

# **A Fact in Historical Phonology from the Viewpoint of Generative Phonology: The Underlying Schwa in Old English**

## **Abstract**

Although OE schwa has been viewed as an allophone, but not as a phoneme, the abstract schwa like the latter appears in the analysis of a phonological representation. The four pieces of evidence (posttonic weakening, derivation, distribution, and consonant lenition) converge to argue in favor of the underlying schwa of the syllabic consonants. The present discussion is, in terms of analyzing the correct underlying form, superior to the one solely of a sonorant consonant that has seemingly been implicitly accepted. The effect the article has on facts of English contributes to the form on account of which another early schwa invisibly takes place. It makes a contrary view both on the long-standing fact that the OE allophone caused by the vowel reduction shifted to the ME phoneme and on the ban on the occurrence of the schwa that is caused by epenthesis, derivation from rhotic and alternation with high vowel.

## **1. Introduction**

Historical research has the well-known fact that OE schwa appears as an allophone, but not as a phoneme. The allophonic schwa as well as word order, impersonal construction, meters and proeses, noun cases, strong and weak verbs, the Norman Conquest, breaking, ME schwa deletion and others has very long been orthodoxly shown in the textbooks. The 'history' of the historical facts therein dates back to the days before or around those of Sweet and Jespersen. The status of the schwas conforms to the historical direction that full vowels undergo vowel reduction and that, in the later stage, the reduced vowel is deleted in some way. OE has only the former prior to the mutes. For sound changes, allophonicization takes precedence on phonemecization in terms of early occurrences. Whether or not the seemingly unchangeable fact can be changed deserves a pursuit of research. The article seeks to pursue other existence of early schwa by employing the derivational account in the analysis, which leads me to argue for the nonallophonic schwa in the phonology.

Though not commonly regarded as the theme of the research, OE syllabic consonants are subject to phonological discussion. The reasons are two-fold. First, syllabic consonants occur as an allophone, whose representation, relative to the segment without derivation, involves highly commonly certain unsolved issues; the controversy for derived segments occurs everywhere in the phonologies of the world's languages. Inside OE, vowel reduction, smoothing and cluster simplification representationally differ between underlying

and surface forms and have some controversial aspects with respect to, say, the different underlying vowels from those in other languages (Crosswhite 2001 for the crosslinguistic view), functional account (Howell and Wicka 2007), sonority (Suzuki 1989), in the order of the phonological processes specified above. Second, topics with minor attentions in previous research may lead to a new finding. Unknown facts or phenomena are expected to still remain, all else being equal, in the sense of, beyond pure facts such as alternation and lengthening, the way in which notion or theory in modern phonology is applied to the topic. Apparently, OE syllabic consonants seem to have received the least attention among the controversial topics in the historical research and thus may lead to uncover a fact or a phenomenon. The following give the examples of the syllabic consonants cited from Campbell (1959:171-172):

- (1) *botl* ‘building’, *setl* ‘seat’, *botm* ‘bottom’, *fæþm* ‘embrace’, *mæþl* ‘talk’, *nædl* ‘needle’, *adl* ‘disease’, *midl* ‘horse’s bit’, *widl* ‘impurity’, *ædr* ‘vein’, *maðm* ‘treasure’, *æðm* ‘breath’

The restrictions on the occurrences are generalized to being in part same as, but in part different from, those in other languages. The OE syllabic consonants in all of the above examples as well as those in other literature share some aspects: (a) word-final, (b) posttonic, not pretonic (c) preceded by obstruent, and (d) unstressed syllables. The segmental conditionings contain (a) surface lateral release vs. lack of nasal release, (b) lack of syllabic velar nasal, (c) nuclei distributed slightly similar to those in the later stages (relatively common syllabic [r, l, n]) and (d) no syllabic obstruent.

In the history of the English language, schwa is considered to be the typical segment to have undergone a variety of shifts. The occurrences and the subsequent mutates of schwas have repeatedly happened.<sup>1</sup> Irrespective of the differences in terms of being (a) allophonic or phonemic, (b) deleted, alternative, or shifted, and (c) common or rare, the former consist of the four sorts of phonological processes and the latter the three sorts of them:

- (2) a. vowel reduction (highly common throughout HEL)  
 b. vowel epenthesis (PDE, ath[ə]letics),  
 c. derivation from rhotics (Early ModE *ir*, *er* → ɜ:, first, eternal)  
 d. alternation with high vowel (PDE devil)
- (3) a. vowel loss (OE whanne, ME whan ‘when’)  
 b. syllabic consonant formation (ModE able, water)  
 c. Open Syllable Lengthening (ME take, name, cf. Minova 1982, Hayes 1989)

One of the common shifts in the language is shown to be the vowel reduction and, in the later

period, the syllabic consonant formation. The shifts of the former in ME and of the latter in ModE are illustrated by the words *seven* and *middle*. Other common shift consists of the vowel reduction in Late OE or Early ME and the vowel loss during the ME period in the process of either (3a) or (3c).

The OE schwa was derived as an allophone from the unstressed vowels (*e, o, a, u*). In the history of the English language, unstressed syllables highly commonly undergo vowel reduction and schwa is subject to increase to the large extent. Prior to the common schwa in ME, the OE schwa has much less frequency relative to that in the later periods, while the one in ME and ModE is more or less deleted in some way. It seems that the allophonic, but not phonemic, schwa has been accepted, without any doubt, by English historical researchers. The article challenges this well-known, long-standing fact. It finds out a fact by employing a traditional tool of theoretical phonology in the historical phonology. The argument, at first glance, might be a simple analysis, but uncovers an unknown schwa that means to differ from the well-known fact in the unstressed syllables that has been considered to be true very long following the classical historical works.

The early schwa that was derived from the unstressed vowels has been made everywhere in textbooks, handbooks, introductory remarks in relevant papers and academic lectures. Whereas Lass (1994), Stockwell (1996), Minkova and Stockwell (2008) view the second elements of OE diphthongs as schwa with the dates and the conditionings inconsistent, the schwa is beyond the scope of this article. Diphthongs consist of unseparable two elements, one of which does not constitute either phoneme or allophone. Notwithstanding the sole existence of the schwa since the classical research, my assertion posits another one.

The historical phonologists (Vennemann 1976, Rauch 1981, among others) have questioned the issue of whether or not schwa constitutes a phoneme in Early West Germanic languages. The allophonic status of OE schwa has been almost, if not totally, agreed by English historical phonologists and no objection might arise hereafter. The present article seeks to pursue and find out other schwa in the phonology.

The analysis made in what follows plays an effective role not only in the derivational analysis of the variant but in a fact of early schwa. English historical phonologists have, for the most part, implicitly, assumed the underlying form to consist solely of the corresponding sonorant consonant. The former effect is meant to positing a different opinion with respect to the underlying form of the OE syllabic consonants. The arguments are made that the two surface forms syllabic consonant and unstressed vowel plus the corresponding nonsyllabic one are represented as the form with schwa underlyingly and that the abstract form without schwa has flaws in a few respects. The four pieces of the evidence posttonic weakening, derivation, distribution and consonant lenition convergingly demonstrate the underlying schwa.

This article is structured in the following way. Following the theoretical introduction of underlying forms (section 2), the four criteria are shown to play a conditioning factor:

posttonic weakening (section 3), derivation (section 4), distribution (section 5), and lenition-based analysis (section 6). Sections 4 and 5 exhibit the flaw on the underlying form solely of a nonsyllabic consonant, relative to the underlying schwa evidenced without fail. Sections 7 and 8 examine the other forms of OE schwa and give rise to the argument that the other surface schwas do not take place derivationally or analytically. Section 8 concludes this paper.

## **2. Underlying form**

### **2.1. Necessity in phonological theories**

Underlying forms (or underlying representations) are employed in phonological theories. The phonologists (Kenstowicz 1994, Clark and Yallop 1995, Gussenhoven and Jacobs 2005, Odden 2005, Hayes 2009) explain the term in their books outlining phonological theory. Underlying forms are assumed to be an abstract entity regarding allophones. The earlier postulation dates back to the classical research such as Trubetzkoy, Trager and earlier works of Halle.

When two or more phonetic forms appear per morpheme, underlying form is required to be analyzed in the licit way in the phonological grammar of individual languages. The reasons for the necessity of underlying forms are three-fold. First, the derivation from inputs to outputs has always occupied one of the central issues in phonological theories. It holds to, taking one work from each theory, Linear or Classical Generative Phonology (Chomsky and Halle 1968), Syllabic Phonology (Kahn 1980), Historical Phonology (Vennemann 1988), Lexical Phonology (Kiparsky 1982), Underspecification Theory (Steriade 1995), Optimality Theory (Kirchner 1997), etc. It is a matter of fact that languages have phonological changes and accentual and/or syllable-based variants and that the former are represented as the shift of the form from phonological to other phonological, while the latter as the one from phonological to phonetic. Owing to the latter, the underlying form per more than one pronunciations is in essence needed and the phonological analysis gives the outcome. Second, some rule applications apply only to either of the forms. Assuming that a rule is applied to a phonological form, phonological changes are meant to be the shifts from one abstract form to the other. The derivation into phonetic form is made at synchronic level. By contrast, allophonic shifts in identical words in an accent of contemporary languages imply the derivation from one surface form to the other, whether the underlying form, dependently on each case, remains consistent or becomes different. Third, economy and generalization play a key role in linguistic theories. Both of them share the core feature that fewer accounts or descriptions prescribe more linguistic entities. In phonology, Clements (2003), discussing

feature economy, makes use of minimum feature inventories with respect to the large number of segments. Underlying forms correspond to the account of minimization. To postulate them implies representational economy since two or more phonetic forms become underlyingly one phonological form.

## 2.2. Conditionings

Given two or more identical surface forms, the underlying form differs among languages. The case of syllabic consonants in which the two forms [l] and [əl] surface is represented underlyingly as /əl/ or /l/ in each language. When adducing some pieces of evidence, some of the phonological processes have universal aspects. In relation to the assumably correct underlying schwa, vowel reduction (Crosswhite 2001), monomoric rhyme, and less sonorous nuclei in unstressed syllables (Vennemann 1988b for the two) and less sonorous syllable margins are involved in the crosslinguistic phonological processes and applicable to the specific observations in OE. Others are meant to be the conditionings in the level of individual languages; adjacent segments, contemporary shifts, differences between dialects, historical direction in a narrow sense, possibility of epenthesis and deletion, etc. must be taken into consideration. Regarding the present theme, languages may or may not have schwa epenthesis; vowel reduction may or may not be common; schwa is likely to shift to either rhotic to full vowel, etc. Now work out the following schemata and examine several sorts of conditionings:

- (4) a. /A/ → [A], [B]  
b. \*/B/ → [A], [B]

It is shown that given the two phonetic forms [A] and [B], the underlying /A/ is meant to be correct, while the other is to be incorrect. If [A] occurs much more commonly than [B], and if [B] occurs by way of the assimilation of an adjacent sound (e.g. /s/ to [ʃ] followed by high front vowel, obstruent voicing between vowels), the underlying /A/ is expected to be true. The faithfulness for the majority represents the derivational economy. The assimilations like the ones above commonly take place. Some of underlying forms can be chosen only by this kind of simple analysis, which is nonetheless insufficient to accounting for other underlying forms which require other several factors to be employed in the analysis.

The first grounding stems from distribution. The inventory of vowels differs between stressed and unstressed syllables and that of consonants between onsets and codas. The tendency is intrinsic that stressed vowels are more sonorous than unstressed vowels (cf. de Lacy 2004 for the contemporary discussion). In particular, the vowels of mid status in terms of sonority (e.g. mid central, high and mid peripheral vowels) fluctuate between stressed and

unstressed ones. The sonority-based system affects underlying vowel. Some consonants tend to be banned syllable-internally (onset /ŋ/, onset lateral release and coda /h/). In OE as well as in some other languages, this makes a contrast with the allophonic occurrences of the coda [ŋ], the syllabic lateral release and onset [h] vs. coda [x, ç]. All else being equal, onsets and codas have some clear-cut distributions; the former have smaller sonority value or more phonetic strength relative to the latter; coda consonants occur more commonly by way of syllable-internal allophones and, thus, are required to be analyzed on what the underlying form is.

The effect the distributions have on analyzing underlying forms leads to language-specific difference. Languages may have stronger syllabic gaps than the general ones. OE has the gaps; unstressed syllables contain low vowel, which is usually stressed; consonant lenition (cf. Kirchner 2001, Kingston 2007 for the examples and the phonetic bases) occurs, for the majority of the cases, in minor degrees. The lenition from /g/ to [j] (weg 'way') exceptionally represents a high degree. The former has closure and release, while the latter no constriction of air flow.

The distribution affects the underlying status of segments. Provided that a segment is distributionally highly common, or appears in many basic words, the segment has more possibility to occupy it. The phonological system of a language is not equivalent to the one in Universal Grammar. The two surface forms [ŋ] and [ən] are commonly derived from the underlying /n/ or /ən/. It depends on phonological grammars. A language with schwa highly frequent, in terms of either the inventory of unstressed vowels or the manifestation in basic words, may result in the underlying status of the schwa.

Second, derivations are restricted within those that conform to language-internal cooccurrences. The schemata in (5) demonstrate the licit underlying form /A/ and the illicit one /B/, in relation to adjacent sounds, regarding the two phonetic forms [A] and [B]:

- (5) a. /A/ - [AX], [BX], [BY]  
b. \*/B/ - [AX], [BX], [BY]

In the above, the phonetic representation [A] is followed by [X], while the one [B] by [X] or [Y]. Certain restrictions hold to each of the derivations. Given that [AY] is prohibited from appearing as a phonetic representation and that [BY] surfaces, the underlying /A/ makes sense. Due to the ban on the former as a surface, [BY] is derived naturally from the assumably licit underlying form /AY/. Conversely, the reason why the underlying /B/ does not work owes to the allowed surface form [BX]. It does not lead the form [AX] to surface, unless a certain factor motivates the outcome in (5b).

Turn to consider the issue of vocalic weakening processes, which consist of monophthongization (diphthong to long or short vowel), vowel shortening (moraic decrease),

vowel reduction (full vowel to schwa, for the majority), vowel loss (unstressed vowels mute) as well as the syllabic consonant formation with the loss of schwa (compensatory formation of syllabic nuclei). The last one corresponds to the assertion in this article. If the syllabic formation results from the schwa deletion, weakening processes are required to commonly take place in the sense of whether many of them are manifested in the phonological grammar of the language at issue or certain weakenings are just or near obligatory.

Language acquisition occupies the third case, though it is irrelevant to the analysis in early English due to native speaker. The evidence does not appear that certain segments or clusters come to be pronounced earlier or later. In languages where acquisition is involved in the criteria, the pronunciation in early stage more commonly represents underlying form. Two segments that equally appear in both early and late stages give no clear evidence with respect to acquisition. On the condition that one of the two segments is frequently pronounced or acquired in early stage, all else being equal, the segment is possibly selected as abstract form. The language acquisition from early to late stages reflects the mapping from underlying to surface representations.

The fourth conditioning on the analysis is meant to be diachronic, but occasionally, synchronic, segmental shifts. There are two pieces of factors related to this. The first one is the existence of a segment at issue in earlier stage (ca. a few hundred years ago). In the case in which one of two or more phonetic forms occupies the underlying status, it is not involved in the evidence at this point. The underlying-surface faithfulness does not require that a segment lacking in contemporary pronunciation be in abstract form. When an underlying segment differs from all of two or more phonetic forms, the sound must exist in the period prior to or contemporary to the one analyzed in the literature. Halle and Mohanan (1985) argue on the underlying forms of ModE diphthongic vowels, which are illustrated as in the following:

(6) a. Eat /e:t/ - [i:t]

b. Fight /fi:xt/ - [fart]

Both of the underlying vowels illustrated above represent the corresponding surface forms in ME that were replaced by each of the ones in (6a, b). The phoneme /x/ exists in ME, but not in ModE. These forms demonstrate the mapping from the inputs to the outputs. In the sense that the earlier forms in ME are prior to those in ModE, the ME forms are equivalent to the inputs.

Another effect sound changes have on the analyses contributes toward the direction of shifts (cf. diachronic direction of syllable structures Vennemann 1988, diachrony vs. synchrony Blevins 2004, 2006). This is, in part, not shared by languages, in the narrow sense of prescribing phonological grammar. In the English language, the phonological

processes which have occurred commonly throughout the history contain posttonic weakening, onset-coda differentiation, the number of morae in stressed syllables from two to more than two. If one of the specific periods has one of the language-specific shifts, it is able to be employed in the analyses.

Finally, phonological environments, whether phenomena or constraints operate, play a role. Intervocalic strong consonants (more constriction of air flow) tend to undergo lenition. Assuming that /A/ - [B] is meant to be a lenition and that /B/ - [A] a fortition, the environment of the two or more phonetic forms gives a clue to the analysis. If it is likely to undergo lenition, underlying /A/ makes sense owing to the match between the phonological process and the derivation from the underlying to the surface forms, and vice versa.

### 2.3. Underlying forms and phonemes

Phonological theory has the different use of the two technical terms on abstract forms. Phonemes are referred to as the minimal inventory of segments. Given the words *land* 'land' and *rand* 'border', the lateral and the rhotic play a distinctive role and the words constitute a minimal pair. Both of the liquids are therefore involved in OE phonemes. The alveolar nasals in the words *span* 'suggestion' and *spann* 'span' present the parallel factor. Both the singleton and the geminate are involved in OE phonemes. Phonemic analyses can be made by finding out the minimal pairs where one of the all segments in two words solely makes a contrast with each other.

Although underlying forms are equivalent to phonemes in the sense of the representations in the phonological level, the former differ from the latter in a few respects. First, underlying forms are not always consistent with phonemes owing to the use of the forms in earlier periods like those in (6a, b). Second, phonemes in a language have very similar distribution to the ones in other languages. Common phonemes such as /j/ and /t/ are shared by the majority of the world's languages (cf. Maddieson 1984). In analyzing underlying forms on two or more same phonetic forms, each language receives different outcomes. The reason for it stems from the difference on adjacent segments, sequential prohibitions, historical direction, etc. To take one case, the underlying form of syllabic consonants and the surface form with schwa is commonly divided into the different ones: for [ŋ] and [əŋ], /əŋ/ in one language or /n/ in other.

### 2.4. An effect on English historical phonology

Segmental shifts have some historical directions. In a period, consonants are replaced by other ones and new forms appear. The directions have, most commonly, syllable-based conditionings: stability in onsets vs. variability in codas, strengthening in onsets vs.

weakening in codas, etc. In the history of English, the phoneme /h/ behaves differently from other segments. Both the deletion and the reoccurrence for it have repeatedly happened and English historical researchers had considered the inconsistency to be a myth (e.g. Clark 1992, Lass 1992). The analysis on the basis of whether or not the initial /h/ is pronounced in descriptive terms can not account explicitly for the issue.

Crisma (2007, 2009) employs underlying form in the analysis on the behavior of /h/. The satisfactory accounts result from the supposition of underlying form. The deletion of /h/ is not meant to be the deletion in each case and the reoccurrence is not phonemecization, either. In the diachronic level, the descriptive accounts for both of the processes are replaced by the unitary account from the point of view of generative phonology. Thus, the behavior of /h/ does not contradict with the historical direction of English, but conforms to some of the phonological processes where the underlying /h/ may or may not surface. The Crisma's account changed the unnatural shift into the natural one. Furthermore, ME accents vary on the condition that the underlying /h/ surfaces. Both [h]-full and [h]-less variants have some features.

Relative to the Crisma's (2007, 2009) explanatory use of the underlying form, the author in this article makes an analysis of finding out a fact on the basis of underlying form. Early schwa has constituted one of the main topics in English historical phonology (cf. Minkova 1982, 1985, Lass 1985 on Open Syllable Lengthening processes, Minkova 1987, 1991 on apocope, Lass 1994, Stockwell 1996, Minkova and Stockwell 2008 on the second elements of OE diphthongs). The present research does not give the descriptive analysis, but posits the fact related to generative phonology in the research traditionally addressed in the literature. The assertion made in the paper contributes not only to the analysis of the correct underlying form but to the new evidence on early schwa.

## 2.5. Generative phonology and historical phonology

It is a matter of course that modern research on historical phonology has, for the majority of the cases, more or less, beyond the description of pure facts, depended on theoretical analyses. I observe that it makes use of two sorts of the theories: those of historical linguistics and of generative phonology. The former is not equivalent to the latter that specify the mapping from inputs to outputs, but rather function as the account for the mechanism of language changes. The theories are shown to be phonological laws in contemporary view (Petrova 2004, Pierce 2006, Vennemann 2006, Johnsen in press), lexical diffusion (Phillips 1984, 1998, 2001, 2002, 2006, Kiparsky 1995, Ogura 1995, Ogura and Wang 1996, 1998, Bybee 2002), dialectology (Hickey 2004, Hogg 2004, Liberman 2007, Ogura and Wang 2004, Ogura, Wang and Luca 1991), Union of linguistics and philology (Lutz 1986, Hogg 1994, Minkova 2004), the analyses by way of Ormulum (Anderson and

Britton 1997, 1999, Fulk 1996, Mailhammer 2007, Murray 1995, Page 2000, Phillips 1992), Metrical Grammar (Cable 1991, Stockwell and Minkova 1997b), shifts and drifts (Labov 1991, Stockwell 1996, Stockwell and Minkova 1997a) and functional, social and chaotic changes (Butters 2001, Ogura 2008).

The issue this paper addresses is based on the theoretical analyses. The advent of generative phonology has required English historical phonological research to be reanalyzed in the contemporary framework beyond the description of facts and pure analyses. The assertion of the research this article addresses employs the framework of generative phonology in historical phonology. The way of doing the research alongside this line has been taken up in various respects. Apart from Optimality Theoretic research (Miglio 1998, Miglio and Morén 2003, McMahon 2000, 2003, 2007, Bermúdez-Otero and Hogg 2003, Bermúdez-Otero 2006, Pierce 2008) and several syllabic analyses (Murray and Vennemann 1983, Murray 1988, 2000a, 2000b, Vennemann 1988a, 1988b, 2000, Minkova 1985, 1987, 2000, Suzuki 1985, 1994, Lutz 1986, 1992, Liberman 1990, Salmons 1990, Fulk 1997, 1998, Ham 1998, Terajima 1998, McCully 2002, Riad 2004, Mailhammer 2007, 2009, Schlüter 2009), generative phonology has had the effect on the contemporary views on English historical phonology: to take, though not all, inclusively many works, historical direction on the basis of syllable structures (Vennemann 1988), Nucleus Stress Rule in ME (Minkova and Stockwell 1997), the specific ranking of sonority in early Germanic (Suzuki 1989), to account for idiosyncratic phenomenon by making use of underlying form (Crisma 2007, 2009), the shifts of syllable onsets (Minkova 2000), the analyses based on speaker-listener (Page 2006, cf. Ohala 1981, 1989, 1993, 2010 for the theoretical suppositions), phonetic bases on phonological change (Howell and Wicka 2007), phonetic bases on diachronic shifts (Hall 2004, Oda 2008), early forms and the corresponding PDE forms (McMahon 1990, Beal 2007), Dispersion Theoretic analysis (Minkova and Stockwell 2003), fortition and lenition (Honeybone 2003, 2007), phonemes and allophones (Laker 2009, Minkova 2011), systematic occurrence of marked diphthongs (Oda 2007b).<sup>1</sup>

To take the view of way of making arguments, these are classified as the seven sorts: to compensate for explanatory inadequacy in previous research (e.g. phonetic bases), to make controversy resolved (e.g. the Crisma's papers), to divide unified analysis in early Germanic languages into different one (Page 2006), to argue whether or not contemporary phonological theory is capable of being applied to early English (Minkova and Stockwell 1997), to suggest other account in a framework (Butters 2001), to reexamine a long-standing issue (Minkova 2000, Honeybone 2003), and to give a new topic in the research (e.g. lexical diffusion). My way of argument in this article differs from all of them demonstrated above: to find out a fact. In the sense of making article in English historical research combined with generative phonology, it differs from all sorts of the previous assertions.

## 2.6. The assumption

As mentioned in section 2.2., contemporary or earlier existence of the segment at issue constitutes one of the criteria on underlying forms. To assert the underlying schwa in OE necessitates as the prerequisite the segment during the contemporary or slightly earlier date. Historical phonological works (Minkova 1991, Hogg 1992a, b, Lass 1994, among others) have assumed the earliest occurrence of schwa to be one of the four possible dates in the view of half a century periods: late 8<sup>th</sup> century, early and late 9<sup>th</sup> centuries, and early 10<sup>th</sup> century. Whether or not the exact date is either of them, the two generalizations should be clear; (a) the schwa in early OE is possibly considered to occur with less frequency, on the condition that all of the OE unstressed syllables underwent vowel reduction during in late OE; (b) the one in Late OE being no need for questioning the existence, the allophonic occurrences had been increasingly common.

In the two phonetic forms relevant to the examples in (1), there are the three logically possible underlying forms: nonsyllabic consonant with schwa, with phonemic unstressed vowel and without vowel. The phrase ‘logically possible’ at this point is meant to be the assumable derivations. For instance, the derivations from one consonant to other are definitely meant to be the ones where the two consonants share point or manner of articulation. Likewise, the sonorant syllabifications do not take place arbitrarily. The syllabic consonants do not constitute a candidate on the underlying form since OE has no minimal pair where nonsyllabic and syllabic sonorant consonants make a contrast with each other (e.g. *set*/l/ vs. *set*/l̩/). Owing to the restricted occurrences within unstressed syllables, the vowels in unstressed syllables in (7) and (8) might be allowed to be true underlyingly. The schwa occupies the underlying status of the syllabic consonants in PDE (Gimson 1980, Wells 1995, Oda 2007) and, with the derivation controversial, Present-Day German (Wiese 1986, 1996, Johnson 1998). The four vowels in (8) represent the phonemes in unstressed syllables, though they differ radically from those in other languages. The nonsyllabic consonant in the abstract form in (9) is another possibility. I wonder that the majority of English historical phonologists believe it to be correct. OE is near typical in the sense of spelling-pronunciation correspondence. Given the words such as *bearhtm* ‘instant’, *setl* ‘seat’, and *tacn* ‘token’, the underlying representations in (9) on the word-final syllabic consonants might be considered to make sense. Taking the different view, I bet those in (7) is correct:

- (7) a. /ə/ + /r, l, m, n/ in onsets or codas [ɾ, l̩, m̩, n̩],  
b. /ə/ + /r, l, m, n/ in onsets or codas → /e, o, a, u/ + [r, l, m, n] in onsets or codas

- (8) a. \* /e, o, a, u/ + /r, l, m, n/ in onsets or codas [ɾ, l̩, m̩, n̩]  
b. \* /e, o, a, u/ + /r, l, m, n/ in onsets or codas /e, o, a, u/ + [r, l, m, n] in onsets or

codas

- (9) a. \*/r, l, n, m/ → [r̥, l̥, m̥, ŋ̥]  
b. \*/r, l, n, m/ → /e, o, a, u/ + /r, l, m, n/ in onsets or codas

In the remainder of this article, the four pieces of evidence in favor of my assertion will be posited. It is also argued that the other underlying forms have the explanatory inadequacies and that the other four logically possible cases turn out to lack the schwa in the phonology.

### 3. Posttonic Weakening

Unstressed syllables in English commonly undergo vocalic reduction following stressed syllables in terms of the number of morae, articulatory energy or duration. This is referred to as posttonic weakening (cf. Minkova 1991, Giegerich 1992, Wells 1995, Hammond 1999, McMahon 2002 and others) and widely observed in every period of English as diphthong monophthongization (VV to V), vowel shortening (long to short), vowel reduction (full to reduced), vowel loss (weak nuclei disappears) and sonorant syllabification (schwa deletion and compensatory syllabic status of sonorant consonant, if weakening). Diphthong monophthongization is not involved in weakening processes in OE, though the one termed smoothing occurs in the stressed syllables (liohtan > lihtan 'light', beacen > becen 'beacon'). The syllabic consonants occur in the posttonic syllables, as in (1). Whether the syllabic consonants are derived by way of a vocalic weakening process (the case of the underlying schwa) or by way of the sonority (the one without the schwa) should be pursued throughout this article. Other vocalic processes conform to posttonic weakening: reduction, shortening and loss, in the order shown below:

- (10) a. stanas > stones 'stone'      b. sunu > sune 'son'  
(11) a. winī > wini 'lord'      b. mihtīg > mihtig 'mighty'  
(12) a. woruld > world 'world'      b. rikiu > ricu 'rules'

Setting aside the suspended sonorant syllabification, the three weakening processes in (10)-(12) occur in the posttonic syllables. That is why OE is assumed to be included in the languages with the posttonic weakening processes in the phonology. Given the syllabic consonants like the ones illustrated in (1), all of them occur in the posttonic syllables. The unstressed syllables in the non-posttonic positions consist of the following two: the first syllable of words with two or more syllables with the second stressed and the final syllable of words with the first of trisyllabic words or the second of four syllabic words stressed. In

terms of the syllabic consonants following an obstruent, which hold to all of the examples in OE, the following two cases might be possibly expected to appear:

- (13) a. forlætan ‘to let go’  
      \*[r]  
      b. fremedon ‘advance (past plural)’  
      \*[ŋ]

The nonposttonic syllabic consonants like those demonstrated above, however, do not appear in the literature. It implies that the OE syllabic consonants are, without exception, restricted to posttonic syllables (see 1). Syllabic consonant formations crosslinguistically may or may not be classified as weakening process. It depends on the phonological process from underlying to surface forms.

Let us examine the two competing underlying forms on how the derivation proceeds. If the underlying form solely of a nonsyllabic consonant is correct, the formation stems from the violation of the sonority contour in the syllables that forms that the word-final sonorant consonant is preceded by an obstruent. The phonological process does not mean to be a posttonic reduction in some sense, but rather presents the issue of the sonority inside the syllables. No exception regarding the more sonorous word-finals relative to the preceding consonant renders sonority-based the underlying form that consists solely of a sonorant consonant.

The derivation from the underlying form with schwa to the surface syllabic consonant represents the one containing the schwa deletion and, subsequently, the compensatory sonorant syllabification. It is accounted for by a weakening process since the vocalic status of syllabic nuclei as the neutral vowel varies to one of the liquids and the nasals. Whether the functional aspect of the shift is grounded in phonological features or a certain physical activity is beyond the scope of this article. The issue to be pursued at this point is ascribed to the phonological process, rather than the functional motivation. The analytical difference of the underlying forms results in that of whether or not the weakening process occurs. That is why the application of the posttonic weakening processes is required to be considered.

Prior to the increase in the later stage, schwa has the limited occurrences in OE. The schwa is originated in the vowel reduction which dates back to one of the four periods late 8<sup>th</sup>, early and late 9<sup>th</sup> and early 10<sup>th</sup> centuries. While the English historical phonologists, as those mentioned in the last section, have assumed the slightly different ideas on the earliest schwa, it has been the universally accepted idea that it first occurred in the earlier stages of OE. The schwa has a highly common distribution to the posttonic syllables. Minkova (1991:1) describes that the OE vowel reduction occurred ‘in all posttonic syllables’. It is reflected in the vowels of the posttonic syllables in the ME phonological systems. Even if nonposttonic

syllables underwent vowel reduction, the highly common word-formation of the disyllabic words with the first syllable stressed leads to the fact that the process of the OE vowel reduction is peculiar to the posttonic environments. It is one of the remarkable facts that the syllabic consonants and the vowel reduction have in common the occurrence in posttonic syllables, though the minor difference occurs that the former is always and the latter is for the most part restricted to the position. (See 1 on the examples of the former. The exceptions on the latter are illustrated by the words with one of the prefixes *be-*, *ge-*, *for-* for which the syllables with it are unstressed.) In any case, both of the processes have the distributional similarity to the large extent.

Not only the posttonic syllables but also the dates of the increase relevant to them adduce the evidence. On the one hand, the increase of the schwa in late OE and early ME is uncontroversial. I expect that no objection arises on it. On the other hand, the syllabic consonants increased in the posttonic syllables in early and late ME:

(14) a. travel, water, peple 'people', seven, written, centre

The periods for the syllabic consonants correspond to the ones for the vowel reduction in late OE and early ME by the difference of one when dividing each of OE and ME into the early and late stages. The posttonic syllables underwent the vowel reduction prior to the sonorant syllabification. The reasons for the increase of the latter in the periods are three-fold. First, the literature shows the more examples in ME in comparison with those in OE. Second, the ME syllabic consonants commonly occur in the basic words (e.g. water, peple). Third, ME, but not OE, possesses some of the forms: the nasal release (golden, sudden) and the heterorganic obstruent + lateral (table, miracle). The posttonic weakening-related sound changes lead me to argue that, during OE and ME, the derivation from the underlying form schwa plus a sonorant consonant to the surface syllabic consonant appears in the other case of the positional effect. The continuous processes are, in unstressed syllables, represented as the sonorant syllabification following the vowel reduction. As noted in section 2.2., diachronic shifts constitute one of the criteria to choose correct underlying forms. Earlier to later stages in the history of a language are equivalent to underlying to surface forms in phonological derivation. The appearance of the schwa induces the phonological process of the sonorant syllabification to take place and, the syllabic consonant formation consequently follows from it. Both of the processes are distributionally very similar to each other in the sense of the posttonic syllables.

## 4. Derivation

### 4.1. Underlying schwa

Given the assumably correct underlying form, the derivation from the one with schwa to the surface syllabic consonant must account for the one, in a sense, that OE has the process of the schwa deletion and the one, in other sense, that the syllabic consonant is formed. The argument in this section covers both of the processes.

The schwa deletion does not occur in other process of OE in any way. In early English, certain unstressed syllables, following vowel reduction, underwent schwa deletion in the slightly later stage. The following generalize the dates on both of the shifts (Minkova 1991, Hogg 1992a, 1992b/2011 Lass 1994, among others). The vowel reduction began in the earlier stages of OE and became highly common in late OE. The schwa deletion began to take place around the end of late OE and proceeded to be common in early ME. Whereas the underlying form at issue gives rise to the schwa deletion owing to the surface syllabic consonants, the process is not equivalent to vowel loss in the sense that it has the compensatory formation of syllabic nuclei. The shift from the underlying to the surface forms implies that after the underlying schwa is deleted, a sonorant consonant in the onset or the coda occupies the slot of the nucleus. The latter differs from the former because the deletion of the schwa does not lead to the process to compensate for the nucleus in any respect and because the number of the syllables does not remain consistent. That is why the two sorts of the schwa deletions differ from each other in terms of the syllable-internal structures and the consistent or decreasing number of syllables:

(15) Schwa plus SonC - SyllCons (compensatory formation)

the number of syllables – same

(16) Schwa vowel - deleted (no compensatory formation)

the number of syllables – decrease by one

The difference between the two phonological processes leads to the claim that the fact that OE lacks the schwa deletion does not prohibit the sonorant syllabification in (15) from emerging.

The syllabic consonants are crosslinguistically generalized to the long counterpart of nonsyllabic sonorant consonants. The syllabic consonant formation at issue assumably corresponds to the durational pattern. The occurrence as a result of the schwa deletion, as in (15), is, in broad sense, ascribed to compensatory lengthening (Hayes 1989) where, in order to make up for the consistency, the deletion of a sound and the shift from short to long pronunciations on other take place at the same time. It is, in fact, involved in the phonological system of OE. As dealt with in Opalinska (2004), the following demonstrate

the case of compensatory lengthening: the deletion of the postvocalic obstruent and the subsequent vowel lengthening. The examples are cited from Campbell (1959:104):

(17) a. þwahl > þwēal ‘washing’ feorh > fēores ‘spirit’

Taking into consideration both the irrelevancy to the lack of the schwa deletion and the attestation of the compensatory lengthening-based phonological processes, the derivation from the underlying form with schwa to the surface syllabic consonant is assumably inherent in the phonology. The schwa deletion and the subsequent lengthening are meant to be a compensatory process since the two elements become the other two once again.

As well as the derivational shift to the surface syllabic consonant, the one to an unstressed vowel plus a sonorant consonant in the onset or the coda has a well-formedness. It leads to the opposite shift to the OE vowel reduction: /ə/ plus SonC in the onset or the coda → [e, o, a, u] + SonC for the sonorant syllabification vs. /e, o, a, u/ → [ə] with or without syllable margin. The cases in which the syllable margins for the latter are represented as one of the corresponding sonorant consonants /r, l, m, n/ occur in, say, the verb ending with <-an> (e.g. standan > standen ‘stand’) and the noun with the final <-or> (e.g. foddor > fodder ‘fodder’). The examples with the onset, which are commonly analyzed as ambisyllabicity (cf. Fulk 1997, 1998, Liberman 1990, Luts 1986, Minkova 1992, Salmons 1990, Suzuki 1985, 1994), are manifested in, say, nama > name ‘name’ (i.e. both the stressed syllable coda and the unstressed syllable onset for the affiliation of /m/). Hall (2007) argues that languages may have certain two opposite processes; both of the shifts from A to B and from B to A occur in the phonologies of the individual languages. I assume that OE represents the language to which the phonological process is applied. In fact, breaking and, thereafter, smoothing (cf. Stockwell 1996, 2002a, b, Davenport 2005, Howell and Wicka 2007, Botma and Ewen 2009 for the analyses) represent the two opposite processes where the stressed vowels undergo diphthongization when followed by the segment containing [+back] (/r, l, x, u/) and, then, monophthongization preceding the allophone derived from the same phoneme. If the stressed and the unstressed vowels distributionally differ from each other, both A to B and B to A are not likely to occur in a position. On the assumption that a language has the stress system that, in the five-degreed sonority (low, mid peripheral, high peripheral, mid central, high central), the higher two are always stressed, and the lower two are always unstressed, the alternation at issue does not arise. The reason for it comes from the impossible shift on either of them; in stressed syllables, the vowels do not shift to weaker one; in unstressed syllables, the vowels do not shift to stronger one. OE has the distributionally similar system of the sonority on the stressed and the unstressed vowels; all of the low, the mid peripheral and the high peripheral vowels occur in both of the syllables.

Looking back on the issue in this paper, the question to be asked at this point results



sequences with the OE syllabic consonants make a contrast with the contours between the two obstruents. Since they are formed by O + SonC in every example, the two phenomena might arise: the large violation and the different degrees. The larger violations of the sonority in the word-finals are expected to have the higher possibility of the syllabic nuclei relative to others, if the underlying form without a vowel is correct. The larger the sonority contours violate, the less the syllable-finals conform to the principle. The examples in (20) and (21) illustrate the minimal and the maximum violations of the sonority sequencing on the syllabic consonant formations, respectively:

- (20) a. lybsn ‘amulet’    b. bosm ‘bosom’    c. efn ‘even’  
 (21) a. hristl ‘shuttler’    b. spaldr ‘asphalt’

The syllabic nasals preceded by the voiced fricatives, which stem from the assimilation on voicing in the intervocalic positions, have the minimal distance of one. The maximum distance of the sonority consists of the two sorts with the degree of five: a voiceless stop plus the lateral, and a voiced stop plus a rhotic. Assuming the underlying form without a vowel on the basis of the sonority contour, if the distance of the sonority between the obstruent and the final sonorant consonant is one or two, the syllabic consonant formation must be largely blocked. In the opposite way, if the distance is just or close to the maximum of five, the possibility must be enough. The mid levels on it are exemplified in the following:

- (22) a. bearhtm ‘instant’    wolcn ‘cloud’  
       b. roþr ‘oar’    adl ‘disease’

The examples in (22a) and (22b) represent the distance of the sonority by the degrees of four (voiceless stop + nasal) and three (voiced fricative + rhotic, voiced stop + lateral), respectively. The distance of two is much few or does not exist. The preceding segments are, without exception, the obstruents and the voiceless fricatives medially voice. The sequence voiced fricative + lateral conceivably occurs, but the OE literature does not give any example like that as far as my knowledge. The underlying form solely of a sonorant consonant holds true, on the condition that those with the large distance of the sonority more readily lead to the syllabic formation, though it is not the case in point.

Articulations play a conditioning role in the (im-)possibility on the sequences. (Regarding coarticulatory easiness or difficulty, see Beddor 2007, 2009, Blevins and Garrett 2004, Hall 2003, 2004, Hall and Hamann 2010, Jun 1996, Oda 2008, Pater 1999.) Consider first the examples with the minimal sonority distance: [zŋ], [zɱ] and [vŋ]. The articulation of [zŋ] does not have difficulty. The shift from the fricative to the nasal requires speakers to raise the tip of the tongue. It is but one simple movement, but does not cause incompatibility,

which is referred to as the difficult articulation of certain two minor-levelled differences (for two coronals, tip vs. blade, convex vs. concave, Hall 2003), relative to broad phonological features. Concerning the latter two, speakers can prepare for the articulation of each syllabic consonant when making those of the preceding fricatives. When making [z], lips are slightly open. Then, speakers close the lips and articulate the [m̩]. For the last one, the phonetic account differs between the labiodentals and the alveolar of the nasal. The former is implied to be no movement. In the latter, when making the articulation of the fricative, speakers are ready for that of the alveolar nasal. This means that no difficulty arises on each of them.

Now turn to the ones with the maximum distance in (21a, b). The existence of the sequence [t̩] makes a contrast with the ban on onset /tI/ both in the English language and crosslinguistically (cf. Steriade 1982, Gussenhoven and Jacobs 2005). The difference is grounded in the duration of the lateral. The gap in OE is not so strong as those in other languages. First, OE does not contain the syllabic consonants such as \*[t̩] and \*[p̩], both of which are equivalent to the pronounced [t̩] in the sense that, if any, the long articulations facilitate the counterpart of the nonsyllabic consonants. The laterally released one is therefore not strongly preferred.

The other one [d̩] also does not have articulatory preference. The phonetic value on OE /r/ has been controversial (cf. Lass 1983, Hogg 1992a, Erickson 2002); the opinions range over alveolar trill, retroflex, uvular rhotic, uvular fricative. The logically implausible case seems to be nothing, but I observe all of them do not serve as the easy pronunciations as in the following; in [t̩] + the central approximant of /r/, after the front of the tongue is away from palato-alveolar, it readily moves to the articulation of the rhotic.

The phonetic accounts give the first evidence according to which the sonority-based formation (i.e. the underlying form without schwa) does not make sense. The violations of the sonority range over the high (21), the mid (22), and the low (20) levels. The former two sorts of the violations are shown to be insufficient to explaining the underlying form solely of a sonorant consonant by way of the large violations of the sonority in the word-final positions.

The syllabic consonant [t̩] is rather common in the literature and exemplified by the final segments in the words litl ‘little’, setl ‘seat’, etc. The other one with the same-degreed violation [d̩] has the relatively uncommon occurrences. The morpheme-final <-dor> (e.g. ealdor ‘chief’) occurs in some nouns, but the relevant syllabic consonant is sparse in the literature.

The literature in the phonology might not involve the syllabic consonant [t̩] in it at all. It is a widespread example in Germanic languages (ModE button, German guten ‘good’). The gap of the segment in OE makes a contrast with the [t̩] which, though uncommon in Germanic, represent one of the examples (OE bearhtm ‘instant’).

To sum up, the three-degreed violations of the word-final sonority contours do not, in any sense, give rise to the fact that in the examples in (20)-(22), those with the large

violations of the syllable-final sonority contours lead commonly to the syllabic consonant formations. Due to the similar frequency and the similar articulatory possibility irrelevant to the sonority distance, the syllabic consonant formation is grounded not in the violation of the sonority, but in the underlying schwa and the compensatory syllabification.

## 5. Distribution

### 5.1. Underlying schwa

Stressed and unstressed vowels intrinsically differ, in small or large degrees, from each other. The distributional differences (i.e. definitely or commonly restricted to either of them) play an essential role in some allophone-related analyses:

- (23) a. healdan ‘hold’ weorpan ‘throw’  
b. bittan ‘bit’ habban ‘have’  
c. [ʔ]Eall ‘all’ [ʔ]eofot ‘crime’

Each of the syllabic conditionings is as follows: the stressed syllables for the breaking (diphthongization), the syllable boundary preceded by the stressed syllable and followed by the unstressed syllable for the germination, and the onset of the stressed syllables for the epenthesis of glottal stop (cf. Vennemann 1988b, Minkova 2000).

On the general assumption that OE has the disposition that the allophones have the restricted occurrences with regard to the syllabic environments, consider those of the nuclei, some of which are distributionally confined to either the stressed or the unstressed syllables:

- (24) a. /i, y, æ/ - only in stressed syllables  
b. /e, o, a, u/ - in both stressed and unstressed syllables  
c. Schwa – only in unstressed syllables  
d. Syllabic consonants – only in unstressed syllables

The evidence for the outcome stems from the first elements of the diphthongs which originate in the stressed monophthongs, unstressed vowels which induce vowel reduction, etc. The distressed environments shown above lead to the match for the syllabic consonants and the schwa. With the restriction, no other syllabic nucleus occurs. Due to the distributional difference between them, the vowels other than schwa are disallowed to occupy the underlying status. The underlying forms with the unstressed vowels other than schwa (i.e. 8) are analyzed to be incorrect. To my knowledge, no English historical phonologist has argued

in favor of the underlying form with them. The placement of the vowels in both the stressed and the unstressed syllables contradicts with the syllabic consonants that occur only in the unstressed syllables.

Moreover, the distribution in (24a-d) implicitly shows that all of the high peripheral, the mid peripheral, and the low vowels are both stressed and unstressed. If the vowels /e, o, a, u/ satisfy the underlying status, they range over the three degrees. It means that the vocoids that occur in both of the syllables occupy the underlying forms of the syllabic consonants restricted to the unstressed syllables. The outcome erroneously yields to the similarity between both of the syllables, since the sonorant syllabifications take place in the unstressed syllables, but not in the stressed ones. That is why the underlying forms with the four vowels fail to explain the derivations. The two ways of the distributions on the vowels are sufficient to rejecting the one in (8). Conversely, the other two underlying forms necessitate the thorough examination.

In favor of the argument on the underlying schwa, other two pieces of phenomena relevant to the distributions adduce the additional evidence: the less frequency in OE, and the similar increase in the later stage.

Both the schwa and the syllabic consonants occur less commonly in OE than in many other Germanic languages. The former does not constitute a phoneme, but an allophone. The objection will not arise on the allophonic, but not phonemic, status of the schwa. The allophonic schwa has also positional restriction; it occurs in all of the posttonic syllables. By contrast, even if the unstressed syllables in pretonic positions undergo the vowel reduction, the occurrence of the schwa seldom appears.

Regarding the syllabic consonants, the occurrence is restricted to the posttonic syllables. No example occurs in pretonic syllables. No stressed syllabic consonant occurs, either. As argued in section 3, both the syllabic consonants and the schwa share the occurrence in the posttonic syllables, whether it is totally or for the most part same. From the viewpoint of segmental cooccurrences, the OE syllabic consonants contain those of the lateral release, but not those of the nasal release: \*[tɲ], \*[pɲ], etc. With respect to the syllabic lateral, the heterorganic consonants are banned on occurring before it: \*[kɺ], \*[bɺ], etc.

OE has the small number of the schwa as well as that of the syllabic consonants. If either of them by far exceeds, the account of the underlying schwa might not make sense. However, both of them appear with less frequency than those in later periods. The fact that the limited occurrences in the same phonological environment are shared by both of the sounds underpins the underlying schwa.

The fact that both of the allophones increased is also very similar to each other. The schwa shifted to a phoneme. The allophonic schwa in OE changed to occupy all of the posttonic unstressed syllables. This means that the variant increased to the obligatory pronunciation. The syllabic consonants of the nasal release and of the lateral preceded by a

heterorganic obstruent were prohibited from occurring in OE, as mentioned above. In ME, however, both the former (golden, written) and the latter (table, miracle) came into existence. It is also a remarkable fact that relative to those in OE, ME involves so many basic words in those with the syllabic consonants.

The similar increase implicitly accounts for the adequacy of the underlying schwa. Observing all, the underlying schwa of syllabic consonants in ME is considered to be correct. By way of the comparison, the OE syllabic consonants function as the antecedents on the corresponding variants in ME. The reason for it stems from the increases of both of the syllabic consonants and the schwa in the same environments.

## 5.2. Flaw on the form without schwa

One of the key issues on the assumably incorrect underlying form was the word-final sonority contour claimed in section 4.2. The other made at this point is shown to be the vowel epenthesis:

- (25) a. \*/r, l, n, m/ → [r̥, l̥, m̥, ŋ̥]  
 b. \*/r, l, n, m/ → /e, o, ə, u/ + /r, l, m, n/ in onsets or codas = (9)

The one in (25b) where the nonsyllabic consonants surface implies to be the example on the epenthesis of the unstressed vowels. If the underlying form shown above makes sense, the epenthesized vowels must be inherent in the phonology.

Theoretically, vowel epenthesis is more common to weak vowels. On account of perceptual phonology, listeners do not confuse sequences with a weak vowel epenthesized. Strong vowels are blocked from being epenthesized since they lead to the perceptually much difference. In the context at issue, schwa is considered to occupy the perceptually weakest vowel and, thus, most epenthetic, and the vowel *a* the perceptually strongest one. (cf. Flemming 2002 for the perceptual theory, see also Boersma 2007, Boersma and Hamann 2008 for the relevant articles).

In OE, the system of the epenthesized vowels is rather close to the crosslinguistic generalization. The following are cited from Campbell (1959):

- (26) a. /i, u/-epenthesis (fylgan – fyligan ‘follow’, weorc – weoruc ‘work’)  
 b. /u, o/-epenthesis (sorwe – soruwe ‘sorrow’, medwe – medowe ‘meadow’)

The distributions consist of the three high vowels and the one mid vowel. No example on the low vowel occurs. Despite the incorrect form in my assertion, the underlying form of the OE syllabic consonants solely of a sonorant consonant has the /e/ as the most common epenthetic

vowel. The cases in which the relevant segments are included are shown to be *lytl* vs. *lytel* ‘little’, *adl* vs. *adle* ‘disease’. The vowel is not only distributionally highly common in the unstressed syllables but occupies the typical alternative vowel for the syllabic consonants discussed in this article. However, it is not involved in the epenthetic vowels in (26). The most common epenthetic /e/ in the underlying form is lacking in the phonological grammar. The account of the epenthetic vowel therefore does not hold true. This leads to another flaw on the underlying form without a vowel.

## 6. Consonant lenition-based analysis

Intervocalic consonants commonly undergo lenition, that is to say, the shift to a weaker one:  $t \rightarrow \text{ʔ}$ ,  $s \rightarrow z$ ,  $t \rightarrow s$ ,  $p \rightarrow \text{ɸ}$ , etc. The sense of the ‘weaker’ in this context means to weaken consonantality. The consonant lenition processes stem from physical conditionings under which the movement of articulators facilitates or, oppositely, renders difficult, phonological entities. Kirchner (2001, 2004) argues that consonant lenition is grounded in reduction in constriction degree or duration and that the lack of the process such as the one from fricative to nasal leads to the flaw of the account by way of the ranking of the sonority. Kingston (2007) regards the conditioning as reduction in interrupting the stream of speech. The two assertions makes a contrast with each other in the sense that the lenition is viewed as consonant-based (constriction), in the former, or vowel-based (air stream), in the latter. The consonant lenition occurs commonly both in the English language and crosslinguistically. OE involves in the phonological grammar the consonant lenition that a voiceless fricative word-medially voices. The voiced fricatives have been recently claimed to be not the allophones, but the phonemes (Laker 2009, Minkova 2011). This section touches on the argument hereafter:

- (27) a. nosu ‘nose’      b. giefan ‘give’  
       /s/ → [z]            /f/ → [v]

These are meant to be the lenitions between the two vowels, which correspond to those with crosslinguistically high frequency. There exist the same processes preceded by a stressed vowel, like the examples illustrated above, and followed by a syllabic consonant, instead of an unstressed vowel:

- (28) a. bosm ‘bosom’      b. efn ‘even’  
       /s/ → [z]            /f/ → [v]

The voicing is applied to the underlying forms of the corresponding voiceless ones. The difference on the abstract forms of the syllabic nasals turns out to be the one of whether the lenition conforms to the common case or the targeted consonants come exceptionally before the sonorant consonants.

On the whole, the surface string Stressed V + Voiced Obs. + Syll. Cons. has the alternative form in the words like those illustrated above (*bosom, efen*). Kirchner (2004:316-317) argues on the four sorts of typologies on consonant lenitions:

- (29) a. All else being equal, lenition occurs more readily the greater the openness of the flanking segments (the widely attested pattern of intervocalic lenition being a special case).
- b. All else being equal, lenition occurs more readily the faster or more casual the speech.
- c. Unaffricated stops never synchronically spirantise to strident (sibilant or labiodentals) fricatives.
- d. Geminate stops never undergo voicing or reduction of oral constriction unless they concomitantly degeminate.

The generalizations (29b, c, d) are irrelevant to the claim made at this point. The conditioning in (29a) predicts the degrees of the frequency on the occurrence of the lenitions from the point of view of functionalist phonetics. The sequences like the ones in the words such as *bosm, fæðm, efn, lybsn, roðr* illustrate that the voiced fricatives are preceded by one of the low, mid or high peripheral vowels without a sonorant consonant and followed by a syllabic consonant. The voicing as the lenition might not seem to have the restriction on the occurrences. As far as I know, any literature in OE phonology does not specify the voicing to vary on the basis of the dialects and the phonological environments. Furthermore, all of the allophonic voiced fricatives in OE became the ME phonemes. In a view, Laker (2009) and Minkova (2011) argue on the phonemecization of the voiced fricatives in OE. The arguments to set the voiced phonemes implicitly renders possible the voiced counterpart that exists always, instead of the contextual allophones. This leads to the fact that the fricative voicing is just or near obligatory. The intervocalic obstruents preceded by the stressed syllables undergo other consonant lenition, as illustrated in the following:

- (30) a. mægden ‘maiden’      dæg ‘day’  
           /g/ → [j]                    /g/ → [j]

The weakening process does not always occur. The same underlying form in the intervocalic positions has also the surface [g]:

- (31) a. eglan ‘plague’      b. hogian ‘plan’  
       /g/ → [g]                /g/ → [g]

It makes a contrast with the palatalization in (30) in the sense that the faith, instead of the lenition, holds to the velar stop. At first glance, the preceding front vowels in (30a, b) seem to affect the palatalization, but, given the one in (31a), it is not the case in point. The intervocalic voicing in (27) and (28) has a different frequency from the palatal in (30, 31). The obligatory occurrence of the obstruent voicing in contrast to the restricted manifestation of the palatal can be attributed to the difference of the flanking consonants between the two nuclei.

Very similarly, other two intervocalic allophones have the restricted occurrences. The gemination may or may not occur. The fluctuation can be accounted for by the Syllable Contact Law, which specifies the preference of the sonority across syllable boundary (cf. Vennemann 1988b, Murray 2000, see also Suzuki 1989, Ham 1998, Hall 2004 for the relevant discussions). The ambisyllabicity is also in part applied to some of the medial consonants that the sonority profile allows to undergo (e.g. Minkova 1985, Lutz 1986, Murray 1988, Liberman 1990, Salmons 1990, Suzuki 1994).

In order to argue on the obligatory occurrence of the consonant lenitions and the phonotactics, examine the following schemata (SV = stressed vowel, SonC = sonorant consonant, O = obstruent, SyllCons = syllabic consonant):

- (32) a. SV (SonC) O    ∅    SyllCons  
       b. SV (SonC) O Schwa SyllCons

With other conditions consistent, the one in (32b) induces the consonant lenition to occur more readily, relative to the other. The obligatory voicing of the fricatives can be accounted for by the underlying form with schwa. Irrespective of the functional accounts, the underlying form with schwa has the phonotactic strings to more commonly undergo the lenition.

## 7. The other schwas

### 7.1. The allophonic schwa

The schwa derived from the four unstressed vowels (*e*, *o*, *a*, *u*) has been a shared knowledge in the research. It is considered to be unchangeable due to both the functional

and the social factors.

Diachronic studies of English suggest that unstressed vocoids shift to weaker segments (cf. Vennemann 1988b). In a simple view on schwa, the occurrence must precede the subsequent loss. Prior to the early ME schwa loss, schwa began to occur as a result of the OE vowel reduction. In other view, the differentiation between stressed and unstressed vowels began to occur in the same period. The first large effect of strengthening stressed syllables results from the OE breaking (diphthongization). The OE vowel reduction constitutes the corresponding weakening effect. While unstressed syllables have continuously undergone the weakening processes, they originate in the OE vowel reduction.

The Norman Conquest affected the directions on the history of English, one of which was to accelerate the vowel reduction. It occurred in 1066, i.e. around or only slightly before the end of OE. This does not mean the sudden shift of the vowel reduction originated in the Conquest, but rather rendered the slightly common process much more common. Without it, the shift that all of the posttonic syllables underwent the vowel reduction did not occur. In any case, the social effect strengthened, not initiated, the process. This means that the sharp increase on the vowel reduction is grounded in the double effect.

## 7.2. The diphthongal schwa

Reconstructing OE diphthongs constitutes a topic in English historical phonology. According to Lass (1994), Stockwell (1996) and Minkova and Stockwell (2008), the second elements are considered to be schwa, although the opinions in detail are in part different from each work and not always shared by other researchers (Howell 1991, Hogg 1992b, Davenport 2005, Howell and Wicka 2007, Botma and Ewen 2009). Whichever they are, diphthongs consist of unseparable two elements, which imply that one of them does not occupy the status of either a phoneme or an allophone and that the schwa as the second elements corresponds to neither of them.

The most accepted description regarding the second elements of the diphthongs is uncertain, but, in late OE, /u/, but neither /o/ nor /a/, as the second elements is fronted owing to the palatalization of the tautosyllabic velar consonants in the coda. The effect the palatalization has on the diphthongs consists of the assimilation and the subsequent shift from back to central. Articulatorily, the fronting of the velar /k, g, x/ is equivalent to the shift from /u/ to schwa (see Howell and Wicka 2007 for the discussion on this issue).

The suggestions on this issue made by this author arise from the positional phonetic effect. OE exemplifies a language where physical movements commonly affect the allophonic occurrences. Both the diphthongization (Stockwell 1996) and the subsequent monophthongization (Howell and Wicka 2007) stem from such an effect; the intervocalic fricative voicing is ascribed to consonant lenition (cf. Krchner 2001, Kingston 2007 for the account); the [j] derived from /g/ occurs when preceded by a fronted segment; the coda

allophones [x] and [ç] are affected by the segment with articulatorily front or back.

All of the allophones noted above are shown to be the ones in the rhyme. The effect the phonetics of the adjacent sounds has on the allophones is applied to argue that the second elements of the diphthongs (i.e. the allophones in the rhyme) may undergo phonetic effect.

Consider first the case of the /u/ as the second element. The OE diphthongs are followed by [x, r, l, u], all of which are represented as [+back], but phonetically cause minor difference. My own suggestion is that, given the diphthongal /u/, the allophonic [u] and [o] are derived from the following segments. (see Flemming 2003 on the issue of articulation and allophone.) The following /u/ simply leads to the faith of the second element. The lateral and the voiceless velar fricative in the rhyme affectively make it [o]. The assumable shape of the tongue gives rise to the sound. Concerning the rhotic that has been controversial for decades on whether the articulation is made by alveolar trill, retroflex, or uvular, it depends on which to be articulated.

Providing that in late OE, the second elements of the diphthongs shift to the schwa, as Minkova and Stockwell (2008) describe, another effect on the allophonic status comes out. The allophonic [x] occurs in both OE and ME when being adjacent to a [+back] sound. Let us assume the occurrence of the diphthongal schwa in the words such as heah 'high', leoht 'light'. The sequences at issue consist of schwa + [x] + (C). This means that the appearance of the diphthongal schwa leads to the case in which the [x] does not surface because the adjacent schwa does not involve [+back] in the features and because the following C, if any, is occupied by coronal. The allophonic fricative consistently occurred in both OE and ME. That is why there exists no blocking constraint on it. This phonotactics requires that the second elements of the diphthongs be the vocoid with [+back]. By taking the view of physically motivated allophones, the second elements become [o], instead of the schwa.

## **8. Other possibilities**

Schwa constitutes the typical vowel which is epenthesized or deleted in surface forms. The two derivations make a contrast with each other in phonology. The former is implied to be no existence in input and the existence in output, and the latter to be the existence in input and no existence in output. Since the derivation from one segment to other, irrespective of phonological to phonological (historical shift of phonemes), phonological to phonetic (accentual variants), and phonetic to phonetic (emergent allophones in a word), occupies one of the core aspects in the analyses or theoretical construction, the occurrence of a segment in either level play a crucial role.

From the point of view of functional phonology (i.e. cause of existence), the epenthesis or the deletion of schwa leads to a perceptually minor difference, relative to either process of

strong vowels. That is to say, when listeners perceive a certain word with the schwa epenthesis or deleted, due to the similarity of the pronunciations, they can easily understand what speakers utter.

At this point, I repeatedly show some possible cases on the occurrence of schwa. Other than the theoretical way in my assertion, the four cases make it logically possible to form a new schwa:

- (33) a. Vowel reduction
- b. Vowel epenthesis
- c. Derivation from rhotics
- d. Alternation with high vowel = (2)

Excluding the uncontroversial occurrence on the basis of (33a), the other three possibilities and, if any, other phonological tools must be examined.

#### 8.1. Epenthesis

OE has some cases in which a segment fills syllabic environments. In OE phonology, onsets must be satisfied. If empty underlyingly, glottal stop is epenthesis to them (Minkova 2000). As she argues, the obligatory onsets, differently from those in the later stages of the language, are the requirement in OE. Another case of the segmental epenthesis comes from that of the weak vowels:

- (34)a. /i, u/-epenthesis (fylgan – fyligan ‘follow’, weorc – weoruc ‘work’)
- b. /u, o/-epenthesis (sorwe – soruwe ‘sorrow’, medwe – medowe ‘meadow’)

The examples illustrated above have the conditioning of phonetic movement. In the order from the first one, the articulation of /i/ is easily accessible following the lateral; whatever the sort of the articulation, the rhotic has the compatible one with the vowel /u/; between the /d/ and the /w/, the epenthetic segment is most suitably /o/. To my thinking, the epenthesis in the English language are generalized to the articulatory possibility. That is to say, if speakers are easy to pronounce, they possibly occur. In the later stages of the language, some other cases of the epenthesis took place: the /p/ in the word *empty*, the /ə/ between the /θ/ and the lateral in the word *athletic*, etc. The former functions as, as it were, conjunction in terms of the point of articulation with the /m/ and the stop with the /t/. Given the case in which the sequence [θ] + [l] in the latter surfaces, once the tip of the tongue is away from the dental, it travels inside oral cavity and make a contact with alveolar ridge. Without the epenthesis, the sequence represents the rather difficult one. The epenthetic schwa between

the two consonants facilitates the articulatory sequence.

Between the occurrences of the schwas by way of the vowel reduction and the epenthesis, the phonological processes differ from each other in two respects. As one of them, OE is the language where unstressed syllables undergo posttonic weakening processes, in which the vowel reduction is involved. By contrast, the schwa epenthesis leads to the increment of the morae. Preference Laws and the subsequent works (Venemann 1983, 1986, 1988b, 1988c, in press, Murray and Venemann 1982, 1983, Murray 1987, 1992, 2000a, Picard 1990, Ezdard 1991, Iverson and Salmons 1992, Davis and Iverson 1995, Ham 1998, Wurzel 1998, Hall 2004, Oda 2008, 2010b) have the tenet 'from worse to better' on sound change. The morae in unstressed syllables are better by the number of one, relative to two. The shift of the moraic number from two to one is preferred in the historical phonology, but the one from one to two is not. The schwa epenthesis causes the number of morae to increase (i.e. from one to two). Other else being consistent, the vowel reduction is more likely to take place, relative to the other. This expression implies that other reason is necessary.

I observe that the OE vowel reduction was caused by both the posttonic weakening (functional) and the Norman Conquest (social). The effect the latter has on the schwa epenthesis diverges from that of the vowel reduction. The unstressed vowels (*e, o, a, u*) have the rare distribution because the vowels with the lower sonority value are usually unstressed and because the four vowels do not have the majority of the features in common. That is why the foreign effect gave the requirement that they be simplified. For the schwa epenthesis, the conditioning position seems to be between consonants; the shift /tk/ → /tək/ is considered to be possible in the logical thinking; the ones between vowels and between a vowel and a consonant seems to be never; in the last case, the schwa epenthesis leads to the diphthongization or triphthongization. Although the phonological inventory of the OE unstressed vowels have the rare distribution, the any sequences CC are likely to conform to the common ones both in European languages and crosslinguistically. Onset clusters tend to be stable. The sequences in the word-medial positions, in uncontroversial sense on the syllabifications, common to the basic words consist of the /ld/ (weald 'power', healdan 'hold'), the geminates (bedd 'bed', sittan 'sit'), etc. The vowel epentheses are generalized to satisfying the conditioning to facilitate the incompatible sequences. The OE medial sequences, however, predominantly range over the crosslinguistically common ones. Thus, the schwa epenthesis does not work.

## 8.2. Derivation from rhotic

Rhotics may or may not shift to weak nuclei. The possibility depends on languages. In order to argue the possibility of the shift, let us now consider the mechanism of sound changes for consonants. As a shared idea among phonologists, segmental shifts take place

within the range of either point or manner of articulation remains consistent. If /k/ shifts to /ŋ/, both of the segments have the velar articulation in common. If /t/ shifts to /ʔ/, the manner of stop is still same. The semivowel /j/ shifts to /i/, but not to /u/. Very similarly, the other semivowel /w/ shifts to /u/, but not to /i/. The shared ground behind the sound change is the shift within the same point of articulation.

American English (AmE) is involved in the languages where schwa shifts to a rhotic. Several rhotics appear in AmE: tap, flap, central approximant, etc. The central approximant of /r/ is closer to schwa than the other rhotics and, according to Gick (2002), both of the sounds differ in terms of the articulation with or without constriction, but otherwise make no contrast with each other at all. This implicitly shows that the schwa that varies to the central approximant represents the issue of the articulatory similarity between the vowel and the consonant, which is equivalent to the shared point of articulation between two consonants.

OE rhotics are, in a controversial sense, assumed to be alveolar trill, retroflex or uvular (Lass 1983, Hogg 1992a, Erickson 2002). In relation to the articulatory phonetics in AmE, I observe that all of the articulations for the rhotics are not similar to that of schwa. While the case in AmE shows the same articulation except constriction, the three assumable rhotics do not have such a close relationship with schwa. The alveolar trill and the uvular are not forced to examine thoroughly since there is no possibility on the articulatory similarity between one of the two rhotics and schwa.

The retroflex is the sound where the tip of the tongue is moved backward and, then, more or less upward. I observe that the articulation of the variant renders virtually impossible the shift that the retroflex changes/varies to the schwa in the sense of either historical or synchronic ones. The shift from a rhotic to schwa therefore assumably does not appear in the phonology irrespective of the sort of the articulated variants.

### 8.3. Alternation with high vowel

When schwa alternates with high vowels, the way of thinking is equivalent to that of the derivation from rhotic; the sound pattern arises with the requirement that the behavior be same or similar. Provided that both high vowels and schwa occur, for the most part or definitely, in unstressed syllables and/or provided that the other vocalic behaviors are same or similar, the alternation is considered to take place.

The former plays an essential factor. If high vowels occur mainly in stressed syllables, the alternation seems to be implausible. In OE, the high front vowels /i/ and /y/ are confined only to stressed syllables (e.g. *hildedeor* ‘brave’, *symbol* ‘feast’). The reasons are two-fold. First, both of them occupy the first elements of the diphthongs that caused the breaking to occur. The two vocoids are stressed.

Second, both /i/ and /y/ are not involved in the vowels that underwent the reduction,

which, in essence, occurs in unstressed syllables. The high back front vowel appears in both stressed and unstressed syllables (e.g. lufu 'love'). The reason for the unstressed entity is that it underwent the vowel reduction. The occurrence of the /u/ vowel in the stressed syllables is reflected in the shift to ME onward:

(35) /u/ → /ʌ/, ex. love, hundred

The vowel in the later stages is the one restricted to the stressed syllables. The three vowels shown above differ distributionally from the schwa that intrinsically constitutes a weak nucleus.

In addition to the stress-based system that demonstrates that all of the high peripheral, the mid peripheral, and the low vowels are both stressed and unstressed, further evidence is provided to show that the high peripheral vowels do not behave equally to the schwa. Their phonological status is, to the large degree, closer to that of the mid peripheral and the low vowels. In the occurrences of the allophones in a same morpheme, the vowels in the three degrees on account of the sonority affect them in the same way. The phonological change from /sk/ to /ʃ/ gives one piece of evidence (cf. Campbell 1959: §440):

(36) a. risce 'rush'    b. Þerscen 'remove'    c. æsc 'ash'

When the preceding vowel was front, the consonant at issue was assimilated. The front vowel is the high peripheral, the mid peripheral and the low ones. The examples illustrated above do not mean to be the single one that shows that the vowels with the three degrees of the sonority behave equally to the others, but rather represent one of the cases in which OE has commonly the sound patterns on the vocalic effects.

The stress system on the basis of the sonority and the same behaviors between the high peripheral vowels and the more sonorous ones therefore implicitly suggest that on the basis of the account that the similarities of the behaviors lead to the alternative forms, the high peripheral vowels do not shift to the schwa. The OE schwa does not occur by way of the epenthesis, the derivation from the rhotics and the alternation with the high vowels.

## 9. Conclusion

Historical research has very long had canonically the fact that the OE schwa is derived, as an allophone, from the unstressed vowels, but does not constitute a phoneme. In order to deal with early occurrence, allophonicization takes precedence on phonemecization. Pre-OE languages lacked schwa in the inventory. The allophonic schwa in late OE shifted to the

phonemic one in early ME. Given the sound change and the well-known occurrence, it might be the case in point that schwa does not appear in the abstract level of OE phonology. However, the analysis in the article makes possible the fact that changes the traditional view by employing the commonly demonstrated phonological tool according to which another schwa appears beyond the level of phonemes and allophones. The four pieces of evidence (posttonic weakening, derivation, distribution, and consonant lenition) give the evidence that the underlying schwa makes sense. Whereas the form solely of a sonorant consonant seems to have been implicitly believed to be true, the word-final sonority contour and the epenthesis of the unstressed vowels result in the counterevidence. The neutral vowel is also possibly derived from epenthesis, derivation from rhotic and alternation with high vowel, but all of them are not explicitly inherent in the OE phonology in any sense. The underlying schwa not only contributes to the correct analysis of the derivation but also posits another case of early schwa beyond the level of phonemes and allophones.

\* This article was presented first at the 4th Conference on Studies in the History of the English language, held at Northern Arizona University on October 1, 2005. Reexamining both each of the criteria and the explanatory adequacy, this author made the second presentation at the 2010 Berkeley Germanic Linguistics Roundtable, held at University of California at Berkeley on April 10, 2010. Suggestions made by the audiences at the conferences have rendered the paper improve in a few respects. Needless to say, any inadequacies are my own.

1 Though every period of the history of the English language has not so been analyzed concerning the syllabic consonant, it has been one of the central issues and typically discussed in PDE phonology. The works during the recent one decade contain Toft (2002), Mora and Mott (2003), Garcia (2006), Arboleda and Monroy (2010), and Oda (2010a). The continuous arguments come from (a) the difference of the phonetic implementations among accents, occasions, etc., (b) ongoing shifts (Wells 1995), (c) the articulation of sonorant consonants, more specifically, on the lateral (Sproat and Fujimura 1993) and the central approximant of /r/ (Gick 2002), (d) durational effects, and (e) syllabic organizations.

2 The reason for the highly common shifts is attributed to the perceptual weakness of schwa. Both of the occurrences and the deletions lead listeners to perceive the small difference. See Flemming (2002) on this sort of perceptual aspect, Zuraw (2009) on the theory of weakness, Lass (2009) on overviewing the shift of schwa in the history of English, and Minkova (1991) on the analysis of ME schwa in detail.

3 In Germanic languages, the underlying form of syllabic consonants has a controversial aspect. PDE syllabic consonants have the one with schwa (Gimson 1980 and others) or the one without schwa (Jones 1967, Giegerich 1992). The difference of the opinions is also

manifested in Present-Day German. Wiese (1996) utilizes derivational stages; nonsyllabic consonant, schwa plus nonsyllabic consonant, syllabic consonant. Johnson (1998) shows schwa plus nonsyllabic consonant in the underlying representation. Barry (1995) discusses the related issue. The issue equivalent to those in PDE and PDG appears also in Norwegian (Kristoffersen 1998) and Dutch (van Oostendorp 2001). The analysis on the underlying form of the syllabic consonants represents a highly common controversy inside Germanic languages, though possible underlying forms are rather limited.

4 The stressed syllabic consonants occur in AmE and Czech (Kucera 1961): heard [hɹ:d], your [jɹ], Brno ['bɹ.no], Vltava ['vɹ.tava]. Those examples in each language are underlyingly not represented as the form with schwa. The reason for it is grounded in the nonoccurrence of schwa in the stressed syllables. This means that the stress-based distributions reflect the underlying vowel of certain allophones.

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