

# Evaluating ChatGPT's Mandarin "yue" pronunciation system in language learning

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## ABSTRACT

By incorporating voice control technology into ChatGPT, it becomes possible to engage in conversations or dialogues with individuals who are actively engaged in the process of acquiring language skills. Our study team conducted a modest experiment to evaluate the efficacy of a voice control feedback system in facilitating the mastery of the most challenging pronunciation of the Mandarin syllable "yue". The objective of this study is to evaluate the effectiveness of voice-controlled ChatGPT in aiding learners to acquire accurate pronunciation of the Mandarin phoneme "yue". Furthermore, the study seeks to investigate the methods utilised by the ChatGPT model in identifying and distinguishing the word "yue" when it is used alone or in combination with "ye" and "yi". We employed many testing approaches, including single-word instances, paired instances, and the integration of phrases. In addition, we evaluated the model's ability to accurately detect the term "yue" in short sentences and, ultimately, in a longer sentence.

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## 1. INTRODUCTION

Despite earlier significant studies admitting the helpful support provided by artificial intelligence (AI) for language learning, there is continuous speculation over the usefulness of ChatGPT in this domain. Research has demonstrated that incorporating technology into language acquisition can significantly improve the efficiency of both learning and teaching languages. Brata and Brata [1] promote the improvement of user experience by using mental models. Laato *et al.* [2] discusses that higher education teachers must adapt their methodologies to integrate AI innovative learning modes and the advent of large language model (LLM) services is profoundly altering pedagogy in higher education. We ultimately offer a narrative to reflect on our AI-driven future.

Using ChatGPT can expedite the process of acquiring Mandarin proficiency through AI. This study aims to provide a comprehensive approach for effectively acquiring the intricate pronunciation of the Mandarin syllable "yue" using ChatGPT. The disputes around the roles of AI and humans in language acquisition are focused on two main aspects: i) the impact of AI on learners' motivation and individual cognitive capacity and ii) the complexity of AI in terms of pronunciation. Multiple previous studies have been undertaken on the association between AI performance and language learning or acquisition, examining it from various perspectives. The findings also concluded that the advancement of AI has provided an

extensive support of language learning and would possibly supplant human instructors in the foreseeable future. However, the potential trajectory of this development is conditioned for further investigations [3].

A dynamic advancement and widespread adoption of AI at the present era elucidates both opportunities and concerns in the field of language learning, particularly, and learning Mandarin as a second or foreign language for the present study. On one hand, the support of AI can help achieve an optimal degree of language learning whereby the learners will be given full autonomy or self-regulated schedule of learning a language. With the progressive development of AI at the present time, the challenges for AI to completely replace human instructors can be foreseen in the near future once AI can achieve flawless in its consistency of pronunciation and create an optimal level of language learning for the learners.

Many scholars are using ChatGPT as application softwares as language learning and pedagogy for studying Mandarin or Chinese. Similar research was conducted by Hung and Chen [4]. They investigated the pros and cons of using ChatGPT by Chinese students in schools. This study evaluated the regulatory mechanism of using ChatGPT in Chinese academic settings with the purpose to protect the ethical standard and academic integrity of the learners. The accuracy of pronunciation would either improve or reduce the level of comprehension of the Chinese language in verbal communication [4]. However, levels of sensitivity for AI to produce human sounds are questionable as some of the phonetic sounds are distinctive within the Mandarin syllabus. For example, the phonetic transcription of the "ü" phoneme exhibits a distinct and exact articulation within the Mandarin language. In the context of letter representation, it is observed that the letters x, y, j, and q are denoted as "xu", "yu", "ju", and "qu", respectively. There exists a notable disparity in the pronunciation of the vowel "ü" when compared to the vowel "u". Therefore, under the supervision of human instructors, a significant number of inexperienced learners are still encountering difficulties when attempting to appropriately articulate the vowel "ü".

In light of this, taking ChatGPT as one of the AI language learning instruments, the primary aim of this research is to conduct a thorough assessment of the ChatGPT voice control functionality in enhancing the conversational interactions of language learners with the system. The collected team has made a collective decision to employ the term "yue" as a test case to evaluate the level of sensitivity exhibited by the voice control mechanism in ChatGPT. An experiment was undertaken utilizing ChatGPT as a means to facilitate the instruction of the intricate pronunciation of the Mandarin syllable "yue". The term is formed by the amalgamation of the consonant "y", the vowel "ü", and the vowel "e".

Yang *et al.* [5] developed an AI-based system for a Mandarin-Tibetan multilingual learning website which commences five courses based on Tibetan primary school Mandarin textbooks. The project recruited 15 Tibetan students to assess the platform and proposed improvements after they went through different learning modules. The core learning provides an evaluation on the pronunciation and feedback in the first module. Students were allowed to practice pronouncing class-taught characters, phrases, and texts as well as ordinary sentences. Subsequently, in the second module, students would go through a grade-level assessment on the Mandarin pronunciation of some library items and basic classroom things.

Using ChatGPT for language learning has become a new trend in recent years. Several studies examined the role of ChatGPT in language acquisition of different levels of learners. Klyshbekova [6] investigated if chat-bots could help teachers and students in learning languages. This study examined various ways that chat-bots can aid language learning. Li *et al.* [7] studied how precisely the technical affordance of ChatGPT can replicate human interaction, monitoring linguistic ambiguity in the process of language acquisition. This study examined the educational affordances of ChatGPT in several languages as addressed across YouTube language groups. The study also attempted to identify and implement ChatGPT integration best practices for language training.

Compelling debates on the adaptability of ChatGPT pedagogy and learning possibilities has been dynamically engaged by different scholars in the field of language acquisition. Cacicio and Riggs [8] argued that adult learners can self-regulate their learning in the technologically advanced setting with many benefits compared to language instructors' ongoing guidance and support. Their research highlighted methods with efficient integration of digital tools in language teaching to improve the collaboration between human instructors and AI in language learning for adults. Those adult learners should master a digital instrument before using it, and similarly, language instructors could also learn new abilities with their students. This activity illustrated the importance of skill improvement in learners and instructors' daily life [9], [10].

According to Cannon [11], Dr. Morton Ann Gernsbacher commenced classes to teach students using ChatGPT by following more responsible and professional principles and procedures. Apart from this, Vaccino-Salvadore [12] contended that ChatGPT in education has increased learners' language learning opportunities. Nevertheless, the abuse of using ChatGPT in the academic activities needed to be highlighted as it involved important ethical issues. Given a rapid progress of AI, educators and administrators must carefully examine the ethical implications of ChatGPT in language training and other fields [13]–[17].

Focusing on using ChatGPT as a model, He and Garner [18] examined the cognitive effects using the advancement of LLM. The research aims to contribute to the current debate over the cognitive effects of modern LLM. On the other hand, Li *et al.* [19] analysed eleven sets of data collected from six learning activities in order to assess the comprehension levels of learners who used ChatGPT in the reading activities of Chinese language.

The empirical results showed that ChatGPT performed well in sentiment analysis, summarization, and reading comprehension for Chinese language learning. However, ChatGPT is prone to show factual inaccuracies, especially when answering inquiries without external references. Their research also suggests that a direct chain-of-thought prompt can improve ChatGPT's precision in intricate reasoning for two more complex Chinese language comprehension tasks, idiom fill-in-the-blank and cants understanding. Meanwhile, Wang [20] also examined international Chinese language education and AI. This study examined how advanced technology of AI has affected Chinese language teaching and learning. In addition, the report also investigated the learning trajectory of ChatGPT in future, the potential barriers, and improvements of this application software.

A group of academics conducted a study on the identification of local languages to acknowledge linguistic diversity, enhance intercultural comprehension, safeguard endangered languages, and enhance accessibility to education and services [21]. In addition, AI can also aid in the development of low-resource languages [22], [23]. Annamalai *et al.* [24] assert that their findings reveal chatbots lack emotional context and disseminate inaccurate information concerning English language development. Students suggested that chatbots be employed solely for evaluative reasons in education. The students also supported that a hybrid learning approach or traditional classroom instruction to mitigate their doubts after the use of chatbots. Research conducted by Suyanto *et al.* [25] focusses on the field of reading comprehension. This demonstrates the potential of AI to assist in multiple domains of language.

## 2. METHOD

The present study adopted a methodology described by Kohnke *et al.* [15]. The model is designed to test the functional usage of ChatGPT by providing interactive learning activities in an evolving learning approach which includes four different proportions with distinctive learning outcomes. In the experimental design for section 1, learners would start with a relaxing warm up session: interacting conversation as language practices between learners and ChatGPT which falls mainly on greeting someone or phrases of opening a conversation in an authentic Mandarin speaking environment.

In section 2, distinctive sounds in the pronunciation of "yue" and "ye" in some Mandarin words are highlighted for the vocabulary expansion in the learning of these two distinctive sounds. The interactive language practice is followed by a conversational simulation in section 3. Learners are to make formal requests to the ChatGPT in the attempts to pronounce some Mandarin words with the two distinctive sounds. To simply put, the progress of this experimental study in acquiring Mandarin as a foreign language is entailed with focus on listening and speaking skills through interacting activities with ChatGPT. The design of investigation is shown in Table 1.

Taking ChatGPT as one of the AI language learning instruments, the primary aim of this research is to conduct a thorough assessment of the ChatGPT voice control functionality in enhancing the conversational interactions of language learners with the system. The collected team has made a collective decision to employ the term "yue" as a test case to evaluate the level of sensitivity exhibited by the voice control mechanism in ChatGPT. An experiment was undertaken utilizing ChatGPT to facilitate the instruction of the intricate pronunciation of the Mandarin syllable "yue". The term is formed by the amalgamation of the consonant "y", the vowel "ü", and the vowel "e". The design taking this phonetic sound is to evaluate the techniques utilized by the ChatGPT model in the identification and distinction of the term "yue" when it is used independently as well as in combination with the terms "ye" and "yi". Various testing methodologies were employed, including single-word occurrences, paired occurrences, and the use of phrases. Additionally, we evaluated the model's ability to accurately detect the phrase "yue" in concise sentences and, ultimately, in a lengthier statement.

Table 1. Experimental language learning activities for data collection

Kohnke <i>et al.</i> [15] Language learning activities between learners and ChatGPT	Adopted design for the experiment		
	Functional design in the interactive language learning activities	Examples	Duration
1. Language practice	Warming up activities – Mandarin learners greet the ChatGPT	1. How are you? (你好吗?) 2. Have you eaten? (你吃饱了吗?) 3. Are you busy now? (你现在忙吗?)	10 min
2. Vocabulary expansion	Assessing the efficacy of the ChatGPT voice control system in discerning subtle variations in Mandarin sounds	Nouns: 衣 (clothes), 叶 (leaf), 月 (moon) Nominal Nouns: 衣服 (clothes), 叶子 (leaf), 月亮 (moon) Verb + Nominal Nouns: 穿衣服 (wear clothes), 捡叶子 (pick up a leaf), 看月亮 (see the moon)	10 min
3. Conversation simulation	Assessing the accuracy of pronouncing the sound "yue" given by ChatGPT	Please teach me to pronounce y-e-u.	15 min
4. Immediate feedback	Assessing the validity and reliability of the voice control system.	1. 月亮很大很美。 (The moon is so big and beautiful.) 2. 我喜欢看月亮。 (I like to see the moon.)	15 min

### 3. RESULTS AND DISCUSSION

This section features findings from the interactive data collected between Mandarin learners and ChatGPT as an AI language learning instrument. The assessments evaluate the effectiveness of ChatGPT as an AI language learning machine in the learning of Mandarin as a foreign language, particularly assessing the voice control system of ChatGPT in the interactive language functions of learning between learners and ChatGPT. The discussion highlights on evaluating the accuracy of the voice control mechanism of ChatGPT in terms of the pronunciation of two Mandarin phonetic sounds "yue" and "ye", and interactive responses made by ChatGPT in the conversational practice between Mandarin learners and ChatGPT. Our findings align with those of [3], indicating that users may experience boredom while continually practicing the same lines of dialogue. To enhance conversational variety, it is essential to provide various replies for each line.

The criticism raised by Li *et al.* [19] argues that the existence of hallucination in generative language models is currently a significant problem, as it undermines the accuracy of the material produced by these models. Deceptive or unreasonable hallucinogenic writing can mislead users and provoke concerns within the community regarding the use of language models. ChatGPT's nature as a generative language model may limit its ability to provide appropriate responses to academic enquiries and certain common-sense questions. Therefore, the generic language model is presently incapable of replacing specialised models in professional fields. Thus, to resolve these issues, we provide straightforward and concise step-by-step instructions.

Table 2 is a categorization of the interactive records and analysis in the Mandarin language learning activities between Mandarin learners and ChatGPT. The first column shows the queries made by the learners while interacting with ChatGPT. The second column records the responses of the ChatGPT, while the third column is the analysis and findings. Analyses of ChatGPT's responses are presented in Table 2.

Evidently, responses generated by ChatGPT were entirely within the given framework, exhibiting a consistent style. It is evident that ChatGPT has a lack of flexibility and humanism from the experimental observation as the AI system possessed a shortcoming in its voice control functionality. Notably, ChatGPT showed the absence of a natural feedback mechanism. The system demonstrated constraints in its ability to effectively and consistently assess the reading proficiency of learners. The existence of similar pronunciations of Mandarin words in the reading material can potentially lead to different mistakes in reading comprehension. For example, learners might wrongly associate the pronunciations of "yue" with different Chinese words as the system persists in categorizing them as "yue" pronunciations. Moreover, the learner might deduce from the feedback that the pronunciation is precise.

Unlike a human language teacher, ChatGPT does not possess the ability to engage in code switching or code mixing. This limitation has restricted its capacity to provide explanations or assist beginners of language learning in acquiring reading skills. The lack of flexibility and practicality is evident from the findings in the present study. It is obvious that the level of intelligence exhibited by ChatGPT is inadequate in the interactive language learning activities. To commence the utilization of ChatGPT, it is important to familiarize oneself with the recommended procedures when engaging with the system. The time frame required for the familiarization may be substantial, potentially exceeding the time needed to acquire word pronunciation with the assistance of a human Mandarin instructor.

The utilization of ChatGPT in educational settings may lead to misinterpretation of the words, utterances of phrases or sentences by language learners due to the tonal characteristics inherent in Mandarin words. As for Mandarin language, many Chinese words share the same phonetic representations of both their phonetic symbols and pronunciation, resulting in linguistic ambiguity and the interpretation of those Chinese words. Without adequate guidance from a human Mandarin instructor, learners may perceive the reading of Chinese words as language errors in the reading exercise. The root cause of this misinterpretation arises because these Mandarin learners encounter multiple words in the explanation given by ChatGPT without proper feedback and clarification in the reading exercises although in reality, other words also share the same pronunciation. For instance, in the process of acquiring knowledge of the character "衣", when the learner ChatGPT voice system will present the character "一". In a similar vein, when the learners were presented with the character "叶", ChatGPT voice system will generate the character "夜". Indeed, it is observed that both the letters 衣 and 一 were phonetically represented by the first tone yi, but both 叶 and 夜 were phonetically represented by the fourth tone ye.

The opinion of Hung and Chen [4] concurs that ChatGPT is a valuable tool for fostering the development of language and cultural competency in pupils. Utilising AI technology to enhance learner support could have a significant effect in the field of adult education [8]. ChatGPT serves multiple purposes in achieving this objective, such as functioning as a tool for teachers to build instructional materials, aiding in the enhancement of academic and cognitive abilities, and serving as a concrete implementation of AI technology. With the aid of this comprehensive tutorial, Mandarin learners will find it simpler to master the correct pronunciation of the word "yue".

Table 2. Responses of ChatGPT and analysis

Learners queries	ChatGPT's responses	Analysis and findings
How are you? 你好吗?	我是一个人工智能程序，没有感受和情绪，但感谢你的问候！我可以帮您回答问题或提供信息。有什么我可以帮您助您的吗？ Meaning: As an artificial intelligence programme, I lack the capacity for experiencing emotions or sentiments. Nonetheless, I appreciate your salutation. I can help in addressing inquiries or furnishing relevant data. May I be of any assistance to you?	The ChatGPT reminds learner that he/she is talking with non-human. This would affect psychological relatedness of learners in the learning. Furthermore, setting of ChatGPT would always end conversation with new question, showing ChatGPT offered itself to help in answering any questions which probably would startle the learners who were still new in learning the language.
Have you eaten? 你吃饱了吗?	我是一个计算机程序，没有生理需求，所以我不需要吃饭。但我随时可以回答您的问题或提供帮助。有什么我可以帮您助您的吗？ Meaning: As a computer programme, I lack physiological requirements and hence do not possess the necessity to consume food. However, I am available to address your inquiries or offer support at any given moment. May I be of any assistance to you?	The response might not give any form of support or motivation for the learners to further the practice of conversation with their AI Mandarin instructor. This scenario could potentially hinder their further learning activities.
Are you busy now? 你现在忙吗?	我是一个计算机程序，随时可以回答您的问题，没有忙碌或休息的时候。请随时提出您的问题或需要帮助的事情，我将尽力为您提供支持。 Meaning: I am automated computational system, designed to provide prompt and uninterrupted responses to inquiries, devoid of any constraints related to time, availability, or need for pauses. Please do not hesitate to inquire about any inquiries or inform me of your requirements, and I will use my utmost effort to help.	Learners attempted to apply simple adjacency pairs in Mandarin conversation, but the ChatGPT failed to provide the expected standard response such as "Yes, I am ok" or "No, I am not".
Practising the pronunciation of the Chinese words such as 衣 (clothes), 叶 (leaf), 月 (moon)	一, 夜, 月 Please note that when learners read the syllables "yi" with tone 1, "ye" with tone 4, and "yue" with tone 4, different words are produced and listed. Despite the variation in words, this observation nevertheless confirms that the learners are reading in the correct manner. The characters "衣" and "一" share the identical pronunciation, namely the first tone "yi", while the characters "叶" and "夜" are both pronounced with the fourth tone "ye".	As it is generated by an AI voice system, while learners pronounce "yi", there would be an excessive amount of additional explanation provided. However, the explanation was unnecessary for learners who only required confirmation of whether the pronunciation was accurate or not.
Practising the pronunciation of nominal nouns such as 衣服 (clothes), 叶子 (leaf), 月亮 (moon)	Feedback from ChatGPT: The lexical sequence of nouns such as "衣服, 叶子, 月亮", exhibited characteristics of a collocation, although lacks a discernible semantic interpretation. If the user could provide further context or clarification, ChatGPT (I) would try to offer more precise information or address their inquiries.	There is an excessive amount of additional explanation provided, which is unnecessary for learners who only require confirmation of whether the pronunciation is accurate or not. Furthermore, the feedback would confuse the beginner of learning Mandarin.
Imperative sentences like 穿衣服 (wear clothes), 捡叶子 (pick up a leaf), 看月亮 (look at moon)	Feedback from ChatGPT: The line "穿衣服, 剪叶子, 看月亮" appears to convey a specific action or activity. The language in question possesses the potential for many readings, with its precise meaning being contingent upon the contextual framework or subjective viewpoint. If further clarification or elaboration is required on the statement, kindly furnish additional contextual details, and I shall endeavor to provide the necessary assistance.	There is an excessive amount of additional explanation provided, which is unnecessary for learners who only require confirmation of whether the pronunciation is accurate or not. In addition, this would bore the learners with long explanations of simple imperative sentences.
Please teach me how to pronounce y-u-e in Mandarin.	In Mandarin Chinese, the word "月" (yue) is pronounced as a single syllable. Here's a breakdown of how to pronounce it: Start with the "y" sound, which is like the English "y" sound in words like "yes". Then, add "u" sound, which is like "oo" sound in English word "moon". Finally, finish with the "e" sound, which is pronounced like the "uh" sound in the English word "butter". So, when you combine these sounds, "月" (yue) is pronounced as "yoo-uh". To practice, you can try saying it slowly at first and then gradually pick up speed to achieve a smoother pronunciation.	This academic text provides comprehensive explanation of the pronunciation of the Mandarin word "yue". It covers the proper placement and skilful articulation of the tongue, with a focus on novices as the target audience. The entire explanation is written in Mandarin. Learners were unable to comprehend significant number of Chinese characters, and learners would also struggle to comprehend sentences in Mandarin.
月亮很大很美。 The moon is enormous and exquisite.	Feedback from ChatGPT: The moon exhibits a visually captivating spectacle in the nocturnal firmament, particularly at its full phase when it manifests as a substantial and luminous celestial body. The moon is frequently regarded with awe and fascination due to its aesthetic appeal and enigmatic nature. If there are any inquiries pertaining to the moon or the field of astronomy, or if you desire to expand your knowledge on lunar matters, please do not hesitate to pose your queries. I am delighted to furnish you with information or address any issues you may have.	There was an excessive amount of additional explanation provided, which was redundant for beginners who only require confirmation of the accuracy of uttering the phrase "月亮很大很美。".
我喜欢看月亮。 I enjoy observing the moon.	Feedback from ChatGPT: The allure and serenity of the moon have captivated several individuals. The phenomenon frequently offers a captivating visual spectacle in the nocturnal expanse. The act of appreciating the moon is a delightful endeavor that has the potential to foster a sense of tranquility and introspection. If there are any inquiries pertaining to the observation of the moon, the field of astronomy, or any other subjects that are closely associated, please do not hesitate to inquire. I would be delighted to offer information or extend my aid.	There is an excessive amount of additional explanation provided, and the clarification is out of the context in the learning of uttering the sentence "我喜欢看月亮。" as learners only required a confirmation of whether the pronunciation is accurate or not.

#### 4. CONCLUSION

In the process of language acquisition, it is important to partake in a preliminary activity that encompasses the act of greeting the learners. The purpose of this is to establish an atmosphere that promotes relaxation and comfort for the individuals engaged in the learning process. In most cases, educators commence the instructional session by questioning about the emotional well-being and recent nutritional consumption of the students, thereby creating rapport and cultivating a conducive learning environment. The insufficiency of ChatGPT in providing learners with adequate warm-up preparation is apparent. It is crucial to continually underscore to the learners that the language machine does not necessitate sustenance in the interaction with learners and it is not bound by the limitations of the availability as a language AI assistant, which in this case refers to ChatGPT. In addition to the acquisition of a foreign language, learners frequently exhibit a keen interest in observing the articulatory gestures employed by their human instructors. Similarly, the ChatGPT model possesses the capacity to graphically depict the precise articulatory configurations employed in the enunciation of words. The language system of ChatGPT is dependent upon the input provided by the user to the system. When considering the specific objective of assessing the veracity of the textual content, it becomes evident that ChatGPT does not offer any meaningful or applicable replies. On the contrary, it often inappropriately presents a surplus of extraneous information in simple interactions with language beginners. This may potentially evoke irritation among learners and exhibits a lack of adaptability, hence impeding prompt action. The feedback generated by ChatGPT is predominantly considered unproductive as it lacks practicality and relevance in the practice of specific Chinese words, showing an ineffectiveness in assisting the learning of the reading skill in these specific Chinese words. To sum up, the present research has arrived at the determination that ChatGPT could not potentially serve as a helpful assistance for learners possessing elementary proficiency in Mandarin learning, particularly learners who are at the introductory level or lack any prior familiarity with the language. In order to mitigate the risk of misinterpretation or waning motivation in the process of language acquisition, it is advisable to start Mandarin language learning with the supervision of a qualified human instructor.

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