(córho)ra
(rétsi)na
(timpá)ni

The statistics show two contradictory observations. If we take all #HLL# words into consideration, we see that nearly 75% of them show extrametricality. This may be viewed as a statistical evidence for the extrametricality proposal. On the other hand, if we consider only the underived words, then Sww words are less

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11 A small ‘s’ means weak stress, a capital ‘S’ means the main stress and ‘w’ denotes stressless syllables in the chart.

12 Others not specified here include Ssw (library, boondoggle) wSw (Kentucky, confetti, albino gazpacho), and variation between sSw and Sww (Montana, tempura, eczema). Words that end with [ow], are viewed as a result of final lengthening and thus regarded as L and stressless, following the proposal in Halle & Mohanan (1985).
than half. The absolute majority of $Sww$ words are found in derived words. We adopt the line of thought of Fudge (1984) and Lee (2000) to argue that Class I affixes are responsible for stress placement, and exclude them to focus only on the underived words.

What we actually see in (9b) is that the words with $Sww$ pattern almost always have non–alternating schwas in the second syllables. This observation captures the generalization. Schwas cannot come in the stressed syllable, since $\text{NonHead}($ does away with controversial and exception–ridden proposal of syllable extrametricality.

One problematic aspect of this analysis is that there are words that actually contain full vowels in the second syllable of $Sww$ pattern words. Examples are given in (10):

(10) Vowel alternation in HLL words with $Sww$ pattern

- fánt[ə]sy  \rightarrow  fant[ɨy]sia
- hárm[ə]ny  \rightarrow  harm[ow]nious
- húŋg[ə]ry  \rightarrow  hung[ɛə]rian
- lúx[ə]ry  \rightarrow  lux[ʊə]rious
- Cälg[ə]ry  \rightarrow  Calg[ɛə]rian
- dí[ə]ry  \rightarrow  di[ɛə]rial

These examples, however, are not threatening to the generalization of stress patterns. Note that all the examples given in (10) end in ‘y’ and that it appears as a suffix in such words as photography, tyranny, homophony and many others. And actually the words in the left column of (10) can be structurally reanalyzed as derived words. Though they are not suffixes from historical point of view, they are reanalyzed as suffixes and can possibly feed the process of back-formation as in greed (from
If we adopt this line of thought, crucially embedded in the notion of underlying schwas, then what we see in the difference of stress patterns in (9) is not the work of syllable extrametricality but the effect of underlying schwas and the related constraint, NonHead(\(\theta\)).

Another area we may look into is the stress placement of #LLL# type of tri-syllabic words. The survey result, employing the same method for #HLL# words, is shown in (11):

(11) Stress patterns of #LLL# words

a. Statistics

<table>
<thead>
<tr>
<th></th>
<th>word count</th>
<th>wSw</th>
<th>Sww</th>
<th>Others(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>total words</td>
<td>381</td>
<td>93</td>
<td>282</td>
<td>6</td>
</tr>
<tr>
<td>underived words</td>
<td>157</td>
<td>77</td>
<td>76</td>
<td>5</td>
</tr>
</tbody>
</table>

b. Examples

i) wSw patterns

   ba(nána)  (séne)ca
   to(ccáta) (páme)la
   spa(gétti) (sála)ry
   sa(lámí)  (ópe)ra
   pa(jáma)  (páti)na

ii) Sww patterns

   ba(nána)  (séne)ca
   to(ccáta) (páme)la
   spa(gétti) (sála)ry
   sa(lámí)  (ópe)ra
   pa(jáma)  (páti)na

With syllable extrametricality, words in (11a) remain unexplained. They are simply exceptions. We may, however, take a different approach. Though we agree that (11bi) types

\(^1\)One supporting observation is that there is only one \(y\)-final word, bialy, among 47 words that show sSw stress pattern. On the other hand, we find 16 words that contain word-final \(y\) among the 53 words that have Sww stress pattern. Note that grouping the first two light syllables in bialy results in the violation of WeakOnset.

\(^\text{14}\)Other types for underived words include wSw~Sww variation (sashimi, reveile, and kabala) and two other peripheral variation as in bógota/bógota, and cúpala/cúpalà.
Underlying Schwas in English

are exceptional, we find the explanation outside of extrametricality. First take a look at the examples given in (9). We see that both types of words have the first syllable properly footed. This is viewed as an effect of a constraint \textit{Align-PrWd} as given in (12):

(12) \textit{Align-PrWd} (McCarthy & Prince (1993: 2))

\begin{align*}
\text{Align} & (\text{PrWd}, L, \text{ Ft, L})
\end{align*}

Each prosodic word begins with a foot.

This constraint, designed to explain the initial dactyl found in English, Garawa and the like is responsible for the initial stress found in words in (11bii). From this point of view, these words have initial stress not because of the syllable extrametricality but because of alignment constraint on prosodic words (\textit{Align-PrWd}).

Now let's turn to the words in (11bi). What we actually find here is that the words in (11bi) have underlying and non-alternating schwas in the first syllables. Then, we see that wSw pattern, found in words in (11bi), is the result of the constraint ranking \textit{NonHead(\(n\))} \(>>\) \textit{Align-PrWd}. In other words, the high ranking nature of \textit{NonHead(\(n\))} prohibits the assignment of stress to these schwa-headed initial syllables in (11bi). Now consider the brief evaluation tableaux exemplified with the first words in (11bi) and (11bii):

(13) Sample evaluation tableaux

\begin{tabular}{|c|c|c|c|c|}
\hline
a. b[\(\alpha\)]nana & \textit{NonHead(\(n\))} & \textit{Align-PrWd} & \hline
\hline
\text{\(i\)} & (b[\(\alpha\)]nana) & *! & \hline
\text{\(ii\)} & b[\(\alpha\)](nana) & * & \hline
\hline
b. seneca & \textit{NonHead(\(n\))} & \textit{Align-PrWd} & \hline
\hline
\text{\(i\)} & (sene)ca & \hline
\text{\(ii\)} & set(neca) & *! & \hline
\end{tabular}

In general cases, the constraint \textit{Align-PrWd} forces the initial
syllable to be parsed into the foot and (13bi) emerges as optimal. But if the first syllable contains an underlying schwa as in (13a), NonHead(a) works against the parsing of a schwa-headed syllable into the strong position of a foot to rule out the candidate in (13ai). Therefore non-initial stress is witnessed in LLL words only when the first syllable contains a non-alternating schwa vowel.

Historically, it is true that LLL words of Latin origin have antepenult stress due to syllable extrametricality and that non-Latinate LLL words have penult stress. The distinction in this historical stage clearly comes from their morphological origin. However, lapse of time and nativization of foreign words have blended these two types of words and produced a language internal generation that obliterates the effect of syllable extrametricality. The newly emerged generalization is the presence of a schwa vowel in the underlying representation. As for words in (11a), being of non-Latin origin, they have stressless initial syllables, and the initial vowel is historically reduced to a schwa, completely losing its original phonetic value, giving birth to underlying schwas.

5. Conclusion

In this paper, we have surveyed three different areas of English phonology to propose that a schwa vowel has phonemic status in English. The data employed in this paper clearly support the idea that a schwa is not just a derivative, resulting from vowel reduction, and that a schwa should be recognized as a full-fledged phoneme.

When {-ic} is suffixed onto schwa-final words, the stem final vowels are either deleted or lengthened. There is no
morphological difference between the deleting and lengthening
groups of schwa final words. The proposed explanation is that
the surface schwa is lengthened if it is a reduced form of a full
vowel and it is deleted if it is an underlying schwa.

Deciding the weight for word final xVC(C) syllables has been
most problematic in English stress literature. We have shown
that no amount of theoretical elaboration based on the final
consonant and consonant cluster types can make a correct
prediction on the syllable weight. The only generalization we
can possibly get is that the presence of a schwa makes the
syllable light.

Finally in explaining syllable extrametricality, we are forced to
divide the English lexicon at least into two groups: one with
syllable extrametricality and the other without it. Such arbitrary
division of words significantly weakens the theory on syllable
extrametricality. With underlying schwas and a constraint
against a stressed schwa, however, we may produce a significant
generalization that it is the constraint NonHead(a) and the
presence of an underlying schwa, that result in the surface
complexity involving syllable extrametricality.

As such, though schwas are historically derived by vowel
reduction, they can be synchronically viewed as a legitimate
phoneme in English. They, however, still retain the general
property of historical development that they cannot come into
the head position of a foot.

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