



Research article

Cross-cultural study of hotel practices as perceived by Chinese and North American travellers: A data mining analysis

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ABSTRACT

This paper aims to unearth the different perception styles of Chinese and North American travellers from analytic versus holistic thinking perspectives. Python was utilized to gather online textual data from Chinese and North American travellers, while word frequency analysis, latent Dirichlet allocation (LDA) topic modelling analysis and content analysis were employed to elucidate the perception styles in a cross-cultural context. In general, North American travellers mainly leaned towards analytic thinking, whereas Chinese travellers showcased a blend of holistic and analytic thought processes. The topic of *travel, leisure and accommodation* showed both holistic and analytic thinking styles. The topics of *nature and environment, front desk service, and travel routes and scenic spot areas* mainly represented a holistic thinking style. The topics of *convenience and facilities, breakfast, transportation, hotel theme and features, and decoration and amenities* mainly suggested an analytic thinking style. Hotels should consider the different perception styles of Chinese and North American travellers to facilitate strategies accordingly and to maximize the experience of travellers from different cultural backgrounds.

1. Introduction

Previous literature indicates that perception plays a pivotal role in customer satisfaction, loyalty, and revisit intentions [1–3]. For instance, perception can mediate the relationship between satisfaction and loyalty [4,5], influence word-of-mouth and revisit intention, and can partially mediate the impact of the servicescape on word-of-mouth [6]. The perceptions of hotel practices, such as service quality, facilities, and robot assistants, have direct effects on perceived value, satisfaction, loyalty, and revisit intentions [5,7].

However, existing research has focused primarily on scale development, such as the dimensions of hotel practices, the importance of perception dimensions, and their relationships with behavioural variables [8–12]. Less attention has been given to *perception patterns*, which refer to the consistent or recurring ways in which individuals or groups perceive and interpret their environment. These patterns are often shaped by past experiences, cultural norms, and psychological biases. They can influence how people perceive and understand the world, leading them to have similar reactions and interpretations in similar situations. Perception patterns can be explained by analytic vs. holistic thinking styles, with East Asian societies leaning towards holistic thinking and Western societies inclining towards analytic thinking [13–15]. Different thinking styles impact decision-making, product evaluation, and brand extension [16–18]. With few studies exploring *perception patterns* in the hospitality setting, it is critical for both academics and professionals to understand hotel guests' perception patterns in a cross-cultural context to enhance satisfaction.

Therefore, this study aims to uncover distinct perception patterns among Chinese and North American travellers from an analytic-

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holistic thinking perspective. By analysing textual data from the renowned travel website TripAdvisor(.com), this study sought to explore the differences in perception patterns (holistic vs. analytic thinking patterns) between Chinese and North American travellers. The goal of this study is to answer the following questions: (1) What are the differences in word frequency between Chinese and American travellers, and how do these differences reflect distinct thinking patterns between the two groups? (2) What are the differences in themes according to latent Dirichlet allocation (LDA) topic modelling analysis between Chinese and American travellers, and how do these differences reflect distinct thinking patterns between the two groups? (3) How valid are the themes and differences in the thinking patterns between Chinese and American travellers?

In the following sections, we first conduct a literature review, then introduce the research methods, identify the research conclusions, and finally, discuss the limitations of the research.

2. Literature review

2.1. Perception differences in hospitality

Recent years have witnessed an extensive exploration of perception disparities in the hospitality realm. One research strand delves into culturally distinct emphases on hotel attributes. For instance, Chinese travellers demonstrate heightened attention to food [12, 19]; hygiene, comfort, and check-in/check-out experiences [20]; room-related aspects [10]; superstitious attributes [21]; personalized services; and attributes linked to lifestyle and social norms [11]. Conversely, American travellers prioritize life and entertainment-related factors, sporting amenities, tranquillity, overall satisfaction, and the physical environment [22]. Notably, they value staff competence [20] and standardized services [11]. In Eastern Europe, the physical environment takes precedence; Western Europeans prioritize rooms and food, along with the physical setting and servicescape; Southern Europeans prioritize personnel, followed by the environment; and Northern Europeans favour core product aspects [23]. Meanwhile, Canadians emphasize friendliness, cleanliness, and delightful surprises, and Latin Americans highlight both tangible and intangible elements such as amiability, professionalism, restaurant services, and room service cuisine [9].

In addition to the distinct cultural variations in the perception of comprehensive hotel attributes, the literature has also examined the differentiation of attribute rankings based on diverse star ratings, travel types, and satisfaction levels in cross-cultural contexts. For instance, Americans prioritize service competence more broadly, whereas among 1-star travellers, this priority shifts to Chinese travellers. Cleanliness holds greater importance for Chinese travellers, although among 1-star travellers, Italians emphasize its significance. Notably, the budget attribute's discriminating power is generally low, but it becomes important for Americans staying in 1-star hotels [20]. Another study revealed that travellers from English-speaking countries favoured larger rooms in four-star hotels, while their non-English-speaking counterparts prioritized enhanced service quality [24].

Diverse traveller profiles demonstrate disparities in hotel attribute significance, criterion importance, and selection outcomes. For instance, Chinese family travellers prioritize restaurant attributes, unlike Italians, who emphasize check-in and check-out procedures (unlike the general situation for Chinese travellers) [20]. However, Rohani et al. (2017) explored perception distinctions among vacationers and business travellers from Canada, New Zealand, and the United Arab Emirates [25]. The findings indicated that Canadian vacationers were less price-sensitive and prioritized nonsmoking and comfortable furnishings. New Zealanders emphasized safety, while UAE travellers were price-sensitive and less concerned about staff responsiveness, housekeeping, and maintenance [25].

By examining various satisfaction levels, Davras and Caber (2019) identified entertainment services as the exclusive "dissatisfiers if absent" across nationalities. Restaurant services emerge as "dissatisfier if absent" for Turks and Russians but satisfy Germans. Enhancing restaurant offerings is pivotal for German contentment. General area cleaning is a "hybrid" for Turks, a "dissatisfier if absent" for Germans, and a "satisfier" for Russians. Improving this aspect could thus increase Russian satisfaction. Service staff please Turks and Germans while dissatisfying Russians. Elevating staff attitudes at dining venues would therefore please Turks and Germans. Multilingual staff members delight Turks and Russians, boosting overall satisfaction upon performance enhancement [26]. Ying et al. (2020) later revealed that as satisfaction decreases, Chinese travellers reduce the importance that they attribute to functionality but emphasize staff interactions, while North American travellers show minor fluctuations in theme importance across satisfaction levels [11].

The second line of research concentrated on cross-cultural differences in specific hotel attributes, particularly service quality. Asian travellers attribute significance to interpersonal relationships [27]. For instance, Chinese travellers emphasize ritualistic behaviours such as greetings, smiles, and customized services [1,28]. Japanese travellers also value interpersonal relations with hosts [29]. Westerners prioritize efficiency, goal achievement, and time savings [27]. Notable patterns emerged when examining traveller perceptions across nationalities. American travellers prioritize adaptable, affable, proficient, and value-enhancing service attributes. In contrast, Northern European travellers emphasize amicability and effective conflict resolution. Latin American travellers emphasize congeniality and professionalism, while Canadian travellers emphasize friendliness and unexpected elements [9]. Nonetheless, both Asian and Western travellers value hospitality [30] and reliable service [31] as key factors for positively perceiving hotel performance.

The third research stream pertains to the influence of culture on the perception of hotel attributes and their connection to satisfaction. Previous literature has extensively explored how culture moderates the varying impacts of hotel attributes on customer satisfaction [8]. For instance, Spanish consumers show heightened sensitivity to cleanliness and aesthetics, while the link between cost and satisfaction is more robust among Guatemalan diners [32]. A study of Hofstede's cultural dimensions, which reflect cultural disparities, revealed significant effects on satisfaction [33]. Individualism negatively influenced the connection between the room rating and overall rating, while uncertainty avoidance had a detrimental impact on the link between the cleanliness rating and overall rating. Masculinity negatively affected the value rating, and long-term orientation impacted room and service ratings differently.

Indulgence unfavourably affected the relationship between location ratings and overall ratings [34].

The existing research largely explores cultural variations in *ontological aspects* such as individualism-collectivism, with fewer studies examining *epistemological differences*, for example, analytic vs. holistic thinking from a cultural psychology perspective [14].

2.2. Theoretical background: analytic vs. holistic thinking patterns across cultures

In cultural psychology, holistic thinking is characterized by embracing a perspective that encompasses the entirety of the context or domain, including an awareness of the interconnections between a central entity and the domain and an inclination towards elucidating and foreseeing occurrences based on these interconnections [13]. In contrast, analytic thinking involves isolating the object from its surroundings, a propensity to concentrate on the qualities of the object for the purpose of categorization, and a leaning towards employing categorical principles to interpret and predict the actions of the object [13].

Choi (2007) developed four constructs (*attention*, *causality*, *perception of change*, and *contradiction*) as the key characteristics of analytic-holistic thinking. In the holistic thinking style, *attention* tends to be directed towards the relationships between objects and the broader context to which these objects belong [35]. Conversely, the analytic thinking style tends to focus more on the individual object itself rather than the larger context that it is situated within [36,37]. When explaining *causality*, individuals inclined towards holistic thinking styles tend to consider intricate causal networks and place greater emphasis on the interactions and interplay between an individual and their surrounding circumstances. In contrast, those with analytic thinking styles predominantly consider the internal traits and tendencies of an individual when explaining causality [38]. Regarding the *perception of change*, individuals embracing holistic thinking styles tend to view phenomena as dynamic and nonstatic. They anticipate a continuous state of change due to the intricate patterns of interactions among various elements. Conversely, individuals with analytic thinking styles perceive most objects as independent entities, leading to the belief that the fundamental nature of an object remains relatively stable over time and is not significantly influenced by external factors [36,39]. When confronted with *contradictory* opposites, holistic thinkers tend to seek a middle ground that represents a compromise between the two opposing viewpoints. To the contrary, the formal logic approach of analytic thinkers compels them to resolve contradictions by selecting one of the two opposing propositions [35]. The analytic cognitive style is predominant in Western societies, whereas the holistic cognitive style is more prevalent in Eastern cultures [40].

Previous research indicates that consumer thinking styles, characterized as either holistic or analytic, play a significant role in shaping the evaluation of objects in relation to their environmental or contextual cues [16,41]. For instance, in a study by Zhu and Meyers-Levy (2009), individuals with a holistic thinking style tended to view an object and the displaying table as integral components of a larger whole [42]. In contrast, those with an analytic thinking style perceived the product and table as distinct pieces of information during product evaluation. Building on this, Monga and Williams (2016) found that holistic thinkers, emphasizing context, align their product evaluations with the attributes of the table surface [43]. This means that they perceive a neutral item as modern when placed on a modern glass surface and less modern when placed on a wood surface. Analytic thinkers, however, isolate objects and produce contrasting evaluations, viewing neutral items as more modern when placed on wood rather than on glass. Additionally, Monga and John (2007) demonstrated that individuals from Eastern cultures, often associated with holistic thinking, are more prone to recognizing connections between brand extensions and their parent brands (contextual cues) [16]. Further delving into the wine purchase decision-making process, Choi (2016) discovered that individuals primed with a holistic thinking mindset established broader links between key perceptual elements, leading to intricate interconnected motives, than those primed with an analytic thinking mindset [17].

Recent studies have expanded the exploration of thinking styles into the hospitality domain. For instance, Beekman and Seo (2022) investigated the influence of cognitive styles on consumers' everyday food experiences, revealing that consumers with an analytic thinking style tended to emphasize individual ingredients, separate portions, and key attributes, while those with a holistic thinking style highlighted overall impressions, complete portions, and multiple attributes [44]. Similarly, Alnawas et al. (2023) found that individuals with a secure attachment style and holistic thinking were less affected by the negative impact of hotel service failure severity on brand forgiveness, while those with an anxious attachment style and analytic thinking experienced a heightened negative effect [45]. Analytic thinkers demonstrate greater sensitivity to price discounts and add-on product relevance, whereas holistic thinkers are inclined towards add-on purchases regardless of relevance and are often driven by impulse buying tendencies [46]. This disparity in thinking styles also influences sustainability perceptions, highlighting the necessity for tailored marketing strategies [47]. Despite these findings, there remains a research gap regarding segmentation differences based on analytic vs. holistic thinking in the hospitality industry. This study aims to bridge this gap by examining distinct perception patterns among Chinese and North American travellers through the lens of analytic vs. holistic thinking.

3. Method

3.1. Selecting travel websites

Online platforms, such as TripAdvisor, Agoda, Booking.com, and Ctrip.com, offer valuable user-generated content for conducting consumer behaviour research. For this study, TripAdvisor was chosen due to its extensive reviews of Chinese hotels from customers worldwide, which aligns with the study's objectives. TripAdvisor features diverse hotel types in major travel destinations such as Beijing, Shanghai, and Chengdu, with reviews available in multiple languages, including Chinese, English, German, and French. The platform's data, which is sourced from millions of users, cover various aspects and serve as a robust resource for tourism and hotel research [46]. TripAdvisor boasts a broader global user base than other Chinese websites [48]. User reviews not only capture cognitive

dimensions such as room attributes, services, and location but also reveal diverse perception styles. This abundance of online data offers ample material for an in-depth exploration of customer perception patterns [49].

3.2. Collecting the data

This study employed online reviews from TripAdvisor travellers for data analysis. First, the research focused on Hangzhou, known as a premier domestic traveller destination in China, as the context. Hangzhou attracts a considerable number of both domestic and international travellers and boasts a well-developed hotel industry. Second, the study employed TripAdvisor's hotel type criteria to select budget, mid-range, and luxury hotels. Ultimately, the top 10 most popular hotels from each category (30 in total) were chosen for analysis; these included travellers from China, North America, Europe, Oceania, Southeast Asia, and Africa. To ensure data validity, this study concentrated on the two regions with the largest sample sizes (China and North America) (Table 1 and 2). The analysis encompassed a total of 7079 online reviews (6090 in Chinese and 989 in English).

3.3. Analysing the data

The data analysis in this study followed a four-stage process (depicted in Fig. 1). Initially, due to the extensive unstructured data from online reviews, Python was employed to collect and perform textual mining. Tailored programs facilitated the acquisition of Chinese and North American travellers' reviews for the 30 hotels. First, a word frequency analysis was conducted. By removing words that did not provide meaningful information, the most frequently mentioned words were extracted and listed for both Chinese and North American travellers (see Table 3 and 4).

Second, the LDA method was used in the textual analysis to extract the most relevant themes for both Chinese and North American travellers' online reviews. The LDA topic model, an unsupervised machine learning technique, unveils hidden thematic information within extensive document collections or corpora. LDA operates as a three-layer Bayesian probability model, with documents representing topic probability distributions and topics embodying word probability distributions. Regarding the word, topic, and document layers, LDA incorporates document-topic and topic-word probability distributions. The latter showcases words and their relevance to topics, thus revealing topic structures. Document-topic probability distributions yield document weights under each topic, where higher weights signify stronger topic presence [50–53]. Unlike conventional manual coding, LDA analyses the clustering and extracts potential topics from sizable text data autonomously. Perplexity is a metric that assesses the model's ability to effectively represent or replicate the observed data, and coherence quantifies the semantic similarity among highly rated words within a given topic [50].

We implemented the LDA model using Python and used perplexity and coherence as the metrics to determine the optimized number of topics in the LDA results. The LDA process underwent multiple iterations, with manual scrutiny aimed at optimizing the number of topics by adhering to the standard of minimizing redundancy among topics while ensuring sufficient diversity and heterogeneity. Ultimately, nine topics were identified for the optimal interpretation of both Chinese and North American travellers' textual reviews (Fig. 2 and 3).

Finally, we conducted manual coding using content analysis on a subset of reviews to delve deeper into insights and uncover latent themes beyond those identified through automatic coding. Grounded theory was employed for the manual coding, given its widespread use in exploratory studies to unearth underlying themes in qualitative data and to develop theories from the data [51]. First, the longest 900 texts were selected from Chinese tourists and North American tourists, as longer reviews typically provide more detailed descriptions than shorter reviews. Second, each set of 900 reviews was divided into 600 reviews and 300 reviews. Each set of 600 reviews was subjected to open coding, and then, the reviews related to the guests' perceptions were identified.

To ensure reliability, two researchers independently coded each set of reviews and subsequently compared their results and resolved discrepancies through discussion until consensus was reached. To ascertain data saturation, the additional sets of 300 reviews were coded, with no new themes emerging. Finally, through selective coding, we compared the differences in perception patterns between Chinese and North American guests (Fig. 4).

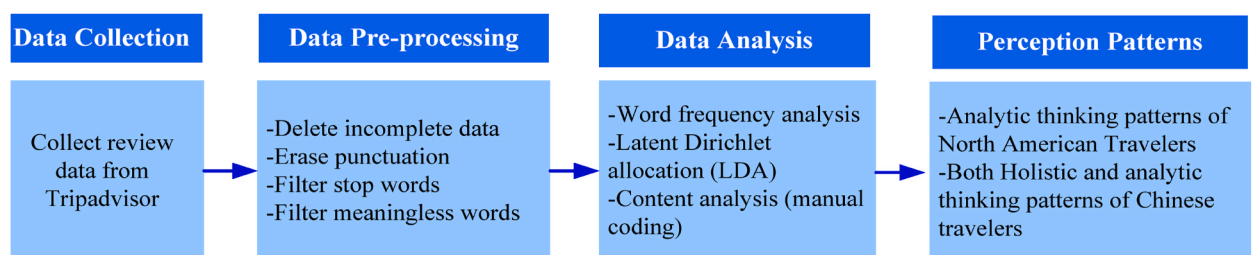


Fig. 1. Workflow of data processing and analysis.

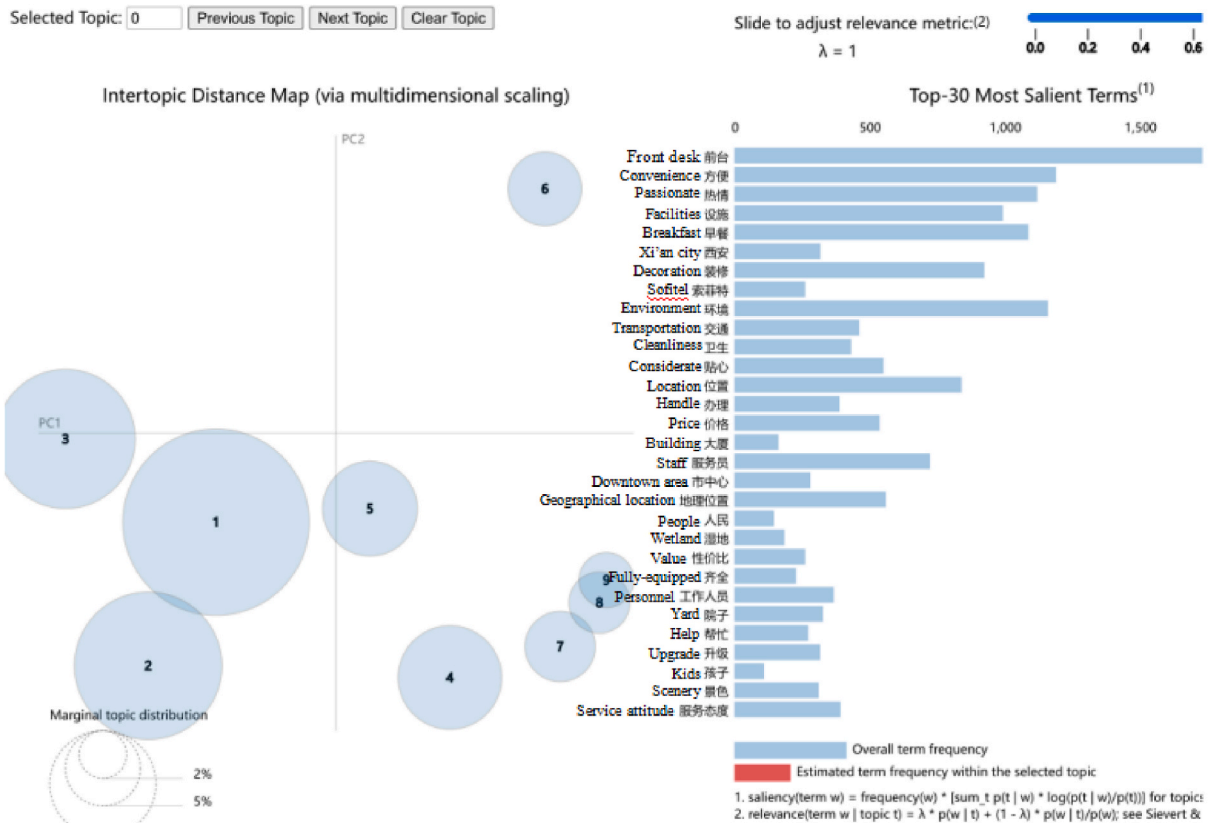


Fig. 2. Nine topics identified from Chinese travellers' reviews.

4. Results

4.1. Word frequency analysis

Tables 3 and 4 show the 30 most frequent words (nouns, verbs, and adjectives) used by Chinese and North American travellers in their reviews of hotels. In the experience of Chinese travellers, “room” appeared 4832 times and was the most common of the top 30 nouns. Room-related nouns such as “facility”, “design”, “decoration”, “style”, “traveller room”, and “hygiene” appeared 1005, 932, 908, 828, 565, and 418 times, respectively, suggesting that Chinese travellers tend to focus on holistic elements. The noun “bed”, which appeared 412 times, also simultaneously embodies analytical thinking. In the experience of North American travellers, “room” appeared 3824 times and was ranked first among the top 30 nouns. Room-related nouns such as “bathroom”, “bed”, “floor”, “shower”, and “water” appeared 491, 432, 420, 367, and 256 times, respectively, reflecting North American travellers' analytic thinking style.

“Service” and “staff” ranked second and appeared 4471 times and 1705 times, respectively, in Chinese and North American travellers' hotel experience. Compared to nouns related to “staff”, such as “service” and “English”, those associated with “service” particularly underscored the importance of “service attitude” by focusing on interactions between travellers and waiters or waitresses. This highlights a tendency towards a more holistic thinking style. The remaining nouns in Table 3, such as “environment” and “overall”, suggested Chinese travellers' holistic thinking style; “location”, “breakfast”, “restaurant”, “price”, and “transportation” also reflected the analytic thinking of Chinese travellers. The remaining nouns in Table 4, including “breakfast”, “location”, “food”, “city”, “bar”, “street”, “style”, etc., mainly reflected North American travellers' analytic thinking style.

Among the top 30 verbs, Chinese travellers were inclined to emphasize interactions between travellers and waiters or waitresses, such as the most frequently mentioned verb (verb phrase) “check in”. Other verbs related to interaction were “recommend”, “introduce”, “thank”, “help”, “check out”, “arrange”, “upgrade”, “welcome”, “greet”, “suggest”, etc. The second most mentioned verb was “like”, indicating the traveller's satisfaction or degree of liking towards the hotel or its provided services, facilities, and environment. North American travellers most frequently mentioned “stay”, which reflects the duration of the traveller's stay in the hotel. The second most frequently mentioned verb by North American travellers was “walk”, suggesting their emphasis on the distance to airports, subway stations, attractions, and commercial centres. “Feel” ranked third and indicated travellers' feelings or experiences towards the hotel or its provided services, environment, ambiance, etc. Other verbs mentioned by North American travellers reflected travellers' evaluations of staff, such as “recommend”, “help”, “check”, “speak”, “told”, “said”, “provided”, etc.

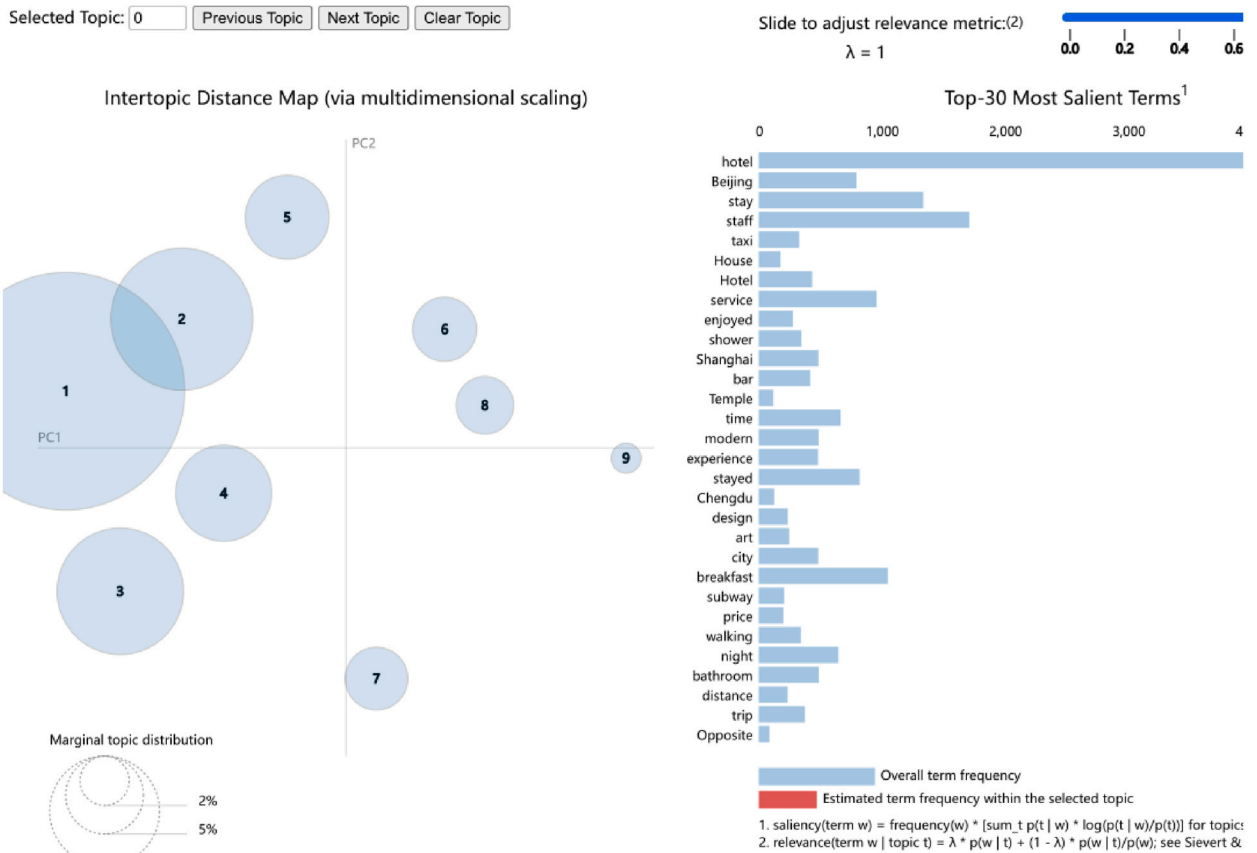


Fig. 3. Nine topics identified from North American travellers' reviews.

Among the top 30 adjectives, “not bad” ranked first and indicated Chinese travellers' overall impressions of a certain hotel. The second most commonly described adjective by Chinese travellers was “enthusiastic”, reflecting their interactions with staff. Other adjectives related to interaction included “thoughtful”, “attentive”, “warm”, “friendly”, “initiative”, “patient”, etc. “Convenient” ranked third. Other words, such as “tranquil”, “beautiful”, and “thorough”, also indicated Chinese travellers' focus on the overall environment. The top three adjectives mentioned by North American travellers were “great”, “good”, and “nice”, which suggested that their evaluations of hotel attributes were based on a textual review. Adjectives such as “helpful” and “friendly” also reflected interactions between staff and travellers. Other adjectives, including “clean”, “small”, “large”, “spacious”, “big”, “huge”, “delicious”, “new”, “far”, “near”, etc. suggested that travellers concentrated on detailed attributes.

The results of the frequency analysis leverage empirical data to illuminate cognitive styles influenced by cultural backgrounds, enhancing our understanding of cross-cultural consumer behaviour in a concrete, quantifiable manner. These findings offer insights into how Chinese and North American tourists prioritize and value different aspects of their travel experiences.

4.2. Topic modelling

Automatic coding with LDA identified nine topics that appeared in both the Chinese and North American reviews. Topics were labelled based on the top 30 most relevant words for each topic. Table 5 illustrates the nine topics identified from Chinese travellers' reviews and their representative keywords, which are ranked by the proportion of each topic. Among the nine topics, *travel, leisure and accommodation* had the largest proportion, representing 30.8 % of the total reviews and reflecting both holistic and analytic thinking styles. For instance, related words such as “vacation”, “beautiful scenery”, “traveller attractions”, “stroll around”, “ancient town”, and “ancient charm” reflected their attention to the field (environment) and a holistic thinking style, and words such as “room rate”, “bathtub”, and “window” indicated their focus on attributes and an analytic thinking style.

The topics of *nature and environment* (19.3 %), *front desk service* (4.8 %), and *travel routes and scenic spot areas* (4.4 %) mainly represented a holistic thinking style. *Nature and environment* contained the words “wetland”, “environment”, “nature”, “park”, and “ecological environment”, suggesting Chinese travellers' attention to the field. *Front desk service* contained words such as “enthusiastic”, “thoughtful”, “patient”, “kind”, “attentive”, and “initiative”, which highlighted the interactions between staff and travellers. *Travel routes and scenic spot areas* attracted Chinese travellers' attention to the field. The topics of *convenience and facilities* (17.2 %),

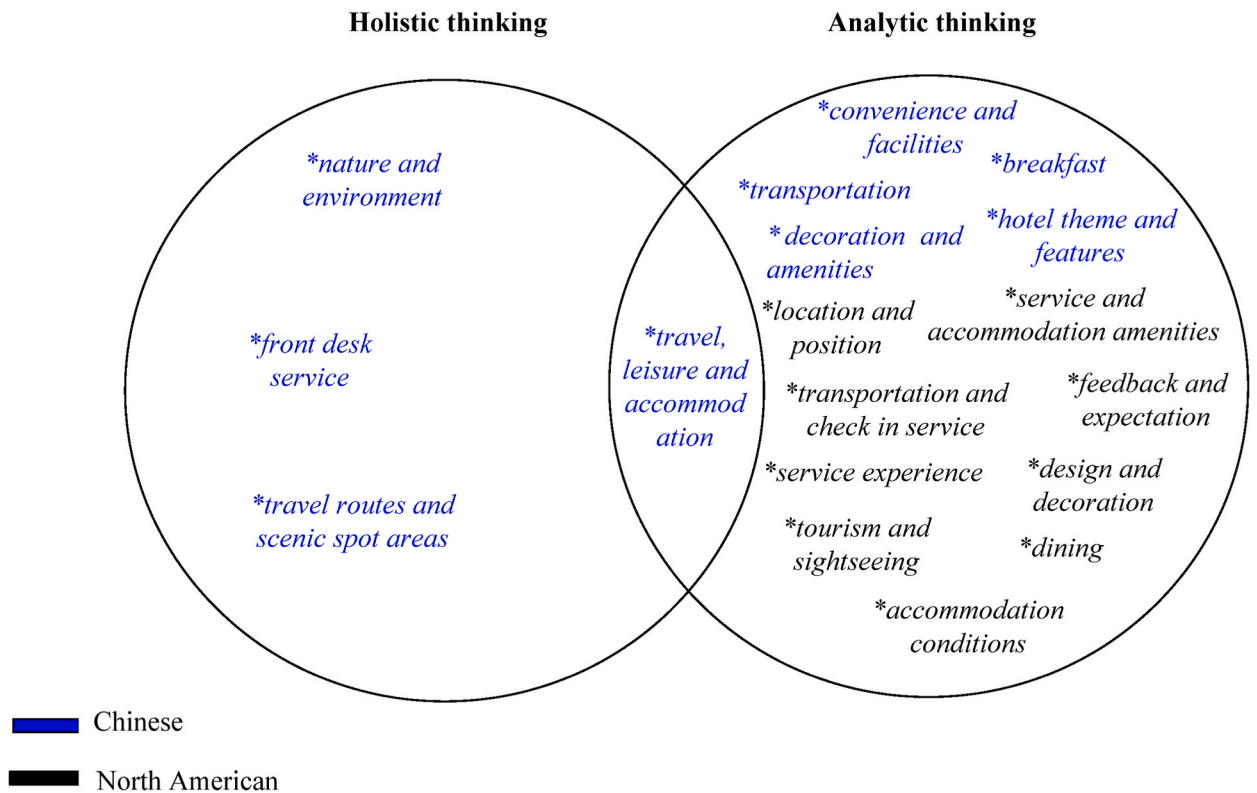


Fig. 4. Mapping of Chinese and North American travellers' perception patterns.

Table 1

Features of Chinese travellers' textual reviews.

Item	Frequency					
	Budget Hotel	(%)	Mid-Range hotel	(%)	Luxury Hotel	(%)
Score						
1	2	0.65	14	1.70	31	0.63
2	4	1.30	9	1.09	21	0.42
3	49	15.91	42	5.11	42	0.85
4	114	37.01	248	30.17	139	2.80
5	139	45.13	509	61.92	4727	95.30
Trip type						
Travelled as a couple	31	10.06	77	9.37	603	12.16
Travelled solo	39	12.66	95	11.56	835	16.83
Travelled with friends	93	30.19	142	17.27	1185	23.89
Travelled with family	37	12.01	172	20.92	1121	22.60
Travelled on business	108	35.06	336	40.88	1216	24.52
Year of review						
2006–2010	172	55.84	205	24.94	7	0.14
2011	6	1.95	4	0.49	0	0.00
2012	2	0.65	5	0.61	2	0.04
2013	7	2.27	4	0.49	2	0.04
2014	5	1.62	15	1.82	13	0.26
2015	7	2.27	9	1.09	19	0.38
2016	4	1.30	24	2.92	22	0.44
2017	3	0.97	26	3.16	54	1.09
2018	4	1.30	29	3.53	400	8.06
2019	67	21.75	106	12.90	1163	23.45
2020	12	3.90	23	2.80	645	13.00
2021	17	5.52	70	8.52	333	6.71
2022	2	0.65	165	20.07	1418	28.59
2023	0	0.00	137	16.67	882	17.78

Table 2
Features of North American travellers' textual reviews.

Item	Frequency					
	Budget Hotel	(%)	Mid-Range hotel	(%)	Luxury Hotel	(%)
Score						
1	1	2.78	4	2.05	4	0.53
2	3	8.33	3	1.54	20	2.64
3	6	16.67	17	8.72	54	7.12
4	7	19.44	55	28.21	163	21.50
5	19	52.78	116	59.49	517	68.21
Trip type						
Travelled as a couple	6	16.67	40	20.51	177	23.35
Travelled solo	12	33.33	11	5.64	32	4.22
Travelled with friends	9	25.00	16	8.21	47	6.20
Travelled with family	6	16.67	48	24.62	173	22.82
Travelled on business	3	8.33	80	41.03	329	43.40
Year of review						
2006–2010	5	13.89	4	2.05	44	5.80
2011	7	19.44	5	2.56	54	7.12
2012	3	8.33	10	5.13	67	8.84
2013	1	2.78	11	5.64	64	8.84
2014	3	8.33	30	15.38	62	8.18
2015	6	16.77	23	11.79	89	11.74
2016	7	19.44	36	18.46	91	12.01
2017	3	8.33	31	15.90	135	17.81
2018	0	0.00	26	13.33	82	10.82
2019	1	2.78	17	8.72	63	8.31
2020	0	0.00	1	0.51	4	0.53
2021	0	0.00	0	0.00	1	0.13
2022	0	0.00	1	0.51	1	0.13
2023	0	0.00	0	0.00	1	0.13
Country of origin						
The US	27	75.00	170	87.18	682	89.97
Canada	9	25.00	25	12.82	76	10.03

Table 3
The Top 30 nouns, verbs, and adjectives that appear in Chinese travellers' reviews.

No	Noun	Freq.	Verb	Freq.	Adjective	Freq.
1	room	4832	check in	2829	not bad	2481
2	service	4471	like	1403	enthusiastic	1283
3	feeling	2860	recommend	970	convenient	1278
4	waiter/waitress	2338	dine	841	comfortable	1486
5	front desk	2263	introduce	559	tranquil	751
6	location	1526	thank	513	clean	689
7	environment	1332	help	511	thoughtful	656
8	experience	1173	travel	491	satisfied	544
9	breakfast	1140	look forward to	425	free	543
10	facility	1005	check out	421	huge	528
11	design	932	arrange	383	great	526
12	decoration	908	hope	379	excellent	490
13	style	828	upgrade	343	beautiful	431
14	service attitude	824	book	341	worthwhile	397
15	restaurant	793	tourism	328	attentive	341
16	feature	682	vacation	304	happy	338
17	inn	680	play	285	delicious	337
18	traveller	645	check out	281	warm	327
19	lobby	630	be located	245	elegant	274
20	traveller room	565	enjoy	230	friendly	242
21	price	529	welcome	216	thorough	238
22	transportation	500	greet	195	initiative	234
23	hygiene	418	shop	194	complete	231
24	bed	412	go on a business trip	191	praise	228
25	manager	411	decorate	180	expensive	228
26	taste/flavour	401	take a taxi	160	patient	226
27	problem	388	go out	160	modern	220
28	overall	373	make a phone call	148	professional	217
29	bar	369	enter	147	relaxed	213
30	scenery	365	suggest	141	surprised	194

Table 4

The Top 30 nouns, verbs, and adjectives that appear in North American travellers' reviews.

No	Noun	Freq.	Verb	Freq.	Adjective	Freq.
1	room	3824	stay	2521	great	1596
2	staff	1705	walk	970	good	1161
3	restaurant	1183	feel	508	nice	937
4	breakfast	1091	recommend	499	comfortable	719
5	service	963	help	393	helpful	636
6	location	849	located	383	clean	558
7	area	769	look	361	friendly	520
8	place	692	see	305	beautiful	489
9	food	650	enjoyed	286	excellent	483
10	experience	582	found	264	modern	466
11	English	516	went	249	small	436
12	city	507	check	247	large	411
13	bathroom	491	visit	246	wonderful	390
14	desk	437	loved	221	spacious	317
15	bed	432	took	221	amazing	310
16	bar	427	booked	213	lovely	263
17	floor	420	work	206	quiet	259
18	street	411	know	202	perfect	247
19	trip	398	speak	200	local	235
20	shower	367	come	199	big	223
21	taxi	340	arrived	194	western	211
22	lobby	340	wanted	191	boutique	194
23	shopping	326	return	185	huge	188
24	courtyard	318	asked	165	fantastic	188
25	buffet	317	told	163	delicious	187
26	art	280	use	163	new	178
27	dinner	270	said	154	different	176
28	tea	267	provided	151	far	176
29	style	260	access	147	near	172
30	water	256	going	147	traditional	164

Table 5

Topic summary based on LDA analysis (Chinese travellers).

No	Topic label	Keywords	Proportion
1	travel, leisure and accommodation	vacation, beautiful scenery, traveller attractions, small bridge flowing water, wonderful, leisure, tea tasting, candy, mood, performance, party, memory, crowd, stroll around, ancient town, ancient charm, room rate, bathtub, window, Jinji Lake, bonfire, outside the window, stay	30.80 %
2	nature and environment	wetland, environment, nature, park, ecological environment, air, season, Jiangnan water town, white cloud, scenic view, garden, landscape, paradise	19.30 %
3	convenience and facilities	convenient, facilities, transportation, soundproofing, space, parking, parking lot, equipment, supporting, supplies, modern, internet access, leisure, entertainment, walking, going out, buffet, bedding, washroom	17.20 %
4	breakfast	breakfast, fruit, chocolate, Western food, Chinese-Western food, variety, quality, fresh, milk	9.50 %
5	transportation	shuttle bus, ticket, direct bus, traffic jam, train station, in the city, high-speed train, public transportation)	7.90 %
6	front desk service	front desk, enthusiastic, thoughtful, handle, help, upgrade, service attitude, check-out, convenient, concierge, patient, kind, reception, attentive, initiative, inquire, solve, attentive service, timely, make travellers feel at home, answer, take care of, enter	4.80 %
7	travel routes and scenic spot areas	train station, Bell Tower, Terracotta Warriors, Drum Tower, Hui people, provincial government, France, building, walking, underground passage, theatre, city wall, a street, city centre, snack street	4.40 %
8	hotel theme and features	manor, hostel, Kamba, Arro, backyard, village, Four-Faced Buddha	3.30 %
9	decoration and amenities	decoration, courtyard, lobby, restroom, bathtub, bathroom, window, on the bed, style, architecture, space, layout, sofa, furniture, house, floor, corridor, bedroom, shower, elevator, second floor, hall, balcony, refrigerator, decoration, terrace	2.70 %

breakfast (9.5 %), transportation (7.9 %), hotel theme and features (3.3 %), and decoration and amenities (2.7 %) mainly emphasized detailed attributes, representing an analytic thinking style.

Table 6 illustrates the nine topics identified from North American travellers' reviews and their representative keywords, which are ranked by the proportion of each topic. Each topic and its related words mainly represent the analytic thinking of North American travellers. For instance, *service and accommodation amenities* have the largest proportion, representing 46.6 % of the total reviews. Related words include "staff", "owner", "suites", "checking", "management", "assistant", "switches", "bed", "pillows", "bathroom", and "shower". The second topic is *service experience*, which represents 13.2 % of the total reviews and contains the words "service", "experience", "excellent", and "wonderful".

Location and position (7.6 %) stand out as the third topic, in which "location", "city", "street", "close", "Hutong", and "Forbidden City" are highlighted by North American travellers. *Feedback and expectation* (6.7 %) refers to the comments and opinions provided by

Table 6
Topic summary based on LDA analysis (North American travellers).

No	Topic label	Keywords	Proportion
1	service and accommodation amenities	staff, owner, suites, checking, management, assistant, switches, warm, spacious, quiet, bed, pillows, bathroom, shower, view, modern, comfortable	46.60 %
2	service experience	service, experience, excellent, wonderful, top, recommended, attentive, helpful, friendly, exceptional, incredibly, perfect	13.20 %
3	location and position	location, city, street, close, Hutong, Forbidden City	7.60 %
4	feedback and expectation	client, hope, feedback, apologetic, trust	6.70 %
5	tourism and sightseeing	Bund, Shanghai, Lijiang, city, Baisha, trip, tour, sightseeing, travel	5.80 %
6	dining	food, restaurant, bar, coffee, tea, delicious, dinner, breakfast	3.40 %
7	transportation and check in service	taxi, driver, trip, airport, subway, walk, train, taxis, running, price rate, RMB, money, cash, bills, currency, fee, booked, reservation arrival, arrived, check-in, upgrade, speak, English, Chinese, phone	3.20 %
8	design and decoration	design, modern, gorgeous, art, cool, tasteful, unique, artwork, gallery, elements, amazing, outstanding, impressed, incredible, remember, beautiful, luxurious	2.70 %
9	accommodation conditions	floor, noise, window, space, dirty, view, size, clean	0.70 %

travellers regarding various aspects of a hotel's services, facilities, and environment, as well as the anticipated standards and experiences they hope to encounter during their stay, including the related words "client", "hope", "feedback", "apologetic", "trust", etc. *Tourism and sightseeing* (5.8 %) involve the words "trip", "tour", "sightseeing", "travel", etc. *Dining* (3.4 %) is represented by the keywords "food", "restaurant", "bar", "coffee", "tea", "delicious", "dinner", "breakfast", etc.

Transportation and check in service (8.6 %) refers to the provision of transportation options and the assistance offered during the check-in process at a hotel, including the keywords "taxi", "driver", "trip", "airport", "subway", "price rate", "English", etc. *Design and decoration* (2.7 %) refers to the aesthetic and stylistic aspects of the hotel's interior and exterior spaces, represented by the keywords "design, modern", "gorgeous", "art", "cool", "tasteful", "unique", "artwork", "gallery", etc. *Accommodation conditions* (0.7 %) is the last topic identified and comprises the keywords "floor", "noise", "window", "space", "dirty", "view", "size", and "clean".

The LDA reveals that Chinese travellers exhibit a blend of holistic and analytic thinking. In contrast, North American travellers predominantly demonstrate analytic thinking, as indicated by their emphasis on detailed attributes of service and accommodations. This analysis provides a clearer picture of how cognitive processing influenced by cultural background affects tourist behaviour and preferences. The findings from the LDA topic analysis help deepen our understanding of consumer decision-making in cross-cultural contexts, especially in understanding how holistic versus analytic processing impacts the evaluation of travel-related experiences.

4.3. Manual coding

Content analysis with open coding resulted in 9 themes and 19 subthemes. [Table 7](#) shows all themes and subthemes and one quote from the reviews for each subtheme. *Service* included attitudes, professionalism and English levels. With respect to the subthemes of attitude and professionalism, Chinese travellers give more attention to interactivity. The subtheme English level primarily appeared in the reviews of North American travellers. *Room* mainly referred to the room amenities of a hotel. Both Chinese and North American travellers tended to focus on detailed attributes. *Environment* included the surrounding area and the physical environment of the hotel. The surrounding area showed Chinese travellers' attention to the field and North American travellers' emphasis on the convenience and richness of the surrounding environment of the location. The physical environment of the hotel reflected Chinese travellers' tendency to interact with the environment and North American travellers' appreciation for hotel design and decoration.

Location included geographical location, convenience, and accessibility. Compared to North American travellers, Chinese travellers tended to sense the atmosphere and interact with the environment more when arriving at a certain hotel and experiencing a geographical location. The focus on convenience and accessibility was similar for both Chinese and North American travellers, mainly in terms of the distance from scenic spot areas, stations, business centres, etc. *Food* incorporated dishes and tastes, and both Chinese and North American travellers gave attention to the variety of dishes and tastes of food. *Design* consisted of two dimensions: public space design and room design. Compared to North American travellers, Chinese travellers were more inclined to sense the atmosphere and interact with the environment when experiencing public space design and room design. Chinese and American travellers had a similar focus on details across the subthemes of *cleanliness, value, and entertainment*.

By combining the coding results of the two approaches, Chinese and North American travellers' thinking styles in the hotel context were identified. Manual coding demonstrated that Chinese travellers have both holistic and analytic thinking styles in the hotel context. For instance, their attention to the field and their interaction with staff and the environment in the subthemes of *service (attitude and professionalism), location (geographical location), environment, and design* reflected a holistic thinking style. Chinese travellers also mainly concentrated on the key elements of the subthemes of *location (convenience, accessibility), room (room amenities), food, cleanliness, value, and entertainment*, which indicated their analytic thinking style. Meanwhile, North American travellers' consistently showed attention to the key elements across all themes.

The findings from automatic coding also showed relevant features. For Chinese travellers, *travel, leisure and accommodation* accounted for the largest proportion, representing 30.8 % of the total reviews and reflecting both holistic and analytic thinking styles. The topics of *nature and environment* (19.3 %), *front desk service* (4.8 %), and *travel routes and scenic spot areas* (4.4 %) mainly suggested holistic thinking. The topics of *convenience and facilities* (17.2 %), *breakfast* (9.5 %), *transportation* (7.9 %), *hotel theme and features* (3.3 %), and *decoration and amenities* (2.7 %) mainly emphasized detailed attributes, indicating an analytic thinking style. For North

Table 7

Themes and subthemes of Chinese and North American travellers' reviews by manual coding.

Themes	Subthemes	Review quotes (Chinese travellers)	Review quotes (North American travellers)
service	attitude	The most commendable service, from check-in to departure, was warm and thoughtful. Special recognition goes to Clara at the front desk for recommending us excellent dining options; they were fantastic. We will definitely stay here again if given the chance.	The very young staff were competent, earnest, attentive and friendly.
	professionalism	The hotel staff was warm and friendly, providing professional service that made me, a stranger, feel loved here.	The very professional, capable, pleasant and enjoyable front desk staff will take care of whatever you need without a second thought.
	English level	——	people at desk speak great English and they helped in all my needs from booking a car to have a massage!
room	room amenities	There are many places to store luggage (with 18 hangers!), adjustable lighting, a minibar, excellent coffee and tea, fresh milk, great sound system, high-quality bed linens, a writing desk, and various plugs and sockets. Walking on the wooden floors feels great. The very large bathroom has a bathtub resembling a large wooden box, and soaking in it is very comfortable with ample toiletries.	The rooms are clean and modern and very attractive, and spacious enough with a kind of open air bathroom area that it almost feels like a suite.
environment	surrounding area	The surrounding environment is excellent, as its in Longjing Village with a high forest coverage and fresh air, making it very quiet at night.	Step outside and you are surrounded by the ultra chic designer shops and restaurants of this urban mall.
	hotel physical environment	The hotel itself is located in a scenic area, so even staying inside the hotel's courtyard is enjoyable. We even saw people fishing in the hotel's lake, which was very comfortable.	We really liked the beautiful Chinese style (NanXi) environment.
location	geographical location	The location, quiet yet bustling, made me feel like I'd entered a paradise, and the design style full of scholarly atmosphere made me and my friends very relaxed.	Small 'boutique' hotel in a good location very near to the Forbidden City.
	convenience	The hotel is located in the ancient city, making it very comfortable to stroll around. It's very convenient to go to the Wooden Mansion Square, just a five or 6-min walk.	The location is ideal with wonderful shops and restaurants close by.
	accessibility	Located in the bustling city center, close to the train station, with a 30–40 min drive to the airport.	The location is also just a few blocks away from the nearest subway station, I walked the few blocks but if you are tired there are PLENTY of pedicabs that will ask you if you want a ride the entire way.
food	dishes	The hotel offers a rich breakfast with a mix of Chinese and Western cuisine.	Breakfast is quite good, mostly Chinese food, but has eggs, sausages, English bacon
	taste	Especially commendable is the sherry trifle and spring chicken at the cafe.	The food was presented fine and it was very tasteful.
design	public space design	The lobby design is unique, and the library design is impressive, with many valuable books. It's suitable for a leisurely vacation.	This is a well-appointed, comfortable, well-designed hotel for business travellers including the public spaces and the junior suite we stayed in
	room design	The rooms are designed with unique features, all in the style of the Naxi architecture, with an ancient charm.	The room design was modern and architected to anticipate my every need and move – from the layout to the light switches to the blinds.
cleanliness	room cleanliness	The hotel is relatively upscale, with good software and hardware. The rooms are very clean, the beds are comfortable, and the quality is good.	The room was spacious, comfortable and spotlessly clean.
value	room rate	It's right next to Metro Line 2, and the city center and airport are very close, making it very convenient for transportation. Considering its location, the hotel's prices are reasonable.	Your room rates include a fantastic breakfast, afternoon tea (which is very beautifully laid out), and 2 coupons for drinks during Happy Hour.
	additional price	The hotel's spa is said to be excellent and famous, with many people coming here specifically for it, although it's not cheap.	The spa was a bit overpriced and always empty but the staff was amazing.
	worth of price (room)	The room rates are also quite reasonable.	great service, wonderful breakfast was included, good location, worth the price and would stay again!
	worth of price (additional)	The included spa is just a packet of herbal medicine for soaking in the room, which was disappointing and not worth the price.	Dinner there was of very high quality, though a little over priced compared to nearby alternatives.
entertainment	leisure activity	The hotel has both Chinese and Western restaurants, a library, and you can also try the English afternoon tea or Chinese tea and snacks at the lobby bar, or enjoy the hotel's spa.	The swimming pool is brilliant; first indoor infinity pool I've ever seen.

American travellers, all nine topics, including *service and accommodation amenities, service experience, location and position, feedback and expectation, tourism and sightseeing, dining, transportation and check in service, design and decoration, and accommodation conditions*, primarily indicated analytic thinking.

Manual coding helped confirm and deepen the insights gained from the word frequency and LDA analyses regarding the differences

in the holistic and analytic thinking styles. By presenting specific quotes and examples for each subtheme, manual coding offered concrete evidence to support the thematic distributions identified by LDA. This assists in verifying the accuracy of the automated coding methods and ensures that the interpretations are grounded in actual data. Combining both methods provides a more robust analysis, where manual coding adds depth and qualitative insights to the quantitative breadth of LDA. This approach confirms that both the macro patterns and the micro details are considered, leading to a richer, more accurate portrayal of cultural differences.

5. Discussion

5.1. Theoretical implications

Theoretically, the study contributes to the literature in two ways. First, the study extends the existing knowledge of hotel travellers' perceptions of attributes by adopting a word frequency analysis, LDA topic modelling analysis, and manual coding. Travellers' perceptions of hotel attributes have been extensively explored in prior research. For instance, Zhou et al. (2014) categorized hotel attributes as satisfiers, dissatisfiers, and bidirectional factors [48]. Lee et al. (2017) and Davras and Caber (2019) investigated the asymmetric relationships between service quality attributes and satisfaction [26,54]. However, this study stands out as a pioneering effort to reveal the perception attributes through mixed methods, demonstrating more comprehensive themes for both Chinese and North American travellers.

Second, the study indicates that North American travellers leaned towards analytic thinking, whereas Chinese travellers showcased a blend of holistic and analytic thought processes. North American travellers consistently exhibited an analytic thinking style across different themes identified by a word frequency analysis, LDA topic modelling analysis, and manual coding. This observation aligns with previous findings, as exemplified by the works of Yama and Zakaria (2019) [55].

Chinese travellers' cognitive patterns appeared to be more intricate than those of their North American counterparts. Interestingly, the perception patterns of Chinese travellers encompassed a blend of holistic and analytic thinking. The manual coding results showed that the subthemes of *service (attitude and professionalism)* and *location (geographical location)* and the themes of *environment and design* reflected a holistic thinking style. The subthemes of *location (convenience, accessibility)* and the themes of *room (room amenities), food, cleanliness, value, and entertainment* identified their analytic thinking style. The findings from automatic coding also identified relevant features. *Travel, leisure and accommodation* demonstrated both holistic and analytic thinking styles. The topics of *nature and environment, front desk service, and travel routes and scenic spot areas* mainly represented a holistic thinking style.

The topics of *convenience and facilities, breakfast, transportation, hotel theme and features, and decoration and amenities* indicated an analytic thinking style. This outcome diverges significantly from previous research, such as the findings of Senzaki et al. (2014) [56], who suggested that individuals from East Asian cultures, including China, Japan, and Korea, tend to exhibit a proclivity towards holistic perceptual styles. This study introduces a new dimension to consumer behaviour research and adds a novel perspective to investigations of perception within the hospitality domain.

This research enriches the field of cross-cultural and tourism studies by quantitatively demonstrating how cultural thinking styles can be inferred from user-generated content. This approach opens new avenues for using natural language processing and other computational techniques to analyse large datasets for cultural research, thereby providing a more scalable and nuanced understanding of global tourist behaviour.

5.2. Pragmatic implications

The practical implications derived from these findings are significant for hospitality industry management, branding, and marketing. They provide a broader scope for managers to formulate strategies grounded in an analytic-holistic thinking perspective. Although the previous literature has extensively explored perceptions and their dimensions, understanding perception patterns in a cross-cultural context offers a more comprehensive approach to deciphering hotel travellers' behaviour. The outcomes underscore that North American travellers predominantly exhibit an analytical thinking pattern. It is imperative for hotel managers to consider travellers' thinking patterns. For instance, hotel managers should pay meticulous attention to details and specific influencing factors (such as *service and accommodation amenities, service experience, location and position, feedback and expectation, tourism and sightseeing, dining, transportation and check in service, design and decoration, and accommodation conditions*) to increase North American travellers' perceptions.

In contrast, the perception pattern of Chinese travellers is notably intricate. It demonstrates a propensity to blend both analytical and holistic thinking patterns, which marks a significant departure from prior research. To enhance the satisfaction of Chinese travellers, hotel managers should consider their perception pattern, which inclines towards a holistic orientation, such as field dependence and interaction with the environment and staff. It is imperative for hotels to optimize interpersonal communication between staff and clientele to facilitate elevated interaction quality. Strategic considerations pertaining to site selection should prioritize the environmental context. Architectural and design elements within hotels should evoke atmospheric ambiance, which is conducive to sensory stimulation and guest resonance. Meanwhile, the provision of convenience and accessibility within hotel premises, including well-appointed accommodations, gastronomic diversity, and stringent cleanliness standards, alongside an extensive array of entertainment amenities, are also imperative, all while ensuring a commendable cost-performance ratio.

5.3. Limitations and future research

This study is not without its limitations. First, the dataset was drawn from 9196 online reviews that focused exclusively on Chinese and North American travellers. The perspectives of travellers from Europe, Oceania, other Southeast Asian regions, and Africa were not incorporated in the analysis of cross-cultural perception patterns. To offer a more comprehensive outlook, future research should encompass diverse global regions and amass a more extensive dataset. Additionally, the disparity in the number of English reviews compared to Chinese reviews warrants attention. Future investigations should strive for a more balanced data representation. Moreover, relying on secondary data from online platforms introduces potential inherent limitations. Subsequent studies should prioritize the collection of primary data to further validate the findings. Finally, this study's scope is confined to hotel perception patterns, and future research should explore the connections between perception patterns and variables such as satisfaction, decision-making processes, revisit intentions, and motivation.

6. Conclusion

This study examined the perceptions of hotel practices among Chinese and North American travellers and assessed the differences in cognitive style between these two market segments by adopting a word frequency analysis, LDA topic modelling analysis, and manual coding. In general, North American travellers leaned towards analytic thinking, whereas Chinese travellers showed a blend of holistic and analytic thought processes. Past studies have primarily focused on the dimensions of perception or the associations between perception and customer behaviour variables such as satisfaction, experience, and revisit intention. Grounded in the analytic-holistic thinking perspective, this study offers novel insight into the *epistemological* disparities across cultures within the context of hospitality. Serving as a pioneering effort, this study makes a theoretical contribution to the current understanding of perception and cross-cultural literature.

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Data availability statement

Data associated with our study hasn't been deposited into a publicly available repository. And data will be made available on request.

Ethics statement

Informed consent was not required for this study because it was completed independently by a single author. Review and/or approval by an ethics committee was not needed for this study, because our study belongs to the field of social sciences, and it does not involve experiments on human beings.

CRediT authorship contribution statement

Shun Ying: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.heliyon.2024.e31883>.

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