

**A COMPARATIVE STUDY OF LEBLANGO AND FRENCH VOWEL SOUNDS:
IMPLICATIONS FOR LEBLANGO SPEAKERS OF FRENCH AS A THIRD
LANGUAGE**

BY

BOSCO OPIO

Dip. Ed. (Kyu), BA (Mak)

REG: 21/U/2911/MEL/PS

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DECLARATION

I, Bosco Opio, hereby declare that the thesis titled “*A Comparative Study of Leblango and French Vowel Sounds: Implications for Leblango Speakers of French as a Third Language*” is my own original work and has not been submitted for the award of any degree or for any examination at any other institution of higher learning. All references have been correctly acknowledged to the best of my knowledge.

Signature: _____

Date: _____

BOSCO OPIO

21/U/2911/MEL/PS

APPROVAL

This is to certify that this thesis titled "*A Comparative Study of Leblango and French Vowel Sounds: Implications for Leblango Speakers of French as a Third Language*" has been submitted for examination with the approval of the supervisor:

Sign:  Date: 09.10.2026

Assoc. Prof. Bebwa Isingoma
BA, PGDE, MPhil, PhD, FAHP, MSCF

SUPERVISOR

DEDICATION

I dedicate this work to my late father, Mr. Stanley Okello Bodo, whose memory continues to inspire me, and to my mother, Mrs. Yoko Awuma Bodo, for her love and encouragement. I also dedicate it to my sister, Ms. Margret Aboo, and to my three sons—Ramos, Raymond, and Brandon—for their unwavering support throughout this journey.

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ACRONYMS AND ABBREVIATIONS

ATR	–	Advanced Tongue Root
AUF	–	Agence Universitaire de la Francophonie
BA	–	Bachelor of Arts
BERA	–	British Educational Research Association
CAH	–	Contrastive Analysis Hypothesis
CFPP2000	–	Corpus de Français Parlé Parisien des années 2000
CVI	–	Content Validity Index
Dip. Ed.	–	Diploma in Education
Hz	–	Hertz
I-CVI	–	Item Content Validity Index
IPA	–	International Phonetic Alphabet
IRRI	–	Inter-Rater Reliability Index
L1	–	First Language
L2	–	Second Language
L3	–	Third Language
NCDC	–	National Curriculum Development Centre
NULP	–	Northern Uganda Literacy Program
PAM	–	Perceptual Assimilation Model
S-CVI	–	Scale Content Validity Index
SLM	–	Speech Learning Model
UBOS	–	Uganda Bureau of Statistics
UCC	–	Uganda Communications Commission
UNEB	–	Uganda National Examinations Board
USAID	–	United States Agency for International Development

DEFINITION OF TERMS

1. **Exonormative** – Based on the way a second/foreign language is used in the country it came from originally, rather than the way it is used by local speakers.
2. **Phonemes** – Distinct sound units in a language that differentiate words, e.g., /p/ in *pad* vs. *pat*.
3. **Syllables** – Units of pronunciation having one vowel sound, with or without surrounding consonants, forming whole words or parts of words.
4. **Obstruent** – A speech sound formed by obstructing airflow, e.g., /k/, /f/.
5. **Spectrogram**: A photograph or visual representation of a spectrum (i.e. a range of soundwaves)
6. **Acoustics**: Physical properties of sounds
7. **Hertz**: A unit of frequency, equal to one cycle per second.
8. **Diphthong**: A complex vowel sound that begins with one vowel quality and glides smoothly to another within the same syllable, as in the English vowel /aɪ/ in *time*.
9. **Phonologization**: The process by which an initially phonetic or allophonic sound difference becomes a phonemic contrast in a language over time, often after the loss or weakening of the original conditioning environment.
10. **Corpus**: A large, structured collection of spoken or written texts compiled for linguistic analysis, used for conducting linguistic research and analysis.
11. **L3**: Third language; a language acquired or learned after a person's first and second languages.
12. **L2**: Second language; a language acquired or learned after a person's first language.
13. **L1**: First language; a language acquired or learned as one's first language or mother tongue.

ABSTRACT

This study, titled “*A Comparative Study of Leblango and French Vowel Sounds: Implications for Leblango Speakers of French as a Third Language (L3)*”, compared the vowel systems of Leblango and French and examined their impact on French vowel pronunciation by L1 Leblango speakers. The analysis was conducted using the parameters of vowel height, backness, rounding, nasality, and distribution. The study employed a descriptive survey and comparative research design within a framework combining the Contrastive Analysis Hypothesis and Autosegmental Phonology. Data were collected from 20 advanced French speakers from the Lango sub-region, selected via purposive sampling. The study used audio-recorded conversational modules and reading activities. French reference data were sourced from the *Corpus de Français Parlé Parisien des années 2000* (CFPP2000). The findings reveal that Leblango and French share the oral vowels /a, e, ε, i, ɔ, o, u, ə/ and the nasal vowels /ɔ̃/ and /ɛ̃/. The primary differences are the presence in French of front rounded vowels /y/, /ø/, /œ/ and the distinct nasal vowels /œ̃/ and /ỹ/, which are absent in Leblango. These similarities could be said to have facilitated the accurate pronunciation of shared French vowels, such as /i/ in *si* and /ɔ̃/ in *bon*. Conversely, the differences could be said to have led to systematic challenges, resulting in substitutions like the realization of /y/ as [u] in *tu* and /œ̃/ as [ɛ̃] in *un*. The study recommends that French language teachers in the Lango sub-region familiarize themselves with both vowel systems and adopt pedagogical methods that explicitly address these phonological contrasts, and utilize targeted listening, pronunciation exercise, and contrastive drills to enhance learners' proficiency.

Chapter One

General Introduction

1.0 Introduction

This study aimed to conduct a comparative study of Leblango and French vowel sounds and explore the implications of the similarities and differences between the two systems for Leblango speakers of French as L3. This chapter contains the background to the study, statement of the problem, purpose of the study, objectives of the study, research questions, scope of the study, justification of the study, significance of the study and theoretical frameworks.

1.1 Background to the Study

1.1.1 Conceptual Background

According to Roach (2009), vowels are speech sounds produced with a free passage of air through the vocal tract without obstruction. Studies reveal that vowels are categorized based on various criteria, including tongue height (vertical position in the mouth), tongue backness (horizontal position), lip configuration (rounding or spreading), and the tenseness of oral tract muscles (Anderson et al., 2022; Delahunty & Garvey, 2010). Additionally, vowel length plays a significant role in vowel classification. For instance, Roach (2009) classifies English vowels into short vowels, long vowels, diphthongs, and triphthongs. Tandon (2017) further classifies vowels into monophthongs, which are pure and consistent sounds, and diphthongs, which involve a glide from one vowel sound to another.

Vowels can further be distinguished by whether they are oral (produced through the mouth) or nasal (produced through the nose and the mouth), a distinction controlled by the position of the velum (Ladefoged & Johnson, 2010). The velum, or soft palate, is a muscular structure at the back of the oral cavity that functions like a valve between the oral and nasal cavities; when raised, it

blocks nasal airflow, producing oral vowels. This movement is what Ladefoged and Johnson (2010) identify as the key factor that distinguishes oral from nasal sounds.

Ladefoged and Maddieson (1996) state that vowel systems across languages exhibit common patterns, with most being categorized based on height, backness, and rounding. Maddieson (1984) notes that many vowel inventories include high front vowels like /i/ and high back vowels like /u/, which are almost universally present. Similarly, Anderson et al. (2022) assert that vowel systems are commonly structured along a scale of high and low, front and back, as well as rounded and unrounded. Cardinal vowels, such as /a/, /e/, /i/, /o/, and /u/, as identified by Jones (1956), serve as reference points in many languages. Additionally, Gorrie (2021) and Maddieson (1984) highlight the universality of certain vowels, particularly /i/, /a/, and /u/, often referred to as corner vowels due to their prominence in the vowel space across most languages.

In terms of vowel production, Ladefoged and Johnson (2010) emphasize that vowels across languages are produced with an open vocal tract, making them less obstructive than consonants and more consistent across languages. Many vowel systems also exhibit vowel harmony, a phonological feature where vowels within a word harmonize to share similar phonetic properties. For instance, Advanced Tongue Root (ATR) harmony is common in African languages, particularly Western Nilotic languages such as Leblango (Clements & Hume, 1995). In such systems, vowels in a word tend to belong to the same ATR class, either [+ATR] (e.g., /i/, /u/, /e/, /o/) or [−ATR] (e.g., /ɪ/, /ʊ/, /ɛ/, /ɔ/). Thus, if the root of a word contains [+ATR] vowels, affixes or suffixes are also likely to adopt [+ATR] vowels in order to maintain harmony.

Vowel harmony, as widely observed in crosslinguistic research, operates through three main mechanisms: feature agreement (where vowels uniformly adopt properties like advanced tongue root or lip rounding), directionality of spread (either progressively from root to affix or

regressively from affix to root), and neutral vowel exceptions (where certain vowels resist harmony patterns) (Clements & Hume, 1995; Hulst, 2016). This phenomenon manifests itself differently across language families such as palatal harmony in Uralic languages, rounding and backness harmony in Turkic languages, and ATR harmony in Western Nilotic languages (Walker, 2011; Hyman, 2008; Polgárdi, 2006).

Despite the (almost) universal tendencies in vowel systems, there are notable differences across languages. For instance, some languages exhibit vowel reduction, where unstressed vowels tend to centralize or lose quality. Nespor et al. (2003) note that European Portuguese reduces its eight distinct vowels in stressed syllables to four in unstressed positions, while English frequently centralizes unstressed vowels, leading to significant reduction. Additionally, the occurrence and degree of vowel nasalization differ among languages. For instance, Pouplier et al. (2024) observe that vowel nasalization varies across languages based on coarticulatory and phonological contexts (the influence of surrounding sounds and language-specific sound rules, respectively). Similarly, Clumeck (1976) found that French, Hindi, and Amoy exhibit relatively lower degrees of contextual nasality, while Brazilian Portuguese demonstrates comparatively higher levels of nasalization.

Vowel length contrasts can also vary across languages, with some languages distinguishing between short and long vowels. For instance, in Japanese, vowel length plays a phonemic role, distinguishing between words such as *biru* ‘building’ and *bīru* ‘beer’ (Vance, 2008, p. 111). Similarly, Finnish contrasts short and long vowels, with duration being critical to meaning (Suomi et al., 2008), while English uses vowel length to a lesser extent, primarily in diphthongs and certain vowel pairs (Roach, 2009).

Diphthongization, a phonetic process in which a single vowel sound glides from one articulatory position to another within the same syllable, differs across languages in the number

and type of diphthongs employed (Delahunty & Garvey, 2010). For example, English uses several diphthongs including /aɪ/, /eɪ/, and /əʊ/ (Price, 2005), while French features stable, pure vowels, or monophthongs (Metz, 2014).

The universality and variability in vowel systems have implications for speakers of a third language (L3) (which can also be referred to as an additional language), which comes after a first (L1) and second language (L2) (Hammarberg, 2018). While acknowledging L2's potential role in L3 production (Wrembel, 2010; Barkov et al., 2022; Parrish, 2022), this study strategically focuses on L1-L3 transfer based on empirical precedents that demonstrate the dominant phonological influence of L1. For example, Kopečková et al. (2023) note that the vowel space of L1 Polish predicted L3 English vowel errors more reliably than L2 German. Similarly, Llama et al. (2010) observed that L1 Spanish exerted a stronger influence than L2 English on L3 French vowel production. Further support comes from Jin (2009) and Ranong and Leung (2009), who noted that speakers often transfer features from L1 to L3 even in the presence of an L2, especially when the L2 lacks relevant structural features. Their findings indicate that excluding L2 from analysis allows for a more accurate examination of L1–L3 phonological transfer, particularly in contexts where the L2 is typologically distant. Leung (2003) also argues that typological similarity between L1 and L3 often determines the direction of transfer, and that isolating L1 influence helps clarify the origin of L3 phonological features. While the interaction between L1 (Leblango), L2 (English, in the context of Uganda), and L3 (French) is of considerable linguistic interest, it lies beyond the scope of the current study.

Vowel similarities across languages often result in positive transfer during L2 or L3 production (Flege, 2002). For instance, shared vowel qualities between a speaker's L1 and L2 or L3 may enhance vowel perception and production, as outlined by Best (1995) in the Perceptual

Assimilation Model (PAM). Kartushina and Frauenfelder (2014) found that Spanish learners of French produced French vowels more accurately when they closely resembled their native Spanish vowel categories.

However, vowel differences may present challenges for speakers of an L2 or L3. According to Bardel and Falk (2020), languages with larger vowel inventories or distinct phonetic contrasts can make it difficult for learners to achieve accurate vowel production and perception in L3. This arises because L3 learners have to navigate the influence of two prior phonological systems (Wrembel, 2010), which can result in both facilitation and interference (Jensen et al., 2023). For example, learners whose L1 has a smaller vowel inventory, like Spanish, may find it challenging to distinguish mid-central vowels like the schwa when learning L3 French, especially if their L2 does not adequately reinforce such distinctions (Flege, 1995; Wrembel et al., 2019; Parrish, 2022). Additionally, perceptual assimilation, where vowel contrasts in the L3 are interpreted using L1 or L2 vowel categories, can cause complications leading to pronunciation inaccuracies (Best & Tyler, 2007). Moreover, the interplay between prior linguistic systems introduces variability, as learners selectively transfer phonetic features based on perceived similarity or markedness (Barkov et al., 2022).

Given the role of vowel system differences in L3 phonological transfer (Wrembel, 2010; Bardel & Falk, 2020) and the influence of prior languages on L3 production and perception (De Angelis; (2007), it is essential to establish clear definitions of vowel systems and the implications for speakers of an L3, particularly in relation to Leblango and French. As Ladefoged and Maddieson (1990) note, vowel systems across languages exhibit both universal and language-specific properties, which influence how speakers perceive and produce L2 and L3 vowels. In line with this study's objective of comparing the vowel systems of Leblango and French, the definition

of vowels as speech sounds produced with a free passage of air through the vocal tract without obstruction (Roach, 2009) serves as a foundational concept. This definition aligns with many studies' findings, including Ladefoged and Maddieson (1990), Stevens (2000), and Kent and Read (2002), which define vowels by the free airflow through the vocal tract, their syllabic nature, and the absence of major strictures. Additionally, this study defines “implications for speakers of an L3” as the measurable effects, either facilitative or interfering, that a speaker's L1 (Leblango) vowel system may exert on their perception and production of French vowels, especially in the areas of quality, length, or nasalization. This definition is grounded in crosslinguistic influence frameworks (De Angelis, 2007; Wrembel, 2010; Hammarberg, 2018), and is operationalized through the analysis of vowel correspondences, transfer patterns, and predicted pronunciation challenges based on vowel similarity or markedness.

1.1.2 Contextual Background

Vowels, as Odden (2005) highlights, are a fundamental element of language that plays a critical role in both distinguishing meaning and shaping the structure of sound systems. Given their significance, this section provides an overview of the linguistic environments of the two languages central to this study: Leblango and French.

Leblango is a Luo language spoken primarily by the Lango people of northern Uganda, particularly in the districts of Abim, Alebtong, Amolatar, Apac, Dokolo, Kole, Lira, Otuke, and Oyam. It is also used as a second language by the neighboring Kumam people (Eberhard et al., 2024). According to the Uganda Bureau of Statistics (UBOS, 2024), the Leblango-speaking population is 2.5 million, which accounts for 5.5% of Uganda's total population.

According to Eberhard et al. (2024), Leblango is used as the medium of instruction in primary schools through grade 3 in the Lango area, in accordance with the government policy of

using mother tongue instruction in lower primary education. It is also taught as a subject at some post-primary levels. The language is spoken widely and with positive attitudes in various settings, including homes, markets, and offices, reflecting its importance and widespread use within the community.

Significant publications in Leblango include *Baibul* ‘Leblango Bible’ (1978), *Lango i Kare Acon* ‘The history of the Lango people’ (1952), *Twa me Ngec Lango* ‘A collection of Lango proverbs and sayings’ (2012), and A Simplified Lango-English, English-Lango Dictionary (2012). According to Mango Tree Literacy Lab (2019), the organization has distributed over 500,000 books in local languages and trained teachers to support literacy. It has promoted Leblango through its Northern Uganda Literacy Program (NULP), which sponsored various primary school reading materials.

Leblango is also prominent in local media. The Uganda Communications Commission (UCC, 2023) reports that 15 FM radio stations based in the Lango area broadcast in Leblango. Wilmot (2016) notes the strong presence of Leblango in local radio broadcasts, which serve not only as sources of entertainment and news but also as platforms for mobilizing communities on economic, political, and social issues.

French is categorized as a Romance language that evolved from Latin and has developed over centuries to become a major global language (Price, 2005; Dennis, 2023). It is the mother tongue in several countries, including France, Belgium, Switzerland, Luxembourg, and Canada (primarily in Quebec), and serves as a second or foreign language in numerous regions, particularly in former French and Belgian colonies in Africa, such as Senegal, Algeria, Cameroon, Côte d'Ivoire, and the Democratic Republic of Congo (Leconte, 2008). According to the Organisation

Internationale de la Francophonie (2018), French is the world's fifth most widely spoken language, with over 300 million speakers globally, 60% of whom reside in Africa.

Other than francophone countries, the presence of French is also reported in many other parts of the world in both large and small concentrations of communities; for instance, quoting the U.S. Census Bureau (2011), Stein-Smith (2023) reports that French is the second most widely studied language and the fourth most spoken language in the country with about two million Americans speaking it at home.

According to Organisation Internationale de la Francophonie (2018), French is an official language in 32 countries and is one of the working languages of major international organizations, including the United Nations, the European Union, the African Union, and the International Olympic Committee.

French plays a vital role across various domains. It is commonly used in administration, business, diplomacy, media, and law within many Francophone countries (Organisation Internationale de la Francophonie, 2018). Additionally, French holds significant cultural importance, particularly in literature, film, and the arts (Tjahjani, 2021). Globally, French is the second most studied language after English (Organisation Internationale de la Francophonie, 2018), playing a key role in areas such as trade, politics, and education, especially in Africa (O'Mahony, 2019).

The prominence of French in educational systems, particularly in France and other Francophone countries, is evident, where it serves as the primary language of instruction at all educational levels. Moreover, French is taught as a foreign language in numerous non-Francophone countries, particularly in Africa and Europe, due to its status as a language of international communication (Wright, 2006). Through the Agence Universitaire de la

Francophonie (AUF), which unites 784 member institutions across 98 countries, French plays a pivotal role in higher education systems worldwide (Dincă et al., 2018). In Canada, where French and English are official languages, bilingualism is highly valued, offering significant career advantages. The demand for French proficiency in the country has driven widespread French language education, underscoring its importance for those seeking to advance in the workforce (Phongolo, 2024).

In Uganda, where English is the language of instruction in schools (Isingoma, 2021; USAID, 2020), French is taught as a foreign language and as an L3 in many schools and tertiary institutions, as reflected in various curricula. For example, both the National Curriculum Development Centre (NCDC) and the Alliance Française de Kampala incorporate French language teaching into their programs (National Curriculum Development Centre [NCDC], 2019; Alliance Française de Kampala, 2024). As highlighted by the Uganda National Examinations Board's (2022) results report for the Uganda Certificate of Education, French is offered in numerous schools across the country, including key institutions in the Lango sub-region, such as Dr. Obote College, St. Katherine Secondary School, and Lango College.

The French government has long supported French education in Uganda. As reported by Akankwatsa (2022), the French government recently committed financial aid worth USD 250,000 to enhance French learning resources, strengthen teacher training, and expand access to French programs nationwide. This initiative will be implemented by the Alliance Française de Kampala and the Association des Professeurs de Français en Ouganda (Association of French Teachers in Uganda). Additionally, The Independent (2022) highlights the adoption of French as an official language of the East African Community following the inclusion of francophone countries, namely the Democratic Republic of Congo, Rwanda, and Burundi.

In the media in Uganda, although French's presence is low, electronic and internet broadcast is slowly picking up. Other than Radio France Internationale, which broadcasts in French and English in Kampala, Losange's (2021) study reveals how *Bonjour Kampala*, a French web radio in Uganda, promotes French by broadcasting French lessons in a relaxed tone and speech style appropriate for L3 learners.

As discussed above, French is taught in Uganda as an L3 and a foreign language (National Curriculum Development Centre [NCDC], 2019; Alliance Française de Kampala, 2024). Although currently studied by relatively few students, French continues to grow in importance in Uganda and the wider East African region, particularly following the admission of Francophone countries into the East African Community and the adoption of French as one of the bloc's official languages (The Independent, 2022). In this context, understanding how speakers of local languages like Leblango pronounce French becomes relevant. Yet, little is known about how the phonological background of Leblango shapes the pronunciation of L3 French. This study addresses this gap by examining the vowel systems of Leblango and French.

1.1.3 Historical Background

The origin of Leblango, according to Driberg (1923), is traced back 300 years ago during the Lango migration from South Sudan and Ethiopia. This happened in the early 1600s when an Ateker group comprising two Lango clans from Ethiopia were incorporated into the Luo-speaking Shilluk community in Didinga Highland, Eastern Equatoria, South Sudan, leading to the formation of the Lango people.

The vowel inventory of Leblango has undergone evolution over the years. Noonan (1992, p. 18), citing evidence from Driberg (1923), reports on the emergence of the partitive article “a”,

which evolved from the historical “pa” through a devoicing process. The following example illustrates this phonological change:

Ot pa dako (historical) → /ɔt pà dákô/

‘The woman’s house’

Ot a dako (today) → /ɔt à dákô/

‘The woman’s house’

Bavin (2010, p. 232) summarizes the findings from Tucker (1958) and Driberg (1923) on the phonological evolution of Leblango vowels, noting an early similarity with Lebacholi in the use of consonant-initial morphemes. For example, Leblango once had forms like *latin* /lâtin/ (child), as in Lebacholi. Over time, changes in morphological processes, such as tone sandhi, resulted in modern Leblango adopting vowel-initial morphemes, hence *atin* /âtin/.

In contrast, French has a much older linguistic history, having developed from Vulgar Latin around the 5th century AD. According to Rickard (1989), this transition took place in the Roman province of Gaul (modern-day France) and was influenced by the interaction between Latin and local Celtic languages. Vaissière (2009) demarcates three key stages of the French language's evolution: *l’ancien français* (Old French) from the 9th to the 13th century, *le français moyen* (Middle French) from the 14th to 16th century, and *le français moderne* (Modern French) from the 17th century onward. Jordan (2015) highlights how the Parisian dialect of French became dominant during the 18th century, emerging as the primary language for the aristocracy and overshadowing regional dialects.

The history of French in Uganda dates back to the colonial era when French Catholic missionaries, known as the White Fathers, arrived in 1879 and established churches, schools, and health centers (Vilhanová, 2011). Between 1885 and 1921, the White Fathers produced the first

grammar books and dictionaries for Ugandan indigenous languages, authored in French (Togboa et al., 2021). Nankindu (2020) observed that the Bunsen Committee Report (1952) further encouraged the teaching of foreign languages such as French. By 1967, French had gained considerable prestige among students, despite being an optional subject (Nankindu, 2020).

This period of linguistic standardization contributed to shaping modern French vowels, which underwent significant changes over time. Terry and Webb (2013) and Vaissière (2009) describe key phonological processes such as nasalization, vowel lengthening, and shifts in vowel height, which were particularly pronounced during the transition from Latin to Old French. As Rickard (1989) explains, the shift from Latin involved the loss of syllable quantity, and stressed syllables with long vowels retained their original quality, while unstressed syllables became more open. This process reduced the vowel inventory in stressed syllables from 10 to 7, and in unstressed syllables to 5, introducing phonological contrasts such as /e/ vs. /ɛ/ and /o/ vs. /ɔ/.

Nasal vowels, a defining feature of modern French, did not exist in Vulgar Latin. Vaissière (2009) and Terry and Webb (2013) note that nasalization occurred through a regressive process, whereby oral vowels followed by nasal consonants were nasalized, as seen in words like “an” (year), which was pronounced with a final /n/ sound (Vaissière, 2009, p. 128). During the Middle French period, nasal consonants, especially in final or pre-consonantal positions, began to weaken and eventually disappeared, leaving French with four distinct nasal vowels: /ɑ̃/, /ɛ̃/, /oẽ/, and /ɔ̃/ (Dowd, 2005; Vaissière, 2009). This transformation significantly shaped the modern French vowel system.

The long history of French in Uganda has certainly brought it into contact with Leblango, another language with a long, uninterrupted presence in Uganda. In line with crosslinguistic findings that show L1 influences on additional language perception and production (Hammarberg,

2018; Wrembel, 2010; Ladefoged & Johnson, 2010), it is possible that L1 Leblango affects how its speakers pronounce French vowels. Yet, no documented studies have explored this possibility. This study therefore seeks to fill that gap by comparing the vowel systems of Leblango and French and examining how their similarities and differences may impact the pronunciation of L3 French vowels by Leblango speakers.

1.1.4 Theoretical Background

Languages have intricate segmental systems underlying their phonological structures, and understanding how these systems operate across different languages is crucial for accurate L2 or L3 pronunciation (Wardhaugh, 2006). For that matter, this study will employ Autosegmental Phonology (Goldsmith, 1976), which is particularly useful for analyzing features that span multiple segments, such as nasality (Clements & Sezer, 1982). By representing features of segments on a separate tier, this theory provides a comprehensive approach to studying how they operate across languages.

In addition, this study will employ the Contrastive Analysis Hypothesis (CAH) (Lado, 1957) to predict potential challenges and facilitative effects that L1 Leblango speakers may face when pronouncing French vowel sounds. The CAH posits that structural differences between languages can either facilitate or hinder language acquisition, with positive transfer occurring when similar features exist between the two languages. Ladefoged (2001) highlights universal tendencies in vowel production, suggesting that even in diverse vowel systems, there may be predictable patterns in how speakers produce unfamiliar sounds (for more details, see Section 1.9).

1.2 Problem Statement

Vowels are important components of the sound systems of languages. A comparative study of different languages' vowel systems (e.g. Leblango and French) offers valuable insights into the

underlying structures of human languages. Different languages may share their vowel systems or exhibit differences. Either way, this state of affairs may impact on the speakers of an additional language (be it an L2 or L3), either positively or negatively. A study delineating such a state of affairs involving Leblango and French is of essence. Although previous studies on Leblango such as Noonan (1992) have detailed Leblango phonological structure, they have not investigated these from a comparative perspective with French or from the perspective of the nature of the interaction between Leblango's vowel system with that of French in an L3 learning context. Research on phonological transfer in L3 speakers has shown that both positive and negative transfers affect L3 pronunciation (Bardel & Falk, 2020; Cabrelli & Pichan, 2019; Wrembel, 2010). For example, Kwofie (1989) observed that many African language speakers face difficulty pronouncing the French front rounded vowel /y/, absent in their languages. Despite this research, there is a gap in specific research examining vowel similarities and differences between Leblango and French and how these affect the pronunciation of French among L1 Leblango speakers. This study, therefore, aims to carry out a comparative analysis of the vowel systems in Leblango and French and how the similarities and differences impact the pronunciation of French vowels by Leblango speakers.

1.3 Purpose of the Study

The purpose of this research is to compare the vowel systems of Leblango and French and explore the implications of the similarities and differences between the two systems for L1 Leblango speakers of French.

1.4 Specific Objectives

- (i) To establish the similarities between the vowel sounds of Leblango and French
- (ii) To find out the differences between the vowel sounds of Leblango and French

- (iii) To determine the implications of the similarities and differences between the vowels of Leblango and French for the pronunciation of French by L1 Leblango speakers

1.5 Research Questions

- (i) What are the similarities between the vowel sounds of Leblango and French?
- (ii) What are the differences between the vowel sounds of Leblango and French?
- (iii) How do the similarities and differences between the vowels of Leblango and French affect the pronunciation of French by L1 Leblango speakers?

1.6 Scope of the Study

1.6.1 Thematic Scope

This study focused on a comparative analysis of the vowel systems in Leblango and French, examining both similarities and differences. It also aimed to investigate how these phonological features influence the pronunciation of French vowels by L1 Leblango speakers.

1.6.2 Geographical Scope

This study was conducted in Lira City, the principal urban center of the Lango Sub-region. Lira City was strategically chosen because it attracts speakers from both the Western and Eastern dialects of Leblango, providing a linguistically diverse environment (Dokotum, Lango Language Board, personal communication, January 30, 2025). Moreover, the majority of schools in the Lango Sub-region that teach L3 French are located in Lira City, making it an ideal location for this research.

1.6.3 Time Scope

The study was conducted between January 2024 and October 2025.

1.7 Justification of the Study

The present study investigated the vowel systems of Leblango and French, as well as how their similarities and differences influenced the pronunciation of French by Leblango speakers. While extensive research exists on the phonetics and phonology of French vowels (e.g., Terry & Webb, 2013; Fagyal et al., 2006; Price, 2005; Rickard, P. (1989). Tranel, 1987), studies on the vowel system of Leblango are limited (Noonan, 1992; Ocen et al., 2013). Moreover, no study has systematically compared the vowel inventories of these languages or examined the impact of their structural similarities and differences on L3 pronunciation. Cross-linguistic vowel comparisons have been explored in other languages, such as English and Spanish (Flege, 1995), German and Dutch (Dommelen, 1982), and Mandarin and French (Wu, 2024), but no such research has been conducted on Leblango and French from a crosslinguistic perspective. Furthermore, while previous studies have examined vowel perception and production in L3 learning (Price, 2005; Wrembel, 2010; Hammarberg, 2018; Jensen et al., 2023), they have largely focused on widely spoken languages, leaving a gap in understanding how speakers of under-researched languages like Leblango produce foreign vowel sounds. Thus, this study is crucial as it generated empirical insights into the phonetic and phonological properties of Leblango and French from a comparative perspective. It also examined how these properties affect the production of French vowels by L3 speakers, thereby contributing to the broader fields of phonology and additional language pronunciation.

1.8 Significance of Study

The results of this study hold significance for both linguistic research and language teaching. First, by conducting a comparative analysis of the vowel systems of Leblango and French, this study contributes to a deeper understanding of the phonological structures of both

languages from a comparative perspective. Such an analysis provides valuable insights into universal and language-specific vowel patterns, which are essential for phonological theory and cross-linguistic research. The study also helps document and describe phonetic features of Leblango, which remains underrepresented in comparative phonetics and phonology.

Second, the findings have pedagogical implications for both language teachers and learners. By identifying the specific advantages and challenges Leblango speakers have in pronouncing French vowel sounds, this research can inform the development of targeted teaching materials and instructional strategies. These insights will enable educators to better support Leblango speakers in overcoming pronunciation difficulties in French.

Finally, this study can contribute to the development of educational computer programs that assist in French pronunciation training for Leblango speakers. The comparative vowel analysis can serve as a foundation for speech recognition and pronunciation assessment tools, which enable learners to receive automated feedback on their pronunciation accuracy. Such applications can enhance self-paced learning and also make phonetic training more accessible and effective for students and teachers alike.

1.9 Theoretical Frameworks

1.9.1 Introduction

This study draws upon two principal theoretical frameworks: Autosegmental Phonology and the Contrastive Analysis Hypothesis (CAH). These frameworks were crucial for analyzing the vowel systems of Leblango and French and exploring the implications of their similarities and differences for L1 Leblango speaker's pronunciation of French vowels.

1.9.2 Autosegmental Phonology

Autosegmental Phonology, developed by Goldsmith (1976), is a theoretical framework that models phonological representations as multi-tiered structures, where features such as tone, nasality, and vowel quality are represented on separate tiers linked to a central skeletal tier. This framework is particularly useful for analyzing vowel systems because it allows for an independent representation of features, enabling a detailed examination of how vowel features interact within and across languages (Hyman, 2013). By analyzing phonological phenomena in a hierarchical manner, Autosegmental Phonology provides insights into processes such as feature spreading, delinking, and association, which are essential for understanding complex phonological systems (Clements & Hume, 1995).

Weijer (2006, p. 626) summarizes the framework's core principle, stating that "the central tenet of autosegmental phonology is that sounds, or, using a technical term, segments (or phonemes) can be split up into smaller units, which can be independently manipulated by phonological operations such as deletion or spreading". Clements and Rialland (2005) demonstrate how vowel harmony in Akan can be analyzed using autosegmental representations, where [+ATR] and [-ATR] vowel features are assigned to separate tiers and spread across morphemes. Similarly, Pulleyblank (2009) applied the framework to Yoruba tone spreading, showing that tonal features function independently of segmental units. Gilley (1988) extended this approach to the nasal vowel system in Shilluk, illustrating how nasality spreads across segments rather than being confined to individual vowels.

A key principle of Autosegmental Phonology is tier segregation, which enables phonological features to behave independently. For instance, Goldsmith (1976) demonstrates in his analysis of Guaraní nasalization that nasal features are not tied to individual segments but

instead operate as autosegments that spread across syllables. Similarly, Gilley (1988) applied this principle to Shilluk, showing how nasality spreads independently of vowel quality. These examples highlight how tier segregation accounts for feature autonomy.

Another key principle is feature delinking, in which phonological features are removed from segments under specific conditions. This process has been observed in tone sandhi in Kikuyu, where a high tone is delinked from its original syllable and subsequently neutralized (Clements & Rialland, 2005). A clearer case of feature delinking can also be seen in post-nasal obstruent devoicing in Kinyarwanda, where the [+voice] feature of a consonant is delinked after a nasal consonant, leading to a surface realization of a voiceless obstruent (Myers, 2005).

Despite its strengths, Autosegmental Phonology prioritizes theoretical representations of phonological features over their acoustic and articulatory properties, which may not always align with real-world speech data (Clements & Hume, 1995; Odden, 2005). Nevertheless, the framework has remained highly relevant to this study, particularly in analyzing complex phonological features such as nasality and vowel quality. Goldsmith (1990) acknowledges that while Autosegmental Phonology abstracts away from some finer phonetic details, its ability to represent features hierarchically is essential for understanding vowel systems across languages. Accordingly, this study employed Autosegmental Phonology to analyze the distribution and interaction of vowels in both Leblango and French.

1.9.3 Contrastive Analysis Hypothesis (CAH)

The Contrastive Analysis Hypothesis (CAH), proposed by Lado (1957), posits that language learners encounter difficulties when there are significant structural differences between their native language (L1) and the target language (L2). According to the CAH, learners transfer

linguistic structures from their L1 to their L2 or L3, resulting in either positive transfer (where similarities facilitate learning) or negative transfer (where differences impede learning).

The CAH draws its theoretical foundation from both behaviorist learning theory and structuralist linguistics (Ortega, 2009; Rothman, 2009). Behaviorism emphasizes habit formation and posits that additional language learning involves the transfer of already established linguistic patterns from the L1, a principle central to the notion of transfer theory (Ara, 2021). Omage (2024), for instance, employed the CAH to analyze vowel production difficulties Gbari learners of French faced as a result of the absence of the target vowel features in their native language. Similarly, Ara (2021) applied the hypothesis to show how Bengali speakers transferred vowel sounds into English, highlighting patterns of distortion and substitution.

While the Contrastive Analysis Hypothesis (CAH) has been widely applied in L2 research, its effectiveness in L3 phonology and multilingualism has been questioned due to its simplistic view of language transfer (Rothman, 2009; Ara, 2021). The CAH's deterministic perspective overemphasizes L1-L2 structural differences while neglecting crucial factors such as learner motivation, cognitive processes, and universal grammar (Ortega, 2009). Moreover, research on multilingual learners has shown that phonological transfer is not limited to L1-to-L2 influence but also extends to L3 production, where both L1 and L2 interact with the target language (Rothman, 2009). For instance, studies indicate that L3 learners often exhibit combined transfer effects from both their L1 and L2, leading to phonetic deviations that cannot be solely attributed to L1 influence (Rothman et al., 2013). Flege (1995) further argues that phonological transfer is dynamic, shaped by factors such as perceptual salience and language dominance, rather than rigid structural contrasts alone. Additionally, Ara (2021) critiques the CAH for its inability to fully account for

error sources in both second and third language acquisition, particularly in cases where L2 influence outweighs L1 influence in L3 pronunciation.

Despite its criticisms, the Contrastive Analysis Hypothesis (CAH) remained relevant to this study. Its primary strength was in its ability to systematically identify structural similarities and differences between languages, which is crucial for understanding how L1 Leblango speakers produce L3 French vowels (Lado, 1957). Moreover, recent research in multilingual phonology indicates that structural contrasts continue to influence transfer patterns, even when cognitive and sociolinguistic factors are taken into account (Rothman et al., 2013; Ortega, 2009). Additionally, the CAH was useful for analyzing phonological transfer phenomena, such as substitutions, distortions, or omissions of non-native vowel features occurring in L3 due to influence from prior linguistic systems (Ara, 2021).

1.9.4 Conclusion

In summary, the theoretical frameworks of Autosegmental Phonology and the Contrastive Analysis Hypothesis (CAH) provides complementary perspectives for analyzing the vowel systems of Leblango and French. Autosegmental Phonology offers a structured approach to understanding the hierarchical organization of phonological features, particularly in relation to vowel quality, while the CAH highlights the role of structural differences in shaping phonological transfer between languages. Although both frameworks have limitations, they have remained valuable for this study, especially in examining phonological similarities and differences between Leblango and French vowel sounds and how these affect L1 Leblango speakers' production of L3 French vowels.

Chapter Two

Literature Review

2.0 Introduction

The chapter reviews literature on the similarities between vowel systems of languages, the differences between vowel systems of languages, and the implications of the similarities and the differences between vowel systems of languages for the pronunciation of L3 Leblango speakers.

2.1 Similarities between Vowel Sounds of Languages

In phonological terms, aperture, referring to the degree of openness of the vocal tract during vowel production (Ladefoged & Maddieson, 1996), is a fundamental feature across vowel inventories. Hyman (2008) notes that most phonological systems distinguish at least two degrees of aperture. Specifically, high vowels, characterized by a relatively closed aperture, involve the raising of the tongue toward the roof of the mouth. In contrast, low vowels exhibit a more open aperture, with the tongue positioned lower in the mouth (Ladefoged & Johnson, 2015). This contrast in tongue height is a universal feature of vowel systems, with high vowels such as /i/ and /u/ produced with a more constricted vocal tract, while low vowels like /a/ are produced with a more open vocal tract (Ladefoged & Johnson, 2010; Maddieson, 1984). Price (2005) supports this by describing French vowels like /i/ as a close front vowel and /a/ as an open front vowel, based on the degree of mouth openness. Noonan (1992) also concurs with earlier research, such as that of Tucker and Bryan (1966), in classifying the vowels of Nilotic languages, including Leblango, into two distinct categories, open and close, based on their aperture. This universal distinction between high and low vowels provides key insights into the comparative analysis of the vowel systems in Leblango and French, particularly how vowel height impacts their phonological structure.

Ladefoged and Maddieson (1996) and Crosswhite (2001) reveal that lip configuration, where front vowels are usually unrounded and back vowels are rounded, is a key feature of universality across languages. Hudu (2023, p. 4), in a study of West African languages, identified lip position as one of the “phonetic properties that define the inventory of vowels in many languages.” Other studies, such as those by Chomsky and Halle (1968, p. 300) and Roach (2009, p. 14), have used terms like “rounded”, “spread”, and “neutral” to describe how lip position characterizes vowel production across languages. Price (2005, p. 22) observes that “the rounding of the lips in French is appreciably more pronounced than it is for approximately similar vowels in English,” further highlighting the role of lip position in distinguishing vowels across languages. Much as lip configuration is a marker of universality across languages, Price’s (2005) observation of its behavior between French and English poses a question for the present study to find out what happens in Leblango and French.

Moreover, the five-vowel system, comprising the vowels /a/, /e/, /i/, /o/, /u/, is one of the most common vowel inventories found across the world’s languages (Ladefoged & Maddison, 1990; Crothers, 1978). This system is frequently observed in languages such as Spanish, Swahili, and Japanese, indicating a general pattern that balances articulatory ease and perceptual clarity. Ladefoged and Maddieson (1990) note that this system’s simplicity, involving five evenly spaced vowels along the dimensions of tongue height and backness, allows for clear distinctions between vowel sounds without introducing complexity. The relatively straightforward articulation of these vowels, along with their perceptual distinctiveness, contributes to their widespread adoption in many languages (Schwartz et al., 1997). Furthermore, the consistency of these vowel systems across diverse language families suggests that they provide an optimal balance between articulatory economy and acoustic distinctiveness, facilitating efficient communication

(Lindblom, 1986). These findings provide a suggestion that both Leblango and French vowel systems may possess the five-vowel system (or some other shared system), something this study will seek to confirm.

Knight (2012) further observes that cardinal vowels, a theoretical set of vowel sounds established by Daniel Jones, serve as reference points for the articulation of vowels in the world's languages (Jones, 1956). As Jones (1956) describes, cardinal vowels occupy the highest and lowest, as well as the most front and back positions of the tongue during vowel production, serving as yardsticks for the measurement of vowel sounds of languages. This system is crucial for phoneticians as it provides a standardized framework for analyzing and describing vowel sounds globally (Jones, 1956; Laver, 1994). The cardinal vowel system serves as a valuable tool for analyzing the specific vowels similar in both Leblango and French.

Many languages share similarities in how they use vowel length as either a phonemic or phonetic feature (Kawahara & Braver, 2013). According to Ladefoged and Johnson (2010), numerous languages distinguish long and short vowels, where length alone differentiates meaning. For instance, in Finnish, *tuli* 'fire' and *tuuli* 'wind' differ only in vowel length (Paschen et al., 2022, p. 1). Additionally, some languages restrict where vowel length contrasts occur; for example, both Swedish and Norwegian limit vowel length contrasts to stressed syllables (Jepson & Stoakes, 2015). Odden (2005) highlights that in many languages, vowel duration is influenced by prosodic features such as emphasis and intensity. Additionally, vowel lengthening is widely observed across languages, though the degree varies (Kawahara & Braver, 2013; Paschen et al., 2022). In English, for example, *so* /səʊ/ may be lengthened to "soo" /su:/ to indicate emphasis (Kawahara & Braver, 2013). Similarly, in Japanese, /sotto/ 'softly' or 'gently' can be produced with a lengthened /o/ as /so:tto/ to emphasize its meaning (Tajima et al., 2013, p. 3213). In line with these patterns, Vogel

and Spinu (2011) found that in Bantu languages, long vowels typically last two to three times longer than short vowels. The findings above suggest that vowel length patterns may be shared across languages. This study hypothesizes that Leblango and French may also exhibit commonalities in vowel length, which will be explored further.

Vowel harmony, a process in which vowels within a word agree in terms of specific phonological features such as backness, tongue position, and lip rounding, is a widespread phenomenon across languages, particularly in Niger-Congo and Nilo-Saharan language families (Leblango inclusive) (Hulst, 2016). Hudu (2023) observes that in Nilo-Saharan languages, a nine-vowel system characterized by [+ATR] and [-ATR] distinctions is common, where one feature dominates and triggers alternations in root vowels and affixes to maintain harmony. Similarly, in many Bantu languages, vowel harmony follows an ATR-based pattern, where affixes and root vowels align according to ATR specifications (Higgins, 2012). Other languages such as Hungarian exhibit palatal harmony, meaning that all vowels in a word must be either front or back (Polgárdi, 2006). Additionally, in Mongolic languages, rounding harmony determines vowel distribution within morphemes (Nugteren, 2011). Even though the current study will not attempt to explore vowel harmony similarities between Leblango and French, since studies already reveal no vowel harmony in French (Fagyal et al., 2003), the vowel harmony in Leblango still remains a crucial component of Leblango vowel system.

Nasality is a widespread phonetic feature across the world's languages, occurring as contrastive nasal vowels, contextual nasalization, and vowel-nasal consonant interactions, with more than one in five languages contrasting them with oral vowels (Zsiga, 2013). According to Ladefoged and Maddieson (1990), the volume of air flowing through the nasal cavity determines the degree of nasality, with /ĩ, ã, ã/ being the most frequent nasalized vowels. In French and Akan,

nasality is phonemic, meaning that nasal vowels distinguish word meanings, as seen in French *paix* /pɛ/ ‘peace’ versus *pain* /pɛ̃/ ‘bread’ and Akan *fa* /fa/ ‘to take’ versus *fã* /fã/ ‘half/festival’ (Tow, 2024, p. 8; Odoom & Adomako, 2022, p. 146). Additionally, many languages exhibit context-dependent nasalization, where nasal consonants influence adjacent vowels, as found in Leblango (Noonan, 1992; Hyman, 2008). Also, Rolle and Berkeley (2013) note that nasality is widespread across West African languages, with languages such as Bowili and Bariba featuring multiple contrastive nasal vowels. Furthermore, Jeong (2012) observes that in typological studies, anticipatory nasalization (where a vowel is nasalized before a nasal consonant) is more common than carryover nasalization (where nasalization persists after a nasal consonant). While studies have documented the presence of nasality in both Leblango and French, no research has specifically examined potential similarities in these languages. This study intends to explore and spell them out.

The discussion above highlights key phonetic and phonological similarities among vowel systems across languages, focusing on aperture, lip configuration, vowel inventories, length, harmony, and nasality. These features are widely observed in various language families, with some patterns emerging as near-universal tendencies. The presence of these commonalities suggests that cross-linguistic phonetic and phonological comparisons can provide valuable insights into the structure and function of vowel systems. Given these patterns, this study will examine how Leblango and French vowels align within these broader linguistic tendencies, particularly in terms of vowel inventories, length contrasts, lip rounding, and nasality.

2.2 Differences between Vowel Sounds of Languages

One of the primary areas where languages diverge is in their vowel systems, which are influenced by the specific articulatory settings of the tongue, lips, jaw, and vowel length

(Ladefoged & Maddieson, 1990). As Meunier et al. (2003) explain, vowel quality varies significantly across languages, with different languages making use of distinct phonetic features. For example, while French features front rounded vowels /ø/ and /y/, which, according to Price (2005), are produced with tongue positions similar to /i/ but with additional lip rounding (as in /u/), Nishi et al. (2008) observe that such vowels are absent in languages like Spanish and English. Similarly, while Italian maintains clear and several distinctions between open and close vowels like /e/ (close-mid) and /ɛ/ (open-mid), languages such as Pirahã employ a simpler vowel system with fewer distinctions (Everett, 1982). Also, while languages such as Arabic and Korean exhibit contrastive vowel qualities, particularly through the tension between short and long vowels for distinguishing meaning (Mittleb, 1984; Cho & Park, 2006), languages like English and Spanish rely instead on other features like vowel height and backness for differentiation (Clements & Sezer, 1982; Hualde, 2005). These variations in vowel quality across languages demonstrate the diverse ways in which phonetic features are utilized, thus underscoring the importance of examining how Leblango and French vowel systems may potentially differ, a task to be undertaken in this study.

Another area of divergence is nasality. While nasality is a common feature across languages, studies show variations in how it is realized (Zsiga, 2013). Tow (2024) and Pograjc and Markič (2017) note significant differences between French and Portuguese, despite both languages exhibiting phonemic nasality. French contrasts four nasal vowels /ã, ɛ̃, œ̃, ɔ̃/, while Portuguese contrasts five /ĩ, ẽ, ɐ̃, õ, ũ/, with distinct phonetic realizations in each system. Also, while Portuguese features nasal triphthongs, such as /uãõ/ in *saguão* “hall” and /uõẽ/ in *saguões* “halls” (Pograjc & Markič, 2017, p. 247), French does not have nasal triphthongs (Metz, 2014). Even within the same language family, nasalization differs, as seen in West Benue-Congo languages, where Oko and Agbon are the only ones that nasalize mid vowels /e/ and /o/, while others do not

(Atóyèbí, 2009). Similarly, European French and Canadian French vary in nasalization timing, with velum lowering occurring earlier in the former (Cohn, 1990). Also, in Japanese, vowels nasalize more strongly before /m/ and /n/ than before /ŋ/ (Zsiga, 2013), whereas in English, nasalization is strongest before velar nasals and weaker before alveolar or bilabial nasals (Cohn, 1990). In Yaka, nasality spreads freely, even through voiceless stops (Hyman, 1995), while in Applecross Gaelic, nasal harmony is restricted to progressive spreading from a stressed nasal vowel, with obstruent stops acting as barriers (Walker, 2011). Given the documented cross-linguistic variations in nasality, this study will examine whether similar (or pronounced) differences exist between the vowel systems of Leblango and French.

Vowel harmony varies across languages in terms of feature type, directionality, and transparency (Polgárdi, 2006). For instance, Hungarian exhibits front-back harmony, where suffixes must match the root vowel in backness, while Finnish follows a similar system but allows neutral vowels like /i/ and /e/ that do not participate in the process (Hulst, 2016). Many languages, including Kinande, Tangale, and Akan, employ Advanced Tongue Root (ATR) harmony, requiring vowels in a word to align as either [+ATR] or [-ATR] (Hyman, 2008). However, Tangale differs from Kinande and Akan in that its /a/ does not participate in ATR alternations but functions as a neutral vowel without an ATR counterpart (Hulst, 2016). In Hungarian, roots determine vowel harmony and affixes must conform, whereas in Turkana, affixes can also dictate harmony patterns (Polgárdi, 2006). Additionally, languages like Turkish exhibit progressive harmony, spreading from root to suffixes, while Tuvan features regressive harmony, where suffix vowels influence root vowels (Walker, 2011). As demonstrated by the literature, vowel harmony, although prominent in many languages, varies in occurrence. The present study will take those differences into consideration when analyzing the differences between the vowel systems of Leblango and

French, bearing in mind that each language may have a different mechanism, including the possible absence of vowel harmony in one of the languages.

The treatment of reduced vowels highlights cross-linguistic variation. Crosswhite (2001) states that vowel reduction, which refers to a change in vowel quality in unstressed positions, is moderate in some languages but extreme in others. Jaworski (2010) observes that in English, vowels are often reduced to /ə/, whereas in Russian, vowel reduction follows systematic patterns based on stress position, such as /o/ reducing to /ɐ/ or /ə/ in unstressed syllables. These variations in vowel reduction involving some languages offer insights for this study, which aims to explore the differences between Leblango and French.

In all, the literature reviewed in this section underscores cross-linguistic variations in vowel systems, involving specific vowel types nasality, vowel harmony, and vowel reduction. For instance, Price (2005) and Nishi et al. (2008) demonstrate that the rounded vowels /ø/ and /y/ are unique to French and absent in languages such as English. This insight suggests the possibility of vowel differences between Leblango and French, validating the need for the present study. Research on nasality highlights that while it is widespread, its manifestation differs across languages, occurring either phonemically or contextually or both or none (Zsiga, 2013). Similarly, vowel reduction and lengthening show extensive variation across languages. For instance, vowel reduction patterns differ in English, Russian, and Japanese, illustrating the diverse strategies languages employ to structure their vowel systems (Crosswhite, 2001; Jaworski, 2010; Beckman, 1986). These findings emphasize the importance of examining vowel distinctions in a comparative context. In this study, the documented patterns from the literature will provide a foundation for investigating how Leblango and French differ in terms of vowel quality, nasality, harmony, and

vowel reduction processes. By building on these cross-linguistic insights, the study aims to contribute to a broader understanding of phonological variation and vowel system organization.

2.3 Implications of Similarities and Differences between the Vowel Sounds of Languages for the Pronunciation of a Language by L3 Speakers

This section explores how similarities and differences between vowel sounds across languages impact L3 pronunciation. The first sub-section discusses the implications of similarities between the vowel sounds of languages for the pronunciation of a language by L3 speakers. The second sub-section explores the implications of differences between the vowel sounds of languages for the pronunciation of a language by L3 speakers.

2.3.1 Implications of Similarities between the Vowel Sounds of Languages for the Pronunciation of a Language by L3 Speakers

L3 pronunciation is often shaped by a speaker's prior linguistic knowledge (Cabrelli & Pichan, 2019). Hammarberg (2001) argues that this foundational knowledge includes the ability to grasp the articulatory settings and phonological systems of the target language. Studies on crosslinguistic influence indicate that phonetic similarities between languages facilitate accurate L3 pronunciation. In support of this, Barkov et al. (2022) and Parrish (2022) observe that L3 learners integrate phonological elements from both prior languages.¹ According to Flege's (1995) Speech Learning Model (SLM), learners are more likely to produce L3 vowels accurately when these vowels share key articulatory features, such as height, backness, and rounding, with their L1 or L2 (and by extension L3). Escudero and Boersma (2003) further note that when vowel categories overlap across languages, learners have a greater chance of transferring those sounds successfully. These findings emphasize the importance of examining whether similarities between

¹ As indicated earlier in Chapter 1, given the scope of the current study, it will not include the effects of L2 on L3, despite their role in L3 production.

the vowel systems of Leblango and French can support accurate pronunciation for Leblango speakers of French as an L3.

Ladefoged and Maddieson (1996, p. 282) state that “the basic parameters of most vowel systems are the three scales whose endpoints are traditionally called high and low, front and back, and rounded and unrounded.” Parrish (2022, p. 20) applied these parameters to analyze the production of French /y/ by L1 Spanish, L2 French, and L3 German speakers, discovering that the L3 French /y/ was assimilated to Spanish /u/ and the L3 German /y/ to English /u/. This observation aligns with findings by Wrembel et al. (2019) that extensive language experience allows learners to perceive subtle phonetic differences and form distinct L2 or L3 vowel categories. Additional studies reinforce this pattern; Park (2021) found that Korean learners with limited English exposure could accurately perceive the English vowels /i/ and /ε/ due to cross-linguistic similarities, while Escudero and Boersma (2003) argue that when vowel categories in a learner’s known languages overlap with those in an additional language, it enhances the ability to perceive and produce those vowels accurately in the additional language. Moreover, Ladefoged and Maddieson (1996) observe that front vowels are typically unrounded while back vowels are rounded, a pattern that Hammarberg (2001) suggests can ease the transfer of articulatory habits when similar rounding patterns exist across languages. If Leblango and French exhibit similar vowel height, backness, and rounding patterns, this may assist Leblango L3 speakers in pronouncing French vowels more effectively.

Martin (2023) notes that when a learner’s prior language contrasts nasal vowels, this similarity enhances production accuracy in the additional language. According to Ladefoged and Maddieson (1996), nasality, found in more than one in five languages, is a critical element in phonetic transfer across languages. As outlined in the Typological Primacy Model (Rothman,

2009), additional learners (such as L3 learners) initially transfer phonological features from the language that is typologically most similar to the L3. Martin (2023) further observes that speakers of a language with phonemic nasal contrasts, such as Akan, produce French nasal vowels more accurately than speakers whose native language lacks such contrasts. This observation aligns with Delvaux et al.'s (2002) research, which discovered that Brazilian Portuguese speakers, whose L1 includes a rich inventory of nasal vowels, are more successful at producing French nasal vowels than learners from languages without such contrasts. Complementing this view, the Scalpel Model (Slabakova, 2016) posits that the selective transfer of phonetic features depends on the learner's perception of similarity between the L3 and their prior languages. In line with Wrembel et al.'s (2019) observation that L3 learners with advanced knowledge of their prior languages exhibit better transfer skills, Tow (2024) found that advanced listeners with L1-English and L2-French backgrounds could accurately distinguish between French nasal vowels (phonemes) and English nasalized vowels (allophones). Given the literature demonstrating that similarities in nasal vowel features facilitate L3 production, this research aims to determine whether such phonetic similarities between Leblango and French positively impact the pronunciation of French vowels by Leblango speakers.

In conclusion, the reviewed literature indicates that cross-linguistic similarities in vowel systems, including features such as height, backness, rounding, and nasality, can enhance pronunciation accuracy in an L3. Although prior studies have not specifically examined the implications of the similarities between Leblango and French for L1 Leblango speakers of French as an L3, this research will explore whether shared vowel qualities contribute to improved L3 pronunciation among Leblango speakers of French.

2.3.2 Implications of Differences between the Vowel Sounds of Languages for the Pronunciation of a Language by L3 Speakers

Research on L3 pronunciation suggests that learners often substitute L3 vowels with the closest equivalents from their L1 (and L2), which can lead to pronunciation challenges (Wrembel et al., 2019; Flege et al., 1997). Where L1 is involved, the situation is similar to the transfer of L1 sounds to L2. For instance, Knight (2013, p. 86) notes that Japanese speakers frequently substitute vowels when pronouncing English words, such as replacing the initial vowel /ɔ:/ in *Australia* with /o:/. Flege et al. (1997) observe that this challenge is more pronounced when the learner's previously acquired languages lack similar vowel contrasts to those in the additional language. Rochet (1976) conducted an experiment on French and Portuguese learners of English and found that French speakers tended to replace English /ɪ/ with /i/, whereas Portuguese speakers produced /ɪ/ more accurately due to the presence of a similar vowel in their native phonetic system. Similarly, Escudero and Boersma (2003) found that Spanish speakers learning Dutch as an L3 had difficulty distinguishing between /y/ and /u/ due to the absence of /y/ in Spanish, often assimilating it to /u/. Given these findings, Leblango L3 speakers of French may similarly exhibit vowel substitutions based on the structure of their native vowel system.

Another difficulty that arises from vowel system differences is nasality. Martin (2023) notes that nasal vowels vary significantly across languages, not only in the lowering of the velum but also in tongue and lip positioning. While some languages, such as French and Portuguese, exhibit phonemic nasal vowels that contrast with their oral counterparts, others, such as English, treat nasality as an allophonic process (Tow, 2024). Delvaux et al. (2002) demonstrate that learners whose prior languages lack phonemic nasal vowels may not articulate them accurately in an additional language. For example, English speakers learning French often nasalize vowels

inconsistently, treating them as coarticulatory features rather than distinct phonemes (Tow, 2024). Additionally, Delvaux et al. (2002) cited denasalization (omitting nasality) and hypercorrection (adding a nasal consonant where it does not belong) as pronunciation errors arising from crosslinguistic variation in languages. For instance, English speakers may pronounce French *fin* as /fan/ instead of /fɛ̃/ (Towell & Hawkins, 1994, p. 7). Similarly, Martinez et al. (2023) found that speakers of languages with extensive nasalization, such as Brazilian Portuguese, may overapply nasality when learning non-nasal languages, leading to pronunciation errors. Since the literature above does not examine Leblango and French, the present study seeks to investigate whether Leblango speakers face similar challenges when learning French as an L3.

Diphthongization presents another difficulty in additional language vowel pronunciation, particularly when speakers' prior languages differ in their treatment of monophthongs, diphthongs, and triphthongs. English, for instance, features a large number of diphthongs, whereas French vowels tend to remain monophthongal (Flege, 1995). Research has shown that English speakers learning French often diphthongize vowels where native French speakers use pure monophthongs, pronouncing French *beau* as /boʊ/ instead of /bo/ (Flege et al., 1997). Conversely, French speakers learning English may monophthongize diphthongs, pronouncing *low* /ləʊ/ as /lɔ:/, or replacing the diphthong /əʊ/ in *focus* with /ɔ/ (Zhao, 2022). These tendencies can lead to mispronunciations that affect intelligibility, as native French speakers may perceive such diphthongization as unnatural or exaggerated (Escudero & Boersma, 2003). Similar pronunciation challenges may arise for Leblango L3 learners of French if their native vowel system differs in its treatment of diphthongs and monophthongs.

Differences in lip configuration also impact L3 vowel pronunciation. Lip rounding plays a crucial role in distinguishing vowel contrasts in many languages, yet its use varies cross-

linguistically (Ladefoged & Maddieson, 1996). In French, rounding is phonemically contrastive, particularly with vowels such as /ø/ and /y/ (Hammarberg, 2001). Price (2005, p. 55) highlights a key difference in the timing of rounding: in French, speakers round their lips before producing the consonant in words like *tout* ‘all’, *coup* ‘blow’, and *loup* ‘wolf’, while English speakers begin rounding their lips after initiating the vowel sound in words like *too*, *cool*, and *food*. As a result, learners from languages that do not use contrastive rounding cannot produce these distinctions accurately (Ladefoged & Maddieson, 1996). For example, English speakers learning French frequently mispronounce the French vowel /y/ as /u/ (Flege et al., 1997). If Leblango does not have similar rounding distinctions, Leblango L3 speakers of French may experience comparable difficulties in pronouncing rounded vowels accurately.

Another issue in additional language vowel pronunciation is vowel length contrasts. While some languages, such as English and Japanese, use vowel length contrastively to distinguish meaning, for example, /ʃi:p/ *sheep* vs. /ʃɪp/ *ship* in English, other languages, like Spanish, lack this feature, which results in mispronunciation of word pairs like *fill* and *feel* by L2 or L3 speakers (Valencia, 2022, p. 147). Also, Knight (2013) found that English learners of Japanese have difficulty producing Japanese long vowels, often shortening them, while Japanese learners of English had the opposite difficulty, lengthening short vowels. A study by Flege et al. (1997) similarly found that English speakers overemphasized vowel length in French, producing exaggerated pronunciations. Given these findings, this study will examine whether Leblango speakers encounter similar pronunciation issues in distinguishing vowel length contrasts in L3 French.

Vowel inventory size can also present challenges in L3 pronunciation. Ladefoged and Maddieson (1990) observes that languages differ in the number of vowel phonemes they utilize,

which influences how learners perceive and produce vowels in additional languages. Spanish and Italian, for instance, have five-vowel systems (/i, e, a, o, u/), whereas French has a much larger inventory, including multiple mid-vowel distinctions (/e/ vs. /ɛ/ and /o/ vs. /ɔ/) and nasal vowels (Escudero & Boersma, 2003). Liu and Lin (2021) suggest that speakers of languages with smaller vowel inventories tend to assimilate unfamiliar vowels to the closest equivalents in their native system. Similarly, Heeringa and Velde (2024) and Nishi et al. (2008) found that speakers of languages with fewer vowels, such as Japanese, face difficulty producing unfamiliar L2 or L3 vowels of more extensive systems like English. Saritaş and Saritaş (2022) also point out that L1 Portuguese speakers experience difficulty mastering English vowels, not only due to the larger number of English vowel phonemes but also because these vowels are articulated in different tongue positions, requiring greater listening precision for accurate production. Additionally, Meunier et al. (2003) found that French speakers, whose vowel systems are more compact, categorized Spanish vowels more accurately than American English speakers, whose vowel inventory is more extensive and overlapping. These structural differences between vowel systems suggest that while Leblango speakers may find some French vowels easier to pronounce, they may still encounter difficulties with more complex or unfamiliar vowel sounds.

Overall, the literature reviewed demonstrates that speakers often substitute, assimilate, or exaggerate vowel features when their prior languages lack equivalent contrasts. While existing studies provide valuable insights, they do not specifically examine the contrasts between Leblango and French. This study will investigate how these differences impact the pronunciation of L3 French by Leblango speakers, contributing to a broader understanding of crosslinguistic vowel transfer.

2.3.3 Summary of Implications for the Current Study

In summary, the literature reviewed on the similarities between vowel systems across languages highlights common phonological features such as vowel height, backness, rounding, tenseness, and nasality (Hyman, 2008; Price, 2005; Ladefoged & Maddieson, 1996). These features have been documented in languages such as Spanish, Turkish, and Yoruba, offering valuable insights into cross-linguistic vowel patterns. However, this literature focuses on comparisons between other languages, and does not examine similarities between the vowel systems of Leblango and French.

With regard to differences in vowel systems, the reviewed literature discusses contrasts in vowel inventory size, vowel length distinctions, the presence or absence of nasal vowels, diphthongization, and the occurrence of front rounded vowels in particular languages (Hulst, 2016; Zsiga, 2013; Meunier et al., 2003; Flege, 1995). While these findings are informative, they do not offer a direct comparison between the vowel systems of Leblango and French. Specifically, contrasts in vowel height, tenseness, front rounded vowels, and nasal vowels in French have not yet been examined alongside those in Leblango, making this study necessary.

Regarding the implications of vowel system similarities for L3 pronunciation, the literature suggests that learners tend to produce vowels more accurately when the target language shares phonological or articulatory features with their L1 or L2 (Wrembel et al., 2019; Hammarberg, 2001; Ladefoged & Maddieson, 1996). Learners often transfer pronunciation patterns from prior languages to the new language, particularly when features such as vowel height, backness, or rounding are shared (Wrembel et al., 2019). These findings are relevant to the current study because they raise the possibility that similarities between the vowel features of Leblango and

French may facilitate accurate pronunciation of French by Leblango speakers. However, the specific implications of these potential similarities have not been documented in previous research.

The literature on the implications of vowel system differences for L3 pronunciation focuses on phonological transfer, perceptual assimilation, and vowel epenthesis (Tow, 2024; Knight, 2013; Price, 2005; Flege, 1995). These studies explain that when a learner's L1 or L2 lacks a vowel feature found in the L3, such as a certain degree of rounding or a specific vowel length contrast, the learner may substitute it with a more familiar vowel sound. This substitution can result in systematic pronunciation deviations. Such insights are valuable for understanding how the distinct vowel features of French, including front rounded vowels, nasalization, and contrasts in tenseness or length, might pose difficulties for Leblango speakers pronouncing French vowels. However, no study has examined these issues, thus making this research timely and necessary.

2.3.4 Conclusion

This chapter has reviewed the relevant literature in relation to the study's research questions, focusing on the similarities and differences between the vowel sounds of Leblango and French. It has also examined the implications of these similarities and differences for the pronunciation of French by L1 Leblango speakers, emphasizing both the potential benefits and challenges for L3 French pronunciation.

Chapter Three

Methodology

3.0 Introduction

This chapter provides details of the research approach, research design and the methods that were used to collect data, as well as the sources of data. It also provides details on the population sample size and sampling techniques used in selecting the sample, and the research procedure and ethical considerations.

3.1 Research Approach

The research adopted a mixed-method approach, combining qualitative and quantitative methodologies to capture a comprehensive view of the phonetic and phonological phenomena under study. The qualitative approach explored the nuanced differences and similarities between the vowel systems of Leblango and French language pronunciation activities. As Creswell (2014) notes, qualitative methods are suitable for in-depth exploration and interpretation of linguistic phenomena, aligning with this study's objectives.

In addition to the qualitative approach, the phonetic analysis incorporated quantitative measures, such as acoustic comparisons of vowel properties. By using a mixed-methods approach, this study offered a more comprehensive understanding of the research problem.

3.2 Research Design

The study employed the descriptive and comparative research designs. The descriptive design gathered detailed data from a representative sample of the population to understand general patterns in vowel production among Leblango speakers (Saunders et al., 2016), as well as characterizing the properties of the vowels in the two languages. The comparative design focused

on comparing the vowel inventories of Leblango and French, providing insights into how vowel similarities and differences influence L3 pronunciation (Best & Tyler, 2007).

3.3 Study Area

This study was conducted in Lira City, the principal urban center of the Lango Sub-region and a location that encompasses the two main Leblango dialects of Western and Eastern (Dokotum, Lango Language Board, personal communication, January 30, 2025). Lira also has several schools in which French is taught as an L3. The choice of this area was strategic, as it provides access to a population of native Leblango speakers, who served as participants in the study. The study also involved digital spaces, specifically for the collection of data in the French language.

3.4 Population

The target population for this study consisted of native speakers of Leblango who were also advanced speakers of French (minimum A-Level proficiency). Participants who have advanced experience speaking French as a third language were prioritized since their experiences are central to understanding the impact vowel similarities and differences on L3 pronunciation (Blume & Lust, 2017). These involved teachers and advanced students or speakers of French. Table 1 provides a summary of their demographic characteristics.

Table 1

Demographic Summary of L1 Leblango Participants (N = 20)

Variable	Category	Frequency	Percentage
Gender	Male	11	55%
	Female	9	45%
Age Range	18–25 years	6	30%
	26–35 years	9	45%
	36–60 years	5	25%
Education Level	A-Level	4	20%
	Undergraduate	8	40%
	Graduate	8	40%
L1	Leblango	20	100%
L3	French	20	100%

Source. Primary data

These demographic characteristics ensured that participants possessed the linguistic background necessary to represent advanced L3 French users within the Lango-speaking community.

Also, audio provisions in dictionaries and a corpus were used to get information about L1 French. For the French data, a selection of 1 hour and 36 minutes of spoken French was drawn from the *Corpus de Français Parlé Parisien des années 2000* (CFPP2000). The corpus data included a variety of speakers across age, gender, and speech registers (formal and informal), ensuring comparability (O’Keeffe & McCarthy, 2010).

3.5 Sample Size and Sampling Technique

Purposive sampling was used to select participants based on linguistic proficiency and relevance to the study, involving French language teachers and students, all of who were native speakers of Leblango who speak French, as well as any other proficient L1 Leblango speaker of French (cf. Nyimbili & Nyimbili, 2024). Additionally, purposive sampling was used to select

specific words and phrases that contain the target vowel sounds for comparative analysis. Larousse, Collins, and Cambridge French-English dictionaries supplemented the analysis by providing standardized phonetic transcriptions of French vowels.

Memon et al. (2025) argue that purposive sampling is not only appropriate for qualitative research but can also be effectively applied in mixed-methods studies where specific, hard-to-find populations are required. In acoustic phonetic research, Ladefoged (2003) observes that working with a small number of well-controlled speakers is standard practice, especially when examining fine-grained articulatory features such as vowel quality. Similarly, Milroy and Gordon (2003) emphasize that phonetic and phonological studies tend to prioritize data depth and quality over large sample sizes, while Tagliamonte (2006, p. 33) observes that “the size of the sample must necessarily be balanced with the available time and resources for data handling.” In line with these methodological principles, the study sought to collect rich acoustic data from a small number of carefully selected Leblango-French bilingual speakers.

3.6 Sources of Data

Data were gathered from primary and secondary sources. Primary data came from recordings of 20 native Leblango speakers, while secondary data included spoken French samples from the CFPP2000 corpus. Dictionaries and prior studies on vowel systems supplemented the above sources (cf. Creswell, 2014).

3.7 Data Collection (methods and tools)

3.7.1 Questionnaire Survey

The questionnaire survey method was used to collect demographic information. This method was chosen because it can be used to collect a large amount of data from a population

within a short period of time (DeVellis, 2017). Accordingly, a questionnaire was designed for that purpose.

3.7.2 Conversational Modules

Conversational modules were applied as the primary method for investigating the production of vowels in natural speech. These modules provide spontaneous, unscripted language data that more accurately reflect how vowels are articulated in everyday communication contexts (Kyprianou & Graebner, 2015). Unlike reading tasks, which offer controlled phonetic environments, conversational data reveal how vowel production is influenced by factors such as speech rate, discourse planning, and cognitive load (Hazan & Baker, 2011).

To capture linguistic variation, participants were encouraged to converse in both Leblango and French with minimal prompts from the researcher (Piske et al., 2001). This approach allowed for the analysis of vowel production under different cognitive loads and speech rates, reflecting more authentic pronunciation patterns (Hazan & Baker, 2011). The conversational tasks were designed to elicit target vowel sounds in a variety of phonetic environments, including word-initial, word-medial, and word-final positions, as well as in connected speech (Ladefoged & Maddieson, 1996).

The conversations involved 4 participants per group, and 5 groups were formed. Each session lasted an average of 25 minutes, a duration typical in conversational speech research (Feldman, 1999). All conversations were audio-recorded and subsequently transcribed for acoustic analysis, in accordance with procedures adapted from Bernard (2022), Byrd (1994), and Yuan et al. (2006). Analysis showed an average speech rate of 163 words per minute across sessions, resulting in approximately 4,075 words per group and a total of 20,375 words across the five groups.

Data collection was conducted using high-quality digital audio recorders to ensure clear capture of speech signals suitable for acoustic analysis. The recorded conversations were then transcribed using ELAN (EUDICO Linguistic Annotator) for detailed acoustic measurements of vowel quality. Acoustic analysis was carried out using Praat software (Boersma & Weenink, 2023), a widely used tool in phonetics research.

3.7.3 Reading Activities

Reading tasks were used to supplement the conversational modules. This supplementary role ensured that any critical vowels or word forms not naturally occurring in spontaneous speech could still be captured systematically for analysis. Participants were recorded while performing reading tasks in both Leblango and French to assess their production of target vowel sounds. Words and sentences containing the target vowels were read, allowing for the assessment of both isolated vowel production and how vowel articulation is influenced by sentence-level prosody (Munro & Derwing, 2008; Best & Tyler, 2007).

Data collection for reading tasks was conducted using high-quality digital audio recorders to ensure clear and precise capture of participants' speech. The recorded conversations were then transcribed using ELAN and Praat was used for acoustic analysis (Boersma & Weenink, 2023).

3.7.4 Repository Search

A repository search complemented primary data by reviewing linguistic databases for data on French vowels. This search focused on resources such as phonetic corpora, pronunciation dictionaries, and specialized linguistic repositories. Key sources included audio dictionaries such as *Le Dictionnaire de la Prononciation Française* and phonetic databases such as the *Corpus de Français Parlé Parisien des années 2000* (CFPP2000). Additionally, standard reference works like the *Trésor de la Langue Française Informatisé* (TLFi) and the PhonBank database were

consulted to support the analysis. Dictionaries with phonetic transcriptions, including Larousse (2025), Collins French Dictionary (2025), and Cambridge French-English Dictionary (2025), were utilized to verify standard French pronunciations and their phonemic representations (Best & Tyler, 2007).

3.8 Data Processing and Analysis

Data collected through structured reading tasks, conversational modules, and corpus analysis were transcribed and analyzed using thematic analysis, which helped identify key patterns and themes related to the production of French vowel sounds by native Leblango speakers (Braun & Clarke, 2006). For the phonetic tests, both qualitative and quantitative data were analyzed. Quantitative data, derived from recordings, were analyzed using descriptive and inferential statistics, with JASP (Jeffrey's Amazing Statistics Program) to identify trends, and similarities and differences between vowel systems in Leblango and French (Pallant, 2020).

For the quantitative analysis, statistical methods were used to determine the frequency of vowel production patterns and their alignment with expected French vowel sounds. To ensure accuracy in statistical evaluation, data were processed using IBM SPSS Statistics, which facilitated descriptive and inferential statistical analyses. This includes calculating means and percentages of correct versus incorrect vowel productions. Graphical presentations such as tables and charts illustrated the distribution of responses across participants (Pallant, 2020).

Acoustic analysis of vowel production was conducted using the Praat software (Boersma & Weenink, 2001), focusing on measurements such as formant frequencies, vowel duration, and nasality. This in-depth analysis allowed a detailed comparison of vowel quality between Leblango and French, highlighting areas where Leblango speakers of L3 French experience facilitations and challenges.

For the qualitative analysis, thematic analysis was employed to identify patterns in the transcribed data (Braun & Clarke, 2006). This process involved reviewing the recordings and transcripts, systematically coding phonetic features such as vowel substitutions, diphthongization, and nasalization, and organizing them into themes, such as the influence of Leblango phonology on French vowel production. These themes were then refined and interpreted to draw insights into how Leblango speakers of L3 French produce French vowel sounds.

3.9 Quality Control

3.8.1 Validity

Validity in research refers to the extent to which the collected data accurately represent the speech phenomena being analyzed (Taherdoost, 2016). In this study, validity was ensured through methodological triangulation, where multiple sources of evidence, acoustic analysis, expert evaluation, and corpus comparison, were used to ascertain vowel classification (Koster & Cutler, 1997). To establish content validity, the research instruments underwent a thorough pretesting process. Initially, the instruments, including the phonetic transcription guidelines and vowel classification criteria, were reviewed by a group of two linguistic experts specializing in phonetics and phonology. These experts assessed the clarity, relevance, and comprehensiveness of the tools to ensure that they are suitable for capturing the specific phonetic data required. Their feedback helped refine the instruments before they were used in the field.

Following expert review, a pilot test was conducted with six non-participant Leblango speakers who produced vowel samples. This pilot group helped assess whether the instruments effectively capture the relevant vowel distinctions and ensure that the questions were clear and capable of generating the required data. The pretest served as a trial run to identify any issues with the instruments that could affect the quality of the collected data.

In terms of computational validity, the study applied the Content Validity Index (CVI) to quantify the relevance of each item on the instrument. Experts rated each item on a 4-point scale: (1) not relevant, (2) somewhat relevant, (3) quite relevant, and (4) highly relevant (Polit et al., 2007). To compute the Item-Level Content Validity Index (I-CVI), the formula used was:

$$\text{I-CVI} = \frac{\text{Total number of experts}}{\text{Number of experts rating the item as 3 or 4}}$$

Following Lynn's (1986) guidelines, an I-CVI of 1.00 is acceptable from two to five experts, while a minimum of 0.78 is required from six to ten experts. Additionally, the Scale-Level Content Validity Index (S-CVI/Ave) was computed as the average of all I-CVI scores. A value of 0.90 or higher, as recommended by Waltz et al. (2005), was used to indicate a valid set of instruments.

3.8.2 Reliability

Ensuring reliability is critical to maintaining the consistency and accuracy of the study's results. Multiple strategies were employed to guarantee that data collection, transcription, and analysis were reliable throughout all stages of the research process (Cohen et al., 2017).

First, standardized procedures were applied consistently. The use of phonetic analysis tools like Praat was standardized across all participants to ensure uniform measurement of vowel sounds (Boersma & Weenink, 2001). Recordings also underwent verification by multiple researchers, enhancing the accuracy of transcriptions and reducing subjective interpretation (Golafshani, 2003).

To further strengthen data analysis, inter-rater reliability was assessed using the Inter-Rater Reliability Index (IRRI). A subset of phonetic data was independently analyzed by multiple researchers (LeBreton, 2008). The IRRI was calculated using the following formula:

$$\text{IRRI} = \frac{\text{Total number of items}}{\text{Number of agreements}}$$

This method determined the degree of agreement among the researchers, ensuring consistency in phonetic analysis. A value above 0.75 was considered reliable, indicating a high level of agreement (Tinsley & Weiss, 1975; Smits-Engelsman et al., 2021). Any discrepancies were resolved through collaborative discussion, refining the analysis process (Hallgren, 2012).

Additionally, statistical reliability was assessed by examining the consistency of phonetic measurements across multiple recordings of the same vowel sounds. This involved calculating the coefficient of variation (CV), a measure of relative variability, to ensure that the measurements were stable and reproducible. The CV was calculated as:

$$\text{CV} = \left(\frac{\text{Standard Deviation}}{\text{Mean}} \right) \times 100$$

A low CV value indicated high consistency in the measurements, further supporting the reliability of the phonetic data (Everitt & Skrondal, 2010).

3.8.3 Qualitative Dimension

To ensure the qualitative integrity of the study, several strategies were adopted based on the framework of Lincoln and Guba (1985):

First, credibility was strengthened through prolonged engagement with the data, including repeated listening to audio recordings and iterative analysis. Peer debriefing with fellow linguists supported critical reflection, while researcher reflexivity was maintained to minimize personal bias during phonetic interpretation.

Second, dependability was addressed by maintaining a detailed audit trail documenting all methodological decisions, coding procedures, and interpretative choices. This allowed for the replication and scrutiny of the research process.

Third, confirmability was enhanced through expert validation of the transcription and coding schemes. This process helped ensure that interpretations were grounded in the data and not shaped by researcher assumptions.

3.10 Research Procedure

This research commenced with the development of the research concept and went through the proposal stage. After that, the study proceeded through several key phases, each informed by established research methodologies.

The first phase, Preparation, involved seeking a letter of introduction from the University to facilitate access to participants. During this phase, the research instruments underwent pilot testing to ensure their validity and reliability (DeVellis, 2017). Participants were carefully recruited based on the inclusion criteria of being native Leblango speakers with experience speaking or learning French as a third language, ensuring a purposive sample that is both diverse and representative of the population (Creswell, 2014).

The second phase, Data Collection, involved multiple methods to capture both qualitative and quantitative data, ensuring methodological triangulation (Creswell, 2014). Questionnaires gathered demographic data, while reading activities and conversational modules generated phonological data. Relevant spoken French data were gathered from the CFPP2000 corpus (O’Keeffe & McCarthy, 2010). Consistency in data collection methods ensured that both primary and secondary data comprehensively covered the phonetic aspects under investigation (Best & Kahn, 2014).

The third phase, Data Processing and Analysis, included transcribing audio recordings, coding qualitative data, and preparing all data for analysis. JASP was employed for statistical analysis of quantitative data, ensuring rigorous statistical examination of trends in vowel production between Leblango and French (Pallant, 2020). Praat was used for acoustic analysis, enabling a detailed investigation of vowel production, including formant frequencies, vowel duration, and nasality (Boersma & Weenink, 2001). The comparative aspects of the vowel systems in Leblango and French were explored in depth during the interpretation of the findings.

3.11 Ethical Considerations

The study strictly adhered to ethical guidelines governing research with human participants. Before participation, informed consent was obtained from all participants. They received a full briefing on the study's objectives, their role, and how their data would be managed. Participation was entirely voluntary, and participants retained the right to withdraw from the study at any stage without facing any consequences. Anonymity was maintained by assigning pseudonyms to all participants, and all data were securely stored to ensure the confidentiality of personal information (BERA, 2018). Furthermore, recordings and any sensitive data were only accessible to the research team, ensuring full compliance with data protection standards.

3.12 Conclusion

This chapter outlined the methodology for the study, detailing the research design, population, sampling techniques, data collection instruments, and procedures for analysis. The described approach was implemented to ensure the study was grounded in rigorous and systematic research practices.

Chapter Four

Comparison of the vowel sounds of Leblango and French

4.0 Introduction

This chapter analyzes and discusses the findings of the study in relation to the first two objectives: identifying the similarities and differences between Leblango and French vowel sounds. The comparison is structured around key phonetic and phonological parameters: vowel contrast, nasality, cardinal vowels, and vowel length, which provide the basis for the analysis. The vowel data, drawn from respondent productions, were analyzed using the International Phonetic Alphabet (IPA) and couched within the relevant phonological literature. Furthermore, they were interpreted through the lenses of the Autosegmental Phonology (to highlight how autonomous features like height, backness, and nasality interact across separate tiers) (Goldsmith, 1990). It should be noted that Leblango examples are presented without tonal marking, as the study focuses exclusively on segmental vowel features; supra-segmental features such as tone fall outside the scope of the analysis.

4.1. Similarities between the Vowel Sounds of Leblango and French

The first objective of this study was to identify similarities between the vowel sounds of Leblango and French. The analysis of the data indicates five major areas of similarity: vowel height, vowel backness, lip rounding, contrastivity, and nasality. These parameters are widely recognized in phonological systems across languages and are present in both the Leblango and French vowel inventories.

4.1.1 Shared Vowel Height Categories

In examining the similarities between Leblango and French vowels, this study adopts the observation of Ladefoged and Maddieson (1996) that vowel height is a prominent universal and

reliable dimension for cross-linguistic comparison. While height provides the primary basis for classification, other qualities such as backness and lip rounding are also considered, since they interact with height to determine the overall position of vowels in the phonological space. The analysis confirms that both Leblango and French organize their vowel systems around comparable high, mid, and low tiers, with specifications of backness and rounding reinforcing these core contrasts. The following subsections examine these shared height categories in greater detail.

4.1.1.1 Similar High/Close Vowels (/i, u/)

The analysis of collected data reveals that the two languages share a similar use of the high vowel tier. The table below presents high vowel phonemes that occur in both Leblango and French.

Table 2

Similar High Vowels in Leblango and French

Language	Vowel	Word	Transcription	English Gloss
Leblango	/i/	pii	/pi:/	“water”
	/u/	ruping	/ru'piŋ/	“daybreak”
French	/i/	qui	/ki/	“who”
	/u/	coup	/ku/	“blow”

Source. Primary data

Both Leblango and French utilize the close front vowel /i/ and the close back vowel /u/. This observation aligns with the corner vowel hypothesis (Maddieson, 1984; Gorrie, 2021), which posits that /i/ and /u/ are cross-linguistically stable due to their role in maximizing perceptual distinctiveness (Lindblom, 1986; Schwartz et al., 1997).

This similarity is established through acoustic analysis by measuring the formant frequencies (F1 and F2) of the high vowels /i/ and /u/ from native speakers of each language, both of which showed comparable acoustic patterns. Figures 1 and 2 illustrate the high front vowel /i/

in Leblango and French, while Figures 3 and 4 illustrate the high back vowel /u/ in the two languages.

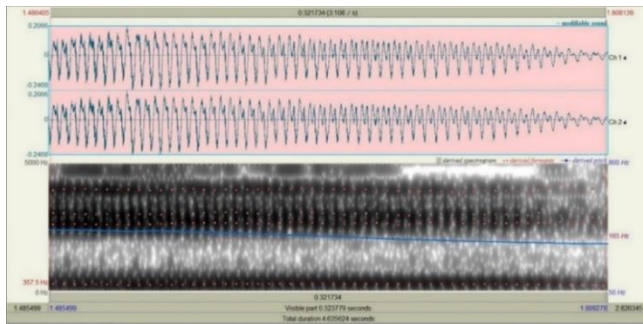


Figure 1. Spectrogram of the Leblango Word *pii* by a Native Leblango Speaker

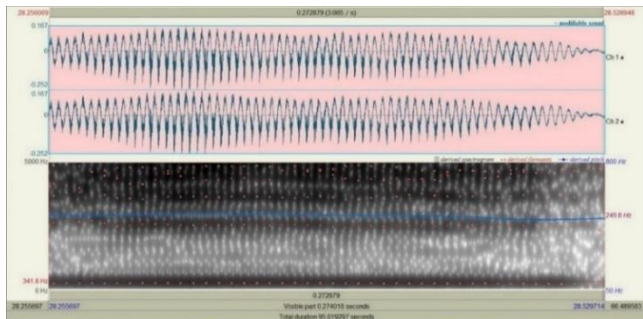


Figure 2. Spectrogram of the French Word *qui* by a Native French Speaker

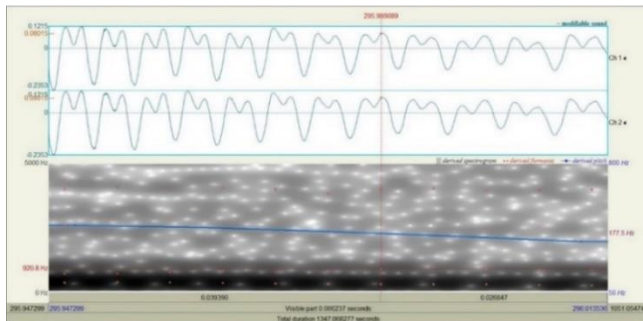


Figure 3. Spectrogram of the Leblango Word *ruping* by a Native Leblango Speaker

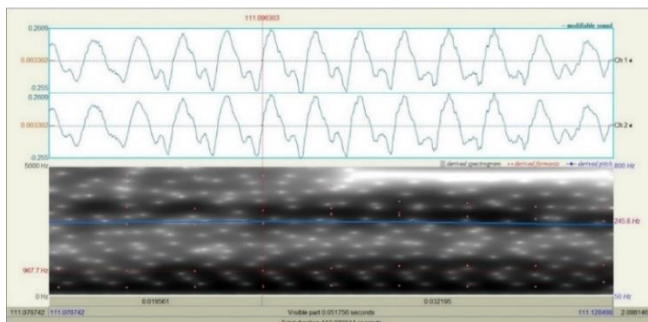


Figure 4. Spectrogram of the French Word *coup* by a Native French Speaker

Source. Primary data

The acoustic results are summarized in Table 3, which presents formant frequencies for the high front vowel /i/ and the high back vowel /u/.

Table 3

Formant Frequencies of /i/ and /u/ in Leblango and French

Language	Vowel	Word	F1 (Hz)	F2 (Hz)
Leblango	/i/	<i>pii</i>	357.5	2673
French	/i/	<i>qui</i>	341.8	2579
Leblango	/u/	<i>ruping</i>	326.2	920.8
French	/u/	<i>coup</i>	310.5	967.7

Source. Primary data

For /i/, both Leblango and French exhibit low F1 values (≤ 360 Hz), confirming their high vowel quality, and high F2 values (≈ 2600 Hz), confirming their frontness. For /u/, both languages display similarly low F1 values ($\approx 310\text{--}370$ Hz), consistent with their high vowel status, and F2 values near 950–1000 Hz, indicating backness and lip rounding. Taken together, these findings show that /i/ and /u/ are acoustically aligned across the two languages, supporting their phonological similarity and reinforcing the typological universality of high vowels (Ladefoged & Johnson, 2015).

4.1.1.2 Similar Front Mid Vowels (/e, ε/)

Another area of similarity between Leblango and French is the presence of distinctions within the mid-vowel range, which is characterized by a tongue height midway between the high and low vowels. Both languages maintain a phonemic contrast between close-mid /e/ and open-mid /ε/ on the front axis. Table 4 presents the measured acoustic values for these vowels from native speakers of both languages.

Table 4

Similar Front Mid Vowels Measured from Leblango and French Speakers

Language	Vowel	Word	Transcription	English Gloss	F1 (Hz)	F2 (Hz)
Leblango	/e/	ame	/ame/	“which”	560.9	2126
	/ɛ/	ber	/bɛR/	“good”	733.0	1985
French	/e/	né	/ne/	“born”	529.6	2266
	/ɛ/	père	/pɛR/	“father”	639.1	1891

Source. Primary data

The results from the acoustic measurements show that, in both Leblango and French, /e/ is realized with lower F1 values (≈ 530 – 560 Hz) and relatively high F2 values (≈ 2100 – 2260 Hz), consistent with a close-mid front vowel. In contrast, /ɛ/ displays higher F1 values (≈ 639 – 733 Hz) and slightly lower F2 values (≈ 1890 – 1985 Hz). These values match patterns reported cross-linguistically. For instance, Hillenbrand et al. (1995) found that English /e/ clusters around $F1 \approx 470$ Hz and $F2 \approx 2100$ Hz, while /ɛ/ shows higher F1 values (≈ 610 Hz) and lower F2 values (≈ 1900 Hz). This stable acoustic distinction suggests a consistent height contrast in both languages, which can be represented as a vowel-height specification on a separate feature tier within the Autosegmental Phonology framework (Goldsmith, 1990).

Figures 5 and 6 provide spectrographic illustrations of /e/ as produced by native speakers of Leblango and French.

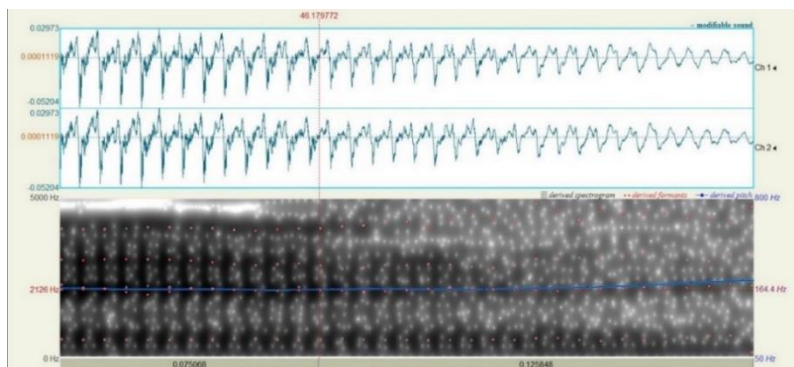


Figure 5. Spectrogram of the Leblango Word *ame* by a Native Leblango Speaker

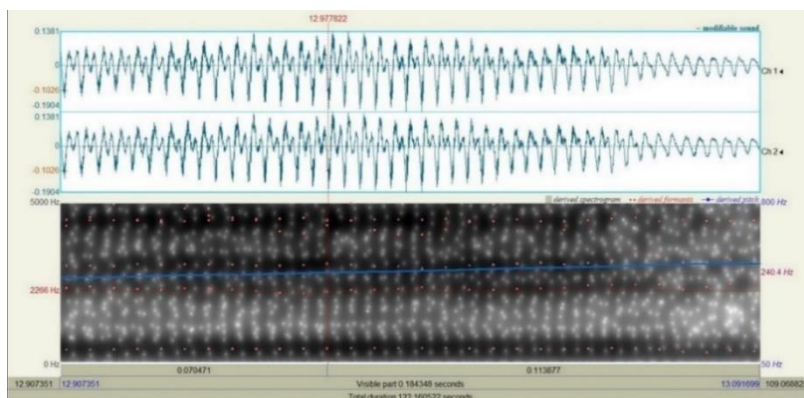


Figure 6. Spectrogram of the French Word *né* by a Native French Speaker

Source. Primary data

The acoustic and spectrographic evidence shows that both Leblango and French make comparable use of the mid-vowel space to signal a robust phonemic contrast, a feature typical of languages with relatively rich vowel inventories (Ladefoged & Johnson, 2015).

4.1.1.3 Similar Back Mid Vowels (/o, ɔ/)

The phonological similarity between Leblango and French extends to the back axis of the mid-vowel tier. Both languages exhibit a phonemic contrast between the close-mid back rounded vowel /o/ and the open-mid back rounded vowel /ɔ/. This opposition highlights the systematic organization of both vowel systems and represents another area of structural overlap as shown in Table 5

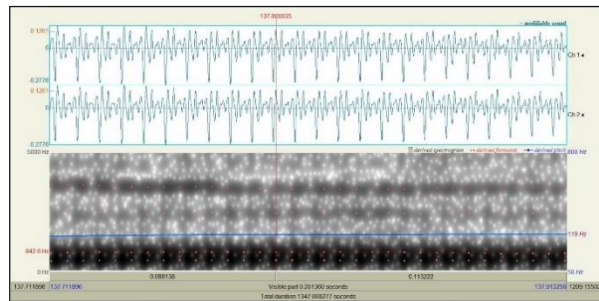
Similar Back Mid Vowels Measured from Both Leblango and French Speakers

Language	Vowel	Word	Transcription	English Gloss	F1 (Hz)	F2 (Hz)
Leblango	/o/	kwo	/kwo/	“theft”	467.9	842.6
	/ɔ/	pol	/pɔl/	“many”	514	858.2
French	/o/	beau	/bo/	“nice”	467	842.6
	/ɔ/	porte	/pɔʁt/	“door”	560	889

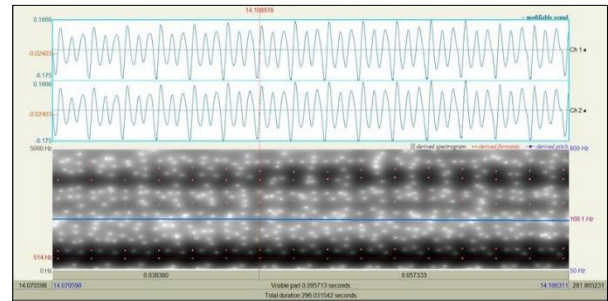
Source. Primary data

The formant data reveal a consistent acoustic pattern across both languages (see Figure 7 below). As with the front mid vowels, the primary acoustic cue for the /o/-/ɔ/ distinction is vowel height, indexed by the first formant (F1). In both Leblango and French, /ɔ/ is realized with higher F1 values (Leblango $\approx$ 514 Hz; French $\approx$ 560 Hz) than /o/ (Leblango $\approx$ 468 Hz; French $\approx$ 467 Hz). This difference, approximately 120 Hz in each language, reflects the lower tongue position required for /ɔ/.

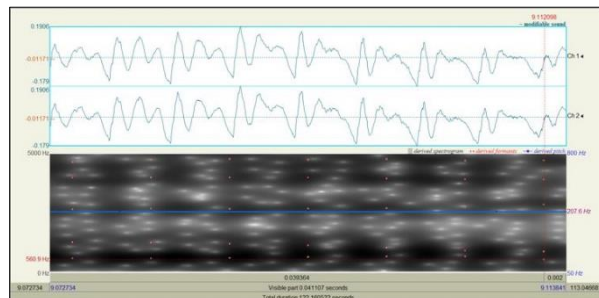
The second formant (F2) values for both vowels remain below 1000 Hz, confirming their back articulation. A slight lowering of F2 for /ɔ/ compared to /o/ suggests additional tongue retraction alongside height lowering. These findings are consistent with Peterson and Barney's (1952), Ladefoged and Maddieson's (1990) and Hillenbrand et al.'s (1995) studies, which show that /ɔ/ typically exhibits higher F1 and slightly lower F2 values than /o/ in English and other languages, reflecting a lower and more retracted tongue position.



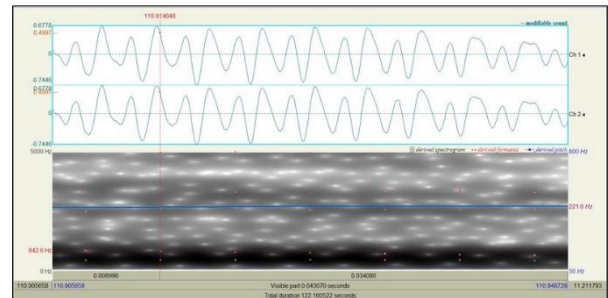
(a) Leblango /o/ (*kwo*)



(b) French /o/ (*beau*)



(c) Leblango /ɔ/ (*pol*)



(d) French /ɔ/ (*porte*)

Figure 7. Composite Spectrograms of /o/ and /ɔ/ in Leblango and French

Source. Primary data

In both languages, the /o/-/ɔ/ contrast is acoustically robust, with F1 serving as the primary distinguishing cue and consistently low F2 values confirming backness. This parallel realization underscores their phonological and phonetic alignment and reflects the typological stability of back mid-vowel contrasts across the world’s languages (Maddieson, 1984; Ladefoged & Johnson, 2015).

4.1.1.4 Similar Low Vowels (/a/)

Another major point of convergence between Leblango and French is the presence of a low vowel that occupies the open position of the vowel space. Both languages exhibit the low central/front unrounded vowel /a/, which functions as a phonemic anchor in their vowel inventories. Table 6 presents the measured formant values for this vowel from native speakers of both languages.

Table 6

Formant Frequencies of /a/ Measured from both Leblango and French Speakers

Language	Vowel	Word	Transcription	English Gloss	F1 (Hz)	F2 (Hz)
Leblango	/a/	ka	/ka/	‘if’	780	1497
French	/a/	la	/la/	‘the’	747	1468

Source. Primary data

The presence of /a/ in both languages reinforces the corner vowel hypothesis, which identifies /i, a, u/ as universal vowel space anchors (Maddieson, 1984; Gorrie, 2021). This universality is further supported by Lindblom (1986) and Schwartz et al. (1997), who argue that /a/ provides a perceptual and articulatory extreme by maximizing openness (high F1 values) while maintaining central/front positioning.

Acoustic analysis confirms this similarity (Figures 8 and 9). In both Leblango and French, /a/ is realized with a high F1 value (≥ 700 Hz), consistent with its low vowel quality, and an F2

around 1300–1500 Hz, reflecting its relatively central/front placement. These measurements are consistent with cross-linguistic findings: Hillenbrand et al. (1995) report English /a/ at $F1 \approx 730$ Hz and $F2 \approx 1300$ Hz, values which closely parallel those observed in Leblango and French.

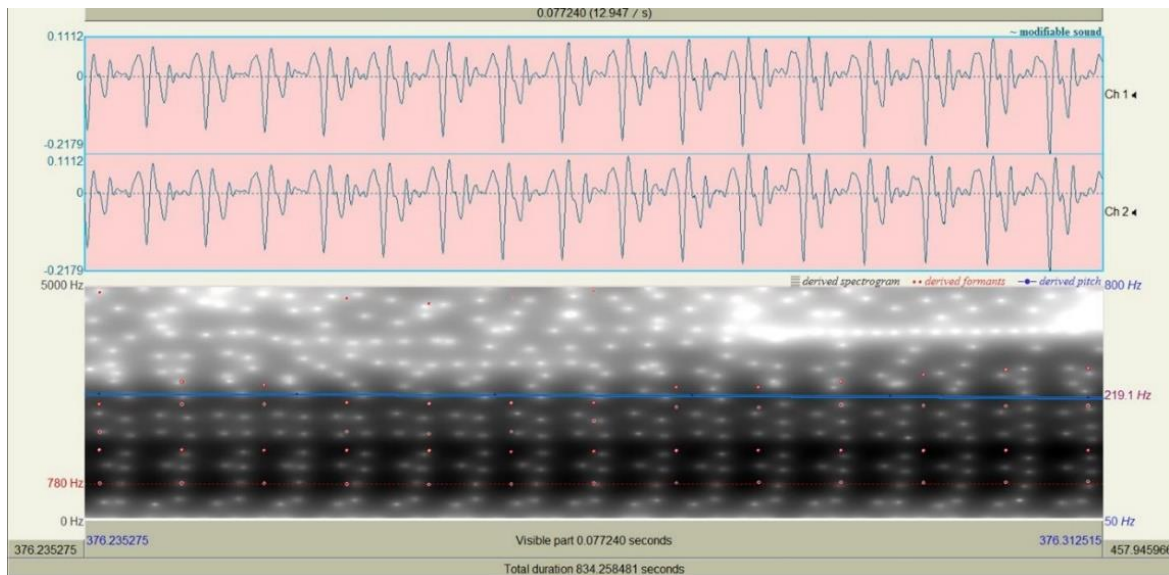


Figure 8. Spectrogram of the Leblango Vowel /a/ in *ka* by a Native Leblango Speaker

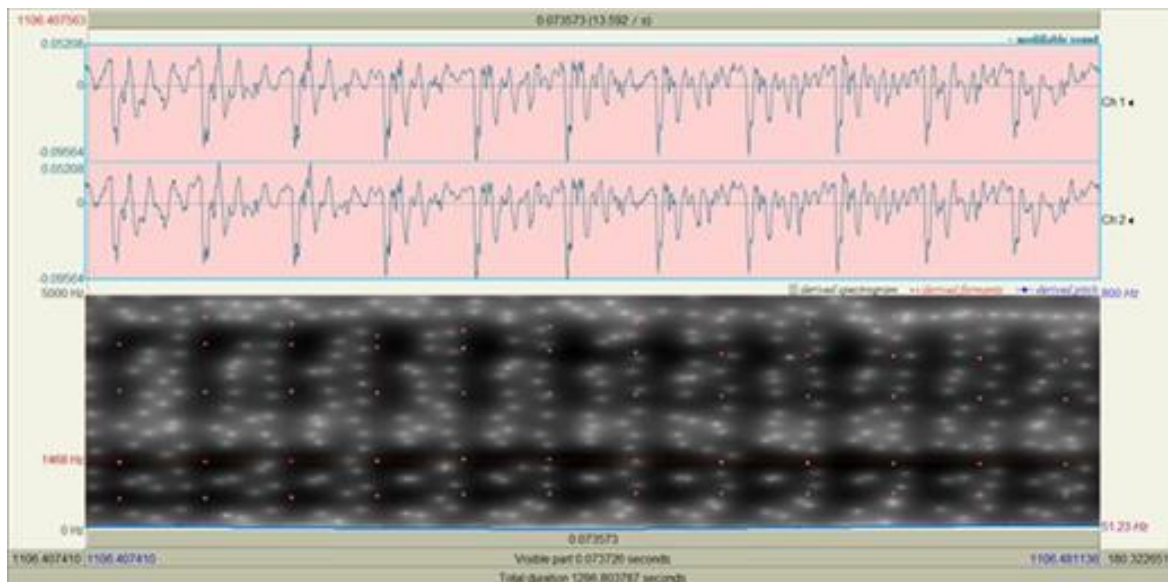


Figure 9. Spectrogram of the French Vowel /a/ in *la* by a Native French Speaker

Source. Primary data

The acoustic convergence of /a/ in both languages illustrates its typological stability as a low vowel, reinforcing the argument that /a/ is among the most cross-linguistically robust vowels. Its shared presence in Leblango and French thus provides another strong area of phonological similarity in their vowel systems.

4.1.2 Similarity in Vowel Nasality

Vowel nasality constitutes an important area of similarity between Leblango and French where both languages employ nasal vowels as a contrastive phonological property. Previously, Noonan (1992) described vowel nasality in Leblango as contextual where vowels flanking the velar nasal /ŋ/ became nasalized, while the /ŋ/ itself disappeared (as in *Lango* → /lãɕ/). In certain morphological forms like the plural and infinitive, the underlying nasal consonant resurfaces, demonstrating its historical presence:

- (1) Singular: *Lango* /lãɕ/ ‘a Lango person’ → Plural: *langngi* /laŋŋi/ ‘Lango people’
- (2) Singular: *bongo* /bɔ̃:/ ‘clothes’ → Plural: *bongngi* /bɔŋŋi/ ‘clothes’
- (3) Simple Present: /pũ:/ ‘lock’ → Infinitive: *pungngu* /pɔŋŋɔ/ ‘to lock’

This pattern suggests that nasality historically arose through coarticulatory transfer from /ŋ/. Such trajectories are widely attested cross-linguistically, where consonant-induced nasalization becomes reanalyzed as a property of the vowel (Hajek, 1997; Beddor, 1993). Maddieson (1984) likewise observes that although phonologized nasal vowels are typologically uncommon, they expand vowel systems by exploiting perceptually salient acoustic cues.

Current data indicate that nasality in Leblango has progressed to a phonemic status. Minimal pairs, central to identifying phonemic vowels (Ladefoged & Maddieson, 1996), now exist where nasality alone distinguishes meaning such as *Lango* /lãɕ/ ‘Lango (ethnic group)’ versus *lao* /laɔ/ ‘saliva’. Such contrasts (Table 7) show that nasal vowels are no longer predictable but

function as independent segments, aligning with cross-linguistic pathways where nasalization progresses from predictable to contrastive once the conditioning environment is lost (Maddieson, 1984).

Table 7

Selected Leblango Nasal–Oral Vowel Contrasts

Sn	Nasalized Vowel Word	IPA	English Gloss	Oral Vowel Word	IPA	English Gloss
1	Lango	/lã̃/	‘ethnic group’	lao	/laɔ/	‘saliva’
2	bongo	/bõ:/	‘clothes’	boo	/bo:/	‘cover it’
3	mingo	/mĩ̃/	‘foolishness’	mio	/mio/	‘cause’ (present simple)
4	dongo	/dõ:/	‘grow’	doo	/do:/	‘weed’
5	ringo	/rĩ̃/	‘meat’	rio	/rio/	‘giraffe’
6	cango	/tʃã̃/	‘heal’ (present simple)	cao	/tʃaɔ/	‘despise’ (present simple)
7	arango	/arã̃/	‘marriage’ (initial step)	arao	/araɔ/	‘female name’
8	jingo	/dʒĩ̃/	‘strengthen’ (present simple)	jio	/dʒio/	‘economize’ (present simple)
9	tenge	/tɛ̃:/	‘away’	tee	/tɛ:/	‘treat’ (present simple)
10	gingi	/gĩ:/	‘meanness’	gii	/gi:/	‘their’

Source. Primary data

Personal names further reinforce this evidence (Table 8), where oral–nasal alternations differentiate otherwise identical forms.

Table 8

Selected Leblango Nasal–Oral Vowel Contrasts in Personal Names

Sn	Nasalized Vowel Word	IPA	English Gloss	Oral Vowel Word	IPA	English Gloss
1	Bunga	/bũã/	‘male name’	Bua	/bua/	‘male name’
2	Otongo	/ɔtõ:/	‘male name’	Otoo	/ɔtɔ:/	‘male name’
3	Abongo	/abõ:/	‘male name’	Aboo	/abɔ:/	‘female name’
4	Odongi	/ɔdõĩ/	‘male name’	Odoi	/ɔdɔĩ/	‘male name’

Source. Primary data

Further evidence of phonologized nasality in Leblango comes from the deletion of final /ŋ/, which creates contrastive nasal vowels. Words still spelled with *-ng* in the orthography, such as *kong* ‘please’, *ping* ‘weather’, *dong* ‘so’, and *dang* ‘also’, undergo complete consonant loss, with nasality transferred to adjacent vowels.

This process parallels the historical development of French nasal vowels, where final /n/ was lost and the preceding vowels acquired phonemic nasalization (Vaissière, 2009). As Fagyal et al. (2006, p. 32) note, final /n/ in French words such as *ban* ‘ban’ disappeared in Old French pronunciation and the preceding vowels “became fully nasal, and assumed a lexically distinctive role (e.g. *bas* ‘low’ /ba/ vs. *ban* ‘ban’ /bã/).”

The acoustic analysis of *Ogong ogoe* ‘Ogong beat him/her’ from the reading exercise confirms this pattern. Across 20 speakers, the final /ŋ/ in *Ogong* was consistently elided, with nasality transferred to the preceding vowel /ɔ/, realized as [ogõ.gœ]. Mean values of F1 $\approx$ 380 Hz and F2 $\approx$ 991 Hz reflect this realization.

A more complex pattern emerges in connected speech, where phrases such as *kong i bin* ‘please come’ are realized as [kõĩ.bm]. Here, /ŋ/ is deleted and both /ɔ/ and /i/ become nasalized, forming a nasal diphthong /õĩ/. Similarly, data from conversational modules show that the phrase *ping oruu* ‘the day broke’ is realized as [pĩõ.ru], with /ŋ/ deleted and the resulting nasal sequence

forming a nasal diphthong /ĩõ/. These processes parallel the Autosegmental Phonology pattern in which the deletion of a nasal consonant leaves behind a floating [+nasal] feature, which subsequently spreads to adjacent vocalic segments, as seen in Portuguese, where it gave rise to phonemic nasal diphthongs such as /ẽĩ/ and /ẽĩ/ (Wetzels, 1997; Mateus & d'Andrade, 2000; Shea & Lira, 2020). The acoustic values of the affected vowels in *Ogong ogoe* and *ping oruu* are summarized in Table 9, while Figure 10 provides spectrographic evidence of the diphthongal realization in *ping oruu*.

Table 9

Acoustic Evidence of Final /ŋ/ Deletion and Nasality Transfer in Leblango

Phrase	Target Vowel	Realized Form	F1 (Hz)	F2 (Hz)
<i>Ogong ogoe</i>	/ĩ/	/ogõgõe/	~380	~991
<i>ping oruu</i>	/ĩõ/ (diphthong)	/pĩõru/	~420–461	~2063–1015

Source. Primary data

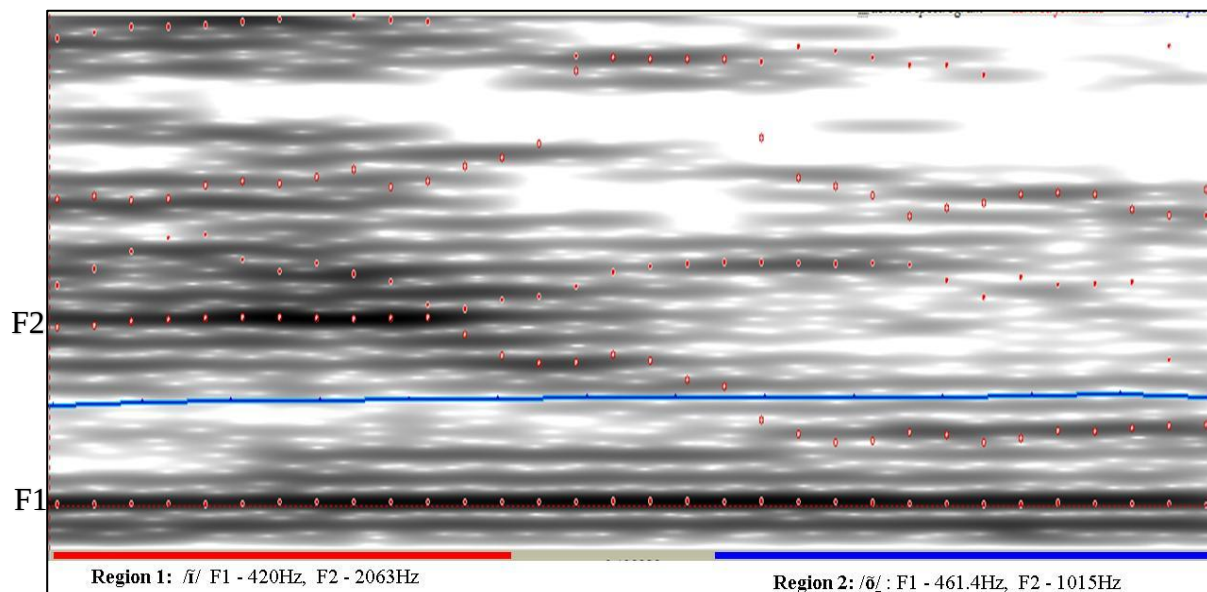


Figure 10. Spectrogram of the Leblango phrase *ping oruu* by a native Leblango speaker

Source. Primary data

The spectrogram shows /ĩ/ in Region 1 gliding into /õ/ in Region 2, with no closure trace for /ŋ/. The measured values of /ĩ/ (F1 ≈ 420 Hz, F2 ≈ 2063 Hz) and /õ/ (F1 ≈ 461 Hz, F2 ≈ 1015 Hz) are consistent with the expected acoustic profiles of nasal vowels cross-linguistically (Delvaux et al., 2002; Hajek, 1997; Beddor, 1993).

In French, nasality is also phonemic, with four standard nasal vowels: /ɑ̃/, /ɛ̃/, /ɔ̃/, and /œ̃/ (Price, 2005). These vowels systematically contrast with their oral counterparts, as in *bon* /bɔ̃/ ‘good’ vs. *beau* /bo/ ‘nice’ (see Table 10).

Table 10

Selected French Nasal–Oral Vowel Contrasts

Sn	Nasalized Vowel Word	IPA	English Gloss	Oral Vowel Word	IPA	English Gloss
1	bon	/bɔ̃/	‘good’	beau	/bo/	‘nice’
2	un	/œ̃/	‘one’	peu	/pø/	‘few, little’
3	main	/mɛ̃/	‘hand’	mais	/mɛ/	‘but’
4	ban	/bɑ̃/	‘cheers’	bas	/ba/	‘low’

Source. Primary data

Comparative analysis of collected data show that Leblango shares at least two nasal vowel categories with French: /ɛ̃/ and /ɔ̃/ as illustrated in Table 11.

Table 11

Shared Nasal Vowels in Leblango and French

Nasal Vowel	French Example	English Gloss	Leblango Example	English Gloss
/ɛ̃/	<i>main</i> /mɛ̃/	'hand'	<i>tenge</i> /tɛ̃:/	'away'
/ɔ̃/	<i>bon</i> /bɔ̃/	'good'	<i>bongo</i> /bɔ̃:/	'clothes'

Source. Primary data

From acoustic analysis, the shared Leblango-French nasal vowels /ɛ̃/ and /ɔ̃/ exhibit:

- (i) a nasal formant near 250–300 Hz,

- (ii) widened bandwidths of oral formants (especially F1),
- (iii) anti-formants (attenuated energy regions) between 500–1500 Hz, and
- (iv) reduced overall amplitude compared to oral vowels.

These cues, widely documented in cross-linguistic research (Beddor, 1993; Hajek, 1997; Rossato & Feng, 1999; Stevens, 1998), are visible in spectrograms. Figures 11a and b illustrate this with /ẽ/ in Leblango *tenege* and French *main*.

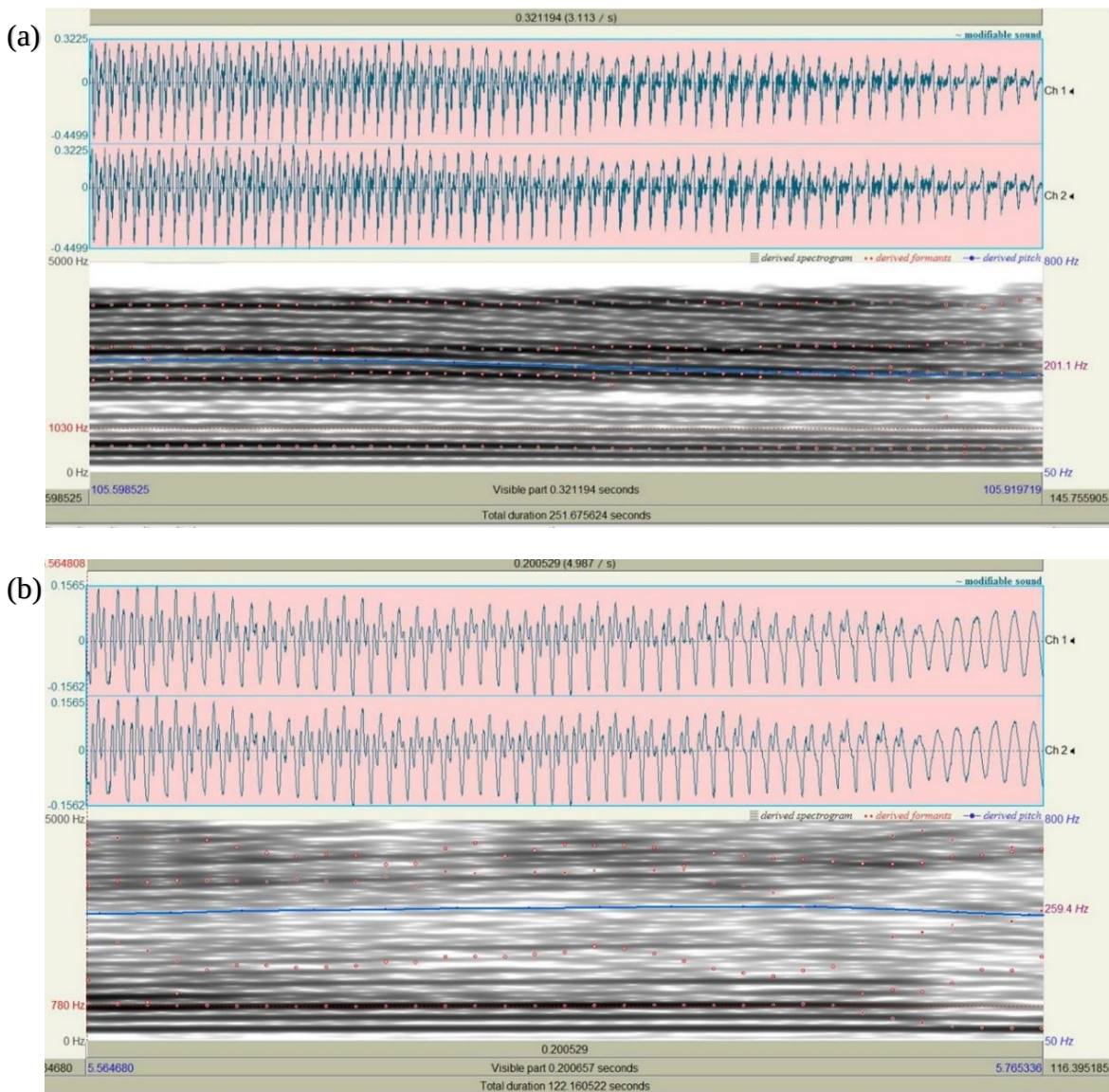


Figure 11. Spectrograms of /ẽ/ in (a) Leblango *tenege* and (b) French *main*

Source. Primary data

This acoustic common ground is further illustrated by a direct comparison of words containing /ɔ̃/. For instance, the Leblango word *bongo* /bɔ̃:/ and the French word *bon* /bɔ̃/ demonstrate comparable formant structures, save for length, which are the primary determinants of vowel quality. The mean values from native speakers are shown below:

- 1- Leblango *bongo* /bɔ̃:/ ‘clothes’: F1 623 Hz, F2 1093 Hz.
- 2- French *bon* /bɔ̃/ ‘good’: F1 670 Hz, F2 1062 Hz.

The close alignment of these F1 and F2 values indicates a very similar perceived vowel quality. This finding aligns with cross-linguistic studies indicating that formant patterns for a given vowel category are more stable across languages than suprasegmental features like duration (Ladefoged & Maddieson, 1996).

Taken together, these findings suggest that Leblango not only shares nasal categories with French but also employs similar acoustic strategies to encode them. This common ground in vowel quality forms the basis for examining another area of overlap: how vowels are distributed across positions within the word and syllable.

4.1.3 Similarities in Distribution of Vowels between Leblango and French

Beyond shared vowel qualities, an important area of phonological congruence between Leblango and French lies in the distributional patterns of vowels within the syllable and the word. Both systems permit vowels in word-initial, medial and final word positions and treat nasality as a phonemic property (see Table 12).

Table 12

Similarities in Vowel Distribution between Leblango and French

Distributional Feature	Leblango	Example	French	Example
Word-Initial Vowels	Permitted	<i>ame</i> /ame/ ‘which’	Permitted	<i>ami</i> /ami/ ‘friend’
Word-Final Vowels	Permitted	<i>lao</i> /laɔ/ ‘saliva’	Permitted	<i>parler</i> /parle/ ‘to speak’
Phonemic Nasal Vowels in Medial Positions	Permitted	<i>tingere</i> /tĩẽre/ ‘nag oneself’	Permitted	<i>danse</i> /dãse/ ‘to dance’
Phonemic Nasal Vowels in Final Positions	Permitted	<i>kong</i> /kõ/ ‘please’	Permitted	<i>bon</i> /bõ/ ‘good’

Source. Primary data

These distributional parallels confirm that both Leblango and French support positional flexibility of vowels that encompasses oral, nasal, and sequential patterns. Such similarity highlights the structural compatibility of the two vowel systems. However, as the next section will show, differences in frequency, phonetic realization, and conditioning remain significant.

4.2. Differences between the Vowel Sounds of Leblango and French

The second objective of this study was to establish the differences between the vowel sounds of Leblango and French. To achieve this task, conversational modules, reading tasks and corpus and dictionary sources were used to generate data for analysis. After collecting the data, they were transcribed before I embarked on the analysis presented below.

4.2.1 Differences in Vowel Height Categories

Differences in vowel height between Leblango and French constitute a key phonetic distinction between the two languages. This subsection examines these differences systematically for high, mid, and low vowels.

4.2.1.1 Differences in High Vowels

A key point of divergence between the vowel systems of Leblango and French lies in their high vowel inventories. French maintains a three-way high vowel contrast, /i/, /y/, and /u/, a system well documented in descriptions of the French vowel inventory (Price, 2005; Walker, 2001). The presence of /y/ as a front rounded high vowel is typologically marked, since such vowels are relatively rare outside of Europe (Maddieson, 1984; Ladefoged & Maddieson, 1996). These high vowels form a symmetrical set with distinctions spanning both the front–back and rounding dimensions:

- (i) /i/: a front, unrounded vowel (as in *si* /si/ ‘if’),
- (ii) /y/: a front, rounded vowel (as in *su* /sy/ ‘known’), and
- (iii) /u/: a back, rounded vowel (as in *sous* /su/ ‘under’).

By contrast, this study’s findings align with Noonan (1992), who observed that Leblango has a high vowel system comprising /i/, /u/, and /ʊ/, but no phonemic front rounded vowel. The Leblango high vowels are organized primarily along the front–back dimension, leaving a systemic gap where French has /y/:

- (i) /i/: a front, unrounded vowel (as in *pii* /pi:/ ‘water’),
- (ii) /u/: a back, rounded vowel (as in *ruping* /ru'piŋ/ ‘daybreak’).
- (iii) /ʊ/: near-high back rounded (as in *kulu* /kʊlʊ/ ‘never’)

The formant chart in Figure 12 illustrates these differences acoustically, where, in French, /y/ occupies an intermediate position between /i/ and /u/ in the F1–F2 space, while Leblango exhibits no vowel occupying that front-rounded acoustic space, highlighting a systemic gap.

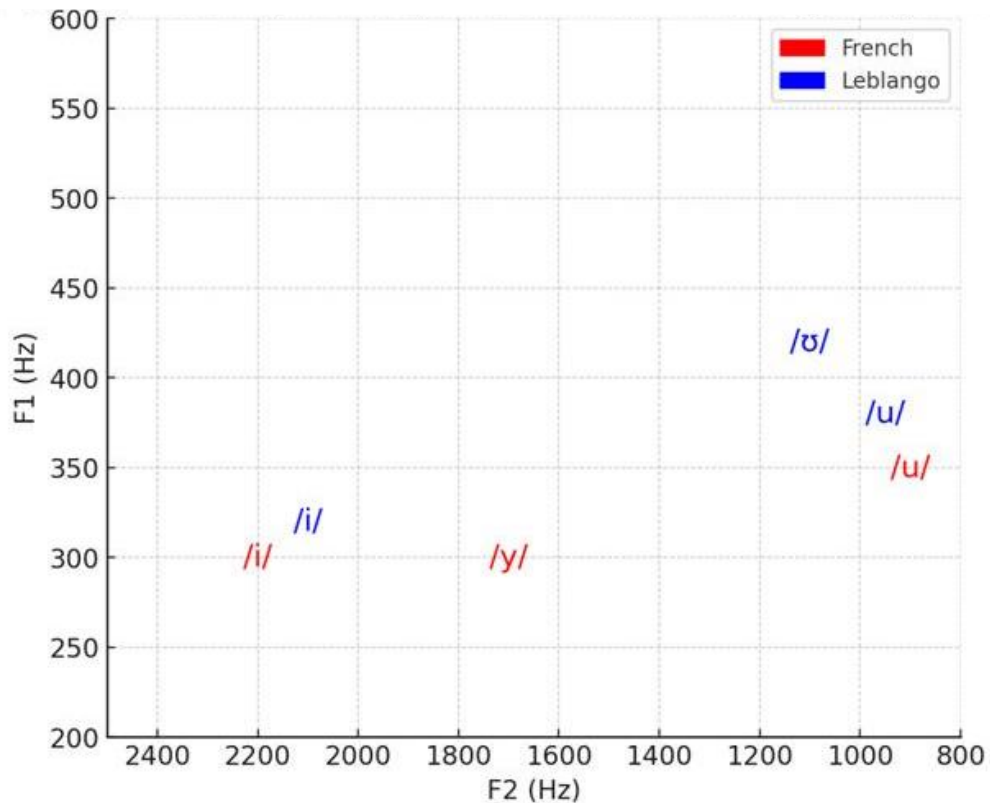


Figure 12. Formant Chart (F1 × F2 Plot) of French and Leblango High Vowels

Source. Primary data

As can be seen, the contrast between the two systems is twofold. First, French contains a front rounded vowel /y/, creating a rounding contrast in the front vowel space that is absent in Leblango. Second, Leblango maintains a height distinction in the back vowel space with /u/ and /ʊ/, a phonemic contrast that French lacks. The two languages therefore exploit different phonological dimensions to maximize their vowel inventories.

4.2.1.2 Differences in Mid Vowels

The mid vowel systems of French and Leblango differ substantially in size, organization, and phonological principles. French maintains a dense and highly differentiated six-member subsystem, while Leblango operates with a more compact structure consisting of four core mid

vowels plus a central vowel. These contrasts demonstrate how the two languages draw on different phonological resources.

French distinguishes its mid vowels along three parameters height, backness, and rounding, yielding the following set:

- (i) /e/: close-mid, front, unrounded (as in *été* /ete/ ‘summer’)
- (i) /ɛ/: open-mid, front, unrounded (as in *fait* /fɛ/ ‘fact’)
- (ii) /ø/: close-mid, front, rounded (as in *jeu* /ʒø/ ‘game’)
- (iii) /œ/: open-mid, front, rounded (as in *sœur* /sœʁ/ ‘sister’)
- (iv) /o/: close-mid, back, rounded (as in *eau* /o/ ‘water’)
- (v) /ɔ/: open-mid, back, rounded (as in *porte* /pɔʁt/ ‘door’)
- (vi) /ə/: mid-central, unrounded (as in *ce* /ə/ ‘that’)

This intricate system carries a high functional load, with numerous minimal pairs hinging on subtle vowel quality differences such as *jeûne* /ʒøn/ ‘fast’ versus *jeune* /ʒœn/ ‘young’; *paume* /pom/ ‘palm’ versus *pomme* /pɔm/ ‘apple’. The presence of front rounded mid vowels (/ø/, /œ/), which are typologically rare (Maddieson, 1984; Ladefoged & Maddieson, 1996), further distinguishes French.

On the other hand, Leblango's mid vowel inventory is built upon a four-way distinction in the front and back dimensions, plus a unique central vowel. The vowels are structured primarily by quality and height without the front-rounded dimension present in French:

- (i) /e/: close-mid, front, unrounded (as in *ame* /ame/ ‘which’);
- (ii) /ɛ/: open-mid, front, unrounded (as in *ber* /bɛʁ/ ‘good’);
- (iii) /o/: close-mid, back, rounded (as in *kwoo* /kwo:/ ‘theft’);
- (iv) /ɔ/: open-mid, back, rounded (as in *pol* /pɔl/ ‘many’).

(v) /ə/: mid-central, unrounded (as in *catto* /cətə/ ‘to place a hand on’)

Table 13

Contrastive Inventory of Mid Vowels in Leblango and French

Language	Front Unrounded	Front Rounded	Central Unrounded	Back Rounded
Leblango	/e/, /ɛ/	--	/ə/	/o/, /ɔ/
French	/e/, /ɛ/	/ø/, /œ/	/ə/	/o/, /ɔ/

Source. Primary data

From an acoustic perspective, Figure 13 plots the $F1 \times F2$ values of these vowels. The chart shows that French mid vowels occupy a broader and more finely divided vowel space, reflecting distinctions in height, backness, and rounding. Leblango mid vowels, by contrast, cluster into ATR-based pairs and a central vowel.

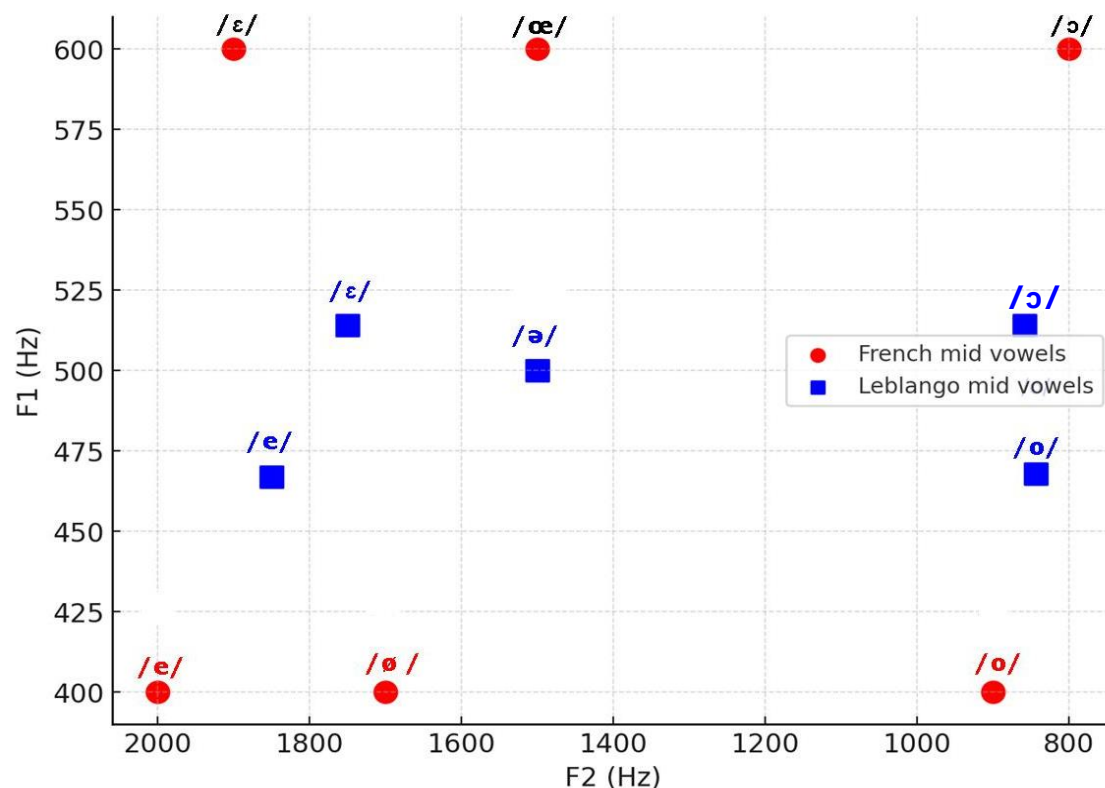


Figure 13. Scatter Plot of $F1 \times F2$ Values for Leblango and French Mid Vowels

Source. Primary data

In Leblango, the clustering of mid vowels into ATR-based pairs reflects a core organizing principle of the vowel system. The [+ATR] vowels /e/ and /o/ contrast systematically with their [–ATR] counterparts /ɛ/ and /ɔ/, which form harmonic pairs that differ in tongue-root position and degree of vowel openness. From an Autosegmental Phonology perspective (Clements & Rialland, 2005; Goldsmith, 1990), this contrast can be treated as a feature-tier distinction, where the feature [±ATR] associates independently with the vowel root node. This is consistent with analyses of ATR harmony in Nilotic languages (Ladefoged & Maddieson, 1996; Noonan, 1992). This organization manifests itself in lexical contrasts such as *ame* /ame/ ‘which’ versus *ber* /ber/ ‘good’, and *kwoo* /kwo:/ ‘theft’ versus *pol* /pɔl/ ‘many’. The central vowel /ə/ lies outside this opposition, functioning as a neutral vowel that does not participate in ATR alternations (Hulst, 2016). Figure 13 illustrates this structure by showing that Leblango mid vowels form compact ATR-driven clusters, in contrast to the finer height–backness–rounding distinctions that define the French mid vowel system.

4.2.1.3 Differences in Low Vowels

The low vowel systems of French and Leblango diverge in both structure and acoustic realization. In French, traditional descriptions report a two-way distinction between /a/ (as in *ami* /ami/ ‘friend’) and /ɑ/ (as in *pas* /pa/ ‘not’) (Delattre, 1965; Price, 2005). Although more recent studies observe that this contrast is frequently neutralized in contemporary Standard French, resulting in a single low vowel (Fagyal et al., 2006), acoustic analyses confirm that /a/ and /ɑ/ historically occupied distinct regions of the vowel space. By contrast, Leblango maintains only a single low vowel, /a/, whose formant structure reveals a more retracted articulation compared with the French low vowels (Noonan, 1992; Hyman, 2008).

Acoustic analysis in this study confirms mean values for French /a/ and /ɑ/ that are consistent with earlier reports (Delattre, 1965). French /a/ is realized as a low central–front vowel (F1 $\approx$ 811 Hz; F2 $\approx$ 1359 Hz), while /ɑ/ shows a slightly lower F1 ($\approx$ 780 Hz) and a higher F2 ($\approx$ 1468 Hz), placing it in a low central position rather than a back one.

In Leblango, the low vowel /a/ exhibits a different profile. As attested in *bappo* /bapɔ/ ‘to slap’, /a/ is characterized by F1 $\approx$ 780 Hz and F2 $\approx$ 1171 Hz. This lower F2 value confirms that Leblango /a/ is realized with greater retraction than French /ɑ/. Such retraction is consistent with descriptions of Nilotic vowel systems, where tongue root position and backness play a crucial role in vowel organization (Noonan, 1992; Hyman, 2008).

Table 14

Acoustic Measurements of Low Vowels in Leblango and French

Language	Vowel	Example	English Gloss	F1 (Hz)	F2 (Hz)
Leblango	/a/	<i>bappo</i> /bapɔ/	‘slap’	780	1171
French	/ɑ/	<i>pas</i> /pa/	‘not’	780	1468
French	/a/	<i>ami</i> /ami/	‘friend’	811	1359

Source. Primary data

As summarized in Table 14, the comparison highlights two distinct organizational strategies. French historically employed a two-way contrast in the low vowel space, while Leblango differentiates its single low vowel through retraction.

Figure 14 plots the F1 $\times$ F2 values of these vowels. The chart shows broadly similar F1 values across the systems, indicating comparable vowel height, but F2 values diverge: French low vowels are more central, while the Leblango low vowel occupies a more retracted (backed) position. The F2 axis is reversed to approximate the IPA vowel quadrilateral.

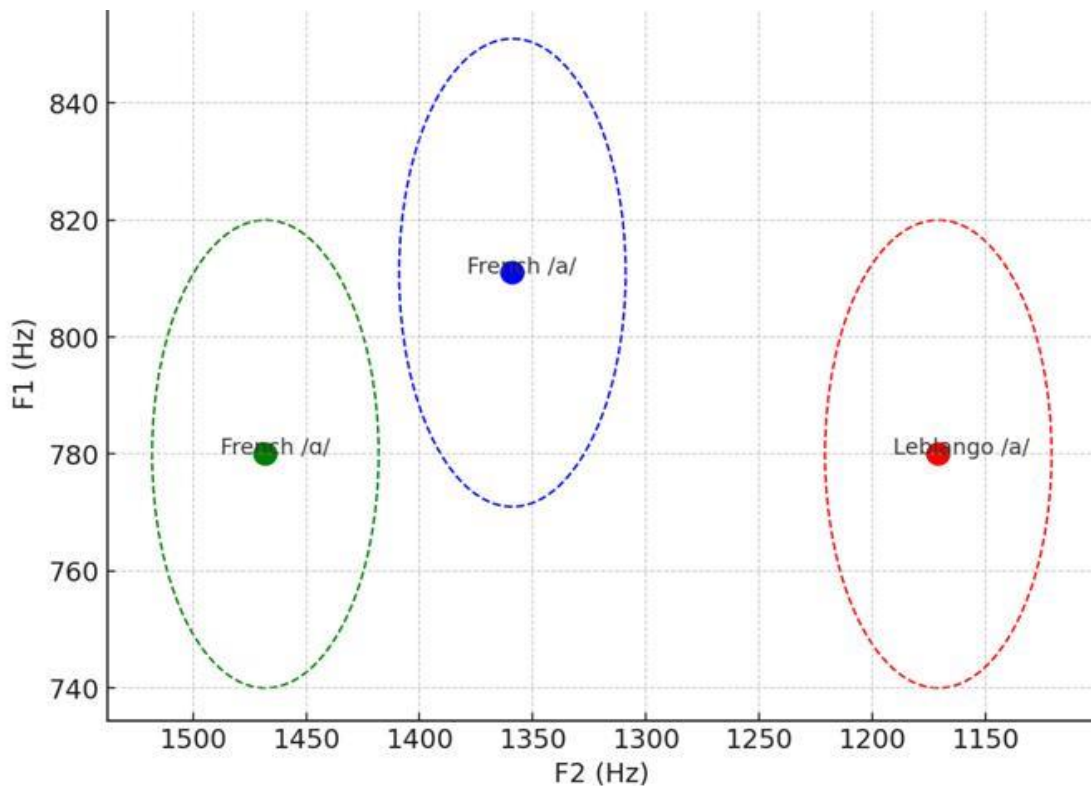


Figure 14. Scatter Plot of F1 × F2 Values for Leblango and French Low Vowels

Source. Primary data

Typologically, this contrast illustrates two strategies of vowel organization. French follows the widespread pattern of a single low vowel (Maddieson, 1984), while Leblango differentiates its low vowel space by retraction (Noonan, 1992). This finding supports the view that vowel systems may diverge not only through inventory size but also through the precise acoustic positioning of their members.

4.2.2 Differences in Nasal Vowels

Both French and Leblango exploit vowel nasality as a phonological feature, yet their systems diverge significantly in inventory size and historical development. These differences highlight how nasalization has evolved through distinct linguistic pathways in the two languages.

In French, nasal vowels are limited to four contrastive phonemes: /ã/, /ẽ/, /õ/, and /œ̃/. This set, attested in numerous descriptive and acoustic studies (Walker, 2001; Price, 2005), is phonemically distinct from the oral vowels, yielding minimal pairs such as *bon* /bõ/ ‘good’ versus *beau* /bo/ ‘nice’, and *main* /mẽ/ ‘hand’ versus *mais* /mɛ/ ‘but’. Acoustic analysis of those words above aligns with previous studies (Maeda, 1993; Stevens, 1998) showing that nasalization lowers the amplitude of oral formants and also introduces a nasal pole-zero structure, typically raising F1 and lowering F2.

Leblango, by contrast, presents a somewhat richer and more variable system. In addition to /ẽ/ and /õ/, which overlap with French, Leblango includes /ã/, /ẽ/, /ĩ/, /õ/, and /ũ/. Minimal pairs such as *Lango* /lãõ/ ‘Lango (ethnic group)’ versus *lao* /laõ/ ‘saliva’, *gingi* /gĩ:/ ‘meanness’ versus *gii* /gi:/ ‘their’, and *Bunga* /bũã/ ‘male name’ versus *Bua* /bua/ ‘male name’ demonstrate that nasality has fully phonologized. Such pairs show that vowel nasality in Leblango carries significant functional load. Its lexical weight is evident in its role in distinguishing word meanings, where nasality alone differentiates items, a hallmark of a phonologized feature (Cohn, 1990).

Beyond its lexical role, nasality in Leblango also functions as a morphophonological process in verbal derivation. In verbs whose roots end in *-ng* in the Leblango orthography, the addition of the reflexive suffix *-ere* triggers the deletion of /ŋ/ and the spread of nasality onto the adjacent vowels, resulting in sequences of two consecutive nasalized vowels. For example, *ting* ‘nag’ + *-ere* ‘REFL’ yields *tingere* ‘nag oneself’, realized as /tĩẽre/ (see Figure 15). Similar examples include *kwong* ‘swear’ yielding *kwongere* ‘to swear’ /kwõẽre/ and *lung* ‘slope’ yielding *lungere* ‘to slope down’ /lũẽre/.

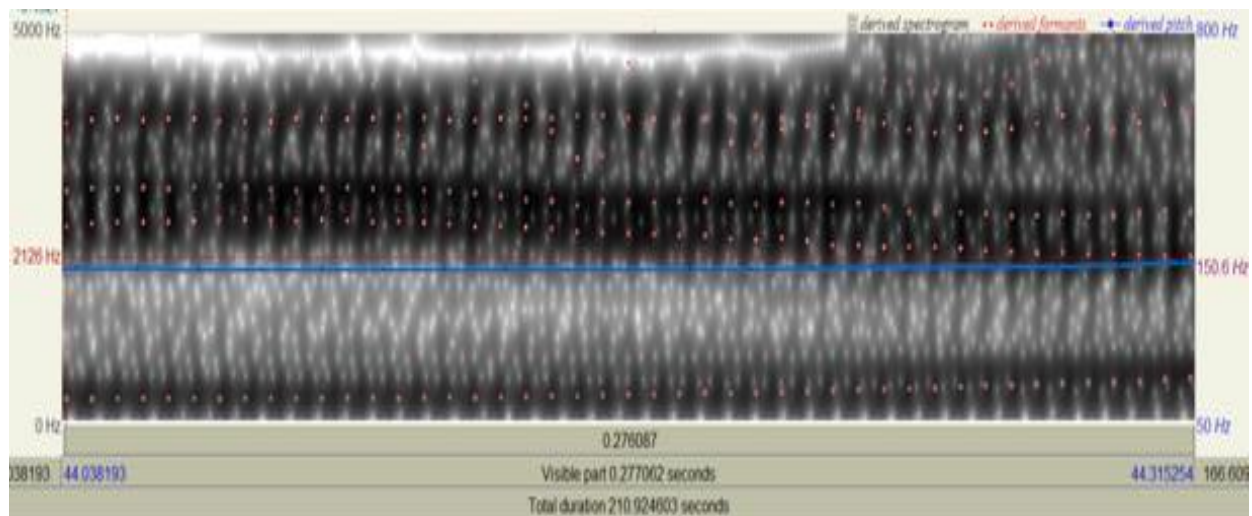


Figure 15. Spectrogram of the Nasal Vowel Sequence /ĩẽ/ in *tingere* by a Native Leblango Speaker

Source. Primary data

As shown in Figure 15, the formant tracks show a clear absence of the stop closure and burst expected for a /ŋ/. Instead, the spectrogram displays a continuous vocalic sequence consistent with consonant deletion. The measured formant values /ĩ/ (F1 = 326 Hz; F2 = 2302 Hz) and /ẽ/ (F1 = 420 Hz; F2 = 2110 Hz) match established acoustic patterns for nasal vowels (Delvaux et al., 2002; Martinez et al., 2023; Mateus & d'Andrade, 2000). The characteristic raising of F1, attenuated high-frequency energy, and diffuse formant structure confirm the process of /ŋ/-deletion and subsequent vowel nasalization in derived forms. This phonological process demonstrates that nasality is a productive morphophonological feature in Leblango and this supports cross-linguistic observation that a single phonological feature may encode both lexical and grammatical distinctions (Hyman, 2008).

Length distinctions further mark a point of divergence. Data from reading exercises revealed that Leblango permits contrastive long nasal vowels, as in /kĩ/ (*kong* 'please' in connected speech) versus /kĩ:/ (*kongo* 'beer'), whereas French does not exhibit phonemic nasal vowel length.

This pattern aligns with crosslinguistic observations by Hajek (1997) that many African languages contrast both oral and nasal vowel length, a feature largely absent from European systems.

Historically, French nasal vowels arose during the transition from Old French to Middle French, whereby oral vowels followed by the nasal consonants /m/ and /n/ were nasalized, as in the word *an* ‘year’, which was pronounced with a final /n/ sound but transitioned into elided /n/ and nasalized /a/ realization (Vaissière, 2009). Leblango on the contrary, according to earlier descriptions, traces its vowel nasality to contextual nasalization triggered by the velar nasal /ŋ/ (Noonan, 1992), which over time generalized to a wider set of vowel contexts. This pattern aligns with Hajek’s (1997) observation that coarticulatory nasalization often spreads to full phonemic contrast in Niger-Congo and Nilotic languages.

Typologically, French represents a compact system typical of European languages, while Leblango exemplifies the expanded nasal vowel inventories common in parts of Africa (Bender, 2020). As summarized in Table 15 and illustrated schematically in Figure 16, French nasal vowels cluster in the mid–low region of the vowel space, whereas Leblango nasal vowels spread across high, mid, and low qualities. This broader dispersion suggests that Leblango assigns a heavier functional load to nasality, contrasting sharply with the more restricted French system.

Table 15

Nasal Vowel Inventories in French and Leblango

Language	High	Mid	Low	Examples
French	–	/ɛ̃, œ̃, ɔ̃/	/ɑ̃/	<i>main</i> /mɛ̃/ ‘hand’, <i>un</i> /œ̃/ ‘one’, <i>bon</i> /bɔ̃/ ‘good’, <i>dans</i> /dɑ̃/ ‘in’
Leblango	/ĩ, ỹ, ü/	/ẽ, ẽ̃, ɔ̃, õ/	/ã/	<i>tingere</i> /tĩẽre/ ‘nag oneself’, <i>mingo</i> /mĩĩ/ ‘foolishness’ <i>Bunga</i> /bũã/ ‘male name’, <i>tenge</i> /tẽ:/ ‘away’, <i>ogonge</i> /ɔgõẽ/ ‘postured’.

Source. Primary data

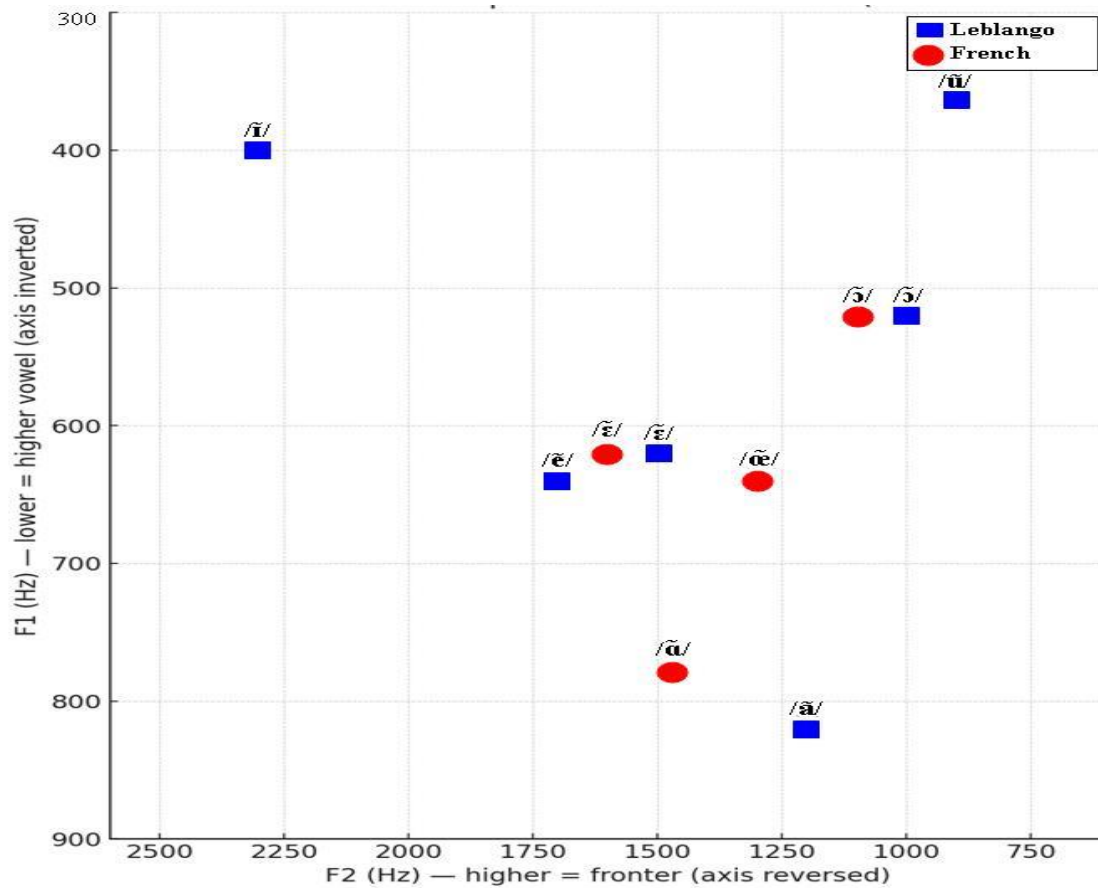


Figure 16. Acoustic Space of Nasal Vowels in Leblango and French (Schematic F1 × F2 Plot)

Source. Primary data

As can be noted from the chart, French nasal vowels cluster in mid–low regions, with relatively compact distributions, while Leblango nasal vowels spread across the vowel space, covering high, mid, and low qualities, indicating a broader functional deployment of nasality.

4.2.3 Variations in Distributional Restrictions

The distribution of nasal vowels in Leblango and French reveals a fundamental typological distinction: Leblango exemplifies a system of nasal vowels in progress, where distribution is transparently governed by phonetic origins, whereas French represents a mature, stable system with abstract, lexicalized phonotactic constraints.

In Leblango, nasal vowels occur primarily in syllables historically closed by the velar nasal /ŋ/, with nasality transferred to the adjacent vowel as the consonant is elided. This restricts nasalization to non-initial syllables and word-final position, as in *Lango* /lã̃/ ‘Lango ethnic group’ and *kong i bin* /kõ̃.bɪn/ ‘please come’. This pattern illustrates a phonotactic restriction in which vowel + nasal consonant sequences reduce to a single nasal vowel. French, by contrast, exhibits far fewer positional restrictions. The phonologization of nasal vowels following the loss of final /m/ and /n/ in Old French (Fagyal et al., 2006) resulted in a system where nasal vowels are contrastive in a wide range of syllabic positions. Establishing true minimal pairs for nasality in French is challenging due to the historical merger and subsequent changes in vowel quality that accompanied nasalization. For instance, classic examples like *beau* /bo/ ‘beautiful’ versus *bon* /bõ/ ‘good’ involve differences in both nasality and vowel quality (/o/ vs. /ɔ/). A more accurate representation can be found in near-minimal pairs, where vowel quality remains constant and nasality is the main point of distinction. For instance, *longue* /lõg/ ‘long (feminine)’ and *lors* /lɔʁ/ ‘then’ illustrate this near-minimal contrast, differing primarily in the (non-)nasality of /õ/ versus /ɔ/. These near-minimal pairs confirm that nasality operates as an autonomous, contrastive feature in the French vowel system, not confined to specific word positions as in Leblango.

A further contrast lies in morphological productivity. In Leblango, the oral–nasal contrast may neutralize when the underlying /ŋ/ resurfaces, as in singular /lã̃/ ‘Lango’ versus plural /laŋɲi/. This shows that the process is still synchronically active. In French, by contrast, oral-nasal alternations such as *bon* /bõ/ versus *bonne* /bɔn/ are historically conditioned but synchronically frozen (Fagyal et al., 2006).

Additionally, Leblango and French display opposite distributional tendencies. In Leblango, nasal vowels must be followed by another vowel or a pause and cannot precede a nasal consonant,

as in *kong i bin* ‘please come’ realized as /kɔ̃.bɪn/. In French, nasal vowels cannot precede another vowel. When another vowel follows, the nasal consonant reappears and the vowel is typically oralized, e.g. *bon* /bɔ̃/ versus *bonne* /bɔn/, *un* /œ̃/ versus *une* /yn/. However, in such cases, the vowel in *bonne* or *une* is not entirely oral; the velum begins to lower in anticipation of the upcoming nasal consonant, resulting in partial or coarticulatory nasalization (Delvaux et al., 2002; Hajek, 1997). This distinction highlights that in Leblango, nasality is a stable phonemic property of the vowel itself (as in /ɔ̃/), whereas in French sequences such as /ɔn/, nasality is a transient coarticulatory effect occurring in the transition from an oral vowel to a nasal consonant.

A further area of divergence concerns diphthongization. The data from this study confirm that Leblango permits vowels to glide into adjacent vowels, producing diphthongal sequences such as *lao* /laɔ/ ‘saliva’ and *meicel* /meicɛl/ ‘completely’. This finding is consistent with prior descriptions, such as Noonan (1992), who documents similar phenomena (as in *ka en* ‘if he’ realized as /kaɛn/). In sharp contrast, French vowels are categorically monophthongal and resist such glide formation (Metz, 2014).

Together, these contrasts demonstrate that while both languages underwent phonologization of nasal vowels through consonant loss, Leblango’s system remains restricted, harmony-driven, and morphologically productive, whereas the French’s system is unrestricted, segmentalized, and lexically fixed. This aligns with Maddieson’s (1984) typological observation that nasalization pathways diverge into either restricted harmony systems (as in many African languages) or unrestricted phonemic contrasts (as in Romance).

4.3 Conclusion

This chapter has presented, analyzed, and discussed the findings on the similarities and differences between the vowel systems of Leblango and French. The analysis focused on vowel

height categories, vowel nasality, and distributional restrictions. The findings revealed that the two languages share a number of oral vowels, nasal vowels, and distributional patterns. In addition, the study identified areas of divergence, particularly in oral vowels, nasal vowels, and distributional restrictions. The next chapter deals with the implications of the above similarities and differences for the pronunciation of French vowels by L1 Leblango speakers of French.

Chapter Five

Implications of the Similarities and Differences between the Vowels of Leblango and

French for the Pronunciation of French by L1 Leblango Speakers

5.0 Introduction

This chapter presents, analyzes, and discusses the findings of the study regarding the pronunciation of French vowels by native speakers of Leblango. It specifically addresses the implications of the similarities and differences between the vowel systems of Leblango and French, analyzed through the theoretical lens of the Contrastive Analysis Hypothesis (Lado, 1957). The chapter provides an analysis of the target-like pronunciations and the deviant pronunciations produced by the respondents, which are accounted for by the phonological overlap and divergence between the two languages. The discussion is structured to first examine the facilitating implications of similarities (Section 5.1) and then to explore the challenges arising from differences (Section 5.2).

5.1 Implications of the Similarities between the Vowels of Leblango and French for the Pronunciation of French by L1 Leblango Speakers

The first component of the third objective was to examine the implications of the similarities between the vowel systems of Leblango and French for the pronunciation of French vowels by native speakers of Leblango. Data from reading and conversational tasks were analyzed to identify patterns in vowel production accuracy. Given the significant overlap between the Leblango and French vowel inventories (Table 16), it was hypothesized that speakers would demonstrate a high degree of accuracy for shared vowel phonemes.

Table 16

Native-like Pronunciation of French Oral Vowels by L1 Leblango Speakers of French

Sn	Target vowel	French word	Near-native realization	Deviant pronunciation
1	/ɑ/	pas /pɑ/ ‘not’	20 (100%)	0 (0%)
2	/a/	ami /ami/ ‘friend’	20 (100%)	0 (0%)
3	/e/	les /le/ ‘the’	20 (100%)	0 (0%)
4	/ɛ/	mais /mɛ/ ‘but’	20 (100%)	0 (0%)
5	/i/	si /si/ ‘if’	20 (100%)	0 (0%)
6	/ɔ/	porte /pɔrt/ ‘door’	20 (100%)	0 (0%)
7	/o/	beau /bo/ ‘nice’	20 (100%)	0 (0%)
8	/u/	tout /tu/ ‘all’	20 (100%)	0 (0%)
9	/ə/	le /lə/ ‘the’	20 (100%)	0 (0%)

Source. Primary data

As shown in Table 16, the participants produced all French oral vowels with near-native accuracy. This outcome reflects substantial phonological overlap, as Leblango possesses phonemes acoustically and articulatorily equivalent to French /a, e, ɛ, i, ɔ, o, u, ə/. This aligns with Lado’s (1957) Contrastive Analysis Hypothesis, which posits that shared linguistic features facilitate learning.

This acoustic convergence is shown in Figure 17, which compares the French vowel /a/ in *la* ‘the’ produced by a native French speaker and an L1 Leblango speaker. Their acoustic values are nearly identical (French: F1 = 747 Hz, F2 = 1468 Hz; Leblango: F1 = 764 Hz, F2 = 1484 Hz), which indicates that both speakers realize /a/ as a low central vowel with highly comparable articulatory settings.

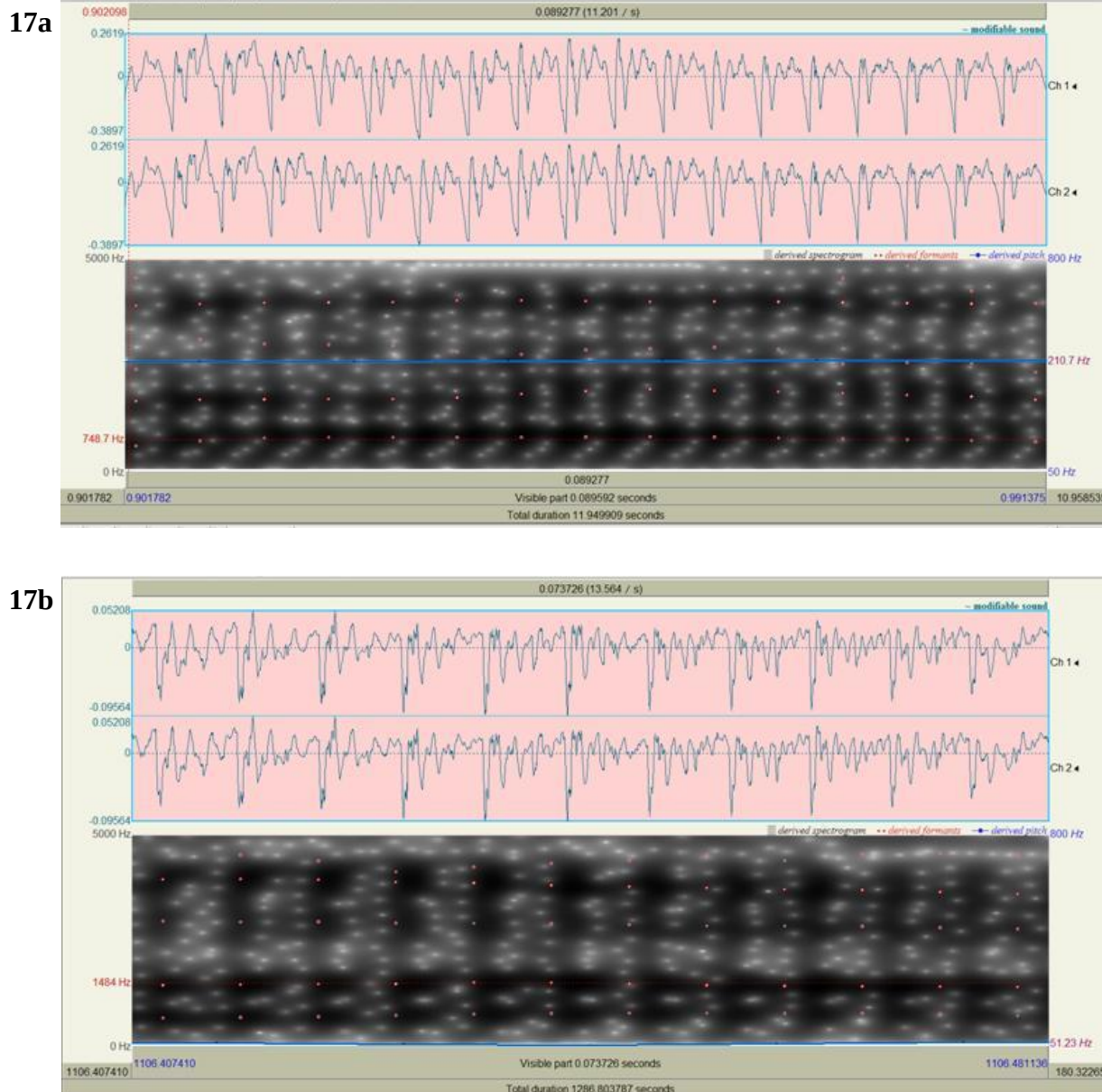


Figure 17. Spectrograms of French /a/ in *la* by Native Speakers of French and L1 Leblango Speakers of French

Source. Primary data

The accurate production of French /a/, which is not a distinct phoneme in Leblango, can be explained by its functional merger with /a/ in the speakers' interlanguage. That is, speakers used the single Leblango category /a/ to approximate both French vowels, resulting in functionally accurate but non-contrastive productions. This outcome is predicted by Best's (1995) Perceptual

Assimilation Model (PAM), which holds that when two L2 sounds are assimilated to one L1 category, speakers achieve near-target productions without preserving contrast.

Having examined the oral vowels, the analysis next turns to French nasal vowels, which show a similarly high degree of accuracy among L1 Leblango speakers. The results are summarized in Table 17.

Table 17

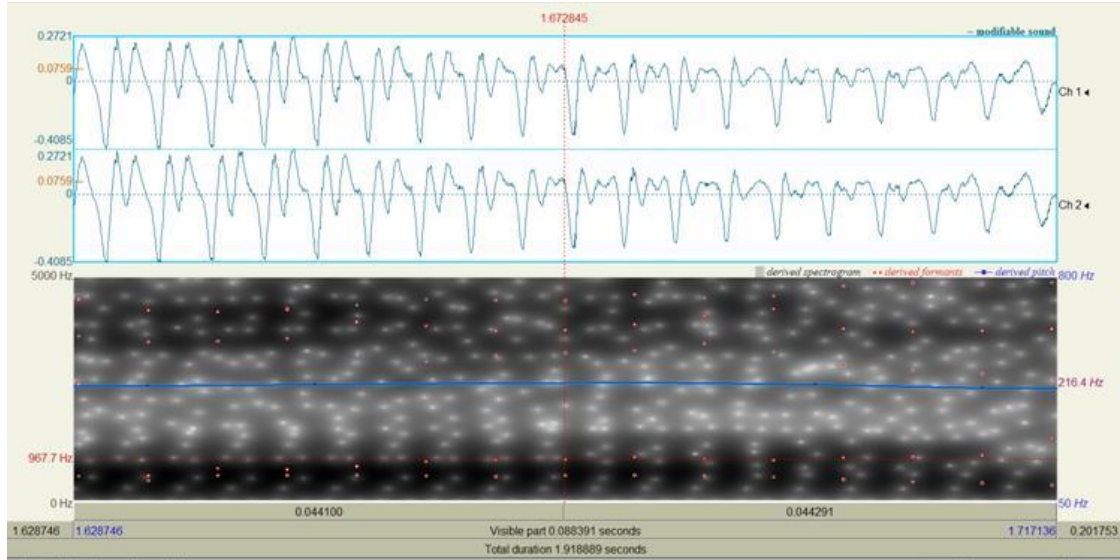
Native-like Pronunciation of French Nasal Vowels by L1 Leblango Speakers of French

Sn	Target vowel	French word	Near-native realization	Deviant pronunciation
1	/ã/	sans /sã/ ‘without’	17 (85%)	3 (15%)
2	/ɛ̃/	pain /pɛ̃/ ‘bread’	17 (85%)	3 (15%)
3	/œ̃/	un /œ̃/ ‘one’	14 (70%)	6 (30%)
4	/ɔ̃/	bon /bɔ̃/ ‘good’	20 (100%)	0 (0%)

Source. Primary data

The results for nasal vowels, presented in Table 17, further illustrate the role of phonological similarity. The accuracy for /ɔ̃/ is a clear case of positive transfer, as this phoneme exists in Leblango. This successful transfer could be said to be strongly facilitated by the direct acoustic similarity between the categories. As established earlier, the /ɔ̃/ in Leblango *bongo* and French *bon* have comparable formant structures as the spectrographic evidence in Figure 18a and b confirms.

18a



18b

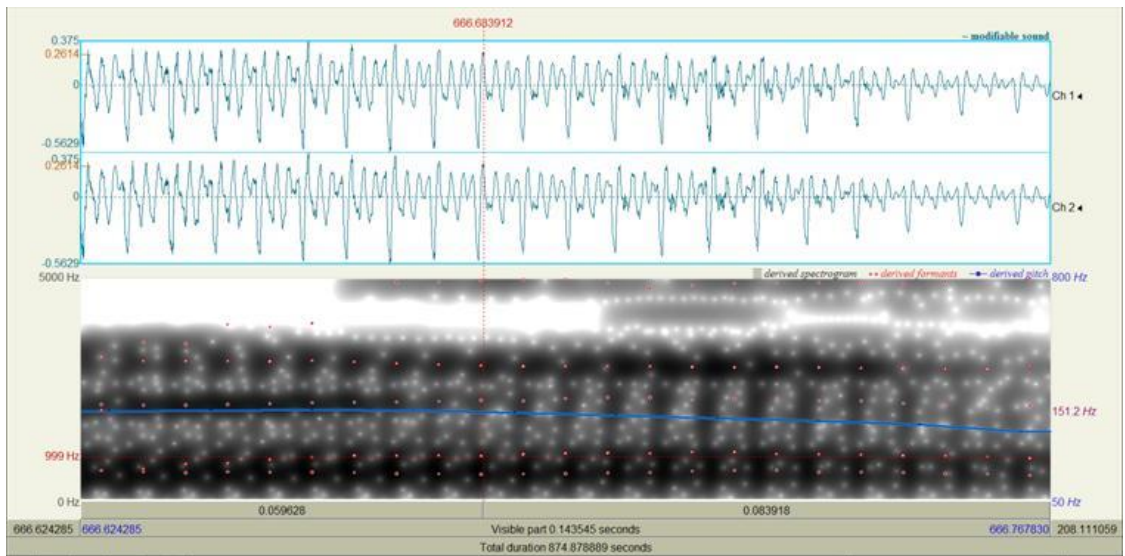


Figure 18. Spectrograms of French /ʒ/ in *bon* by Native Speakers of French and L1 Leblango Speakers of French

Source. Primary data

The numerical formant values extracted from these spectrograms provide concrete evidence for this acoustic overlap. The native French speaker produced /ʒ/ with an F1 of 560 Hz and an F2 of 967 Hz, while the L1 Leblango speaker produced it with an F1 of 576 Hz and an F2 of 999 Hz. The minimal difference, only 16 Hz in F1 and 32 Hz in F2, is acoustically negligible and falls well within the range of native-speaker variation. This near-identical formant pattern,

visually apparent in the spectrograms' similar energy concentrations, means the two language communities produce the same vowel with the same articulatory and auditory-perceptual targets. According to Beddor (1993) and Stevens (1998), such a close match suggests that the core auditory-perceptual properties of the /ɔ̃/ vowel are realized similarly in both languages, which fosters positive transfer.

However, the less consistent accuracy for /ɛ̃/ could be partly explained by the influence of non-native teacher models, as many French teachers in the Lango sub-region are from the Democratic Republic of Congo, where regional varieties affect the realization of this vowel (MEPSP, 2014). Greater difficulty with /œ̃/ and /ɑ̃/ can be attributed to the absence of direct counterparts in Leblango, which requires speakers to establish new phonological categories, a process the Speech Learning Model (Flege, 1995) predicts to be more difficult.

In summary, the findings demonstrate that structural similarities between the vowel inventories of Leblango and French provide a strong foundation for accurate pronunciation, promoting positive transfer and potentially reducing learning difficulty. This confirms core predictions of cross-linguistic speech learning models (Best, 1995; Flege, 1995). The results show that, while shared categories facilitate pronunciation, the establishment of new categories presents a greater challenge, and even similar sounds may be subject to interference from various sources.

5.2 Implications of the Differences between the Vowels of Leblango and French for the Pronunciation of French Vowels by L1 Leblango Speakers

The second component of this study's third objective was to examine the implications of phonological differences between the Leblango and French vowel systems. Data from reading tasks and conversational modules were analyzed to identify patterns of deviant pronunciation. While similarities between the systems facilitated pronunciation (as shown in Section 5.1), specific

divergences posed significant and predictable challenges. These challenges, stemming from the absence of certain French vowel categories and differing phonotactic patterns in Leblango, are shown in Table 18.

Table 18

Deviant Pronunciation of French Vowels with No Leblango Equivalent

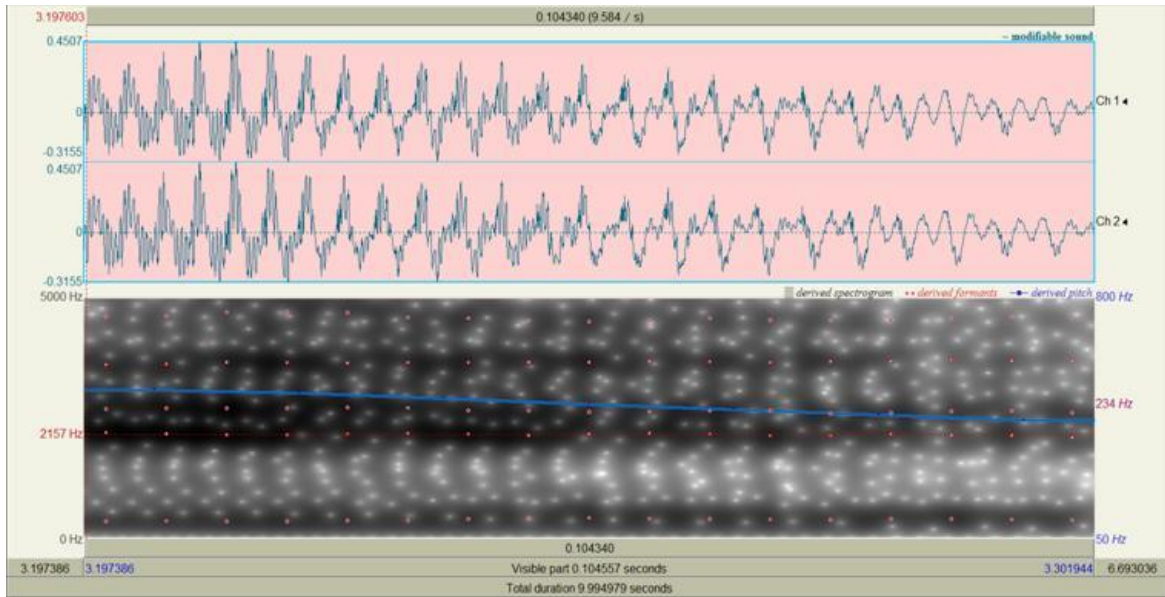
Sn	French Vowel & Word	Standard French Pronunciation	Leblango Pronunciation	Frequency (N=20)
1	/y/ tu	/ty/	/tu/ or /ti/	18 (90%)
2	/ø/ feu	/fø/	/fo/	17 (85%)
3	/œ/ soeur	/sœʁ/	/sɔʁ/	16 (80%)
4	/œ̃/ un	/œ̃/	/ã/	14 (70%)

Source. Primary data

The results show that where French vowels lack direct counterparts in Leblango, participants systematically approximated them using the closest L1 category, a phenomenon widely reported in cross-linguistic studies (Wrembel et al., 2019; Knight, 2013; Flege, 1995). The primary challenges stemmed from the absence of specific French vowel categories in the Leblango inventory and the consequent difficulty in establishing new phonological representations.

For instance, the French front rounded vowels /y/, /ø/, and /œ/ do not exist in Leblango. This gap resulted in consistent substitutions. The word *tu* /ty/ ‘you’ was realized as /tu/ or /ti/ by 18 respondents (90%), replacing the close front rounded vowel /y/ with the close back rounded vowel /u/ or the close front unrounded vowel /i/. Figure 19 provides the acoustic comparison.

19a



19b

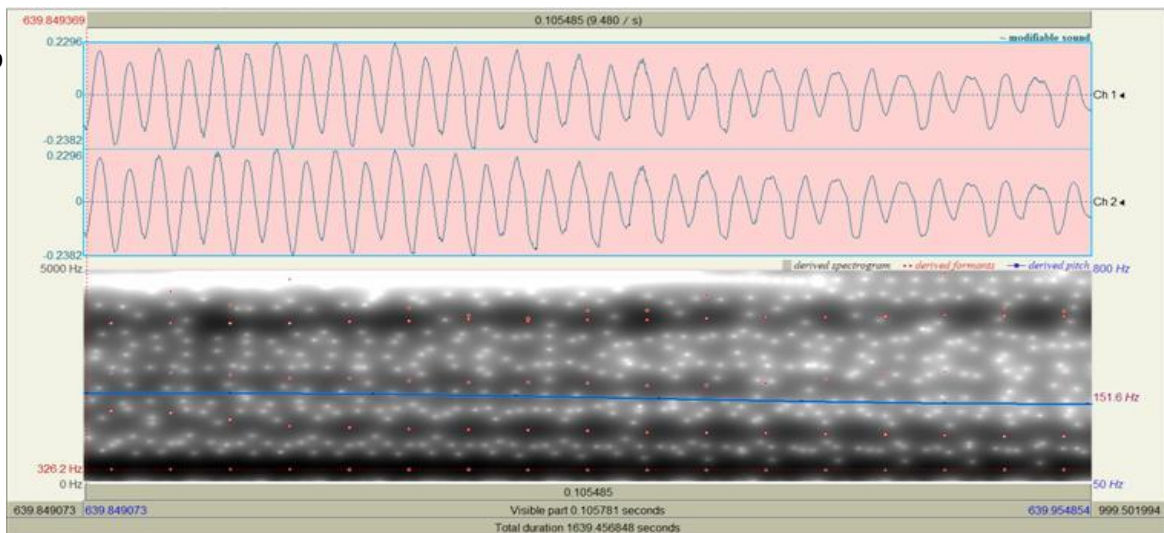


Figure 19. Acoustic Comparison of French /y/ in *tu* by Native Speakers of French and L1 Leblango Speakers of French

Source. Primary data

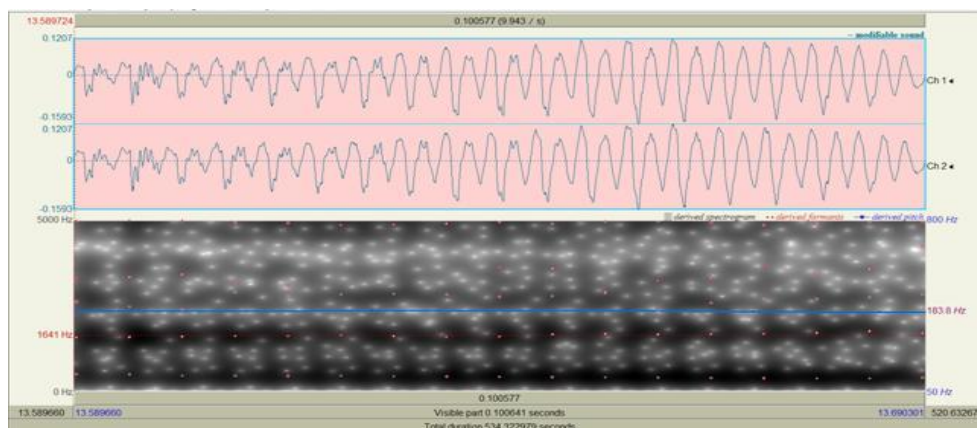
An acoustic comparison confirms the nature of this substitution. The native French production in Figure 19a shows F1 and F2 values ($F1 \approx 326$ Hz, $F2 \approx 2157$ Hz) that fall within the established range for a canonical close front rounded vowel /y/ in French (cf. Gendrot & Adda-Decker, 2007). In contrast, the L1 Leblango speaker of French's production in Figure 19b shows a substantial lowering of F2 to 1109 Hz, which is acoustically characteristic of the close back

rounded vowel /u/. The fact that F1 remains identical (326 Hz) in both productions highlights that the primary articulatory shift was in backness, not height.

Similarly, *feu* /fø/ ‘fire’ was realized as /fo/ by 17 respondents (85%), substituting the open-mid back rounded vowel /ɔ/ (or /o/ in Leblango) for the target /ø/. Likewise, *sœur* /sœʁ/ ‘sister’ was produced as /sɔʁ/ by 16 participants (80%), indicating a shift toward a familiar back vowel.

The nasal vowel /œ̃/, also absent from the Leblango system, posed comparable challenges. In the word *un* /œ̃/ ‘one’, 14 respondents (70%) produced /ã/, assimilating it to the closest existing nasal vowel in their L1. Figure 20 provides an acoustic comparison that reveals the multi-dimensional nature of this substitution.

20a



20b

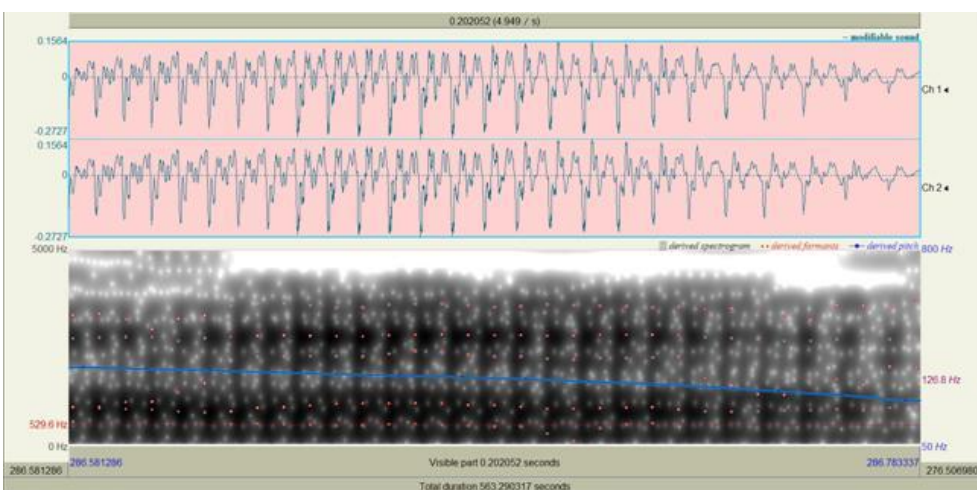


Figure 20. Acoustic Comparison of French /œ̃/ in *un* by Native Speakers of French and L1 Leblango Speakers of French

Source. Primary data

An acoustic comparison of the productions, detailed in Figure 20, confirms the nature of this substitution. The native French production of /œ̃/ (Figure 20a) shows a formant structure typical of a front nasal vowel, with a low F1 (435 Hz) indicating mid height and a high F2 (1641 Hz) confirming frontness. These values are consistent with reported values for French nasal vowels (cf. Delvaux, 2009). In contrast, the L1 Leblango realization (Figure 20b) shows a shift toward a low, central-back vowel, where a higher F1 (529 Hz) signals a lower tongue position, while a much lower F2 (1093 Hz) indicates significant tongue retraction. This displacement in acoustic space demonstrates that speakers assimilated the unfamiliar French nasal category to the nearest nasal vowel in their L1 inventory, the low-central /ã/.

Such substitutions align with the Contrastive Analysis Hypothesis, as well as with Best's (1995) Perceptual Assimilation Model, which holds that unfamiliar L2 categories are assimilated into the nearest L1 category, and with Flege's (1995) Speech Learning Model, which predicts that entirely new categories are more difficult to establish than overlapping ones.

Mispronunciations based on diphthong influence were also observed, especially in conversational modules. As noted by Noonan (1992), Leblango permits diphthongs, and this study found a clear transfer of this tendency. Some French monophthongs were often realized as diphthongs, including *maison* /mɛzɔ̃/ 'house' as /mɛizɔ̃/, *vraiment* /vrɛmɑ̃/ 'really' as /vrɛimɑ̃/, and *j'ai* /zɛ/ 'I have' as /zɛi/ (see Figure 21).

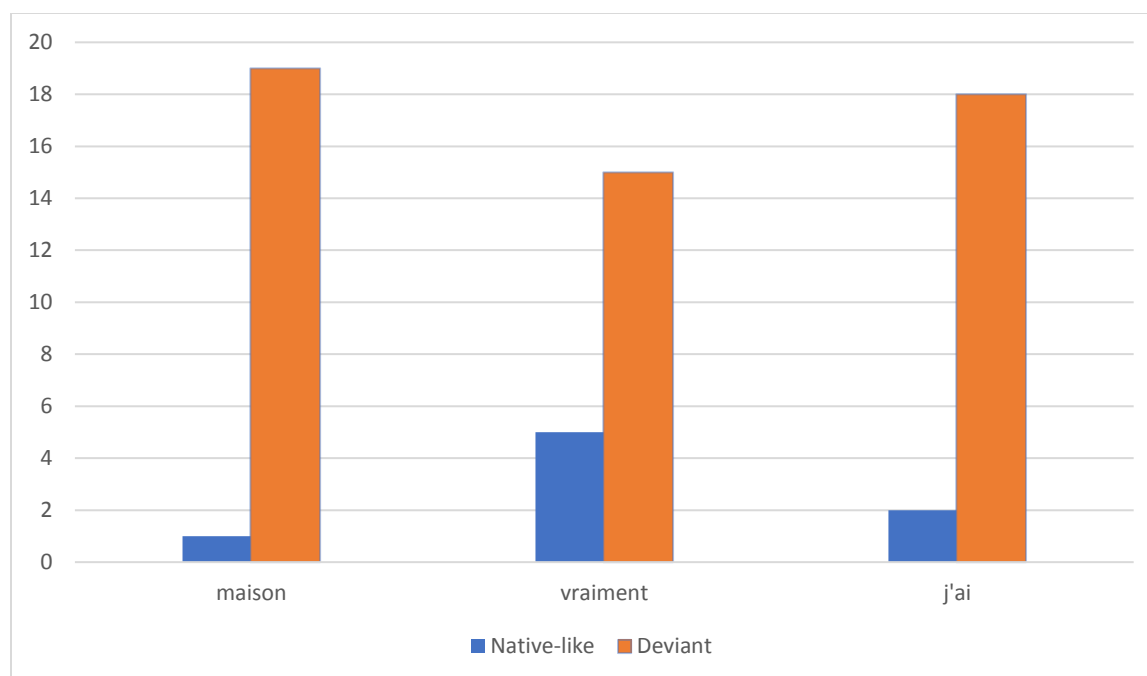


Figure 21. Diphthongized French Words by L1 Leblango Speakers

Source. Primary data

Such diphthongization illustrates how speakers may project native phonemic patterns onto French, aligning with Lado's (1957) transfer theory. These findings show that in addition to categorical substitution, L1 influence shapes the phonetic detail of L3 production, affecting both monophthongs and diphthongs.

In summary, the absence of front rounded vowels and certain nasal vowels in Leblango, along with diphthongization tendencies in Leblango, lead to systematic deviations in the pronunciation of French by L1 Leblango speakers. These deviations highlight the influence of structural gaps, perceptual assimilation, and transfer from L1 phonemic system, which underscore the challenges speakers face when pronouncing vowel categories with no clear L1 equivalent.

5.3 Conclusion

This chapter presented and discussed the implications of the similarities and differences between the vowels of Leblango and French for the pronunciation of French by L1 Leblango

speakers. With reference to objective (3), which had two components, it was shown that shared vowel features facilitated pronunciation, while divergent features complicated it, in line with the predictions of Lado's (1957) contrastive analysis hypothesis. The findings revealed that Leblango exerts a clear influence on the pronunciation of French in the region. However, it was also observed that some L1 Leblango speakers of French were able to produce near-native realizations of certain vowels, a result that may be attributed to exposure to exonormative models of French pronunciation. Such outcomes were more evident in reading tasks than in conversational modules, where spontaneous speech tended to reveal stronger L1 influence.

Chapter Six

Summary, Conclusions and Recommendations

6.0 Introduction

This study investigated the similarities and differences between the vowel systems of Leblango and French, with a view to examining the implications of these similarities and differences for the pronunciation of French by L1 Leblango speakers. The preceding chapters presented the results and discussion of these aspects. This chapter provides a summary of the findings, draws conclusions, outlines recommendations, and suggests areas for further research.

6.1 Summary

The first and second objectives of the study were to establish the similarities and differences between the vowel systems of Leblango and French. Data collected from respondents in the Lango sub-region, alongside evidence from the French spoken corpus, revealed that the two languages share several vowel categories but also diverge in significant ways.

With respect to similarities, Leblango and French share oral vowels such as /a, e, ε, i, o, ɔ, u, ə/, as well as the nasal vowels /ĩ/ and /ẽ/. Regarding differences, French includes vowel categories absent in Leblango, such as the front rounded vowels /y, ø, œ/ and the nasal vowel /œ̃/.

The third objective examined the implications of these similarities and differences for the pronunciation of French by L1 Leblango speakers. It was found that similarities could be said to have promoted near-native pronunciations and positive transfer, while differences could be said to have created systematic deviations. Specifically, front rounded vowels and certain nasal vowels posed the greatest challenges. Moreover, diphthongization was observed in the realization of some French monophthongs, reflecting the influence of Leblango phonemic structure.

6.2 Conclusions

6.2.1 General Conclusions

This study compared the vowel systems of Leblango and French and examined the implications for the pronunciation of French vowels by L1 Leblango speakers. The findings confirm that Leblango and French share a number of vowel categories, but also differ in crucial respects. This aligns with the Universal Grammar perspective (Chomsky & Halle, 1968; White, 2003), which posits that while languages share certain universal principles, they also vary parametrically.

Similarities were observed in several oral vowels and in two nasal vowels, which could be said to have facilitated accurate or near-native pronunciation. However, differences, particularly the absence of front rounded vowels and variations in nasal vowel nasality, could be said to have led to systematic substitutions, consistent with predictions of Best's (1995) Perceptual Assimilation Model and Flege's (1995) Speech Learning Model. Furthermore, the transfer of diphthongization tendencies highlighted the influence of L1 phonemic structure, as captured by Lado's (1957) contrastive analysis framework.

While L1 influence was evident in many cases of deviant pronunciation, the study also revealed that some Leblango speakers were able to produce near-native realizations of difficult French vowels. This was more pronounced in reading tasks than in conversational modules. This discrepancy can be attributed to the difference between monitored and spontaneous speech. During reading tasks, learners benefit from visual orthographic cues and greater processing time, which allows for more careful, monitored articulation that can temporarily override L1 habits (Segalowitz & Hulstijn, 2005). In contrast, the spontaneity and cognitive demands of conversation, such as formulating meaning, managing turn-taking, and monitoring the listener's comprehension, often

lead to a reliance on more automatized L1 phonological patterns, which results in stronger L1 transfer (Kormos, 2006). This suggests that the Leblango speakers' more accurate vowel realizations in reading contexts may reflect attention to form, while the increased deviations in conversation likely represent default, L1-governed production patterns that emerge under reduced cognitive monitoring.

This study constitutes a significant milestone in the field of phonology and cross-linguistic speech research by providing the first systematic acoustic and phonological analysis of L3 French vowel pronunciation by native speakers of Leblango, a critically under-documented Nilotic language. By integrating the Contrastive Analysis Hypothesis with Autosegmental Phonology, the study demonstrates how theoretical synthesis can offer a more comprehensive explanation of vowel correspondence, transfer, and deviation. Moreover, the identification of nasal vowel diphthongization and conditioned nasal spreading in Leblango contributes new empirical evidence to the understanding of nasality in contact situations. Finally, this study establishes a methodological model for researching under-documented African languages by demonstrating how acoustic analysis can be used to test and validate phonological theories. Collectively, these innovations mark the study as a milestone in documenting and interpreting vowel interaction across genetically and typologically distinct languages.

6.2.2 Limitations and Outlook

Although this study successfully described and compared the vowel systems of Leblango and French and examined their implications for L3 French pronunciation among L1 Leblango speakers, several limitations merit consideration.

The sample comprised 20 native Leblango speakers. While purposive sampling ensured participants with the required linguistic background (Etikan, Musa & Alkassim, 2016), the

relatively small sample size may limit the generalizability of the findings (Creswell, 2014). Future research could therefore include larger and more diverse participant groups.

The study's design did not control for the potential influence of the participants' L2 (English), leaving open the question of whether certain pronunciations resulted from complex L1–L2–L3 interactions. Future research could therefore adopt a multi-layered design that isolates and compares the relative contributions of each linguistic system in order to offer a clearer understanding of how multilingual phonological transfer operates among Leblango–English–French speakers.

A further consideration concerns the influence of non-native French teachers. As noted earlier, many instructors in the Lango sub-region are from the Democratic Republic of Congo, where regional French varieties differ in vowel realization (MEPSP, 2014). Although this study did not measure their direct impact, exposure to non-standard models may have influenced learners' production of vowels such as /ɛ̃/ and /œ̃/. Future investigations could compare learners taught by L1 Leblango instructors with those taught by Congolese teachers to clarify how input variation mediates phonological transfer and interlanguage development.

Notwithstanding its limitations, this study establishes a crucial foundation for understanding cross-linguistic vowel relationships in L1 Leblango–L3 French contexts. To build upon this foundation, future research should pursue the longitudinal and intervention-based designs advocated by Flege (1995) to track phonological development over time. Further directions include targeted pronunciation training and dialect-sensitive analyses within Leblango communities, aligning with the broader imperative for contextually rich phonetic research (Beddor, 1993; Munro, 2022)

6.3 Recommendations

Based on the findings of this study, the following recommendations are made:

1. For teachers of French in the Lango sub-region: Teachers should be sensitized to the specific vowel challenges faced by Leblango speakers, particularly front rounded vowels and nasal vowels absent in Leblango. Focused drills and visual–acoustic aids can help learners establish new phonological categories.
2. For curriculum developers: Greater emphasis should be placed on the teaching of vowel contrasts that are absent in Leblango. Instructional materials should integrate minimal pair training and acoustic feedback tools to enhance learner accuracy.
3. For learners: Leblango learners of French should be encouraged to use resources such as audio dictionaries, pronunciation software, and authentic French media to improve exposure to native vowel realizations.
4. For educational policy: School syllabi in the Lango sub-region should highlight phonetics and phonology components, ensuring that learners receive systematic training in pronunciation alongside vocabulary and grammar.
5. At the same time, educators should adopt a balanced approach, recognizing that intelligibility is the primary goal. Non-native pronunciations that do not impede communication should not be stigmatized, even as learners are encouraged toward more target-like productions.

6.4 Areas for Further Research

The study opens up several avenues for further research:

1. A comparative acoustic study of Leblango and French vowels, focusing on formant measurements, to better capture the degrees of overlap and divergence.

2. An investigation of the role of teacher models, particularly the influence of Congolese French varieties, on the pronunciation of French in the Lango sub-region.
3. A study of prosodic features (intonation, stress, rhythm) in the French spoken by L1 Leblango speakers, to assess how suprasegmental transfer interacts with vowel production.
4. Longitudinal research on L1 Leblango learners of French to examine how vowel accuracy develops with increased exposure and instruction.

References

- Adomako, K. (2015). Final-Nasal Deletion in Akan (Asante Twi) Reduplication. *The Buckingham Journal of Language and Linguistics*, 1, DOI: [10.5750/bjll.v1i0.594](https://doi.org/10.5750/bjll.v1i0.594).
- Akankwatsa, P. (2022, July 13). France outlines new plans to elevate Ugandan French language education programs. *The Independent*. <https://www.independent.co.ug/france-outlines-new-plans-to-elevate-ugandan-french-language-education-programs>.
- Alliance Française de Kampala. (2024). French Language Programs. <https://afkampala.org>.
- Anderson, C., Bjorkman, B., Denis, D., Doner, J., Grant, M., Sanders, N., & Taniguchi, A. (2022). *Essentials of linguistics* (2nd ed.). Ontario, Canada: eCampus Ontario, Hamilton.
- Ara, A. (2021). Contrastive analysis and its implications for Bengali learners of ESL. *Shanlax International Journal of Education*, 9(3). <https://doi.org/10.34293/education.v9i3.3827>
- Atóyèbí, J. D. (2009). On nasals and nasalization in Òkò. In A. Ojo & L. Moshi (Eds.), *Selected proceedings of the 39th Annual Conference on African Linguistics* (pp. 131–136). Somerville, MA: Cascadilla Proceedings Project.
- Bardel, C., & Falk, Y. (2020). L1, L2, and L3: Same or different? *Second Language Research*, 36(1), 1–6. <https://doi.org/10.1177/0267658320941033>
- Barkov, M., Santiago, F., & Peralta, T. (2022). Production of vowel reduction by Mexican learners of English as L2 and Russian as L3. *Canadian Journal of Linguistics / Revue canadienne de linguistique*, 67(1–2), 88–117. <https://doi.org/10.1017/cnj.2022.6>
- Barnard, D. (2022, November 8). Average speaking rate and words per minute. VirtualSpeech. Retrieved from <https://virtualspeech.com/blog/average-speaking-rate-words-per-minute>

- Bavin, E. L. (1982). Aspects of morphological and syntactic divergence in Lango and Acholi. *Studies in African Linguistics*, 13(3), 215–235. Retrieved from Academia.edu
- Beckman, M. E. (1986). Stress and non-stress accent in Japanese. In D. L. Goyvaerts (Ed.), *Phonology in the 1980s* (pp. 443–456). Ghent: Story-Scientia.
- Bender, E. M. (2020). Linguistic Fundamentals for Natural Language Processing II: 100 Essentials from Semantics and Pragmatics. *Synthesis Lectures on Human Language Technologies*. <https://aclanthology.org/J15-1007.pdf>
- Best, C. T. (1995). A direct realist view of cross-language speech perception. In W. Strange (Ed.), *Speech perception and linguistic experience: Theoretical and methodological issues* (pp. 171–204). York Press.
- Best, C. T., & Tyler, M. D. (2007). Nonnative and second-language speech perception: Commonalities and complementarities. In O.-S. Bohn & M. J. Munro (Eds.), *Language experience in second language speech learning: In honor of James Emil Flege* (pp. 13–34). John Benjamins Publishing Company.
- Best, J. W., & Kahn, J. V. (2014). *Research in education* (10th ed.). Pearson.
- Blume, M., & Lust, B. C. (2017). Research methods in language acquisition: Principles, procedures, and practices. Retrieved from <http://dx.doi.org/10.1037/15968-001>.
- Boersma, P., & Weenink, D. (2001). PRAAT, a system for doing phonetics by computer. *Glott International*, 5(9/10), 341–345. Retrieved from https://www.researchgate.net/publication/208032992_PRAAT_a_system_for_doing_phonetics_by_computer

- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- British Educational Research Association. (2018). *Ethical guidelines for educational research* (4th ed.). Retrieved from BERA website.
- Byrd, D. (1994). Relations of sex and dialect to reduction. *Speech Communication*, 15(1–2), 39–54. Retrieved from https://www.researchgate.net/profile/Dani-Byrd/publication/223835917_Relations_of_sex_and_dialect_to_reduction/links/64ff8bc625ee6b7564e14ba8/Relations-of-sex-and-dialect-to-reduction.pdf
- Cabrelli, J., & Pichan, C. (2019). Initial phonological transfer in L3 Brazilian Portuguese and Italian. *University of Illinois Chicago*. <https://doi.org/10.25417/uic.16746178.v1>
- Cho, J., & Park, H.-K. (2006). A comparative analysis of Korean-English phonological structures and processes for pronunciation pedagogy in interpretation training. *Meta: Journal des traducteurs*, 51(2), 264–284 <https://doi.org/10.7202/013253ar>
- Chomsky, N., & Halle, M. (1968). *The sound pattern of English*. New York, USA: Harper & Row.
- Clements, G. N., & Hume, E. V. (1995). The internal organization of speech sounds. In J. Goldsmith (Ed.), *The handbook of phonological theory* (pp. 245-306). Oxford, UK: Blackwell.
- Clements, G. N., & Rialland, A. (2005). Africa as a phonological area. In B. Heine & D. Nurse (Eds.), *A linguistic geography of Africa* (pp. 36–85). Cambridge University Press.
- Clements, G. N., & Sezer, E. (1982). Vowel and consonant disharmony in Turkish. In H. van der Hulst & N. Smith (Eds.), *The structure of phonological representations* (pp. 213–255).

Foris.

<https://brucehayes.org/251VowelHarmony/Readings/ClementsSezer1982TurkishVowelHarmony.pdf>

Clumeck, H. (1976). Patterns of soft palate movements in six languages. *Journal of Phonetics*, 4(4), 337–351. [https://doi.org/10.1016/S0095-4470\(19\)31248-3](https://doi.org/10.1016/S0095-4470(19)31248-3)

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6th ed.). London, United Kingdom: Routledge.

Cohn, A. C. (1990). Phonetic and phonological rules of nasalization. *Phonology*, 7(2), 275-291.
Retrieved from https://escholarship.org/content/qt1xq3d5hr/qt1xq3d5hr_noSplash_f397562624ffd826fd14e62143b7cfba.pdf.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Thousand Oaks, CA: SAGE Publications, Inc.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks, CA: Sage.

Creswell, J. W., & Clark, P. V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Thousand Oaks, CA: Sage.

Crosswhite, K. (2001). *Vowel reduction in Optimality Theory*. New York, NY: Routledge.

Crothers, J. (1978). Typology and universals of vowel systems. In J. H. Greenberg (Ed.), *Universals of human language: Volume 2, Phonology* (pp. 93–152). Stanford, CA: Stanford University Press.

- De Angelis, G. (2007). *Third or additional language acquisition*. Clevedon, England: Multilingual Matters.
- Delahunty, G. P., & Garvey, J. (2010). *The English language: From sound to sense*. The WAC Clearinghouse.
- Delvaux, V., Metens, T., & Soquet, A. (2002). French nasal vowels: Acoustic and articulatory properties. *Proceedings of the 7th International Conference on Spoken Language Processing (ICSLP 2002)*. Retrieved from https://www.isca-archive.org/icslp_2002/delvaux02_icslp.pdf
- Dennis, N. (2023). A Brief History of the French Language. Retrieved from <https://www.newsdle.com/blog/a-brief-history-of-the-french-language>.
- DeVellis, R. F. (2017). *Scale development: Theory and applications* (4th ed.). Thousand Oaks, CA: Sage.
- Dincă, V. M., Bogdan, A., Zottu-Z., M., & Floricel, T. (2018). The economic impact of the French language. In *Proceedings of the 12th International Conference on Business Excellence* (pp. 324–334). De Gruyter.
- Dowd, E. A. (2005). Les Voyelles Nasales en Français: Histoire, Variation Régionale, et Pédagogie (Master's thesis, University of Georgia). Retrieved from https://getd.libs.uga.edu/pdfs/dowd_emily_a_200205_ma.pdf.
- Driberg, J. H. (1923). *The Lango: A Nilotic tribe of Uganda*. Macmillan.
- Eberhard, D. M., Simons, G. F., & Fennig, C. D. (2024). Ethnologue: Languages of the world. SIL International. Retrieved from <https://www.ethnologue.com>.

- Escudero, P., & Boersma, P. (2003). Bridging the gap between L2 speech perception research and phonological theory. *Studies in Second Language Acquisition*, 26(4), 551–585.
Retrieved from <https://www.fon.hum.uva.nl/paul/p2/papers/BridgingTheL2Gap3.pdf>
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1–4.
- Everett, D. L. (1982). Phonetic rarities in Pirahã. *Journal of the International Phonetic Association*, 12(2), 94–96.
https://www.researchgate.net/publication/231983905_Phonetic_rarities_in_Piraha
- Everitt, B. S., & Skrondal, A. (2010). *The Cambridge dictionary of statistics* (4th ed.). Cambridge University Press.
- Fagyal, Z., Kibbee, D., & Jenkins, F. (2006). *French: A linguistic introduction*. Cambridge, UK: Cambridge University Press.
- Feldman, A. (1999). The role of conversation in collaborative action research. *Educational Action Research*, 7(1), 125–147. <https://doi.org/10.1080/09650799900200076>
- Flege, J. E. (1995). Second-language speech learning: Theory, findings, and problems. In W. Strange (Ed.), *Speech perception and linguistic experience: Issues in cross-language research* (pp. 233–277). York Press.
- Flege, J. E., Schirru, C., & MacKay, I. R. A. (2003). Interaction between the native and second-language phonetic subsystems. *Journal of Phonetics*, 31(2), 99–121.

- Flege, J. E., Bohn, O.-S., & Jang, S. (1997). Effects of experience on non-native speakers' production and perception of English vowels. *Journal of Phonetics*, 25(4), 437–470. <https://doi.org/10.1006/jpho.1997.0052>
- Gilley, L. G. (1988). An Autosegmental Approach to Phonological Phenomena in Shilluk (Doctoral dissertation, University of London). ProQuest LLC. Retrieved from <https://eprints.soas.ac.uk/28914/1/10673109.pdf>
- Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The Qualitative Report*, 8(4), 597–607.
- Goldsmith, J. (1976). Autosegmental phonology (PhD dissertation, Massachusetts Institute of Technology, Cambridge, MA, USA). IULC Publications.
- Goldsmith, J. (1990). *Autosegmental and metrical phonology*. Oxford, UK: Basil Blackwell.
- Gorrie, C., (2021). The Complete Guide to Vowel Inventories. *Colin Gorrie* Retrieved from <https://colingorrie.com/articles/vowel-inventories/#:~:text=>
- Hallgren, K. A. (2012). Computing inter-rater reliability for observational data: An overview and tutorial. *Tutorials in Quantitative Methods for Psychology*, 8(1), 23–34. Retrieved from <https://pmc.ncbi.nlm.nih.gov/articles/PMC3402032/>
- Hammarberg, B. (2001). Roles of L1 and L2 in L3 production and acquisition. In J. Cenoz, B. Hufeisen, & U. Jessner (Eds.), *Cross-linguistic influence in third language acquisition: Psycholinguistic perspectives* (pp. 21–41). Multilingual Matters.

- Hammarberg, B. (2018). L3, the tertiary language. In A. Bonnet & P. Siemund (Eds.), *Foreign language education in multilingual classrooms* (pp. 127–150). John Benjamins Publishing Company.
- Hansen, A. B. (2014). La prononciation du français en milieu natif et non-natif: Le cas des voyelles nasales. [The Pronunciation of French in Native and Non-Native Settings: The Case of Nasal Vowels]. *Université Paris Diderot*.
- Hazan, V., & Baker, R. (2011). Acoustic-phonetic characteristics of speech produced with communicative intent to counter adverse listening conditions. *Journal of the Acoustical Society of America*, 130(4), 2139–2152. Retrieved from <https://discovery.ucl.ac.uk/id/eprint/1317084/2/1317084.pdf>
- Heeringa, W., & Van de Velde, H. (2024). Visible vowels as a tool for the study of language transfer. *Languages*, 9(2), 35. <https://doi.org/10.3390/languages9020035>
- Higgins, H. A. (2012). *Ikoma vowel harmony: Phonetics and phonology* (Master's thesis). SIL International, Dallas, TX. <https://doi.org/10.3389/fpsyg.2022.916736>
- Hualde, J. I. (2005). *The sounds of Spanish*. Cambridge University Press.
- Hudu, F. (2023). The vowels of West African languages. *Journal of West African Languages*, 50(Anniversary Volume), 1–18. https://www.researchgate.net/publication/377205279_THE_VOWELS_OF_WEST_AFRICAN_LANGUAGES
- Hyman, L. M. (1995). Nasal consonant harmony at a distance: The case of Yaka. *Studies in African Linguistics*, 24(1), 5–30. <https://doi.org/10.32473/sal.v24i1.107408>

- Hyman, L. M. (2008). Issues in African language phonology. *UC Berkeley Phonology Lab Annual Report*, 2008, 1–20. <https://escholarship.org/uc/item/1808w29w>
- Hyman, L. M. (2013). *Phonology: Theory and analysis*. Cambridge University Press.
- Isingoma, B. (2021). Politeness strategies in Ugandan English: Making requests and responding to thanks. *Brno Studies in English*, 47(1). <https://doi.org/10.5817/BSE2021-1-2>
- Jaworski, S. (2010). Phonetic and phonological vowel reduction in Russian. *Poznań Studies in Contemporary Linguistics*, 46(1), 51–68. <https://doi.org/10.2478/v10010-010-0003-9>
- Jensen, I. N., Mitrofanova, N., & Westergaard, M. (2023). Crosslinguistic influence in L3 acquisition: Evidence from Norwegian-Russian-English trilinguals. *International Journal of Multilingualism*, 20(1), 45. <https://doi.org/10.1080/14790718.2021.1985127>
- Jeong, S. (2012). Directional asymmetry in nasalization: A perceptual account. *Studies in Phonetics, Phonology and Morphology*, 18(3), 437–469. https://sunwooj.github.io/documents/jeong-sppm-2012.pdf?utm_source=chatgpt.com
- Jin, F. (2009). Third language acquisition of Norwegian objects: Interlanguage transfer or L1 influence? In Y.-K. I. Leung (Ed.), *Third language acquisition and universal grammar* (pp. 144–161). Multilingual Matters.
- Johnson, K. (2005). *Acoustic and auditory phonetics* (2nd ed.). Malden, MA: Blackwell.
- Jones, D. (1956). *An outline of English phonetics* (9th ed.). Cambridge, UK: Heffer & Sons.
- Jordan, S.-C. (2015, May 19). How Parisian French became standard. *Alpha Omega Translations*. Retrieved from <https://alphaomegatranslations.com/foreign-language/how-parisian-french-became-standard/>

- Kamiyama, T., & Vaissière, J. (2010). *Perception and production of French close and close-mid rounded vowels by Japanese-speaking learners*. Retrieved from <https://hal.archives-ouvertes.fr/hal-00468169>.
- Kartushina, N., & Frauenfelder, U. H. (2014). On the effects of L2 perception and of individual differences in L1 production on L2 pronunciation. *Frontiers in Psychology*, 5, 1246. <https://doi.org/10.3389/fpsyg.2014.01246>
- Kawahara, S., & Braver, A. (2013). The phonetics of multiple vowel lengthening in Japanese. *Open Journal of Modern Linguistics*, 3(2), 141–148. <https://doi.org/10.4236/ojml.2013.32019>
- Kent, R. D., & Read, C. (2002). *The acoustic analysis of speech* (2nd ed.). Boston, MA: Pearson.
- Knight, K. J. (2013). L1 English vocalic transfer in L2 Japanese (Doctoral dissertation). The University of Georgia. Retrieved from https://getd.libs.uga.edu/pdfs/knight_kenneth_j_201312_phd.pdf
- Knight, R. (2012). *Phonetics: A coursebook*. Cambridge University Press.
- Kopečková, R., Gut, U., Wrembel, M., & Balas, A. (2023). Phonological cross-linguistic influence at the initial stages of L3 acquisition. *Second Language Research*, 39(4), 1107–1131. <https://doi.org/10.1177/02676583221123994>
- Koster, M., & Cutler, A. (1997). Segmental and suprasegmental contributions to spoken-word recognition in Dutch. *Language and Cognitive Processes*, 12(4), 429–461. Retrieved from <https://core.ac.uk/download/pdf/210766019.pdf>

- Kwofie, E. N. (1989). *The acquisition and use of French as a second language in Africa* (Sociolinguistic, historical-comparative and methodological perspectives). Publication H-10. *International Center for Research on Bilingualism*, Laval University. Retrieved from <https://files.eric.ed.gov/fulltext/ED313908.pdf>
- Kyprianou, C., & Graebner, M. E. (2015). Strategic conversations: Methods for data collection and analysis. In *The Routledge companion to qualitative research in organization studies* (pp. 123–140). Routledge. <https://doi.org/10.4324/9781315849072>
- Labov, W. (1972). *Sociolinguistic patterns*. Philadelphia, PA: University of Pennsylvania Press.
- Ladefoged, P. (2001). *A course in phonetics* (4th ed.). San Diego, CA: Harcourt College Publishers.
- Ladefoged, P. (2003). *Phonetic data analysis: An introduction to fieldwork and instrumental techniques*. Blackwell.
- Ladefoged, P., & Johnson, K. (2010). *A course in phonetics* (6th ed.). Wadsworth.
- Ladefoged, P., & Maddieson, I. (1990). *The sounds of the world's languages*. Oxford, UK: Blackwell.
- Ladefoged, P., & Maddieson, I. (1996). *The sounds of world's languages* (2nd ed.). Oxford, UK: Blackwell Publishers.
- Lado, R. (1957). *Linguistics across cultures: Applied linguistics for language teachers*. Ann Arbor, MI: University of Michigan Press.
- Laver, J. (1994). *Principles of phonetics*. Cambridge, UK: Cambridge University Press.

- LeBreton, J. M. (2008). Answers to 20 questions about interrater reliability and interrater agreement. *Organizational Research Methods*, 11(4), 815-852.
<https://doi.org/10.1177/1094428106296642>
- Leconte, F. (2019). Appropriations du français dans les migrations d’afrique susaharienne en france. *Research in Language and Culture Education*, 21(3). Retrieved from <https://journals.openedition.org/rdlc/12883>.
- Leung, Y. K. I. (2003). Failed features versus full transfer full access in the acquisition of a third language: Evidence from tense and agreement. In J. M. Liceras, H. Zobl, & H. Goodluck (Eds.), *Proceedings of the 6th Generative Approaches to Second Language Acquisition Conference (GASLA 6)* (pp. 199–207). Cascadilla Proceedings Project.
- Lindblom, B. (1986). Phonetic universals in vowel systems. In J. J. Ohala & J. J. Jaeger (Eds.), *Experimental phonology* (pp. 13–44). Academic Press.
- Lippus, P. (2010). Variation in vowel quality as a feature of Estonian quantity. In *Proceedings of the 5th International Conference on Speech Prosody* (pp. 1–4). Chicago, IL, USA. <https://doi.org/10.21437/SpeechProsody.2010-36>
- Llama, R., Cardoso, W., & Collins, L. (2010). The influence of language distance and language status on the acquisition of L3 phonology. *International Journal of Multilingualism*, 7(1), 39–57.
https://www.researchgate.net/publication/249025381_The_influence_of_language_distance_and_language_status_on_the_acquisition_of_L3_phonology

- Losange, M. (2021). La Web radio Bonjour Kampala: Le pari de l'innovation au service de la diffusion du français et de la coopération linguistique et éducative en Ouganda. *DUMAS*. Retrieved from <https://dumas.ccsd.cnrs.fr/dumas-03771478>
- Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research*, 35(6), 382–385. Retrieved from <https://doi.org/10.1097/00006199-198611000-00017>
- Maddieson, I. (1984). *Patterns of sounds*. Cambridge, UK: Cambridge University Press.
- Mango Tree Literacy Lab. (2019). Our Books. Retrieved from <https://www.mangotreeitlab.org/our-books>.
- Martin, O. M. (2023). *Perception and production of French nasal vowels by German native speakers* (Master's thesis). Uppsala University.
- Martinez, R. M., Goad, H., & Dow, M. (2023). L1 phonological effects on L2 (non-)naïve perception: A cross-language investigation of the oral–nasal vowel contrast in Brazilian Portuguese. *Second Language Research*. <https://doi.org/10.1177/02676583211044953>
- Mateus, M. H. M., & d'Andrade, E. (2000). *The phonology of Portuguese*. Oxford: Oxford University Press.
- Memon, M. A., Ting, H., Cheah, J.-H., Ramayah, T., Chuah, F., & Cham, T. H. (2025). Purposive sampling: A review and guidelines for quantitative research. *Journal of Applied Structural Equation Modeling*, 9(1), 1–23. [https://doi.org/10.47263/JASEM.9\(1\)01](https://doi.org/10.47263/JASEM.9(1)01)
- Metz, G. (2014, September 30). *Word of the week #2: No diphthongs on French vowels* [Video]. YouTube.

- Meunier, F., Frenck-Mestre, C., Lelekov-Boissard, T., & Le Besnerais, M. (2003). Production and perception of vowels: Does the density of the system play a role? In *Proceedings of the 15th International Congress of Phonetic Sciences* (pp. 723–726).
- Meyer, P. L. (1976). *Development of Distinctive Feature Theory* (B.A. thesis). University of Virginia.
- Ministère de l'Enseignement Primaire, Secondaire et Professionnel [MEPSP]. (2014). Livret de formation: Français (Enseignement primaire) [Training booklet: French (Primary education)]. Initiative francophone pour la formation à distance des maîtres (IFADEM). <http://www.ifadem.org>
- Mitleb, F. (1984). Vowel length contrast in Arabic and English: A spectrographic test. *Journal of Phonetics*, 12(1), 77–82. <https://www.sciencedirect.com/science/article/pii/S0095447019308794>
- Möller, M. (2009). *Vowel harmony in Bale: A study of ATR harmony in a Surmic language of Ethiopia* (Bachelor's thesis). Stockholm University.
- Munro, M. J., & Derwing, T. M. (2008). Segmental acquisition in adult ESL learners: A longitudinal study of vowel production. *Language Learning*, 58(3), 479–502. Retrieved from https://www.academia.edu/29218472/Segmental_Acquisition_in_Adult_ESL_Learners_A_Longitudinal_Study_of_Vowel_Production
- Myers, S. (2005). Vowel duration and neutralization of vowel length contrasts in Kinyarwanda. *Journal of Phonetics*, 33(4), 427–446. <https://doi.org/10.1016/j.wocn.2005.01.001>

- Nankindu, P. (2020). The history of educational language policies in Uganda: Lessons from the past. *American Journal of Educational Research*, 8(9), 643–652. <https://doi.org/10.12691/education-8-9-5>
- National Curriculum Development Centre. (2018). *Lower Secondary Curriculum: Foreign Languages Syllabus, French/German*. Kampala, Uganda: National Curriculum Development Centre.
- Nespor, M., Peña, M., & Mehler, J. (2003). On the different roles of vowels and consonants in speech processing and language acquisition. *Lingue e Linguaggio*, 2(2), 203–230.
- Fagyal, Z., Nguyen, N., & Boula de Mareüil, P. (2003). From dilation to coarticulation: Is there vowel harmony in French? *Studies in Linguistic Sciences*, 32(2), 1–21. <https://hal.archives-ouvertes.fr/hal-00308395>
- Nishi, K., Strange, W., Akahane-Yamada, R., Kubo, R., & Trent-Brown, S. A. (2008). Acoustic and perceptual similarity of Japanese and American English vowels. *The Journal of the Acoustical Society of America*, 123(5), 2780-2794. <https://doi.org/10.1121/1.2931949>
- Noonan, M. (1997). *A grammar of Lango*. Berlin, Germany: Mouton de Gruyter.
- Nugteren, H. (2011). Mongolic phonology and the Qinghai-Gansu languages (Doctoral dissertation). Leiden University, Leiden, Netherlands.
- Nyimbili, F., & Nyimbili, L. (2024). Types of purposive sampling techniques with their examples and application in qualitative research studies. *British Journal of Multidisciplinary and Advanced Studies: English Language, Teaching, Literature, Linguistics & Communication*,

https://www.researchgate.net/publication/378433792_Citation_Nyimbili_F_and

O’Keeffe, A., & McCarthy, M. (2010). Historical perspective: What are corpora and how have they evolved? In A. O’Keeffe & M. McCarthy (Eds.), *The Routledge handbook of corpus linguistics* (pp. 3–13). London, United Kingdom: Routledge.

Ocen, L. L. (2012). *Twa me Ngec Lango (A collection of Lango proverbs and sayings)*. Fountain Publishers.

Ocen, L. L., Dokotum, O. O., Robin, R., & Akaa, D. (2013). *A Standardised Orthography and Spelling Guide for Leb-Lango* (2nd ed.). Kampala, Uganda: Mango Tree.

Odden, D. (2005). *Introducing phonology*. Cambridge, UK: Cambridge University Press.

Odoom, J., & Adomako, K. (2022). Vowel nasality in Akan. *Linguistics and Language Studies*, 12(2), 65-81. <https://lartis.sk/wp-content/uploads/2022/07/OdoomAdomako-1.pdf>

Okonye, G. (2012). *A simplified Lango-English, English-Lango dictionary*. Kampala, Uganda: Fountain Publishers.

Omage, P. D. (2024). Contrastive analysis of the French-Gbari segmental phonologies. *African Journal of Humanities & Contemporary Education Research*, 16(1), 127–140. <https://doi.org/10.62154/ajhcer.2024.016.010422>

O’Mahony, J. (2019). Why the future of French is African. *BBC News*. Retrieved from <https://www.bbc.com/news/world-africa-47790128>

Organisation Internationale de la Francophonie (OIF). (2018). *La langue française dans le monde 2018*. OIF. <https://www.francophonie.org>

- Ortega, L. (2009). *Understanding second language acquisition*. Abingdon, United Kingdom: Routledge
- Pallant, J. (2020). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS* (7th ed.). London, United Kingdom: Routledge.
- Park, H. L. (2021). Stress and vowel reduction by Korean learners of English (Master's thesis, Colorado State University). Colorado State University Digital Repository. Retrieved from <https://api.mountainscholar.org/server/api/core/bitstreams/7933c70e-a329-4458-8463-c49096c6ef9f/content>
- Parrish, K. (2022). The categorization of L3 vowels near first exposure by Spanish-English bilinguals. *Languages*, 7(3), 226. <https://doi.org/10.3390/languages7030226>
- Paschen, L., Fuchs, S., & Seifart, F. (2022). Final lengthening and vowel length in 25 languages. *Journal of Phonetics*, 94, 101–123. <https://doi.org/10.1016/j.wocn.2022.101123>
- Phongolo, S. (2024, April 22). Why it is a good idea to learn French in Canada? *MDC Canada*. Retrieved from <https://mdccanada.ca/news/immigration/why-it-is-a-good-idea-to-learn-french-in-canada->
- Piske, T., MacKay, I. R. A., & Flege, J. E. (2001). Factors affecting degree of foreign accent in an L2: A review. *Journal of Phonetics*, 29(2), 191–215.
- Pograjc, B. M., & Markič, J. (2017). Nasal vowels and diphthongs in European Portuguese: A problem for Slovene speakers. *Linguistica*, 57(1), 243–254. <https://doi.org/10.4312/linguistica.57.1.243-254>

- Polgárdi, K. (1998). Vowel harmony: An account in terms of government and optimality (Doctoral dissertation). Leiden University, Leiden, Netherlands.
- Polit, D. F., Beck, C. T., & Owen, S. V. (2007). Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Research in Nursing & Health*, 30(4), 459-467. *Research in Nursing & Health*, 29(5), 489–497. Retrieved from <https://scispace.com/pdf/focus-on-research-methods-is-the-cvi-an-acceptable-indicator-1c7cnx29u8.pdf>
- Pouplier, M., Rodriguez, F., Lo, J. J. H., Alderton, R., Evans, B. G., Reinisch, E., & Carignan, C. (2024). Language-specific and individual variation in anticipatory nasal coarticulation: A comparative study of American English, French, and German. *Journal of Phonetics*. Advance online publication. Retrieved from <https://www.sciencedirect.com/science/article/pii/S0095447024000718>
- Price, G. (2005). *An introduction to French pronunciation*. Oxford, UK: Blackwell Publishing.
- Puggaard-Rode, R., Horslund, C., & Jørgensen, H. (2022). The rarity of intervocalic voicing of stops in Danish spontaneous speech. *Laboratory Phonology*, 13(1), 1–25. <https://doi.org/10.16995/labphon.6449>
- Pulleyblank, D. (2009). *Tone in lexical phonology*. Springer. Retrieved from <https://www.researchgate.net/publication/36089880>
- Ranong, N., & Leung, Y. I. (2009). Null objects in L1 Thai–L2 English–L3 Chinese: An empirical test of the CEM and TPM. *International Journal of Multilingualism*, 6(3), 291–310. https://soeg.kb.dk/discovery/fulldisplay?docid=cdi_proquest_ebookcentralchapters_408

- Rickard, P. (1989). *A history of the French language* (2nd ed.). London, UK: Routledge.
- Roach, P. (2009). *English Phonetics and Phonology: A practical Course* (4th ed.). Cambridge, UK: Cambridge University Press.
- Rochet, B. L. (1976). *The Formation and Evolution of the French Nasal Vowels*. Niemeyer, Germany: Tübingen:
- Rolle, N. (2013). Nasal vowel patterns in West Africa. *UC Berkeley Phonology Lab Annual Report*, 9, 226–267. <https://escholarship.org/uc/item/7q81c3rg>
- Rothman, J. (2009). Understanding the nature and outcomes of early bilingualism: Romance languages as heritage languages. *International Journal of Bilingualism*, 13(2), 155–163. <https://journals.sagepub.com/doi/pdf/10.1177/1367006909339814>
- Rothman, J., Cabrelli Amaro, J., & De Bot, K. (2013). Third language acquisition. In J. Herschensohn & M. Young-Scholten (Eds.), *The Cambridge handbook of second language acquisition* (pp. 372–393). Cambridge, UK: Cambridge University Press.
- Sarıtaş, B. B., & Sarıtaş, B. C. (2022). A comparison of Portuguese and English phonology. *International Journal of Social Sciences and Management Review*, 5(2), 101–112. Retrieved from http://ijssmr.org/uploads2022/ijssmr05_32.pdf
- Saunders, M., Lewis, P., & Thornhill, A. (2016). *Research Methods for Business Students* (7th Ed.). Harlow, England: Pearson Education Limited.
- Schwartz, J.-L., Boë, L.-J., Vallée, N., & Abry, C. (1997). The dispersion-focalization theory of vowel systems. *Journal of Phonetics*, 25(3), 255–286. <https://doi.org/10.1006/jpho.1997.0043>

- Shea, C., & Lira, C. (2020). L2 production of Brazilian nasal vowels in online dyads: Does a native speaker model make a difference? In O. Kang, S. Staples, K. Yaw, & K. Hirschi (Eds.), *Proceedings of the 11th Pronunciation in Second Language Learning and Teaching conference, Northern Arizona University, September 2019* (pp. 186–196). Ames, IA: Iowa State University.
- Slabakova, R. (2016). The Scalpel Model of third language acquisition. *International Journal of Bilingualism*, 20(5), 641–654. <https://doi.org/10.1177/1367006916655413>
- Smith, C. L. (1999). *Handbook of the International Phonetic Association: A guide to the use of the International Phonetic Alphabet*. Cambridge, UK: Cambridge University Press.
- Smits-Engelsman, B. C. M., Schoemaker, M. M., Delabastita, T., Hoskens, J., & Geuze, R. H. (2021). Measurement of interrater reliability. *Journal of Motor Behavior*, 53(5), 528–536. <https://doi.org/10.1080/00222895.2020.1863754>
- Stevens, K. N. (2000). *Acoustic phonetics*. Cambridge, MA: MIT Press.
- Suomi, K., Toivanen, J., & Ylitalo, R. (2008). *Finnish sound structure: Phonetics, phonology, phonotactics, and prosody*. Oulu, Finland: Oulu University Press.
- Taherdoost, H. (2016). Validity and reliability of the research instrument: How to test the validation of a questionnaire/survey in a research. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3205040>
- Tajima, K., Tanaka, K., Martin, A., & Mazuka, R. (2013). Is the vowel length contrast in Japanese exaggerated in infant-directed speech? In *Proceedings of Interspeech 2013* (pp. 3211–3215). Lyon, France.

- Tandon, N. (2017). Introduction to Linguistics & Phonetics. Retrieved from <https://ebooks.inflibnet.ac.in/engp13/chapter/classification-and-description-of-speech-sounds-english-vowels/>
- Tarantino, A. (1952). *Lango i kare acon* 'The history of the Lango people'. Kampala, Uganda: Fountain Publishers.
- Terry, K. K., & Webb, E. R. (2013). Modeling the emergence of a typological anomaly: Vowel nasalization in French. In C. Cathcart, I.-H. Chen, G. Finley, S. Kang, C. S. Sandy, & E. Stickles (Eds.), *Proceedings of the 37th Annual Meeting of the Berkeley Linguistics Society* (pp. 155–169). Berkeley Linguistics Society. <http://linguistics.berkeley.edu/bls/>
- The Independent. (2022, June 24). EAC Council of Ministers endorse French as an official language. *The Independent Uganda*. Retrieved October 9, 2024, from <https://www.independent.co.ug/eac-council-of-ministers-endorse-french-as-an-official-language/>
- Tinsley, H. E. A., & Weiss, D. J. (1975). Interrater reliability and agreement of the scoring of data. *Journal of Applied Psychology*, 60(1), 45-48. Retrieved from <https://sci-hub.se/downloads/2019-02-03/55/tinsley2000.pdf>
- Tjahjani, J., & Jinanto, D. (2021). Teaching French language through films: The cultural contents in French and Francophone films. *Indonesian Journal of Applied Linguistics*. Retrieved from <https://ejournal.upi.edu/index.php/IJAL/article/view/29450>
- Togboa, E. N., Tumwine, A., & Ebil, M. W. (2021). The future of French in Uganda in the context of language policy challenges: A situational analysis. *Education Quarterly Reviews*, 4(1), 11. <https://doi.org/10.31014/aior.1993.04.01.184>

- Tow, C. E. (2024). Orthographic influences on the production of French nasal vowels by English-speaking learners of French (Honors thesis). University of Northern Iowa, Cedar Falls, IA. <https://scholarworks.uni.edu/hpt/915>
- Towell, R., & Hawkins, R. (1994). *Approaches to second language acquisition*. Clevedon, UK: Multilingual Matters
- Tranel, B. (1987). *The sounds of French: An introduction*. Cambridge, UK: Cambridge University Press.
- Tucker, A. N. (1958). *The Eastern Sudanic Languages*. Oxford University Press.
- Tucker, A. N., & Bryan, M. A. (1966). *Linguistic Analyses: The Non-Bantu Languages of North-Eastern Africa*. Oxford, UK: Oxford University Press.
- Turk, A., & White, L. (1999). The domain of accentual lengthening in Scottish English. *Proceedings of the 14th International Congress of Phonetic Sciences (ICPhS 99)* (pp. 2381–2384). San Francisco, CA, USA.
- Uganda Bible Society. (1978). *Baibul 'Bible'*. Kampala, Uganda: Bible Society of Uganda.
- Uganda Bureau of Statistics (UBOS). (2024). Uganda population and housing census 2024 final report. UBOS. <https://www.ubos.org>
- Uganda Communications Commission (UCC). (2023). Operational & New Radio Stations – October 2023. Retrieved from <https://www.ucc.co.ug/broadcasting/>.
- Uganda National Examinations Board (UNEb). (2022). *Uganda Certificate of Education (UCE) Examination Results Report*. Kampala, Uganda: UNEb.

- United States Agency for International Development (USAID). (2020). *Language of Instruction Country Profile: Uganda*. Prepared by Dexis Consulting Group. Washington, DC.
- Vaissière, J. (2009). From Latin to modern French: On diachronic changes and synchronic variations. Retrieved from https://shs.hal.science/halshs-00365006/file/vaissiere_1996_from_latin_to_modern_French.pdf
- van der Hulst, H. (2016). Vowel harmony. In M. Aronoff (Ed.), *Oxford research encyclopedia of linguistics*. Oxford University Press.
<https://doi.org/10.1093/acrefore/9780199384655.013.38>
- Van Dommelen, W. (1982). A contrastive investigation of vowel duration in German and Dutch. *Phonetica*, 39(1), 1–12. <https://doi.org/10.1159/000261648>
- van Heuven, V. J. (2019). Acoustic correlates and perceptual cues of word and sentence stress: Towards a cross-linguistic perspective. In R. Goedemans, J. Heinz, & H. van der Hulst (Eds.), *The study of word stress and accent: Theories, methods and data* (pp. 15–34). Cambridge University Press. <https://doi.org/10.1017/9781316683101.002>
- Vance, T. J. (2008). *The sounds of Japanese*. Cambridge, UK: Cambridge University Press.
- Vilhanová, V. (2011). The role of early “Missionaries of Africa” or “White Fathers” in the study and development of African languages. *Asian and African Studies*, 20(2), 267–288.
<https://www.researchgate.net/publication/274077120>
- Vogel, I., & Spinu, L. (2011). Vowel length in Luganda. *The Journal of the Acoustical Society of America*, 129(4), 2714–2725. <https://doi.org/10.1121/1.3557035>

- Walker, R. (2011). Nasal harmony. In M. van Oostendorp, C. J. Ewen, E. Hume, & K. Rice (Eds.), *The Blackwell companion to phonology* (pp. 1275–1295). Wiley-Blackwell.
<https://doi.org/10.1002/9781444335262.ch78>
- Waltz, C. F., Strickland, O. L., & Lenz, E. R. (2005). *Measurement in nursing and health research* (3rd ed.). New York: Springer Publishing Company.
- Wardhaugh, R. (2006). *An introduction to sociolinguistics* (5th ed.). Oxford, UK: Blackwell Publishing.
- Weijer, J. van de (2006). Autosegmental phonology. In K. Brown (Ed.), *Encyclopedia of language & linguistics* (2nd ed., pp. 262–272). Elsevier. Retrieved from https://www.researchgate.net/publication/304040671_Autosegmental_Phonology
- Wetzels, W. L. (1997). *The lexical representation of nasality in Brazilian Portuguese*. Probus, 9(2), 203–232.
- White, L. (2003). *Second Language Acquisition and Universal Grammar*. Cambridge, UK: Cambridge University Press.
- Wilmot, P. (2017, April 4). How Organisers are Using Radio and Shared Values in Uganda. *Mobilisation Lab*. <https://mobilisationlab.org/stories/organising-across-uganda-radio-values/>.
- Wrembel, M. (2010). L2-accented speech in L3 production. *International Journal of Multilingualism*, 7(1), 75–90. <https://doi.org/10.1080/14790710902972263>
- Wrembel, M., Gut, U., & Mehlhorn, G. (2019). *Crosslinguistic influence in multilinguals: An examination of Chinese-English-French speakers*. Berlin, Germany: De Gruyter Mouton.

- Wright, S. (2006). French as a lingua franca. *Annual Review of Applied Linguistics*, 26, 35–60.
<https://www.cambridge.org/core/journals/annual-review-of-applied-linguistics>
- Wu, J. (2024). *Perception of L3 French vowel contrasts by L1 Mandarin-L2 English learners: A contrastive hierarchy perspective* (Doctoral dissertation). University of Victoria. Available at <https://dspace.library.uvic.ca/items/0fbfc9d7-09bd-4768-bbc5-6047f5aadba9>
- Yuan, J., Liberman, M., & Cieri, C. (2006). Towards an integrated understanding of speaking rate in conversation. *Proceedings of Interspeech 2006*, 541–544. Retrieved from http://itre.cis.upenn.edu/myl/llog/icslp06_final.pdf
- Zhao, V. (2020). 5 most common English pronunciation errors by French speakers. LinkedIn. Retrieved from <https://www.linkedin.com/pulse/5-most-common-english-pronunciation-errors-french-vivienne>
- Zsiga, E. C. (2013). *The sounds of language: An introduction to phonetics and phonology*. Oxford UK: Wiley-Blackwell.

Appendices

Appendix 2: Data Collection Instruments

Dear Respondent,

I am a student of Gulu University, conducting research on the topic: *A Comparative Study of Leblango and French Vowel Sounds: Implications for Leblango Speakers of French as a Third Language (L3)*. I kindly seek your consent to participate in this study by providing information through questionnaires, conversations, and recorded readings. Your participation is voluntary, and you may withdraw at any time. The information collected will be used solely for academic purposes, and your confidentiality will be respected throughout.

Thank you for your time and contribution.

Consent Agreement

I agree to participate in this study and give permission for the material I contribute to be used for linguistic research, teaching, and scientific presentations and publications. I also consent to a copy of my contribution being stored in the Department of Languages and Literature, Gulu University, Uganda.

Date.....Signature.....

PART ONE- QUESTIONNAIRE

Section A: Demographic Information

(strictly confidential: names will not appear in the final thesis)

1. Gender:

☐ Male

☐ Female

2. Age _____

3. Level of Education:

☐ A Level

☐ Diploma

☐ Degree

Section B: Language Background

1- What is your first language (mother tongue)?

☐ Leblango

☐ Other (please specify): _____

2- Do you speak any other languages?

☐ Yes

☐ No

If yes, list them: _____

3- At what age did you start learning French?

☐ Under 10 years

☐ 10–15 years

☐ 16–20 years

☐ Above 20 years

Thank You!

PART TWO - CONVERSATIONAL MODULES

(a) Leblango Conversation Prompts

1. *Lok i kom jami ame pe yomo yii i Boma Lira.*
2. *Kobba kit ame nino ni me aworo obedo kede.*
3. *Titta kit ame itamo ni yera me mwaka abino bino bedo kede.*
4. *Yin ineno kwan me kare ni ningo?*
5. *Ngo amyero otim me gikko tim me aram i lobo wa?*

English Translation

- 1- Talk about what you don't like in Lira City.
- 2- Tell me how your yesterday was.
- 3- Tell me how you think next year's election will be conducted.
- 4- How do you see the current situation of education?
- 5- What should be done to end corruption in our country?

(b) French Conversation Prompts

1. *Décrivez votre journée typique, du matin au soir.*
2. *Parlez-moi de ce que vous aimez manger ou cuisiner.*
3. *Décrivez votre maison ou votre quartier.*
4. *Comment voyez-vous la ville de Lira dans dix ans ?*
5. *Racontez-moi une fête ou une célébration spéciale où vous êtes allé(e).*

English Translation

- 1- Describe your typical day, from morning to evening.
- 2- Tell me about what you like to eat or cook.

- 3- Describe your house or your neighborhood.
- 4- How do you see the city of Lira in ten years?
- 5- Tell me about a special celebration or party you attended.

PART THREE – READING ACTIVITY

(A) Leblango Reading Tasks

For the word and sentence lists below, read them in Leblango at a natural speed as I record. You can reread the word or sentence if you feel the need.

Single words:

#	Word
1	lak, pala, wanga (teeth, knife, my eye)
2	tet, tekere, kenge (technology, clan, guard him)
3	cik, kipirit, cingi (law, matchbox, your hand)
4	dog, dokoro, kongo (mouth, cross over, beer)
5	duc, pukuru, adungu (all, break free, harp instrument)
6	ame, ameo, lengo (who/which, rabbit, cleanliness)
7	ebii, dio, dingo (male name, presses, deafness)
8	pi, pii, ringi (for, water, run (imperative))
9	an, anam. canga (I, Bantu person, heal me)

10	bulu, bullu, bungngu (youth, to roast, to flog)
11	aman, amada, oranga (now, wound dressing, infertile woman)
12	em, emer, gwenge (thy, male name, stones)
13	iyi, iriga, agingi (inside, hunt variety, miser)

Single sentences:

#	Word
1	Timmi no mio mingo. (That idea of yours brings foolishness.)
2	En camo ringo rio? (Does he eat zebra meat?)
3	Wek angulli lao Lango. (Let me spit a Lango blessing for you.)
4	Tin nino me arango Arao? (Is today Arao's traditional marriage day?)
5	Baa banga kan. (Throw it to me here.)
6	Pe wek adinga dia. (Don't let the deaf squeeze me.)
7	Wek en tee tenge. (Let him perform skin-cutting treatment on him away.)
8	Gingi gii tik. (Their meanness stinks.)
9	Two arac loo longo pe. (No disease is worse than elephantiasis.)

10	En puu, pungu ot. (She smears the flour, locks the house.)
11	Lum tuu Kungu. (Grass grows in Kungu)
12	Gungngu gungu arac. (Bending in a seductive way.)
13	Yomo ni yomo yii. (your weakness pleases you.)

Paired sentences:

#	Word
1	Agweng gengo coto. (Agweng stops mud.) Agweng geo coto. (Agweng removes mud.)
2	An nyinga Bunga. (My name is Bunga.) An nyinga Bua. (My name is Bua.)
3	Dako Ogong ogonge. (Ogong's wife swaggered him.) Dako Ogong ogoe. (Ogong's wife hit him.)
5	Ajok obange. (The witch bewitched him.) Ajok obae. (The witch threw a projectile at him.)
6	En ocenga. (He targeted me.) En ocea. (He snatched me)
8	Bul okok. (The drum sounded.) Bul icok. (Roast the potato.)

Leblango Reading Passage

Read the passage below in Leblango as I record.

Pwonyere i cukul Awangi otyeko dong cakere iyunge otino aworomaca wot i cukul i ceng Okiko me cakko tem anyen ento te nwongngo wudi kwan ducu opungu oko. Man te miyo yika me kwan i cukul man balle dok dang tyen kop angio omio opupungu wudi kwan magi onwongo ngeyo tek.

Wonkom me Wangtic Baromele, Odongo, okobo ni en ebedo i wur atek meicel me nwongngo ngec man. Acalo adwogi, en owoto naka i cukul me mokko ka ce obedo kop ateni, dang te nwongngo otino mogo tye akwanno buk i te yen, pien jami pwonyere gi ducu onwongo pe.

En okobo ni aedi pe obedo kwanyinyo cim i kare ame egoye cim. En dang okwao opwonye me kanyakino atika pi kop pwonyere, dang te cayo onywalogo ame pango culu kwan ni kodi dit-wic kede dingo man myero gik.

English Translation

The reopening of classes at Awangi School has finally taken place. This follows the failed reporting day on Monday, when pupils arrived at the school only to find the classrooms locked. As a result, no lessons were conducted that day because no one knew why the classrooms were locked.

The chairman of Baromele Village, Mr. Odongo, said he was surprised when he learned about the situation. He went to the school to verify the claims and found pupils reading books under the trees because their classrooms were indeed locked.

He said that his attempts to contact the head teacher were unsuccessful, as the head teacher was not picking his calls. Mr. Odongo urged teachers to take education matters seriously and also criticized parents who avoid paying school fees, saying this habit must stop.

(B) French Reading Tasks

For the word and sentence lists below, read the items in French at a natural speed as I record.

You can reread the word or sentence if you feel the need.

single words

#	Word
1	si (if)
2	livre (book)
3	fée (fairy)
4	des (some)
5	mère (mother)
6	pâte (paste)
7	ami (friend)
8	beau (beautiful)
9	dos (back)
10	porte (door)
11	tout (all)
12	lune (moon)
13	peu (little/few)
14	soeur (sister)
15	sans (without)
16	pain (bread)
17	nom (name)
18	un (one)

19	le (the)
20	brun (brown)
21	tu (you)
22	rue (street)

Paired words

#	Word
1	vue, vieux (view), (old)
2	ceux, ce (those), (this)
3	tout, tu (all), (you)
4	lit, lait (bed), (milk)
5	peu, peur (few), (fear)
6	fou, feu (mad), (fire)
7	ta, te (your), (your)
8	les, le (the), (the)
9	sous, su (under), (known)
10	me, mais (me), (but)

Single sentences

#	Word
1	Tu as vu le mur rouge? (Did you see the red wall?)

2	Il faut payer ici. (You must pay here.)
3	Je mets les maîtres là. (I put the masters there.)
4	Elle vend du pain au marché. (She sells bread at the market.)
5	Donne-moi le nom de cet homme. (Give me the name of this man.)
6	Un vin rare est cher. (A rare wine is expensive.)
7	Le banc est là. (The bench is there.)
8	J'ai besoin d'un petit repas. (I need a little meal.)
9	On peint des parfums bleus. (One paints blue perfumes.)
10	Ce matin, il va mal. (This morning, it is bad.)

French Reading Passage

Read the passage below in French as the researcher takes the recording.

Hier, sous un ciel bleu clair, nous avons pris le train pour une petite ville charmante près d'une grande forêt. En chemin, nous avons admiré le paysage : des collines verdoyantes, des champs dorés, et une rivière tranquille qui brillait sous le soleil. À notre arrivée, nous avons mangé du pain frais, bu du vin rouge, et respiré le parfum des fleurs sauvages. L'air sentait bon, et le silence était parfois interrompu par le bruissement des feuilles.

Plus tard, nous avons marché sur des chemins ombragés, croisant des enfants qui jouaient dans un champ en chantant. Le soir, le coucher du soleil a teinté le ciel d'orange, de rose, et de brun, tandis que le vent soufflait calmement dans les branches. C'était si paisible, loin du bruit de la ville. Une journée simple, mais vraiment charmante, qui m'a rappelé la beauté de la nature et l'importance de prendre le temps de vivre.

English Translation

Yesterday, under a clear blue sky, we took the train to a charming little town near a large forest. Along the way, we admired the scenery: green hills, golden fields, and a quiet river shimmering in the sunlight. When we arrived, we ate fresh bread, drank red wine, and breathed in the fragrance of wildflowers. The air smelled so nice, and the silence was sometimes broken by the rustling of leaves.

Later, we walked along shaded forest paths, passing children playing in a field and singing. In the evening, the setting sun painted the sky in shades of orange, pink, and brown, while the wind gently whispered through the branches. It was so peaceful, far from the noise of the city. A simple but truly charming day that reminded me of the beauty of nature and the importance of taking time to enjoy life.

(C) Paired Leblango-French words

#	Leblango Words	French Words
1	bongo (clothes)	bon (good)
2	longo (elephantiasis)	long (long)
3	dongo (to grow)	dont (whose/which)

4	tenge (away)	teint (complexion)
5	tenge (shake it)	thym (thyme)
6	tanga (blessing)	temps (time)
7	lwongo (word)	loin (far)
8	wii (top)	oui (yes)
9	myel (dance)	miel (honey)
10	lwak (people)	loi (law)
11	el (open)	elle (she)
12	or (consignment)	or (gold)

Appendix 3: Repository Search Checklist for Standard French

A. Repository Identification

#	Item	Details
1	Repository Type	- Corpus: Spontaneous spoken French - Dictionaries: Recorded Standard French Pronunciation
2	Corpus Source	Corpus de Français Parlé Parisien (CFPP2000) http://cfpp2000.univ-paris3.fr/
3	Dictionary Sources	Larousse – https://www.larousse.fr Collins – https://www.collinsdictionary.com Cambridge – https://dictionary.cambridge.org
4	Audio Format	Preferred format: MP3 with a bit rate of 128 Kbps or higher, essential for phonetic accuracy.
5	Audio Availability and Downloadability	Yes – available for download or audio capture from both corpus and dictionaries
6	Source Region (Corpus)	Paris

B. Data Selection Criteria for Corpus

#	Selection Criteria	Implementation Notes
1	Native speakers only	Verify speaker's birthplace and first language through available metadata.
2	Natural speech contexts	Prioritize conversational speech over read/scripted samples
3	High-quality audio	Recordings must be clear and free from distortion
4	Available speaker metadata	Includes age, location, and gender
5	Inclusion of vowel contrasts	Examples of oral vs. nasal, front vs. back
6	Exclusions	Exclude nonnative speakers and speech that is whispered or sung

C. French Vowel Collection Protocol

#	Feature	Target Vowels	Word Examples	Collection Protocol
1	Oral vowels	/i/, /e/, /ɛ/, /a/, /o/, /ɔ/, /u/	si, les, mettre, la, eau, porte, vous	Extract 5 tokens per vowel
2	Nasal vowels	/ã/, /ẽ/, /œ̃/, /ɔ̃/	vent, fin, brun, bon	Extract 5 minimal pairs per nasal vowel.
3	Front rounded vowels	/y/, /ø/, /œ/	tu, peu	Extract 5 tokens per vowel
4	Mid-central vowel	/ə/	le, petite, cheval	Extract 5 tokens
5	mid-front rounded vowel	/œ/	sœur, cœur	Extract 5 tokens

GULU

P.O. BOX 166 GULU



UNIVERSITY

TEL: +256471432922;

OFFICE OF THE DEAN, FACULTY OF EDUCATION AND HUMANITIES

August 26, 2025

TO : WHOM IT MAY CONCERN

This is to introduce to you Mr. Bosco Opio (Reg No. 21/U/2911/MEL/PS) a student pursuing a programme of study leading to an award Master of Arts in Literature and English Linguistics of Gulu University, Master of Gulu University.

He is undertaking research on the Topic:

**A COMPARATIVE STUDY OF LEBLANGO AND FRENCH VOWEL SOUNDS:
IMPLICATIOSN FOR LEBLANGO SPEAKERS OF FRENCH AS A THIRD LANGUAGE(L3)**

Which is in partial fulfilment of the requirements for the award.

Any assistance rendered to him in relation to this research work will be highly appreciated.

Yours faithfully,



Dr. Denis Thaddeus Ofoyuru

Dean, Faculty of Education and Humanities