

A Study on AI-Generated Translations and Human-AI Collaborative English Translation of Culture-loaded Words of Guangxi Zhuang Brocade from the Perspective of Three-Dimensional Transformation in Eco-Translatology

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Abstract: As a representative national-level intangible cultural heritage of Guangxi, Zhuang Brocade embodies the unique rice-farming civilization, totem beliefs and folk traditions of the Zhuang people, giving rise to numerous culture-loaded words with semantic gaps in the English linguistic context. With the deepening of cultural-tourism exchanges between China and ASEAN, the demand for international dissemination of Guangxi Zhuang Brocade keeps growing. Nevertheless, AI-generated translations produced by large-language models represented by Doubao mostly stay at the superficial level of linguistic transfer, and tend to produce biased terminologies or lose cultural connotations when coping with Zhuang-originated cultural concepts. Taking the linguistic, cultural and communicative three-dimensional transformation of Eco-Translatology as the analytical framework, this paper classifies culture-loaded words of Guangxi Zhuang Brocade into four categories: weaving implements, craft techniques, totem patterns and folk-custom-related items. Using AI-generated translations output by the Doubao large-language model as research corpus, it analyzes manifestations of translational ecological imbalance from three dimensions. It further explores how translators conduct human post-editing on AI-generated translations based on three-dimensional transformation, so as to construct a human-AI collaborative translation path assisted by large-language models. This study expects to offer references for the external translation and publicity of Guangxi Zhuang Brocade and similar ethnic handicraft intangible cultural heritage across China.

Keywords: Eco-Translatology, three-dimensional transformation, Guangxi Zhuang Brocade, culture-loaded words, human-AI collaborative translation, AI-generated translation, intangible cultural heritage publicity.

1. Introduction

Together with Shu Brocade, Yun Brocade and Song Brocade, Zhuang Brocade is known as one of China's four famous brocades. It was inscribed on China's first batch of national-level intangible cultural heritage lists in 2006 and serves as a vital representative of traditional ethnic handicrafts in Guangxi. Rooted in the mountain rice-farming environment of western Guangxi, Guangxi Zhuang Brocade condenses the weaving techniques, aesthetic ideas and spiritual beliefs of the Zhuang people. The national standard GB/T 44475-2024 *Zhuang Brocade* came into formal implementation in 2025. It provides authoritative definitions for Zhuang Brocade in terms of weaving implements, craft techniques, pattern systems and folk-custom connotations, and supplies normative foundations for the living inheritance and international communication of Guangxi Zhuang Brocade^[1]. Against the backdrop of continuously deepening China-ASEAN cultural-tourism cooperation, Guangxi Zhuang Brocade frequently appears in various international cultural exhibitions. There is an increasing demand for translation of bilingual museum guides, cultural-creative product labels and external publicity texts.

Texts about Guangxi Zhuang Brocade contain plenty of culture-loaded words. Rooted in Zhuang people's production practices, totem worship, wedding ceremonies and festivals, many of these concepts have no corresponding expressions in English and constitute major difficulties in translation practice. In recent years, generative AI large-language models

have been widely adopted to produce drafts for intangible-cultural-heritage texts, greatly improving the efficiency of preliminary translation output. However, when confronted with special ethnic implements, folk totems and concepts, large-language models are prone to misinterpreting texts literally, misusing terminologies and flattening cultural connotations. A review of current external translation of Guangxi Zhuang Brocade reveals that many AI-generated translations are limited to literal symbol conversion, with non-unified proper nouns and occasional Chinglish. Cultural connotations of totems and rice-farming folk customs are often simplified, and differences in overseas audiences' cognition are rarely considered in translation procedures. In response to the above-mentioned practical problems, this paper introduces the Three-Dimensional Transformation analytical tool of Eco-Translatology. It selects AI-generated translations from the Doubao large-language model as research corpus, sorts out categories of culture-loaded words for Guangxi Zhuang Brocade, analyzes manifestations of translational ecological imbalance in AI-generated translations from three dimensions, and discusses how translators, situated within the translational ecological environment, carry out human post-editing for large-model outputs relying on three-dimensional transformation. It aims to realize complete transmission of source-text information, build a large-model-assisted human-machine collaborative translation path, and explore feasible translation approaches adapted for the international communication of Guangxi Zhuang Brocade.

2. Domestic and International Research Status

Domestic academia has carried out certain research concerning the English translation of Guangxi Zhuang Brocade. Ning Chuanfeng (2024) analyzed drawbacks in external publicity translation of Guangxi ethnic minority intangible cultural heritage from the macro perspective of Eco-Translatology and pointed out that literal translation may cause cultural loss. Nevertheless, his research did not specially classify culture-loaded words of Guangxi Zhuang Brocade and lacked concrete translation examples, resulting in limited practical operability^[2]. Ye Yongyu (2025) sorted out terminologies related to raw materials and weaving procedures of Guangxi Zhuang Brocade from the perspective of textile terminology and clarified chaotic industrial translation practices. Still, his research was confined to the linguistic dimension without in-depth exploration of cultural and communicative dimensions for characteristic folk totems such as Magwai patterns and Na-culture^[3]. Wei Ni (2024) adopted thick-translation theory to interpret classical texts on Zhuang Brocade and attached importance to supplementing cultural information via annotations. However, her research objects leaned toward ancient books and failed to adapt to lightweight public-publicity scenarios such as short-video platforms and cross-border e-commerce^[4]. Ji Mengting and Meng Fanxu (2020) put forward macro principles for English translation of Zhuang Brocade from an eco-rational perspective, yet they did not form detailed operable schemes for proper nouns such as weaving implements and folk patterns, leaving their theories overly macroscopic with weak implementation guidance^[5]. Furthermore, the Three-Dimensional Transformation theory of Eco-Translatology has been widely applied to translation studies on ethnic-minority intangible cultural heritage and provides an analytical paradigm for this paper. Wang Jinxue (2025) adopted this theory to analyze external-publicity corpus of Guizhou batik and constructed an analytical framework for intangible-cultural-heritage craft vocabulary. But she did not make targeted adaptation to the unique rice-farming culture and totem symbols of Guangxi Zhuang Brocade^[6]. Zhao Wang (2025) divided types of intangible-cultural-heritage vocabulary of western Hunan with the theory of culture-loaded-word classification and verified the feasibility of phonetic-translation-plus-annotation in filling cultural semantic gaps, without touching upon normalization of translation for weaving-craft terminologies^[7]. Cao Ying and Li Yue'e (2025) explored translation paths for textile vocabulary in *Tiangong Kaiwu* based on classical-text translation theories. Their research focused on ancient official handicraft workshops and rarely covered translation scenarios of folk ethnic brocades^[8]. Wang Hui and Wang Xiaolong (2024) proposed optimized multi-narrative strategies from the perspective of intangible-cultural-heritage external-publicity communication theory, yet they lacked detailed three-dimensional translation case analysis targeting concrete craft-related loaded words of Guangxi Zhuang Brocade^[9].

With the development of generative artificial intelligence, some scholars have begun to examine the performance of domestic large-language models in translating culture-loaded words. Yao Qingqing (2026) and Wang Lei (2024) pointed out that domestic large-language models such as Doubao enjoy efficiency advantages in translating general texts. When

handling ethnic-cultural proper items, however, they tend to produce literal translation and cultural information default, and human review and post-editing are required to meet external-publicity requirements^[10,11]. Some AI-translation studies framed by Eco-Translatology indicate that large-language models can rapidly produce AI-generated translations and finish basic syntactic conversion. Still, they lack deep comprehension of local ethnic-minority folk knowledge and show insufficient adaptive capacity in cultural and communicative dimensions. Hence they are suitable only as auxiliary tools rather than final deliverable translations^[12]. Hu Kaibao and Li Xiaoqian (2023) proposed that in the era of large-language models, translation studies should re-examine role division between human beings and machines and attach importance to human translators' dominant position^[13]. The above-mentioned studies confirm that Three-Dimensional Transformation is applicable to translation of ethnic-craft texts. Few studies, however, take AI-generated translations by large-language models as analytical corpus and make special adaptation for Zhuang-unique rice-farming and totem symbols belonging to Guangxi Zhuang Brocade, nor do they extend reflections on industrial-norm dimensions.

Overseas specialized English-translation research on Guangxi Zhuang Brocade and brocades of southwest Chinese ethnic minorities remains absent. Guided by Skopos Theory and reader-response theory, western translation studies on intangible cultural heritage tend to adopt simplified domestication strategies and delete exotic ethnic-cultural elements to lower audiences' reading barriers. Such approaches can take audiences' receptive experience in the communicative dimension into consideration. Excessive simplification, nevertheless, will eliminate distinctive ethnic-cultural symbols such as Magwai and Na and bring risks of homogenizing ethnic cultures. Research achievements in overseas textile-terminology standardization and audience cognition can serve as auxiliary references, yet they cannot directly eliminate semantic gaps brought by Zhuang-originated concepts and cannot be directly applied to translation practice of Guangxi Zhuang Brocade.

Existing research has two main deficiencies. First, there is a lack of three-dimensional stratified empirical analysis covering all categories of loaded words including weaving implements, craft techniques, totem patterns and folk-custom items, especially systematic analysis of AI-generated translations output by domestic large-language models. Second, most studies stay at the level of strategy discussion and give inadequate responses to practical problems in industrial implementation. Drawing on analytical paradigms of similar intangible-cultural-heritage research, this paper carries out case analysis relying on Three-Dimensional Transformation, takes AI-generated translations from the Doubao large-language model as corpus, and sorts out operable human-AI collaborative translation paths.

3. Theoretical Core of Three-Dimensional Transformation in Eco-Translatology

Hu Gengshen holds that translation constitutes a dynamically balanced ecological system composed of source texts, translators, bilingual cultures, overseas audiences and communication scenarios. Its core proposition is "translation is adaptation and selection by the translator"^[14]. In his monograph *Eco-Translatology: Construction and*

Interpretation, Hu Gengshen systematically illustrated this theory and put forward the analytical framework of linguistic, cultural and communicative three-dimensional transformation^[15]. As the core subject within the system, translators need to adapt simultaneously to source-cultural ecology and target-audience reading ecology, complete three layers of adaptive transformation on linguistic, cultural and communicative dimensions, and ultimately achieve overall ecological balance of target texts.

The linguistic dimension focuses on reconciling morphological differences between Chinese and English. Chinese is a parataxis-oriented language featuring loose running sentences without conjunctions, multi-layer pre-modifiers and highly condensed four-character craft phrases. As a hypotaxis-oriented language, English builds logical relations via prepositions and subordinate clauses and prefers nominalized static expressions. Linguistic-transformation work needs to align with international textile standard terminologies, restructure fragmented short sentences, adjust modifier word-order, correct grammatical and collocation errors, avoid Chinglish and adapt to written styles of cultural-tourism popular-science texts. Common techniques include integration, re-translation and terminology normalization.

The cultural dimension is committed to eliminating cross-linguistic semantic gaps. Guangxi Zhuang Brocade contains numerous Zhuang-specific concepts with no corresponding carriers in English-language cultural systems. Translation should follow the principle of “foreignization-oriented while domestication-assisted”. Representative ethnic symbols such as Magwai and Na may prioritize phonetic-translation-plus-annotation. Shared auspicious imagery between China and foreign countries can be moderately domesticated and simplified. Moderate supplementation of information concerning totem and folk-custom origins can be adopted to strike a balance between cultural fidelity and readers’ cognitive difficulty. Phonetic-translation-plus-annotation and folk-background interpretation constitute important implementation means for the cultural dimension. AI models tend to conduct only literal conversion and risk losing unique ethnic-cultural connotations; therefore human intervention and compensation from translators become necessary.

The communicative dimension takes practical effects of cross-cultural publicity as an important judging criterion. Exhibition halls, expos and cultural-creative-product texts for Guangxi Zhuang Brocade undertake functions such as popularizing intangible-cultural-heritage values, conveying Zhuang folk-custom sentiments and constructing cultural identity. Translation should step beyond pure textual conversion, adjust narrative word-order according to overseas audiences’ reading habits and delete redundant lyrical content in Chinese source texts. English texts generally follow the narrative logic of “presenting functions first and interpreting connotations afterwards”. Narrative rewriting, moderate omissions and adjustment of emotional diction can serve the realization of communicative goals.

The linguistic, cultural and communicative dimensions form an organically integrated whole. Language acts as the carrier for information transmission; deficiency in standardized expressions will hinder output of cultural connotations and communicative intentions. Culture serves as the core kernel of intangible-cultural-heritage translation. Fluent target texts that lose ethnic symbols will impair

local-communication values of translation. Communication points to the ultimate orientation of translation. Even texts with well-handled linguistic and cultural dimensions will remain in a state of translational ecological imbalance if mismatched with communication scenarios. Qualified English translations for Guangxi Zhuang Brocade require coordinated adaptive adjustments of the three dimensions to maintain dynamic translational ecological balance.

Under the context of artificial-intelligence-intervened translation, large-language models become important technical conditions within the translational ecological environment. AI can accomplish translation generation at the basic linguistic level, yet cultural interpretation and control over communicative effects still rely on translators’ subjective judgment. Balancing linguistic, cultural and communicative objectives, the Three-Dimensional Transformation theory adapts well to external-publicity texts for intangible cultural heritage such as Guangxi Zhuang Brocade that combine ethnic features and promotional attributes. Under the human-AI collaborative mode, AI produces first drafts, and translators carry out optimization and adjustment based on Three-Dimensional Transformation so as to realize translational ecological balance.

4. Analysis on English Translation of Culture-loaded Words of Guangxi Zhuang Brocade under Three-Dimensional Transformation

Combined with common problems in external publicity of Guangxi Zhuang Brocade, this paper takes AI-generated translations from the Doubao large-language model as research corpus and divides culture-loaded words of Guangxi Zhuang Brocade into four categories: weaving implements, craft techniques, totem patterns and folk-custom-related items. For each case, source text, AI-generated translation and revised translation are presented in sequence. Detailed analysis is then conducted respectively from linguistic, cultural and communicative dimensions to explore how translators review and revise AI-generated translations, make adaptation and selection within the translational ecological environment and realize effective transmission of source-text information.

4.1. Culture-loaded Words of Weaving Implements

Culture-loaded words of weaving implements refer to special manual weaving devices exclusive to Guangxi Zhuang Brocade. Belonging to material-culture-loaded words, they mainly pose difficulties in professional textile terminologies. Lacking knowledge of craft technologies, AI may produce terminology mistranslation caused by literal interpretation, which first disturbs linguistic ecology and further exerts influences on cultural and communicative dimensions.

Case 1

Source

text:

花笼机是壮族手工织造专用传统织机，用于织制多彩壮锦。

AI-generated translation: Hualong loom is the traditional loom for Zhuang people's hand weaving, it is used to weave colorful Zhuang brocade.

Revised translation: The flower-pattern jacquard loom is a

traditional hand-weaving implement exclusively used for producing multicolored Zhuang Brocade.

Three-dimensional analysis: Linguistic dimension: The AI-generated translation contains a grammatical error of comma-splicing two independent main clauses. Such fragmented sentences connecting two complete main clauses merely with commas violate syntactic norms of hypotaxis-oriented English. Abandoning literal decomposition, the revised translation adopts jacquard loom, a general term in the textile industry, reconstructs complete compound sentences, sorts out syntactic logic, eliminates grammatical defects and adapts to written styles of external-publicity texts, completing adaptive transformation on the linguistic dimension. Cultural dimension: Literally translating *Hualong* as “flower cage machine” may mislead overseas readers into regarding it as a flower-holding container and obscure material-cultural connotations of this Zhuang-exclusive jacquard loom. Though the AI-generated translation adopts transliteration “Hualong loom” to preserve the implement’s name, it fails to point out its jacquard function. Retaining the ethnic proper noun “Zhuang Brocade”, the revised translation clarifies its jacquard function via “flower-pattern”, preserves ethnic-craft attributes of the weaving implement for Zhuang Brocade, realizes adaptation and selection on the cultural dimension and avoids loss of ethnic-craft information. Communicative dimension: Suffering from syntactic defects and without descriptions of craft features for the loom, the AI-generated translation may mislead overseas audiences and fail to achieve communicative purposes of popularizing special tools for Zhuang Brocade. Following the English narrative logic of “introducing object attributes first and then functional usages”, the revised translation points out implement attributes and practical functions at the very beginning, enabling tourists and craft researchers to capture core information rapidly and achieve popular-science communicative intentions for external publicity.

Case 2

Source

text:

竹箨是壮锦织造的核心部件，起到梳理、固定经线的作用。

AI-generated translation: Bamboo reed is the key part of Zhuang brocade weaving, it combs and fixes the warp threads.

Revised translation: The bamboo reed serves as the core component in Zhuang brocade weaving, functioning to comb and secure the warp threads.

Three-dimensional analysis: Linguistic dimension: Although selecting the correct textile term “reed”, the AI-generated translation suffers from missing articles and comma-splicing of double predicates, resulting in fragmented sentence structures. Retaining the professional term “reed” for loom reeds, the revised translation integrates sentences with participle structures, repairs grammatical loopholes, conforms to expressive habits of English popular-science texts on science and technology and completes transformation on the linguistic dimension. Cultural dimension: The bamboo reed is a weaving component made of local bamboo materials by the Zhuang people, embodying mountain ethnic groups’ wisdom of making use of locally available materials in Guangxi. While retaining “bamboo” to indicate raw-material features, the AI-generated translation presents coarse sentence structures and fails to highlight mountain-ethnic-groups’ wisdom behind this implement. Keeping “bamboo” to mark raw-material characteristics, the

revised translation anchors cultural traits of traditional weaving implements for Guangxi Zhuang Brocade and safeguards information on the cultural dimension. Communicative dimension: Inappropriate terminology handling may mislead overseas audiences into mistaking loom components for daily hair-combs and invalidate popular-science communication. Despite correct terminology selection, syntactic defects in the AI-generated translation raise reading barriers. Clearly explaining components’ functions within weaving workflows, the revised translation adapts to reading scenarios of museum and exhibition-hall texts, helps overseas audiences accurately understand weaving procedures of Guangxi Zhuang Brocade and achieves balance on the communicative dimension.

4.2. Culture-loaded Words of Craft Techniques

Most culture-loaded words of craft techniques are Chinese four-character phrases condensing complicated weaving procedures. Their condensed craft connotations can hardly be converted into concise English expressions. In AI translation practice, rigid copying of Chinese running-sentence structures and patchwork of English phrases frequently occur, leading to loose syntactic logic, Chinglish, loss of professional craft information and imbalance of linguistic ecology.

Case 3

Source

text:

壮锦采用通经断纬独特技法，纬线分段染色，纹样层次丰富立体。

AI-generated translation: Zhuang brocade uses the special skill of through warp and broken weft, the weft is dyed section by section, the patterns are rich and three-dimensional.

Revised translation: Zhuang Brocade adopts the distinctive craft of continuous warp and discontinuous weft. Sectionally-dyed weft yarns create multilayered, three-dimensional decorative patterns on the fabric.

Three-dimensional analysis: Linguistic dimension: Rigidly copying Chinese four-character structures, the AI-generated translation coins non-existent English phrases such as through warp and broken weft. Clauses are connected without conjunctions, forming typical Chinglish. Adopting universally-acknowledged expressions in textile academia, the revised translation splits running long sentences, adjusts word-order and establishes clear syntactic logic to complete adaptive transformation on the linguistic dimension. Cultural dimension: *Continuous warp and discontinuous weft* constitutes a landmark technique distinguishing Zhuang Brocade from other brocades. Mere word-by-word splicing in the AI-generated translation cannot convey its core craft connotation of “continuous warp yarns and sectionally broken weft yarns for pattern formation” and erases ethnic-craft identifiers. Fully preserving craft concepts without arbitrary simplification or rewriting, the revised translation safeguards core cultural connotations of ethnic crafts and realizes adaptation on the cultural dimension. Communicative dimension: Chaotic sentence structures of the AI-generated translation raise audiences’ reading difficulty, making it impossible for readers to comprehend procedural logic and invalidating popular-science communicative objectives for exhibition-hall craft introduction. Following the English narrative sequence of “craft introduction — fabric effects”, the revised translation first introduces techniques and then illustrates fabric performances, lowers cognitive burdens for ordinary overseas audiences and achieves balance on the

communicative dimension.

Case 4

Source text: 挑花结本是壮锦传统的纹样记忆技法，记录织物纹样的编排信息。

AI-generated translation: Pattern picking and knot-making is Zhuang brocade's traditional pattern memory skill, it records the arrangement information of fabric patterns.

Revised translation: Pattern-tying for pattern programming is a traditional mnemonic craft of Zhuang Brocade, which records arrangement information for fabric decorative motifs.

Three-dimensional analysis: Linguistic dimension: Translating purely according to literal Chinese characters, the AI-generated translation coins new phrases and connects two sets of subject-predicate structures with commas, bringing about grammatical defects of double predicates. Abandoning literal decomposition, the revised translation adopts nominalized structures to adapt to English written styles, expands semantic contents with attributive clauses, repairs grammatical problems and finishes adaptive selection on the linguistic dimension. Cultural dimension: Pattern-tying for pattern programming represents a unique ancient brocade technique for storing pattern programming information and embodies weaving wisdom of Guangxi ethnic minorities. Literal translation "pattern memory skill" in the AI-generated translation may mislead overseas readers into interpreting it as human-brain memory and lose its core connotation as a pattern-storage program. Explaining the essence of this technique via "pattern-tying for pattern programming", the revised translation preserves traditional-craft concepts and reduces loss of cultural information. Communicative dimension: Literal mistranslation will make audiences completely misunderstand craft connotations and block transmission of ancient weaving wisdom of Guangxi Zhuang Brocade. First pointing out technique attributes and then interpreting functions, the revised translation adapts to museum-guide-text scenarios, enables overseas readers to understand historical values of this technique and achieves popular-science communicative purposes.

4.3. Culture-loaded Words of Totem Patterns

This category of culture-loaded words originates from Zhuang totem worship, and some names derive from oral Zhuang expressions. A common defect in AI-generated translations lies in flattened cultural connotations: sacred totems are simplified into ordinary decorative patterns, resulting in ecological imbalance on the cultural dimension.

Case 5

Source text: 蚂拐纹是壮锦经典图腾纹样，源自壮族蚂拐祭祀，寓意风调雨顺、五谷丰登。

AI-generated translation: Magua pattern is the classic totem pattern of Zhuang brocade, it comes from Zhuang Magua sacrifice, it means good weather and rich harvest.

Revised translation: Magwai (sacred water-frog totem of the Zhuang people) is a classic decorative motif of Zhuang Brocade, originating from the Magwai Festival, a traditional ritual worshipping water gods for favorable weather and bumper grain yields.

Three-dimensional analysis: Linguistic dimension: Representing typical Chinese-style running sentences, the AI-generated translation suffers from missing articles, comma-splicing of multiple main clauses and fragmented short sentences. Adopting "motif", a general term in pattern-research studies, the revised translation decomposes

scattered minor sentences, constructs main-subordinate compound sentences, completes various grammatical components, conforms to linguistic norms of English external-publicity texts and accomplishes transformation on the linguistic dimension. Cultural dimension: *Magwai* is a Zhuang-phonetic-translated term. Rather than ordinary biological frogs, it refers to the Zhuang water-god totem related to Magwai sacrificial folk customs. Merely adopting simple transliteration without supplementary totem backgrounds, the AI-generated translation may lead readers to interpret it as ordinary frog patterns, strip away cultural kernels of totem worship and flatten cultural connotations. Adopting the phonetic-translation-plus-annotation strategy, the revised translation retains the original Zhuang symbol "Magwai", supplements information concerning sacrificial backgrounds, safeguards the cultural dimension and prevents oversimplification of Zhuang ethnic totem symbols of Guangxi. Communicative dimension: The AI-generated translation can only convey superficial meanings of "frog patterns". Overseas audiences cannot understand folk origins behind repeated appearances of such patterns and can hardly generate cultural empathy. Arranging information layer-by-layer following the logic of "pattern name - folk origin - symbolic implication", the revised translation adopts parentheses for annotations adaptable to limited layout of picture albums and guide-boards. Audiences can comprehend connotations without consulting external materials, completing adaptation on the communicative dimension.

Case 6

Source text: 凤鸟纹是壮锦重要图腾，象征百鸟朝凤，寄托壮族民众吉祥安康的期盼。

AI-generated translation: Phoenix bird pattern is an important totem of Zhuang brocade, it symbolizes hundreds of birds worship phoenix, it carries Zhuang people's hope for good luck and health.

Revised translation: Phoenix-bird motif is an important totem on Zhuang Brocade. Derived from the folk allusion of "hundred birds paying homage to the phoenix", it embodies the Zhuang people's aspiration for auspiciousness and wellbeing.

Three-dimensional analysis: Linguistic dimension: Rigidly copying literal meanings of Chinese four-character allusions, the AI-generated translation piles up phrases, contains wrong predicate forms and lacks conjunctions for connection. Its colloquial style violates requirements for formal English external-publicity texts. Using the noun "motif" for patterns, the revised translation decomposes compound semantics, handles connotations of allusions with participle structures, sorts out syntactic relations and completes adaptive transformation on the linguistic dimension. Cultural dimension: The phoenix-bird motif integrates local Zhuang bird worship and Central-Plains phoenix culture, serving as a pattern symbol for multi-ethnic-cultural integration. Rigid literal translation of allusion sentence patterns in the AI-generated translation loses cultural information behind folk-custom integration of patterns. Retaining core imagery of the allusion and pointing out spiritual expectations carried by patterns for local people, the revised translation takes into account dual attributes of locality and cultural integration and achieves balance on the cultural dimension. Communicative dimension: Stiff and obscure allusion translation in the AI-generated translation prevents overseas audiences from understanding allusive implications. First introducing totem

identities, then explaining allusions and finally illustrating people's fine wishes, the revised translation follows reading habits of overseas audiences and conveys emotional values of patterns to realize objectives on the communicative dimension.

4.4. Culture-loaded Words of Folk Customs

Culture-loaded words of folk customs are deeply associated with mountain rice-farming culture and wedding folk customs. Some concepts derive from Zhuang phonetics, and no corresponding real-world objects exist within English-language cultural systems. AI-generated translations face certain difficulties in strategy selection. Excessive domestication or unrestrained foreignization may both bring about ecological imbalance on the communicative dimension.

Case 7

Source

text:

那文化锦织满梯田稻禾纹样，承载壮族千年山地稻作文明。 AI-generated translation: Na culture brocade is full of terraced rice patterns, it carries the thousand-year mountain rice civilization of Zhuang people. Revised translation: Na Culture Brocade (Na means paddy field in the Zhuang language) is woven with terraced rice ear patterns, embodying the Zhuang ethnic group's thousand-year mountain rice-farming civilization.

Three-dimensional analysis: Linguistic dimension: Suffering from missing definite articles, confusing subject-predicate logic and absence of participles or clauses for sentence connection, the AI-generated translation belongs to Chinglish. Revising predicate-verb forms and adopting participle structures for accompanying semantics, the revised translation constructs standard and complete English sentence patterns, adapts to written styles of cultural-creative-product and museum-publicity texts and completes transformation on the linguistic dimension. Cultural dimension: The Zhuang word *Na* specially refers to paddy fields and constitutes the core symbol of unique Zhuang rice-farming culture rooted in karst-terraced-field agriculture of western Guangxi. Merely applying simple transliteration without interpretations, the AI-generated translation makes overseas audiences unaware of real connotations of *Na*. If AI directly domesticates it as "paddy culture", uniqueness of Zhuang "Na-culture" will be eliminated and confused with general agricultural concepts. Adopting phonetic-translation-plus-annotation and preserving the original Zhuang symbol "Na" with concise parenthetical explanations, the revised translation retains regional-cultural identifiers of mountain terraced fields in Guangxi and maintains ecological balance on the cultural dimension. Communicative dimension: The AI-generated translation may mislead overseas audiences into regarding it as ordinary agricultural-theme brocade and prevent them from identifying exclusive Zhuang rice-farming-cultural symbols. Concise annotations in the revised translation adapt to limited layout of picture albums and cultural-creative-product labels. Audiences can grasp core concepts on-site and realize communicative intentions of introducing thousand-year-old mountain rice-farming civilization of the Zhuang people.

Case 8

Source

text:

菱形方胜纹壮锦是壮族婚嫁必备嫁妆锦，两两交叠菱形象征生生不息，寄托子孙绵延、婚姻美满的祝愿。 AI-generated translation: Diamond fangsheng pattern Zhuang brocade is a necessary dowry brocade for Zhuang weddings.

Two overlapping diamonds stand for endless life and carry wishes for lasting descendants and happy marriage. Revised translation: Zhuang Brocade woven with interlocking double rhombus patterns serves as essential wedding dowry for Zhuang brides. The overlapping rhombuses symbolize perpetual vitality, carrying the Zhuang people's sincere wishes for harmonious marriage and prosperous descendants.

Three-dimensional analysis: Linguistic dimension: Merely adopting simple transliteration for the concept of fangsheng, the AI-generated translation presents confusing noun-modifier word-order, defects in noun number and predicate collocation, and introduces colloquial vocabulary into formal texts. Objectively describing pattern forms via "interlocking double rhombus patterns", the revised translation reconstructs complete sentence patterns, replaces colloquial expressions, conforms to written-language norms for intangible-cultural-heritage external publicity and completes adaptive transformation on the linguistic dimension. Cultural dimension: Within Zhuang contexts of Guangxi, interlocking-double-rhombus *fangsheng* patterns possess specific folk-custom connotations for wedding dowries and carry folk expectations for happy marriages and flourishing offspring. Applying only literal transcription without interpreting folk-custom attributes, the AI-generated translation erases folk-custom identities of patterns. Fully retaining folk-custom information on wedding dowries without arbitrary rewriting of auspicious implications, the revised translation preserves folk-cultural kernels of Zhuang wedding customs and realizes adaptation and selection on the cultural dimension. Communicative dimension: Colloquial expressions in the AI-generated translation interfere with audiences' understanding of patterns' status in Zhuang wedding customs and hinder cross-cultural emotional resonance. Following the English narrative logic of "object functions - symbolic connotations", the revised translation first illustrates wedding-relevant functions and then interprets symbolic implications. It conforms to reading habits of overseas audiences and achieves communicative objectives of transmitting cultural emotions.

5. Conclusion

Drawing upon the Three-Dimensional Transformation theory of Eco-Translatology and taking AI-generated translations from the Doubao large-language model as research corpus, this paper conducts in-depth analysis on English-translation problems of culture-loaded words in external-publicity texts for Guangxi Zhuang Brocade. By sorting out four major categories of culture-loaded words for Guangxi Zhuang Brocade - weaving implements, craft techniques, totem patterns and folk-custom-related items - and comparing AI-generated translations with manually optimized versions, this paper discusses translators' paths of adaptation and selection within the translational ecological environment. Multiple translation means including phonetic-translation-plus-annotation, terminology calibration, syntactic reconstruction and background supplementation are comprehensively adopted to optimize target texts.

Research findings are shown as follows. Firstly, on the linguistic dimension, generative AI can rapidly produce translations, yet it frequently produces comma-splicing sentences, non-standard terminologies and Chinglish. Translators should take both professional textile norms and English external-publicity styles into consideration, complete adaptive transformation in vocabulary, syntax and expressive

forms, repair linguistic defects of AI-generated translations and avoid terminology mistranslation and Chinglish. Secondly, on the cultural dimension, large-language models lack local folk-custom knowledge of Guangxi ethnic minorities and are prone to cultural information default. Translators should properly grasp the scale between foreignization and domestication, reserve and interpret Zhuang-originated cultural symbols such as Magwai and Na-culture, and reduce loss of ethnic-cultural connotations. Thirdly, on the communicative dimension, AI can hardly automatically adapt to diverse communication scenarios such as museum guides, exhibitions and cultural-creative-product labels. Translators need to control narrative logic in accordance with overseas audiences' cognitive habits and practically realize external-publicity intentions for disseminating intangible-cultural-heritage values of Guangxi Zhuang Brocade. To sum up, the human-AI collaborative mode of "AI-generated translation plus human review and post-editing", combined with translation strategies such as phonetic-translation-plus-annotation, terminology normalization and moderate interpretative compensation, helps realize cross-cultural adaptive transformation of culture-loaded words of Guangxi Zhuang Brocade and boosts international communication of Zhuang Brocade intangible cultural heritage.

Nevertheless, this research still has certain limitations. On the one hand, it mainly selects paper-printed external-publicity texts as research corpus and insufficiently explores translation issues under new-media scenarios such as short-video platforms and cross-border e-commerce. Translation priorities vary for different types of external-publicity materials, and corpus coverage needs further expansion. On the other hand, dominated by qualitative case analysis, this study lacks quantitative means such as audience questionnaires to test practical communication effects of AI-generated translations and manually revised translations. Differentiated reading demands from different audience groups including ordinary tourists, craft researchers and cultural-creative-product consumers have not been fully considered.

Therefore, follow-up research can be advanced in the following directions. First, refine translation specifications for different external-publicity carriers of Guangxi Zhuang Brocade combining new-media scenarios such as short-video platforms and cross-border e-commerce, and explore application boundaries of AI-assisted translation in new-media intangible-cultural-heritage texts. Second, introduce audience surveys to explore differentiated translation schemes for various overseas-audience groups. Third, explore translation paths for Zhuang Brocade targeting ASEAN languages. Fourth, promote collaborative participation of folk-custom scholars, craft practitioners and translators, improve multi-party-collaboration modes for translation of ethnic-minority handicraft intangible cultural heritage, continuously optimize external-translation practice for Guangxi Zhuang Brocade and similar ethnic-minority handicrafts in Guangxi, and facilitate international exchanges and mutual-learning among civilizations for fine traditional Chinese culture.

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