PHONETIC AND PHONOLOGICAL CONTRAST OF NASALS M, N, AND Ñ IN ENGLISH, SPANISH, AND KICHWA

Matabay Cargua René Mauricio[1]
https://orcid.org/0009-0003-9635-2325

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[1] Universidad de Investigación de Tecnología Experimental Yachay - Universidad Americana de Europa (UNADE), Docente - Tesista,
mauriciomatabay@hotmail.com

RESUMEN

Este estudio analiza el contraste fonético y fonológico de las consonantes nasales /m/, /n/ y /ɲ/, representadas por los grafemas *m*, *n* y *ñ*, en los idiomas inglés, español y kichwa. La investigación se enmarca en un enfoque cualitativo, descriptivo y contrastivo, orientado a examinar la distribución fonológica, la variación alofónica y los fenómenos de transferencia interlingüística, con especial énfasis en hablantes bilingües kichwa-español. Desde una perspectiva constructivista, se considera que el conocimiento lingüístico se construye a partir de la interacción entre los sistemas fonológicos en contacto. Los resultados evidencian diferencias significativas entre los tres idiomas. En inglés, las consonantes nasales presentan una distribución fonológica mayoritariamente total y una amplia variedad de realizaciones fonéticas condicionadas por factores fonotácticos y prosódicos. En español, se observa una posición intermedia, caracterizada por distribuciones fonológicas estables y patrones de asimilación previsibles. En contraste, el kichwa exhibe distribuciones fonológicas parciales y patrones de alofonía complementaria altamente sistemáticos, determinados por principios históricos, etimológicos y ortográficos. Asimismo, se identifican procesos de transferencia positiva cuando existen similitudes fonológicas entre las lenguas, y transferencia cero cuando los sonidos son exclusivos de un idioma. El fonema /ɲ/ no existe en inglés, pero muestra comportamientos fonológicos similares en español y kichwa, aunque con divergencias fonéticas relevantes. Estos hallazgos contribuyen a la comprensión del contacto lingüístico y ofrecen aportes relevantes para la fonología contrastiva y la educación bilingüe.

Palabras clave: Fonética, Fonología, Kichwa

ABSTRACT

This study analyzes the phonetic and phonological contrast of the nasal consonants /m/, /n/, and /ɲ/, represented by the graphemes m, n, and ñ, in English, Spanish, and Kichwa. The research adopts a qualitative, descriptive, and contrastive approach aimed at examining phonological distribution, allophonic variation, and interlinguistic transfer phenomena, with particular emphasis on Kichwa–Spanish bilingual speakers. From a constructivist perspective, linguistic knowledge is understood as being constructed through interaction among phonological systems in contact. The results reveal significant differences across the three languages. In English, nasal consonants exhibit largely total phonological distribution and a wide range of phonetic realizations conditioned by phonotactic and prosodic factors. Spanish occupies an intermediate position, characterized by stable phonological distributions and predictable assimilation patterns. In contrast, Kichwa displays partial phonological distributions and highly systematic patterns of complementary allophony shaped by historical, etymological, and orthographic principles. Additionally, processes of positive transfer are identified when phonological similarities exist across languages, whereas zero transfer occurs when sounds are exclusive to a single language. The phoneme /ɲ/ does not exist in English but shows similar phonological behavior in Spanish and Kichwa, despite exhibiting relevant phonetic divergences. These findings contribute to the understanding of language contact and provide valuable insights for contrastive phonology and bilingual education.

Keywords: Kichwa, Phonetics, Phonology

INTRODUCTION

Nasal consonants are a fundamental component of phonological systems across languages. Despite their articulatory stability, nasals frequently display complex allophonic variation influenced by phonotactic constraints, coarticulation, and prosodic structure (Ladefoged & Johnson, 2015). In multilingual and contact settings, such variation becomes especially salient, as speakers negotiate multiple phonological systems simultaneously.

This study focuses on the nasal consonants /m/, /n/, and /ɲ/ in English, Spanish, and Kichwa. These languages represent distinct typological and sociolinguistic contexts: English as a Germanic language with extensive allophonic variation, Spanish as a Romance language with systematic nasal assimilation, and Kichwa as an indigenous Andean language characterized by complementary allophonic distributions and historically motivated orthography.

The study addresses the following research questions:

1. How are the nasals /m/, /n/, and /ɲ/ distributed phonologically and phonetically in English, Spanish, and Kichwa?
2. What types of allophonic variation characterize each language?
3. What patterns of phonological and phonetic transfer emerge across language pairs?

STATE OF THE ART

Research on nasal consonants has long occupied a central place in phonetic and phonological theory due to their articulatory stability and cross-linguistic frequency. Foundational work by Peter Ladefoged and Keith Johnson (2015) establishes that nasals are characterized by velum lowering and oral closure, yet they frequently display context-dependent variation influenced by coarticulation and prosodic structure. Similarly, Carlos Gussenhoven and Haike Jacobs (2017) emphasize that nasal consonants often participate in systematic place assimilation, particularly before obstruents, resulting in predictable allophonic alternations.

Within Spanish phonology, nasal assimilation has been extensively documented. Nasals typically assimilate to the place of articulation of a following consonant, producing realizations such as [ɱ], [ŋ], or dental [n̪]. These processes are widely recognized as examples of complementary distribution rather than phonemic contrast, reinforcing the stability of /m/ and /n/ within the Spanish phonological system.

In English, nasal consonants also exhibit significant phonetic variation, including syllabic nasals ([m̩], [n̩]) in unstressed positions. Such patterns are discussed in depth in descriptive and pedagogical phonology literature, including the work of David Crystal (2008). English differs from Spanish and Kichwa in that syllabic nasals are phonologically relevant in reduced prosodic environments, especially in connected speech.

Contrastive phonology, as a methodological framework, has traditionally aimed to predict transfer phenomena in bilingual or multilingual contexts. Early structuralist approaches emphasized error prediction, while contemporary perspectives highlight dynamic interaction between phonological systems in contact. In this regard, positive transfer is expected when phonemic inventories overlap, whereas divergence at the allophonic level may generate partial or zero transfer.

Regarding Kichwa, phonological research remains comparatively limited but has expanded in recent decades. Carmen Yánez Cossío (2013) provides one of the most systematic descriptions of Kichwa phonology, documenting consonantal inventories and morphophonemic processes. Studies on language vitality and contact, such as those by Marleen Haboud and colleagues at Universidad Andina Simón Bolívar, highlight the dynamic interaction between Kichwa and Spanish, particularly in Andean communities. Sociophonological perspectives offered by Diego Narváez (2020) and Carlos Puma Ninacuri (2022) further demonstrate that contact-induced phenomena extend beyond lexicon to phonological and morphosyntactic domains.

Despite this growing body of research, few studies have conducted a systematic contrastive analysis of nasal consonants across Kichwa, Spanish, and English, particularly with empirical data from bilingual

speakers. Most available works either focus exclusively on Spanish–English contrast or on internal descriptions of Kichwa phonology without integrating multilingual transfer analysis.

Therefore, the present study addresses a notable gap in the literature by:

1. Providing empirically grounded documentation of Kichwa nasal realizations.
2. Integrating contrastive phonology with language contact perspectives.
3. Examining phonemic and allophonic transfer across three typologically distinct languages.
4. Contributing to bilingual education research in Andean multilingual contexts.

By situating Kichwa within a broader comparative framework, this research advances current understanding of nasal consonant behavior in multilingual phonological systems and expands the scholarly conversation on indigenous language phonology in contact settings.

THEORETICAL FRAMEWORK
Phonological Distribution and Allophony
Phonological distribution refers to the positional occurrence of phonemes within a language, typically categorized as total or partial. Allophony involves predictable phonetic realizations of a phoneme that do not produce meaning contrasts (Gussenhoven & Jacobs, 2017). Complementary distribution occurs when allophones appear in mutually exclusive environments.

Contrastive Phonology and Language Transfer
Contrastive phonology aims to identify similarities and differences between languages to predict learning facilitation or difficulty (Crystal, 2008). Similar phonological features often lead to positive transfer, whereas language-specific features result in zero transfer.

Orthographic Principles in Kichwa
Kichwa orthography reflects etymological, historical, and geographical principles rather than purely phonetic criteria. Consequently, a single grapheme may represent multiple allophones without orthographic alternation, a feature crucial for understanding nasal consonant behavior.

METHODOLOGY
This study is grounded in a qualitative research design framed within a constructivist epistemological perspective. The empirical scope is explicitly limited to the analysis of phonetic realizations and phonological distributions of the nasal phonemes /m/, /n/, and /ɲ/ as produced by Kichwa–Spanish bilingual university students. While the contrastive description of English and Spanish draws on established phonological literature, the empirical data derive exclusively from Kichwa-speaking participants.

Participants
The sample consisted of 17 Indigenous undergraduate students at Yachay Tech University who self-identified as native Kichwa speakers. Participants (10 women and 7 men), aged 18–24, came from bilingual Kichwa–Spanish communities in the Imbabura region of Ecuador.

Data Collection
Data were collected over a three-month period through:

- Semi-structured interviews (elicited production and metalinguistic reflection)
- Participant observation (naturally occurring speech in academic contexts)
- Targeted elicitation tasks designed to prompt lexical items containing /m/, /n/, and /ɲ/

Documentary analysis supported the theoretical contrastive framework but did not constitute primary empirical evidence.

Data Analysis
All recorded tokens were transcribed using standardized IPA conventions. Phonological distribution was classified as total (occurring in initial, medial, and final positions) or partial (restricted to specific

positions). Allophonic variation was categorized as complementary or context-conditioned, based on articulatory environment.

Transfer phenomena were identified through systematic comparison between empirically documented Kichwa realizations and established phonological descriptions of English and Spanish.

RESULTS

The results were presented through tables showing the contrastive transfer analysis, as well as tables indicating the phonetic and phonological distribution of nasals m, n, and ñ in the English, Spanish, and Kichwa languages.

Table 1
Allophones of the grapheme "m"

Grapheme "m"	Kichwa word	Meaning	Phoneme position	Allophone position
Fonema /m/	mamaku	mamita	/ma'maku/	
Allophone (Variant 1)[m]	mana	no		['mana]
Allophone (Variant 2) [n]	kimsa	tres		[kinsa]
Allophone (Variant 3)[w]	millma	lana		[willma]

Source: Own elaboration

As shown in Table 1, the grapheme *m* in Kichwa, whose phoneme is represented by the symbol /m/, exhibits three allophones: [m], [n], and [w]. Therefore, Kichwa lexemes that are etymologically, geographically, and historically realized as [m], [n], and [w] are written using the grapheme *m*.

Table 2
Matrix of phonetic and phonological distribution of /m/

English					Spanish			Kichwa				
Position	/m/	[m]	[ɱ]	[ɯ]	Position	/m/	[m]	Position	/m/	[m]	[n]	[w]
Initial	✓	✓	x	x	Initial	✓	✓	Initial	✓	✓	x	✓
Middle	✓	✓	x	x	Middle	✓	✓	Middle	✓	✓	✓	x
M + f	✓	X	✓	x	-	-	-	-	-	-	-	-
Final	✓	✓	x	✓	Final	x	x	Final	x	x	x	x
C + F	✓	✓	x	✓	-	-	-	-	-	-	-	-

Source: Own elaboration

Table 2 shows that in Kichwa the phoneme /m/ exhibits partial phonological distribution (initial and medial positions) and complementary allophony. The primary realization is [m], while [n] occurs in specific medial environments, and [w] appears in restricted lexical contexts motivated by historical and orthographic conventions.

Table 3

Matrix of Contrastive transfer analysis of /m/ between English and Spanish; Spanish and Kichwa

English	Analysis	Spanish	Analysis	Kichwa
/m/	+	/m/	+	/m/
[m]	+	[m]	+	[m]
[ɱ]	ø	x	ø	[n]
[-m]	ø	x	ø	[w]
[m̩]	ø	x	-	-

Source: Own elaboration

In contrast, English displays total phonological distribution of /m/ and context-dependent allophones such as [ɱ] before /f/ and syllabic [m] in reduced unstressed syllables. Spanish presents a more stable system, with /m/ occurring in initial and medial positions and predictable place assimilation before labiodental segments.

Positive transfer occurs between all three languages at the phonemic level (/m/). However, zero transfer emerges in language-specific allophones, particularly Kichwa [w] and English[m].

Table 4

Allophones of the grapheme "n"

Grapheme "n"	Kichwa word	Meaning	Phoneme position	Allophone position
Phoneme /n/	nina	fuego	/'nina/	
Allophone (Variant 1) [n]	ninanta	demasiado, en exceso		[ni'nanta]
Allophone (Variant 2) [m]	yanta	leña		['yamta]

Source: Own elaboration

As shown in Table 4, the grapheme n in Kichwa, whose phoneme is represented by the symbol /n/, exhibits two allophones: [n] and [m]. Therefore, Kichwa lexemes that are etymologically, geographically, and historically realized as [m] and [n] are written using the grapheme n.

Table 5
Matrix of Phonetic and phonological distribution of /n/

English				Spanish							Kichwa						
Position	/n/	[n]	c+[-øn]	Position	/n/	[n]	[n̪]	[ň]	[ŋ]	[ɱ]	Position	/n/	[n]	[n̪]	[ň]	[ŋ]	[m]
Initial	✓	✓	x	Initial	✓	✓	x	x	x	x	Initial	✓	✓	x	x	x	x
Middle	✓	✓	x	Middle	✓	✓	✓	✓	✓	✓	Middle	✓	✓	✓	✓	✓	✓
				M /t-d/	✓	x	✓	x	x	x	M /t-d/	✓	x	x	x	x	✓
				M /tʃ/	✓	x	x	✓	x	x		✓	x	x	✓	x	x
				M /f/	✓	x	x	x	x	✓		x	x	x	x	x	x
				M /k, g, x/	✓	x	x	x	✓	x		✓	x	x	x	✓	x
Final	✓	✓	✓	Final	✓	x	x	x	✓	x	Final	✓	x	x	x	✓	x
C + F	✓	✓	✓														

Source: Own elaboration

Based on Table 5, in English the phonological distribution of the grapheme n is total, since the phoneme /n/ occurs in initial, medial, and final positions. The phonetic distribution of the grapheme n is partial, as the allophone with the structure c+[-øn] occurs exclusively in unstressed syllabic position without a reduced vowel, as in the word Manhattan.

In Kichwa, /n/ shows total phonological distribution. Allophonic variation is complementary and conditioned by following consonants. The bilabial [m] appears before bilabial segments, while other variants align with place assimilation patterns.

Spanish also exhibits total phonological distribution with systematic place assimilation ([ŋ], [ɲ], [n̪], [ɱ]) depending on the following consonant. English presents total distribution as well, including syllabic [n] in unstressed final position.

Table 6
Matrix of contrastive transfer analysis of /n/ between English and Spanish; Spanish and Kichwa

English	Analysis	Spanish	Analysis	Kichwa
/n/	+	/n/	+	/n/
[n]	+	[n]	+	[n]
c+[-øn]	ø	x		x
X	ø	[n̪]	+	[n̪]
X	ø	[ň]	+	[ň]
X	ø	[ŋ]	+	[ŋ]
X	ø	[ɱ]	ø	x
x		x	ø	[m]

Source: Own elaboration

Phonemic transfer of /n/ is positive across languages; however, phonetic transfer is partial. Certain allophones (e.g., syllabic [n] in English) lack equivalents in Kichwa, while some Kichwa realizations do not occur in English.

Table 7

Allophones of the grapheme "ñ"

Grapheme "ñ"	Kichwa word	Meaning	Phoneme position	Allophone position
Phoneme /ɲ/	ñawi	ojo	/ 'ɲawi/	
Allophone (Variant 1) [ɲ]	ñuka	yo		['ɲuka]
Allophone (Variant 2) [n]	ñitina	presionar, apretar		[ni'tina]
Allophone (Variant 3) [y]	ñan	camino		['yan]

Source: Own elaboration

As shown in Table 7, the grapheme ñ in Kichwa, whose phoneme is represented by the symbol /ɲ/, has three allophones: [ɲ], [n], and [y]. Consequently, Kichwa lexemes that are etymologically, geographically, and historically produced in the forms [ɲ], [n], and [y] are written using the grapheme ñ.

The phonetic transfer [ʃ] of the grapheme "sh" is positive and zero. Positive, since the allophone [ʃ] of the grapheme "sh" is similar in both languages, English and Kichwa. Zero, since the allophones [ʧ], [s], and [ž] of the grapheme "sh" do not occur in English; they only occur in Kichwa.

Table 8

Matrix of phonetic and phonological distribution of /ɲ/

English			Spanish			Kichwa				
Position	/ɲ/	[n]	Position	/ɲ/	[n]	Position	/ɲ/	[ɲ]	[n]	[y]
Initial	x	x	Inicial	✓	✓	Initial	✓	✓	✓	✓
Middle	x	x	Middle	✓	✓	Middle	✓	✓	x	x
Final	x	x	Final	x	x	Final	x	x	x	x

Source: Own elaboration

Table 8 shows that, in the English language, the phoneme /ɲ/ does not exist. This phoneme occurs only in Spanish and Kichwa. In Spanish, the phonological distribution of the grapheme ñ is partial, since the phoneme /ɲ/ occurs exclusively in initial and medial positions. The phonetic distribution of the grapheme ñ is also partial, as the allophone [ɲ] occurs only in initial and medial positions.

Finally, in Kichwa, the phonological distribution of the grapheme ñ is partial, since the phoneme /ɲ/ occurs exclusively in initial and medial positions. The phonetic distribution of the grapheme ñ is partial and complementary: the allophone [ɲ] occurs only in initial and medial positions, whereas the allophones [n] and [y] occur only in initial position.

Table 9

Matrix of contrastive transfer analysis of /ɲ/ between Spanish and Kichwa

Spanish	Analysis	Kichwa
/ɲ/	+	/ɲ/
[ɲ]	+	[ɲ]
x	Ø	[n]
x	Ø	[y]

Source: Own elaboration

Table 9 shows that the phonological transfer /ɲ/ of the grapheme ñ is positive, since the sound of the grapheme ñ is similar in both Spanish and Kichwa. Therefore, in both languages the grapheme ñ is dorso-palatal, voiced, nasal, occlusive, and continuant.

The phonetic transfer [ɲ] of the grapheme ñ is both positive and zero. It is positive because the allophone [ɲ] of the grapheme ñ is similar in both Spanish and Kichwa. It is zero because the allophone [y] occurs only in Spanish. The allophones [l], [ʧ], and [r] of the grapheme ll do not occur in Spanish and occur exclusively in Kichwa.

DISCUSSION

These findings are consistent with the theoretical framework outlined in the introduction, which highlights that nasal consonants, despite their articulatory stability, tend to exhibit complex allophonic variation conditioned by phonotactic constraints, coarticulation, and prosodic structure (Ladefoged & Johnson, 2015). The results confirm that nasal consonants maintain stable phonological identities across English, Spanish, and Kichwa; however, their phonetic realizations vary systematically depending on language-specific constraints and contact dynamics. In Kichwa, nasal allophony is largely complementary and reflects long-standing historical and orthographic principles that regulate grapheme–phoneme correspondence. English, by contrast, displays greater phonetic complexity, with context-dependent allophones and syllabic nasals influenced by prosodic reduction. Spanish occupies an intermediate position, characterized by predictable assimilation patterns that limit allophonic variation while preserving phonological transparency. In multilingual and contact settings, these differences become especially salient, as speakers must negotiate overlapping nasal systems, which in turn shape patterns of phonological and phonetic transfer.

The findings further demonstrate that transfer phenomena occur across the three languages under analysis. Positive transfer emerges when phonetic and phonological similarities are shared between languages, whereas zero transfer is observed when specific sounds are exclusive to Kichwa. This distinction aligns with the pedagogical concerns raised by Mejía (2024), who underscores the relevance of contrastive phonology in second language instruction.

Moreover, sociolinguistic research by Narváez (2020) and Puma (2022) supports the view that contact between Kichwa and Spanish extends beyond lexical borrowing to encompass phonological and morphosyntactic dimensions. The present study reinforces this perspective by evidencing how Kichwa digraphs shape learners' articulatory patterns within multilingual contexts.

CONCLUSIONS
This study demonstrates that:
1. The phonemes /m/ and /n/ show cross-linguistic phonological stability but language-specific phonetic variation.
2. Kichwa nasal consonants exhibit systematic complementary allophony shaped by phonotactic and orthographic principles.

3. The absence of /ɲ/ in English constitutes a significant contrastive divergence.
4. Positive phonemic transfer coexists with partial or zero phonetic transfer across languages.

The study contributes to contrastive phonology by providing empirically grounded documentation of Kichwa nasal consonants in contact with Spanish and English. It also advances research in language contact and offers practical insights for bilingual and multilingual education.

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