



# Analysis of Preschool Children's High Tonic Acquisition Errors

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**Abstract.** Tone is a crucial aspect of modern Chinese pronunciation and a challenge for preschool children learning Mandarin. This study uses Praat software and T-value analysis to examine the tonal biases of 20 preschool children in Yangjiang City. The analysis reveals that the rising tone has the highest deviation rate, while the falling tone is the most accurate. Deviation rates, from smallest to largest, are: falling tone < falling-rising tone < level tone < rising tone. Contributing factors include tone bias, domain bias, and negative transfer from the mother tongue. Corrective teaching strategies proposed are contrastive learning, music-assisted teaching, aptitude-based teaching, and step-by-step learning. These methods effectively aid preschool children in learning Mandarin tones.

**Keywords:** Preschool children, tone, the flat tone, the rising tone, the falling-rising tone, the falling tone.

## 1 Introduction

Mandarin Chinese is a tonal language, meaning that the pitch contour or intonation pattern of a syllable can change the meaning of words [1][2]. This characteristic is integral to the language's structure, where a single syllable with different tones can convey entirely distinct meanings. For instance, the syllable "ma" can mean "mother," "hemp," "horse," or "scold," depending on the tone used. This complex tonal system requires not only an understanding of pitch but also precise control over vocal production, which can be particularly demanding for young children. For preschool children, who are in the early stages of language acquisition, distinguishing and reproducing these tones is especially challenging [3][4]. At this developmental stage, they are still refining their auditory discrimination and motor skills related to speech, which are crucial for accurate tone production. Proper mastery of tones is essential for effective communication in Mandarin, but it often poses significant difficulties for young learners. Without proper tone usage, children risk being misunderstood or failing to convey the intended meaning, which can hinder their overall language development. These difficulties are compounded in regions where local dialects differ significantly from standard Mandarin, adding another layer of complexity to the learning process [5][6].

Yangjiang City, located in Guangdong Province, is home to a variety of dialects that influence how children learn and use Mandarin [7]. These dialects, which often possess

their own tonal systems distinct from Mandarin, can lead to specific tonal biases and errors in Mandarin acquisition. The tonal structure of these dialects may vary significantly from that of Mandarin, leading children to apply familiar patterns from their native dialects when speaking Mandarin. For example, a child whose native dialect has fewer tones or different tonal contours might transfer these patterns to Mandarin, resulting in tonal errors. These errors are not merely random mistakes but are often systematic and reflect the phonological structure of the child's native dialect. Such transfer phenomena are well-documented in language acquisition research, where the influence of a first language often impacts the learning of a second language. Understanding these biases is crucial for developing effective teaching strategies that address the unique linguistic challenges faced by preschool children in this region [8][9][10]. By identifying the specific ways in which local dialects influence tone acquisition, educators can design more targeted interventions to mitigate these effects. Tailoring educational approaches to consider these dialectal influences can greatly improve the effectiveness of Mandarin instruction in Yangjiang.

This paper focuses on analyzing the tone acquisition errors of preschool children in Yangjiang City, utilizing Praat software and T-value analysis to provide a detailed examination of tonal deviations. Praat, a powerful tool for phonetic analysis, allows for precise measurement of pitch contours, enabling researchers to identify even subtle deviations from the standard tones. Its advanced features facilitate the accurate capture of the pitch patterns, which are crucial for understanding how children produce tones. T-value analysis further aids in quantifying these deviations, offering a statistical framework to understand the extent and nature of tonal errors. By combining these tools, the research provides a robust methodological approach to studying tone acquisition errors. By identifying the most common types of tonal errors and their underlying causes, this research aims to contribute to the development of targeted educational interventions that can improve tone accuracy in young Mandarin learners[11]. These interventions could include tailored pronunciation exercises, tonal drills, and other pedagogical strategies designed to address the specific needs of children influenced by the linguistic environment of Yangjiang City. The research findings are expected to have broader implications, offering insights that can be applied to other regions with similar linguistic challenges. Through this research, we hope to provide insights that will enhance the effectiveness of early Mandarin education, particularly in regions with diverse linguistic landscapes.

## **2 Characteristics of Single-Character Bias of Preschool Children**

The Mandarin monotones of preschool children investigated in this article are the flat tone 55 and the rising tone 35. The article will make a specific analysis from the aspects of the starting point of the tone, the middle point of the tone, the end of the tone and the area of the tone, intonation pattern, pitch of tones (Turn the beginning, stem, end, range, type, value). The bias rate of the tone in the text = the number of errors/number of errors/number of people surveyed people in the test.

### 2.1 The Flat Tone

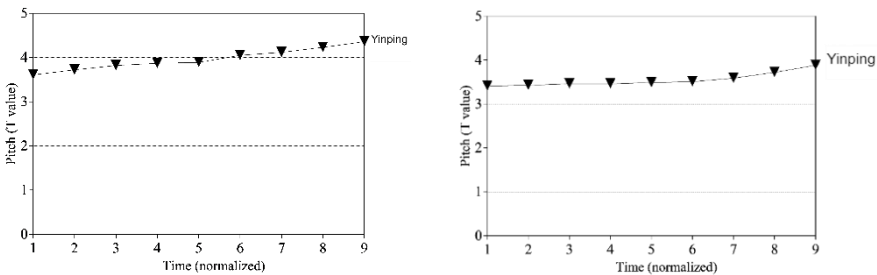
Error rate: Among the 20 preschool children tested in this experiment, there are 12 pronunciation standards with a tone value of 55, and the remaining 8 pronunciations have a bias rate of 40%. For details, see Table 1 and Figure 1:

**Table 1.** Error rate table for the level tone

intonation pattern	pitch of tones	number	proportion
high level tone	55	12	60%
high-rise tone	45	1	5%
second-high-level tone	44	7	35%

Specific errors: 1 child's tone type of the flat tone is high-rise tone, with a tone value of 45, and 7 children's tone type of Yin-level tone is second-high-level tone, with a tone value of 44. See Figure 1 for details:

As shown in table 1 and figure 1, one of the subjects pronounced the flat tone 55 as 45, and the tone value showed an upward trend, which was consistent with the flat tone value of 45 in Yangchun dialect. Investigation of his family background found that the child was influenced by the dialect and during the process of learning Mandarin. The mother tongue transfer phenomenon mentioned by Odlin (1989) occurred, that is, the learner's first language and mother tongue usage habits directly affected the acquisition of the second language and interfered with it, resulting in the child's pronunciation bias. The other seven children pronounced the flat tone value 55 as the tone value 44. The tone type was consistent with the flat tone value of Mandarin, but the tone range was slightly lower than the overall standard Mandarin. The reason was that when learning Mandarin, the boundaries of the tone range were vague, and it was difficult to find an accurate starting tone value, resulting in the turning around too low, and the stem and tail tone rising to the standard tone value.



**Fig. 1.** the flat tone chart

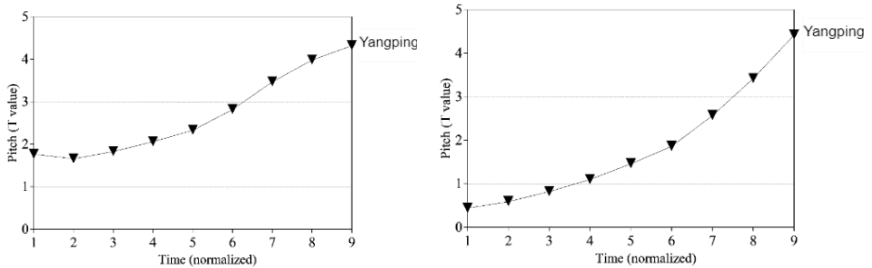
### 2.2 The Rising Tone

Error rate: Among the 20 preschool children tested in this experiment, 6 had standard pronunciation with a key value of 35, and 14 had errors in pronunciation, with a deviation rate of 70%. See Table 2 and Figure 2 for details:

**Table 2.** Error rate table for the rising tone

intonation pattern	pitch of tone	number	proportion
Moderate rising tone	35	6	30%
Second-low rising tone	25	10	50%
low rising tone	15	4	20%

Specific errors: 10 children's tone type of the rising tone is pronounced as the second low rising tone, with a tone value of 25, and 4 children's tone type of the rising tone is pronounced as the low rising tone, with a tone value of 44. See Figure 2 for details:

**Fig. 2.** the rising tone chart

As shown in Table 2 and Figure 2, the 14 children's the rising tone errors were all due to the low starting point of the turn around or too low. The subjects 'the rising tone was all rising, and the tails reached the standard height of Mandarin the rising tone, but the tone range was lower than the standard Mandarin tone. The reasons are as follows: The guardians of the 14 preschool children are all locals in Yangchun or Yangjiang, and the children also master at least one of these two dialects. Both dialects have the habit of raising and lengthening the final sound in daily communication. American linguists S.G. Thomason and T. Kaufman (1927) called this phenomenon "interference caused by diversion", that is, in the process of language diversion, language users bring their mother tongue characteristics into the target language, habitually lengthen the rising tone process and final pronunciation. The lowering of the beginning can just reflect the raising and lengthening of the tone in dialect habits; Secondly, in the early stages of preschool children's learning of tones, in order to highlight the rising trend of tones in teaching, teachers will deliberately emphasize tone changes to express tone, which will lead to children's imitation learning starting point being too low and then rising. Secondly, in the beginning stage of tone learning, it is difficult for learners to grasp the tone time well, and too long a rising tone time will also lead to too low a turn, which is acceptable in terms of hearing, that is, "pronunciation deviation" phenomenon occurs, and there is still a gap compared with the actual standard Mandarin.

### 3 Conclusion

This study reveals significant challenges in Mandarin tone acquisition among preschool children in Yangjiang City, with the rising tone showing the highest error rate. The

rising tone, often characterized by a sharp increase in pitch, is particularly difficult for young learners to master. This difficulty is compounded by the influence of local dialects, which may have different tonal systems or lack certain tones altogether. For instance, in some dialects, the rising tone may not exist or may be realized differently, leading children to apply incorrect tonal patterns when speaking Mandarin. Negative transfer from the mother tongue, where children inadvertently apply the tonal rules of their native dialect to Mandarin, is identified as one of the primary contributors to these tonal biases. This transfer is not only limited to tone but also affects other phonological aspects, such as intonation and rhythm, further complicating Mandarin acquisition.

To address these challenges, the study proposes several effective teaching strategies tailored to the unique linguistic environment of Yangjiang City. One such strategy is contrastive learning, which involves explicitly highlighting the differences between the tones in Mandarin and those in the local dialects. By making these differences clear, children can become more aware of the distinct tonal patterns in Mandarin, helping to reduce confusion and errors. Another innovative approach is music-assisted teaching, which leverages the natural connection between music and language. Since music involves variations in pitch, rhythm, and intonation, it can be a powerful tool for teaching tones. Singing exercises, for example, can help children internalize the pitch contours of Mandarin tones in a more engaging and memorable way.

Aptitude-based instruction is also recommended, where teaching methods are adapted to the individual learning needs and abilities of each child. This personalized approach ensures that children receive the appropriate level of support, whether they need more intensive practice with certain tones or more general language development. Additionally, the study advocates for step-by-step learning methods, which break down the complex process of tone acquisition into manageable stages. By gradually introducing tones and building on previous learning, this method allows children to develop a solid foundation in Mandarin tones before moving on to more advanced language skills. These approaches have shown promise in improving tone accuracy and addressing the specific needs of young learners in multilingual environments. Early intervention is emphasized as crucial, as it allows for the timely identification and correction of tonal errors before they become entrenched. Tailored teaching methods, such as those proposed in this study, are essential for helping children overcome these challenges, facilitating better Mandarin proficiency and effective communication skills. The findings underscore the importance of targeted educational strategies in supporting language development in diverse linguistic settings. By implementing these strategies, educators can help ensure that all children, regardless of their linguistic background, have the opportunity to achieve fluency in Mandarin. This not only benefits their language skills but also enhances their overall cognitive development and academic success.

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