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Cameroonian Local Languages as an Asset for Mastering Chinese Tone

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Abstract

This study investigates the acquisition of Mandarin lexical tones among beginner-level learners of Chinese in Cameroon, with particular emphasis on the influence of first language background on tonal perception and production. Using acoustic analyses based on Praat and statistical interpretation via SPSS, the research examines tonal errors in two groups of learners — notably Group A (speakers of tonal languages such as Bamun from Grassfield, Ewondo, Duala, and Bassa) and Group B (speakers of non-tonal languages__ whose daily communication languages are French/English/Arabic/Fulfulde) — and explores how linguistic, environmental, pedagogical, and individual factors shape tone acquisition.

Results show that while tonal acquisition poses significant challenges for all learners, error types and acquisition patterns vary according to linguistic background. Group A learners demonstrate relatively higher tonal sensitivity but often display substitution errors and sandhi misapplications due to transfer from complex native tonal systems. Group B learners, by contrast, struggle with tonal neutralization, contour simplification, and category confusion, reflecting the absence of lexical tone categories in their first languages and the predominance of stress-based prosodic systems.

Building on these findings, the study proposes a dual pedagogical approach. First, integrating local language awareness into tone instruction helps tonal-language speakers transfer existing phonological knowledge to Mandarin. Second, targeted strategies for non-tonal learners — including intensive perception training, functional explanations of tone, gesture-based teaching, and staged progression from controlled practice to communicative use — address specific cognitive and perceptual barriers.

By linking linguistic theory to classroom practice, this research contributes to the field of second language phonology and offers practical solutions for improving Mandarin tone acquisition in multilingual African contexts, highlighting the value of culturally and linguistically responsive teaching strategies.

Key words

Cameroon; local languages; Chinese (Mandarin); tones; pronunciation ; L1 transfer; phonology

Résumé

Cette étude examine l'acquisition des tons lexicaux du mandarin chez des apprenants de chinois débutants au Cameroun, en accordant une attention particulière à l'influence de la langue maternelle sur la perception et la production tonales. À l'aide d'analyses acoustiques réalisées avec Praat et d'une interprétation statistique effectuée via SPSS, la recherche analyse les erreurs tonales de deux groupes d'apprenants : le groupe A (locuteurs de langues à tons telles que le bamoun des Grassfields, l'ewondo, le duala et le bassa) et le groupe B (locuteurs de langues non tonales dont les langues de communication quotidienne sont le français, l'anglais, l'arabe ou le fulfulde). Elle explore également la manière dont les facteurs linguistiques, environnementaux, pédagogiques et individuels façonnent l'acquisition des tons.

Les résultats montrent que, bien que l'acquisition des tons représente un défi majeur pour tous les apprenants, les types d'erreurs et les schémas d'acquisition varient selon le fond linguistique. Les apprenants du groupe A font preuve d'une sensibilité tonale relativement plus élevée, mais commettent fréquemment des erreurs de substitution et des applications erronées des règles de sandhi en raison du transfert de leurs systèmes tonals natifs complexes. À l'inverse, les apprenants du groupe B rencontrent davantage de difficultés avec la neutralisation des tons, la simplification des contours tonals et la confusion de catégories, ce qui reflète l'absence de catégories tonales lexicales dans leurs langues maternelles et la prédominance de systèmes prosodiques basés sur l'accent de mot.

S'appuyant sur ces constats, l'étude propose une approche pédagogique double : pour les locuteurs de langues à tons, intégrer une prise de conscience des langues locales dans l'enseignement des tons afin de favoriser le transfert positif des connaissances phonologiques existantes vers le mandarin ; pour les locuteurs de langues non tonales, mettre en œuvre des stratégies ciblées (entraînement intensif à la perception, explications fonctionnelles du rôle des tons, enseignement gestuel, progression étalée allant d'exercices contrôlés à une utilisation communicative) afin de lever les obstacles cognitifs et perceptifs spécifiques.

En reliant la théorie linguistique à la pratique en classe, cette recherche contribue au domaine de la phonologie de l'acquisition d'une langue seconde et propose des solutions concrètes pour améliorer l'acquisition des tons en mandarin dans des contextes africains multilingues, tout en soulignant l'importance de stratégies d'enseignement culturellement et linguistiquement adaptées.

Mots-clés

Cameroun ; langues locales ; chinois (mandarin) ; tons ; prononciation ; transfert L1 ; phonologie

Introduction

The introduction lays the theoretical, contextual, and methodological foundations of the research in five sections: **background of the study, statement of the problem, objectives of the study, significance and scope of the study, methodology.**

I. Background of the study

Mandarin Chinese, as a rapidly expanding international language, has become an increasingly important subject of study in Africa, especially in Cameroon where educational and cultural exchanges with China are steadily growing. However, one of the most persistent difficulties encountered by African learners of Mandarin is the acquisition of lexical tones, which are fundamental to meaning differentiation in the Chinese language. Unlike consonants and vowels, tones require learners to master both pitch perception and pitch production, skills that are often unfamiliar to students whose first languages (L1s) either differ in tonal systems or lack lexical tone altogether.

In the Cameroonian context, this challenge is further shaped by the linguistic diversity of the country, where over 200 languages are spoken. Some of these, such as Bamun, Ewondo, Duala, and Bassa, are tonal and can provide a foundation for positive transfer into Mandarin tone learning. Others, however, are non-tonal, leaving learners without a tonal reference framework. This situation makes Cameroon a particularly valuable context for studying the acquisition of Mandarin tones and the role of L1 background in shaping learning outcomes.

I.1. Statement of the problem

Despite the central role of tone in Mandarin, tone acquisition is often given limited attention in teaching curricula and is frequently reduced to introductory exercises at the beginner stage. Learners in Cameroon typically struggle with tone substitution, neutralization, contour simplification, and sandhi misapplication, leading to communication breakdowns and reduced intelligibility. These problems are compounded by the limited availability of specialized tone teaching materials, the lack of continuous tonal reinforcement in curricula, and the relatively scarce opportunities for authentic exposure to native speech.

Current research on tone acquisition has focused primarily on learners from Western or East Asian backgrounds, leaving a gap in understanding how African learners, with their diverse linguistic repertoires, approach tone acquisition. This dissertation seeks to fill that gap by providing an empirical description of tone errors, analyzing their causes, and proposing pedagogical strategies adapted to African learners.

I.2. Objectives of the study

The primary objective of this study is to analyze the acquisition of Mandarin lexical tones among Cameroonian learners of Chinese at the beginner level. Specifically, the study aims to:

- Describe and classify the main types of tone errors produced by learners.
- Compare the tonal acquisition patterns of learners from tonal language backgrounds (Group A) and non-tonal backgrounds (Group B).
- Identify the linguistic, environmental, pedagogical, and individual factors contributing to tone acquisition difficulties.
- Propose pedagogical strategies, including local-language-based approaches and targeted training for non-tonal learners, to improve tone teaching and learning in African contexts.

I.3. Significance of the study

This research makes both theoretical and practical contributions. Theoretically, it expands the scope of second language phonology research by incorporating African learners, whose linguistic diversity provides valuable insights into cross-linguistic transfer and tonal acquisition. Practically, it addresses a pressing pedagogical need in African universities by proposing context-sensitive teaching strategies. By linking Mandarin tone instruction to local phonological systems and adapting practices for non-tonal learners, the study provides teachers, curriculum designers, and policymakers with concrete tools to improve learning outcomes and foster greater communicative competence.

I.4. Research methodology

The study employs a mixed-method approach, combining acoustic analysis with statistical interpretation. Speech data were collected from beginner-level students enrolled in Chinese language programs at Cameroonian universities. Recordings were analyzed using Praat software to measure pitch contours and tonal realizations, while SPSS was used to classify error patterns and compare performance between groups. The analysis focuses exclusively on lexical tone errors, providing a detailed picture of learners' tonal performance and intergroup differences.

II. Theoretical and literature review

This section provides the theoretical and empirical groundwork for the study in four concise sections dealing with: the main theoretical frameworks of tone acquisition, the review of previous studies and the conceptual model of the study.

II.1. Theoretical Foundations of Tone Acquisition

The acquisition of Mandarin tones can be understood through several key theoretical perspectives. Selinker's (1972) Interlanguage Theory explains how learners construct evolving linguistic systems when acquiring a second language. In the case of tone acquisition, learners often produce systematic but non-target tonal patterns that reflect hypotheses based on partial understanding of pitch functions. These patterns evolve with increased input and feedback, making tonal errors valuable indicators of developmental stages. Similarly, Error Analysis (Corder, 1967) emphasizes that errors are not random but represent internalized linguistic hypotheses. Tone errors such as substitution, neutralization, contour simplification, and sandhi misapplication reveal how learners restructure their phonological systems and help teachers design stage-appropriate interventions. The Perceptual Assimilation Model (Best, 1994) and Speech Learning Model (Flege, 1995) further explain how learners' L1 influences tone perception and production: speakers of tonal languages often transfer existing tonal categories, while non-tonal speakers struggle to perceive tone as lexical. Finally, the Feature Hypothesis (Brown, 1998) and Functional Load Hypothesis (Brown, 1988) argue that unfamiliar features are harder to acquire and that highly meaningful features, such as tone, are learned more effectively when their communicative importance is explicitly emphasized in instruction.

II.2. Review of Previous Studies on Tone Acquisition

While a substantial body of research has examined L2 Mandarin tone acquisition among learners from East Asian tonal backgrounds or non-tonal Western languages, studies focusing on learners from African tonal systems remain scarce. This section reviews key findings on L1 tonal influence, with particular attention to typological differences and their implications for Cameroonian learners.

II.2.1. L1 Tone Experience and L2 Mandarin Tone Learning

A robust body of research indicates that first-language (L1) tonal experience influences how learners of Mandarin Chinese (hereafter Mandarin) perceive and produce lexical tone contrasts. For example, Wang, Jongman, and Sereno (1999) review evidence showing that non-native speakers (especially from non-tonal L1 backgrounds) struggle with both perception and production of Mandarin tones, because the functional mapping between fundamental frequency (F0) cues and lexical meaning is unfamiliar. Furthermore, recent research on Indonesian adult learners showed that gains in perception and production of Mandarin tones coincide with increased weighting of the critical F0 slope cue (pitch direction) rather than simply F0 height, suggesting that successful L2 tone learning depends on learning to attend to the right acoustic cues. Additionally, another recent study re-

ported that adult learners' "tonemic" perception improved significantly after only one month of classroom exposure, underlining the plasticity of adult learners when given sufficient input and training. These results show that an L1's prosodic experience can act as an asset—but only if the learner can re-orient perceptual attention toward the contours and dynamics that are contrastive in Mandarin.

II.2.2. Tonal-to-Tonal Transfer: Typology Matters

Although having a tonal L1 may provide an advantage, the nature of that tone system matters. Some studies compare learners whose L1 is tonal with those whose L1 is non-tonal, finding that tonal-L1 learners often perform better than non-tonal-L1 learners—but this is not guaranteed. For example, a study of non-native learners of Mandarin found differential performance depending on L1 tonal typology: learners from tonal languages with contour systems out-performed those whose L1 tones were mainly level or register-based. Furthermore, Zhang et al. (2017) found that L2 learners' improvements in perception did not always correlate with production improvements, especially when their L1 tone systems differed significantly from Mandarin's contour system. These findings highlight that when framing Cameroonian local languages as an asset for learning Mandarin tone, it is necessary to consider how typologically similar the L1 tone system is to Mandarin (e.g., contour vs. level tones, number of tone categories, role of tone in morphology).

II.2.3. African Tonal Systems and Cameroonian Context

Turning to African tonal systems and the Cameroonian context, tone plays a major role in many Niger-Congo languages, including those spoken in Cameroon. As noted by Oxford Research Encyclopedia (2024), African tone languages have been the basis for major generalisations in tonology (e.g., down drift, down step) and thus provide a rich typological basis for investigating tone transfer. In orthographic studies, Bird (1999) demonstrated that marking tone in African languages such as Dschang (a Grassfields Bantu language in Cameroon) can reduce reading fluency when the orthography is overly complex, highlighting the cognitive salience of tone for speakers of these languages. Research in writing systems further shows that African tone-marking strategies vary considerably—this suggests that learners with literacy in tonal L1s may possess implicit metalinguistic awareness of tone that can be harnessed in L2 tone instruction. While there is less published work specifically on Cameroonian learners of Mandarin, Udofot (n.d.) documents tone features in Cameroonian English accents and notes the pervasive influence of local tonal L1s on speech. Additionally, a descriptive study of the Cameroonian Bantu language Nyokon (2022) demonstrates that Cameroonian learners are accustomed to working with complex tone systems, which suggests

potential advantage in acquiring L2 Mandarin tones. These pieces of evidence collectively support the view that Cameroonian local languages can provide a meta-phonological advantage (via pitch-awareness, tone-consciousness) for Mandarin tone learning—but this asset must be explicitly leveraged.

II.3. Research Gaps

Although extensive research exists on tone acquisition by East Asian and Western learners, very few studies have addressed African contexts. Little is known about how the linguistic diversity of Cameroon affects tone acquisition or how teaching strategies can be adapted to leverage L1 tonal knowledge and address non-tonal learners' specific needs. This study seeks to fill that gap by:

- Describing and classifying tone errors among Cameroonian learners.
- Comparing tonal acquisition patterns across different L1 backgrounds.
- Investigating causes of tone errors from multiple perspectives.
- Proposing pedagogical strategies grounded in African linguistic realities.

II.4. Conceptual Model of the Study

Bringing together the above theoretical perspectives, this dissertation conceptualizes tone acquisition as an interaction of four main factors:

- Phonological transfer from learners' L1 (facilitating or hindering tone perception and production).
- Interlanguage development reflected in systematic tonal errors.
- Functional salience of tone in communication and its role in lexical differentiation.
- Pedagogical mediation, which shapes how learners internalize tonal categories.

These factors form the analytical lens through which data are interpreted and pedagogical recommendations are designed.

III. Research Methods and Experimental Procedure

This study adopts a descriptive and analytical approach to investigate the acquisition of Mandarin lexical tones among beginner-level Cameroonian learners of Chinese, focusing on how first language background influences tonal production. The research combines qualitative and quantitative methods, including acoustic phonetic analysis and statistical interpretation, to describe error types, examine their causes, and propose pedagogical strategies adapted to the African learning context.

The participants were sixty students enrolled in the first two years of the Chinese language teacher-training program at the Higher Teachers' Training College of the University of Maroua. All were beginner-level learners with no

prior exposure to Mandarin before entering the program. They were divided into two groups based on their linguistic backgrounds: Group A, speakers of tonal languages such as Bamun, Ewondo, Duala, and Bassa; and Group B, speakers of non-tonal or stress-based languages(who daily communication languages are only French/English/Arabic or Fulfulde). This classification allowed for a comparative analysis of how different phonological systems affect tone acquisition.

Data were collected through controlled pronunciation tasks. Each participant was recorded reading a carefully selected list of Mandarin monosyllabic and disyllabic words covering all four tones, as well as short sentences to observe tonal production in connected speech. The word list included minimal pairs to test tonal contrast and high-frequency vocabulary to reflect natural language use. Recordings were conducted in a quiet environment using high-quality audio equipment to ensure accurate acoustic measurements.

The acoustic properties of the speech samples were analyzed using Praat, a specialized phonetic software. This allowed for the extraction of fundamental frequency (F0) values and the visualization of pitch contours, enabling precise comparison between learners' tonal realizations and standard Mandarin models. Tonal errors were then identified and classified into four major categories: (1) tone substitution, where one tone was replaced by another; (2) tonal neutralization, where pitch distinctions were flattened; (3) contour simplification, where rising or dipping movements were reduced; and (4) tone sandhi misapplication, where tonal alternations were incorrectly applied in connected speech.

Quantitative analysis was conducted using SPSS (Statistical Package for the Social Sciences). Descriptive statistics were used to summarize the frequency and distribution of each error type, while inferential statistics (including t-tests and ANOVA) were applied to assess the significance of differences between groups. This statistical comparison helped determine the extent to which first language background influenced tonal performance. Qualitative observations were also incorporated to interpret learners' pronunciation strategies and possible cognitive explanations for their errors.

To ensure reliability and validity, several measures were implemented. All speech data were annotated and cross-checked by two independent researchers to ensure inter-rater reliability. Triangulation was achieved by combining acoustic measurements, statistical analysis, and qualitative interpretation. Standard Mandarin pronunciation models were used as the reference point for evaluation, and all participants were recorded under similar conditions to control for external variables. Ethical considerations were strictly observed: all participants gave informed consent, their identities were kept confidential, and they were informed that participation was voluntary and unrelated to their academic performance.

The methodological approach adopted in this study is grounded in the theoretical frameworks discussed in the previous chapter. It allows for a systematic analysis of learners' tonal acquisition processes and the identification of key error patterns linked to first language transfer, perceptual limitations, and instructional factors. By combining phonetic evidence with statistical comparisons, the methodology provides a comprehensive basis for interpreting how Cameroonian learners perceive and produce Mandarin tones and for developing pedagogical recommendations tailored to their linguistic context.

IV. Description of Students' Tone Acquisition Errors

This section presents the empirical findings on tone errors produced by Cameroonian beginner learners, based on acoustic analysis of recorded speech.

IV.1.1. General Patterns of Tone Errors

The data indicate that tone acquisition remains a significant challenge for all learner groups, though the nature and frequency of errors vary according to the learners' linguistic backgrounds. Across all participants, substitution errors — where one lexical tone is systematically replaced by another — are the most frequent, followed by contour simplification errors and tonal neutralization. These errors reflect both perceptual and articulatory difficulties as well as interference from the learners' first language tonal systems or the absence thereof.

IV.1.2. Group A: Bamun language and Related Tonal Languages (Ewondo, Duala, Bassa)

Learners from Group A, whose L1s are tonal (such as Bamun, Ewondo, Duala, and Bassa), display a relatively higher sensitivity to pitch contrasts but still encounter systematic difficulties.

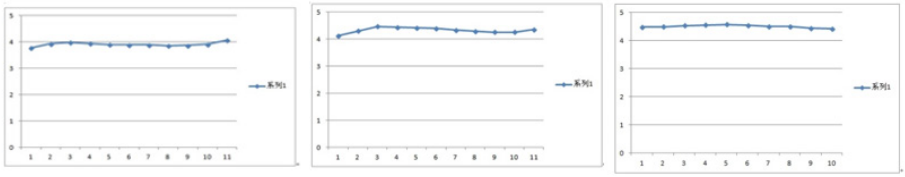


Fig1: Group A T1 tone contour (praat, voice analysis software) standard pronunciation of Mandarin:55

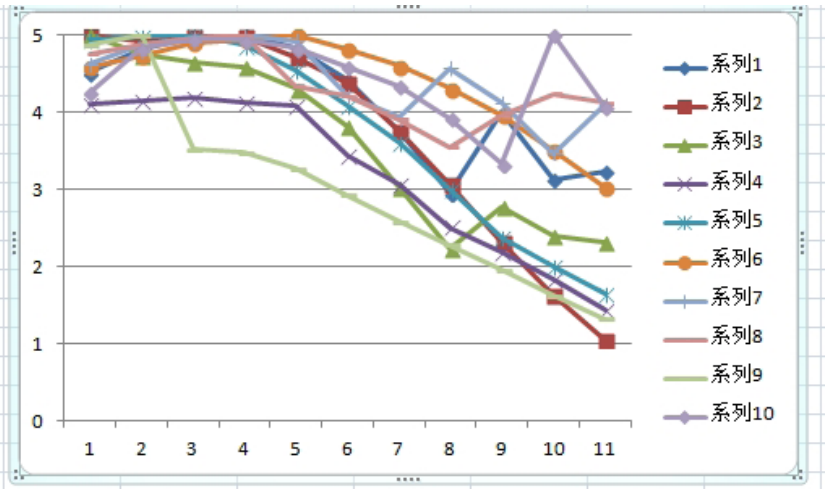
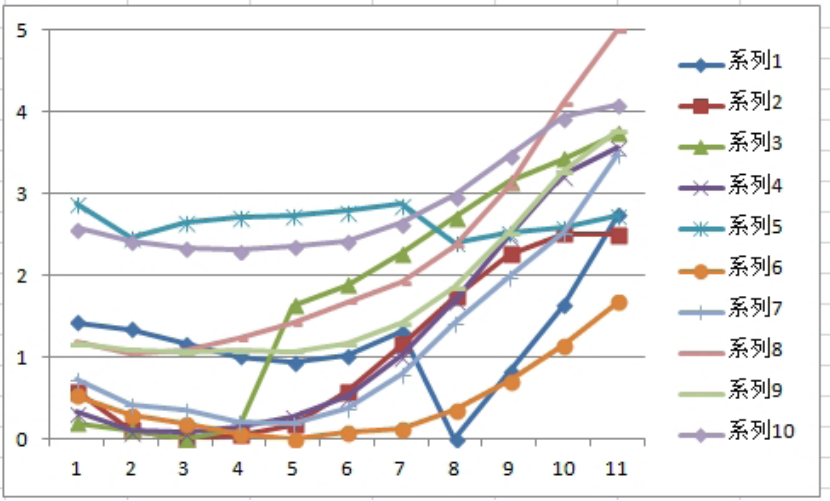


Fig2: Group A T4 tone contour (praat, voice analysis software standard pronunciation of Mandarin:51

Group A students' most frequent error type involves tone substitution, particularly confusion between Mandarin Tone 2 (rising) and Tone 3 (low-dipping). This suggests perceptual transfer from their native tonal systems, which often have more complex tone inventories and contour distinctions.

Additionally, Group A exhibits tone sandhi misapplication in connected speech. Learners often fail to apply Tone 3 sandhi correctly, resulting in sequences of low tones that disrupt the expected tonal contour. This phenomenon reflects a partial awareness of tonal rules but insufficient procedural knowledge in tonal contexts.



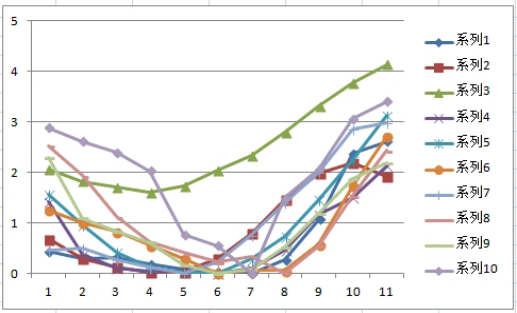


Fig3:Group A T2pitch contour (praat, voice analysis software) Fig4:Group A T3 pitch contour (praat, voice analysis software)

standard pronunciation of Mandarin:35 standard pronunciation of Mandarin:214

IV.1.3. Group B: Non-Tonal Dominant Languages

In contrast, learners from Group B, whose L1s are non-tonal or have limited tonal function, demonstrate a broader range of tonal errors. Their most prominent difficulties include tonal neutralization, where lexical tones are produced with a relatively flat or mid-level pitch, and contour reduction, particularly with Tones 2 and 3. These learners also show higher instances of tone category confusion, often substituting Tone 4 (falling) for Tone 1 (high level), indicating reliance on stress-based prosodic patterns from their L1.

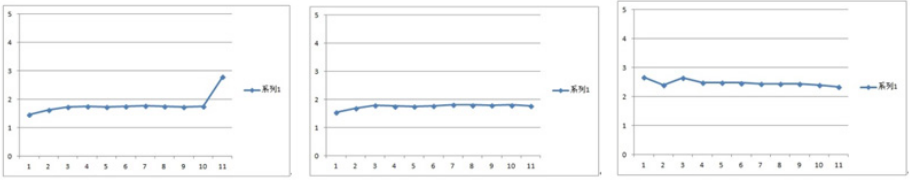


Fig5:Group B T1 pitch contour (praat, voice analysis software)
standard pronunciation of Mandarin:55

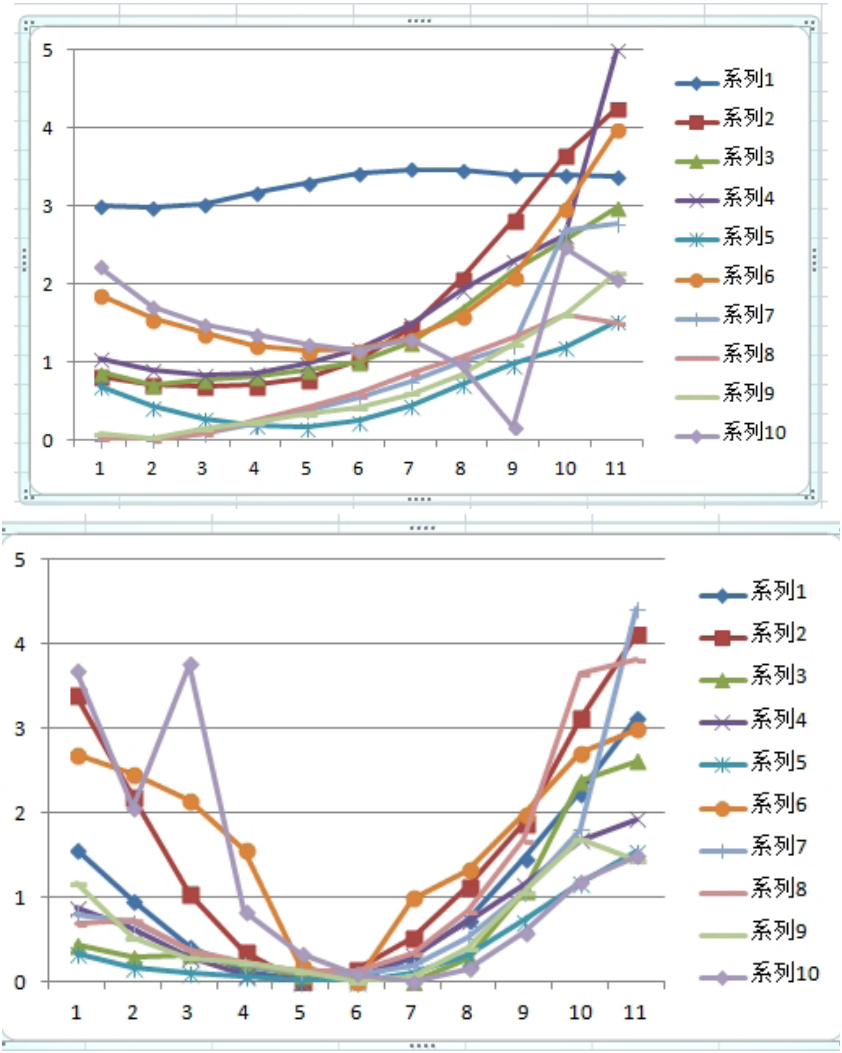


Fig6:Group B T2 pitch contour (praat, voice analysis software) Fig7: Group B T3 pitch contour (praat, voice analysis software)

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dard pronunciation of Mandarin:35

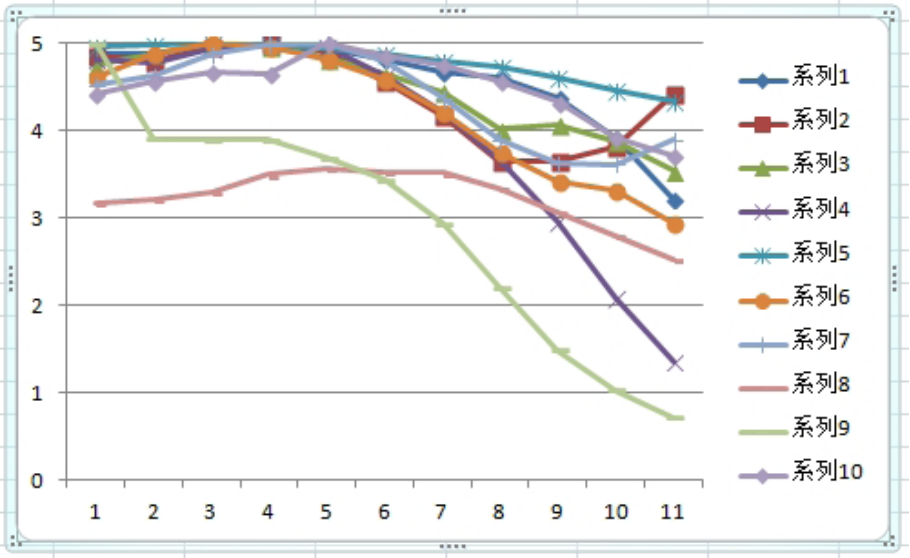

Fig8: Group B T4 pitch contour (praat, voice analysis software standard pronunciation of Mandarin:51

Unlike Group A, Group B learners display little evidence of tonal rule internalization, and their tonal productions often lack consistent pitch movement. This suggests that for non-tonal language speakers, tonal contrasts are processed less as lexical features and more as general prosodic variations.

IV.2. Comparative Observations

The above figure shows the pitch contours of Tone 1 (yīnpíng), Tone 2 (yángpíng), Tone 3 (shǎngshēng), and Tone 4 (qùshēng) produced by learners in Group A and B. From the contour, it can be observed that regardless of whether they are producing Tone 1 or Tone 4, the pitch values of Group A learners tend to be relatively high (with Tone 2 generally reaching 44 and Tone 4 approximately 5). In addition, the tone contours are relatively flat, which is close to the standard pronunciation of Mandarin.

However, although the production of Tone 2 and Tone 3 by Group A learners is often not fully accurate (Tone 2 is sometimes produced as 24 or 34, and Tone 3 as 213), their performance is still more accurate than that of Group B, which may be attributed to the influence of their first language awareness.

Table1: Classification of Tone Acquisition Errors among Learners

Error Type	Description	Typical Features in Group A (Tonal L1)	Typical Features in Group B (Non-Tonal L1)	Illustrative Example
1. Tone Substitution	A lexical tone is replaced by another tone due to perceptual confusion or L1 interference.	Frequent confusion between Tone 2 (rising) and Tone 3 (low-dipping); sometimes Tone 1 and Tone 4 are interchanged.	Broad range of tone substitutions, often random and inconsistent; Tone 4 frequently replaces Tone 1.	"mā" (妈, mother, Tone 1) → "mà" (骂, scold, Tone 4)
2. Tonal Neutralization	Distinct lexical tones are produced with a similar or undifferentiated pitch, resulting in loss of tonal contrast.	Rare; appears mainly in rapid speech or unfamiliar words.	Frequent; tones often realized as mid-level or flat pitch, leading to semantic ambiguity.	"mǎ" (马, horse, Tone 3) → "ma" (flat, unmarked)
3. Contour Simplification	Complex contour tones (especially Tone 2 and Tone 3) are produced with simplified pitch movements.	Rising or dipping contours are flattened; Tone 3 may be realized as a low-level tone.	Contours are often reduced to single-level tones, especially for Tone 2 and Tone 3.	"má" (麻, hemp, Tone 2) → "mā" (Tone 1-like high level)
4. Tone Sandhi Misapplication	Failure to apply tonal alternations in connected speech (e.g., Tone 3 sandhi) or incorrect application of rules.	Frequent omission of Tone 3 sandhi; tonal sequence does not conform to expected pattern.	Rare, as tonal alternations are generally not internalized; when attempted, errors are inconsistent.	"nǐ hǎo" (你好, both Tone 3) → "nǐ hǎo" (no sandhi applied)

V. Causes of Tone Acquisition Errors

The acquisition of Mandarin lexical tones by foreign learners is a complex process influenced by a combination of linguistic, environmental, pedagogical, and individual factors. In the present study, the tonal errors observed among learners from Group A (tonal language background) and Group B (non-tonal background) can be attributed to multiple interrelated causes. These can be examined from four complementary perspectives: theoretical linguistic factors, learning environment, teaching materials and instructional context, and individual learner characteristics.

V.1. Theoretical and Linguistic Perspective

From a theoretical standpoint, tonal acquisition challenges stem primarily from the phonological distance between Mandarin Chinese and the learners'

native languages. Mandarin uses pitch variations at the lexical level to differentiate word meaning, whereas many African languages, particularly those in Group B, are non-tonal or use pitch in a non-lexical prosodic function. Consequently, these learners lack pre-existing phonological categories to perceive and produce lexical tones accurately, resulting in tonal neutralization or random substitution.

Even for learners from tonal language backgrounds (Group A), tonal transfer can lead to systematic errors. Their first languages often contain more complex tone systems with numerous level and contour tones or tone sandhi rules distinct from Mandarin. This can result in inter-lingual interference, where learners apply native tonal patterns to Mandarin words, misperceive contour differences, or over generalize L1 tonal rules. Furthermore, Mandarin's third tone (low-dipping) presents particular challenges due to its dynamic contour and contextual alternations, which differ significantly from typical tone patterns in African languages.

V.2. Influence of Study Environment

The learning environment also plays a critical role in shaping tonal acquisition. In many Sub-Saharan African contexts, Mandarin is learned as a foreign language with limited exposure to naturalistic input outside the classroom. Students are often exposed to tones only in formal instructional settings, which restricts opportunities for authentic auditory processing and spontaneous production practice.

Additionally, many language programs operate in environments where peer and community reinforcement of tonal distinctions is minimal. This lack of communicative necessity reduces learners' motivation to monitor tonal accuracy and leads to fossilization of incorrect tonal patterns. The absence of native-speaking instructors or tutors in some institutions further limits accurate auditory models for learners to imitate.

V.3. Local and Regional Teaching Materials

Pedagogical materials and curricula used in many African universities and Confucius Institutes often emphasize grammar, vocabulary, and character recognition over tonal training. Tone-related content is frequently treated as an introductory topic in early lessons and is not systematically reinforced throughout the curriculum.

Furthermore, locally adapted teaching materials may oversimplify tone explanations or fail to provide sufficient intonation contour diagrams, pitch-range exercises, or auditory discrimination tasks. The lack of contextualized tone practice—such as minimal pairs, tone drills embedded in dialogue, or real-life communicative tasks—can result in learners memorizing tones mechanically without internalizing their functional significance. This pedagogical gap contributes significantly to persistent tonal substitution and contour simplification errors.

V.4. Individual Learner Factors

Finally, individual cognitive and psychological variables exert considerable influence over tonal learning outcomes. Learners vary widely in auditory discrimination ability, working memory capacity, and phonological awareness, all of which are critical to successful tone acquisition. Learners from non-tonal language backgrounds may require more time to develop pitch sensitivity and to associate pitch patterns with lexical meaning.

Motivation, learning strategies, and attitudes toward tonal practice also shape outcomes. Some learners, perceiving tones as a peripheral aspect of language learning, devote insufficient attention to tonal accuracy. Others experience anxiety or self-consciousness about tonal production, leading to reduced experimentation and slower progress. Finally, age and previous language learning experience may affect tone acquisition: younger learners or those with prior exposure to tonal languages generally show better tonal discrimination and production accuracy.

VI. Pedagogical strategies for improving tone acquisition among african learners

Drawing on the empirical findings and theoretical framework presented earlier, there is a need of practical, context-sensitive strategies to enhance Mandarin tone teaching in african (particularly Cameroonian) classrooms. These strategies implies: strengthening phonological awareness through explicit instruction, integrating communicative contexts into tone practice, enhancing input quality and quantity through technology and authentic materials, localizing pedagogical materials and curriculum design and addressing individual differences through differentiated instruction.

VI.1. Strengthening phonological awareness through explicit instruction

A foundational step in improving tone acquisition is the enhancement of learners' phonological awareness — their ability to perceive, differentiate, and consciously manipulate pitch contours. Traditional teaching often assumes that exposure alone leads to tonal mastery; however, learners from non-tonal language backgrounds require explicit metalinguistic guidance to conceptualize tones as meaningful lexical features rather than prosodic variations.

Teachers should incorporate targeted training in pitch perception and tone categorization, using visual aids such as pitch contour diagrams, tonal spectrograms, and hand gestures to represent rising, falling, and dipping tones. Classroom

activities should include minimal pair discrimination exercises, where students identify meaning contrasts based solely on tonal differences, and tone imitation tasks supported by native speaker audio. Such explicit training helps learners establish robust mental representations of tone categories, which form the basis for accurate production.

VI.2. Integrating communicative contexts into tone practice

One of the main limitations of current pedagogical practices in many Cameroonian institutions is the isolation of tonal drills from communicative contexts. To overcome this, tone practice should be embedded into meaningful language use, enabling learners to associate tonal contrasts with functional communicative outcomes.

Activities such as dialogue reconstruction, role-play, and contextual minimal pair usage can help learners see tones as integral to meaning rather than as mechanical pronunciation features. For example, practicing sentences where tone differences lead to semantic shifts (e.g., mā妈"mother" vs. mǎ马"horse") within conversational scenarios reinforces the communicative importance of tone and promotes long-term retention. Additionally, task-based activities that require learners to convey information accurately through tone — such as giving directions, conducting interviews, or describing objects — further consolidate tonal competence.

VI.3. Enhancing input quality and quantity through technology and authentic materials

Limited exposure to natural Mandarin speech remains a major challenge in many African learning environments. To address this, teachers should integrate technology-mediated input and authentic materials into the classroom. Tools such as digital tone training apps, online pronunciation platforms, and speech visualization software (e.g., Praat) can provide immediate feedback on pitch accuracy and allow learners to self-monitor their progress.

Furthermore, incorporating authentic audio-visual materials — such as dialogues from Chinese media, interviews, and short video clips — exposes learners to a range of pitch patterns, speech rates, and prosodic variations. Repeated listening, shadowing, and transcription tasks based on these materials improve learners' auditory discrimination and enhance their tonal sensitivity beyond textbook examples.

VI.4. Localizing pedagogical materials and curriculum design

A major pedagogical gap in many African programs is the heavy reliance on imported teaching materials, which may not address the specific challenges faced by tonal and non-tonal language learners in Africa. Developing localized teaching materials that explicitly target common error types identified in this study — such as tonal neutralization, contour simplification, and substitution — is crucial.

These materials should include exercises that contrast Mandarin tones with tonal features of local languages (for Group A learners) or emphasize pitch differentiation and functional load (for Group B learners). Curriculum design should also ensure that tone instruction is not confined to beginner levels but is systematically reinforced across all proficiency stages, including intermediate and advanced courses.

VI.5. Addressing individual differences through differentiated instruction

Individual learner variability — including auditory discrimination ability, motivation, and learning style — significantly affects tonal acquisition. Therefore, pedagogical strategies should incorporate differentiated instruction to accommodate diverse learner profiles. Diagnostic assessments at the beginning of a course can identify students who require more intensive tonal training, allowing teachers to provide supplementary listening and pronunciation support.

Encouraging learners to adopt self-directed strategies, such as daily tone shadowing, tone dictation, or recording and self-evaluating their pronunciation, fosters learner autonomy and reinforces classroom instruction. Moreover, building a classroom environment that reduces anxiety and encourages experimentation with tone production can increase learner confidence and willingness to engage with challenging tonal tasks.

VII. Conclusion and Recommendations

This section synthesizes the study's main findings and translates them into actionable recommendations.

VII.1. Conclusion

This study investigated the acquisition of Mandarin lexical tones among beginner-level learners of Chinese in Cameroon, with a particular focus on the influence of first language background on tonal perception and production. By analyzing acoustic data from three learner groups — notably Group A (speakers of tonal languages such as Grassfield Bamun, Ewondo, Duala, and Bassa) and

Group B (speakers of non-tonal languages) — the research employed Praat-based pitch contour analysis and SPSS statistical methods to classify tone errors and explore their underlying causes.

The findings reveal that while tonal acquisition is a universal challenge, the nature and frequency of errors vary significantly depending on learners' linguistic backgrounds. Group A learners demonstrated higher pitch sensitivity and better production of Tone 1 and Tone 4 but often exhibited substitution and sandhi misapplication influenced by their native tonal systems. Group B learners, by contrast, showed widespread tonal neutralization, contour simplification, and category confusion due to the absence of lexical tone categories in their first languages.

Environmental limitations (such as restricted exposure to native speech), insufficient tone-focused instruction, and individual learner differences further contributed to persistent tonal errors. These results highlight the multifaceted nature of tone acquisition and the need for comprehensive pedagogical interventions that respond to the linguistic and sociocultural realities of African classrooms.

VII.2. Recommendations

The following recommendations are practical, immediately applicable and tailored to the multilingual African classroom.

VII.2.1. Leverage Local Tonal Systems for Tonal Instruction (Group A)

Teachers should use learners' existing tonal knowledge as a starting point for Mandarin tone teaching. Drawing explicit parallels between local tonal patterns (e.g., high-level, rising, dipping, falling) and Mandarin tones helps learners transfer their phonological awareness productively. For example, linking the high tone in Bamun or Ewondo to Mandarin Tone 1, or comparing rising tones in Bassa to Mandarin Tone 2, can make tone learning more intuitive. Such cross-linguistic comparisons also deepen learners' understanding of tonal functions and improve pronunciation accuracy.

Table 2 : Comparison of Chinese Tone to local Cameroonian language tone

Corresponding Tone in Chinese Monosyllabic words and expressions in Cameroonians languages	Tone1 high-level	Tone2 rising	Tone3 dipping	Tone4 Falling (for both tonal and non-tonal background students)
Bamun/ Shupamum words And meaning	Lie=sleep	Ya=come		Ah=exclamation
	Nuo=drink	e=laugh(exactly the same pronunciation with mandarin final "e")	Ka=onion	go
	Pouo=hand	Su=wash	Lu=honey	Vas! Imperative form of go in French
	Li=eye	Souo=put in		
Beti words And meaning	Lou=la head	Za=come	(o)guan=illness	
	Miss=eyes	Va=remove	Mougn=baby	
	Mou=hands	Dui=nose		
Bassa words and meaning			Nyo=mouth	Nol (laugh)
	Gno (head)	Dzol =nose	Kon=illness	
	O'O(ear)	Lo'o=come		
	Djoa (wash)	Ei=cry		
	Dap (house)	Gouel=catch		

VII.2.2. Provide Foundational Tonal Awareness Training (Group B)

Learners from non-tonal backgrounds require more targeted support. Instruction should begin with intensive perception training — using minimal pairs, tone discrimination exercises, and visual pitch contours — to develop pitch sensitivity. Teachers should emphasize the lexical function of tone through communicative examples that show how meaning changes with pitch. Kinesthetic teaching tech-

niques, such as using hand gestures to represent pitch movement, can further support tone memory and production. Gradual progression from controlled pronunciation practice to spontaneous speech tasks helps learners internalize tonal distinctions more effectively.

VII.2.3. Integrate Tone Practice into Communication

Tone instruction should move beyond isolated drills and be embedded in communicative activities. Dialogue reconstruction, role-play, and real-life scenarios where tonal accuracy affects meaning encourage learners to use tones meaningfully and consistently. Contextualized practice reinforces the functional importance of tone and supports long-term retention.

VII.2.4. Localize Teaching Materials and Curriculum

Developing locally adapted materials that address learners' common error patterns is crucial. These materials should include tone-focused exercises, comparative activities linking Mandarin and African tonal systems, and practical tasks for both tonal and non-tonal learners. Additionally, tone training should be reinforced throughout all stages of the curriculum, not limited to beginner levels.

VII.2.5. Enhance Input and Feedback

Increased exposure to native speech — through multimedia resources, language exchanges, and pronunciation software — strengthens tonal perception and production. Regular, individualized feedback based on acoustic analysis tools like Praat helps learners monitor their progress and self-correct errors.

VII.2.6. Final Remarks

Mandarin tone acquisition among African learners is deeply shaped by linguistic background, instructional practices, and learning environments. Effective pedagogy must recognize these factors and adopt flexible, learner-centered strategies. By leveraging local tonal knowledge, building foundational pitch awareness, and embedding tone practice into meaningful communication, educators can significantly improve learners' pronunciation, comprehension, and confidence. Ultimately, such approaches not only enhance language proficiency but also promote successful cross-cultural communication.

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