# Towards AI-Driven Mandarin Learning: Unlocking the Potential of Material Description Table for Indonesian Learners

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**ABSTRACT**

*The study of applied contrastive analysis between Mandarin and Bahasa Indonesia has garnered increasing attention from researchers, particularly in language education and linguistic studies. This research aims to analyze key contrasting linguistic components between the two languages, specifically: number auxiliary words (量词 liàngcí), the occurrences of 了 (le), numbering rules, reduplication (重叠 chóngdié), and 离合词 (líhécí), a unique linguistic structure that has no equivalent in Bahasa Indonesia.This study employs a qualitative research approach with a narrative elaboration model. The primary data source consists of officially recommended textbooks by the Confucius Institute (孔子学院总部): 标准教程 Standard Course HSK 1–6 下. The data analysis techniques include identification, classification, and structured presentation of findings. The results reveal a significant linguistic gap between Mandarin and Bahasa Indonesia, particularly in the complexity and specificity of Mandarin linguistic rules. To bridge this gap, this study proposes the Material Description Table, a structured reference tool designed to optimize Mandarin language acquisition for Indonesian learners. Additionally, this research highlights the potential for future AI-driven language learning applications, where the Material Description Table could serve as a foundation for intelligent language-learning technologies.*

## INTRODUCTION

The study of contrastive analysis or linguistic comparison has been widely explored by researchers, both from the perspective of contrastive analysis theory itself and through direct comparative approaches between two languages. Each approach has its own critical role in understanding linguistic meanings. Comparative studies at various linguistic levels reveal that identifying the differences and similarities between two languages is crucial (James, 1996), particularly when the findings are applied to second-language learning (Tarigan, 1989). The benefits of such studies remain significant, requiring continuous exploration and updates, whether at the morphological, syntactic, or cultural levels embedded in the language.

In the context of Mandarin and Bahasa Indonesia contrastive analysis, numerous studies have been conducted (Goven, 2020; Juliana, 2014; Junaeny, 2020; Liana, 2017; Pandhita et al., 2022; Purnama et al., 2019; Qhomariah et al., 2021; Trihardini, 2022b; Yanggah, 2013). Many have focused on phonological aspects, such as the studies by Mulyaningsih (2014) and Li (2019), which compared the phonetic rules of Mandarin and Bahasa Indonesia. This focus on phonology is unsurprising, as phonology plays a crucial role in second-language acquisition and is often considered the most immediate indicator of learners' proficiency. The perception that Mandarin possesses a distinct and complex phonological structure compared to Bahasa Indonesia is well-founded, given the fundamental differences between the two languages.

Beyond phonology, contrastive analysis between Mandarin and Bahasa Indonesia has also been extensively conducted at the syntactic level. Several studies (Hanafi & Hermawan, 2021; Kunmei et al., 2022; Trihardini, 2022a; Desmayanti et al., 2022) have

examined predicate structures, adjectives, and supplementary sentences in both languages. Syntax is a fundamental aspect of language learning, yet many foreign language learners struggle with it. Mastery of syntax enables learners to construct meaningful sentences and comprehend the boundaries of grammatical structures. Additionally, syntactic variations can produce aesthetic effects in language, making it a critical area for linguistic study. Consequently, these research findings have been instrumental in helping Mandarin learners overcome syntactic challenges when transitioning from their native language (Bahasa Indonesia) to Mandarin.

In addition to syntactic studies, morphological research also plays a crucial role in contrastive analysis. Many scholars have investigated Mandarin morphemes and compared them with their counterparts in Bahasa Indonesia. Research by Afrina (2018), Melisia et al. (2018), Shalima (2019), and Selvia (2020) has explored topics such as noun classifiers, interjections, and other morphemic elements. The growing body of research in this field highlights the need for a structured compilation of contrastive linguistic features between Mandarin and Bahasa Indonesia, leading to the development of the Material Description Table—a systematically organized reference that delineates linguistic contrasts between the two languages.

Over time, the Material Description Table has evolved beyond its initial function as a linguistic reference for learners. It holds significant potential as a foundational model for artificial intelligence (AI) applications in Mandarin language learning. By systematically codifying linguistic rules and contrastive elements, this table can be transformed into an AI-driven tool, optimizing Mandarin language acquisition through personalized learning experiences, automated feedback, and data-driven instructional methodologies. The integration of AI in language learning can enhance the efficiency of second-language acquisition, providing learners with dynamic and adaptive educational experiences.

This study aims not only to analyze contrastive linguistic features between Mandarin and Bahasa Indonesia but also to explore the feasibility of the Material Description Table as an AI-ready framework for advancing Mandarin language education. Specifically, this study focuses on identifying Mandarin linguistic rules from the primary textbook of the Comprehensive Mandarin Course in the Mandarin Education Study Program, Faculty of Language and Arts, Universitas Negeri Surabaya (Unesa), which will be systematically compared with Bahasa Indonesia. The textbook was chosen because the Comprehensive Mandarin Course is a core subject for Mandarin students at Unesa and serves as a reference for the Hànyǔ Shuǐpíng Kǎoshì (HSK) (Chinese Proficiency International Exam). Therefore, accuracy in understanding its linguistic content is crucial for learners preparing for this standardized test.

The objective of this study is to describe the differences and similarities in various linguistic components of Mandarin when compared to Bahasa Indonesia. The theoretical contribution of this research is expected to advance contrastive analysis studies between the two languages. Meanwhile, its practical significance lies in providing solutions to facilitate the learning process for Unesa Mandarin students. By incorporating AI-driven methodologies, this study aims to bridge the gap between traditional contrastive analysis

and innovative educational technology, ultimately optimizing Mandarin language proficiency among Indonesian learners.

Contrastive analysis serves as a powerful tool for objectively comparing two languages from multiple perspectives. First, it uncovers linguistic contrasts while maintaining the integrity of each language's unique grammatical structures. Second, it provides scientific recommendations for second-language instruction, aids in curriculum design, and helps learners overcome difficulties and common errors. Lastly, contrastive analysis contributes to interdisciplinary fields, particularly in translation studies and cross-linguistic research.

James (1998) in Nur (2016) categorizes contrastive analysis into applied contrastive analysis and pure contrastive analysis. Applied contrastive analysis involves comparing languages to address pedagogical challenges, with direct implications for language teaching methodologies, instructional material development, and language acquisition strategies. Meanwhile, pure contrastive analysis, as part of linguistic typology, seeks to identify fundamental structural differences and similarities between languages without immediate application to pedagogy. Findings from pure contrastive analysis contribute to a deeper theoretical understanding of linguistic structures.

In the context of this study, contrastive analysis not only serves as a linguistic comparison framework but also acts as a foundation for AI-driven Mandarin learning. By systematically mapping the linguistic contrasts between Mandarin and Bahasa Indonesia, the Material Description Table can function as a reference model for AI-based language education applications. This AI-driven approach extends the impact of contrastive analysis beyond traditional language teaching methods, offering innovative solutions for Mandarin language acquisition among Indonesian learners.

## RESEARCH METHOD

This study employs a qualitative descriptive research approach, as it primarily involves the descriptive analysis of linguistic data (Mills, 2018; Mohajan, 2018). The data analysis focuses on identifying contrastive linguistic rules between Mandarin and Bahasa Indonesia. These linguistic contrasts serve as the foundation for developing the Material Description Table, a systematically structured reference that highlights key differences and similarities between the two languages.

According to James (1998) in Nur (2016), contrastive analysis follows two primary procedures in comparing two languages: 1) Description – This step involves identifying specific linguistic structures in the target language (Mandarin) and finding their equivalents in the native language (Bahasa Indonesia) using translational rules. The translation process is critical to ensuring accurate comparisons between the two linguistic systems. 2) Comparison – This step aligns the structures of the target language with the native language, emphasizing the contrastive linguistic elements that distinguish the two systems.

To collect data, this study employs a documentary research technique, which involves literature review and data extraction from predetermined sources. This technique includes reading and analyzing relevant materials, identifying linguistic data that align with the theoretical framework, and compiling the findings for structured analysis.

The primary data source for this study is the Comprehensive Mandarin Course textbook series used in the Mandarin Education Study Program, Faculty of Language and Arts, Universitas Negeri Surabaya (Unesa). These textbooks were selected because Unesa's Mandarin Language and Literature Department is one of Indonesia's oldest Mandarin programs, nationally accredited, and actively engaged in academic collaborations with China, ensuring the credibility and relevance of its curriculum.

The linguistic data are extracted from the following Standard Course HSK textbooks published by Beijing Language and Culture University Press (*北京语言大学出版社*) and officially recommended by the Confucius Institute Headquarters/China National Office for Teaching Chinese as a Foreign Language (*孔子学院总部/国家汉办*): 1) *标准教程* Standard Course HSK 1, 2) *标准教程* Standard Course HSK 2, 3) *标准教程* Standard Course HSK 3, 4*) 标准教程*Standard Course HSK 4 (Volumes 1 & 2), 5*) 标准教程*Standard Course HSK 5 (Volumes 1 & 2), and last 6) *标准教程*Standard Course HSK 6 (Volumes 1 & 2).

This study focuses on the morphological level of Mandarin as presented in the HSK 1–6 textbooks. The research methodology follows the four-step contrastive analysis framework proposed by Pietro & Robert (1971): 1) Data Collection – Linguistic data are gathered from textbook observations and literature review. 2) Translation Comparison – Corresponding linguistic structures in Bahasa Indonesia are identified through translation. 3) Contrast Identification – Differences and similarities between Mandarin and Bahasa Indonesia are analyzed and classified. 4) Formulation of Findings – The contrastive linguistic findings are structured into the Material Description Table.

Following this framework, the data analysis technique consists of: 1) Identifying relevant morphological data from the selected textbooks. 2) Comparing the extracted data with their Bahasa Indonesia equivalents, using translation as an intermediary tool. 3) Presenting and interpreting the contrastive linguistic findings in a systematic manner.

By following this structured approach, this study aims to bridge traditional contrastive analysis with AI-driven language learning. The Material Description Table is not only intended as a linguistic reference but also as a foundational model for AI-based Mandarin language education. The integration of AI into contrastive linguistic studies has the potential to optimize personalized learning, automate language instruction, and enhance Mandarin language acquisition for Indonesian learners.

## RESULTS AND DISCUSSION

### Number Auxiliary Words / *量词* (*Liàngcí*)

Bahasa Indonesia employs number auxiliary words as classifiers to quantify objects, a linguistic feature that also exists in Mandarin as *量词* (*liàngcí*). In Bahasa Indonesia,

classifiers are used consistently when referring to objects and often reflect the nature of the object itself. In Mandarin, however, classifiers are more diverse and context-dependent, making them a significant challenge for Indonesian learners.

The Comprehensive Mandarin Course textbooks (*标准教程* Standard Course HSK 1–6) used in the Mandarin Education Study Program at Universitas Negeri Surabaya contain only 23 Mandarin classifiers. However, Wang Dongmei (1997) documents a total of 232 classifiers in Mandarin, meaning the HSK textbooks cover only 9.91% of the full classifier system. In contrast, Bahasa Indonesia has only 22 number auxiliary words in total, illustrating a substantial difference between the two languages.

Key Differences in Number Auxiliary Words between Mandarin and Bahasa Indonesia
1. *只* (*zhǐ*) vs. "*ekor*" – In Bahasa Indonesia, "*ekor*" applies to all animals. However, Mandarin uses *只* (*zhǐ*) for general animals, but assigns different classifiers to specific ones, such as *条* (*tiáo*) for snakes and fish.
2. *条* (*tiáo*) vs. multiple classifiers in Bahasa Indonesia – In Mandarin, *条* (*tiáo*) is used for long, thin objects like rivers, roads, and pants. However, Bahasa Indonesia uses "*buah*" for rivers and "*ekor*" for snakes, showing inconsistencies between the two languages.
3. Specificity in Mandarin vs. Generalization in Bahasa Indonesia – Bahasa Indonesia often uses "*buah*" as a generic classifier, while Mandarin has specialized classifiers, such as:

* *件* (*jiàn*) – for clothing and certain objects
* *辆* (*liàng*) – for vehicles
* *张* (*zhāng*) – for flat objects like paper
* *碗* (*wǎn*) – for bowls and their contents
* *家* (*jiā*) – for businesses and establishments

4. *个* (*gè*) vs. "*buah*" – *个* (*gè*) is often used as a default classifier in Mandarin, similar to "*buah*" in Bahasa Indonesia, but Mandarin has more specific classifiers that must be memorized.
5. Unique Mandarin Classifiers – Mandarin contains classifiers that do not exist in Bahasa Indonesia, such as *层* (*céng*) for layers, *句* (*jù*) for sentences, and *棵* (*kē*) for plants.

The Material Description Table will provide a structured reference to simplify these differences, making it easier for Indonesian learners to understand and apply Mandarin classifiers correctly.

### *了* (*Le*) – The "Already Happened" Particle

In Bahasa Indonesia, past actions are indicated using words like "*sudah*", "*telah*", or "*usai*", often combined with time markers (e.g., "*kemarin*" for "yesterday"). However, Mandarin expresses past actions primarily using *了* (*le*), a grammatical particle without direct lexical meaning (Chan, 2013; Kurniati, 2019).

Functions of *了* (*le*) in Mandarin
1. Marking completed actions
2. Indicating a change in state
3. Highlighting ongoing actions that started in the past

4. Serving other grammatical roles beyond past tense

Since 了 (*le*) does not have a perfect equivalent in Bahasa Indonesia, many Indonesian learners struggle with its correct placement and function. The Material Description Table will offer step-by-step usage guidance to help learners understand its correct application.

**Mandarin vs. Bahasa Indonesia Numbering System**

The Mandarin numbering system differs significantly from Bahasa Indonesia, creating challenges for learners (Wardhany et al., 2019; Susanti, 2022).

Key Challenges in Mandarin Numbering

1. Zero Pronunciation Rules – In Mandarin, when 0 appears in the middle of a number (e.g., 1010), it must be pronounced, unlike in Bahasa Indonesia.
2. Special Handling of "110" and "1010" – Mandarin sometimes requires additional pronunciation of "1" (一 *yī*), making it more complex.
3. Fractions and Percentages – Mandarin states denominators before numerators, unlike Bahasa Indonesia.
4. Discount Expression Reversal – In Mandarin, discounts express the remaining amount to be paid, rather than the percentage deducted.
5. Variations in "2" (二 *èr* vs. 两 *liǎng*) – The pronunciation of "2" changes depending on the context, which is confusing for Indonesian learners.

The Material Description Table will categorize and explain these differences, helping learners avoid errors in numerical expressions.

**Reduplication (*重叠 chóngdié*)**

Both Bahasa Indonesia and Mandarin use reduplication, but with different functions (Ayuningtias, 2018; Hartanto, 2018).

1. Bahasa Indonesia – Reduplication modifies meaning, such as:
    1) "kemerah-merahan" → slightly red
    2) "gelap gulita" → completely dark
    3) "lauk pauk" → various dishes
2. Mandarin – Reduplication emphasizes mildness, trial actions, or casual occurrences:
    1) AA (*看看 kànkan*) → to take a look
    2) A 一 A (*试一试 shìyīshì*) → to try out
    3) AABB (*热热闹闹 rèrènàonào*) → lively and bustling

Since Mandarin reduplication follows strict grammatical patterns, the Material Description Table will help Indonesian learners grasp the correct usage.

**Splittable Words (*离合词 líhécí*)**

One of the biggest differences between Mandarin and Bahasa Indonesia is the concept of splittable words (*离合词 líhécí*), which does not exist in Bahasa Indonesia. These words are verb-object combinations that can be split (Xie et al., 2015; Gadman Markali & 李智彬, 2018).

Examples of Splittable Words

1) *结婚* (*jiéhūn*) - to marry → *结了婚* (*jiélehūn*) - got married
2) *道歉* (*dàoqiàn*) - to apologize → *向你道个歉* (*xiàng nǐ dào ge qiàn*) - to apologize to you

Since Bahasa Indonesia does not have this structure, Indonesian learners often struggle with recognizing and using splittable words correctly. The Material Description Table will provide clear explanations to help learners navigate this linguistic feature with ease.

The Material Description Table serves as a comprehensive linguistic reference that bridges Mandarin and Bahasa Indonesia. By highlighting key differences in number auxiliary words, grammatical particles, numbering systems, reduplication, and splittable words, this study simplifies complex linguistic contrasts.

Furthermore, by integrating AI-driven methodologies, this table lays the foundation for future AI-assisted Mandarin learning, allowing Indonesian learners to develop proficiency more effectively. This research not only advances contrastive analysis studies but also paves the way for AI-enhanced language education.

## CONCLUSION

Based on the analysis presented above, the following conclusions can be drawn. From the perspective of contrastive linguistic analysis, Mandarin and Bahasa Indonesia exhibit significant differences in their morphology, syntax, grammatical structures, and linguistic functions. These differences present challenges for Indonesian learners, as they must adjust not only to new vocabulary and syntax but also to distinct grammatical concepts that do not exist in their native language. The greater the linguistic gap, the more cognitive adjustments learners must make to achieve fluency in Mandarin. Given these challenges, it is crucial to develop a Material Description Table that systematically compiles linguistic rules, offers illustrative examples, and presents detailed word pairings between Mandarin and Bahasa Indonesia. This structured reference will help Indonesian learners bridge linguistic gaps, reduce errors, and improve Mandarin proficiency more effectively. Furthermore, by integrating AI-driven methodologies, the Material Description Table has the potential to evolve beyond a traditional linguistic reference into an AI-powered learning tool. This AI-enhanced approach can provide personalized language instruction, real-time feedback, and automated learning adaptations, ensuring that Indonesian learners receive dynamic and optimized Mandarin language education. Ultimately, this study not only contributes to contrastive analysis research but also paves the way for AI-driven Mandarin learning innovations, offering new solutions to enhance language acquisition and proficiency among Indonesian learners.

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