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ON THE QUESTION OF GLIDE FORMATION AND NASALITY IN ẸDO SYLLABLE

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ABSTRACT: Previous assumptions suggest that there is no regressive vowel nasalisation in Ẹdo, a language spoken in southern Nigeria. It is also generally believed that the process of glide formation applies automatically in the Ẹdo syllable patterning whenever the condition is met (that is, if a high(er) vowel immediately occurs before another vowel). Prevailing evidence from synchronic data, including 85 cases in which glide formation was expected to have occurred, suggests a different understanding of nasalisation and glide formation, as well as their effects on the Ẹdo syllable structure. The aim of this study is to investigate the conditions under which glide formation fails to occur when vowels co-occur in a given context. The data for the study are sourced from Ẹdo speakers in several speech contexts. The data were organized, analyzed with both perceptual and acoustic methods and observed carefully with the aim of achieving the set goal. The study reveals that regressive nasalisation is manifested in the language, and its interaction with glide formation questions the presumed automatic nature of vowel gliding in Ẹdo syllable. The paper also goes further to suggest an alternative account of glide formation: that its rule does not always apply, but is suspended in certain context by a 'glide formation suspension rule'. It is maintained, herein, that Ẹdo manifests the CVV syllable structure, in addition to the V and CV.

KEYWORDS: Ẹdo, phonology, syllable, glide formation, regressive nasalisation

Introduction

This paper focuses on the Ẹdo syllable structure. It provides evidence to show that the glide formation in the language is doubtful or not automatic, at least. The study uses the case of nasalisation to illustrate how the process is suspended, or non-existent, in certain contexts.

Ẹdo has over one million native speakers (National Bureau of Statistics, 2016). It is a Kwa language that belongs to the Proto-Edoid family (Elugbe, 1989)

and is also classified under the New Benue Congo family (Williamson and Blench, 2000). Its speakers are found in Oredo, Ikpoba-Okha, Ovia South-West, Ovia North-East, Egor, Uhunmwode and Orhionmwon local government areas of present-day Ẹdo State. Imasuen (1998) has observed that Ẹdo native speakers are also found in Oza N'Ogogo in Delta State and Okitipupa, Akotogbo, Idoani and Akure in Ondo State. Ẹdo is a tonal language (Evbuomwan, 2014, 2018; Edionhon, 2016).

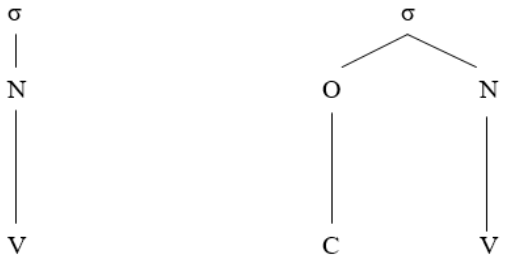
The data used for the study were collected from the three municipal local government areas (i.e. Oredo, Ikpoba-Okha and Egor) in Benin City. They include lexical items that were excerpted from the speeches of the eighteen (18) Ẹdo speakers in different controlled and uncontrolled contexts. The items were organized according to their syllable structures, as well as the occurrence or non-occurrence of nasality on the occurring syllable peaks. The analysis of the data was done using both perceptual and acoustic methods (using the KayPENTAX Computerized Speech Lab, CSL4500) to test for evidence of regressive nasalization. The results were observed against the syllable structure conditions in the Ẹdo language.

Ẹdo Syllable Structure

The syllable has increasingly become a subject of discourse in phonology, given the assumption that "a word is phonotactically well-formed if it can be divided exhaustively into one or more well-formed syllables" (Booij, 1999, p. 53). There are several definitions of the syllable in the phonological literature (Gimson, 1980, Katamba, 1989, Giegerich, 1992, Laver, 1994, Roach, 2000, 2009, Ugorji, 2002, Ugechi & Ayugah, 2021, Inusah, 2024, and Evbuomwan & Asoro, 2025) and each definition differs in line with the aspect of syllable analysis that motivates such definition. Syllable weights are considered in view of the constituents of the peak or coda, hence languages with a V, CV, or CCV syllable structure have light syllables while languages with VC, CVV, CVC, CVCC, etc. are said to have heavy syllable weight. Onsets do not contribute to syllable weight (Hyman, 1985, Hyes, 1989, Broselow, Chen and Hoffman, 1997, Gordon, 2002).

Ẹdo is claimed to manifest light syllables (Evbuomwan & Evbayiro, 2024) as shown in the following.

1. a) V Syllable tree b) CV Syllable tree



The V syllable structure has a vowel (the nucleus, which occupies the position of the syllable peak) as its only segment while the CV syllable structure

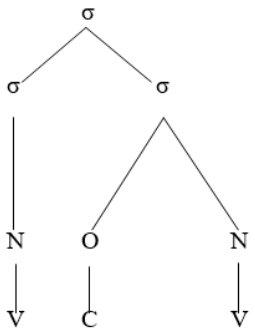
is made up of an onset (i.e. a consonant) and a nucleus (i.e. a vowel). Ẹdo syllables do not have coda (i.e. arresting consonants). The language operates an open syllable structure in which all syllables end in vowels. The understanding of the Ẹdo syllable structure is central to the present study because of the effect of glide formation on the syllable structure of words in which they occur, changing a CVV to CCV. These syllable structures are illustrated in the examples below.

2. V – Syllable
   a) I /i/ 'I'
   b) u /u/ 'You'
   c) ọ /ɔ/ 'Him/She'
   d) i /i/ 'neg. marker'

3. CV – Syllable
   a) lo /lò/ 'use'
   b) le /lè/ 'cook'
   c) ban /bã̀/ 'rip off'
   d) si /sì/ 'creep'
   e) mu /mù/ 'carry'
   f) re /ɹè/ 'eat'
   g) wu /wù/ 'die'
   h) rre /rè/ 'arrive'
   i) go /gò/ 'shout/wail'
   j) ka /kà/ 'count'
   k) so /sò/ 'sing'
   l) ma /mà/ 'mold'
   m) do /dò/ 'trade/weave'
   n) tan /tã̀/ 'spread (to dry)'
   o) se /sè/ 'sew'
   p) kọ /kɔ̀/ 'plant'
   q) rẹn /ɹɛ́/ 'yes'
   r) rẹn /ɹɛ̀/ 'know'

These structures can combine in Ẹdo words in different formations which could be di-syllabic, tri-syllabic, etc. (Omozuwa, 1992, 1997, 2010) as in the following:

4. V – CV

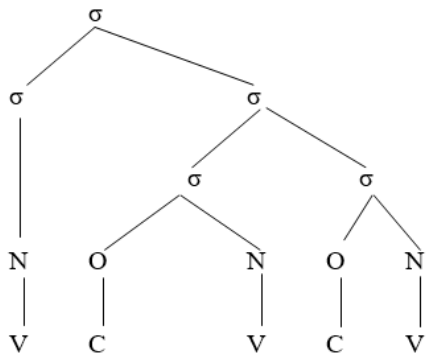


As in the following examples:

5. a) ọmọ /ɔ̀mɔ́/ ‘child’
   b) okọ /òkɔ́/ ‘canoe’
   c) uwu /ùwú/ ‘death’
   d) ọdọ /ɔ̀dɔ̀/ ‘husband’
   e) owẹ /ówɛ́/ ‘broom’
   f) ota /òtà/ ‘evening
   g) edẹ /èdɛ́/ ‘grey hair’

And

6. V – CV – CV



As in the following examples:

7. a) ọghẹdẹ /ɔ̀ɣɛ̀dɛ̀/ ‘plantain’
   b) ededе /ɛ̀dɛ̀dé/ ‘old woman’
   c) ekpọnmwẹ /ɛ̀k͡pɔ̃̀mɰ́ɛ́/ ‘appreciation’
   d) isanrẹn /ísã̀ɹɛ̃̀/ ‘key’
   e) ẹgogo /ɛ́gógó/ ‘bell’
   f) urhukpa /ùɾùk͡pà/ ‘lamp/light’

The combination is not restricted to the derivation of three-syllable words, but several other syllable combinations are possible, as in the examples in 8, below.

8. a) ugboloko /ùg͡bòlòkò/ ‘bone’
   b) ahuẹmwọmwa /àhùɛ̀mɰ́ɔ́mɰà/ ‘love’
   c) erhunmwurriarria /ɛ̀ɾ̰ũ̀mɰ̀ùríárìá/ ‘butterfly’
   d) agabagebe /àgàbàgébé/ ‘a deviant’

Beside illustrating the combination of several syllable structures, these examples also show the open syllabicity requirement of the Ẹdo language.

Glide Formation

In Omozuwa (2010, p. 221), glide formation is defined as “the process whereby a high vowel is de-syllabified to form a corresponding glide”. A glide is characterized by a movement from one position of articulation to another in its

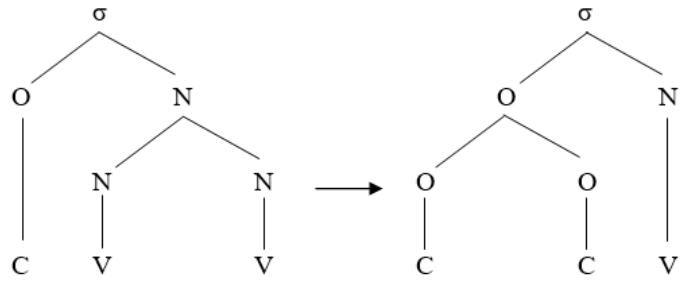
production. This de-syllabification can be accounted for in terms of distinctive features (Chomsky and Halle, 1968, Schane, 1973) as shown below:

9. Distinctive feature rule for de-syllabification in vowel gliding

$$\begin{bmatrix} +\text{syll} \\ +\text{high} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{syll} \end{bmatrix} \Big/ \_\_ \begin{bmatrix} +\text{syll} \\ -\text{high} \end{bmatrix}$$

Glide formation gives rise to a derived CCV (or CGV, where G = glide) syllable structure in Ẹdo from a CVV, where the first occurring vowel is high, as in the following examples:

10a. Syllable tree showing the realization of CVV as CCV



b) Condition for glide formation.

$CV_{(high)}V \rightarrow CCV$

The changes in syllable structure accounts for the following examples:

11. a) sua /sùà/ → [swà] ‘push’
    b) tue /tùè/ → [twè] ‘bleed/pour’
    c) kue /kùè/ → [kwè] ‘agree’
    d) lue /lùè/ → [lwè] ‘chew’
    e) ogui /ógúí/ → [ógwí] ‘bush mango’
    f) iguẹ /ìgùè/ → [ìgwè] ‘kneel’
    g) ọduẹki /ɔdùɛ̀kì/ → [ɔdwɛ̀kì] ‘trader’
12. a) tie /tiè/ → [tjè] ‘call/read’
    b) wia /wià/ → [wjà] ‘to smell’
    c) ekia /ékíá/ → [ékjá] ‘penis’
    d) maimia /mìàmìà/→ [mjɐ̃̀mjɐ̃̀] ‘forget’
    e) erriarria /èrìárìà/ → [èrjárjà] ‘sand fly’
    f) ọkiẹkiẹ /ɔkíɛ́kíɛ́/ → [ɔkjɛ́kjɛ́] ‘jest’
    g) khiakhia /xìàxíá/→ [xjàxjá] ‘scrape’

These suggest a general preference for light syllables in the language, given that the CVV which bears a branching nucleus becomes a CCV, thereby reducing the syllable weight from heavy to a light one. This glide formation, becomes questionable in the face of several CV_1V_2 data in which the second occurring vowel (i.e. V_2) is inherently nasal. This brings to doubt, the issue of automatic glide formation and places the scientific observer under pressure to believe that it

may not be present in the data or, at least, suspended in that context. These will be the subject of discussion in the subsequent sections.

Regressive Vowel Nasality in Ẹdo

Data in Ẹdo language suggest the occurrence of regressive vowel nasality in Ẹdo. Consider the following for example.

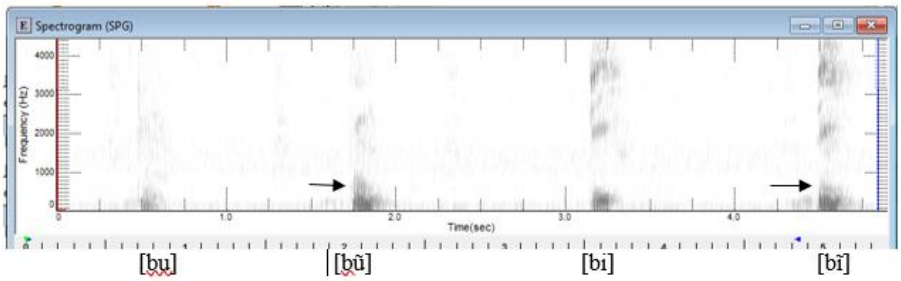
13. a) ohuẹn /óhúɛ̃́/ → [óhṹɛ́] ‘cough’
b) tian /tìã̀/ → [tìã̀] ‘sing praise of’
c) suan /sùã̀/ → [sù̀ã̀] ‘aspire’
d) ihuan /ìhúã́/ → [ìhṹã́] ‘song’
e) rruan /rùã̀/ → [rù̀ã̀] ‘tie (a cloth)’
f) siẹn /sìɛ̃̀/ → [sì̀ɛ̃̀] ‘deny’
g) ladian /làdìã̀/ → [làdì̀ã̀] ‘step out’
h) ihuẹn /ìhúɛ̃́/ → [ìhṹɛ́] ‘dirt’
i) iroẹn /ìɹɔɛ̃̀/ → [ìɹɔ̀ɛ̃̀] ‘himself/herself’
j) ọkhaẹn /ɔ̀xáɛ̃́/ → [ɔ̀xā́ɛ̃́] ‘porcupine’
k) uviẹn /úvíɛ̃́/ → [úvíɛ̃́] ‘line’
l) aviẹn /àvíɛ̃́/ → [àví̋ɛ̃́] ‘lining’
m) esagiẹn /èságìɛ̃̀/ → [èságì̀ɛ̃̀] ‘blood’
n) suẹn /sùɛ̃̀/ → [sù̀ɛ̃̀] ‘start/begin’
o) ihiẹnhiẹn /íhíɛ̃́hìɛ̃̀/ → [íhíɛ̃́hì̀ɛ̃̀] ‘great grandchild’

The spread of nasality from an inherent nasal vowel on the oral vowel preceding it in the above examples questions the true nature of the presumed automatic process of glide formation in the language. This drives two assumptions: 1) that there is glide formation in the examples above, in which case one must also assume that the derived glide is nasalized. This way, CVṼ is realized as CC̃Ṽ as in /óhúã́/ ‘sheep’ becomes [óhw̃ã], and 2) that there is no glide formation in these examples, in which case it is a simple case of regressive nasalization, i.e. CVṼ is realized as CṼṼ, as in /óhúã́/ ‘sheep’ becomes [óhṹã́]. Acoustic evidence, as the nasal formants in Fig. 1-3 below show, favours the argument that the language manifests regressive nasality, in which case an inherent nasal vowel spreads nasality on the preceding vowel in this syllable environment. Nasality involves the lowering of the velum, thereby allowing the coupling of the nasal and oral cavities (Ohala and Ohala, 1993, Pruthi and Epsy-Wilson, 2004). What this does “is to shift the natural frequency of the vocal tract (i.e. the formant frequencies for the non-nasal)” (Hawkins and Stevens, 1985, p. 1560).

Identifying vowel nasality on a spectrogram is not an easy task. However, one common acoustic cue is the appearance of the nasal formant (also nasal resonance) on the spectrum. “The nasal resonance would appear above the first resonance (formant) only for very high vowels … otherwise, the nasal resonance appeared below the first resonance.” (Glass, 1984, p. 71). Other general acoustic cues for the identification of nasals and nasalized vowels include a shift in F1 and

F3 values (which corresponds to the lowering of the velum), longer segment duration, weaker waveform (due to damping), the appearance of a spectral prominence above F1 at about 1000Hz, heavy voicing bar and more visible F3 at about 2500Hz (Fant, 1960, Berger, 2007, Chang, 2008, Omozuwa, 2010, Manyah, 2011, Styler, 2015). A comparison of the Edo front-high and back-high vowels on a spectrogram are shown in Fig.1 below.

Fig.1. Spectrographic analysis of [u] and [ũ], [i] and [ĩ] in the environment of [b], showing the occurrence of nasal formants just above F1.

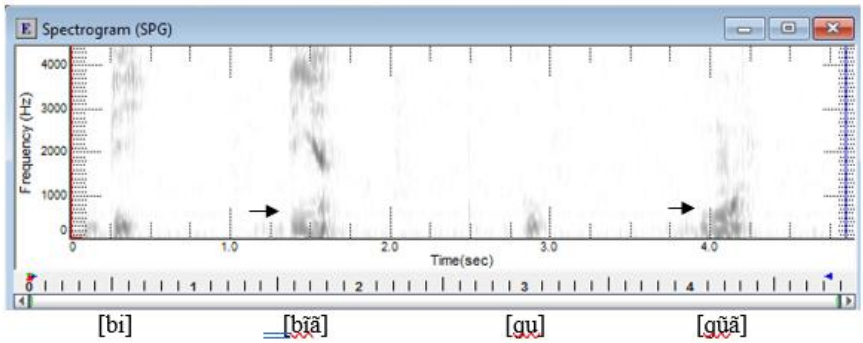


The → points to the observed nasal formants.

When the formant structures of the oral and nasal counterparts of the vowels in the same environment (in Fig.1.) are compared, one observes that the nasal formants (Fn) which are observed in the spectrum of the nasal vowels are clearly absent in the cases of the oral vowels.

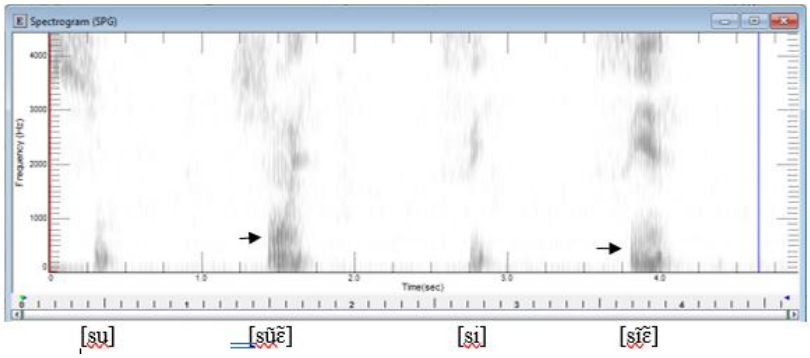
The data analyzed in this study show a consistence appearance of the nasal formant on both vowels in the CVV position when the final vowel is an inherent nasal. Consider the spectrograms below.

Fig. 2. Spectrogram showing nasal formant for nasalized [ĩ] and [ũ] in before [ã] in C_Ṽ context.



The →points to the observed nasal formants.

Fig. 3. Spectrogram showing nasal formant for nasalized [ĩ] and [ũ] in C_Ṽ position.



The → points to the observed nasal formants.

The pointing arrow shows the observed nasal formant, Fn (or nasal resonance) on the nasalized high vowel. Note that the nasality is more on the inherently nasal (word final) vowels, since the nasality only spreads regressively to the preceding vowels. This position (of regressive nasality) is driven by the fact that a CC̃Ṽ analysis is not plausible. The non-plausibility, is further supported by the fact that all data collected for this study manifest regressive nasality in this environment, thereby suggesting a contrary view to general assumptions in the phonological literature: that there is no regressive vowel nasalisation in Ẹdo.

Alternative Account

An alternative explanation to this phenomenon is to make a case for a rule within nasalisation that suspends glide formation in Ẹdo. This glide formation suspension rule can be stated as follows:

14. Glide-formation suspension rule:
When there is regressive nasalization,
glide formation is suspended.

Given this rule, the CVV syllable structure is retained. Ẹdo has five inherent nasal vowels - /ũ, ĩ, ɔ̃, ɛ̃, ã/ - in its sound inventory and any of the high vowels in the Language (i.e. /i, ĩ, u, ũ/) are expected to become corresponding glides in the specified context. However, any of the oral high vowels that immediately precede a nasal vowel is regressively nasalized, hence, only nasalized (not inherently nasal) vowels can be found in that environment. Any of the non-high nasal vowel that occurs immediately after another vowel in a word in the language spreads nasality on the preceding vowel and suspends the occurrence of the envisaged glide formation, if any, as the following sets of examples show:

15. Where [ã] restricts glide formation
    a) ohuan /óhúã́/ → [óhṹã́] ‘sheep’
    b) khuan /xùã̀/ → [xṹã̀] ‘earn money’
    c) khian /xìã̀/ → [xĩã̀] ‘walk/become’
    d) fian /fiã̀/ → [fĩã̀] ‘cut’
    e) vian /vìã̀/ → [vĩã̀] ‘nag’
    f) ebian /èbíã́/ → [èbĩ́ã́] ‘extract(N)’
    g) eghian /éɣìã̀/ → [éɣĩã̀] ‘enemy’
    h) ikian /ìkíã́/ → [ìkĩ́ã́] ‘house fly’
    i) udian /ùdíã́/ → [ùdĩ́ã́] ‘tsetse fly’
    j) okhian /òxìã̀/ → [òxĩã̀] ‘soldier ants’
16. Where [ɛ̃] restricts glide formation
    a) ẹhiẹn /èhíɛ́̃/ → [èhĩ́ɛ́̃] ‘pepper’
    b) ọviẹn /ɔ̀víɛ́̃/ → [ɔ̀vĩ́ɛ́̃] ‘slave’
    c) eghọẹn /èɣɔ́ɛ́̃/→ [èɣɔ́́ɛ́̃] ‘stranger’
    d) giẹn /gìɛ̀̃/ → [gĩɛ̀̃] ‘to burn’
    e) biẹn /bìɛ̀̃/ → [bĩɛ̀̃] ‘slice’
    f) khiẹn /xìɛ̀̃/ → [xĩɛ̀̃] ‘sell’
    g) diẹn /dìɛ̀̃/ → [dĩɛ̀̃] ‘be older than’
    h) ziẹn /zìɛ̀̃/ → [zĩɛ̀̃] ‘get stuck’ (i.e. a vehicle in mud)
    i) rrịẹnrrịẹn /rìɛ̀ríɛ́̃/→ [rĩɛ̀rĩ́ɛ́̃] ‘sweet’
    j) akhaẹn /àxàɛ̀̃/ → [àxãɛ̀̃] ‘evil’
17. Where [ɔ̃] restricts glide formation
    a) ediọn /èdíɔ́̃/ → [èdĩ́ɔ́̃] ‘elders’
    b) vuọn /vùɔ̀̃/ → [vṹɔ̀̃] ‘be full’
    c) orriọn /òríɔ́̃/ → [òrĩ́ɔ́̃] ‘mind’

Following from the above discussion, it is evident that CVV is an attested syllable structure in the language, in addition to the already established ones. The present study, hereby, argues that Ẹdo has the V, CV and CVV syllable structures, as revealed in the analysis presented which has relied on both auditory and acoustic methods.

Conclusion

This paper focused on the Ẹdo syllable structure, with particular reference to observed regressive nasalisation of the two high vowels in the language ([i] and [u]) when they occurred immediately before nasal vowels in word final position. The paper examined data in view of this, using spectrographic analysis (i.e. the Analysis Synthesis Laboratory Tool of the KayPENTAX Computerized Speech Lab 4500) to corroborate the result of the auditory method, and showed that regressive nasalisation is evident in the language. The paper also made a case for a glide formation suspension rule. This rule suspends glide formation in the context of regressive nasalisation of high vowels that are expected to form glides, giving rise to the realization of CVṼ as CṼṼ. Ẹdo manifests a CVV syllable structure in addition to the V and CV structures already established, in which case,

the Ẹdo syllable structures are V, CV, CVV. This paper, therefore, represents an invitation to linguists to examine the phenomena of nasalisation and glide formation in a new light in Ẹdo syllable structure.

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