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Segmental Assimilation and Advanced Tongue Root Harmony in igiHa: An Autosegmental Phonological Analysis

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Abstract

This study investigates phonological processes of segmental assimilation in igiHa, focusing on processes like nasalization, vowel harmony and homorganic nasal assimilation. The rationale stems from the need to document and analyse igiHa's phonological structures, especially Advanced Tongue Root (ATR) harmony, which has been underexplored in lesser-known Bantu languages. Autosegmental Phonology, a framework that separates phonological features across different tiers, serves as the theoretical foundation for analysing how segmental features spread between adjacent phonemes. Methodologically, the study employs introspective data collection supplemented by consultations with native speakers, following an elicitation approach to gather robust data on phonological acceptability. Findings reveal that igiHa uses feature spreading as a phonological mechanism, where assimilation occurs through ATR harmony, dividing vowels into [+ATR] and [-ATR] classes. Additionally, nasalization and homorganic nasal assimilation are significant in igiHa, with nasal consonants influencing adjacent vowels and consonants adapting to match the place of articulation of subsequent sounds. This study contributes to the field by elucidating the nuanced interplay of segmental features in igiHa, enhancing understanding of ATR harmony and feature assimilation in Bantu phonology.

1.0 Introduction

IgiHa is a language that belongs to the Bantu family, specifically classified by Guthrie (1971) as D66 within group D. This group also includes other languages such as Kivinza (D67), Kihangaza (D65), Kisubi (D64), Kifuliiro (D63), Kirundi (D62) and Kinyarwanda (D61). According to the more recent classification of Maho (2009), igiHa is identified as JD66 within the JD group. Regarding its dialectical status, there is some debate among linguists. Kimenyi (1978) considers igiHa, Kinyarwanda and Kirundi to be dialects of the same language. Meanwhile, Bukuru (2003) argues that igiHa, Kinyarwanda, Kirundi, Kihangaza and Kisubi

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exhibit an extensive degree of grammatical similarities, approximately 75-85%, and therefore should be considered dialects of the same language.

In phonology, assimilation is a process where one sound becomes more like a neighbouring sound in terms of one or more phonetic features (Gussenhoven and Jacobs, 2011). In Bantu languages, assimilation processes are quite common and can involve various phonetic features, such as nasality, voicing and place of articulation. Being part of the Bantu language family, igiHa experiences the phenomenon of assimilation within its phonological structure, impacting both the characteristics of its segments (including consonants and vowels) and their associated tones. However, this study concentrates on examining the specific influence of assimilation on the features of segments in igiHa. Segmental assimilation processes, such as vowel nasalisation, vowel harmony, homorganic nasal assimilation, vowel assimilation, palatalisation, labialisation, and spirantisation, are motivated by the need to make speech production easier and more efficient (Katamba, 1989). These processes help reduce the articulatory effort required by speakers, simplifying the pronunciation of sequences of sounds. Additionally, assimilation aids in maintaining fluency and rhythm in connected speech, ensuring smoother transitions between sounds and enhancing overall intelligibility (Crystal, 2008). In the Niger-Congo group of languages, these phonological adjustments are particularly common and serve to streamline verbal communication. Thus, assimilation processes are essential for facilitating effortless speech and preserving the natural flow of language.

This study examines three segmental assimilatory processes in igiHa: nasalization, vowel harmony and homorganic nasal assimilation. By analysing these processes, the study aims to understand how they contribute to the phonological structure and fluidity of the language. This exploration provides insights into the naturalness and intelligibility of IgiHa within the broader context of Bantu phonology.

2.0 Theoretical Framework

This study assumes the broad framework of Autosegmental Phonology, which distinguishes between different tiers of phonological representation. Autosegmental Phonology, introduced by Goldsmith (1975), provides a robust framework for analysing segmental assimilatory processes in IgiHa by distinguishing between different tiers of phonological representation. The theory suggests that all assimilation processes involve the spreading or association of features (Clements and Hume, 1995; Jurgec, 2011) from one segment X to an adjacent segment Y, rather than copying features, which is a concept prevalent in Chomsky and Halle's (1968) framework. For instance, in English, the words 'nut' and 'ten' exhibit feature-filling assimilation, where features extend in two different directions—one to the right and the other to the left, as shown in the following Figure 1:

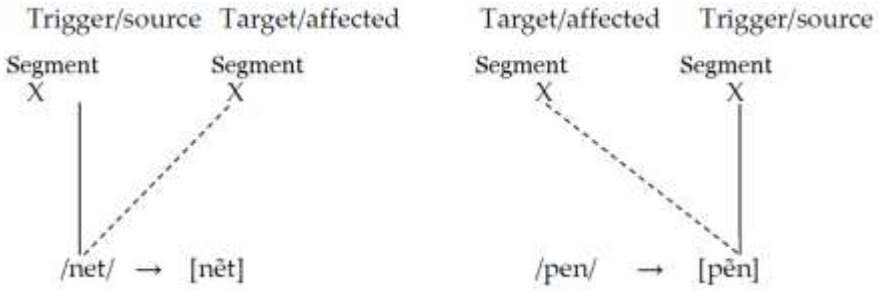


Figure 1: Autosegmental Framework Adopted from Goldsmith (1975: 52)

In Figure 1, which exemplifies a common instance of segmental/nasal assimilation, the nasal segment /n/ in 'net' extends its nasality feature progressively onto the following vowel /e/, resulting in the phonetic representation [ẽ]. Conversely, in 'pen', the nasal segment /n/ extends the same inherent nasality feature regressively onto the vowel /e/, yielding [ẽ]. Despite utilizing the same phonetic realization, the execution direction differs between the two cases. The directional disparity in segmental processes depicted in (1) is denoted by autosegmental symbols, with solid association lines (_____) representing progressive/perseverative nasal assimilation, and dotted association lines (_ _ _) indicating regressive/anticipatory nasal assimilation, precisely defining the process of vowel nasalization. It is essential to note that the formats presented in (1) are valuable for describing/analysing all phonological processes involving the spreading of features, either by ‘filling’ or ‘changing’ feature(s) in languages. Consequently, throughout the remainder of this study, these formats will be utilized to elucidate the segmental assimilation processes of igiHa as discussed earlier. Goldsmith's framework is useful in visualizing these interactions by separating features from segments, supported by Halle and Vergnaud’s (1982) notion that phonological rules operate on multiple tiers. This framework helps illustrate how features spread across segments in IgiHa, ensuring consistency and ease of articulation, and provides a clear and systematic approach to analysing phonological phenomena. This approach aligns with broader phonological theories and enhances understanding of igiHa’s phonological structure.

3.0 Methodology

There is a notable scarcity of linguistic description and analysis concerning igiHa, prompting this study to embrace an exploratory approach to data collection. The methodologies reflect the convergence of two key factors. Firstly, the study benefits from the author who is a igiHa native speaker-linguist. Secondly, the study employs elicitation techniques that facilitate thorough exploration of the language.

To a considerable extent, I relied on my own introspective linguistic insights and judgments regarding phonological acceptability, drawing from my native fluency in igiHa. This native speaker knowledge, often termed "I-language" by generativists (Chomsky, 1986), serves as the foundation for formal grammar models and closely resembles Saussure's concept of langue. My emphasis on I-language does not discount the importance of E-language, which corresponds to Saussure's concept of parole (Thibault, 2013). E-language concerns itself with data on linguistic variation and the social and communicative functions of language. Ideally, research on both aspects would proceed in tandem. In the same veins, Newmeyer (2020) underscores that, despite critiques, the introspective approach remains well-regarded in formal linguistics, particularly in the broad framework of generative grammar. He references Schütze (2006), who argues that introspective data capture linguistic subtleties often absent in spontaneous speech or corpus-based studies. Likewise, Devitt (2006) highlights the value of introspective data in generative syntax, as it reflects the speaker's cognitive-linguistic expertise, which he terms the 'voice of competence.' Devitt (2006) further discusses introspection by citing Pateman (1987), Chomsky (1980; 1986), Fodor (1981), Graves et al. (1973), and Pylyshyn (1984), who assert that intuitions can support grammatical assessments due to the speaker's innate grasp of linguistic structures. Building on these perspectives, Devitt (2006) argues that native-speaker linguists can reliably use introspection to offer accurate grammatical insights and judgments. According to Devitt (2010), linguistic intuitions serve as significant evidence of grammatical knowledge, reflecting a speaker's linguistic competence. However, I acknowledge that language is fundamentally shaped by speakers' interactions, and thus, an individual speaker can provide only a limited range and type of data.

To supplement my intuitions, I informally consulted 8 native igiHa speakers to obtain their perspectives on phonological acceptability, aligning with Featherston's (2007) recommendation to validate introspective data through multiple informants. The selection of these informants was intentionally guided by the researcher's familiarity with elder community members who possess a strong command of the igiHa language. These individuals were chosen based on their linguistic competence and fluency in traditional igiHa, which ensured that the data collected would reflect accurate and authentic phonological patterns. This familiarity-based selection was essential for accessing reliable language knowledge, especially from speakers who could offer insights into features that might be less prevalent in younger generations or less fluent speakers. To strengthen this methodology, I incorporated Matthewson's (2004) elicitation techniques, using both direct and spontaneous methods. In direct elicitation, I asked my consultants to appraise the grammaticality and acceptability of igiHa phonological data I had devised intuitively. In spontaneous elicitation, I invited

participants to share narratives featuring specific phonological patterns relevant to this study.

4.0 Previous Studies on Phonological Processes in Bantu Languages

Studies on phonological processes in Bantu languages reveal a rich array of sound patterns and transformations that underscore the linguistic diversity of the continent. Numerous studies have documented processes such as vowel harmony, assimilation, and tone variation across Bantu, highlighting how these processes shape and reflect the underlying phonological structure of each language family. Scholars like Batibo (1985) and Hyman (2006; 2019) have examined the complex interplay between phonology and morphology, especially in verb extensions, which trigger distinctive phonetic changes in languages like Kisukuma, Kikongo, and Lamnso. Such investigations have established foundational knowledge on how phonological rules operate within and across African languages, yet gaps remain in understanding specific phenomena, such as Advanced Tongue Root (ATR) harmony and nasal assimilation in less-studied languages.

For instance, Hyman (2019) explores the phonological similarities and variations across Bantu languages, emphasizing the shared characteristics of syllable structure, consonant and vowel inventories, and phonological processes. Key findings include the reconstruction of Proto-Bantu's relatively simple consonant and vowel systems, which have evolved into more complex forms in descendant languages. For instance, while Proto-Bantu had a vowel system of seven distinct vowels, many languages, like Swahili, have merged these into a five-vowel system. The article also discusses the influence of morphological factors on vowel distribution, as seen in Punu B43, which restricts vowel sequences in specific contexts. Additionally, the phenomenon of vowel harmony is highlighted, with examples illustrating how vowels interact across morpheme boundaries, such as in Ganda where /i/ and /u/ glide to [y] and [w] respectively.

Orie (2001) notes that in Ife Yoruba, vowel harmony aligns with Standard Yoruba (SY) in that mid and low vowels harmonize according to ATR/RTR features; however, Ife Yoruba uniquely requires mid vowels before high vowels to be advanced, while SY allows retracted mid vowels in this position. In ATR/RTR harmony, high vowels in Ife Yoruba exhibit transparency, permitting harmonic features to pass through, unlike in SY, where high vowels often block retraction. The study attributes these distinctive harmony traits to interactions among grounding, faithfulness, and alignment constraints, with ATR and RTR values aligning with morphological domain edges such as roots. This research contributes to the understanding of ATR/RTR harmony within morphophonological boundaries, suggesting that Ife Yoruba's patterns may prompt further inquiry into less-documented languages like igiHa. This could help determine whether these harmony processes are specific to certain language families or more broadly represented across African languages.

In addition, Wengu (2019) delves into segmental assimilation processes in the Gungbe, focusing on phonological patterns like vowel nasalization, harmony, and homorganic assimilation. These processes aim to modify sound segments for easier articulation and speech fluency. Wengu (2019) advances by analysing the association and spread of features between trigger and target segments. He posits that the dialect's phonological system consists of consonant and vowel phonemes, with distinctive features that influence assimilation processes. According to him, the nasality feature spreads from a nasal segment to a neighbouring vowel, affecting pronunciation in Gungbe. This study sheds light on recurrent natural phonological phenomena in Benue-Congo and Niger-Congo languages, including the language under this study, offering insights into dialectal perspectives and linguistic diversity.

Regarding Shambaa, Mndeme (2022) identifies processes such as elision, vowel assimilation, glide formation, affrication, epenthesis, and changes in fricative and palatal sounds within specific verb forms. The study reveals how verb morphology shapes phonological transformations, leading to dynamic shifts in pronunciation. However, the study does not cover Advanced Tongue Root (ATR) harmony or other assimilatory processes in languages. This gap highlights the need for further research on ATR and assimilatory processes in igiHa to understand their unique phonological rules.

A prominent and ongoing debate in the study of African phonology involves the scope and nature of vowel harmony and segmental assimilation processes, particularly regarding Advanced Tongue Root (ATR) harmony and its interaction with morphological boundaries. This discourse addresses questions around the universality and variability of ATR harmony in African languages and examines how segmental assimilation functions within morphophonemic contexts. The debate centres on whether ATR and other assimilation processes operate solely within specific domains, such as word or morpheme boundaries, or if they extend across phrases, reflecting a broader harmony system within the language (Clements, 2000; Casali, 2008).

Research suggests that while ATR harmony is well-documented in Niger-Congo languages, there is still significant variability in how these processes apply, with languages like Akan (Krämer, 2003) and Yoruba (Pulleyblank, 1996) showing diverse harmony constraints and patterns. This variability has spurred increased interest in less-studied languages like igiHa to determine whether its assimilatory processes align with these patterns or present unique cases that challenge existing models. The need to investigate segmental assimilation in igiHa arises from the hypothesis that it may provide novel insights into the degree of influence ATR harmony exerts on consonant-vowel interactions, especially given the limited documentation of ATR effects in the region's Bantu languages (Odden, 1994). In particular, this research is motivated by recent findings that segmental assimilation may impact broader phonological representation, as noted in Casali's

(2008) study on vowel harmony. Furthermore, Hyman (2014) has argued that understanding such segmental processes in diverse African languages could refine theories on phonological features and harmony typologies, potentially offering new evidence for or against universal constraints in phonological theory.

Regarding the phonology of igiHa, previous studies show that the igiHa phonological system is structured around a systematic organization of segments (both consonants and vowels) and prosodic elements (such as syllables and tones) to create meaningful words, morphemes, phrases, and clauses in discourse (Harjula, 2004; 2005; Bichwa and Kombe, 2017). The phonemic inventory of igiHa was initially proposed by Harjula (2004). According to Harjula, igiHa consists of a total of 22 consonants /p, b, t, d, k, g, ɟ, f, v, s, z, ʃ, h, pf, ts, tʃ, m, n, ɲ, w, ɾ, j/ and five vowel phonemes: /i, e, a, u, o/. These consonants form a critical part of the language's sound system and contribute to its unique phonological characteristics. Each of these vowels can undergo lengthening, which plays a significant role in the language's phonetics and phonology. Vowel lengthening in igiHa affects the meaning of words, making it a phonemic feature (Bichwa, 2018). Harjula's proposal provided a foundational understanding of the igiHa phonemic system. This framework has been essential for subsequent linguistic studies and analyses. His work highlighted the importance of both consonantal and vocalic elements in igiHa. Overall, Harjula's (2004) proposal remains a pivotal reference in the study of igiHa phonology.

Harjula (2004) observes that within the five vowel qualities present in IgiHa, the vowels /e/ and /o/ exhibit a somewhat restricted distribution. These vowels are absent in prefixes but occur in suffixes, where they appear as harmonized variants. Furthermore, /e/ and /o/ can interchange freely with /i/ and /u/, respectively, in specific lexical items, particularly at the end of words. Consequently, the occurrence and alternation of these vowels are determined by their phonological context within the language. She further asserts that the lengthened forms of the Proto-Bantu vowels *I, *U, *e, *o, and *a correspond to the igiHa phonemes /iː/, /uː/, /eː/, /oː/, and /aː/, respectively. According to her, the Proto-Bantu diphthongs have evolved into long vowels in igiHa. The initial elements of these diphthongs (*i, *u, *I, *U, *e, *o) initiated a historical process involving spirantization, labialization, or palatalization of the preceding consonant. Subsequently, the following vowels (*i, *u, *e, *o, *a) underwent lengthening to /iː/, /uː/, /eː/, /oː/, and /aː/, respectively. This compensatory lengthening preserved the moraic count, thereby maintaining the Proto-Bantu distinction between short and long vowels in the igiHa language.

Regarding vowel harmony in igiHa, Harjula (2004) postulates that the semi-open vowels *I and *U in certain derivational extensions exhibit vowel height harmony, aligning with the height of the stem vowel. These extensions include the applicative **-ir-**, causative **-iish-**, neuter **-ik-**, impositive **-ik-**, and separative **-ur-**/**-uk-**. In extensions containing /i/ (applicative, causative, neuter,

and impositive), the vowel appears as [e] when the stem vowel is /e/ or /o/, and as [i] in other contexts, such as when the stem vowel is /i/, /u/, or /a/. In contrast, the separative extension uses [o] only when the root vowel is /o/, while [u] is used with all other stem vowels. This pattern in igiHa demonstrates 'asymmetric' vowel height harmony, as described by Hyman (2019).

Recently, Gidion (2022) postulates that various phonological processes, such as elision, coalescence, vowel lengthening, and nasalization, play critical roles in resolving vowel and consonant interactions in the igiHa language of Tanzania. Elision, particularly involving vowel 1 and vowel 2 deletion, emerges as a primary strategy for managing vowel sequences and preventing vocalic hiatus. Glide formation frequently acts as a foundational process to avoid VV sequences, shifting to elision when structural constraints inhibit gliding. Coalescence occurs mainly with the merging of vowels, like /a/ and /i/, into a new quality. Vowel harmony and consonant processes, including nasalization and glide insertion, further facilitate smoother articulation and adherence to the language's CV syllable structure. However, a notable gap remains between the Assimilatory Process and the ATR (Advanced Tongue Root) features in vowel sequences, as igiHa's processes tend to depend heavily on morphological rather than phonemic or articulatory contexts, indicating a need for deeper exploration of the ATR's influence on vowel harmony in igiHa.

5.0 Segmental Assimilation and Vowel Harmony in igiHa

This section presents a comprehensive analysis and autosegmental perspective on igiHa's distinctive segmental assimilation processes, including nasalization, vowel harmony, and homorganic nasal assimilation. This analysis seeks to deepen the understanding of the characteristic diffusion of phonetic attributes that frequently occur in phonological patterns. In this study, it has been revealed that igiHa vowels exhibit a type of featural harmony known as Advanced Tongue Root (ATR) harmony. The study goes far by positing that igiHa vowels are divided into two sets based on [±ATR] features. These sets include /i, e, u, o/ with [+ATR] and /ɪ, ɛ, ʊ, ɔ/ with [-ATR] features, detailed further in 5.2. Interestingly, the vowel /a/ sometimes patterns with [+ATR] vowels in igiHa, as seen in words like /imbwa/ 'dog', /ama/ 'chase, /iβa/ 'steal', and /aβa/ 'these', without any apparent phonetic explanation.

5.1 Nasal Assimilatory Processes

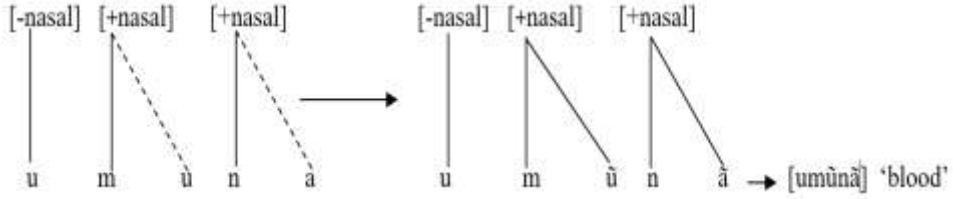
In igiHa, any vowel that follows the nasal consonants /m/, /n/, /ɲ/, and /ŋ/, whether in isolated words or continuous speech, typically assumes the [+nasal] attribute associated with the aforementioned nasals. Following such a feature, the igiHa nasalized vowels are not in opposition to their oral counterparts. As illustrated in example (1) below, the nasalization of vowels occurs phonetically only in the presence of nasal consonants within individual words.

(1)	a.	/imise/	[imĩse]	‘palm nuts’
	b.	/umuna/	[umũnã]	‘nosebleed’
	c.	/inanga/	[inãngã]	‘anchor’
	d.	/ino/	[inõ]	‘toe’
	e.	/iŋo/	[iŋõ]	‘come’
	f.	/iɲama/	[iɲãmã/	‘meat’
	g.	/iɲoŋori/	[iɲõŋõri/	‘millipede’
	h.	/inaga/	[inãga/	‘pot’

Source: Data from the Field (2024)

The data in (1) show that in igiHa, nasalization only occurs in vowels following nasal consonants. The data presented in (1) further show that vowels preceding nasal consonants do not undergo nasalization. Within Goldmith’s (1975) Autosegmental Framework, nasal consonants spread their [+nasal] feature to the following oral vowel. This can be seen in the example given in where the vowels following the nasal consonants adopt the nasal quality through the process of progressive nasal assimilation.

(2) Progressive Nasal Assimilation



The autosegmental diagrams in (2) above illustrate that the nasal qualities of /m/ and /n/ spread rightward to the terminal vowels /u/ and /a/, which are transformed into /ũ/ and /ã/, respectively. This representation shows the application of the progressive nasal assimilation process via the corresponding dotted lines. This phonetic trait distinguishes igiHa from other Bantu languages such as Rwanda (Kimenyi, 1979), Matuumbi (Odden, 1996), Yao (Ngunga, 2000), Urhobo (Aziza, 2002), Lungu (Bickmore, 2007), Isoko (Yul-Ifode, 2008), and Gusii (Nash, 2011), where there is a clear phonemic distinction between oral and nasalized vowels.

5.2 Vowel Harmony

This process involves one vowel adopting the features or characteristics of another vowel within a phonological sequence, a process rigidly governed by the positional constraints of the tongue root, either advancing or retracting. The adoption of the binary features [+ATR] and [-ATR] was inspired by the influence that the tongue root position has on the articulation of vowel segments, as posited

by Stewart (1967) and Lindau (1975) in their respective works and recently adopted by Casali (2008), Iloene (2010), Smolek (2010). Following the works of Casali (2008), Iloene (2010), and Smolek (2010), which describes how vowels harmonize within words and morphemes in many African languages, cases in (3) and (4) demonstrate how sets of vowels are paired within words based on ATR vowel harmony principles.

(3) Vowel Harmony [+ATR] (/i, e, u, o/)

a.	/imbwa/	‘dog’
b.	/itoboɾo/	‘hole’
c.	/ijoɾo/	‘night’
d.	/ibara/	‘spot’
e.	/uruseŋo/	‘net’
f.	/urugo/	‘homage’
g.	/amazi/	‘water’
h.	/umunwa/	‘mouth’

Source: Data from the Field (2024)

As exemplified in (3), the words are entirely composed of [+ATR] vowels such as /i, e, u, o/. The phonological rules of igiHa prevent [–ATR] vowels from appearing in the sequences shown in (3). In the same veins, the tongue root restriction prevents [+ATR] vowels from appearing in the domain of [–ATR] vowels, as demonstrated by the forms in (4) below:

(4) Vowel Harmony [+ATR] (/ɪ, ɛ, ʊ, ɔ/)

a.	/ɪβɛɛɾɛ/	‘breast’
b.	/ʊmʊɲʊ/	‘salt’
c.	/ɪmpɪgɪ/	‘talisman’
d.	/ɪŋɔɾəgɔɾɔ/	‘a kind of terminates’
e.	/ɪɟʊɾʊ/	‘sky’
f.	/ɪgɪsɪgɔ/	‘evil spirit’
g.	/ɛɟɔ/	‘tomorrow’

It is important to note that the two harmonizing features [±ATR] can differentiate word meanings, as in the cases of /ino/ ‘stomach’ versus /ɪnɔ/ ‘here’ and /inda/ ‘stomach’ versus /ɪnda/ ‘pregnancy’. The autosegmental representations in examples (6) and (7) illustrate the long-distance ATR spread or assimilation on vowels. This phenomenon is further demonstrated by the words in examples (3f) /uɾugo/ ‘homage’ and (4e) /ɪɟʊɾʊ/ ‘sky’.

(5) [+ATR] Spread

An analogous instance of vowel harmony spread is evident in the word /ɪjoɾo/, which is lexically specified as [-ATR], as demonstrated in (6):

(6) [-ATR] Spread

The analysis of ATR harmony in (6) above underscores the intricate nature of vowel harmony systems and their significant role in distinguishing lexical meanings within a language. Additionally, Harjula (2004) observes that the semi-open vowels *I and *U in specific derivational extensions demonstrate vowel height harmony, matching the height of the stem vowel. These extensions encompass the applicative ***-ir-***, the causative ***-iish-***, the neuter ***-ik-***, the impositive ***-ik-***, and the separative ***-or-***/***-ur-***. In extensions containing /i/ such as the applicative, causative, neuter, and impositive, the vowel appears as [e] when the stem vowel is /e/ or /o/ as exemplified in (7), and as [i] otherwise, namely when the stem vowel is /i/, /u/, or /a/ (8). In the separative extension, the harmonized variant [o] appears only when the root vowel is /o/ (9), while [u] is used with all other stem vowels (10). Consequently, this illustrates an 'asymmetric' vowel height harmony as described by Hyman (2002).

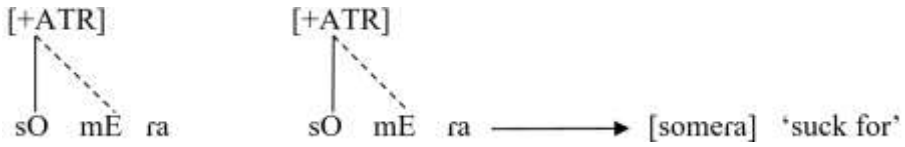
(7)	a.	-seka	sekeɾa
		sek - a	sek - eɾ - a
		laugh-FV	laugh-APPL-FV
		'laugh'	'laugh at'
	b.	-soma	someɾa
		som-a	som- eɾ - a
		suck-FV	read-APPL-FV
		'Suck'	'suck for'

(8)	a.	-ɾima	ɾimiɾa
		ɾim-a	ɾim-iɾ-a
		dig-FV	dig-APPL-FV
		‘dig’	‘dig for’
	b.	-tuma	tumiɾa
		tum - a	tum - iɾ - a
		send-FV	send-APPL-FV
		‘send’	‘send for’
	c.	saβa	saβiɾa
		saβ - a	saβ - iɾ - a
		request-FV	request-APPL-FV
		‘request’	‘request for’
(9)		toɾa	toɾoɾa
		toɾ - a	toɾ - oɾ - a
		take-FV	separate-APPL-FV
		‘take’	‘take out/separete’
(10)	a.	geɾa	geɾuɾa
		geɾ - a	geɾ - uɾ - a
		measure-FV	reduce-APPL-FV
		‘measure’	‘reduce’
	b.	gaβa	gaβuɾa
		gaβ - a	gaβ- uɾ - a
		give-FV	give-APPL-FV
		‘give’	‘divide’
	d.	-giɾa	-giɾuɾa
		giɾ-a	giɾ- uɾ - a
		do-FV	do-APPL-FV
		‘do’	‘undo’

Source: Data from the Field (2024)

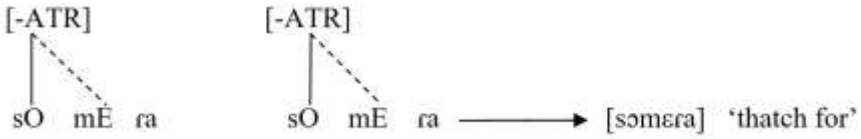
Within the the Autosegmental Framework, the examples provided above clearly elucidate the rightward spread of the [+ATR] assimilatory feature. This is an evident instance of progressive [+ATR] spread, where the [+ATR] characteristic propagates from left to right. The following example (12) illustrates the [+ATR] spread in the work /someɾa/ in (7b).

(11) [+ATR] Spread



Likewise, the opposing [-ATR] feature exhibits analogous pattern, as illustrated in the word and /sɔmɛɾa/ 'thatch for' as illustrated in (12):

(12) [-ATR] Spread



The Autosegmental Framework enables the igiHa [+ATR] assimilatory feature to spreads in a rightward mode, representing a case of progressive assimilation. Correspondingly, the [-ATR] feature demonstrates a parallel behavioral trend, as demonstrated in the aforementioned illustrations. Interestingly, the distinction between [+ATR] and [-ATR] vowels is crucial in this context because it highlights how delicate phonological features can create meaningful contrasts in language. In this case, the difference in tongue root position between **/someɾa/** and **/sɔmɛɾa/** exemplifies a minimal pair where the presence or absence of ATR affects the meaning. This finding emphasizes the role of phonological features like ATR in distinguishing lexical items, thus contributing to a deeper understanding of phonemic contrasts and their impact on meaning within the igiHa language.

5.3 Homorganic Nasal Assimilation

The intriguing aspect of these nasal-consonant sequences in igiHa is that they trigger a process of homorganic nasal assimilation. In igiHa, the alveolar nasal stop /n/ occurs with five allophonic realisations: [m, ɱ, n, ɲ, ŋ]. Each of these realisations arises from the effect of assimilation, where the nasal adopts the place of articulation of the subsequent consonant. Precisely, the nasal [m, ɱ, n, ɲ, ŋ] variants in the examples are conditioned by the place of articulation of the preceding labial /p, b, f, v/, alveolar /t, d, ɾ/, palatal /ʧ, ʝ/, and velar /k, g/ consonants respectively. This exemplifies the process of homorganic nasal assimilation operating within the NC sequences in igiHa.

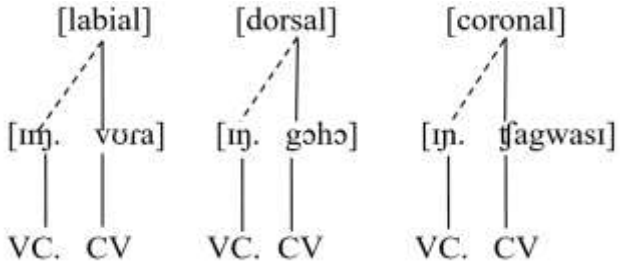
(13) Hormoganic Nasal Assimilation

	Nasal	Consonant	Word	Gloss	Changes
a.	/n-	-p/	[impuzu]	'cloth'	alveolar to labial
b.	/n-	-b/	[imbwa]	'dog'	alveolar to labial
c.	/n-	-f/	[iɱfuvyi]	'orphan'	alveolar to labial-dental
d.	/n-	-v/	[ɪɱvʊra/	'rain'	alveolar to labial-dental
e.	/n-	-t/	[intoɾe]	green tomatoe	remains alveolar
f.	/n-	-d/	[ɪndəβə]	'bucket'	remains alveolar
g.	/n-	-ɾ/	[ndora]	'I look'	remains alveolar
h.	/n-	-ʧ/	[ɪɲʧagwasɪ]	'green mamba'	alveola to palatal
i.	/n-	-j/	[ɪnjəfʊ]	'elephant'	remains alveolar
j.	/n-	-j/	[iɲama]	'meat'	alveolar to palatal
k.	/n-	-g/	[ɪŋgəhə]	'gun'	alveolar to velar

Source: Data from the Field (2024)

In Goldsimith's (1975) Autosegmental Framework, the places of articulation—labial, alveolar, palatal, and velar—are revealed through a process that associates place features to the left, represented by a dotted association line in (14). This process exemplifies regressive/anticipatory assimilation and is insightfully illustrated using the unary features of Sagey (1986): [labial], [coronal], and [dorsal], as follows:

(14) Representation of Homorganic Nasal Assimilation



The section on homorganic nasal assimilation in igiHa discusses how nasals in this language undergo assimilation to match the place of articulation of the following consonant. This process results in the nasal sound becoming phonetically identical to the subsequent consonant, whether it is labial, alveolar, or velar. The assimilation ensures that the nasal consonants harmonize with the articulation of the following sound, thereby creating a more fluid and cohesive pronunciation pattern within the language. This phenomenon exemplifies how igiHa manages phonological consistency and ease of articulation through systematic nasal assimilation. In this regard, igiHa exhibits NC sequences–a combination of a nasal

and a consonant followed by a vowel similar to its close langugaes such as Kirundi and Kinyarwanda as postulated by Bastin (2003) and Zorc and Nibagwire (2007) respectively.

6.0 Conclusion

This study investigates crucial segmental assimilation processes, focusing on vowel nasalization, vowel harmony, and homorganic nasal assimilation in igiHa. Using the standard model of Autosegmental Theory, which conceptualizes assimilation as the spreading of linguistic features, provided a robust framework for analysis. The data revealed that nasal assimilation occurred, with vowels becoming nasalized when preceded by nasal consonants. Additionally, nasal consonants in NC sequences adopted the place feature of the following consonant. The analysis also showed that vowel phonemes are systematically divided into two sub-systems governed by Advanced Tongue Root (ATR) harmony rules. These findings enhance our understanding of common natural feature-spreading phonological phenomena in igiHa. Furthermore, the research highlights the intricate nature of phonological processes and their systematic occurrence within a language. It provides a clearer picture of how linguistic features spread and interact in natural languages. This study contributes to the broader field of phonology by offering empirical evidence supporting the theoretical predictions of Autosegmental Theory. Overall, it underscores the importance of examining specific phonological phenomena to uncover the underlying principles of language structure.

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