

Summary of the Doctoral Dissertation

An Analytical Study of Hiatus Resolution Strategies in Esahie (Sehwi) and Nzema: Phonological and Morphological Perspectives

1. Introduction and Background

This dissertation analyzes hiatus resolution strategies in Esahie (Sehwi) and Nzema, closely related Bia languages in the Central Comoé branch of the Niger-Congo family. Esahie is spoken in Ghana's Western North and Western Regions, while Nzema is spoken in the Western Region. The 2021 Ghana Statistical Service census reports about 305,000 Esahie and 299,000 Nzema speakers.

Despite scholarly works on Esahie (Broohm, 2019; Owusu-Ansah, 2020) and Nzema (Essuah, 1965; Annan, 1980; Tomekyin, 2007), no comparative study of hiatus resolution in these languages has been conducted. The study examines three research questions: (1) What phonological processes and strategies do Esahie and Nzema use to resolve hiatus? (2) How does morphological structure affect hiatus resolution? (3) How can Optimality Theory and Autosegmental Phonology describe these phonological processes?

2. Theoretical Framework and Methodology

Theoretical Framework

The study uses two complementary theoretical frameworks: Optimality Theory (OT) for constraint-based analysis and Autosegmental Phonology (AP) for analyzing tonal phenomena. OT captures how universal, violable constraints interact through language-specific ranking to select optimal candidates. AP provides representational tools for analyzing tones, allowing them to be represented on separate tiers from segments, with association lines linking tones to tone-bearing units. This dual-framework approach accounts for both constraint interaction and the tonal effects of vowel deletion.

Methodology

The study used a qualitative, descriptive research design based on fieldwork in Ghana's Western and Western North Regions. Data were collected from twenty native speakers (ten per language) through purposive sampling. Participants ranged from 20 to 80 years old, including literate and non-literate individuals, as well as students and staff from the University of Education, Winneba (Ajumako Campus).

Four data collection instruments were used: word and phrase lists, carrier sentences, semi-spontaneous narratives, and repetition and judgment tasks. Audio recordings were transcribed using the International Phonetic Alphabet (IPA). The analysis identified, classified, and patterned hiatus repair strategies, framing regularities within OT and Autosegmental Phonology.

3. The Phonological and Morphological Systems of Esahie and Nzema

Phonological Systems

Esahie and Nzema share a seven-vowel phoneme inventory: /i, e, u, o, ε, ɔ, a/. These vowels exhibit allophonic variation: /e/ can be [e] or [ɪ], /a/ as [a] or [æ] in Esahie or [ʌ] in Nzema, and /o/ as [o] or [ʊ]. They also have six nasalized vowels: [ã, ĕ̃, ð̃, ĩ̃, ī̃, ũ̃].

The consonant inventories include stops, nasals, fricatives, affricates, liquids, and glides. For hiatus resolution, only the palatal glide /j/ and the labial-velar glide /w/ are relevant. These are the consonants that are epenthesized between vowels to resolve hiatus.

Syllable Structures

Both languages have three syllable types: V (vowel alone), CV (consonant + vowel), and syllabic C (nasal consonants). Syllabic nasals /n, ɲ, m/ can function as independent tone-bearing units, carrying either high or low tones.

Morphological Systems

Both languages are predominantly prefixing, with occasional suffixation marking grammatical distinctions. Subject agreement prefixes include {ɔ-} ‘he/she’ in Nzema and {me-} ‘I’ in Esahie. Nominal prefixes include nasals {m-, n-} and the vowel {a-}. Compounds are typically right-headed, with the final element determining the grammatical category and core meaning. However, Esahie exhibits bidirectional headedness.

4. Data Analysis: Hiatus Resolution Strategies

Epenthesis (Glide Insertion)

Hiatus in Esahie and Nzema is resolved through the insertion of palatal glides [j] or labial glides [w]. The choice of glide is determined by the first vowel in the sequence: if the first vowel is back and rounded, the epenthetic glide is [w]; if it is front and unrounded, the glide is [j]. This pattern holds across monomorphemic words, across morpheme boundaries, and across word boundaries.

CUa Sequences: A Key Difference

A major difference between the two languages concerns the resolution of CUa sequences (A consonant + u + a). In Esahie, these sequences undergo a complex labial-palatalization process involving three ordered steps:

Consonant labialization: The rounded vowel /u/ labializes the preceding consonant (e.g., /s/ → [s^w]).

Horizontal vowel shift: The labial vowel /u/ is replaced by its coronal counterpart /i/ to achieve featural agreement with the following [-Round] vowel /a/ (Abakah, 2013).

Labial-palatalization and j-epenthesis: The labialized consonant and the front vowel coalesce into a labial-palatal approximant [ɥ], and the hiatus is resolved through [j] insertion.

Example:

- sua (to learn) → [s^hija] (Esahie)

In Nzema, CUa sequences undergo only simple [w] insertion:

- sua (house) → [suwa] (Nzema)

This divergence demonstrates that Esahie has retained a horizontal vowel shift rule that Nzema has lost, representing a significant phonological difference between the two closely related languages.

Elision (Vowel Deletion)

Vowel elision is bidirectional in both languages: either the first vowel (V₁) or the second vowel (V₂) can be deleted, depending on morphological and phonological conditioning.

First Vowel Elision (V₁ Elision)

V₁ elision occurs in possessive constructions and pronominal contexts:

Esahie: yε apina → [japina] ‘our bat’ (the vowel /ε/ of yε deletes)

Nzema: me ava → [mava] ‘(that) I may take’

Second Vowel Elision (V₂ Elision)

V₂ elision occurs in modifier-head constructions, where the modifier is preserved and the head loses its initial vowel:

- Esahie: bowie ekunu → [bowijekunu] ‘bone marrow’

- Nzema: ezene edanle → [ezendanle] ‘funeral cloth’

The exception occurs when the modifier is a pronoun, as in Nzema: kodwo ekye → [kodzɔtɔɛ] ‘little Kodwo’, where the head noun is preserved.

Tonal Evidence in Identical Vowel Sequences

In sequences of adjacent identical vowels, tonal evidence is crucial for determining which vowel is deleted. When the tonal pattern is HLH and the low-toned second vowel is deleted, its low tone floats and triggers downstep on the following high tone. When the high-toned first vowel is deleted, no downstep occurs.

Examples:

- tena ase → tɪná + ásí [tɪná^hsí^h] ‘to sit, to be seated’ (V₂ deletion, downstep) (Esahie)

- aleε ebe → àlìjé + èbí [àlìjé^hbí^h] ‘food is ready’ (V₂ deletion, downstep) (Nzema)

Coalescence (Vowel Merger)

Coalescence involves the merging of two adjacent vowels into a single segment that shares features from both vowels. Both languages coalesce the /a + ε/ sequence to [e]:

Esahie: agya εbo → [adzebo] ‘toe’

Nzema: baka εbu → [bakebu] ‘a stick has broken’

Esahie also coalesces the /a + i/ sequence to [e], a pattern not found in Nzema:

Esahie: mvramain → [mvramen] ‘armpit’

5. Theoretical Representations

Optimality-Theoretic Analysis

The OT analysis employs a set of universal constraints:

*V.V: Adjacent vowels are prohibited in the output.

DEP-IO: Do not insert segments.

MAX-IO(V₁) and MAX-IO(V₂): Preserve the first and second vowels, respectively.

UNIFORMITY: One output segment must not correspond to multiple input segments.

AGREE[Place V₁]: The epenthetic segment must agree in place with the first vowel.

Below is the ranking of the constraints for the resolution strategies

Epenthesis: *V.V >> MAX-IO(V₁), MAX-IO(V₂) >> AGREE[Place V₁], UNIFORMITY >>

DEP-IO

V₁ Elision: *V.V >> DEP-IO >> MAX-IO(V₂) >> AGREE[Place V₁], UNIFORMITY >> MAX-IO(V₁)

V₂ Elision: *V.V >> DEP-IO >> MAX-IO(V₁) >> AGREE[Place V₁], UNIFORMITY >> MAX-IO(V₂)

Coalescence: *V.V >> MAX-IO(V₁), MAX-IO(V₂) >> DEP-IO >> AGREE[Place V₁], UNIFORMITY

The analysis demonstrates that the same constraint set, with different rankings, accounts for all attested patterns in both languages.

Autosegmental Analysis of Identical Vowel Elision

The autosegmental analysis shows that when a low-toned vowel is deleted in an HLH sequence, its tone floats and triggers downstep on the following high tone: This analysis demonstrates that “tonal supremacy” can override segmental considerations in hiatus resolution, providing a unified account of vowel elision in both languages.

6. Major Findings and Contributions

Key Findings

Epenthesis: The epenthetic segment mirrors the feature of the first vowel—front vowels trigger the palatal glide [j], while back rounded vowels trigger the labial glide [w]. The low vowel /a/ remains neutral in this process.

Horizontal Vowel Shift: Esahie undergoes a horizontal vowel shift (/u/ → [i]) in CUa sequences, a process that Nzema has lost. This represents a key phonological difference between the two languages.

Elision: Elision is bidirectional in both languages. V₁ elision targets functional words (possessive pronouns). V₂ elision targets head nouns in modifier-head constructions, where the modifier is preserved. In identical vowel sequences, tonal evidence reveals that V₂ (the low-toned vowel) is deleted.

Tonal Supremacy: The deletion of a low-toned vowel in an HLH sequence triggers downstep on the following high tone. This provides a diagnostic for determining the direction of elision in otherwise ambiguous cases.

Coalescence: Both languages coalesce /a + e/ to [e]. Esahie additionally coalesces /a + i/ to [e], a pattern absent in Nzema.

Morphological Conditioning: The direction of elision is conditioned by morphological structure—functional words (pronouns) are targeted for V₁ elision, while head nouns are targeted for V₂ elision in modifier-head constructions.

7. Recommendations and Future Research

Acoustic Verification: Future studies should conduct detailed acoustic investigation of F1 and F2 values for vowels in Esahie and Nzema using PRAAT software, providing empirical evidence for the vowel quality shifts observed in this study.

Tonal Analysis: Further research should systematically record downstep effects on high tones after identical vowel resolution, contributing to a comprehensive tone map of the two languages.

8. Conclusion

This dissertation analyzes hiatus resolution strategies in Esahie and Nzema, showing both languages use epenthesis, elision, and coalescence to repair vowel hiatus. The choice of strategy depends on vowel quality, tonal structure, and morphology. Esahie retains a horizontal vowel shift in CUa sequences, while Nzema has lost it, suggesting Esahie is more conservative and Nzema has simplified its phonology. The study demonstrates that tonal evidence is crucial for determining

elision direction in identical vowel sequences, providing a diagnostic for identifying deleted vowels in ambiguous cases. This confirms and extends Abakah's (2004) analysis of Fante.

Keywords: hiatus resolution, epenthesis, elision, coalescence, Optimality Theory, Autosegmental Phonology, Esahie (Schwi), Nzema, Kwa languages, Ghana