

Tonal Minimal Pairs in Xitsonga: A Study of Nouns and Verbs

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ABSTRACT

This study examined the role of tone in Xitsonga minimal pairs, focusing on nouns and verbs. Using a descriptive qualitative approach, it applied a desktop research method to analyse data from secondary sources such as published literature, dictionaries, grammar books and language texts. Data were purposively sampled and analysed by thematic analysis within the framework of Saussurean structural linguistics. The study identified four key patterns of tonal minimal pairs in Xitsonga. Tonal variation within nouns distinguishes meanings in words with identical segmental structures. In verbs, the tone differentiates forms and alters semantic interpretation. Pitch variation also functions as a marker between lexical categories, distinguishing nouns from verbs. Additionally, tonal minimal pairs appear in other categories, including ideophones, adverbs, and pronouns. These findings highlight the crucial role of tone in Xitsonga's linguistic system, reinforcing its significance in lexical classification and meaning differentiation. They also enhance the knowledge of Xitsonga's phonological system, offering insights into how tonal features can create contrasts within the language and inform future phonological and linguistic studies.

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INTRODUCTION

Tone plays a crucial role in African languages, serving as a fundamental component of phonological analysis and meaning differentiation. In linguistic terms, tone refers to the use of pitch variations in speech to distinguish the meaning or grammatical function of words.¹ It is a defining characteristic of tonal languages, where variations in pitch patterns can change the meaning of words, even when their segmental components (consonants and vowels) remain identical.² In tonal languages, pitch distinctions such as high, low, medium, rising, or falling serve as critical markers for differentiating words with identical phonetic structures.³ These tonal contrasts are integral to the linguistic system, allowing speakers to convey different meanings using the same segmental features.⁴ The mastery of tonal distinctions is essential for effective communication, as tone functions on a par with consonants and vowels in determining lexical

¹ Yi Xu, "Prosody, Tone, and Intonation," in *The Routledge Handbook of Phonetics*, ed. W.F. Katz and P.F. Assmann (New York: Routledge, 2019).

² Catherine T. Best, "The Diversity of Tone Languages and the Roles of Pitch Variation in Non-Tone Languages: Considerations for Tone Perception Research," *Frontiers in Psychology* 10 (February 26, 2019), <https://doi.org/10.3389/fpsyg.2019.00364>.

³ Jayne Mutiga, "Tone Marking in Kikamba: A Case for Improving Its Orthography," 2008.

⁴ Mutiga, "Tone Marking in Kikamba: A Case for Improving Its Orthography."

and grammatical meaning.⁵ Myers noted that beyond individual word meaning, tone also plays a significant role in morphological and syntactic structures in many African languages.⁶ It can also indicate tense, aspect, mood, or grammatical relationships, further underscoring its complexity and importance.⁷ Understanding tone is therefore essential for linguistic research, language documentation, and language teaching, particularly in Bantu languages, where tonal variation significantly influences both spoken and written communication.

Xitsonga, a Southern Bantu language spoken primarily in South Africa, as well as in parts of Mozambique, Zimbabwe and Eswatini, possesses a complex tonal system that plays a crucial role in both lexical and grammatical distinctions.⁸ As a two-tone language, Xitsonga differentiates between high and low tones, with these tonal variations significantly influencing the meaning of the word.⁹ The interaction between high and low tones, as well as their rising and falling contours, can also result in words with entirely distinct meanings. These tonal patterns are not merely prosodic features but are deeply embedded in the morphosyntactic structure of the language, shaping noun class systems, verb conjugations, and syntactic constructions. Notably, tonal variations in Xitsonga can transform words with identical consonant and vowel structures into terms belonging to the same or completely different grammatical categories.¹⁰ This phenomenon underscores the intricate role of tone in the language, making it a critical area of study for linguists, educators, lexicographers and language learners. Furthermore, mastering tonal distinctions is essential for accurate communication, as misapplication of tone can lead to semantic ambiguity or misinterpretation, highlighting the functional and communicative weight that tone carries in Xitsonga.

It is important to note that while tone in Xitsonga has been examined by scholars such as Lee, Lee and Selkirk and Lee and Riedel, research specifically focusing on tonal minimal pairs, words distinguished solely by tonal variation, remains scarce, especially in distinguishing between nouns and verbs.¹¹ Tonal minimal pairs are words that share identical segmental structures but differ in meaning due to tonal contrasts.¹² The lack of focused research on this phenomenon in Xitsonga presents challenges for linguists, educators, and language learners, as an unclear understanding of tonal minimal pairs can lead to misinterpretation, pronunciation difficulties, and communication barriers. It can also lead to lexical and structural ambiguity, as small tonal differences can alter word meanings and sentence structures, confusing interpretation.¹³ Therefore, this study aims to investigate tonal minimal pairs in Xitsonga, with a particular emphasis on nouns and verbs. The key objectives include identifying tonal minimal pairs within these word categories, analysing the tonal contrasts that differentiate them, and exploring their role in meaning distinction. The study is significant because it contributes to a deeper understanding of the Xitsonga phonology, specifically the function of tone. By examining tonal minimal pairs, this research will underscore the crucial role of tone in shaping the Xitsonga lexicon. Its findings could have practical implications for language teaching, aiding both learners and educators in distinguishing similar-sounding words that differ only in tone, thereby improving comprehension and communication. Additionally, the study may offer broader insights into tonal systems in Bantu languages, enhancing the understanding of their phonological structures and communicative functions.

⁵ Gail Jones et al., "Development of a Setswana Tonal Minimal Pair Word List as Research Tool," *South African Journal of African Languages* 38, no. 2 (2018): 127–35.

⁶ Scott Myers, "Phonetics of Tone (African Languages)," in *Oxford Research Encyclopedia of Linguistics*, 2024.

⁷ Irina Monich, "Morphology and Tone," in *Oxford Research Encyclopedia of Linguistics* (Oxford University Press, 2020), <https://doi.org/10.1093/acrefore/9780199384655.013.520>.

⁸ Seunghun J Lee and Clementinah Burheni, "Repair Strategies in Labial Dissimilation: Diminutive Formations in Xitsonga," *Stellenbosch Papers in Linguistics Plus* 44 (2014): 89–103.

⁹ Lee and Burheni, "Repair Strategies in Labial Dissimilation: Diminutive Formations in Xitsonga."

¹⁰ Seunghun J Lee, "Tonal Polarity and Paradigm Uniformity in the Nominal Paradigm of Xitsonga (S53)," *Studies in Phonetics, Phonology and Morphology* 19, no. 1 (2013): 107–23.

¹¹ Lee, "Tonal Polarity and Paradigm Uniformity in the Nominal Paradigm of Xitsonga (S53)."

¹² Saliu Shittu and Anne-Michelle Tessier, "Perceptual Attrition of Lexical Tone among L1 Yorùbáspeaking Children in Canada," in *Proceedings of the BUCLD*, vol. 39, 2014.

¹³ Colfar Hlongwana, "Ambiguity in Xitsonga" (University of Limpopo, 2015).

LITERATURE REVIEW

Minimal pairs have traditionally been central to phonetic and phonological studies, particularly in teaching pronunciation and linguistic analysis. However, research challenges their pedagogical effectiveness, their role in tone perception, and their utility in different languages. Levis and Cortes questioned the traditional reliance on minimal pairs in pronunciation teaching, arguing that phoneme-based misunderstandings are less frequent than assumed due to lexical and syntactic compensation.¹⁴ Their study, which analysed spoken corpora, revealed that many minimal pairs featured in instructional materials contain at least one word that is rarely used in natural speech, making their pedagogical value questionable. They advocated for a data-driven approach that prioritises high-frequency contrasts over artificial drills. This perspective aligns with contemporary corpus linguistics methodologies, which emphasise authentic language use rather than prescriptive phonetic drills. However, while their argument is compelling for languages with rich lexical and syntactic redundancy, its applicability to languages with fewer contextual cues, such as tone languages, remains uncertain.

Studies on tonal minimal pairs provide a different perspective on phonemic distinctions. Mohasi, Mixdorff and Niesler demonstrated that tone plays a critical role in meaning differentiation in Sesotho, a Southern Bantu language.¹⁵ Their acoustic analysis, using the Fujisaki model, revealed that high tones corresponded to distinct tone commands, whereas low tones were often achieved through phrase contours or creaky voice. For example, the words *bóllá* (to be circumcised) and *bòllà* (to decay) demonstrated how high and low tones alter meaning, with *bóllá* showing a sustained high tone command and *bòllà* aligning with a lower phrase contour. Notably, they also identified a significant discrepancy in tone production between reading and repeating tasks, underscoring the challenges posed by the lack of tonal markers in Sesotho orthography. This highlights the need for tone-inclusive pedagogical strategies, particularly in literacy and second-language instruction.

Lee expanded on the complexity of tonal systems by examining tonal polarity in Xitsonga within the framework of the Obligatory Contour Principle.¹⁶ The study illustrated that tonal polarity in noun and verb morphology is not a uniform process but rather influenced by phonological constraints. The analysis of plural formation in Xitsonga revealed that the tonal variation depends on morphological structures, with some words maintaining tonal uniformity while others undergo tonal shifts. For example, when a noun like *mú-gáyó* (mealie meal) takes a plural prefix, it becomes *mí-gáyó* (mealie meals), where the prefix retains the same tone as the root. However, in cases like *nàwù* (law), the plural form *mí-làwù* (laws) exhibits tonal polarity, where the high-toned plural prefix /*mí-*/ contrasts with the low-toned singular stem. This underscores the importance of constraint-based phonological theories in understanding tonal interactions. Additionally, Lee's suggestion that Xitsonga orthography should primarily mark high tones raises important considerations for the development of writing systems for tone languages.

In contrast, Jones et al. focused on practical applications of tonal minimal pairs by developing a validated word list for Setswana, a two-level tone language.¹⁷ The study highlighted how tone patterns, such as high-low tone *kábà* (to plug or cork) versus low-low tone *kàbà* (to shoulder) shape lexical meaning. The final validated list included pairs such as *pàpà* (father) and *pápà* (porridge), ensuring that natural tone distinctions were represented. Their study emphasised inconsistencies in tone perception among speakers, particularly in urban environments influenced by code-switching and "Street Setswana". The variability in tone perception suggests that exposure to multiple linguistic environments affects phonemic awareness, reinforcing the idea that sociolinguistic factors shape phonological competence. This insight challenges assumptions of linguistic uniformity and raises important questions about how tone should be standardised in educational and clinical settings. Moreover, the findings suggest that phonological models must account for real-world variability and not rely solely on idealised or rural speech forms. This is especially relevant for speech pathology, where incorrect assumptions about tonal

¹⁴ John Levis and Viviana Cortes, "Minimal Pairs in Spoken Corpora: Implications for Pronunciation Assessment and Teaching," *Towards Adaptive CALL: Natural Language Processing for Diagnostic Language Assessment* 197208 (2008).

¹⁵ Lehlohonolo Mohasi, Hansjörg Mixdorff, and Thomas Niesler, "An Acoustic Analysis of Tone in Sesotho.," in *ICPhS*, vol. 17, 2011, 17–21.

¹⁶ Lee, "Tonal Polarity and Paradigm Uniformity in the Nominal Paradigm of Xitsonga (S53)."

¹⁷ Jones et al., "Development of a Setswana Tonal Minimal Pair Word List as Research Tool."

constancy may lead to misdiagnoses, and for language revitalisation efforts, where artificially fixed tone systems may fail to capture the living language as spoken by diverse communities. In this light, the work of Jones et al. contributes to a more dynamic understanding of tone, urging linguists to integrate sociolinguistic realities into phonological analysis and applied language planning.

The pedagogical role of minimal pairs extends beyond Bantu languages, as demonstrated by Wahyuni and Indraswari, who assessed their effectiveness in teaching Japanese pronunciation. Their study addressed challenges in distinguishing phonemes such as *sha/sa*, *ja/za*, *tsu*, long vowels, double consonants, and nasal sounds.¹⁸ Employing a quasi-experimental approach, they implemented the technique in a controlled classroom setting and evaluated students' progress using pre- and post-tests. The results indicated a significant improvement in phoneme recognition and articulation, confirming the effectiveness of the technique. However, the learners struggled most with consonantal contrasts absent in their native language, particularly the differentiation between *sa* and *sha* among Indonesian speakers. Although the students initially perceived the technique as repetitive, they later acknowledged its benefits in strengthening the precision of the pronunciation. The researchers concluded that while minimal pairs were useful for pronunciation training, they needed to be supplemented with engaging instructional strategies to sustain student interest. This aligns with Levis and Cortes's critique of minimal pairs as an isolated teaching tool, reinforcing the need for contextually meaningful pronunciation training.¹⁹

Further examining perception, Sugiyama investigated how Japanese speakers identify pitch accent minimal pairs in noise-vocoded speech.²⁰ The study revealed that listeners relied on secondary cues such as duration and intensity in the absence of fundamental frequency cues (F0). This challenges the assumption that pitch accent perception is solely dependent on F0, suggesting that speech perception involves multiple acoustic dimensions. For example, in distinguishing between *haná* (flower) and *hana* (nose), participants relied on subtle variations in intensity and duration. The study also found that perception accuracy decreased as speech degradation increased, challenging the assumption that fundamental frequency was the sole determinant of pitch accents. These findings highlight the perceptual flexibility of listeners and the robustness of linguistic systems, which often provide multiple cues to ensure comprehension under adverse conditions. Furthermore, the results call for a reevaluation of monolithic models of pitch accent perception that prioritise F0 over other acoustic features. By demonstrating the role of duration and intensity, Sugiyama's study supports a more integrated, multidimensional approach to prosody in speech processing. This is especially relevant for the design of assistive technologies, such as cochlear implants and text-to-speech systems, which must accommodate the complexity and redundancy of acoustic signals to improve user experience and intelligibility. The study also opens the door to cross-linguistic comparisons, prompting questions about whether similar perceptual strategies exist in other tone or pitch accent languages, and how these might inform universal models of speech perception.

Phonemic contrasts in multilingual contexts present additional challenges. Ahmad, Bello and Stephen explored Hausa speakers' difficulties in distinguishing English minimal pairs, attributing pronunciation errors to phonological differences between the two languages.²¹ Their contrastive analysis indicated that vowel contrasts posed the greatest challenge, as Hausa's phonological system does not always distinguish short and long vowels in the same manner as English. Their study was based on observations that Hausa speakers had difficulty distinguishing English minimal pairs, often pronouncing words such as 'peak' and 'pick' or 'goat' and 'gut' as homophones. Additionally, tone played a crucial role in Hausa, affecting lexical meaning more than segmental differences. For instance, the words *korá* (chase) and *korà* (infection) and *damá* (opportunity) and *damà* (to steer) in Hausa differed in meaning due to tonal variation rather than phonemic contrast. This aligns with research on cross-linguistic phonetic

¹⁸ Yuli Wahyuni and Thamita Islami Indraswari, "The Effectiveness of the Minimal Pairs Technique in Learning Japanese Pronunciation," *Journal of Japanese Language Education and Linguistics* 6, no. 1 (February 26, 2022): PRESS, <https://doi.org/10.18196/jjlel.v6i1.13879>.

¹⁹ Levis and Cortes, "Minimal Pairs in Spoken Corpora: Implications for Pronunciation Assessment and Teaching."

²⁰ Yukiko Sugiyama, "Identification of Minimal Pairs of Japanese Pitch Accent in Noise-Vocoded Speech," *Frontiers in Psychology* 13 (May 31, 2022), <https://doi.org/10.3389/fpsyg.2022.887761>.

²¹ Shehu Ibrahim Ahmad, Ubaidallah Muhammad Bello, and Jatau Stephen, "Meaning Generation Through Minimal Pairs Situations in Hausa and English Languages," *Journal of Language and Linguistics* 8, no. 1 (2023): 213.

interference, suggesting that second-language learners require targeted phonetic instruction to overcome language-specific constraints.

Finally, Onuoha and Uba examined minimal pair perception in Igbo using a multimodal approach.²² Contrary to the McGurk effect, which posits that speech perception integrates auditory and visual information, their study found that Igbo speakers primarily relied on auditory cues, even when tone was a differentiating factor. For instance, native speakers can reliably distinguish minimal pairs such as *óru* (work) and *ókú* (fire), *ényí* (elephant) and *ényì* (friend), as well as *ìgbé* (box) and *ìgbó* (Indian hemp) by relying solely on auditory cues. This suggests that multimodal perception theories may not universally apply to tonal languages, where linguistic experience plays a greater role in phonemic distinction. The findings imply that in tonal languages, the auditory system may be more finely attuned to pitch variations due to early and sustained exposure, diminishing the reliance on visual cues. Moreover, this research challenges the cross-linguistic generalisability of models like the McGurk effect, which are often based on non-tonal language data. It suggests that the weighting of sensory inputs in speech perception may be language-specific, shaped by the phonological demands of the linguistic environment. This has important implications for the design of language learning tools, speech therapy interventions, and artificial intelligence systems, which must consider that tone language speakers may not benefit equally from visual aids in contexts where tone is central to meaning. Therefore, the study by Onuoha and Uba adds an important dimension to understanding of speech perception by highlighting how tonal linguistic structures condition perceptual strategies in ways that diverge from dominant western models.

The reviewed literature highlights the diverse functions of minimal pairs in languages, ranging from pronunciation training to tonal analysis and speech perception. Furthermore, phonological and sociolinguistic factors play a crucial role in shaping the perception of tonal minimal pairs, underscoring the importance of language-specific approaches in linguistic research and instruction. However, this topic appears to have received limited attention from Xitsonga scholars. To address this gap and contribute to the existing body of knowledge, this study investigates tonal minimal pairs in Xitsonga, focusing specifically on nouns and verbs. Ultimately, the findings of this research will improve the understanding of tonal distinctions in Xitsonga and support more effective linguistic analysis and instruction.

THEORETICAL FRAMEWORK

This study is based on Saussurean structural linguistics, a theory introduced by Ferdinand de Saussure in the early 20th century. Saussure's framework views language as a structured system of signs, where meaning emerges through differences and relationships between elements rather than direct associations with referents.²³ Arzhanghi noted that each sign comprises a signifier (the spoken or written form) and a signified (the concept it represents).²⁴ This perspective is essential in analysing tonal minimal pairs of nouns and verbs in Xitsonga, a Bantu language where tone plays a crucial role in distinguishing meaning.²⁵ Words with identical consonants and vowels can have entirely different meanings based solely on tonal variation. By applying Saussure's principle of difference, this study examines how tonal distinctions create lexical contrasts, forming minimal pairs that differ only in tone. Additionally, the distinction between *langue* (the structured system of language) and *parole* (individual speech acts) is central to this analysis, as the study focuses on systematic tonal patterns rather than individual speech variations.²⁶ By identifying these tonal contrasts and their impact on meaning, this research improves the structural understanding of the Xitsonga phonology, reinforcing the systematic principles that govern its sound system.

²² Chinenye Esther Onuoha and Ebele Deborah Uba, "An Analysis of Minimal Pairs in Igbo Using a Multimodal Approach to Speech Perception," *UJAH: Unizik Journal of Arts and Humanities* 25, no. 1 (June 21, 2024): 31–50, <https://doi.org/10.4314/ujah.v25i1.2>.

²³ Marcel Danesi, "Saussure's View of Language as a System of Arbitrary Signs.," *Language & Semiotic Studies* 8, no. 1 (2022).

²⁴ Sonia Arzhanghi, "Analyzing the Linguistic Perspective of Ferdinand De Saussure with the Structuralism Approach in 21st Century," *Oriental Art and Culture* 5, no. 3 (2024): 116–27.

²⁵ Seunghun J Lee and Kristina Riedel, "Recursivity and Focus in the Prosody of Xitsonga DPs," *Languages* 8, no. 2 (2023): 150.

²⁶ Feifei Zhou, "Saussure: Langue as an Autonomous System," in *Models of the Human in Twentieth-Century Linguistic Theories: System, Order, Creativity* (Springer, 2020), 13–26.

METHODOLOGY

This study adopted a descriptive qualitative design to explore and analyse tonal minimal pairs of nouns and verbs in Xitsonga. This approach is suitable for research that seeks to develop an in-depth understanding of a phenomenon by examining its characteristics without altering the variables.²⁷ A desktop research method was used for data collection, drawing on secondary sources such as published literature, dictionaries, grammar books, and other relevant texts. These sources provided a solid foundation for identifying and analysing minimal pairs within Xitsonga's phonological system. To ensure data reliability, purposive sampling was used, enabling the selection of accessible and relevant linguistic materials.²⁸ This facilitated the systematic study of tonal contrasts in Xitsonga words that share identical segmental structures but differ in tone. The data were analysed using thematic analysis, a qualitative method that identifies and interprets recurring patterns in the linguistic data.²⁹ (Dawadi 2020). This involved categorising minimal pairs based on tonal variation and examining their role in distinguishing meaning. Patterns in tone distribution and phonological structures were carefully assessed to provide insights into the systematic nature of tonal contrast in Xitsonga. Beyond secondary sources, the researcher incorporated intuitive knowledge as a native Xitsonga speaker to supplement data collection and analysis. This introspective approach allowed for a deeper understanding of tonal distinctions, particularly in cases where secondary sources were limited or ambiguous.³⁰ The linguistic expertise of the researcher and familiarity with Xitsonga's tonal system further enhanced the validity of the data and findings.

PRESENTATION OF FINDINGS AND DISCUSSION

This section presents and analyses tonal minimal pairs in Xitsonga, focusing on how tonal variations influence word meaning and grammatical classification of nouns and verbs. The analysis is structured into four key areas: tonal minimal pairs involving nouns, tonal minimal pairs involving verbs, tonal minimal pairs distinguishing nouns from verbs, and tonal minimal pairs where nouns and verbs contrast with other lexical categories. By examining these tonal distinctions, the study highlights the critical role of tone in Xitsonga's linguistic system and its impact on meaning differentiation. The tables are structured into three columns: lexical items, phonemic distinctions, and semantic contrast.

Tonal minimal pairs involving nouns

Tonal minimal pairs in nouns consist of word pairs with identical segmental structures but distinct meanings due to tonal differences. These tonal variations can signal differences in lexical meaning, grammatical roles, or morphological distinctions.³¹ Understanding such noun-based tonal minimal pairs is crucial for accurate pronunciation, comprehension, and linguistic analysis, as demonstrated in Table 1.

Table 1: Xitsonga tone-based minimal pairs of nouns

Lexical Items	Phonemic Distinctions	Semantic Contrast
Nsele	/nsélé/ with the high tone	[n] cruelty, wickedness
Nsele	/nsèlè/ with the low tone	[n] hole
Mavele	/mávélé/ with the high tone	[n] corns, maize, crops
Mavele	/màvèlè/ with the low tone	[n] breasts
Musi	/músí/ with the high tone	[n] smoke
Musi	/mùsì/ with the low tone	[n] pestle
Matimba	/mátimbá/ with the high tone	[n] power, strength
Matimba	/màtimbà/ with the low tone	[n] sweet cane

²⁷ Vickie A Lambert and Clinton E Lambert, "Qualitative Descriptive Research: An Acceptable Design," *Pacific Rim International Journal of Nursing Research* 16, no. 4 (2012): 255–56.

²⁸ Heather Ames, Claire Glenton, and Simon Lewin, "Purposive Sampling in a Qualitative Evidence Synthesis: A Worked Example from a Synthesis on Parental Perceptions of Vaccination Communication," *BMC Medical Research Methodology* 19, no. 1 (2019): 26.

²⁹ Saraswati Dawadi, "Thematic Analysis Approach: A Step by Step Guide for ELT Research Practitioners," *Journal of NELTA* 25, no. 1–2 (December 31, 2020): 62–71, <https://doi.org/10.3126/nelta.v25i1-2.49731>.

³⁰ Jeffrey Maynes and Steven Gross, "Linguistic Intuitions," *Philosophy Compass* 8, no. 8 (2013): 714–30.

³¹ Irina Monich, "Morphology and Tone." In *Oxford Research Encyclopedia of Linguistics*. 2020.

Makovo	/mákóvó/ with the high tone	[n] supraorbitals
Makovo	/màkòvò/ with the low tone	[n] grain

Table 1 illustrates how tonal variation in Xitsonga differentiates the meanings of identical segmental structures, particularly among nouns. In Xitsonga, like other Bantu languages, tone serves as a phonemic feature that distinguishes lexical items. Minimal pairs that rely on tone highlight its importance in the language's phonological system.³² For instance, the pair *nsélé* (cruelty, wickedness) and *nsèlè* (hole) illustrate how the high tone on both syllables of *nsélé* contrasts with the low tone on *nsèlè*, leading to distinct meanings despite identical segmental structures. Similarly, *mávélé* (corns, maize, crops) with a high tone on both syllables of the stem is phonemically distinct from *màvèlè* (breasts), where both syllables of the stem carry a low tone. These examples reveal that tonal variation alone can function as a distinguishing feature in Xitsonga nouns. Another illustrative example is *músí* (smoke) versus *mùsì* (pestle), where the presence of a high tone on both syllables in *músí* alters its lexical meaning compared to *mùsì*, which carries a low tone on both syllables. The significance of tone is further exemplified in the pair *mátimbá* (power, strength) versus *màtimbà* (sweet cane). The high tone on *mátimbá* differentiates it from *màtimbà*, where the tonal structure shifts the semantic interpretation in separating abstract notions from tangible items. This phenomenon also aligns with the principles of structural linguistics as articulated by Ferdinand de Saussure. Moreover, the pair *makóvó* (supraorbitals) and *makòvò* (grain) further illustrates the importance of tonal contrast as a key distinguishing feature. Although both are nouns, the high tones on both syllables in *makóvó* convey a different lexical meaning from *makòvò*, which is marked by low tones on both syllables. This pattern highlights that Xitsonga's tonal system functions similarly to segmental phonemes, reinforcing its phonemic role. These examples of tonal minimal pairs in nouns also illustrate tone's significance in phonological structure and semantic distinction, highlighting its relevance in linguistic analysis, language learning, and lexicography. This is in line with Saussure's structural linguistics, highlighting the need to incorporate tone in phoneme-based studies.

Tonal minimal pairs involving verbs

Tonal minimal pairs in verbs refer to verb forms that have the same segmental structure but differ in meaning due to tonal variation. Similar to nouns, these tonal contrasts impact the interpretation of actions, influencing speech clarity, communication, and grammatical precision in verb usage.³³ A clear understanding of tonal minimal pairs in verbs is essential for mastering verb conjugation, sentence formation, and overall fluency in Xitsonga, as illustrated in Table 2.

Table 2: Xitsonga tone-based minimal pairs of verbs

Lexical Items	Phonemic Distinctions	Semantic Contrast
Kama	/kámá/ with the high tone	[v] to comb
Kama	/kàmá/ with low tone /kà/ and high tone /má/	[v] to rinse, squeeze, wring
Venga	/véngá/ with the high tone	[v] to hate, dislike
Venga	/vèngà/ with the low tone	[v] to slice (meat)
Phuma	/phúmá/ with the high tone	[v] to bud, blossom
Phuma	/phùmà/ with the low tone	[v] the infiltration of the cold
Hola	/hólá/ with the high tone	[v] to earn (to receive wage or salary)
Hola	/hòlà/ with the low tone	[v] to heal, cure
Ringa	/rínɡá/ with the high tone	[v] crowing of rooster or cock
Ringa	/rínɡà/ with the low tone	[v] to taste, test, tempt

³² Monich, "Morphology and Tone."

³³ Liqun Liu et al., "How Tone, Intonation and Emotion Shape the Development of Infants' Fundamental Frequency Perception," *Frontiers in Psychology* 13 (June 3, 2022), <https://doi.org/10.3389/fpsyg.2022.906848>.

The tone in Xitsonga also plays a vital role in distinguishing the meaning of verbs, as evident in Table 2. The difference between *kámá* (to comb) and *kàmá* (to rinse, squeeze, wring) highlights the impact of tonal shifts. The first verb carries a high tone throughout, while the second begins with a low tone on /kà/ and ends with a high tone on /má/. This variation significantly alters the meaning, distinguishing an action related to grooming from one associated with liquid extraction. Similarly, the pair *véngá* (to hate, dislike) and *vèngà* (to slice [meat]) shows how tonal variation alters meaning. The former, with high tones, conveys an emotional or psychological state, while the latter, with low tones, refers to a physical action. Tonal distinction is essential, as meanings are unrelated and could lead to misinterpretation if incorrectly pronounced.³⁴ A similar pattern is observed in *phúmá* (to bud, blossom) versus *phùmà* (the infiltration of cold). The high-toned verb relates to plant growth and flourishing, while the low-toned form describes an environmental or physiological effect. The pair *hólá* (to earn [to receive a wage or salary]) versus *hòlà* (to heal, cure) also demonstrates the tonal influence on meaning. In this case, the high-tone form pertains to financial gain, whereas the low-tone variant refers to physical well-being. The shift in tone, therefore, differentiates between economic and health-related contexts. Likewise, the verbs *ríngá* (crowing of a rooster) and *rìngà* (to taste, test, tempt) exemplify how tone changes the meaning of words in Xitsonga. The high-toned verb describes a natural auditory event, while the low-toned form relates to sensory evaluation or examination. These examples demonstrate that tone in Xitsonga verbs is not merely a phonetic feature but a crucial semantic marker. The distinction between high and low tones ensures clarity in communication, emphasising the need for speakers to be aware of tonal variations.³⁵ Therefore, mastering tonal variation in Xitsonga verbs is essential for ensuring clarity, preserving meaning, enhancing fluency and preventing ambiguity in the language.

Tonal minimal pairs involving nouns and verbs

In Xitsonga, tonal minimal pairs involving nouns and verbs are word pairs with identical segmental structures but distinct meanings due to tonal variation, where one functions as a noun and the other as a verb. In these cases, pitch differences alone differentiate lexical categories, emphasising the importance of tone in grammatical classification and semantic interpretation.³⁶ This phenomenon highlights the intricate role of tone in Xitsonga's linguistic system, as shown in Table 3.

Table 3: Xitsonga tone-based minimal pairs involving nouns and verbs

Lexical Items	Phonemic Distinctions	Semantic Contrast
Chela Chela	/chélá/ with the high tone /chèlà/ with the low tone	[n] frog, toad [v] to pour
Nyanga Nyanga	/nyàngà/ with the low tone /nyángá/ with the high tone	[n] snobbishness, priggishness, conceit [v] to seek or choose carefully, examine
Gova Gova	/góvá/ with the high tone /gòvà/ with the low tone	[v] to bend [n] gorge, valley
Tiva Tiva	/tívá/ with the high tone /tìvà/ with the low tone	[v] to know [n] lake
Phanga Phanga	/phàngà/ with the low tone /phángà/ with high tone /phá/ and low tone /ngà/	[v] to take greedily [n] seed of palm used to make snuffbox

Tone in Xitsonga also serves as a crucial linguistic feature that differentiates meaning across various nouns and verbs, as demonstrated in Table 3. These minimal pairs also showcase the systemic

³⁴ Siriluck H Phonphanich and Somsonge Burusphat, "The Positive and Negative Effects of Tonal L1 on the Acquisition of Tonal L2: A Case of the Standard Thai Tones and the Chinese Zhuang Learners," *LEARN Journal: Language Education and Acquisition Research Network* 14, no. 2 (2021): 28–58.

³⁵ Tuong Tu Huu et al., "Mispronunciation Detection and Diagnosis Model for Tonal Language, Applied to Vietnamese," in *Proc. INTERSPEECH*, vol. 2023, 2023, 1014–18.

³⁶ Vance Schaefer and Isabelle Darcy, "Lexical Function of Pitch in the First Language Shapes Cross-Linguistic Perception of Thai Tones," *Laboratory Phonology* 5, no. 4 (2014): 489–522.

function of tone in Xitsonga, reinforcing Saussurean principles of structural linguistics, which emphasise how linguistic units gain meaning through their relationships to other units within a system. For example, the contrast between *chélá* (frog, toad) with a high tone and *chèlà* (to pour) with a low tone highlights how tonal differences alone can distinguish a noun from a verb, changing the word's semantic category. A similar trend is observed in *nyàngà* (snobbishness, priggishness, conceit) as a noun with a low tone and *nyángá* (to seek or choose carefully, examine) as a verb with a high tone. Here, the change in tone significantly alters the meaning, illustrating how tonal variation is a key lexical differentiator in the language. The pair *góvá* (gorge, valley) and *gòvâ* (to bend) further reinforces this pattern, where *góvá* (a noun) carries a high tone, denoting a geographical feature, while *gòvâ* (a verb) with a low tone represents an action. This distinction highlights the role of tone in marking not only grammatical categories but also conceptual contrasts between static entities and dynamic processes.³⁷

However, an exception to this trend is observed in *tívá* (to know) and *tìvâ* (lake), where the verb *tívá* carries a high tone, while the noun *tìvâ* takes a low tone. This suggests that in some cases, high tone may also be associated with cognitive or mental actions, not just nominal forms. Lastly, the pair *phàngà* (to take greedily) and *phángà* (seed of palm used to make a snuffbox) presents a more complex tonal pattern, where *phángà* has a high tone on the first syllable and a low tone on the second. This tonal variation within the noun and verb itself may serve a lexical differentiation function, ensuring clarity in spoken communication.³⁸ These examples illustrate how Xitsonga speakers rely on tonal distinctions to convey distinct meanings, reinforcing the Saussurean view that meaning in language arises from the systematic contrasts between units. Thus, the tonal minimal pairs in Xitsonga serve as prime examples of how a language's structure is governed by the relational differences between its phonemic elements, in this case, tone, contributing to a coherent system of meaning.

Tonal minimal pairs involving nouns and verbs with other lexical categories

Tonal minimal pairs involving nouns and verbs along with other lexical categories consist of words with identical segmental structures but different meanings due to tonal variation. In these instances, a noun or verb is paired with another lexical category, such as an ideophone, an adverb, or pronoun, with only pitch differences alone distinguishing its classification and meaning. Mastering these tonal minimal pairs is crucial for accurate comprehension, pronunciation, and effective communication. Table 4 presents examples of tonal minimal pairs involving nouns and verbs alongside other lexical categories in Xitsonga.

Table 4: Xitsonga tone-based minimal pairs involving nouns and verbs with other lexical categories

Lexical Items	Phonemic Distinctions	Semantic Contrast
Barara Barara	/bárará/ with the high tone /bàràrà/ with the low tone	[n] species of big toad living in mud [ideo] lie asprawl as a fledgling
Chefu Chefu	/chéfú/ with the high tone /chèfù/ with the low tone	[n] poison [ideo] the sound generated when large quantities of soil are being stirred
Vona Vona	/vóná/ with high low /vòná/ with low tone /vò/ and high tone /ná/	[v] to see [pron] they
Hala Hala	/hálá/ with high low /hálà/ with high tone /há/ and low tone /là/	[v] scrape [adv] there

The tonal distinctions in Xitsonga minimal pairs extend beyond nouns and verbs to include other lexical categories such as ideophones, pronouns, and locative adverbs, as shown in Table 4. For example,

³⁷ Alexis Michaud and Jacqueline Vaissière, "Tone and Intonation: Introductory Notes and Practical Recommendations," *KALIPHO-Kieler Arbeiten Zur Linguistik Und Phonetik* 3 (2015): 43–80.

³⁸ M. Gail Jones, Ann Howe, and Melissa J. Rua, "Gender Differences in Students' Experiences, Interests, and Attitudes toward Science and Scientists," *Science Education* 84, no. 2 (March 2000): 180–92, [https://doi.org/10.1002/\(SICI\)1098-237X\(200003\)84:2<180::AID-SCE3>3.0.CO;2-X](https://doi.org/10.1002/(SICI)1098-237X(200003)84:2<180::AID-SCE3>3.0.CO;2-X).

the pair *bárará* (species of big toad living in mud) and *bàràrà* (lie sprawl as a fledgling) demonstrates how tone can alter the meaning of words and distinguish between different parts of speech, specifically nouns and ideophones. Similarly, the pair *chéfú* (poison) and *chèfù* (the sound made when large quantities of soil are being stirred) shows how tone influences meaning: the high tone in *chéfú* marks it as a noun, referring to a tangible substance, while the low tone in *chèfù* categorises it as an ideophone, representing a sound effect. This contrast highlights the role of tone in differentiating between concrete entities and expressive linguistic forms that convey sensory experiences.

Furthermore, the pair *vóná* (to see) and *vóná* (they) demonstrate tonal differentiation between a verb and an absolute pronoun. The verb *vóná* carries a high tone in both syllables, emphasising an active perceptual process, while *vóná* as a pronoun follows a tonal pattern where *vò* is low and *ná* is high. This mixed-tone structure suggests that tonal shifts within pronouns may serve to enhance clarity and maintain distinctions within pronominal systems. Such variations underscore the complexity of Xitsonga's tonal system, where tone not only distinguishes lexical categories but also contributes to morphosyntactic organisation.³⁹ In the pair *hálá* (scrape) and *hálà* (there), the tonal contrast differentiates between a verb and a locative adverb. The verb *hálá* with a high tone signifies an action, aligning with the tendency for high tones to mark dynamic processes. In contrast, the locative adverb *hálà* exhibits a high-low tonal pattern (*há* high, *là* low), which may function as a phonological cue to indicate spatial reference. This pattern suggests that locative expressions in Xitsonga can exhibit tonal variation that helps them distinguish them from verbs with similar phonetic forms. These tone-based minimal pairs illustrate the systematic role of tone in Xitsonga's lexical differentiation. The interplay of high and low tones in different word categories, such as nouns, verbs, ideophones, pronouns, and adverbs, demonstrates how tone functions as an essential grammatical and semantic feature in the language. The presence of mixed-tone patterns within certain pronouns and adverbs further highlights the complexity of Xitsonga's tonal system, where tonal contrasts contribute to both lexical meaning and syntactic structure.

CONCLUSION

This study has underscored the pivotal role that tone plays in the Xitsonga, particularly in distinguishing both lexical meaning and grammatical categories. Through a systematic analysis of tonal minimal pairs, it has been clearly illustrated that tonal variation in Xitsonga is not just a phonetic phenomenon but functions as a core phonemic feature of the language. Tone operates alongside consonants and vowels to differentiate words that share identical segmental compositions, thereby enriching the phonological inventory of Xitsonga. This finding reinforces the idea that tone is not an optional or peripheral feature, but rather a central component of the structural system of the language. The study concentrated on four principal areas, each illustrating the impact of tone on semantic interpretation and grammatical classification: tonal minimal pairs among nouns, tonal minimal pairs among verbs, tonal contrasts distinguishing nouns from verbs, and tonal minimal pairs where both nouns and verbs contrast with other lexical categories such as pronouns, ideophone or adverbs. Each of these categories revealed how subtle changes in pitch could lead to significant shifts in meaning or grammatical function, thereby affirming the functional load of tone in Xitsonga. Moreover, the analysis revealed a striking pattern: the majority of tonal minimal pairs in both nouns and verbs tend to be bisyllabic. This recurring pattern suggests that two-syllable structures are particularly conducive to tonal differentiation, possibly due to their optimal length for the perception and production of tonal contrast. This observation also highlights the intricate relationship between syllable structure and tonal realisation, offering new insights into the phonological architecture of Xitsonga. The findings align closely with structuralist linguistic theories, particularly the Saussurean view that the elements of a language derive their value from their relational differences within a system. Tone, in this context, functions relationally by distinguishing words not through intrinsic meaning but through oppositions to other tonal patterns. Furthermore, the results corroborate existing research in Bantu phonology, where tone is consistently identified as a fundamental distinguishing feature. The tonal system of Xitsonga appears to share several typological characteristics with those of other Bantu

³⁹ Yolanda Rivera-Castillo and Lucy Pickering, "Phonetic Correlates of Stress and Tone in a Mixed System.," *Journal of Pidgin & Creole Languages* 19, no. 2 (2004).

languages, further situating Xitsonga within this broader linguistic family. Future research could profitably examine how tone interacts with morphological processes such as affixation and reduplication, as well as with syntactic structures including sentence types and clause boundaries. Such research would deepen understanding of the interface between phonology, morphology, and syntax in Xitsonga, contributing to a more comprehensive account of the language's linguistic complexity.

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