Journal of Linguistics & Cultural Studies

Article

A Study on Number Translation in Zang-Chinese-English from a Cross-Cultural Perspective

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Abstract: Numbers are usually treated as neutral quantitative symbols, yet in Zang, Chinese and English they belong to different counting systems, cultural metaphors and translation conventions. Drawing on cross-cultural theory and integrating methods from linguistics, anthropology and translation studies, this paper compares the numeral systems of the three languages at three levels: lexical conversion, the segmentation and reading of large values, and cultural symbolism in religious, historical and media texts. The comparison shows that English groups digits by three whereas Chinese and Zang group them by four; that Zang has independent terms for ten thousand, hundred million, million and billion but no simple term for trillion; and that Buddhist, Han and Western numerological values diverge sharply. On this basis the paper proposes a three-dimensional model of cultural equivalence, functional correspondence and contextual adaptation, and argues that adequate numeral translation depends on reconstructing socio-pragmatic context rather than on literal transcoding.

Keywords: Zang–Chinese–English; cross-culture; number translation; cultural equivalence

1. Introduction

Numerals perform measuring, ordering, symbolic and rhetorical functions in every human language, but the way they are formed and the meanings attached to them are constrained by the cultural system in which they operate. Zang (Bod skad) belongs to the Trans-Himalayan family and possesses its own syllabic script and a decimal counting system; because it has been deeply shaped by Buddhist cosmology, many of its numerals carry a sacred charge, as in the Seven Treasures or the Eightfold Path [1]. Chinese belongs to the same family, but its ideographic writing gives numerals a double character, at once pictographic and abstract, and traditional culture has attached to them the logic of yin and yang, the five phases and auspicious or inauspicious prediction, as in the familiar phrases " LiuLiuDaShun " (six-six, great smoothness) and BaBa (eight-eight). English, as a representative of the Indo-European family, writes numbers in Arabic digits and favours logical clarity and linear statement; its numerals serve mainly scientific calculation and empirical description, and their symbolic weight is comparatively light.

As contact among minority languages, Chinese and English intensifies—through bilingual education in minority-language regions, international academic cooperation, and the translation of religious canon—the accurate rendering of numerals has become a practical problem. The dissemination of a regional statistical yearbook (an authoritative compilation of statistical data systematically covering a region's annual economic, social, demographic, and resource-related fields) to English-reading audiences, or the translation of dates, quantities, and hierarchical ranks in a Buddhist canon (a comprehensive collection of scriptures encompassing doctrines, precepts, and treatises, and an important document for the study of Buddhist history, philosophy, and culture) both require the transfer of numerically encoded cultural information. Research so far has concentrated on the lexical and syntactic levels and has paid little attention to numerals as units that look neutral but are in fact heavily culture-loaded [2]. The present study therefore approaches

Received: 28 September 2026
Revised: 06 November 2026
Accepted: 16 November 2026
Published: 19 November 2026

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the question from a cross-cultural perspective and examines the cognitive obstacles, cultural conflicts, and compensatory strategies involved in minority-language–Chinese–English trilingual number translation.

The argument advanced here is that a numeral is not a quantity to be carried across languages but a cultural category to be re-established in the target system. Translation is accordingly treated as cultural transfer rather than code switching [3], and the analysis combines a systemic comparison of the three numeral systems with case studies drawn from religious texts, historical documents and contemporary media. The paper first sets out lexical correspondences and the differences in segmentation and reading rules, then examines the cultural meanings attached to numerals in each language, and finally proposes and illustrates a three-dimensional model of numeral translation.

2. Conversion of Arabic Numerals among the Three Languages

A comparison of the three systems begins with the direct lexical correspondences set out in Table 1, in which the same value is expressed by the basic numeral of each language.

Table 1. Conversion of Arabic Numerals among English, Chinese and Zang

Arabic numeral	English	Chinese	Zang
1	one	一	གཅིག
10	ten	十	བཅུ
100	one hundred	百	བརྒྱ
1,000	one thousand	千	སྟོང
10,000	ten thousand	万	ཁྲི
100,000	one hundred thousand	十万	འབུམ
1,000,000	one million	百万	ས་ཡ
10,000,000	ten million	千万	ཀྲོ་ད
100,000,000	one hundred million	亿	དུང་སྒྲོན
1,000,000,000	one billion	十亿	ཐེར་འབུམ
10,000,000,000	ten billion	百亿	དུང་སྒྲོན་བརྒྱ
100,000,000,000	one hundred billion	千亿	དུང་སྒྲོན་སྟོང
1,000,000,000,000	one trillion	兆（万亿）	དུང་སྒྲོན་ཁྲི

From Table 1 above, it can be analyzed that the differences in numeral conversion among Zang, Chinese, and English are:

1. English does not have direct expressions for " Wan " and " Yi " like Chinese; instead, it uses compound words like "ten thousand" and "one hundred million". As the names suggest, " YiWan " is (ten thousand), and " WanYi " is (one hundred million).
2. Chinese does not have independent expressions like English "million" (YiBaiWan) and "billion"(ShiYi). However, it does have an independent expression for " Zhao " (trillion).
3. Compared with English, Zang has independent terms such as "ས་ཡ (million)" , "ཀྲོ་ད (ten million)" and "billion (ཐེར་འབུམ)", but it does not have an independent term for "trillion" .
4. Compared to Chinese, Zang has independent expressions for "ten thousand (ཁྲི)" and "hundred million (དུང་སྒྲོན)", but lacks a term for "trillion (ten thousand times a hundred million)".

Traditional Zang Terms for Large Numbers: Classical Zang sources provide a fuller inventory than the numerals of everyday speech. Figure 1 reproduces the terms recorded in traditional treatises, where each order of magnitude is given in a simple form and in one or more expanded forms built on the order below, as when ཁྲི་བཅུkhri bcu (literally ten ten-thousands) stands beside འབུམ for one hundred thousand, orཁྲི་བརྒྱ khri brgya beside ས་ཡ for one million. The series continues well beyond the range needed for ordinary counting, with further units reserved for cosmological and hagiographical contexts.

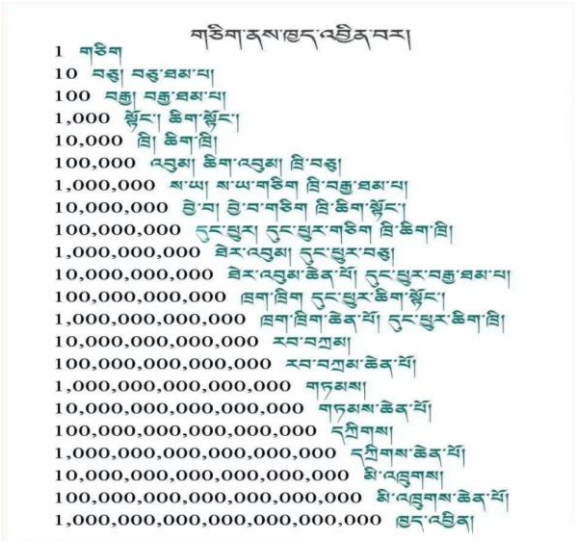

Figure 1. Numerical Terms in Traditional Zang Sources

Read together with Table 1, Figure 1 confirms the conclusion toward which the four differences point: apart from the absence of a simple term for the trillion, Zang satisfies both the English and the Chinese pattern. It has independent terms for million and billion, as English does, and for ten thousand and hundred million, as Chinese does [4]. The consequence for translation is important. Zang is not an outlier in either system but a point of overlap, and a translator working between English and Chinese can use the Zang form as a bridge in either direction.

3. Segmentation of Large Numerals

Numerical translation is one of the recognised bottlenecks of interpreting, and a principal reason lies in segmentation. For values above four digits the three languages divide the digit string differently: English cuts it into groups of three, whereas Chinese and Zang cut it into groups of four. The difference is not a matter of notation only; it governs where a reader pauses, where a listener expects a unit name, and therefore how a large value is held in working memory.

In English the first group comprises one, ten and hundred; the second thousand, ten thousand and hundred thousand; the third million, ten million and hundred million; the fourth billion, ten billion and hundred billion; and the fifth trillion, beyond which ordinary usage does not extend. Each group is marked off by a comma in writing and by a slight pause in speech, so that the written and the spoken form reinforce one another.

In Chinese the same four-place principle operates on a different base. The first group comprises Ge , Shi , Bai and Qian , that is units, ten, hundred and thousand; the second Wan , ShiWan , BaiWan and QianWan ; the third Yi , ShiYi , BaiYi and QianYi ; and the fourth Zhao . Because each group of four repeats the same four names, the system is highly transparent: a speaker who knows the name of the group can read any value inside it without learning a new word.

Zang follows the four-place principle as well. The first group is གཅིག བཅུ བརྒྱ སྟོང་; the second is ཁྲི, འབུམ (also read khri bcu), ས་ཡ (also khri brgya) and ཀྲོ་ཊ (also khri stong); the third is དུང་ཕྱུར, ཞེར་འབུམ (also dung phyur bcu), དུང་ཕྱུར་བརྒྱ and དུང་ཕྱུར་སྟོང་; and the fourth is དུང་ཕྱུར་ཁྲི. The double naming is characteristic of the classical system: every large unit can be read either by its own name or by a compound built on the units below it, and the choice between the two is a matter of register rather than of value.

The asymmetry, then, is not between Zang and Chinese, which share the four-place principle, but between both of them and English, which works in threes. This asymmetry, rather than the vocabulary of any single language, is the main source of error in oral

conversion, because a value that is correctly segmented in one system must be re-segmented before it can be rendered in another.

4. Reading Rules for Large Numerals

The practical consequence of segmentation can be seen in the reading of a thirteen-digit value such as 1,234,567,891,234. Chinese readers punctuate it with a bar every four digits and English readers with a comma every three; the two conventions are commonly described as the three-comma, four-bar rule [5]. Table 2 sets out the three readings side by side.

Table 2. Reading of the Thirteen-Digit Value 1,234,567,891,234 in the Three Languages

Language	Segmented form	Reading
English	1,234,567,891,234	one trillion, two hundred and thirty-four billion, five hundred and sixty-seven million, eight hundred and ninety-one thousand, two hundred and thirty-four
Chinese	1'2345'6789'1234	一（兆）万亿\ 二千三百四十五亿\ 六千七百八十九万\ 一千二百三十四 yi zhao; er qian san bai si shi wu yi; liu qian qi bai ba shi jiu wan; yi qian er bai san shi si
Zang	12345'6789'1234	དུང་ཕྱུར་ཆིག་ཁྲི་ཉིས་སྟོང་སུམ་བརྒྱ་བཞི་ཅུ་ཞེ་ལྔ། ཁྲི་དྲུག་སྟོང་བདུན་བརྒྱ་བརྒྱད་ཅུ་གྱུ་དགུ་དང་ཆིག་སྟོང་ཉིས་བརྒྱ་སོ་བཞི།

Two observations follow. First, the Zang reading divides the value exactly as the Chinese does, four digits to a group, the only exception being the trillion, which is formed by compounding the ten thousand and the hundred million and therefore has to be read as a single five-character unit. Second, the difficulty for the interpreter lies less in finding equivalents than in holding two segmentations at once: the ear receives a value in groups of three and the voice must produce it in groups of four, or the reverse. Training that drills the conversion of group boundaries is therefore more useful than training that drills vocabulary.

5. Cultural Meanings of Numerals in the Three Languages

Segmentation explains how large values are carried across languages; it does not explain what they carry. That question belongs to the cultural semantics of numerals, which differs sharply among the three systems and is the deeper source of translation difficulty.

5.1. The Zang Numeral System and Its Cultural Embeddedness

Zang uses a decimal system whose basic numerals are གཅིག (1), གཉིས (2) and so on to བཅུ (10), and the rules of combination are regular, as in བཅུ་གཅིག (11) and ཉི་ཤུ (20). What is unusual is the order of the unit and the decade: 32 is read sum cu gnyis, literally three-ten-two, a form that reflects a preference for the spoken sequence over the written order and that English, which says thirty-two, does not share. Influenced by Indian mathematics and Buddhist philosophy, Zang also has a rich vocabulary for quantities beyond ordinary reckoning, and asaṃkhyeya names a number beyond computation, used in scripture for the length of kalpas and the measure of merit.

More important for the translator is the religious value attached to quite small numerals. Three stands for the Triple Gem of Buddha, Dharma and Sangha; four for the four continents and the four immeasurables; nine for the nine heavens of the Bon cosmology, from which its auspiciousness derives. Rendered as bare quantity, these numerals lose their content. A nine-storey palace translated as nine-story palace conveys a floor count but not the cosmological claim the source makes, and the loss has to be repaired by annotation or by restructuring the phrase.

5.2. The Dual Character of the Chinese Numeral System

Modern Chinese writes numbers in Arabic digits but speaks them with the traditional forms, and its decimal system is entirely transparent, as in YiBaiErShiWan (one hundred and twenty-three). The cultural freight of Chinese numerals lies elsewhere, in homophony and folk belief [6]. Ba (eight) echoes " Fa " fa (to prosper) and has become a symbol of wealth; Si (four) echoes " Si "(death) and is avoided; Liu (six) is associated with smoothness through the set phrase LiuLiuDaShun ; and Jiu (nine) with long-lasting fortune. The practice extends to telephone numbers, licence plates, retail pricing and the scheduling of major events.

Meanings of this kind do not travel with the numeral. The Double Eleven shopping festival is named after the visual symmetry of 11 November and the self-mocking humour of single young people; a literal November Eleventh leaves the socio-psychological basis unexplained, whereas Singles Day Shopping Festival supplies it. The same caution applies to the statement that the Zang New Year begins on the first day of the twelfth month, where ShiEr (twelve) is uninformative unless its relation to the Zang calendar is made explicit.

5.3. Rationalism and Standardization in the English Numeral System

English numerals are written in Arabic digits and read by strict rules, twenty-one, one hundred and one, and their characteristic virtues are precision, computability and emotional neutrality; they belong to data reporting, technical literature and economic analysis. Symbolism survives at the margins, with seven figuring perfection in Christian numeracy and thirteen ill luck [7], but the cultural load is lighter than in Zang or Chinese.

When the source is a Zang or Chinese text dense in symbolic numerals, English tends to flatten it. SanQianDaQianShiJie , the three thousand great chiliocosms of the Diamond Sutra, rendered word for word, preserves the figure but not the layered cosmology behind it; the vast universe of innumerable worlds conveys the sense, and a note can restore the original figure. English, in other words, is not inherently equipped for cross-cultural interpretation; it needs paratextual support to compensate for what its numeral system does not carry.

6. Number Translation in Cross-Cultural Practice

The cases that follow are drawn from three domains in which numerals carry more than quantity, and they supply the evidence from which the model in section 7 is built.

6.1. Numerals in Religious Texts: From Quantity to Symbol

The formula BaWanSiQianFaMen (eighty-four thousand dharma gates) in the Prajnaparamita section of the Canon does not report a count; it asserts the boundlessness of the Dharma, which answers the eighty-four thousand afflictions of sentient beings. Translated verbatim, it invites an English reader to look for a list of 84,000 items. The Zang original, ཆོས་ཀྱི་སྒོ་བཀྲད་ཁྲི་བཞི་སྟོང (chos kyi sgo brgyad khri bzhi stong), is a fixed expression that cannot be decomposed without damage, since it is built as eight ten-thousands plus four thousands. The appropriate strategy is a functional equivalent, innumerable paths to enlightenment, supported in a scholarly edition by a note on the origin of the figure [8]; a Chinese version may keep the number and gloss it, thus respecting tradition while aiding comprehension.

The same logic governs the Three Bodies. སྐུ་གསུམ (sku gsum) names the three Buddha-bodies of dharma, enjoyment and emanation, and the numeral is part of the term rather than an attribute of it. It cannot be dropped; what it needs is context, so that three bodies is not read as a mere tally.

6.2. Dates and Quantities in Historical Documents

Historical works such as 《 XianZheXiYan 》,མཁས་བའི་དགའ་སྟོན།mkas pa'i dga' ston (The Scholar's Feast) date events by element and animal, as in the"Fire Rabbit year or the Wood Dragon year" [9], and such a designation carries a calendar and a doctrine of cyclical generation and overcoming at the same time. Converting it to a single Gregorian year loses the astrological layer; retaining Fire-Rabbit Year raises the threshold for the reader.

A dual-track solution is preferable: the Gregorian year in the text, the element-animal combination in parentheses, and a conversion table in an appendix.

Quantities raise a different problem. Population, tax and troop figures in the three traditions rarely agree, and a hundred-thousand-strong army may be a rhetorical figure rather than a census return. The translator has to judge the genre before deciding: in epic, preserve the hyperbole; in archive, verify it. Above all, the idiom thousands upon thousands should not be mechanically rendered as tens of thousands when countless or a vast number of better preserves its function.

6.3. Numerals in Modern Media and Public Discourse

In news copy, the claim that nearly one hundred million people were lifted out of poverty is numerically exact in English, but Yi (hundred million) works in Chinese public memory as a unit of national scale, and close to one hundred million carries the policy emphasis better than almost one hundred million. Advertising raises sharper problems. A product code such as XX7 has to be checked against local numerology before it travels: seven is auspicious in Zang culture, where it belongs among the seven royal treasures, and less welcome in some other markets. The brand name 58.com rests on " WuBa ", heard as " WoFa "wo fa, I prosper; the Latin-script form loses the pun, and marketing copy has to rebuild the association. Numeral translation is thus a species of cultural communication rather than a linguistic manoeuvre.

7. A Three-Dimensional Model for Trilingual Number Translation

The cases support an operational framework with three principles, ordered from meaning through function to situation. Each principle answers a different question, and none of them can be replaced by a conversion table.

7.1. Cultural Equivalence

The first task is to estimate how heavily a numeral is loaded. Where the load is high, as with nine or the Triple Gem, literal correspondence is the wrong target; what is wanted is an expression that performs a similar social function in the target language. The Zang seven royal treasures is rendered seven royal insignia not because the words match but because the ceremonial rank matches. Equivalence here is equivalence of status, not of denotation.

7.2. Functional Correspondence

The second step is to identify what the numeral is doing in its text, whether it counts, ranks, symbolises or merely ornaments, and to choose the strategy accordingly [9]. Statistical figures call for exact conversion; metaphorical uses such as bai ban diao nan, harassment in a hundred ways, are better served by all sorts of difficulties; religious terms require terminological consistency and a gloss. Automated systems that map numeral strings across scripts can handle the first case reliably but not the other two [10], which is why the human decision cannot be replaced by a lookup table.

7.3. Contextual Adaptation

The third step adjusts the rendering to text type, readership and purpose. Scholarly translation annotates; popular communication simplifies. A thirteen-storey stupa in a guidebook for international visitors may be glossed as a thirteen-storey stupa, thirteen being a sacred number in the Zang Buddhist tradition, whereas an architectural study has to discuss the symbolic structure at length. The model is deliberately dynamic: it resists a single rule applied uniformly and asks instead where, on each occasion, the balance between fidelity and accessibility should fall.

8. Conclusion

This study demonstrates that numbers are by no means neutral information symbols, but rather cognitive categories deeply embedded in specific cultural contexts. In the trilingual interaction among Zang, Chinese, and English, number translation faces three challenges: structural differences in counting systems, semantic ruptures in cultural

symbolism, and multiple shifts in functional contexts. Effective translation practice must transcend technical conversion and move toward deep cultural dialogue.

Apart from lacking an independent expression for the English-Chinese "trillion" (Zhao , WanYi), Zang has other ways of expressing large number units. It has direct independent expressions such as the English "million" (ས་ཡ) and "billion" (ཐེར་འབུམ), as well as expressions for the Chinese " WanWan " (ཁྲི) and " Yi " (དུང་ཕྱུར). Therefore, in Zang-Chinese-English trilingual number conversion, apart from " WanYi " (trillion), Zang numerical expressions are both the same as English and consistent with Chinese. Second, in English-Chinese interpreting, based on the characteristics of large numbers in English and Chinese, mutual translation techniques are adopted: first, Arabic large numbers are mutually translated using different superscript and subscript notation; second, for numbers with different digit counts, the conversion formulas for the corresponding digit positions in English, Chinese, and Zang are applied.

Future research can be further extended to comparisons between other regional and minority languages (such as those of the Turkic and Mongolic families) and numerical expressions, and corpus linguistics methods can also be used to quantitatively analyze the frequency distribution and collocation patterns of trilingual numeral use. At the same time, with the increasing application of artificial intelligence in machine translation, how to train models to recognize and handle culturally loaded numerals will become an important topic in the development of cross-lingual information technology. Only by injecting humanistic care into technological processes can numerals truly become bridges connecting different civilizations rather than barriers of estrangement.

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