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Analysis of Consonant Minimal Pairs of Nouns and Verbs in Xitsonga

Respect Mlambo

South African Centre for Digital Language Resources, North-West University, Potchefstroom 2531, South Africa

ABSTRACT

Minimal pairs play a crucial role in phonetics and phonology by identifying phonemic contrasts and delineating the boundaries between distinct phonemes. Their importance lies in illustrating how two sounds function as separate phonemes within a given language. This study explores the structural and functional significance of consonant minimal pairs of nouns and verbs in Xitsonga, with a particular focus on their phonological, semantic and grammatical roles. Adopting a descriptive design and qualitative approach, it employs a desktop method to analyse secondary data sources, including published literature, linguistic corpora, dictionaries and language texts. The data were purposefully sampled and examined using thematic analysis. The study is framed within Saussurean structural linguistics, highlighting binary oppositions and systematic relationships that shape the language's structure. The study found that consonant minimal pairs in Xitsonga nouns and verbs play a vital role in shaping lexical meaning and categorisation through phonemic contrasts. These contrasts predominantly occur in initial and medial positions, as the language's phonotactic constraints prohibit final consonant minimal pairs. The findings underscore the systematic nature of Xitsonga phonology, where structured consonantal variations function as key mechanisms for lexical differentiation. They contribute to linguistic theory and language education by offering insights into the significance of minimal pairs in documenting and preserving Xitsonga's phonological intricacies.

Keywords: Xitsonga; Minimal Pairs; Phonological; Consonant; Saussurean Structural Linguistics

*CORRESPONDING AUTHOR:

Respect Mlambo, South African Centre for Digital Language Resources, North-West University, Potchefstroom 2531, South Africa; Email: Respect.Mlambo@nwu.ac.za

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1. Introduction

Language serves as a vital tool for communication, enabling the expression of ideas, emotions, and cultural identities[1, 2]. It operates as a complex system of sounds, symbols, and structures that facilitates meaning-making and social connections[3]. Each language possesses distinct phonological, morphological, syntactic, and semantic features, shaping the linguistic identity of its speakers[4, 5]. In multilingual societies, language functions as both a medium of interaction and a marker of cultural heritage and diversity[6]. Studying languages, particularly those less commonly examined, highlights the richness of human expression and deepens our understanding of linguistic evolution.

Among these is Xitsonga, a Bantu language primarily spoken in South Africa, Mozambique and Zimbabwe[7, 8]. It is one of South Africa's twelve official languages and is classified as S50 in Guthrie's Bantu language grouping[4, 9, 10]. This classification distinguishes it from the Sotho and Nguni languages, categorised as S30 and S40, respectively[4, 11]. Renowned for its rich oral and written traditions, it is characterised by systematic vowel harmony and intricate consonantal patterns. Its consonants can be categorised based on their place and manner of articulation. However, despite its official status, Xitsonga struggles to achieve parity in research with dominant languages like English and Afrikaans in South Africa[12]. As Prah[13] notes, Afrikaans and English remain the dominant languages of socio-economic power in the country, marginalising indigenous languages such as Xitsonga. This marginalisation restricts Xitsonga's use in education, media, and professional spheres, limiting opportunities for speakers to fully express their linguistic heritage.

This study addresses the limited exploration of Xitsonga's phonology, particularly its minimal pairs. Defined as pairs of words differing in meaning due to a single phoneme variation, minimal pairs are crucial in linguistics for identifying contrastive sounds that distinguish meaning[14, 15]. They expose the fundamental sound components of a language, allowing for the identification of its sound patterns and offering insight into its internal structure, while also playing a vital role in uncovering the complexities of language phonology[16]. Crystal[17] explained that a minimal pair consists of two words that are identical in all aspects except for a single differing sound, which may be a vowel or a consonant. In some languages, tonal variations also serve as a distinguishing feature between minimal pairs, allowing speakers to differentiate meanings through pitch changes[18]. This concept is fundamental in phonological analysis, enabling linguists to classify a language's sound system and understand its distinctive phonemic features. Additionally, minimal pairs play a key role in language teaching by enhancing pronunciation and phonemic awareness in second-language learners[19]. They also provide valuable insights into cognitive processes related to speech perception and production[20]. Despite their significance, minimal pairs remain understudied in Xitsonga, leaving a gap in understanding how speakers process and perceive phonemic contrasts. Addressing this gap is critical for advancing language teaching, speech therapy, and the preservation of Xitsonga's linguistic heritage.

Therefore, this study examines the structural and functional significance of consonant minimal pairs in Xitsonga, a phonological phenomenon that underscores the intricacies of the language's sound system. It aims to identify and analyse minimal pairs of consonant sounds in Xitsonga of nouns and verbs, emphasising the contrasting phonemes and their role in distinguishing word meanings and categorisation. The focus on nouns and verbs is due to their essential role in conveying meaning and structure in language. As core lexical categories, they provide clear phonemic contrasts that impact meaning, making them ideal for analysing consonantal shifts in Xitsonga. Additionally, their systematic morphological patterns facilitate a structured and comparative phonological analysis. The study addresses the following research questions:

- What are the minimal pairs of consonant sounds in Xitsonga, and how do they occur in nouns and verbs?
- How do minimal pairs contribute to lexical categorisation and semantic differentiation in Xitsonga?

Therefore, by documenting and analysing these phonological elements of nouns and verbs, the study contributes to the understanding of Xitsonga's consonant inventory and phonological rules, offering valuable insights into Bantu linguistics. Furthermore, it has practical applications for language teaching, particularly in pronunciation training and the development of educational materials.

2. Literature Review

Barlow and Gierut[21] explored the role of phonemes in language and their application in phonological remediation,

particularly through minimal pairs. The study analysed the phonological system of a child named Joseph, who exhibited a functional phonological delay. Joseph's phonetic inventory revealed correct production of some sounds but an absence of others, such as fricatives and affricates. For instance, his production of "drive" as [gɑɪ] and "bite" as [bɑɪ] formed a minimal pair, demonstrating that /g/ and /b/ functioned as distinct phonemes in his system, despite limited contrasts. Barlow and Gierut [21] also examined conventional minimal pair treatments, which pair a target phoneme with a minimally contrasting substitute, such as contrasting /s/ with /t/ in Joseph's case. While this approach proved effective, the study questioned the necessity of explicit instruction on sound production, especially when nonambient substitutes were used. Alternative models were also discussed, emphasising maximal feature differences in minimal pairs, such as contrasting /s/ with /r/, to promote greater generalisation. These findings highlighted the value of linguistic theory in designing interventions to address phonological delays and enhance treatment outcomes for children with speech impairments.

Afifah and Lubis [14] investigated minimal pairs of consonants in English, emphasising their significance in distinguishing phonetic contrasts and their application in phonology and language teaching. The study categorised English minimal pairs based on articulatory features, including place and manner of articulation. For place of articulation, examples included bilabial pairs such as "pat" [pæt] and "bat" [bæt], where the voiceless bilabial plosive /p/ contrasts with the voiced bilabial plosive /b/, altering meaning. Alveolar pairs, such as "sit" [sɪt] and "zit" [zɪt], and velar pairs, like "cat" [kæt] and "gat" [gæt], followed similar patterns of contrast. In terms of manner of articulation, Afifah and Lubis [14] examined plosive minimal pairs, such as "top" [tɒp] and "cop" [kɒp], differing in their initial plosive sounds, as well as fricative pairs like "sip" [sɪp] and "zip" [zɪp], which varied in voicing between the voiceless alveolar fricative /s/ and the voiced alveolar fricative /z/. These distinctions demonstrated how single sound changes could shift meanings significantly, highlighting their relevance in phonological analysis and educational contexts. The study concluded by underscoring the role of minimal pairs in enhancing understanding of phonological systems and their practical utility in English.

Ahmad, Alaku and Kwoku [19] examined pronunciation difficulties faced by Hausa speakers when learning English, focusing on challenges in distinguishing minimal pairs. The study highlighted differences between the phonological systems of Hausa and English, which lead to common errors. For example, Hausa speakers often pronounced pairs like "cope" and "cup" or "pen" and "pain" as identical, despite the distinct phonetic contrasts in English. Using the Contrastive Analysis Hypothesis, the study attributed these errors to the transfer of phonological features from Hausa first speakers to English second speakers, especially where significant differences exist between the languages. The study illustrated these challenges with examples of English minimal pairs, such as "bold" and "cold" or "fame" and "firm," where a single phoneme alters meaning. In Hausa, minimal pairs like "makarantá" (school) and "makarantà" (students) emphasised the role of tone in distinguishing meanings, a feature absent in English. The authors categorised minimal pairs in both languages, noting that English minimal pairs often contrast initial consonants, as in "pad" and "pat," while Hausa minimal pairs combine consonantal and tonal distinctions, such as "babá" (mother) and "babà" (father). The findings revealed that while both languages share some minimal pair patterns, the influence of tone in Hausa contrasts sharply with English stress patterns. Ahmad et al. [19] concluded that Hausa speakers need to recognise these phonological differences to improve their English pronunciation, particularly in accurately identifying and articulating minimal pairs.

Husna, Sholikhah, and Lubis [22] explored the significance of minimal pairs in English phonology, particularly in language learning and pronunciation. They analysed the phonetic contrasts between consonant sounds in English and their impact on meaning. They also highlighted how phonological awareness could be improved through minimal pair exercises in language learning contexts. The authors identified several minimal pairs, including /p/ vs. /b/ ("pat" vs. "bat"), /s/ vs. /z/ ("sip" vs. "zip"), and /t/ vs. /d/ ("ten" vs. "den"). These examples demonstrated how a single consonant changes altered word meaning, emphasizing the importance of precise pronunciation. Husna et al. [22] further investigated the articulation and acoustic properties of these contrasts, helping learner's recognise subtle phonetic differences. The study argued that difficulties in distinguishing consonant sounds often lead to pronunciation errors, which affect intelligibility and communication effectiveness. Addi-

tionally, the study discussed dialectal and accent variations in English pronunciation. For instance, the pronunciation of /r/ varied between American and British English, influencing how learners perceive and produce sounds in different linguistic environments. This aspect underscored the broader implications of phonological differences in global English communication. The research also examined the pedagogical applications of minimal pairs, suggesting that minimal pair drills and pronunciation exercises could enhance learners' ability to differentiate similar sounds, improve phonetic accuracy, and increase confidence in speaking. The findings reinforce the idea that phonological training using minimal pairs help non-native speakers overcome pronunciation challenges, ultimately leading to clearer and more effective communication.

Marpaung, Sipayung, and Lubis [23] explored the effectiveness of the minimal pairs technique in improving English learners' pronunciation skills. Minimal pairs, consisting of words differing by a single phoneme, are essential for distinguishing similar sounds in English. Using a qualitative approach, the study employed questionnaires and interviews to capture students' perceptions of the technique. The findings showed overwhelmingly positive feedback, with students noting its effectiveness in enhancing pronunciation, listening skills, and motivation during language learning. Examples from the study included pairs such as *meet* (/miːt/) and *mitt* (/mɪt/), where learners struggled to differentiate the long vowel /iː/ in *meet* from the short vowel /ɪ/ in *mitt*. Similarly, *live* (/laɪv/) and *life* (/laɪf/) were used to teach the contrast between the voiced /v/ and the voiceless /f/, while *bath* (/baθ/) and *bathe* (/bað/) highlighted the distinction between the voiceless dental fricative /θ/ and the voiced /ð/. These drills significantly improved learners' ability to recognise and produce English phonemes accurately. The study concluded that the minimal pairs technique not only enhanced pronunciation skills but also fostered an engaging and interactive learning environment. Students reported reduced monotony, increased enthusiasm, and greater peer collaboration. Despite challenges such as the need for repetition and difficulties in interpreting similar sounds without native-like proficiency, the technique proved valuable for effective language acquisition.

Onuoha and Uba [20] investigated the role of visual cues in the perception of minimal pairs in Igbo, challenging the multimodal theory of speech perception, particularly the McGurk effect, which posits that both auditory and visual signals are essential for accurate speech comprehension. The study aimed to determine whether visual signals were as critical as auditory signals in distinguishing minimal pairs. Data were drawn from ten Igbo native speakers (six females and four males), existing literature, and the authors' introspection as native speakers. The analysis encompassed 34 minimal pairs categorised into consonantal, vocalic, and tonal differences. Examples included *ọ́ḳụ́* ('fire') and *ọ́ṛụ́* ('work') for consonantal contrasts, *ákà* ('bead') and *úḳà* ('church') for vocalic differences, and *ákáa* ('hand') versus *ákà* ('bead') for tonal distinctions. The findings revealed that Igbo native speakers could identify and differentiate these minimal pairs accurately using auditory signals alone, without relying on visual input. This result contradicted the McGurk effect, which emphasises the importance of visual cues in enhancing auditory speech perception. The study further examined theoretical perspectives on speech perception, highlighting Igbo's reliance on tonal distinctions. The native speakers' familiarity with the language's phonetic and structural features allowed them to discern minimal pairs effectively without visual aids. Onuoha and Uba [20] concluded that linguistic experience and proficiency in a language's phonetic and structural patterns significantly influenced speech perception, reducing the necessity for visual information.

3. Research Methodology

This study adopted a descriptive research design to explore and analyse consonant sounds minimal pairs in Xitsonga, providing a detailed account of their structural and functional roles within the language. A qualitative approach was employed to enable an in-depth investigation of linguistic patterns and their underlying meanings. This approach is utilised to generate non-numerical data that provide insights to social phenomena in their natural environments [24, 25]. The desktop method and purposive sampling were utilised for data collection, focusing on secondary sources such as published literature, linguistic corpora, dictionaries and other relevant texts on Xitsonga phonology. These sources were systematically reviewed to identify examples of consonant minimal pairs, ensuring a comprehensive and reliable data set. The collected data were analysed using thematic ap-

proach, which facilitated the identification, categorisation, and interpretation of patterns and variations in consonant minimal pairs. This method involved coding the data to pinpoint instances of consonant minimal pairs. Each identified minimal pair was analysed by examining the differences in consonant sounds and their effect on word meaning.

4. Theoretical Framework

This study applies Saussurean principles of structural linguistics to analyse consonant sounds minimal pairs in Xitsonga, emphasising the relational and systemic nature of the language. Ferdinand de Saussurean's structuralist perspective conceptualises language as a system of interdependent signs, where each element derives its meaning and function from its relationship to others [26]. Central to this approach is the idea of value through binary opposition, where phonemes gain significance not from their intrinsic properties but through contrasts with other phonemes [27, 28]. By examining these oppositions, this study aligns with Saussurean's view of language as a structured network of differences. Minimal pairs, defined as words or morphemes differing by only one phoneme, illustrate this principle effectively. For instance, phonemes in paradigmatic relationships can replace one another in similar contexts to create different meanings, while syntagmatic relationships govern the sequential combination of phonemes within words, constrained by phonotactic rules [29, 30]. These relationships not only highlight how phonemes interact within Xitsonga's phonological system but also demonstrate the structural role of phonemic contrasts in encoding meaning. Through this lens, the study of consonant minimal pairs provides compelling evidence of the structuralist notion that meaning is rooted in difference. By exploring the systemic organisation of consonant sounds in Xitsonga using Saussurean principles of structural linguistics, the analysis underscores the relational principles that govern the language's structure and functionality.

5. Analysis and Discussion

This section explores and analyses minimal pairs of consonant sounds in Xitsonga, examining their roles within the language's phonological system. It also highlights how variations in consonants affect meaning and contribute to linguistic understanding in Xitsonga. Consonant minimal pairs can occur in the initial, medial, or final positions of a word [31]. However, in Xitsonga, the agglutinating nature and disjunctive writing system adhere to phonotactic rules requiring words to end with vowel sounds, preventing minimal pairs distinguished by final consonants. Instead, Xitsonga displays minimal pairs with consonantal contrasts occurring in initial and medial positions. This section explores these patterns, specifically in nouns and verbs.

5.1. Initial Consonant Minimal Pairs in Xitsonga Nouns

The initial position in minimal pairs refers to the placement of contrasting phonemes at the beginning of words, creating distinctions in meaning [31]. These pairs demonstrate how a single sound change in the word-initial position can alter lexical semantics [32]. Such distinctions play a vital role in phonology, demonstrating how sound contrasts operate within a language's system to distinguish words and meanings. **Table 1** presents examples of Xitsonga noun minimal pairs that differ in their initial consonant sounds.

Minimal pairs in Xitsonga illustrate how subtle phonemic variations in initial consonant sounds of nouns can lead to significant changes in meaning, reflecting Saussurean structuralist principles, as shown in **Table 1**. For instance, the contrast between *vondlo* (nestling) and *kondlo* (rat/mouse) highlights how replacing the fricative /v/ with the plosive /k/ differentiates distinct animal categories, emphasising the functional role of phonemes in semantic distinction. Likewise, the minimal pair *mutshila* (artist) and *vutshila* (art) illustrates how a shift in the initial consonant sound alters meaning while maintaining a similar phonological structure. The word *mutshila* begins with the bilabial nasal /m/, indicating a person and aligning with the noun class prefix /*mu-*/, while *vutshila* starts with the labiodental fricative /v/, denoting an abstract concept and following the /vu-/ noun class pattern. The distinction between *rivoni* (light) and *xivoni* (mirror), where the liquid consonant /r/ shifts to the palatal fricative /x/, further exemplifies how phonemic variation alters conceptual meaning, differentiating a naturally reflective object from an artificial one. These cases reinforce the idea that language functions as a system where units derive significance from their oppositional relationships.

In addition, the opposition between the minimal pairs *bindzu* (business, bargain, trade) versus *pindzu* (a variety

Table 1. Xitsonga initial consonant minimal pairs of nouns.

Word	Phonemic Contrast	Semantic Contrast
Vondlo	/v/	[n] nestling
Kondlo	/k/	[n] rat
Mutshila	/m/	[n] artist
Vutshila	/v/	[n] art
Rivoni	/r/	[n] light
Xivoni	/x/	[n] mirror
Bindzu	/b/	[n] business, bargain, trade
Pindzu	/p/	[n] a variety of melon with white seeds
Tandza	/t/	[n] egg
Nandza	/n/	[n] servant, commoner, subordinate

of melon with white seeds) and *tandza* (egg) and *nandza* (servant, commoner, subordinate) demonstrate how phonemic variations in initial consonant sounds lead to significant shifts in Xitsonga nouns meaning. In *bindzu* and *pindzu*, the contrast lies between the voiced bilabial stop /b/ and the voiceless bilabial stop /p/, altering the meaning from an economic activity (*bindzu*) to a type of fruit (*pindzu*). Likewise, in *tandza* and *nandza*, the difference between the voiceless alveolar stop /t/ and the voiced alveolar nasal /n/ creates a semantic distinction between a physical object and a social role. Such examples align with Saussurean's argument that linguistic meaning is not inherent but emerges from systematic distinctions between elements [33, 34]. Ultimately, these phonemic contrasts in Xitsonga nouns illustrate the structured nature of language, where consonantal shifts serve as key mechanisms for differentiation.

5.2. Initial Consonant Minimal Pairs of Verbs

In Xitsonga, initial consonant minimal pairs involving verbs are pairs of words that differ only in their initial consonant sound while maintaining the same vowel and consonant structure in the rest of the word. These minimal pairs help distinguish meaning based on the contrast between initial consonants, as illustrated in **Table 2**.

The Xitsonga initial consonant minimal pairs of verbs illustrate how phonemic shifts in the initial consonant alter meaning while maintaining a similar phonological structure, as shown in **Table 2**. In *mila* (germinate) and *zila* (mourning), the bilabial nasal /m/ contrasts with the voiced alveolar fricative /z/, shifting the meaning from an agricultural or biological process to an emotional state. Likewise, *vonga* (praise, thank, express appreciation) and *songa* (roll up) differ in their initial sounds, with the labiodental fricative /v/ and the voiceless alveolar fricative /s/ distinguishing the meaning from an expression of gratitude to a physical action, illustrating how consonantal variation in verbs signals different processes. Similarly, the pair *bola* (decay, rot) and *fola* (stand in queue) contrasts the voiced bilabial stop /b/ with the voiceless labiodental fricative /f/, altering the meaning from decomposition to human behaviour. In *chela* (pour) and *phela* (spit), the voiceless palatal affricate /ʧ/ contrasts with the voiceless bilabial plosive /p/, differentiating intentional pouring from bodily fluid expulsion. Finally, *handzela* (to supply food during a famine) and *gandzela* (to honour ancestors or worship God) exhibit a contrast between the voiceless glottal fricative /h/ and the voiced velar plosive /g/, shifting the meaning from material support to a spiritual or religious practice. These examples highlight how initial consonant variations in Xitsonga minimal pairs influence verb semantics, reinforcing the role of phonemic contrast in distinguishing lexical meaning.

5.3. Medial Consonant Minimal Pairs in Xitsonga Nouns

Medial consonant minimal pairs in nouns are pairs of words that vary by only one consonant in the middle position while maintaining the same vowel and overall consonant structure. These differences create distinct meanings within the language. **Table 3** illustrates examples of Xitsonga noun minimal pairs that differ in their medial consonant sounds.

Table 3 presents examples of medial consonant minimal pairs in Xitsonga nouns, illustrating how a single consonantal change in the medial position can significantly alter word meaning. This phonological phenomenon highlights

Table 2. Xitsonga initial consonant minimal pairs of verbs.

Word	Phonemic Contrast	Semantic Contrast
Mila	/m/	[v] germinate
Zila	/z/	[v] mourning
Vonga	/v/	[v] praise, thank, express appreciation
Songa	/s/	[v] roll up
Bola	/b/	[v] decay, rot
Fola	/f/	[v] stand in queue
Chela	/c/	[v] pour
Phela	/p/	[v] spit
Handzeka	/h/	[v] to supply food during a famine
Gandzela	/g/	[v] to honour ancestors or worship God

Table 3. Medial consonant minimal pairs in Xitsonga nouns.

Word	Phonemic Contrast	Semantic Contrast
Xitolo	/t/	[n] store
Xikolo	/k/	[n] school
Feme	/m/	[n] firm
Fene	/n/	[n] fan
Mhisi	/s/	[n] hyena
Mhiri	/r/	[n] puffadder (snake)
Xibalo	/b/	[n] frequency
Xitalo	/t/	[n] tax or vat
Xirimo	/m/	[n] ploughing season
Xirilo	/l/	[n] wailing, outcry

the fundamental role of phonemes in shaping lexical distinctions[35]. It also aligns with Saussurean structuralist principles, which emphasise that linguistic meaning is derived from systematic phonemic differences. For instance, *xitolo* (store) and *xikolo* (school) contrast the voiceless alveolar stop /t/ with the voiceless velar stop /k/, distinguishing a commercial entity from an educational institution. Likewise, *feme* (firm) and *fene* (fan) illustrate the contrast between the voiced bilabial nasal /m/ and the voiced alveolar nasal /n/, shifting meaning from a business organisation to a device for air circulation. The minimal pair *mhisi* (hyena) and *mhiri* (puffadder [snake]) demonstrates the phonemic difference between the voiceless alveolar fricative /s/ and the voiced alveolar tap /r/, where a slight articulation shift results in two distinct animal species.

Additionally, the words *xibalo* (tax or vat) and *xitalo* (frequency) form a consonant minimal pair in Xitsonga, differing in their medial sounds—/b/, a voiced bilabial plosive, and /t/, a voiceless alveolar plosive. This phonemic distinction changes their meanings, with *xibalo* belonging to the economic domain and *xitalo* to measurement, highlighting the importance of sound differentiation in lexical distinction. These distinctions reinforce Saussurean's view that linguistic identity is relational, determined by differences rather than inherent properties[36]. Furthermore, in *xirimo* (ploughing season) and *xirilo* (wailing, outcry), the bilabial nasal /m/ contrasts with the alveolar lateral /l/, distinguishing an agricultural season from an emotional expression. These examples underscore the significance of medial consonant variations in Xitsonga, demonstrating how phonemic contrasts contribute to semantic differentiation and supporting the structuralist perspective that meaning emerges through phonological relationships within a language system.

5.4. Medial Consonant Minimal Pairs in Xitsonga Verbs

Medial consonant minimal pairs in verbs are pairs that differ by only one consonant in the middle of the word while retaining the same vowel and overall consonant structure. Similar to nouns, these contrasts play a crucial role in distinguishing meanings between words. **Table 4** illustrates examples of Xitsonga verb minimal pairs that exhibit differ-

Table 4. Medial consonant minimal pairs in Xitsonga nouns.

Word	Phonemic Contrast	Semantic Contrast
Futa	/t/	[v] to be careless
Fuwa	/w/	[v] to keep and breed stock
Miyeta	/t/	[v] to calm, comfort, or alleviate pain or stress
Miyela	/l/	[v] to remain silent
Celela	/l/	[v] to dig a hole for planting, burial, or other purposes
Cemela	/m/	[v] to cry in pain while seeking assistance.
Fadalala	/d/	[v] maldistribute wealth
Fafalala	/f/	[v] be observable from a distance
Onha	/n/	[v] damage, destroy
Orha	/r/	[v] bask

ences in their medial consonant sounds.

Table 4 highlights how subtle shifts in the medial consonant sounds of Xitsonga verbs can lead to significant changes in meaning. For instance, *futa* (to be careless) and *fuwa* (to keep and breed stock) contrast the voiced bilabial stop /t/ with the voiced labial glide /w/, differentiating a negative human characteristic from an agricultural activity. Similarly, *miyeta* (to calm, comfort, or alleviate pain or stress) and *miyela* (to remain silent) illustrate the shift between the voiceless alveolar stop /t/ and the voiced alveolar lateral /l/, changing the meaning from cessation of an action to a state of tranquillity. The pair *celela* (to dig a hole for planting, burial, or other purposes) and *cemela* (to cry in pain while seeking assistance) contrasts the voiceless velar stop /k/ with the voiced bilabial nasal /m/, altering the meaning from a physical task to an emotional reaction involving distress. In *fadalala* (maldistribute wealth) and *fafalala* (be observable from a distance), the contrast between the voiced alveolar stop /d/ and the voiceless labiodental fricative /f/ shifts the meaning from economic inequality to a state of visibility from a far. Lastly, *onha* (damage, destroy) and *orha* (bask) differentiate between the voiced alveolar nasal /n/ and the voiced alveolar liquid /r/, changing the meaning from an act of destruction to a relaxed activity involving warmth. These examples highlight how medial consonant shifts in Xitsonga verbs create distinct semantic distinctions, underscoring the importance of phonemes in shaping lexical meaning within the language.

5.5. Initial Consonant Minimal Pairs in Xitsonga Nouns and Verbs

In Xitsonga, consonant minimal pairs can appear in the initial position, where one word functions as a noun and the other as a verb. These pairs differ solely in their initial consonant, while the rest of the word structure remains unchanged. This distinction plays a crucial role in differentiating meanings and determining the lexical category of the word within the language. **Table 5** showcases examples of consonant minimal pairs in the initial position, featuring both nouns and verbs.

Table 5 illustrates that Xitsonga consonant minimal pairs, which include both nouns and verbs, can be found in the initial position. In the pair *mona* (surliness, bad temper) and *nona* (grow fat; to be fertile), the contrast between the bilabial nasal /m/ and the alveolar nasal /n/ shifts the meaning from a negative emotional state to a positive biological process. This highlights how a minor phonemic change can transform an abstract quality into a physical condition, demonstrating the role of consonantal differences in generating distinct meanings. Similarly, *xandza* (noise, uproar) and *pandza* (split, cleave, cut) contrast the voiceless velar fricative /x/ and the voiceless bilabial plosive /p/, altering the meaning from an auditory concept to a physical action. This shows how initial consonantal shifts can distinguish between sound-related phenomena and physical actions, underscoring the structural role of phonemes in categorising meanings. The pair *tiva* (pool, lake) and *yiva* (to steal) involves a contrast between the voiceless alveolar plosive /t/ and the voiced palatal glide /j/, transitioning the meaning from a natural or geographic concept (a body of water) to a morally or socially charged action (theft). This illustrates how consonantal differences can signify a shift from physical entities to actions with ethical or social connotations.

Additionally, in *jomela* (earthenware vessel used for drinking beer) and *gomela* (groan), the contrast between the voiced palatal affricate /dʒ/, and the voiced velar plosive /g/

Table 5. Examples of consonant minimal pairs in the initial position of nouns and verbs.

Word	Phonemic Contrast	Semantic Contrast
Mona	/m/	[n] surliness, bad temper
Nona	/n/	[v] grow fat, to be fertile
Xandla	/x/	[n] noise, uproar
Pandza	/p/	[v] split, cleave, cut
Tiva	/t/	[n] pool, lake
Yiva	/y/	[v] to steal
Jomela	/j/	[n] earthenware vessel mostly used to drink beer
Gomela	/g/	[v] groan
Manana	/m/	[n] mother
Banana	/b/	[v] to beat each other

shifts the meaning from a physical object to an emotional or physical response. This demonstrates how consonantal changes can switch between tangible items and expressive states, with each sound carrying unique social and functional implications, as well as defining distinct word categories. Furthermore, the pair *manana* (mother) and *banana* (to beat each other) contrasts the bilabial nasal /m/ with the bilabial plosive /b/, altering the meaning from a nurturing familial term to an aggressive action. This illustrates how consonantal distinctions can create sharp contrasts in lexical categories, transitioning from a nurturing role to a physical action. These examples highlight the importance of initial consonant shifts in shaping distinct meanings and word categories in Xitsonga, showcasing the significant role of phonemic contrasts in the structural organisation of the language.

5.6. Medial Consonant Minimal Pairs in Xitsonga Nouns and Verbs

Consonant minimal pairs in Xitsonga can also occur in the medial position, where one word is a noun and the other is a verb. These pairs differ by only a single consonant in the middle of each word, while the rest of the word structure remains the similar consonants and vowels. This type of contrast is also crucial in distinguishing meanings and lexical categories, allowing the language to create distinctions between nouns and verbs in Xitsonga. **Table 6** presents examples of consonant minimal pairs in the medial position, including both nouns and verbs.

Xitsonga demonstrates significant lexical contrasts through medial consonant minimal pairs, where a single phonemic variation alters meaning between verbs and nouns, as illustrated in **Table 6**. In *babalala* (to lie on one's stomach or to take a nap) and *babalaza* (hangover, shakiness), the distinction lies in the voiced alveolar lateral /l/ and the voiced alveolar fricative /z/. This phonemic difference shifts the meaning from a resting posture to a physiological discomfort, illustrating how subtle articulatory changes influence semantic interpretation. Likewise, *nyama* (to be sad, downhearted) and *nyala* (onion or antelope) contrast the voiced bilabial nasal /m/ and the voiced alveolar lateral /l/, transforming an emotional state into concrete noun referents. This contrast exemplifies how consonantal shifts in medial positions distinguish between abstract concepts and tangible entities.

In addition, the pair *mangala* (to lay a complaint to the authorities) and *manyala* (abomination, filth) differentiates between the voiced velar nasal /ŋ/ and the voiced palatal nasal /ɲ/, altering meaning from a formal legal process to a socially negative state. This distinction highlights the role of nasal consonants in differentiating institutional actions from terms associated with impurity. Similarly, *rima* (to cultivate with a hoe) and *riwa* (precipice, escarpment, or cantaloupe) contrast the voiced bilabial nasal /m/ and the voiced labial /w/, shifting meaning from an agricultural activity to either a geographical feature or an edible fruit. This showcases how medial consonant alternations contribute to lexical categorisation. Lastly, *qakaka* (preoccupation with something) and *qakala* (ankle) differ in the voiceless velar plosive /k/ and the voiced alveolar lateral /l/, demonstrating how a single phonemic change transitions meaning from a cognitive state to a body part. Collectively, these examples affirm that medial consonant variations are integral to Xitsonga's phonological system, emphasising the crucial role of phonemic contrasts in shaping semantic distinctions and lexical categorisation.

Table 6. Examples of consonant minimal pairs in the medial position of nouns and verbs.

Word	Phonemic Contrast	Semantic Contrast
Babalala	/l/	[v] to lie on one's stomach or to take a nap
Babalaza	/z/	[n] hangover, shakiness
Nyama	/m/	[v] to be sad, downhearted
Nyala	/l/	[n] onion or antelope
Mangala	/g/	[v] to lay a complaint in the authority
Manyala	/y/	[n] abomination, filth
Rima	/m/	[v] to cultivate with hoe
Riwa	/w/	[n] precipice, escarpment or cantaloupe
Qakaka	/k/	[v] to preoccupy something
Qakala	/l/	[n] ankle

6. Conclusions

This study explored minimal pairs of consonant sounds in Xitsonga, focusing on nouns and verbs. The analysis highlights how phonemic contrasts serve as essential mechanisms for semantic differentiation. By examining minimal pairs across these lexical categories, it becomes evident that variations in initial and medial consonants significantly alter meaning. These findings align with Saussurean structuralist principles, where meaning emerges from relational differences between phonemes. Due to Xitsonga's phonotactic constraints, minimal pairs involving final consonants are absent, reinforcing the language's preference for vowel endings. Examples such as vondlo versus kondlo, mhisi versus mhiri, and qakaka versus qakala illustrate how shifts in articulation impact lexical semantics, with changes in manner and place of articulation influencing meaning and lexical classification. This insight contributes to a deeper understanding of Xitsonga phonology and its implications for linguistic categorisation, lexical expansion, and language acquisition. Future research should extend this inquiry to vowel minimal pairs in Xitsonga. Since vowel distinctions play a crucial role in phonological contrasts, further exploration could reveal how phonemic variation influences meaning, particularly in morphophonemic processes and prosody. A study on vowel minimal pairs could investigate long and short vowels, diphthongs, and their effects on syllabic structure and tone.

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Data Availability Statement

The data supporting this study's findings are available from the corresponding author upon the request.

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Conflicts of Interest

The author confirms the absence of any conflicts of interest.

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