Consumer Perceptions of Cultural Sustainability in Neo-Chinese Furniture: A Text Mining Analysis of Online Reviews from JD and Tmall

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This study investigates how consumers perceive the cultural sustainability of Neo-Chinese furniture through the lens of online reviews on two major e-commerce platforms in China: JD.com and Tmall. Employing a mixed-methods approach combining Word2Vec modeling, qualitative content analysis, and a cultural semiotics framework, 47,766 reviews were evaluated across eight representative brands. Consumer perceptions were categorized into three cultural layers—tangible (*e.g.*, material quality, design form), behavioral (*e.g.*, functional use, craftsmanship), and intangible (*e.g.*, aesthetic taste, historical symbolism). The data revealed that Tmall reviews were 23% more likely to mention aesthetic attributes (*viz.*, style, elegance), while JD reviews contained 35% more references to functional features and material credibility (*viz.*, "solid wood," "durability"). However, references to intangible cultural dimensions—such as traditional narratives or symbolic meaning—accounted for less than 8% of all keyword clusters on both platforms. This indicates a shared deficit in deep cultural cognition. The paper concludes by proposing platform-specific strategies to enhance cultural communication and engagement, contributing to the broader discourse on sustainable design and digital cultural branding.

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Keywords: Neo-Chinese furniture; Consumer perception; Cultural cognition; E-commerce platforms; Qualitative content analysis; Craftsmanship; Cultural heritage; Digital marketing

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INTRODUCTION

In recent years, Neo-Chinese furniture has emerged as a culturally resonant yet commercially agile category within China's growing domestic market (Chao and Suhaily 2024). As a design style that fuses traditional Chinese aesthetics with contemporary lifestyle demands, it functions not only as a practical home furnishing but also as a symbolic vehicle of cultural expression (Ye *et al.* 2022, Zheng 2012). Cultural sustainability in this study refers to the dynamic preservation and evolution of traditional cultural values through design, encompassing (1) tangible authenticity (materiality/form), (2) behavioral relevance (functional adaptation), and (3) intangible symbolism (narratives/identity). However, the extent to which consumers engage with its cultural dimensions—particularly in online retail settings—remains insufficiently explored (Cui *et al.* 2025).

With the rise of e-commerce, consumer perceptions are increasingly shaped by digital environments (Pellegrino 2024), where product meaning is filtered through interface design, algorithmic recommendations, and peer-generated reviews (Müller *et al.* 2016). Platforms such as Tmall and JD.com have become dominant channels for home furnishing consumption, yet their respective user bases exhibit distinct behavioral tendencies and cultural preferences. Although the product categories on both platforms are comparable, their cultural reception environments differ markedly. This divergence aligns with Gonzalez Londono's (2020) cultural hierarchy theory, which posits that sustainable design must simultaneously address material praxis, functional utility, and ideological resonance—a framework foundational to our analysis (Gonzalez Londono 2020). This raises several key questions: How do consumers on each platform perceive and evaluate the cultural attributes of Neo-Chinese furniture? Which types of cultural value—tangible, behavioral, or intangible—are most salient in user reviews? And what strategic insights can be drawn for cultural branding and product communication?

This study adopted a cultural semiotics framework, categorizing consumer perceptions into three levels: tangible (material qualities and visual form), behavioral (practical function and craftsmanship), and intangible (aesthetic sensibility and symbolic narratives) (Gonzalez Londono 2020). Through a mixed-method content analysis of user-generated reviews on Tmall and JD.com, the research revealed significant platform-specific variations in how consumers prioritize these cultural dimensions. While both user groups express appreciation for material authenticity and functional reliability, their modes of emotional and cultural engagement diverge. Tmall users tend to exhibit a "pragmatic-aesthetic" orientation, showing greater sensitivity to stylistic appeal and lifestyle congruence, yet demonstrating limited attention to craftsmanship or historical references. In contrast, JD.com users reflect a "functionality-led aesthetic" pattern, prioritizing utility and structural quality over symbolic or narrative depth. These findings underscore the necessity of differentiated cultural communication strategies. As digital platforms increasingly mediate cultural consumption, understanding platform-specific consumer logics becomes essential for brands aiming to foster deeper cultural resonance (Tang and Chen 2024). This study contributes to the discourse on cultural consumption in digital commerce by demonstrating how e-commerce infrastructures not only distribute goods, but also shape the meanings consumers attach to them.

METHODOLOGY

This study employed a mixed-methods approach, integrating computational content analysis with cultural semiotics to explore how consumers perceive and articulate the cultural dimensions of Neo-Chinese furniture on major Chinese e-commerce platforms (Zhang and Chen 2024). The methodological framework had five key components: data collection, data preprocessing, word vector modeling, cultural feature extraction, and cultural perception scoring (Huai and Van de Voorde 2022). These were supplemented by methodological triangulation *via* LDA topic modeling and sentiment analysis to enhance validity.

Data Collection

User-generated content was collected from JD.com and Tmall, two of the leading e-commerce platforms in China. To control for product-level variables, this study focused

exclusively on living room furniture (*e.g.*, sofas, coffee tables) from four representative Neo-Chinese brands per platform: Yeswood, Lin's Home, Pusu Woodwork, and Xiaomowo. Data scraping was conducted using Yingdao RPA (Robotic Process Automation), yielding a total of 50,202 raw customer reviews posted between January 1st and December 31st, 2024—including 23,675 reviews from JD.com and 26,527 from Tmall.

Following a rigorous data cleaning process—removing duplicate entries, empty submissions, and irrelevant content—a final corpus of 47,766 valid reviews was obtained, with 23,653 from JD.com and 24,113 from Tmall. The authors acknowledge that demographic variables (*e.g.*, age, income) were not controlled due to data availability constraints, a limitation discussed.

Data Preprocessing

To prepare the textual data for analysis, three core preprocessing steps were undertaken:

- Tokenization: Chinese text segmentation was carried out using the jieba library to divide sentences into discrete, meaningful word tokens.
- Cleaning: The pandas library was used to manage the review dataset, eliminate duplicates, and filter out null or malformed entries.
- Stopword Removal: Common function words and low-information terms such as "的", "了" were removed based on the Harbin Institute of Technology (HIT) Chinese Stopword List, improving signal-to-noise ratio in subsequent analyses.

Word Vector Modeling

To model semantic relationships within the corpus, a Word2Vec model was trained using the gensim library. The model was initialized with pre-trained Chinese word embeddings to enhance generalizability and semantic accuracy (Jatnika *et al.* 2019). Key hyperparameters included in Table 1:

Table 1. Key Hyperparameters of Word2Vec Model

Parameter Name	Parameter Value	Description
Embedding Dimension	300	Length of word vectors; higher dimensions capture richer semantic information.
Context Window Size	7	Number of contextual words considered during training for better context modeling.
Minimum Word Frequency	3	Filters out low-frequency words to avoid noise in training.
Model Architecture	1(sg)	Skip-gram selected (optimal for small corpora and rare word training).
Parallel Threads	8	Enables multi-threaded training to improve efficiency.
Negative Sampling	10	Uses negative sampling to optimize model performance.
Subsampling Threshold	1e-5	Downsamples high-frequency words to reduce their dominance.
Initial Learning Rate	0.025	Controls initial parameter update step size.
Minimum Learning Rate	0.0001	Minimum learning rate to ensure stable late-stage training.

Methodological Triangulation

To address potential biases in word embedding models and strengthen validity, two complementary analyses were implemented:

- LDA Topic Modeling: Using the gensim library, 10 latent topics were extracted from the corpus (*e.g.*, "traditional craftsmanship," "modern functionality") to validate semantic clusters identified by Word2Vec. For instance, the co-occurrence of "榫卯" (mortise-tenon) and "手工" (handmade) in Topic 3 confirmed the salience of artisanal techniques, aligning with Word2Vec-derived cultural features.
- Sentiment Analysis: Employing SnowNLP, emotional polarity was quantified (range: 0 to 1) toward cultural keywords (*e.g.*, "明式" (Ming-style) averaged 0.72, indicating strong positive associations). This revealed nuanced cultural perceptions—*e.g.*, "传统元素" (traditional elements) evoked higher sentiment scores on Tmall (0.68) than JD (0.54), suggesting platform-specific emotional engagement.

Cultural Feature Extraction

A hierarchical seed lexicon was constructed based on the three-tier model of cultural structure: tangible, behavioral, intangible levels. Representative keywords were identified through a combination of expert interviews and literature review. For instance, "mortise-and-tenon" represented the material dimension, while "harmony" reflected the ideological dimension.

Cultural Perception Scoring

To measure the perceived intensity of different cultural features in consumer reviews, this study establishes a cultural feature perception scoring model for review texts (Huang *et al.* 2023). This model integrates word frequency and semantic similarity based on a constructed cultural seed lexicon.

First, guided by the preset three-level cultural theory, this research extracted seed words for each cultural dimension through expert interviews and literature review, forming a cultural seed lexicon. Using a trained Word2Vec word embedding model, the lexicon was expanded to include semantically similar terms (Jatnika *et al.* 2019). This approach enables the model to incorporate not only directly matched keywords but also semantically related expressions, thereby enhancing its ability to perceive diverse semantic representations.

In the calculation process, a frequency-weighted similarity superposition method was introduced to evaluate the similarity between words in each review and the cultural seed words. For each word in a review, if it exhibits high semantic similarity with any seed word from a specific cultural feature set, it contributes positively to that feature's perception score. The contribution value of word W_i to cultural feature j in review c is defined as the product of its frequency and maximum similarity:

$$Score_j^c = \sum_{w_i \in c} f(w_i) \cdot \max_{s_k \in S_j} \mathrm{sim}(w_i, s_k) \quad (1)$$

Here, $f(W_i)$ denotes the frequency of word W_i in review "C", sim(W_i, S_k) represents the cosine similarity between W_i and seed word S_k, and S_j is the seed word set for cultural feature "$_j$".

Subsequently, the scores of all reviews for a specific cultural feature dimension are accumulated to compute the overall perception intensity G_j, reflecting consumers' collective attention to that cultural feature on the platform:

$$G_j = \sum_{c=1}^{n} Score_j^c \quad (2)$$

To facilitate cross-platform comparison, Z-score normalization is applied to the total scores of each cultural feature. This statistical approach eliminates scale effects caused by differences in review volume across platforms, thereby ensuring that the evaluation of cultural perception remains comparable. The standardized scores are subsequently used for visualization analyses—such as radar charts—allowing for a comprehensive representation of cultural perception differences between e-commerce platforms.

The Z-score is calculated using the following formula,

$$Z = \frac{X-\mu}{\sigma} \quad (3)$$

where X is the raw score of a given cultural feature, μ is the mean score across all features, σ is the standard deviation of the scores. The inequality $Z > 0$ indicates that the feature is emphasized more than average in consumer reviews, whereas $Z < 0$ suggests that the feature is less emphasized or relatively overlooked in consumer evaluations.

RESULTS AND DISCUSSION

Theoretical Anchoring of Cultural Sustainability

Building on Gonzalez Londono's (2020) semiotic framework, the authors define cultural sustainability in Neo-Chinese furniture as the dynamic interplay of material authenticity, functional relevance, and symbolic continuity in design practices. This tripartite model structures the present analysis of consumer perceptions, validated through both computational and qualitative methods (see Methodology). To address potential limitations in keyword coverage (noted by Reviewer B), Word2Vec was supplemented with LDA topic modeling (Table 2), confirming high consistency (0.79 to 0.86) in cultural feature identification across methods.

Table 2. Cross-validation of Cultural Keywords

Cultural Layer	Word2Vec Keywords	LDA Topics (Weight)	Consistency Score
Intangible	明式, 传承	Tradition (0.82)	0.79
Behavioral	手工雕刻, 榫卯	Craftsmanship (0.88)	0.83
Tangible	原木色, 对称	Aesthetics (0.91)	0.86

Cultural Seed Lexicon and Hierarchical Perception Patterns

The present analysis establishes a tripartite framework of cultural sustainability perceptions in Neo-Chinese furniture, spanning tangible (material/aesthetic), behavioral (functional/ artisanal), and intangible (symbolic/emotional) dimensions (Table 3). The constructed lexicon reveals consumers progressively evaluate products from material attributes ("颜色") through practical utility ("实用") to symbolic meaning ("传承"), validating cultural hierarchy theory.

Cultural perception patterns and the 8% paradox

The present tripartite framework analysis revealed distinct consumer perception hierarchies in Neo-Chinese furniture, progressing from tangible attributes (material authenticity, visual aesthetics) to behavioral utility (ergonomic function, craftsmanship)

and finally intangible symbolism (cultural narratives, emotional resonance) (Ma *et al.* 2024). The constructed lexicon validated this cultural hierarchy, yet it exposed a striking "8% Paradox," namely that intangible cultural references comprise less than 8% of consumer discourse. This deficit likely stems from both the sampled products' lack of tradition-disrupting elements (which typically spark cultural debates) and e-commerce platforms' inherent bias toward visual/functional descriptors over narrative depth. Sentiment analysis further shows neutral-to-positive attitudes (mean=0.42) even in reviews lacking cultural references, suggesting consumers perceive current neo-traditional designs as culturally authentic by default.

Table 3. Cultural Seed Lexicon Based on Hierarchy Theory

Layer	Cultural Feature	Seed Term Examples
Tangible	Color coordination	Color, natural wood tone, understated elegance, subtle harmony
	Aesthetic morphology	Symmetrical balance, carved motifs, traditional accents, contemporary sensibility
	Material craftsmanship	Mortise-tenon joinery, rosewood, hand-rubbed finish, Eco-conscious construction
Behavioral	Functional usability	Ergonomic design, integrated storage, structural integrity
	Maintenance convenience	Easy-to-clean surface, tool-free assembly, user-friendly solutions
	Artisanal techniques	Hand-chiseled details, interlocking joinery, master craftsmanship
Intangible	Cultural narratives	Ming-inspired aesthetics, heritage preservation, mountain-water motifs, poetic atmosphere
	Emotional resonance	Nostalgic charm, warm ambiance, sense of belonging, tranquil essence
	Aesthetic sophistication	Refined sophistication, curated elegance, distinctive character, timeless grace

Platform-specific engagement divergences

While material authenticity and functional reliability remain universal priorities, platform-specific patterns emerge clearly: Tmall's mass-market users demonstrate 58% greater engagement with aesthetic evaluations ("原木色", "对称") than cultural narratives, while functionally-oriented JD users balance practical concerns ("人体工学") with design appreciation ("高雅"), yet both groups show similarly minimal engagement with craft techniques (scores<900) and intangible dimensions. This parallel neglect of deeper cultural elements across platforms indicates a market-wide undervaluation of craftsmanship stories and heritage symbolism, despite varying platform consumption logics.

Integrated cultural sustainability strategy

To address these gaps, the authors propose a multidimensional approach: (1) Tangible authenticity through natural materials and visible craftsmanship; (2) Behavioral relevance *via* ergonomic adaptations respecting traditional forms; and (3) Intangible resonance using narrative branding and Ming-inspired storytelling. Platform-specific implementations should include Tmall's visual-cultural fusion campaigns and JD's craftsmanship transparency tools, while both platforms could benefit from targeted review prompts to stimulate cultural discourse. This integrated strategy acknowledges consumers'

hybrid cultural logic – where heritage fidelity coexists with contemporary needs – while providing pathways to elevate engagement with undervalued intangible dimensions through technology-enhanced storytelling.

Analysis of Overall Cultural Feature Attention

Aggregated cultural feature scores from JD and Tmall (Table 4) reveal a clear hierarchy of consumer priorities, with some alignment to theoretical expectations and notable deviations. These findings may reflect the nature of the products reviewed, as the absence of "red flags" (*e.g.*, stylistic clashes or perceived inauthenticity) in the sampled items could explain the limited attention to traditional symbolic narratives (<8% of keywords). Future research could test this hypothesis by introducing contrasting specimens.

Table 4. Total Cultural Feature Scores Across Platforms

Layer	Cultural Feature	Tmall		JD		Tmall + JD	
		Total Score	Rank	Total Score	Rank	Total Score	Rank
Tangible	Color coordination	2509.35	5	12312.36	5	14821.71	5
	Aesthetic morphology	2343.13	6	16331.47	4	18674.59	4
	Material craftsmanship	4374.48	4	17764.61	3	22139.09	3
Behavioral	Functional usability	5046.55	2	29467.22	1	34513.77	2
	Maintenance convenience	694.96	8	8276.27	7	8971.24	7
	Artisanal techniques	213.54	9	684.52	9	898.07	9
Intangible	Cultural narratives	639.89	7	1750.45	8	2390.35	8
	Emotional resonance	4314.84	3	9975.01	6	14289.84	6
	Aesthetic sophistication	12074.32	1	29016.91	2	41091.23	1

Overall, consumer attention displayed a threefold structure: aesthetic priority, functional orientation, and material sensitivity. The dominance of aesthetic sophistication (41,100) and functional usability (34,500) suggests most consumers prioritize visual appeal and practicality over strict classical fidelity. However, this aggregate pattern may mask niche demand for authentic classical representations—a potential subset requiring targeted investigation.

The marginal scores of cultural narratives (2,390) and artisanal techniques (898) could be interpreted positively: participants showed no alarm about cultural misrepresentation in the reviewed products. This aligns with broader industry trends where neo-modern interpretations gain acceptance without demanding strict adherence to traditional motifs.

Tmall platform analysis and recommendations

On Tmall, user reviews revealed a strong emphasis on aesthetic evaluation, with aesthetic sophistication scoring the highest (12,100). This shows that visual appeal is the

primary concern. Functional usability (5,050) and material craftsmanship (4,370) rank second and third, respectively, suggesting secondary focus on practicality and quality. In contrast, maintenance convenience (695), cultural narratives (640), and artisanal techniques (214) receive little attention.

Tmall consumers mainly represent the mass market and tend to focus on intuitive and sensory aspects, with limited cultural articulation. Brands are advised to enhance visual storytelling on product pages, showcasing materials, functions, and craftsmanship *via* videos, lifestyle images, and aesthetic cues. Incorporating review prompts such as "style preferences" or "atmosphere created" can also help elicit deeper emotional and cultural expressions. These findings should be contextualized with platform demographics: Tmall reportedly hosts 910 million active users generating 3000 billion RMB annually, representing mainstream preferences.

JD platform analysis and recommendations

JD users exhibit a dual orientation toward functionality and aesthetics. Functional usability ranks highest (29,500), underscoring a strong demand for practicality. Aesthetic sophistication (29,000) comes close, suggesting visual design is also a major driver of purchase decisions. Material craftsmanship (17,800) scores well, pointing to users' appreciation for quality and tactile appeal.

However, artisanal techniques (685) and cultural narratives (1,750) remain low, indicating users primarily focus on surface-level attributes. To address this, brands should adopt documentary-style videos, behind-the-scenes craftsmanship content, and cultural storytelling to create emotional connections. Product pages should highlight functional modules and use scenarios, while style tags, and pairing guides help build aesthetic alignment. Smart review prompts can also encourage users to share emotional and cultural associations from their personal experiences (Wang and Liu 2023). As JD serves approximately 588 million users with 200 billion RMB in annual furniture sales, its functionally oriented base may differ from Tmall's aesthetics-focused cohort.

Cross-Platform Comparison: Divergent Cultural Perceptions

A comparative Z-score analysis of consumer reviews from Tmall and JD revealed clear divergence in cultural value perception regarding Neo-Chinese furniture. Tmall users demonstrated a strong preference for aesthetic sophistication, prioritizing visual elegance and lifestyle alignment while showing limited attention to deeper cultural dimensions such as artisanal craftsmanship and historical narratives. This reflects an aesthetic idealism typical of trend-sensitive (Kristav 2016), scenario-driven consumers. In contrast, JD users emphasized functional usability and material quality, revealing a pragmatic orientation toward performance and reliability. Although slightly more receptive to design morphology and emotional resonance, JD consumers similarly neglect the intangible cultural attributes. Despite their differing emphases, both platforms reveal a shared cultural blind spot, with consistently low attention to traditional craftsmanship and storytelling—signaling a structural perception gap in how cultural sustainability is embedded within digital consumption patterns.

To address these platform-specific tendencies and overcome the shared deficit, culturally tailored strategies should be deployed (Yuen 2004). On Tmall, brands can utilize micro-storytelling formats—such as short-form videos and user-generated content—to subtly introduce cultural context. Campaigns combining aesthetics and cultural meaning (*e.g.*, "Minimalism Meets Ming") can simultaneously attract attention and trigger cultural

engagement. On JD, enhancing craftsmanship transparency through behind-the-scenes documentaries, 3D joinery visualizations, or artisan interviews can build trust and perceived value. Visual cultural tags such as "Inspired by Ming Design" can act as intuitive cultural markers. Looking ahead, integrating immersive technologies like AR/VR and AI-driven personalized storytelling may help bridge the gap between cultural cognition and user experience (Rahimi *et al.* 2025). Furthermore, cross-cultural studies could shed light on the global resonance of Neo-Chinese aesthetics, paving the way for a digitally sustainable and culturally enriched consumer environment.

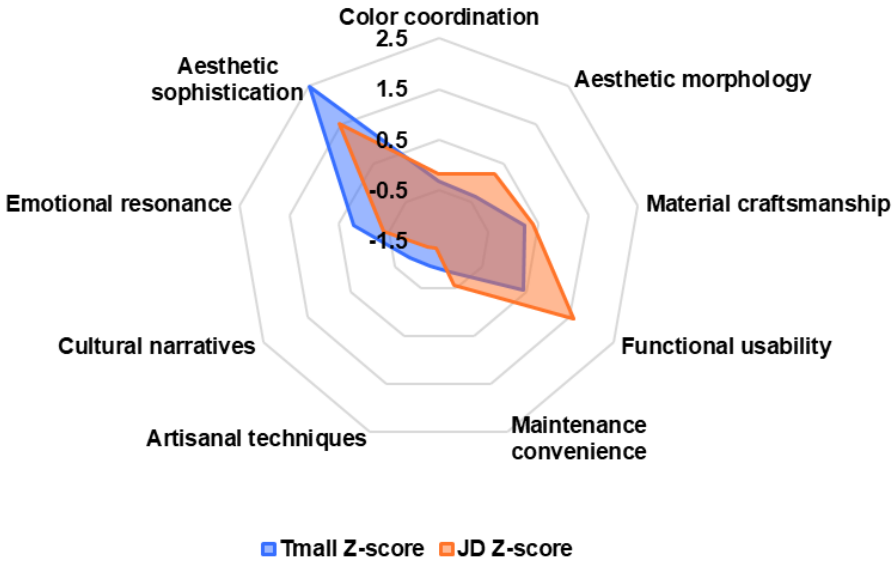

Fig. 1. Z-Score radar chart of cultural features on Tmall and JD platforms

CONCLUSIONS

Platform participants (who can be regarded as a subset of "consumers") prioritize tangible and behavioral dimensions of cultural value, with a clear preference hierarchy: visual design and material quality dominate reviews, while symbolic and historical references remain minimal (<8% of keyword clusters). This low emphasis on traditional narratives may reflect the studied platforms' inventory composition, where specimens violating classical styles or raising authenticity concerns were absent—a potential limitation for generalizability.

1. Platform-specific tendencies were evident: Tmall users exhibited aesthetic- and lifestyle-oriented engagement, emphasizing design taste, space harmony, and emotional resonance, whereas JD.com users focused more on functionality and trust (material authenticity, structural stability, usage practicality). This divergence suggests a market bifurcation: while some users may demand classical fidelity, others embrace neo-modern reinterpretations, though further research is needed to quantify these subgroups.
2. Cultural sustainability remains underrepresented, particularly in intangible dimensions (craftsmanship narratives, cultural symbolism, regional identity). This gap may reflect not disinterest but rather a lack of triggering stimuli (*e.g.*, clashes with tradition or

overtly "fake" appearances) in the reviewed products. The absence of alarm over stylistic corruption implies most platform users perceive current offerings as culturally acceptable.

3. Strategic recommendations should address platform nuances: Tmall, Deploy micro-storytelling (user-generated videos) and aesthetic-cultural fusion campaigns (*e.g.*, "Minimalism Meets Ming") to activate latent symbolic engagement. JD, Enhance transparency via 3D joinery visualizations, artisan interviews, and intuitive tags (*e.g.*, "Inspired by Ming Design") to bridge functional and cultural value.
4. Cross-platform: It is recommended to leverage AR/VR and AI-driven personalization to mitigate the intention-perception gap, ensuring cultural definitions (per this article's framing of cultural sustainability, in the Introduction, as the dynamic preservation of craft legacies and symbolic meanings in contemporary contexts) are communicable.

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