

Article

Attributes Influencing Visitors' Experiences in Conservation Centers with Different Social Identities: A Topic Modeling Approach

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Abstract: The importance of charismatic flagship species (CFSs) in efforts to raise public awareness of conservation has been widely recognized. However, the effect of differences in social identities on shaping visitors' experiences remains underexplored, although these differences can inform the development of inclusive and culturally sensitive conservation strategies to increase visitors' satisfaction in conservation centers. This study explores how cultural social identities influence visitors' conservation experiences, particularly how the out-group homogeneity effect shapes individuals' perceptions of CFSs. This effect can help to explain why visitors from different cultural backgrounds often perceive CFSs in a homogenized manner. Based on data collected from 6804 online reviews of a giant panda conservation center, this study employs anchored CorEx topic modeling and regression analysis. This research develops a novel framework for understanding how CFSs contribute to visitors' experiences in conservation centers. It reveals that social identities affect interactions not only among people, but also between people and culturally significant animals. These findings offer practical implications for conservation center management.



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Keywords: conservation center; topic modeling; experience attributes; social identity; online review; panda

1. Introduction

Charismatic flagship species (CFSs), such as the giant panda, the African elephant, and the Bengal tiger, are endangered animals that frequently serve as cultural symbols for particular nations. These species are generally large, prominent vertebrates linked to specific habitats and play a vital role in conservation initiatives [1]. Among CFSs, the giant panda is unique. It serves not only as a cultural symbol deeply rooted in Chinese heritage [2], but also as a global icon representing conservation efforts and international diplomacy [3]. Employing CFSs to raise visitors' awareness of conservation not only strengthens efforts to protect other species in the same habitat, but also contributes to achieving broader conservation goals for the entire ecosystem [4]. Visitors' experiences in conservation centers are beneficial for increasing their awareness of wildlife protection [5] and fostering pro-environmental behaviors [6]. Both deepen visitors' understanding of the interconnections between humans and animals [7,8].

Although CFSs can be observed in conservation centers and zoos, the contributions of these two types of institutions to visitors' experiences are substantially influenced by their distinct operational frameworks. In terms of motivations for visiting zoos and aquariums,

many people do not consider acquiring conservation-related knowledge as their primary reason for visiting [9,10]. For example, they may be more motivated by entertainment than education [11]. By contrast, conservation centers are designed to provide environments that closely resemble natural habits (or are located in protected areas), thus enabling visitors to experience a sense of solitude and freedom that can support profound experiential engagement [12]. Previous studies on conservation center visitors have investigated how various factors, such as guided services [13], educational equipment [12], accessibility [14], weather conditions [12], and landscape design [15], affect visitors' satisfaction. However, cultural differences may elicit varying perceptions of CFSs [16], potentially resulting in diverse preferences for the educational and experiential attributes of conservation centers based on different social identities.

Social identity theory (SIT), which explains the effects of different social identities, posits that individuals tend to categorize themselves and others into distinct social groups [17]. This categorization influences individuals' attitudes and behaviors, especially in interactions involving in-group and out-group members. One consequence of this is in-group bias, where individuals favor their own group, often adopting lenient attitudes toward inappropriate behaviors by fellow members [18]. Conversely, the out-group homogeneity effect—another cognitive bias posited by SIT—refers to the tendency to perceive out-group members as more homogeneous and interchangeable than in-group members [19]. In the context of visitors' experiences in conservation centers, these biases may shape how visitors from different cultural backgrounds perceive CFSs. However, because SIT focuses primarily on the dynamics characterizing the relationships among human groups, few studies have extended this theory to encompass nonhuman groups, such as animals. Some studies have employed SIT to explain individuals' attitudes toward animals across different social identities, such as the public's attitudes toward grizzly bears [20], sea turtles [21], and wildlife management decisions [22]. However, these studies have emphasized differences among human groups from a human-centric perspective. Specifically, these studies have examined the influence of in-group (humans) and out-group (other humans) perceptions on individuals' views on wildlife rather than treating wildlife as a separate group. Although Amiot and Bastian expanded the scope of group categorization in SIT to include animals by introducing the concept of "solidarity with animals," they did not distinguish among specific subgroups within the in-group (e.g., different cultural backgrounds or occupational groups) [23]. Instead, they treated "humankind as a whole" as a unified in-group.

In addition, most previous studies on visitors' conservation experiences have employed survey methods to conduct cross-sectional analyses. This approach often requires a trade-off between the costs of data collection and the representativeness of the sample [24]. Online reviews can capture visitors' behaviors, experiences, and sentiments within specific temporal contexts [25,26] and help to mitigate typical issues pertaining to asymmetric information [27]. Therefore, review-based research using topic modeling can provide valuable insights into visitors' conservation experiences. In topic modeling, machine learning algorithms are used to identify patterns and underlying themes within online text data [27–29]. This method not only captures unstructured data, but also provides structured insights into visitors' cultural perceptions of and emotional engagement with CFSs. By extracting and comparing topics across different cultural social identities, topic modeling can reveal whether visitors categorize CFSs as in-group symbols or out-group entities, thereby providing empirical evidence regarding the out-group homogeneity effect. This study focuses specifically on the giant panda as a CFS. The giant panda is expected to elicit different levels of emotional engagement and conservation support depending on visitors' social identities, as shaped by the out-group homogeneity effect.

The research gap addressed in this study pertains to the lack of clear distinctions between in-group (humans) and in/out-group (CFSs) entities in the context of various cultural social identities and the limited exploration of how the out-group homogeneity effect shapes these relationships. Identifying the key attributes of conservation experiences and the relationships between these attributes and visitors' satisfaction through topic modeling could provide empirical evidence that can support efforts to expand the scope of SIT. In light of the research gaps identified in this context, this study aims to achieve the following: (1) to identify the prominent attributes of visitors' experiences in conservation centers, (2) to determine which attributes are correlated with visitors' satisfaction, and (3) to examine whether the out-group homogeneity effect influences visitors' perceptions of CFSs when those species (according to visitors' perceptions) are categorized as belonging to an in-group identity or out-group identity.

This study makes numerous contributions. First, the findings of this study can help researchers and conservation center managers to understand visitors' preferences for CFS attributes and their relationships with cultural differences in the context of conservation experiences based on unprompted data sources. Second, this research expands the scope of SIT by highlighting the influence of the out-group homogeneity effect on visitors' attitudes. It also develops a novel framework for understanding the interactions between human social identities and nonhuman cultural symbols in the context of visitors' experiences in conservation centers. Third, this study provides management strategies that can be used to enhance the educational effect of visitors' experiences in conservation centers.

2. Literature Review

2.1. *Attributes of Visitors' Experiences with Conservation in Conservation Centers*

Although conservation centers and zoos play vital roles in educating visitors about animal conservation through tourism, previous research has rarely clearly distinguished between these two types of location in terms of their contributions to conservation education [5,30,31]. Historically, zoos were primarily established for animal performances and family entertainment [32]. Although zoos have begun transitioning toward protecting animal welfare and providing conservation education to raise public awareness of biodiversity [5,7,33], visitors retain a level of autonomy that empowers them to choose whether to learn conservation-related knowledge during their visits [9]. This autonomy means that the effectiveness of conservation education in zoos depends on the presence of stimuli that affect visitors' choices [34]. The absence of such stimuli affects the learning motivation of visitors during zoo visits and reduces the extent to which conservation knowledge is accepted [35]. Carr and Cohen [36] found that zoos often emphasize entertainment over conservation education, which leads visitors to concentrate more on family bonding and recreation than on animal welfare or conservation [37]. Using exploratory factor analysis, Kaffashi et al. [38] indicated that the appeal of conservation centers lies in enhancing wildlife conservation awareness and providing environmental education experiences. Wilson et al. [39] reported that visitors perceive relevant educational opportunities as the main advantage of conservation centers [39]. Folusade et al. [12] identified adventure, sightseeing, and educational purposes as the primary motivations for visiting these sites [12]. Thus, this study chooses conservation centers as the target subject and further explores the key factors that influence visitors' experiences.

Campos et al. [40] identified "attention" as a crucial influence on visitors' experiences in animal tourism. This factor is shaped by physical participation, psychological engagement, and the interactive environment. Specifically, in conservation centers, physical participation includes close encounters [35,41], observing animal behavior [42,43] and zookeeper behavior [44], and witnessing uncivil behavior from other visitors [45]. Psycho-

logical participation is reflected in emotional experiences, such as maternal love [39,46]. The interactive environment encompasses guided services [13], educational equipment [24], accessibility [15], supporting infrastructure [14], weather [47], and design [5], all of which are provided by conservation centers.

2.2. Effects of Social Identities on Attitudes Toward Characteristic Flagship Species via the Out-Group Homogeneity Effect

Although many studies have examined the attributes that influence visitors' experiences in conservation centers, few have explored these factors from visitors' own cross-cultural perspective. Specifically, limited research has indirectly discussed how visitors from different cultural backgrounds perceive the attributes of conservation centers and how these perceptions affect their tourism experiences [45]. SIT, which plays a significant role in accounting for cross-cultural visitors' behavior [48], explains the genesis of intergroup differentiations that shape part of an individual's self-concept. This self-concept is derived from the individual's knowledge of their membership in a social group (or set of groups), along with the value and emotional significance associated with such membership [49]. SIT posits that these intergroup behaviors, by clarifying intergroup comparisons of beliefs, elicit a perception of affiliation with each group to which one belongs [50]. According to SIT, the self-categorization theory (SCT) holds that the process of understanding social identities aligns with prototypes that exist in the cognitive domain [51]. These prototypes distinguish intergroup differentiations and emphasize out-group homogeneity, i.e., judgments of stereo-typicality [52]. They lead in-group members to categorize others on the basis of a subjective sense of consensus within the in-groups' norms and worldviews [53]. Norms and worldviews in groups are considered closely related to symbolic cultural symbols [54,55]. As a symbolic cultural symbol representing China, the panda plays an important role in influencing this process of "fit" in social identity. The notion of fit, according to which members do not act under prototype conditions, helps other categorizations of members to transition to optimal levels [56]. If a member fails to do so, they are excluded by the "collective self," which differentiates "us" from "them" [57]. In other words, the out-group homogeneity effect emphasizes the different mentalities that people hold toward belonging and non-belonging groups because of the aforementioned factors [58]. This effect is one of the most important perspectives in understanding or predicting the collective behavior of tourists across nationalities [59].

Recent research has reported that the perceived similarity between animals and humans can enhance individuals' identification with animals [23], however, SIT and SCT have traditionally focused on the dynamic relationships among human groups. Specifically, the scope of these theories is limited to interactions between in-groups (humans) and out-groups (humans). Few studies have begun to extend SIT to encompass nonhuman groups such as animals. Amiot and Bastian built on the dimension of solidarity in SIT that influences an individual's psychological bonds with and commitments to other members of their group [60] by introducing the concept of "solidarity with animals" [23]. This concept pertains to the social-identity-related mechanisms that operate between humans and animals, thus treating animals as a distinct social group and systematically examining how social identities that pertain to the gap between "us" (humans) and "them" (animals) affect humans' attitudes and behaviors toward animals. On the basis of their previous research, Amiot et al. proposed three dimensions of human identification with animals: "animal pride," "solidarity with animals," and "human–animal similarity" [61]. "Animal pride" indicates that individuals can directly recognize that they belong to the broader group of animals. This dimension corresponds to SIT's emphasis on individuals' positive feelings toward the group to which they belong and positive evaluations of their group identity [60,62]. "Solidarity with animals" represents a person's psychological connection

and commitment to seeing animals as members of a group. This dimension responds to SIT's focus on individuals' self-involvement in carrying out common actions with those to whom they are committed [57,60]. "Human–animal similarity" represents the cognitive dimension of a person's belief that all animals (including humans) share common traits. This dimension reflects SIT's view of an individual's cognitive perception of their similarity to members of an in-group [63]. However, recent studies on the theoretical framework of identification with animals have mainly focused on zoo animals [64], pets [65], and farm animals [66], neglecting CFSs with cultural attributes that are more attuned to social identity.

Considering the role of out-group homogeneity effects in explaining different attitudes toward the same animal in different groups [20], human–animal SIT provides a useful framework for examining how visitors from different nationalities view giant pandas as either in-group or out-group members. This study focuses specifically on the conservation center setting to measure visitors' satisfaction in order to explore differences between visitors who view giant pandas as part of the in-group and those who view them as out-group symbols. By comparing the different attitudes of visitors of different nationalities toward the same experiential attributes, this study fills a gap in the current research on the role of culturally attributed CFSs in social identities. It also provides recommendations for optimizing the experience of visitors of different nationalities in conservation centers.

2.3. Topic Modeling with Online Reviews

Online reviews, particularly consumer-generated content, play an important role in identifying the attributes of visitors' experience [27]. However, these reviews often contain abundant textual information, thus constituting unstructured data that traditional statistical methods are unable to analyze effectively [67]. To address this challenge, topic modeling techniques have become increasingly prominent because of their ability to uncover underlying themes within textual data [68]. The probability that each topic belongs to a particular sentence can be estimated by trained topic models [69]. Consequently, the probabilities generated through topic modeling can reflect visitors' relevant interests and concerns with respect to each topic of their experiences [28,70]. The CorEx model, one of the analytical frameworks for topic modeling, has shown excellent performance in extracting different topics from short text contexts [71]. It is implemented through the Python "corextopic" package developed by Gallagher et al. [69]. The CorEx model systematically classifies words into potential topics by optimizing the explanatory power of word dependencies within textual data, which then reveals the most relevant words characterized by the highest level of mutual information [69]. Therefore, the CorEx model facilitates the extraction of topics from unstructured data, allowing for a nuanced analysis of textual content [72], for example, understanding the sentiment [73] and preferences [70,74] of visitors.

3. Methodology

3.1. Anchored CorEx Modeling Approach

Anchored CorEx modeling is a topic modeling method that can anchor specific words to particular topics. Operating CorEx in Python 3.9.13 starts with a default unsupervised step. Researchers can subsequently use anchored words to guide the unsupervised results and effectively conduct semi-supervised adjustments to enhance the interpretability and relevance of the model [69]. The semi-supervised nature strengthens researchers' control of the model by enabling them to guide machines to extract specific topics from complex textual data [69]. Given the excellent performance of anchored CorEx models in the context of classifying tourism-related social media posts [73,75], we chose anchored CorEx topic models for data analysis. With the overall satisfaction of visitors as the dependent variable

and the probability of each topic as the independent variable, we conducted a linear regression analysis [76]. To explore the differences in social identity, we calculated the average probability of each topic with respect to each online review. This step allows the probability of each topic to correspond to the information related to the different social identities presented in the comments. Therefore, data groups were categorized according to Chinese visitors and non-Chinese visitors, and significant differences between these groups were assessed with the Kruskal–Wallis test [77].

3.2. Data Collection and Data Preprocessing

As a CFS and a significant cultural symbol, particularly in China, the giant panda exhibits numerous characteristics that increase the effectiveness of visitors' experiences in conservation centers [44]. Therefore, it is an ideal subject for exploring the effect of culturally symbolic animals on conservation efforts. The inherent cuteness of pandas positively influences viewers' perceived value, thereby acting as a fundamental driver of the increasingly widespread phenomenon of online panda-watching addiction [43]. The playful behavior of pandas, which are characterized by large heads, round cheeks, and expressive eyes, has the potential to enhance visitors' engagement and increase their interest in learning about panda conservation [42]. In addition, the presence of baby pandas often captivates visitors' interest in acquiring knowledge regarding panda conservation [39].

To collect data for this study, we selected the Giant Panda Breeding Research Base (Xionghao Jidi) in Chengdu, China, as the sampling location. It has made significant contributions to giant panda conservation. Covering an area of 3.07 km², the Xionghao Jidi is one of few animal conservation centers in the world that combines nature reserve, museum, exhibition hall, and delivery room. To gather a wide variety of insights from visitors, we used a Python web crawler to collect online reviews from TripAdvisor (<https://www.tripadvisor.com>) (accessed on 19 June 2024), a prominent platform broadly recognized as relevant to tourism research [28,70,78]. In total, we collected 6804 comments that were generated between 4 June 2004 and 19 June 2024. In addition, to ensure that differences in social identities were captured in our analysis, we followed the previous practice of dividing a particular group from those not in that particular group [79] based on IP and language combinations in the comments [80]. We focused only on comments written in English and Chinese to classify Chinese tourists and non-Chinese visitors and excluded any reviews that did not meet these criteria. Furthermore, we retrieved the satisfaction ratings provided by visitors alongside the dates of their visits to the center and organized these data in an Excel file for further analysis.

Data preprocessing is an important step that must be taken before conducting topic modeling analysis because it ensures the quality and relevance of the textual data being analyzed [78]. After segmenting the comments into individual sentences, we conducted a comprehensive set of preprocessing steps with the help of the "corextopic" package in Python. The workflow includes tokenization, stop word removal, lemmatization, relative pruning, and n-gram analysis. Specifically, we converted all text to lowercase, eliminated non-English specific characters like punctuation and numbers, and removed line breaks to simplify the data. In addition, we filtered out the unimportant [70,76] semantic markup used to ensure that only relevant verbs and nouns were retained. This enhances the clarity and utility of the textual data for subsequent modeling processes [28].

4. Findings

The dependencies among a set of words that pertain to specific attributes are measured to determine the overall total correlation (TC) [69]. The optimal number of attributes can be identified by calculating the TC across varying numbers of attributes [69]. The underlying

principle is that the additional contribution of newly introduced attributes to the overall TC decreases as the number of attributes increases [69]. Therefore, researchers should identify the optimal number of attributes by comparing various attributes on the basis of the top words [70]. The inclusion of insufficient attributes may result in inadequate information, whereas the inclusion of excessive attributes can lead to redundancy within the dataset.

In this study, the number of attributes is approximately between 10 and 20 based on the calculation of the overall TC (Figure 1). We determined the optimal number of attributes by evaluating the interpretability of the top 10 words associated with each attribute. We subsequently identified 16 attributes. However, one attribute was excluded from the analysis after discussion because of its interpretability [70] and exclusivity [81]. We utilized different quantities of anchored words based on the literature [82] for each of the 15 topics identified on the basis of the unsupervised results. According to the previous study on topic modeling [76], naming each topic involves three stages. First, the initial topic names were determined by one researcher, followed by a secondary check by another researcher based on the accuracy of the name [80]. Finally, the research team compared representative comments on each topic with the words under each topic to examine whether they correctly reflected the comments [29]. After combining the words under each topic with the most representative comments, the research team formalized the name of each topic. The results are presented in Table 1. This study ventures beyond the findings of previous studies on this topic by identifying two new attributes: “Identity’s Power” and “Non-Flagship Species.” Overall, the attributes related to the identification with animals are “Research Support,” “Maternal Love,” “Pandas’ Behaviors,” “Self-Feeling,” and “Identity’s Power.” The physical attributes associated with the conservation center are “Center Design,” “Close Encounter,” “Guided Services,” “Educational Equipment,” “Accessibility,” “Weather Conditions,” “Uncivilized Behaviors,” “Supporting Facilities,” “Non-Flagship Species,” and “Keepers’ Behaviors.”

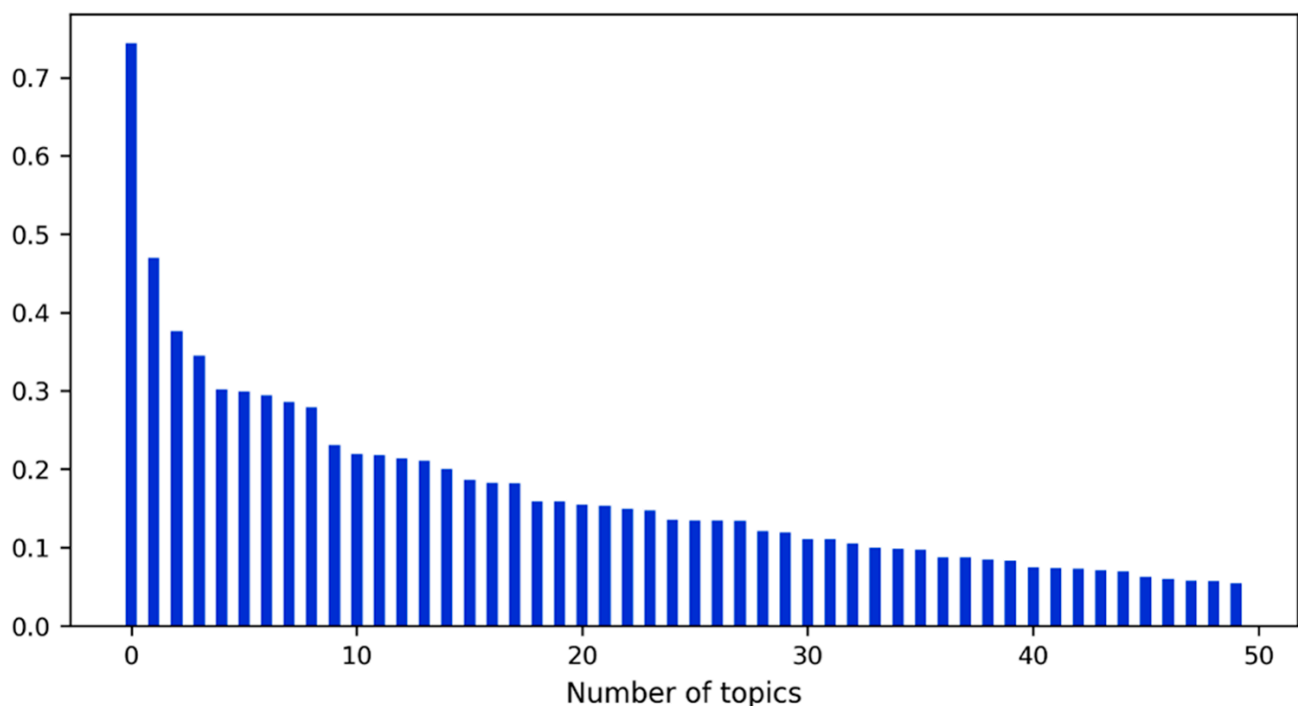


Figure 1. Overall total correlation.

Table 1. Experience attributes.

Attributes	TOP 10 Words	From
Research Support	donation, hold, pay, minute, rmb, cash, camera, money, picture, certificate	(Hehir et al., 2023); (Piao & Managi, 2022)
Maternal Love	baby, cub, nursery, adult, incubator, mother, lucky, crib, tiny, breed	[39,46]
Center Design	enclosure, habitat, natural, zoo, separate, lay, hole, ground, captivity, spacious	[5]
Close Encounter	close, watch, photo, encounter, personal, fun, contact, shot, fence, ops	[41]
Pandas' Behaviors	eat, play, sleep, drink, bamboo, tree, climb, walk, afternoon, lie	[42,43]
Guided Services	guide, staff, conservation, explain, question, tour, answer, english, speak, skill	[13–15];
Educational Equipment	learn, video, signage, knowledge, museum, short, documentary, life, history, purpose	(Arowosafe et al., 2023)
Accessibility	easy, entrance, transport, taxi, bus, ticket, hotel, shuttle, accessible, metro	[14,15]
Weather Conditions	weather, hot, air, summer, moon, condition, inside, sun, glass, car	[47]
Self-Feeling	experience, lifetime, amaze, wonderful, unforgettable, unique, amazing, pre, opposite, background	(Arowosafe et al., 2020)
Uncivilized Behaviors	noise, cut, shout, people, sign, chinese, animal, guard, move, security	(Rahman et al., 2010)
Supporting Facilities	restaurant, shop, hospital, souvenir, food, kitchen, gift, lunch, toilet, café	[14]
Non-Flagship Species	swan, peacock, lake, black, koi, fish, carp, road, white, bird	New
Identity's Power	china, national, treasure, precious, highlight, holiday, nation, travel, live, iconic	New
Keepers' Behaviors	feed, breed, keeper, interact, program, cage, volunteer, pole, cleaning, job	[44]

According to the probability distribution, which reflects the popularity of the topic in question [27,83], the five most frequently mentioned attributes of the experience in this context are “Pandas’ Behaviors,” “Maternal Love,” “Close Encounter,” “Self-Feeling,” and “Non-Flagship Species.” “Uncivilized Behavior,” “Weather Conditions,” “Research Support,” “Supporting Facilities,” and “Educational Equipment” are associated with lower probabilities (Figure 2).

According to the significance level tests of Table 2, “Research Support,” “Maternal Love,” “Close Encounter,” “Pandas’ Behaviors,” “Accessibility,” “Weather Conditions,” “Supporting Facilities,” “Non-Flagship Species,” and “Identity’s Power” all exhibit *p* values below the threshold of 0.05. This outcome indicates that these attributes are significantly correlated with Chinese and non-Chinese visitors’ satisfaction. “Guided Services,” “Self-Feeling,” and “Uncivilized Behaviors” are significantly correlated with non-Chinese visitors’ satisfaction rather than Chinese visitors’ satisfaction. “Keepers’ Behaviors” is significantly correlated with Chinese visitors’ satisfaction rather than non-Chinese visitors’ satisfaction.

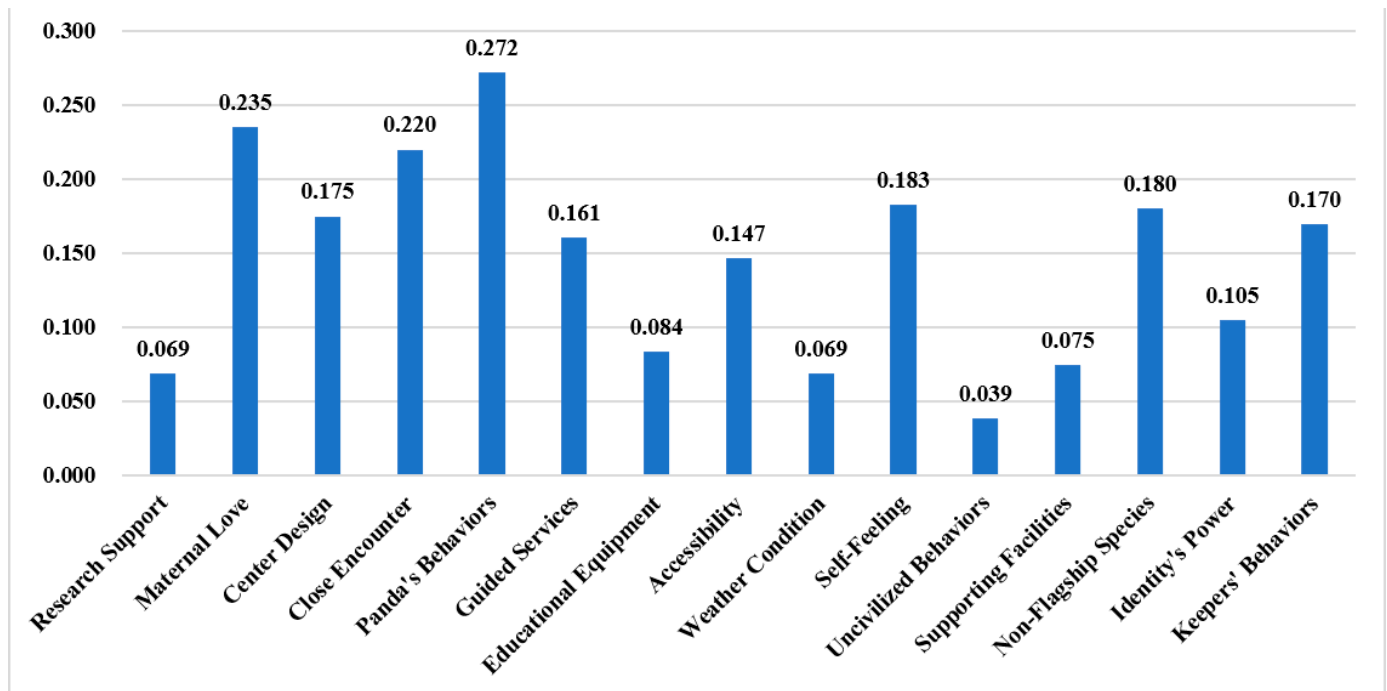


Figure 2. Topic importance.

Table 2. Relationship between topic attributes and Chinese and non-Chinese visitors' satisfaction.

	Non-Chinese Visitors					Chinese Visitors				
	B	Std.Error	t	p	β	B	Std.Error	t	p	β
(constant)	4.509 **	0.053	84.462	0	-	3.867 **	0.233	16.617	0	-
Research Support	0.311 **	0.103	3.014	0.003	0.047	1.756 **	0.449	3.916	0	0.131
Maternal Love	0.225 **	0.067	3.363	0.001	0.072	0.857 **	0.244	3.513	0	0.301
Center Design	-0.004	0.081	-0.054	0.957	-0.001	0.577	0.404	1.429	0.153	0.048
Close Encounter	0.280 **	0.067	4.181	0	0.088	0.594 *	0.25	2.375	0.018	0.177
Pandas' Behaviors	0.175 *	0.071	2.461	0.014	0.05	0.834 **	0.241	3.464	0.001	0.344
Guided Services	0.342 **	0.085	4.005	0	0.068	0.411	0.287	1.432	0.152	0.071
Educational Equipment	0.066	0.095	0.689	0.491	0.011	0.417	0.302	1.382	0.167	0.058
Accessibility	0.164 *	0.075	2.185	0.029	0.044	0.585 *	0.262	2.235	0.026	0.144
Weather Conditions	-0.201 *	0.081	-2.469	0.014	-0.044	0.644 **	0.244	2.643	0.008	0.254
Self-Feeling	0.272 **	0.077	3.539	0	0.065	0.521	0.327	1.595	0.111	0.062
Uncivilized Behaviors	-0.690 **	0.109	-6.314	0	-0.099	-0.324	0.332	-0.977	0.329	-0.038
Supporting facilities	0.190 *	0.093	2.04	0.041	0.034	1.112 **	0.301	3.692	0	0.165

Table 2. Cont.

	Non-Chinese Visitors					Chinese Visitors				
	B	Std.Error	t	p	β	B	Std.Error	t	p	β
Non-Flagship Species	0.298 **	0.084	3.545	0	0.061	0.860 **	0.247	3.481	0.001	0.268
Identity's Power	0.265 *	0.124	2.138	0.033	0.032	0.654 *	0.256	2.554	0.011	0.161
Keepers' Behaviors	0.071	0.078	0.913	0.361	0.016	0.842 **	0.26	3.238	0.001	0.198

* (Single Asterisk) denotes statistical significance at the $p < 0.05$ level; ** (Double Asterisk) denotes statistical significance at the $p < 0.01$ level.

Among the attributes that significantly correlate with Chinese and non-Chinese visitors' satisfaction with conservation centers, the coefficients of those attributes from Chinese visitors are all larger than those from non-Chinese visitors. Therefore, we cannot tell exactly which attributes have statistically larger coefficients. According to the result of Fishers' test shown in Table 3, the attributes of "Research Support," "Maternal Love," "Close Encounter," "Pandas' Behaviors," "Accessibility," "Weather Conditions," "Supporting Facilities," and "Non-Flagship Species" have significant differential characteristics. The influence of these attributes on Chinese visitors' satisfaction with conservation centers is significantly greater than on that of non-Chinese visitors. "Identity's Power" does not have significant differential characteristics, suggesting no statistically significant difference in the effect of this attribute on Chinese and non-Chinese visitors' satisfaction with the conservation center.

Table 3. Fishers' test for regression coefficient difference.

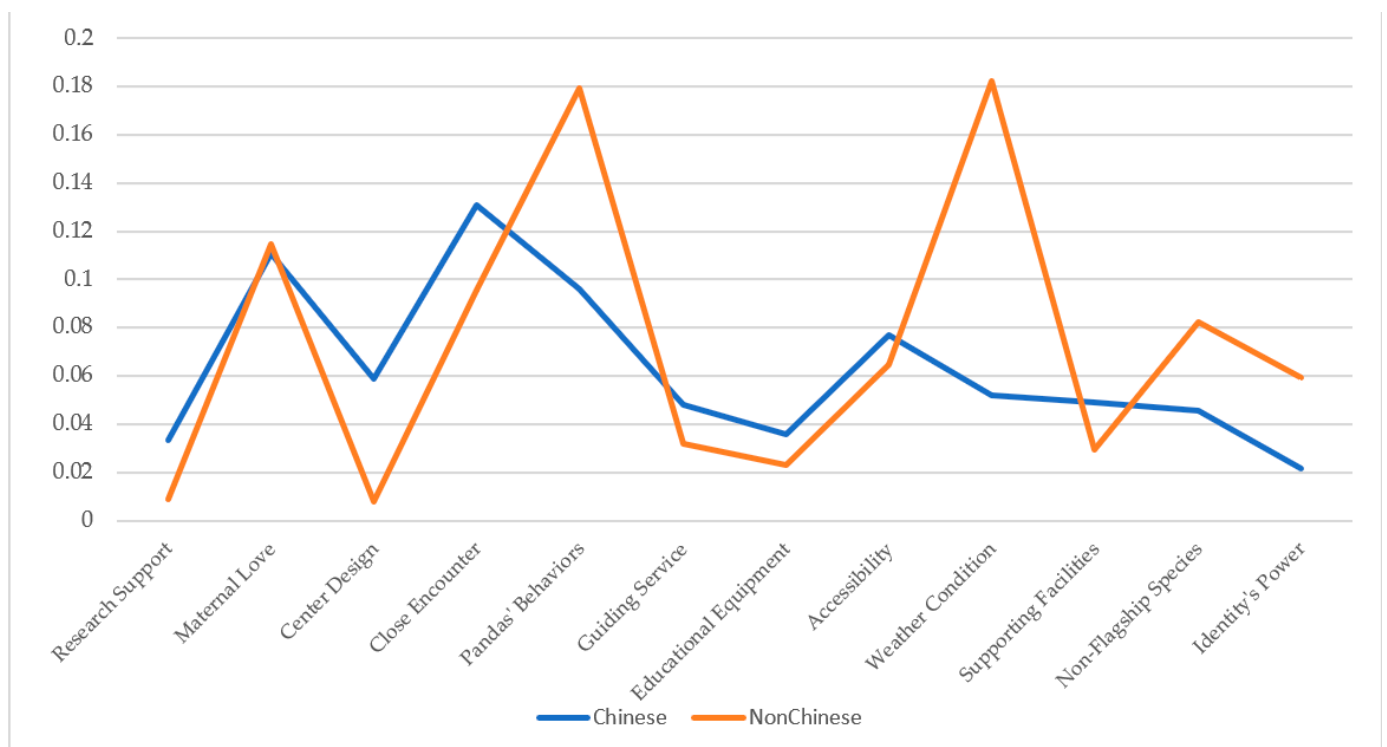
Attributes	b0 – b1	Freq	p Value
(constant)	−0.642	1000	0
Research Support	1.445	0	0
Maternal Love	0.631	1	0.001
Center Design	0.581	6	0.006
Close Encounter	0.314	47	0.047
Pandas' Behaviors	0.659	1	0.001
Guided Services	0.069	371	0.371
Educational Equipment	0.352	86	0.086
Accessibility	0.421	18	0.018
Weather Conditions	0.845	0	0
Self-Feeling	0.249	115	0.115
Uncivilized Behaviors	0.366	176	0.176
Supporting facilities	0.921	0	0
Non-Flagship Species	0.561	4	0.004
Identity's Power	0.389	58	0.058
Keepers' Behaviors	0.771	1	0.001

The probability distributions of conservation center attributes do not follow normal distribution, so we conducted a nonparametric Kruskal–Wallis test to evaluate the differences in attribute distributions among the groups categorized on the basis of cultural social identities in further detail. Table 4 presents the results of the Kruskal–Wallis test, indicating a significant difference in the importance of these attributes between Chinese and non-Chinese visitors. Most attributes (excluding "Self-Feeling," "Uncivilized Behaviors," and "Keepers' Behaviors") exhibit significant distributional differences across different nationalities ($p < 0.05$).

Table 4. Kruskal–Wallis test for varying cultural social identities.

Attributes	<i>p</i> -Value	Sig < 0.05	H-Value
Research Support	0.000	Yes	103.989
Maternal Love	0.001	Yes	10.085
Center Design	0.000	Yes	259.753
Close Encounter	0.000	Yes	42.579
Pandas' Behaviors	0.000	Yes	64.870
Guiding Service	0.001	Yes	25.165
Educational Equipment	0.001	Yes	23.314
Accessibility	0.003	Yes	8.861
Weather Conditions	0.000	Yes	563.263
Self-Feeling	0.066	No	3.391
Uncivilized Behaviors	0.546	No	0.365
Supporting Facilities	0.000	Yes	42.400
Non-Flagship Species	0.000	Yes	30.457
Identity's Power	0.000	Yes	143.059
Keepers' Behaviors	0.634	No	0.227

Figure 3 compares the importance of attributes that exhibit significant differences between Chinese and non-Chinese visitors, as determined by the average frequency of these attributes within each group. Specifically, Chinese visitors showed a stronger preference for “Research Support,” “Center Design,” and “Close Encounter.” On the contrary, non-Chinese visitors placed more emphasis on “Close Encounter,” “Weather Conditions,” “Non-Flagship Species,” and “Identity’s Power.” “Guided Services,” “Maternal Love,” “Accessibility,” “Educational Equipment,” and “Supporting Facilities” are attributes close in preference to both Chinese and non-Chinese visitors.

**Figure 3.** Social identity variations of attributes.

5. Discussion

The effect of CFSs on efforts to raise public awareness of conservation is indisputable [1]. This study employed big data methodologies to validate 13 attributes by topic modeling that had been identified by previous studies and identified two additional attributes: “Identity’s Power” and “Non-Flagship Species.” The discovery of the attribute “Identity’s Power” stems from the role of cultural symbols (pandas) in shaping group identity under SIT [54]. This attribute emphasizes the national symbol and identity that pandas evoke among Chinese visitors [84]. Owing to stereotypical thoughts about the out-group caused by the out-group homogeneity effect [58], “Identity’s Power” highlights that non-Chinese visitors stereotypically view pandas as the primary representatives of Chinese culture [85]. The discovery of the attribute “Non-Flagship Species” illustrates the “animal pride” that Chinese and non-Chinese visitors show in recognizing themselves as a supergroup of animals in the presence of animals with no cultural attributes [61].

This study distinguishes the relationship between experience attributes and Chinese and non-Chinese visitors’ satisfaction and explores the different importance levels of these attributes. As an attribute related to the identification with animals, “Research Support” has a greater effect on Chinese visitors’ satisfaction and is considered a more important attribute by Chinese visitors. This finding suggests that Chinese visitors who consider giant pandas as the member of their in-group exhibit the dimension of “solidarity with animals” from the framework of identification with animals, leading to a greater willingness to donate more to animal charities [61]. “Maternal Love” has a greater effect on Chinese visitors’ satisfaction. This result illustrates that Chinese visitors personify giant pandas by viewing them as members of their in-group [86], thus eliciting empathy to giant pandas [84]. However, this attribute is close in preference because the baby schema of giant pandas evoke a generalized desire for protection by Chinese and non-Chinese visitors [87]. “Pandas’ Behaviors” has a greater effect on Chinese visitors’ satisfaction, illustrating the in-group favoritism of Chinese visitors [88]. Hence, Chinese and non-Chinese visitors perceive “Pandas’ Behaviors” differently [48,89]. This attribute is more important among non-Chinese visitors because curiosity is an important motivation for a group to visit a place that does not belong to their group [90]. Pandas are deeply associated with Chinese culture, so they evoke a sense of mystery among non-Chinese visitors as an out-group, fostering non-Chinese visitors’ curiosity about “Pandas’ Behaviors” [91]. “Self-Feeling” exhibits a significant positive relationship with satisfaction but holds greater importance for non-Chinese visitors than for Chinese visitors. Non-Chinese visitors pay more attention to the personal feeling of the travel experience because of the lack of in-group favoritism toward giant pandas, which they perceive as an out-group [92]. “Identity’s Power” has a greater effect on Chinese visitors’ satisfaction, indicating that Chinese visitors are more motivated by experiences that represent their national identity [93]. However, the higher preference for this attribute from non-Chinese visitors provides a clear example of how the out-group homogeneity effect shapes visitors’ perceptions of pandas. Non-Chinese visitors tend to associate giant pandas exclusively with a simplified and stereotypical perception of China [85]. This tendency increases the probability that non-Chinese visitors may attribute significance to giant pandas as the most representative icon of China.

Among the physical attributes associated with the conservation center, the significant relationship between “Uncivilized Behaviors” and “Guided Services” in non-Chinese visitors’ satisfaction indicates that these visitors do not respond leniently to the uncivilized behaviors of the out-group they perceived [94]. They seek to learn more about giant pandas, which they perceive as out-group members, through the explanations provided by tour guides [13].

6. Implications and Conclusions

6.1. Theoretical Implications

Our study fills a gap in the literature by applying SIT and the out-group homogeneity effect to the fields of tourism and animal conservation education. On the basis of big data methods, we conducted a comprehensive investigation of how the attributes of conservation centers influence visitors' experiences. By expanding the scope of application of SIT and the out-group homogeneity effect, our study provides novel theoretical perspectives and frameworks in this context.

One major theoretical contribution of this study lies in its identification of the influence of the out-group homogeneity effect on visitors' perceptions of CFSs. Our findings reveal that non-Chinese visitors attribute greater importance to "Identity's Power," thus demonstrating their perception of the giant panda as a singular and simplified symbol of Chinese culture. This external perspective reflects the cognitive bias that characterizes the out-group homogeneity effect [85]. According to this, non-Chinese visitors perceive pandas as the most recognizable and representative element of Chinese culture, thereby relegating other cultural symbols to the periphery. This reliance on a simplified symbolic representation limits non-Chinese visitors' engagement with other attributes, such as "Maternal Love" and "Research Support." By contrast, Chinese visitors engage in more pronounced behaviors ("Research Support") and experience more notable emotional connections ("Maternal Love"). These findings are important because they illustrate how visitors categorize giant pandas as either in-group or out-group members on the basis of their own cultural social identities. This revelation expands the theoretical application of SIT by demonstrating that the cognitive processes that underly the formation and categorization of social identities can also apply to culturally significant animals.

Another key contribution of this study lies in its empirical validation and extension of the theoretical framework proposed by Amiot [23,61], who discovered the dimensions of "solidarity with animals" and "similarity with animals" from the concept of identification with animals. Although this theoretical framework reveals the psychological mechanisms of a human's identification with an animal, it views animals as a unified group. The framework overlooks the exploration of cultural factors from CFSs in shaping human–animal relationships. This study has discovered new attributes related to animal identification, namely, "Identity's Power," and other attributes, such as "Research Support," "Maternal Love," "Pandas' Behaviors," and "Self-Feeling." The significant differences in these attributes between Chinese and non-Chinese visitors align with the predictable behaviors under Amiot's theoretical framework of animal identification, as follows: "larger money donations to animal charities," "greater desire to help animals," "greater contact with pets," and "greater support for the rights of zoo animals." This finding enriches the concept of social identities, thus demonstrating that the standards of groups rooted in social identities can be extended to animal groups that represent the same culture via specific cultural links.

Overall, this study reveals how visitors perceive giant pandas as representatives of in-groups or out-groups, thereby influencing their attitudes and behaviors. This research thus provides new evidence to support efforts to extend SIT beyond species boundaries. Such an extension can enable SIT to explain not only the complex social relationships that emerge within human groups, but also the relationships that can be observed between humans and animals.

6.2. Practical Implications

This research provides crucial insights that conservation center managers can use to develop management strategies pertaining to various experiential attributes with the goal of increasing the satisfaction of visitors and the effectiveness of conservation education.

“Identity’s Power,” a new attribute discovered in our study, reflects the subjective experience and cultural identity of visitors. Managers can enhance these aspects by providing visitors with unique cultural experiences and emphasizing the symbolic significance of CFSs. For example, efforts to highlight the role of the CFSs as a “national treasure” can help to enhance the overall satisfaction of visitors who regard CFSs as their own group. For visitors who regard CFSs as an outside group, emphasizing the value of the CFSs with respect to global conservation efforts and their ecological importance can help visitors to recognize the unique global role of CFSs. As for the attribute of “Non-Flagship Species,” managers should create exhibits focusing on “ecosystem integrity” to illustrate the ecological connections between non-flagship and flagship species to spark visitors’ interest and awareness of ecosystem protection [95].

Among the physical attributes related to the conservation center, “Guided Services” and “Uncivilized Behaviors” have significant effects on the satisfaction of non-Chinese visitors rather than that of Chinese visitors. Therefore, for visitors who do not consider CFSs as the member of their in-group, managers should focus on improving the training provided to guides, particularly in cultural sensitivity and communication skills, to enable them to address the needs of these visitor groups effectively [96,97]. In other words, “Guided Services” should highlight the importance of the CFSs to global conservation efforts and their ecological value rather than their cultural meanings. Managers should also fully utilize data from visitors’ satisfaction surveys and on-site inspections to analyze the high-incidence areas and specific types of uncivilized behaviors. They should subsequently formulate appropriate strategies to reduce the negative effects that uncivilized behaviors bring to the destination [48,98]. “Keepers’ Behaviors” is an attribute that greatly affects the satisfaction of Chinese visitors rather than that of non-Chinese visitors. Therefore, managers should introduce interactive experience sessions between keepers and the visitors who consider CFSs as members of their in-group. For example, visitors could participate in animal feeding under the supervision of the keepers while they listen to the keepers explain the dietary habits of CFSs and their cultural connections. Additionally, an “Animal Diary” activity can be introduced, where keepers provide visitors with diaries to record CFSs’ behaviors in specific areas. Through joint analysis of these observations with the keepers, visitors can learn professional observation techniques to increase their interactions with CFSs.

7. Limitations

First, this study is based in the Xiongmiao Jidi, located in China, which exhibits unique cultural and national symbolic significance. Future studies can compare the conservation experiences of individuals who visit the Xiongmiao Jidi with those of individuals who visit other conservation centers that house CFSs in different countries. As an alternative, future studies can explore the different experiences of visitors between those visiting the Xiongmiao Jidi and those visiting other zoos that house giant pandas worldwide.

Second, this study relied exclusively on TripAdvisor as a data source, a choice driven primarily by personal preference. Future studies can strengthen the robustness of the findings of this research by integrating data collected from multiple platforms.

Last, the social identity grouping of non-Chinese visitors is not further distinguished based on IP and nationality, potentially obscuring cultural background differences among visitors. Future studies can adopt a more detailed visitor grouping method by dividing non-Chinese visitors into more specific subgroups by region or specific countries.

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