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# AN EMPIRICAL STUDY ON THE SEGMENTAL FEATURES OF ENGLISH PRONUNCIATION OF CHINA HIGH SCHOOL STUDENTS AND THEIR IMPACT ON SPEECH INTELLIGIBILITY

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**ABSTRACT**

*With the inclusion of oral English tests in China's College Entrance Examination, pronunciation accuracy has become vital to students' speaking performance. However, little empirical evidence exists on how specific segmental errors influence intelligibility in Chinese high school contexts, particularly in dialect-influenced regions such as Chongqing. This study examined how segmental errors affect intelligibility among 55 Grade-10 students in a Chongqing high school. Speech samples were recorded via Voice Memo, annotated by three trained raters for segmental errors, and rated for intelligibility. Statistical analyses in IBM SPSS showed that vowel errors were more frequent than consonant errors, with /iː/, /ɪ/, and /θ/ exceeding a 40% error rate. Vowel errors were negatively correlated with intelligibility ($r = -.48$, $p < .01$), while consonant errors also showed a significant negative correlation ($r = -.39$, $p < .01$). These findings demonstrate that both vowel and consonant mispronunciations substantially reduce listener comprehension and underscore the need for targeted pronunciation instruction, especially in dialect-influenced EFL contexts.*

***Keywords:*** *English phonetics; pronunciation features; intelligibility*

## INTRODUCTION

Pronunciation is a core element of L2 speaking performance because it directly affects speech intelligibility. At the global level, intelligibility has long been recognized as the key criterion for successful oral communication. When unfamiliar L2 sounds are perceived, learners often substitute the closest L1 categories, producing a recognizable "foreign accent" (Ellis, 1999) that can reduce intelligibility, particularly in interactions between non-native speakers. Despite its centrality to communicative success, pronunciation especially at the segmental level has traditionally received less

systematic attention in classroom instruction than grammar or vocabulary.

Two major lines of research have addressed intelligibility: properties of the speech stimulus and listener factors (Munro, 2008). Within the speech-stimulus dimension, a substantial body of work has explored how specific segmental and suprasegmental features contribute to listener understanding. Using rating scales, transcription, and related analytic techniques, studies have identified pronunciation features linked to intelligibility (Kang, 2012; Munro & Derwing, 1995; Pérez-Ramón et al., 2022). More recent research has advanced this line of inquiry by empirically determining which segmental contrasts most strongly affect lexical intelligibility. For instance, Mcbride and Rose (2025) found that only certain vowel distinctions significantly influenced listeners' comprehension of French /E/ vowels, suggesting that pronunciation instruction should prioritize intelligibility-critical contrasts rather than global accent reduction.

On the listener side, factors such as language background, proficiency level, and familiarity with the speaker's L1 have been shown to influence judgments of intelligibility, comprehensibility, and accentedness (Cao & Chen, 2023; Hayes-Harb et al., 2008; Li & Wang, 2015; Sun & Chen, 2022; Xie & Fowler, 2013; Yin, 2015; Zoghbor, 2018). In a recent study, Pietraszek (2025) demonstrated that listeners' first language and L2 proficiency systematically shaped their perception of Spanish-accented English, revealing both intelligibility benefits and attitudinal biases associated with different listener groups. Together, these findings underscore the multifaceted nature of intelligibility, highlighting the interplay between linguistic features and listener-related variables in L2 speech perception.

Nevertheless, several gaps remain in the field of pronunciation teaching. First, many studies still privilege native-speaker judgments as the benchmark for intelligibility, which may not accurately represent the L2–L2 communication that dominates international and regional interactions. Second, within Chinese secondary

education, pronunciation pedagogy often emphasizes overall “accent” reduction rather than identifying which specific segmental errors most strongly affect intelligibility. Yet not all pronunciation deviations equally obscure understanding. For instance, the frequent /θ/-/s/ substitution among Non-native learners does not always hinder comprehension in local L2 exchanges (Jeong & Thorén, 2018). These issues highlight the need to assess segmental errors not merely in terms of accent but in relation to their actual impact on intelligibility in authentic communication.

Specifically, within the secondary education system of Chongqing, a major municipality in southwest China empirical evidence remains limited regarding which segmental features most affect intelligibility. Addressing this gap, the present study investigates the English pronunciation of Grade-10 students and quantifies how specific errors relate to intelligibility outcomes. By identifying high-impact vowels and consonants and their corresponding error rates, the study aims to provide pedagogical insights that prioritize intelligibility-critical segments over low-impact deviations.

Accordingly, the study is guided by the following research questions:

(1) What exact segmental errors do the participants make?

(2) How do these segmental errors lead to misunderstanding?

(3) What are the correlations between speech intelligibility and segmental errors?

## REVIEW OF THE LITERATURE

Research on L2 pronunciation errors has expanded since the 1960s, employing increasingly diverse methods and analytical tools. Yet despite these advances, several gaps persist. Empirical investigations have often tended to rely on convenience samples such as teachers or undergraduates, leaving high-school learners underrepresented. Moreover, while most studies foreground negative L1 transfer, relatively little attention has been paid to intra-language variation, particularly the influence of regional dialects that shape phonological realization within the same L1 community.

In the present study, segmental features refer to the vowel and consonant sounds of English (Levis, 2018). Within segmental domains, vowels and consonants display distinct error patterns. Kennedy (2003) observes that vowel "clusters" may behave similarly to consonants, suggesting multiple types for vowel errors within words. Diagnostic studies have further refined our understanding of learner-specific difficulties. For instance, Alzainidi and Latif (2019) found that lower-intermediate Saudi EFL learners produced more consonant and cluster errors than intermediate learners, with greater variability in word-initial positions. Taken together, such findings illustrate systematic developmental patterns in segmental production, yet they rarely connect error typologies to learners' communicative outcomes.

In China, error analysis began later but emphasized systematic diagnosis to inform instruction (Wu, 1979). Regional dialect effects have been consistently observed: Sun (1979) documented common segmental errors among Sichuan learners, while Yin (2001) analyzed phonological deviations across counties in southeast Gansu. Luo (2015) further contributed to understanding localized accent features in EFL pronunciation. These studies collectively advanced descriptive accounts of dialect-conditioned segmental variation, but their scope remained largely qualitative and geographically limited. More importantly, few have explicitly examined how dialect-induced segmental deviations influence intelligibility. Nevertheless, their descriptions of segmental error patterns among Sichuan learners provide a useful comparative basis for the present study, as the Chongqing dialect shares similar southwestern phonological features. Comparable segmental deviations particularly in vowel quality and final consonant articulation are anticipated among Chongqing learners, offering a basis for comparison with the present data.

Intelligibility is defined as the degree to which a speaker is actually understood (Wheeler & Saito, 2022). Two complementary research streams frame intelligibility: the properties of the speech signal and listener-related factors (Munro, 2008). Using

both rating and transcription tasks, previous studies have linked specific segmental and suprasegmental features to intelligibility outcomes (e.g., Kang, 2012; Munro & Derwing, 1995; Pérez-Ramón et al., 2022). The Lingua Franca Core (Jenkins, 2002) further proposes prioritizing those segmental features most essential for mutual understanding in L2–L2 communication, challenging native-speaker norms and shifting instructional focus toward functional intelligibility. Listener-based research also highlights the mediating roles of listener proficiency and experience, showing that not all deviations reduce understanding equally (e.g., Munro et al., 2006; Crowther et al., 2016).

Despite these contributions, three key gaps remain. First, dialect-specific segmental error profiles for Chinese high-school learners particularly those speaking southwestern varieties such as Chongqing are underexplored. Second, existing work continues to privilege native-speaker judgments over the L2–L2 communicative realities that dominate global English use. Third, limited efforts have quantified which specific segmental deviations most strongly predict intelligibility among secondary-school learners, largely due to restricted access and time constraints.

Building on previous research, this study profiles Grade 10 learners with a Chongqing dialect background, mapping their segmental errors and examining their statistical relationship with intelligibility. It extends existing work on L2 segmental intelligibility by providing context-specific evidence for pronunciation pedagogy in Chinese high schools. To integrate these strands and clarify the study's analytical focus, a conceptual framework linking dialect background, segmental errors, and listener intelligibility guides the analysis and reflects the hypothesized pathway from dialectal influence to speech comprehension.

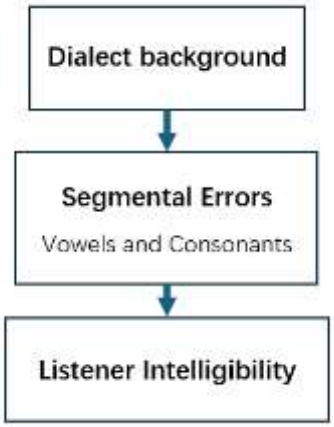


**Figure 1.** Conceptual Framework of the Study

## METHODOLOGY

### Participants and Raters

Participants in this study were randomly selected from a cohort of Grade 10 students at a high school in Chongqing, China. A total of 60 students participated, all of whom had studied English for at least six years, with some having up to nine years of English learning experience. This study adhered to standard ethical guidelines for minimal-risk educational research. Participants were orally informed of the study's objectives, procedures, and their right to withdraw at any point. Verbal informed consent was obtained from all participants prior to data collection. For underage participants, additional consent was secured through their teachers and the school administration. To ensure generalizability, both male and female students aged 14 to 16 were included. Although the gender distribution was unequal (35 males and 20 females), no adjustments were made, as the sample size was considered sufficient for the scope of this study. Three trained raters (two males and one female) were recruited to assess the recordings, identify pronunciation errors, and rate the intelligibility of each speech sample. The raters came from different Chinese dialect backgrounds (Chongqing, Jiangxi, and Cantonese), which helped reduce potential dialect bias. All raters had at least 13 years of English learning experience and were in-service or pre-service English teachers with extensive linguistic and pedagogical training. Prior to the formal

evaluation, raters received specialized training to calibrate rating criteria. Ratings were then conducted independently to ensure consistency and reliability.

**Research Procedures**

Participants read a standardized English passage aloud when they indicated readiness; speech was recorded on a smartphone in a quiet room. Readers could adopt their preferred posture and pace, and the researcher did not interrupt or cue pronunciation. All recordings were denoised to minimize ambient interference, and clips with inadequate acoustic quality were excluded. Five recordings were removed, yielding 55 usable samples for subsequent analysis.

Before formal rating, a pilot pre-rating was conducted to examine whether an online automatic speech recognition (ASR) system—trained on diverse accents—could reliably transcribe the material. Five student recordings were randomly selected for ASR transcription, alongside one control sample produced by a rater. The control was transcribed without error, whereas student recordings showed 5–13 transcription errors per passage, indicating that the ASR tool struggled with these productions and justifying the use of human judgments for intelligibility assessment.

For the main evaluation, three trained raters first completed a calibration phase on a subset of recordings to establish consistent scoring criteria. To ensure scoring consistency, interrater reliability was assessed using Cronbach's α and the intraclass correlation coefficient (ICC) to confirm the internal consistency and stability of rater judgments throughout the evaluation process. After satisfactory interrater consistency was established, the raters listened to each full recording and assigned an intelligibility score based on the overall ease of understanding. They then relistened to the same samples and annotated segmental pronunciation errors at the phoneme level, identifying substitutions, deletions, insertions, and misarticulations for both vowels and consonants. An error was operationally defined as a realized phoneme differing from the target phoneme in voicing, place, or manner of articulation, based on canonical IPA

transcriptions. Segmental errors were subsequently categorized by phoneme type (vowel vs. consonant) and error type. No suprasegmental features were coded in this study.

Scores and annotations were compiled in Microsoft Excel 2016 and analyzed in IBM SPSS 26. Descriptive statistics summarized segmental error patterns (e.g., error counts and rates by phoneme category). To examine the relationship between pronunciation accuracy and intelligibility, Pearson's correlation coefficients were computed between segmental error measures and intelligibility scores. These analyses were used to characterize the intelligibility of Grade-10 learners' oral English and to quantify the extent to which specific segmental errors predict reduced intelligibility.

Figure 2 provides an overview of the methodological procedure, summarizing the key stages of data collection, phoneme-level annotation, statistical analysis, and result interpretation.

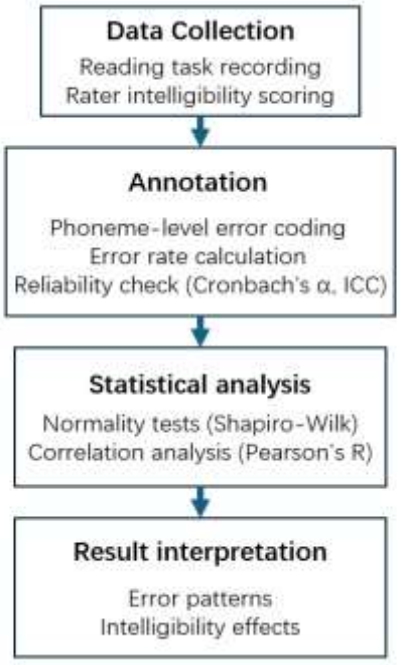


**Figure 2.** Methodological flow diagram

## FINDINGS AND DISCUSSION

### Findings

## Data Reliability and Overview

After data screening, 55 valid recordings and 165 valid intelligibility ratings were retained for analysis.

As shown in Table 1, Cronbach's α reached 0.91, exceeding the 0.80 threshold, indicating high reliability. All raters' ICC values were above 0.75, confirming satisfactory inter-rater consistency.

**Table 1.** Verification of Reliability and Internal Consistency

| Analysis Type | Numerical Value | |
|---|---|---|
| Cronbach's Alpha | 0.91 | |
| ICC | Rater 1 | 0.85 |
| | Rater 2 | 0.88 |
| | Rater 3 | 0.87 |

Overall, the dataset demonstrated strong internal consistency and was suitable for subsequent correlation analyses.

In this study, error rate refers to the percentage of participants who produced pronunciation errors for a given sound relative to the total number of participants. For example, an error rate of 50.9% for the vowel /iː/ indicates that 50.9% of all participants mispronounced this sound during the reading task. Based on Daniel Jones (DJ) phonetic classification, single vowels are grouped into front, central, and back vowels, while diphthongs are divided into closing and centering types. Detailed error rates for individual phonemes can be found in Appendix Tables A1–A9.

## Vowel Errors

Table 2 summarizes participants' vowel pronunciation errors. The average error rate for single vowels was 16.5%, while that for diphthongs was 5.2%, indicating that single vowels were generally more difficult to produce accurately.

**Table 2.** Average Error Rate of Single Vowels and Diphthongs

| Vowel | Average Error Rate |
|---|---|
| Single vowels | 16.5% |
| Diphthongs | 5.2% |

According to Table 3, front vowels exhibited the highest average error rate (29.68%), followed by back vowels, central vowels, and centering diphthongs, all averaging around 9.5%.

**Table 3**. Average Error Rate of each Type of the Vowels

| Type of Vowel | Average Error Rate |
|---|---|
| Front Vowels | 29.68% |
| Back Vowels | 9.46% |
| Central Vowels | 9.7% |
| Closing Diphthongs | 2.56% |
| Centering diphthongs | 9.7% |

Closing diphthongs showed the lowest error rate (2.56%). Within back vowels, /ɒ/ had the highest error rate (23.6%), whereas other back vowels were produced more accurately. For diphthongs, /eə/ displayed the highest error rate (29.1%), while /ɪə/ and /ʊə/ were almost error-free.

## Consonant Errors

**Table 4.** Average Error Rate of Each Type of the Consonant

| Type of the Consonant | Average Error Rate |
|---|---|
| Plosives | 2.72% |
| Fricatives | 5.45% |
| Nasals | 10.3% |
| Lateral | 40% |
| Affricates | 2.42% |
| Semi-vowels | 1.82% |

Table 4 presents the average error rates for consonant categories. Overall, participants achieved higher accuracy in consonant production than in vowels. The lateral consonant /l/ had the highest error rate (40%). Pronunciation accuracy varied by position: initial /l/ was consistently correct, whereas medial and final (dark /ɬ/) realizations were frequently misproduced (≈ 40%). Common error types included vowelization or omission of /l/. For nasals, the /n/ sound was mispronounced by approximately 30% of participants, while other nasal consonants were generally accurate. Errors involving plosives often featured the addition of an epenthetic schwa /ə/ following /t/, producing forms such as /kɒntɪnəntə/ or /weɪtə/. Besides, no confusion was observed between /n/ and /l/ during production.

**Correlation between Pronunciation Errors and Intelligibility**

The assumptions of normality were checked using the Shapiro–Wilk test. Pearson's *r* was then computed to examine the correlations between error rates and intelligibility. The relationship between pronunciation error rates and intelligibility scores was examined using Pearson correlation analysis. All correlations were negative, indicating that higher error rates were associated with lower intelligibility ratings.

At the global level, intelligibility correlated negatively with both vowel ($r = –0.485$, $p < .01$, $r^2 = 0.24$) and consonant errors ($r = –0.395$, $p < .01$, $r^2 = 0.16$), indicating moderate to large effects.

For vowel categories, significant negative correlations were found between intelligibility and front vowel errors ($r = –0.334$, $p < .05$, $r^2 = 0.11$) and between intelligibility and closing diphthong errors ($r = –0.331$, $p < .05$, $r^2 = 0.11$).

Correlations with central vowels, back vowels, and centering diphthongs were not significant ($p > .05$).

**Table 5.** Correlations Between Speech Intelligibility and Segmental Errors

| Errors | Pearson's *r* | Sig. (2-tailed) |
|---|---|---|

| | | |
|---|---|---|
| VE | -.485** | .000 |
| CE | -.395** | .003 |

**. Correlation is significant at the 0.01 level (2-tailed). N=55.

(VE = Vowel Errors, CE = Consonant Errors)

**Table 6.** Correlations Between Speech Intelligibility and Errors of Vowels

| Errors | Pearson's *r* | Sig. (2-tailed) |
|---|---|---|
| EOSV | -.369** | .006 |
| EOD | -.341* | .011 |

*. Correlation is significant at the 0.05 level (2-tailed).

(EOSV = Errors of Single Vowels, EOD = Errors of Diphthongs)

For consonant categories, significant negative correlations emerged for fricatives ($r = –0.338$, $p = .012$, $r^2 = 0.11$) and affricates ($r = –0.307$, $p = .023$, $r^2 = 0.09$), while plosives, nasals, laterals, and semi-vowels showed no significant correlation with intelligibility ($p > .05$).

**Table 7.** Correlations Between Speech Intelligibility and E. of Different Types of Vs.

| Errors | Pearson's *r* | Sig. (2-tailed) |
|---|---|---|
| EOFV | -.334* | .013 |
| EOCV | -.220 | .106 |
| EOBV | -.090 | .512 |
| EOCSD | -.331* | .013 |
| EOCTD | -.210 | .125 |

(EOFV = Errors of Front Vowels, EOCV = Errors of Central Vowels, EOBV = Errors of Back Vowels, EOCSD = Errors of Closing Diphthongs, EOCTD = Errors of Centering Diphthongs)

**Table 8.** Correlations Between Speech Intelligibility and E. of Different Types of Consonants

| Errors | Pearson's *r* | Sig. (2-tailed) |
|---|---|---|
| EOP | -.072 | .599 |
| EOF | -.338* | .012 |

| | | |
|---|---|---|
| EON | -.110 | .425 |
| EOL | -.155 | .259 |
| EOA | -.307* | .023 |
| EOSMV | -.156 | .255 |

(EOP = Errors of Plosives, EOF = Errors of Fricatives, EON = Errors of Nasals, EOL = Errors of the Lateral, EOA = Errors of Affricates, EOSMV = Errors of Semi-vowels)

In summary, vowel-related errors—especially in front vowels and closing diphthongs—showed stronger negative relationships with intelligibility than consonant-related errors. Among consonants, only fricative and affricate errors significantly reduced intelligibility ratings.

**Discussion**

The present study investigated the relationship between segmental pronunciation errors and intelligibility among English learners with a Sichuan or Chongqing dialect background. The results revealed several noteworthy patterns that contribute to the understanding of how vowel and consonant errors affect intelligibility, as well as how specific phonetic features interact with listeners' comprehension.

**Vowel Errors and Intelligibility**

The analysis showed that participants exhibited a considerably higher error rate for single vowels than for diphthongs. Among single vowels, front vowels posed the greatest difficulty, with error rates far exceeding those of back and central vowels. This pattern aligns with earlier research. Sun Fali (1979) found that learners with Sichuan dialect backgrounds tended to pronounce the word "sit" as "seat," replacing /ɪ/ with /iː/. Similarly, Luo Xuefei (2015) observed that many learners could not distinguish /iː/ and /ɪ/ due to their shared mapping to a single Chinese Pinyin vowel, "i." This indicates that the learners' L1 phonological system lacks the tense–lax vowel contrast, leading to systematic substitution.

A similar pattern was observed in the confusion between /ɒ/ and /ɔː/. As Sun Fali (1979) noted, such confusion is common among learners with Sichuan backgrounds, who often treat /ɒ/ as a shorter version of /ɔː/. In this study, more than 70% of participants held the view that /ɒ/ is merely a shortened /ɔː/, suggesting that misperceptions at the phonemic level directly affect production accuracy.

Interestingly, errors in diphthongs were much less frequent overall. However, the diphthong /eə/ showed a relatively high error rate, often being replaced by /ɪə/. This phenomenon has not been reported in previous studies and may be related to insufficient mastery of the target pronunciation. Sun Yun (2016) pointed out that diphthongs require smooth and fluent articulation in a single breath; interruptions during transitions often cause learners to produce them as two separate monophthongs. This issue, which exists in many northern dialect areas including Sichuan and Chongqing, may explain the findings in this study.

Crucially, front vowels and closing diphthongs were found to be significantly correlated with intelligibility. This supports the view that vowels, as syllabic nuclei, play a key role in meaning transmission. When vowel quality is distorted, listeners are less likely to recover the intended lexical item.

**Consonant Errors and Intelligibility**

Compared to vowels, consonants were produced with higher overall accuracy. The most prominent consonant error was the mispronunciation of the lateral sound /l/, especially in coda or medial positions. Participants often produced /l/ as a closing diphthong /əʊ/ or omitted it entirely. This finding is consistent with previous observations regarding the difficulty of producing dark /ɬ/. Surprisingly, despite the 40% error rate for laterals, this did not significantly affect intelligibility. This might be attributed to the fact that English listeners are often able to infer the target word based on context when the lateral sound is omitted or distorted.

In the production of plosives, a common phenomenon was the addition of a schwa sound /ə/ after /t/. As Sun Fali (1979) noted, such inappropriate epenthesis is common among beginners. It leads to both segmental inaccuracy and suprasegmental disruption of rhythm. However, this pattern was not unique to Sichuan or Chongqing speakers.

Among nasals, errors were concentrated on /n/, often due to confusion with other nasal sounds in coda position. Interestingly, despite these segmental inaccuracies, neither nasal nor lateral errors showed significant correlations with intelligibility. This suggests that certain types of consonant errors may be more "intelligibility-tolerant," possibly because they occur in positions that carry less lexical weight or are easier to infer from context.

In contrast, errors in fricatives and affricates were significantly correlated with intelligibility. Mispronunciations of /θ/ in particular caused the greatest difficulty for listeners. Fricatives and affricates may contribute more to intelligibility because they often occur in high-information lexical items and minimal pairs that distinguish meaning.

**The Relative Role of Vowels and Consonants**

The overall correlation analysis showed that vowel errors had a stronger negative impact on intelligibility than consonant errors. This finding is consistent with the view that vowels serve as the core of syllables and play a crucial role in word recognition. Although consonants typically outnumber vowels in running speech, their omission or distortion may not always lead to communication breakdown if the surrounding context provides sufficient cues. Vowel quality, on the other hand, directly affects lexical access.

This pattern also resonates with previous studies on L2 intelligibility, which suggest that not all pronunciation errors are equally detrimental to listener comprehension. Vowel quality, especially in stressed syllables, tends to be a more reliable cue for lexical retrieval than consonantal detail. This may explain why front

vowel and closing diphthong errors showed the strongest correlations with intelligibility in this study.

In summary, these findings provide clear answers to the research questions that guided the study. Regarding RQ1, the analysis identified systematic segmental errors among Chongqing and Sichuan learners, concentrated in front vowels (/iː/, /ɪ/, /eɪ/), interdental fricatives (/θ/), and coda /l/, with additional but less frequent errors in diphthongs and nasals. For RQ2, these errors showed varying degrees of impact on listener comprehension: front vowel and fricative errors often led to lexical misidentification, whereas lateral and nasal errors were more likely to be resolved through contextual inference. Concerning RQ3, the statistical results confirmed significant negative correlations between intelligibility and error rates, with vowel errors—especially front vowels and closing diphthongs exerting the strongest effects, followed by fricatives and affricates. Together, these patterns highlight a hierarchy of segmental features in terms of their intelligibility impact, pointing to a small set of phonological contrasts that should be prioritized in pronunciation instruction.

**Pedagogical Implications**

Instruction should be dialect-aware and intelligibility-first, prioritizing high-impact segmentals rather than native-like accent in general. For Chongqing learners, this means targeting the contrasts most linked to misunderstandings—/iː/–/ɪ/–/eɪ/, interdental fricatives /θ, ð/, and word-final /l/. Teachers can (1) run quick diagnostics to surface each class's top confusion pairs; (2) design short perception-production cycles (ABX listening, minimal-pair drills, immediate feedback); (3) give simple articulatory cues (e.g., tongue placement for /θ, ð/, sustained coda contact for /l/); (4) use spaced retrieval and micro-quizzes to stabilize new categories; and (5) assess with intelligibility tasks (keyword recognition, dictation of minimal pairs, message-transfer) rather than accent scores. Not every error needs attention focus time on those that actually change word identity.

For learners, confidence should come from being understood. Keep a personal confusion list (e.g., week/wake, thin/sin), record short readings, and compare against model audio; use ASR only as feedback, not as ground truth (its errors with student speech are known). Increase exposure to varied L2 English, practice targeted contrasts in short daily bursts (3–5 minutes), and track gains with simple metrics (word-ID accuracy, rater comprehension). This segmental, data-guided approach yields practical gains with minimal extra class time.

## CONCLUSION

This study systematically documented the segmental pronunciation patterns of Chongqing high-school learners and examined their relationship with intelligibility, thereby addressing a previously underexplored context in pronunciation research. Errors were concentrated in vowels, particularly front vowels, where frequent mergers and misarticulations—such as /iː/ being confused with /eɪ/ or /ɪ/—often led raters to misidentify lexical items. Consonant difficulties centered on interdental fricatives /θ, ð/ and segments absent or restricted in the local dialect, notably word-final /l/, which was frequently substituted or omitted. Statistical analyses confirmed a significant negative correlation between overall segmental error rates and intelligibility scores. Within vowels, front vowels and closing diphthongs exhibited the strongest associations with reduced intelligibility, while among consonants, fricatives and affricates showed comparable effects. These findings provide empirical evidence of how segmental deviations differentially affect intelligibility in a dialect-influenced educational setting, thereby filling a data gap in secondary-level English pronunciation research in Chongqing. They also offer pedagogical insights, emphasizing that not all errors are equally consequential for listener comprehension. Instruction should prioritize segmental contrasts with the highest functional load—particularly /iː/–/ɪ/–/eɪ/, interdental fricatives, and word-final /l/—and integrate perception–production cycles, articulatory cues, and intelligibility-focused assessment tasks. Such an approach can

maximize communicative outcomes without requiring native-like accent attainment. The study thus contributes both empirical and pedagogical evidence to guide pronunciation instruction in dialect-influenced contexts, while pointing to directions for further research outlined in the limitations section.

This study offers initial empirical evidence on how segmental pronunciation errors among Chongqing high-school learners relate to intelligibility, but several limitations should be noted. First, the data were drawn from a single dialect group with a relatively small sample (55 speakers) and three raters, which may limit the generalizability and reliability of the findings. Second, the stimulus consisted of textbook reading with incomplete phonemic coverage (e.g., the absence of /ʒ/), potentially reducing its representativeness compared with spontaneous speech. Third, the analysis was restricted to segmental features, and no suprasegmental factors were considered. Future studies should broaden participant pools, increase the number of raters, and incorporate both read and spontaneous speech with comprehensive segmental coverage. The use of more advanced statistical modeling could also yield more robust and fine-grained insights, enhancing the applicability of the findings to pronunciation teaching.

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