

RESEARCH

Open Access



The deconstruction of emotional identity of recreation for ethnic cultural heritage in the geo-cultural perspective: a fuzzy set qualitative comparative analysis on Wuqiang new year paintings

Xin Feng^{1,2}, Lei Yu^{3*} and Guoqiang Chen³

Abstract

As a model of the combination of nostalgia and creative products, ethnic cultural heritage carry the function of shaping and spreading geo-culture. Its unique geo-cultural context, as a link, shows the historical inheritance of local culture. The deep deconstruction of its emotional identity helps to strengthen this identity and stimulate more cultural and creative designs with national and local characteristics. While culture prospers, the local cultural and creative economy is strengthened and cultural confidence and national self-confidence are further enhanced. Based on the New Year paintings of Wuqiang in Hebei, which have a strong folk vernacular and geo-cultural character in northern China, in the process of using the reconstructed pattern elements for clothing design, 156 questionnaires were collected through questionnaire interviews and fsQCA was used to analyze the emotional identity of products with high geo-cultural recognition. The study finds that while the injection of regional culture plays a role in the development of products, people's emotional identification with vernacular cultural and creative products actually depends on a combination of causal paths, with beauty and elegance more important than place and humanity as commonly believed to reflect geographic cultural identity. fsQCA was used to analyze the emotional identity of products with high geo-cultural recognition. And understand the emotional components of vernacular cultural products and how emotional factors influence people's identities.

Keywords Cultural and creative products, Geopolitical culture, Product intentions, Emotional design, Emotional identity

Introduction

Vernacular civilization is the historical starting point of human civilization and an important part of modern civilization [1]. As a model of combining nostalgic sentiment and ethnic cultural heritage, vernacular cultural creation carries the function of shaping and spreading geo-culture, and it shows the historical inheritance of vernacular culture through the unique geo-cultural vein. This has great significance in connecting urban and rural areas and reshaping urban–rural relationship, and is an innovative

*Correspondence:

Lei Yu

185880535@qq.com

¹ School of Economics and Management, Yanshan University, No.438, Hebei Street West, Qinhuangdao 066000, Hebei, China

² School of Management, Shijiazhuang Tiedao University, No.17, Northeast Second Inner Ring, Shijiazhuang 050043, Hebei, China

³ School of Arts and Design, Yanshan University, No.438, Hebei Street West, Qinhuangdao 066000, Hebei, China

application of strategic thinking and implementation path of cultural creativity in rural revitalization.

The logical starting point of local culture creation is geo-cultural resources. As an abstract symbol, geo-culture needs specific objects to carry. Local culture creation creates characteristic cultural products through the evaluation of geo-cultural values and the transformation of cultural capital, and then realizes the optimal exchange of local values through the geo-featured cultural market, which can eventually develop into a cultural industry and cultural economy with geo-featured characteristics [1]. Therefore, some scholars emphasize the infusion of local culture in product design to make these ethnic cultural heritages with cultural connotation attract more consumers to generate emotional identification [2]. However, due to the generally low popularity of geo-culture, and also in the process of transforming cultural characteristics into commodities, consumers' perceptions of products can vary depending on the designers' design ability, as well as the users' gender, cultural background, life experience and living environment [3]. Therefore, some scholars have begun to pay more attention on consumers' emotional needs, and believe that only products that have spiritual resonance and value interaction with consumers can win their hearts [4], but the deeper motivations are yet to be further studied.

Based on this, the article focuses on the in-depth deconstruction of emotional identity factors and people's emotional identity paths, to further strengthen people's identification with geo-culture, prosper the cultural heritage rooted in it, and inspire more cultural and creative designs with national and local characteristics. In the process of cultural prosperity, the local cultural and creative economy will be strengthened, which in turn will contribute to the enhancement of cultural and national self-confidence.

Review of literature studies

Geopolitical culture and local culture and creativity

Geopolitical culture generally refers to the embodiment of cultural markers affiliated with a region. It mainly develops in a specific area around a specific group of people [5]. By reflecting the geo-culture, it also unconsciously reveals the perceptions and attitudes of the inhabitants of a certain area in terms of customs, aesthetics, emotions, and lifestyles [6]. It mainly contains both tangible and intangible forms. Tangible culture mainly refers to the unique and intuitive geo-cultural image, and intangible culture mainly covers regional ethnic psychology, historical veins, etc. [7]. Different regions have different histories and different cultural accumulations, which also produce geo-cultural differences [8],

geo-cultural differences can evoke the local awareness of local residents while satisfying the curiosity of foreign residents [9–11].

Vernacular text creation is an important carrier of geo-culture, and through its tangible form, it records an intangible cultural form that records the pulse of rural evolution and also carries memory and nostalgia [12, 13]. Therefore, in practice, most designers tend to describe the external characteristics of the product by its appearance. In creative design, they use shape, color, material and structure to translate the symbols of geo-cultural elements [14], in order to enhance cultural identity, make people feel the affinity and substitution in the purchase process, and feel the unique charm presented by different regions [15]. However, it is difficult for overly subtle designs to resonate with different cultural groups in a short period, and it has been a focus of designers' attention to capture consumers' psychological feelings, clarify their emotional identification mechanisms, and form product design innovations with regional characteristics.

In recent years, many scholars have put forward different terms for geographical product intention. For example, Khalid and Helander [16] believed that the success of a product in the marketplace may depend on its aesthetic appeal, the pleasure it creates, and the satisfaction it brings to the user based on the consumer demand scale. The consumers' demands for geographical products are divided into three main components: "overall impression", "functional requirements" and "stylistic needs", where overall impression and stylistic needs are related to feelings and emotions; Li and He [17] proposed five terms of geographical product intention: "local", "traditional", "innovative", "unique" and "cordial" to explain the evaluation test of local products; Jagtap [18] analyzed geographical product design based on product shape attributes and emotional scales, and proposed measurement terms such as "innovation", "aesthetics", "harmony", "elegance", "joy", "delight", "satisfaction", "interest", "surprise", "vitality", "charm", "calm" "entertainment", "happiness", "practicality", "convenience", "high quality". It is believed that product form is important in determining consumer response and product success, and it triggers certain characteristics and emotions to help designers design their products; From the perspective of cultural sustainability, Tu et al. [19] proposed that consumers strongly prefer "cultural connotation" and "unique originality" based on the cultural and creative products; Hou [20] established emotional design criteria for cultural and creative products centered on user experience, and proposed design elements such as "beauty", "culture" and "originality" to meet the personalized needs of consumers and establish brand emotion; Ma et al. [21] concluded that the innovative ideas of regional cultural and

creative product design should meet the “fashion (aesthetic demand)”, “belonging (emotional demand)”, “integration (functional demand)” and “experience (cognitive demand)” through the understanding and excavation of regional culture, highlighting regional characteristics while seeking popular cultural identity.

As can be seen from the above, in addition to the perceptual appeal of regional characteristics and creativity such as intimacy, localness, culture, uniqueness, and creativity, people are often attracted to aesthetics as a way to enrich their inner pleasure and inspire emotional identification with geographical cultural products (as shown in Table 1).

Based on this, the article tries to explore the role mechanism of ethnic cultural heritages from geo-culture to emotional identity through a combination of quantitative and qualitative analysis, and whether ethnic cultural heritages with higher cultural recognition are more likely to obtain people’s emotional identity, etc., to provide a reference for designers to better use cultural elements in product design.

Extraction of cultural elements and emotional identity of cultural and creative products

The study of culture and its elements generally divides culture into three levels: (i) material level: mainly the concrete visible forms of artifacts; (ii) value level: mainly to judge whether things are right or wrong; (iii) spiritual culture level: art design without spirits is a product of vulgarity [22]. Leong and Clark [23] further argued that the above culture can correspond to three levels: physical, mid-physics, and metaphysical. Later, Baudrillard [24] used the three levels of culture as a structure to integrate culture into products and defined three levels of product characteristics. (i) physical design: refers to the transformation of the shape, texture, and totem of cultural objects into the appearance of products; (ii) mid-physics design: belongs to the behavioral level of design thinking, considering the

characteristics of product function, use, and pleasure; (iii) metaphysical design transformation: belongs to the psychological inner level of design, involving self-awareness, emotion, and meaning. In the study of the extraction of cultural elements of the product’s geo-culture, it is usually considered that the cultural elements of the product are composed of two main aspects. The first one is the external elements, including the shape, color, material, and structure of the product [25, 26]; the second one is the internal element, including the cultural background, the experience that the designer has and the cultural connotation that comes with the cultural element [27].

Existing studies on emotional identity are relatively diverse, and generally regards emotional identity as a social-psychological process that internalizes external ideas and standards, and forms mechanisms to differentiate from others through this process [28]. In the design of cultural and creative products, it mainly refers to clearly distinguishing the attributes of the product by understanding the people who use the product, and understanding the relationship between commodity identity and consumers. There is a connection between consumer identity and people and what they love, where consumers identify with certain products because they like them [29]. Ultimately consumers want to buy product values formed by pleasure, experience and identity, not just the product [29]. Existing studies generally agree that consumers’ preferences for products are related to perceptions. The reason why consumers like to buy products is that product characteristics meet their needs, and this match is accomplished through product message processing and perceptions by the product design and style [31].

Therefore, the conscious incorporation of geo-culture in the design process of products to make cultural and creative products different from other products requires an understanding of why specific consumer groups prefer certain products, and the extent to which a product is

Table 1 Research on geographical intention evaluation

Test words	Scholar	Published years
“Overall impression”, “functional requirements” and “stylistic need”	Khalid and Helander	2004
“Local”, “traditional”, “innovative”, “unique” and “cordial”	Li, Mingsong and He, Mingquan	2005
“Innovation”, “aesthetics”, “harmony”, “elegance”, “joy”, “delight”, “satisfaction”, “interest”, “surprise”, “vitality”, “charm”, “calm”, “entertainment”, “happiness”, “practicality”, “convenience”, “high quality”	Jagtap	2017
“Cultural connotation” and “unique originality”	Tu et al	2019
“Beauty”, “culture” and “originality”	Hou Y	2020
“Fashion (aesthetic demand)”, “belonging (emotional demand)”, “integration (functional demand)” and “experience (cognitive demand)”	Ma et al	2022

recognized can be observed by observing the perceived and preferred responses to the product.

Emotional design and cognitive level of cultural and creative products

Recent studies by cognitive psychologists and neuroscientists have shown that emotions and feelings have an important influence on decision-making [32]. In the past, ergonomics paid more attention to the research of physiological measurements, but the design concept of perceptual engineering focused on the exploration of users' psychological level. Therefore, through engineering techniques, users' emotions or images were transformed into specific design elements, so that designers could design products in line with consumers' needs [33]. While a systematic approach can help us to observe the external causes, how to further interpret the internal emotional factors behind the data relies on relevant psychological theories. In Maslow's hierarchy of needs theory, the need for cultural products belongs to the highest level of self-actualization [34]. Emotional recognition is the process of information processing between product characteristics and consumer needs, and the higher the fit, the more consumers will like it, and thus the higher the probability of possible choice [35]. Combined with the three-level theory of cognitive and emotional system and product design expounded by Norman [36] in the concept of emotional design, it is pointed out that the instinctive level is related to the appearance of products; the behavior level is related to the interest and utility of the product; the reflection level is related to self-image, personal satisfaction, and memory. The article sorts out the

corresponding relationship between design and emotion (as shown in Fig. 1). The instinct level corresponds to the instinctive perception, that is, the emotional response of vision, hearing, smell, taste, and touch. The behavioral level corresponds to the psychological feelings, that is, positive emotions (pleasure and fun) and negative emotions (pain and frustration). The reflection level corresponds to cognition (annotation, interpretation, and reasoning). It is not difficult to find that people's emotional identity is related to the reflection level of design.

Research methodology and analysis

Based on the characteristics and classification of the three levels of design and emotion, the paper is divided into three stages. The first stage is mainly field research which extracts the local characteristic cultural elements of Wuqiang, Hebei Province. The second stage transforms and applies the cultural elements while making test samples.

The third stage uses fuzzy set qualitative comparative analysis (fsQCA). It is clear from all the surveyed cases that the difference of measurable factors in different cases is continuous. Therefore, this study selects the fuzzy set qualitative comparative analysis method that is applicable when the conditional and fruit variables cannot be accurately classified as 0 or 1 at the same time, still considering the affiliation between 0 and 1. Moreover, the method can deal with many types of antecedent conditions, especially continuous variables, more strictly and precisely. Therefore the method has received more and more attention and application in the humanities and social sciences in recent years.

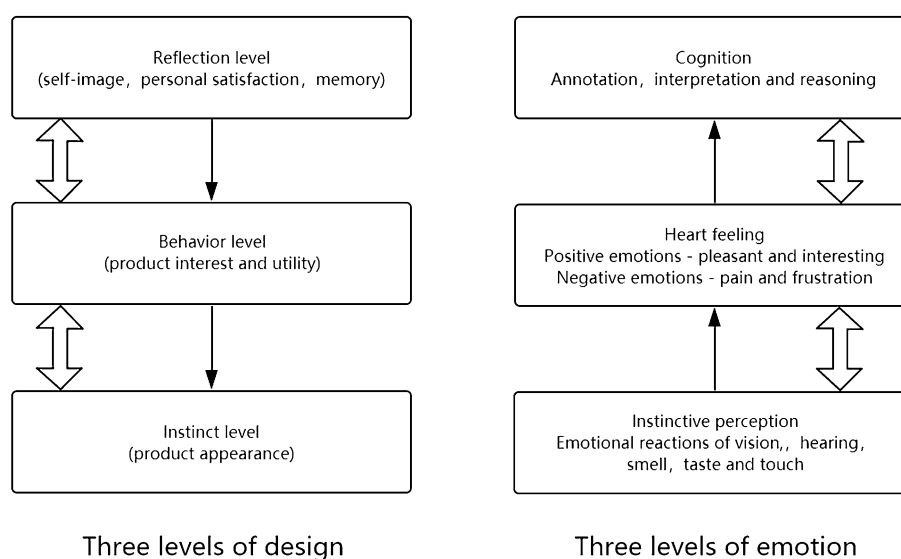


Fig. 1 Relationship between design level and emotional cognitive level

For example, Chatzipanagiotou et al. [37] determined the process of brand equity based on consumers from a cross-cultural perspective through fuzzy set qualitative comparative analysis, which provided a useful diagnostic tool for international brand management. Yang et al. [38] used fuzzy set qualitative comparative analysis to conduct data analysis, which proved that the design of tea drinking utensils may have an impact on the perception of tea taste and odor, brought new significance to the traditional concept of tea cup design. Klijn et al. [39] analyzed the conditions for realizing the output legitimacy in the process of brand building through qualitative comparative analysis. In this study, the seven conditional variables of “friendliness, localization, culture/civilization, uniqueness, originality, beauty and elegance” are transformed into a set of intervals between [0~1] respectively. According to the actual meaning of the sample data, three boundary anchor points are set by “full membership” (0.95), “middle point” (0.50), and “completely non-membership” (0.05). The emotional preference for local cultural and creative products is calibrated from comprehensive factors, gender factors, and cultural factors. Then, the single condition variables are analyzed by two indicators, consistency and coverage (“~” means negation, and no“~” means affirmation) to judge whether there is a sufficient or necessary relationship between them and the outcome variable. Then the membership degree fuzzy set is used to construct the truth table to measure the effect of different combinations of condition variables on the outcome.

At the same time, according to the experience of Fiss, it is believed that complex solutions are not often used in practical analysis. The core conditions are variables that appear in both intermediate solutions and simple solutions, which play a key role in the change of results. At the same time, the auxiliary conditions correspond to the core conditions. [40]. Finally, the holistic perspective and configuration thinking are used to help explain people's complex emotional cognition, and the set relation is used to replace the correlation in previous studies, so as to explore people's geo-cultural formation and emotional identity mechanism. The pattern design transformation in the first stage is relatively close to the physical and tangible level of morphological and symbolic design. The second stage of pattern design applied to clothing products also involves the consideration of the product's function and usage context, which is a mid-physics and behavioral level of design issues. In the third stage, the cultural and creative products further explore the emotional identity and preference of the products through cognitive investigation, which involves metaphysical and internal design thinking.

Design and production of measurement samples

The study is based on Wuqiang New Year paintings in Hebei with strong local flavor and geo-cultural characteristics. Through interviewing people who have lived in the area for more than 20 years, as well as consulting local residents over 50 years old and local museum personnel, this study combines the results of interviews and literature to compile New Year paintings that reflect local cultural characteristics, including historical allusions and folk customs. Then combines with the local residents' cognition, the description of Wuqiang New Year paintings is made. After analyzing and organizing, the characteristics of Wuqiang's New Year paintings are summarized as follows: 1. Color characteristics: rich variations with simple colors, strong color contrast; 2. Modeling characteristics: medium and close scenes, simple and expressive engraving; 3. Line characteristics: strong generalization, mainly Yang engraving and Yin engraving, and the full rhythm of printmaking.


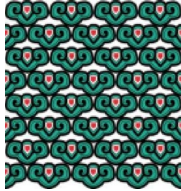
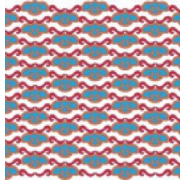


After sorting out the characteristics of Wuqiang's New Year paintings, the design is carried out by 10 designers. In order not to deviate from the cultural characteristics, after collecting information and extracting the stories and elements behind Wuqiang's New Year paintings to improve the design, the designer again discussed with local residents and made corrections by combining comprehensive opinions such as Wuqiang's printing process. For example, a designer extracted the representative “Five Fortunes” New Year painting from Wuqiang New Year paintings, and extracted the concept of bats based on the original “Fortunes” and the harmonic “bat” by tapping into its original symbolism. The bat form was redesigned by combining the common color and printmaking techniques in Wuqiang's New Year paintings to form the final “Fulinmen” design. In this stage, 16 initial patterns were obtained. Then, using the focus group method, 16 pictures were screened by 9 design teachers, and each member selected 10 patterns that he or she liked and explained his or her reasons, and finally, the five patterns with the most votes were selected as the test patterns (cf. Table 2).






When conducting the test sample selection, the study chose clothes that have practical significance in daily life and do not involve popular factors as the test sample, and by using the design patterns on the test sample, it was used as a test sample to study the formation mechanism of people's identification with geo-culture and emotional identity. (cf. Fig. 2).

Questionnaire design

The product geo-cultural test terms used in the questionnaire are obtained mainly through the literature search and previous interviews and were referenced from the

Table 2 Test sample pattern

Reference prints	Five blessings at the door	Rich blossoms	Six sons fighting for the head	Three sheep Kai Tai	The heavenly master's house
Designing physical objects after extracting geo-culture					
Design Name	Fulinmen	Many blessings and longevity	Good weather for the crops	Spring returns to the earth	Ward off evil spirits and fly fire



Fulinmen

Many blessings and longevity

good weather for the crops

Spring returns to the earth

Ward off evil spirits and fly fire

Fig. 2 Test sample

geographical product intention terms used in previous research by Li and He [17]: “localization”, “traditionality”, “innovation”, “uniqueness”, “intimacy”, “beauty”, and “beauty”, “culture”, “originality” proposed by Hou [20]. In addition, key points were extracted from the theories proposed by experts and scholars such as Khalid and Helander [16], Jagtap [18], Tu et al. [19], Ma et al. [21], and the test terms were formed through the combination of theory and local practice based on interviews and surveys with local residents.

During the research process, we sent four inspection groups to visit again, which lasted for a week. To facilitate communication, each team consisted of one man and one woman. Each of the four groups randomly displayed different local New Year paintings to the residents they visited and asked them to select the appropriate intended phrases based on the different samples, record the dictation and then perform initial coding. Later, the KJ method was used to categorize and name the words, and the final words used in this geo-intentional product test were expanded into “Friendliness” F, “Localization” L, “Culture/Civilization” C, “Uniqueness” U, “Originality” O, “Beauty” B and “Elegance” E (cf. Table 3). At the same time, the results were reflected as “whether the product is emotionally identifiable” according to the findings of the previous literature.

Meanwhile, Huiyun Yan et al. [43] suggested that people’s heart (preference), action (purchase) and verbal communication (recommendation) can have a decision-making influence on emotional characteristics, and their influence effects are in decreasing order; Yu et al. [44] also argued that product emotional design is the focus of consumer preferences and purchase intentions, which can be subdivided into whether they would buy this product or similar products and whether they would recommend it to others. Based on this, it can be concluded that product affective design can be extended into preference, purchase intention, and recommendation (see Table 3).

Research process

Study subjects

Considering that most of the audiences whose products are ultimately circulated in the market are mainly young people, and the number of college students is increasing, they integrate the characteristics of the times, forming a special consumer group and playing an important role in the consumer market. Meanwhile, according to the research of Lindstrom and Seybold [41], whether in the East or the West, the influence of the new generation of young people on their parents is strong, and this will also lead to a trend in cultural and creative products.

Table 3 Test words and their points

Test words	Measurement question item	Reference Sources
Friendliness	F1 The design creates a sense of yearning	[17]
	F2 The design creates a sense of intimacy	[17]
Localization	L1 The design reveals the customs of the residents	[17]
	L2 The design reflects the aesthetic perceptions, emotions, and lifestyles of the inhabitants	[21]
Culture/Civilization	C1 Tangible culture mainly refers to unique and intuitive geophysical images	[19]
	C2 Intangible culture includes regional ethnic psychology and historical culture	[20]
Uniqueness	U1 The uniqueness of the design evokes a sense of place in the local population	[17]
	U2 The uniqueness of the design satisfies the curiosity of foreign residents	[21]
Originality	O1 The design tells a new story through a new narrative perspective, breaking down people's old perceptions	[17, 18]
	O2 The design creates an emotionally pleasing atmosphere that is emotionally appealing to memory, imagination, and subconsciousness	[19, 20]
Beauty	B1 Design styling includes product form, color, material, texture, and detail	[18]
	B2 Design aesthetics uses shape as a communication medium as a way to realize the dissemination of information and form the perception of beauty	[20, 21]
Elegance	E1 Elegant design mainly refers to the aura exuded by the design itself	[18]
	E2 Elegant design allows consumers to feel, appreciate, and improve their overall satisfaction	[18]
Emotional perception	P1 Whether consumers will like such products	Huiyun Yan et al. [43]
	P2 Whether consumers will buy this product or similar products	Huiyun Yan et al. [43]
	P3 Whether consumers would recommend the product to others	Huiyun Yan et al. [43]

Second, the locality of Wuqiang in Hebei province is relatively small in the group of universal university students, and in order to avoid the chance of sample results, the study is based on the cultural system formed by the fusion of multiple regional cultural subsystems, as proposed by Feng Shigang and Xu Wenting [45], which has internal differences but generally shows the consistency of the plain culture. Therefore, this study expands the scope of the locality sample from Wuqiang, Hebei, China to Hebei Province, China. In summary, the group of young university students is typically representative of the survey objects, and therefore current university students are selected as the test. In summary, the group of young university students is typically representative of the survey objects, so university students were chosen as the test population. A total of 231 valid questionnaires are obtained for the final study. The age distribution is between 20 and 30 years old; among them, 42 are local to Hebei province (18.2%), 189 are from various provinces such as Shanxi, Hunan, Hubei, Shandong, Henan, and Anhui (81.8%); 78 are male students and 153 are female students.

In the fsQCA analysis, according to the research hypothesis, our study needs to analyze male and female, local and non-local people respectively. The data in Table 4 is the sample size of each group. Since

Table 4 Study subjects

Gender	Number of people	Identity	Number of people
Male	78	Local people	42
Female	153	Out-of-townners	189

the minimum sample size of fsQCA depends on the number of causal conditions included in the model, the minimum sample size of fsQCA with seven causal conditions is required to be 30 [42]. When selecting samples in this study, each part is guaranteed to have more than 30 samples. (cf. Table 4).

Testing process

A total of 231 valid questionnaires were collected for this study using the questionnaire distributed online by Questionnaire Star. The questionnaire was designed with a brief introduction to the characteristics of Wuqiang New Year paintings, a description of the design approach and principles after each specific test sample, and a seven-level evaluation index approach to evaluating the test for each category of product intention.

Purpose and content of the study

By combining Norman's [36] design hierarchy theory and Maslow's [34] hierarchy of needs theory, this study focuses on the relationship between different factors and product identity when emotions are sublimated into the reflective level of emotional identity.

According to the research purpose of this paper, this paper aims to explore the emotional identity of local cultural and creative products in the perspective of geo culture. Through the research review, it can be found that identity is related to people's reflection levels. According to the emotional design theory of Norman [36], people's recognition of products at the reflection level is mainly influenced by identity, environment, culture, and other factors. Among them, the gender difference is the most basic manifestation of identity difference. Men and women tend to have different attitudes and emotional preferences toward the same product. Regional differences are the most objective manifestation of environmental and cultural differences. People in different regions will inevitably form different group memories and social cognition in the long-term life process, which will lead to a different understanding of the cultural connotation conveyed by the same product, resulting in different emotional cognition. Based on this, we separately discussed the factors of gender and whether the sample is local, to explore the influence of different factors on people's emotional identity.

Taking gender factors and different regional populations as the basis for testing, thus focusing on the actual role of different factors at the reflective level, which is most vulnerable to the impact of cultural, experiential and gender variability. Following this, it helps different regional cultural and creative products to meet the psychological needs of consumers with different characteristics to the greatest extent possible, ultimately forming an emotional identity.

Therefore, the contents of this study are: (1) to study how gender factors affect the emotional preference for vernacular cultural products; (2) to study how cultural factors affect the emotional preference for vernacular cultural products; and (3) to study how a combination of multiple concurrent factors affect the emotional preference of vernacular cultural products.

Research process and discussion

Reliability and validity analysis

Reliability mainly answers the consistency, stability and reliability of measurement results, and the higher the value, the higher the reliability. Validity mainly answers the validity and correctness of the measurement results. In this study, the data were obtained by

placing questionnaires on the WJX (www.wjx.cn), and finally 231 valid questionnaire data were obtained and analyzed by SPSS for reliability and AMOS structural equation model for validity. According to the criteria proposed by Lane A M, et al. (1999) [46], the standardized values of each factor are higher than 0.7, which indicates that the measurement system meets the criteria. Secondly, with reference to Fornell and Larcker (1981) [47], who suggested that the standardized value of the average extracted variance (AVE) should ideally be greater than 0.5, and Hair (2009) [48], who suggested that a composite reliability (CR) of 0.7 is an acceptable threshold, all the composite reliability (CR) and average extracted variance (AVE) of this study meet the requirements, demonstrating the consistency of the study data is demonstrated (see Table 5 for details).

In addition, the square root of AVE of each factor in this study is greater than the path coefficient between it and the outcome variable (i.e., affective perception), and according to Hair [48] and Meng et al. [49] and related theories, the factor loadings are greater than their path coefficient values, indicating that the test questions in this study are reliable and the discriminant validity between the factors is ideal (see Table 6 for details). Finally, discriminating according to Hair's [48] definition, its overall indicators largely meet the criteria (see Table 7 for details), indicating that the overall data of this study have a good fit.

Table 5 Reliability analysis data

Factor elements	Measurement variables	Factor load	AVE	CR
Friendliness (F)	F1	0.91	0.8749	0.9332
	F2	0.96		
Localization (L)	L1	0.94	0.8836	0.9382
	L2	0.94		
Culture/Civilization (C)	C1	0.91	0.8559	0.9223
	C2	0.94		
Uniqueness (U)	U1	0.90	0.8282	0.9060
	U2	0.92		
Originality (O)	O1	0.93	0.8557	0.9222
	O2	0.92		
Beauty (B)	B1	0.94	0.8743	0.9329
	B2	0.93		
Elegance (E)	E1	0.95	0.8837	0.9383
	E2	0.93		
Emotional perception (P)	P1	0.92	0.8470	0.9432
	P2	0.95		
	P3	0.89		

Table 6 Correlation coefficient analysis among the factor dimensions

Factor elements	AVE square root	Path coefficients with the outcome variable	F	L	C	U	O	B	E
Friendliness (F)	0.9354	0.38		0.83	0.77	0.82	0.76	0.76	0.80
Localization (L)	0.9400	− 0.52	0.83		0.89	0.89	0.83	0.85	0.82
Civilization (C)	0.9251	− 0.15	0.77	0.89		0.88	0.81	0.85	0.82
Uniqueness (U)	0.9101	0.09	0.82	0.89	0.88		0.89	0.88	0.85
Originality (O)	0.9250	0.26	0.76	0.83	0.81	0.89		0.86	0.84
Beauty (B)	0.9400	− 0.17	0.76	0.85	0.85	0.88	0.86		0.91
Elegance (E)	0.9203	0.73	0.80	0.829	0.82	0.85	0.84	0.91	

Table 7 Data fit

Indicator Points	CMIN/DF	RMR	RMSEA	NFI	RFI	IFI	TLI	CFI	PNFI	PCFI
Numerical value	4.091	0.064	0.052	0.985	0.977	0.988	0.983	0.988	0.659	0.661

Comparison of consumers' emotional preference for local cultural and creative products

Univariate necessity analysis

In the comparative study of the overall consumers' emotional identification with local cultural and creative products, the “~” indicates negation, while no “~” indicates affirmation. Since the range is limited to two decimal places, the accuracy of the third decimal place is required, so we have retained four decimal places in subsequent research. Before conducting the analysis, we calibrate the seven-level scale and the dichotomous scale. The Richter scale is selected as a three-anchor calibration with calibration percentiles of 0.05, 0.5, and 0.95. The dichotomous scale is 1 and 0, representing complete inclusion and complete non-inclusion, respectively. Also we select the consistency threshold, PRI threshold and frequency threshold for the data as: deleted rows width 1, set the result to one width consistency 0.8. PRI consistency threshold is set to 0.7 [50]. When emotional identity is generated, from the consistency scores of the seven variables all are greater than 0.8. it can be seen that although these scores are not low, they can only show that has a certain explanatory power to the occurrence of the results. At the same time, according to the coverage rate, the coverage of all factors reaches 0.80, which is close to the requirements of necessary conditions. When emotional identity was rejected, according to the table data, no factors can constitute sufficient or necessary conditions for rejection. It shows that the result of rejecting emotional identity is the joint effect of multiple factors. Through the above analysis, it can be seen that these seven variables can not be used as sufficient or necessary

conditions for the occurrence of results. Since the behavior of emotional identification with local cultural and creative products is “multiple complex concurrent causality”, it is necessary to further analyze the combination of conditional variables to study how emotional factors affect people's identification, so as to better predict the trend of consumers' emotional identification of cultural and creative products in this region.

Condition combination analysis

From the output, we can see that even though there are no sufficient necessary conditions in the necessity analysis, there are still 13 paths that can be explained rejection. The reason for the high number and complexity of paths to predict emotional identification with products is the “no one knows” principle [51], which makes it difficult to form a consensus on the purchase behavior of cultural and creative products [52]. When the condition is accepted, the overall consistency is 0.943, which is able to cover 75% of the cases with an overall consistency of 0.86, indicating that the combination of all conditions explains about 80% of the cases and has a high strength of necessity explanation. The consistency score of each path is greater than 0.85, indicating that these 13 combined paths have strong explanatory power (cf. Table 8). Based on the properties of QCA Boolean operations, in all subsequent QCA analyses, we will use intermediate solutions combined with simple solutions to analyze the conditional paths simultaneously, and bold the core conditions represented by the simple solutions in the table. Further analysis shows that: (1) The absence of elegance has a significant impact on the results. Among the

Table 8 Sufficiency analysis of the conditional combination before the comprehensive purchase intention

Paths when the result is accepted	Raw coverage	Unique coverage	Consistency
F*L*C*U*O*B*E	0.747	0.747	0.943
Solution coverage: 0.747 Solution consistency: 0.943			
Paths when the result is rejected	Raw coverage	Unique coverage	Consistency
~F*~C*~U*~B*~E	0.688	0.005	0.851
~F*~L*~C*~B*~E	0.687	0.005	0.844
~F*L*~O*~B*~E	0.401	0.004	0.973
~F*~C*U*~O*~E	0.392	0.001	0.958
F*~L*~U*~O*~B*~E	0.395	0.004	0.963
~F*~L*C*~U*O*B	0.366	0.002	0.973
~F*~L*C*~U*~O*B	0.364	0.002	0.974
L*C*U*~O*~B*~E	0.407	0.005	0.975
L*~C*U*~O*B*~E	0.384	0.005	0.976
F*~L*~C*~U*~O*B*E	0.362	0.005	0.978
~F*L*~C*~U*~O*B*E	0.335	0.0003	0.980
F*L*C*~U*~O*B*~E	0.377	0.003	0.978
~F*L*C*U*O*B*~E	0.360	0.009	0.975
Solution coverage: 0.804 Solution consistency: 0.859			

rejected paths, elegance constituted the core condition missing in 9 paths. Therefore, the elegance of products should be considered when designing local cultural and creative products; if they are crude, it will be difficult to attract consumers' emotional recognition. (2) If "Localness" exists, the result will be rejected if originality is missing. So while designing products to inherit local culture, they should not be copied but should have unique and creative designs that meet contemporary consumer preferences. (3) When the result is rejected, Friendliness is often bound with elegance as the core condition missing, and when Friendliness exists as the core condition often originality and elegance become the core condition missing. This indicates that when Friendliness is missing in a cultural product, if elegance is also missing, it is likely to lead to the result being rejected, while when friendliness exists, if originality and elegance are missing together, it will also lead to the result being rejected. (4) The design concept of "new and different" products is not correct. By observing, the paths with the highest unique coverage in Table 8 (2) 13, we find that even if the local cultural and creative products are unique and creative at the same time, When friendliness and elegance are missing together it also causes the result to be rejected. So we should not overly pursue the uniqueness of the product form and ignore its cultural meaning and beauty.

As a whole, among the rejected results, the large number and complexity of 13 paths reflect the asymmetric and complex interaction among seven variables. When the results appear, all variables have positive influences,

and when the results are rejected, each variable has positive influences, and negative influences or do not appear in the 13 paths, which are due to the influence of other variables, so each factor should be considered comprehensively when designing vernacular cultural and creative products.

Comparison of gender factors' emotional preferences for local cultural and creative products

Sufficiency and necessity of a single factor

(1) Sufficiency and necessity of the single factor for men

In the single factor for men, when emotional identity is generated, the consistency scores of the seven emotional factor variables affecting people's identification with local cultural and creative products all above 0.80, which are different but still could provide some explanatory strength to their results. And the coverage values of those 7 factors all exceeded 0.80, closed to the requirement of the necessity condition. None of these seven variables constitutes a sufficient or necessary condition for whether boys can emotionally identify with local cultural and creative products. When emotional identity is rejected, according to the table data, there are no factors that can constitute sufficient or necessary conditions for boys' rejection. It shows that the result of boys rejecting emotional identity is the joint effect of multiple factors.

(2) Sufficiency and necessity of single factor for women

In the single factor for women, when emotional identity is generated, the seven variables' consistency scores all greater than 0.8, which is not a low score but only indicates some explanatory strength for the results. The coverage values of those 7 factors all exceeded 0.80, which is also closed to the requirement of the necessity condition. None of these seven variables constitute a sufficient or necessary condition for whether women can emotionally identify with local cultural and creative products. When emotional identity is rejected, according to the table data, there are no factors that can constitute sufficient or necessary conditions for girls' rejection. It shows that the result of girls rejecting emotional identity is the joint effect of multiple factors.

Conditional combination analysis

(1) Analysis of the path of boys' emotional identification with vernacular cultural and creative products

After obtaining the truth table, the PRI consistency is selected as 0.7.

When the results are accepted, only one path is able to interpret the results and achieved a coverage of 0.76 and consistency of 0.92. When the results are rejected, there are 11 paths predicting boys' emotional identification with vernacular cultural and creative products, and their combination can explain about 79.6% of the cases in which boys have emotional identification with vernacular cultural and creative products. The results can be expressed as follows (cf. Table 9).

The analysis can be found that (1) no single factor is a sufficient or necessary condition to influence boys'

emotional identification with the product, and the factors influencing boys' emotional intention are multiple and concurrent. (2) After analyzing the core conditions, it can be seen that when the product has friendliness, culture and elegance, it will trigger boys to buy. (3) When the product does not have friendliness and elegance, or originality and beauty are missing at the same time and is at the core, boys would not buy the product.

In contrast, boys pay more attention to the good external image conveyed by the product at the visual level when buying geo-cultural products, as well as the degree of novelty and whether the product itself has humanistic and cultural heritage.

(2) Path analysis of girls' emotional identification with local cultural and creative products

After obtaining the truth table, the PRI consistency is selected as 0.7.

When the results are accepted, only one path is able to predict girls' emotional identification with local cultural products, and its amount is able to cover 75.0% of the results and has a high consistency of 0.945. When the result is rejected, there are 10 paths predicting girls' emotional identification with local cultural and creative products, and the combination of which can explain about 78.3% of the cases of girls' emotional identification with local cultural and creative products. The results are shown in Table 10.

When the result is accepted, the analysis reveals that: (1) Among the emotional intentions of girls, friendliness, localization, uniqueness, originality and beauty are main influencing factors, which is enough to see the high

Table 9 Sufficiency analysis of the preconditioning combination for boys

Paths when the result is accepted	Raw coverage	Unique coverage	Consistency
F*L*C*U*O*B*E	0.755	0.755	0.916
Solution coverage: 0.755 Solution consistency: 0.916			
Paths when the result is rejected	Raw coverage	Unique coverage	Unique coverage
F*~C*~O*~B*~E	0.652	0.004	0.891
~F*~L*~C*~B*~E	0.648	0.010	0.889
~F*L*~U*~O*~B*~E	0.378	0.006	0.969
~F*L*~C*~U*~O*~E	0.368	0.001	0.968
~F*~L*~U*O*B*~E	0.373	0.000	0.965
F*~L*C*~U*~O*B*~E	0.363	0.001	0.960
~F*~L*C*~U*~O*B*~E	0.326	0.001	0.966
F*~L*~C*~U*~O*B*~E	0.345	0.004	0.961
F*L*C*U*~O*~B*~E	0.377	0.012	0.966
~F*~L*C*U*O*B*~E	0.330	0.013	0.948
F*L*C*U*O*B*~E	0.387	0.031	0.945
Solution coverage: 0.796 Solution consistency: 0.890			

Table 10 Sufficiency analysis of the preconditioning combination for girls

Paths when the result is accepted	Raw coverage	Unique coverage	Consistency
F*L*C*U*O*B*E	0.750	0.750	0.945
Solution coverage: 0.750 Solution consistency: 0.945			
Paths when the result is rejected	Raw coverage	Unique coverage	Consistency
~F*~C*~U*~O*~B*~E	0.682	0.286	0.832
~F*~L*~C*U*~O*~E	0.382	0.004	0.954
~F*C*~U*O*~B*~E	0.376	0.003	0.977
~F*L*C*O*~B*~E	0.368	0.001	0.977
~F*~L*C*~U*O*E	0.357	0.005	0.978
~F*L*C*U*B*~E	0.371	0.007	0.983
~F*~C*U*O*B*E	0.346	0.003	0.978
F*L*C*~U*~O*B*~E	0.368	0.009	0.981
F*L*~C*U*~O*B*~E	0.362	0.008	0.978
~F*L*~C*~U*~B*~E	0.374	0.002	0.973
Solution coverage: 0.783 Solution consistency: 0.847			

demand of girls for the vernacular cultural and creative products. (2) For the girls' emotional identification with local cultural products, when friendliness is missing, it will largely affect the girls' emotional identification with the cultural and creative products. (3) From the core conditions, when the result is rejected, such as the product lacks friendliness, originality and elegance at the same time, it will lead to the girl's inability to emotionally identify with the cultural and creative product. At the same time, when the beauty of the product is missing, the presence of localization may amplify the negative impact of the lack of beauty, resulting in difficulty for girls to develop emotional identification with the product. (4) We can see that girls have more complex factors in generating cultural identity. In contrast, girls' emotional identification with the products when buying geo-cultural products is due to feeling the emotional intimacy, experiencing their unique geo-cultural and humanistic characteristics, and seeing the unique innovation at the level of design communication.

(3) Comparison of male and female emotional identification with local cultural and creative products

In terms of the overall comparison of path characteristics, boys and girls have different paths of emotional identification with local cultural and creative products. It means that gender is different, the emotional factors that generate identification with local cultural and creative products are different, and thus the emotional preference for local cultural and creative products is also different. Due to personality traits, boys pay more attention to the creativity and beauty of creative products, while girls pay

more attention to the aesthetics and cultural attributes of creative products, and have different evaluation styles depending on the style of creative products.

Comparison of emotional preferences of cultural factors on vernacular cultural and creative products

The adequacy and necessity of individual factors

(1) Sufficiency and necessity of single factors for locals

In the single factor for locals, when emotional identity is generated, the consistency scores of the seven affective factor variables affecting people's identification with vernacular cultural and creative products are higher than 0.8, while friendliness and civilization are higher than 0.9, indicating that these variables have some explanatory power for the occurrence of the results. Meanwhile, coverage values for all factors except localization are above 0.9, indicating that these factors are likely to constitute sufficient conditions for the outcome to occur, but still require further analysis of the combination of the conditional variables to facilitate better predict local consumers' affective intentions toward the geo-culturally distinctive cultural products. When emotional identity is rejected, according to the table data, the consistency of friendliness and elegance above 0.9 may constitute a sufficient necessary condition. But nothing else can constitute a sufficient condition. The result of locals rejecting emotional identity is the joint effect of multiple factors.

(2) Sufficiency and necessity of the single factor of the foreigner

In the single factor for foreigners, when emotional identity was generated, the seven variables here have consistency scores all above 0.75, also indicating that these variables have some explanatory power for the occurrence of the results. At the same time, the coverage values of uniqueness, originality, beauty and elegance reached 0.80, close to the requirements of the necessity condition. However, none of these seven variables can also be used as sufficient or necessary conditions for the occurrence of the results, which also requires still further analysis of the combination of conditional variables. When emotional identity was rejected, according to the table data, there are no factors that can constitute sufficient or necessary conditions for locals' rejection. It shows that the result of locals rejecting emotional identity is the joint effect of multiple factors.

Analysis of combinations of conditions

- (1) Path analysis of local people's intention to develop emotional identification with vernacular cultural and creative products

After obtaining the truth table, the PRI consistency is selected as 0.7.

Here only three paths were able to predict the intention of local consumers to develop emotional identification with vernacular cultural and creative products, and with an overall consistency of 97.9%, there was high explanatory strength. The consistency score for each path was greater than 0.97 and the results were expressed as (cf. Table 11).

Analysis can reveal that: (1) In the two paths with original coverage above 0.7, friendly and beauty play a central conditional role in the emotional intention of locals. In another path with raw coverage of 0.32, friendly is the core condition, and uniqueness is missing as core conditions. (2) Originality and elegance can be substituted for each other, i.e. when local cultural and creative products

are not elegant but have the characteristics of originality and other factors, they can trigger the emotional identity of locals; when local consumers do not feel the originality of the products, but the commerciality, they can also trigger their emotional identity when they have elegance and other characteristics. (3) When the friendliness possessed by the product needs to be at the core, it will stimulate local people's desire to buy. When the product has friendliness, it will cause local consumers to buy even if there is the core element of uniqueness that does not exist.

When the result is rejected, there is only one path in which all conditions are missing, Friendliness, culture/civilization and Beauty are the core conditions missing. Compounding the analysis with the accepted results, it can be seen that friendliness and beauty are the two factors that will have a big impact on the locals.

- (2) Path analysis of foreigners' emotional identification with vernacular cultural and creative products

When the results are accepted, there is only one pathway that leads to emotional identification with the locals. When the results are rejected, 12 paths make it difficult for locals to identify with the results. The overall coverage of the seven paths was 0.799 and the overall consistency was 0.840, indicating that the combination of all conditions could explain about 79.9% of the cases and had a high explanatory power of necessity. Each pathway consistency score was greater than 0.86, indicating that all seven combined pathways had strong explanatory power, and the results can be expressed as follows (cf. Table 12).

When the result is rejected, Further analysis reveals that: (1) comparing paths 1 and 2, uniqueness and originality can be substituted for each other, i.e. when other emotional factors are the same, either the consumer perceives the originality or the uniqueness of the product is missing can lead to no emotional identification. (2) In many cases, when elegance is absent, the presence of localization can prevent foreigners from developing

Table 11 Sufficiency analysis of the preconditioning combination for locals

Paths when the result is accepted	Raw coverage	Unique coverage	Consistency
$F^* \sim L^* \sim U^* \sim O^* \sim B$	0.321	0.056	0.971
$F^* \sim L^* \sim C^* \sim U^* \sim O^* \sim B$	0.784	0.014	0.984
$F^* \sim L^* \sim C^* \sim U^* \sim B^* \sim E$	0.779	0.009	0.992
Solution coverage: 0.849 Solution consistency: 0.978			
Paths when the result is rejected	Raw coverage	Unique coverage	Consistency
$\sim F^* \sim L^* \sim C^* \sim U^* \sim O^* \sim B^* \sim E$	0.784	0.784	0.960
Solution coverage: 0.784 Solution consistency: 0.960			

Table 12 Sufficiency analysis of the preconditioning combination for foreigners

Paths when the result is accepted	Raw coverage	Unique coverage	Consistency
F*L*C*U*O*B*E	0.716	0.716	0.927
Solution coverage: 0.716 Solution consistency: 0.927			
Paths when the result is rejected	Raw coverage	Unique Coverage	Consistency
~F*~C*~O*~B*~E	0.656	0.005	0.824
~F*~C*~U*~B*~E	0.655	0.09	0.823
~L*~C*~U*~O*~B*~E	0.675	0.007	0.829
~F*~L*~C*~U*~O*~E	0.354	0.001	0.952
~F*~L*~C*~U*~O*~E	0.347	0.003	0.968
F*L*C*~U*~O*~E	0.378	0.002	0.971
F*L*~C*~U*~O*~E	0.361	0.004	0.968
~F*L*C*~U*~O*~B	0.349	0.001	0.967
F*L*C*U*~B*~E	0.383	0.04	0.974
~F*L*C*U*B*~E	0.349	0.001	0.976
F*L*C*U*O*~E	0.383	0.005	0.968
~F*L*C*U*O*B	0.363	0.014	0.965
Solution coverage: 0.799 Solution consistency: 0.840			

emotional identification, possibly because some foreigners perceive local cultural symbols as lacking in beauty. (3) The presence and absence of each of the seven variables suggests that there is a crossover effect between the seven variables. (4) After the core conditions are analyzed, it can be seen that when the results are accepted, friendliness, civilization, uniqueness, originality and elegance are the core conditions. When the result is accepted and rejected, we can find that friendliness and

localization have a certain degree of co-linearity. When the result is rejected, friendliness and beauty of the cultural product are jointly missing as core conditions, and at this time, uniqueness and originality are interchangeable as core conditions missing. It shows that when either uniqueness or creativity is missing, it may lead to foreigners' failure to develop emotional identity.

Compared with locals, foreigners are more sensitive to the lack of aesthetic type of condition, if the aesthetic

Table 13 Sufficiency analysis of the conditional combination for boys and girls

Paths when the result is accepted	Raw coverage	Unique coverage	Consistency
F*L*C*U*O*B*E	0.747	0.747	0.943
Solution coverage: 0.747 Solution consistency: 0.943			
Paths when the result is rejected	Raw coverage	Unique coverage	Consistency
~F*~L*~C*~O*~B*~E	0.680	0.184	0.849
~F*L*~U*~O*~B*~E	0.393	0.002	0.973
~F*~C*~O*~B*~E*boys	0.228	0.001	0.885
~F*~L*~C*~B*~E*boys	0.227	0.004	0.883
F*~L*~U*~O*~B*~E*~boys	0.260	0.004	0.962
~F*L*~C*~U*~B*~E*~boys	0.250	0.000	0.973
~F*~L*~C*~U*~O*~E*~boys	0.257	0.000	0.950
~F*~L*~C*~U*~O*~B*~boys	0.224	0.003	0.880
~F*L*C*~O*~B*~E*~boys	0.255	0.001	0.976
L*~C*~U*~O*~B*~E*~boys	0.262	0.006	0.977
F*L*C*~U*B*~E*~boys	0.254	0.003	0.980
~F*~C*~U*~O*B*~E*~boys	0.231	0.002	0.976
~F*~L*C*~U*~O*~B*~E*~boys	0.240	0.001	0.975
~F*~L*C*~U*~O*B*~E*~boys	0.231	0.002	0.982
~F*~L*C*~U*~O*B*~E*~boys	0.116	0.002	0.973
~F*L*C*~U*~O*B*~E*~boys	0.242	0.004	0.981
F*L*C*~U*~O*~B*~E*~boys	0.132	0.016	0.973
Solution coverage: 0.785 Solution consistency: 0.862			

Table 14 Sufficiency analysis of the conditional combination for locals and foreigners

Paths when the result is accepted	Raw coverage	Unique coverage	Consistency
F*L*C*U*O*B*E	0.747	0.747	0.943
Solution coverage: 0.747 Solution consistency: 0.943			
Paths when the result is rejected	Raw coverage	Unique coverage	Consistency
~F*~C*U*~O*~E*~local	0.329	0.009	0.953
~F*~C*~U*O*~B*~E	0.375	0.001	0.956
F*~L*~U*~O*~B*~E*~local	0.329	0.001	0.962
~F*~L*~C*~U*~O*~B*~local	0.101	0.034	0.992
~F*L*C*~U*~O*~B*~E	0.379	0.002	0.977
~F*~L*C*~U*O*~B*~local	0.307	0.002	0.971
~F*~L*C*~U*~O*B*~local	0.308	0.003	0.972
L*C*U*~O*~B*~E*~local	0.343	0.005	0.976
L*~C*U*~O*B*~E*~local	0.323	0.005	0.977
F*~L*~C*~U*~O*B*E*~local	0.301	0.004	0.978
~F*L*~C*~U*~O*B*E*~local	0.277	0.000	0.978
F*L*C*~U*~O*B*~E*~local	0.316	0.003	0.979
~F*L*C*U*O*B*~E*~local	0.303	0.008	0.973
F*~L*~C*~U*~O*~B*~E	0.385	0.005	0.964
~F*L*~C*~U*~B*~E*~local	0.313	0.003	0.971
~F*~L*~C*O*~B*~E*~local	0.314	0.001	0.956
Solution coverage: 0.592 Solution consistency: 0.941			

type of condition is not enough, it is likely that they will not be able to understand the local culture deeply. At the same time, foreigners also focus on the uniqueness of the product design. At the same time, foreigners also focus on the uniqueness of the product design. Therefore, when targeting foreigners, it is more important to focus on whether the product itself is unique and beautiful enough to be attractive. (cf. Tables 13, 14).

(3) Comparison of local and foreigners' emotional identification with local cultural and creative products

From the overall comparison of path characteristics, local people and foreigners have different paths of emotional identification with local cultural and creative products, i.e., the emotional factors of identification with local cultural and creative products are different according to their geographical location. Locals mainly consider the friendliness, civilization and elegance of the products, but foreigners consider the uniqueness and creativity of the products. If the local cultural and creative products tend to be homogeneous with other geopolitical products and do not produce differences, it is difficult to arouse the emotional recognition of foreign consumers.

From the comparison of the number of paths, when results are generated, there are fewer paths of agreement for both locals and foreigners. When the results are rejected, more paths are generated by foreigners, which indicates that the combination of emotional factors that reject recognition of

local cultural and creative products by foreigners is more diverse and complex. Therefore, in order to better promote local culture and make more people accept regional cultural and creative products, more attention should be paid to the factors that influence foreigners' emotional intentions. Showing the unique cultural characteristics of the local area and forming a distinctive style of regional cultural and creative products can significantly reduce the substitutability of the products, improve the competitiveness of the products among many geo-cultural products, meet the consumers' demand of eagerness to learn about the local cultural characteristics, and turn the cultural value into economic value.

Comparative analysis of paths after introducing dummy variables

Univariate necessity analysis

After adding dummy variables, in the comparative study of the overall consumers' emotional identification with local cultural and creative products, when emotional identity is generated, the consistency of antecedent conditions and the dummy variable does not reach 0.9. According to our data, there are no factors that can constitute sufficient or necessary conditions for a generation. When emotional identity is rejected, the consistency of antecedent conditions and the dummy variable does not reach 0.9. According to our data, there are no factors that can constitute sufficient or necessary conditions for rejection. It shows that the result of rejecting emotional identity is the joint effect of multiple factors.

Through the above analysis, it can be seen that these seven variables can not be used as sufficient or necessary conditions for the occurrence of results. Since the behavior of emotional identification with local cultural and creative products is "multiple complex concurrent causality", it is necessary to further analyze the combination of conditional variables to study how emotional factors affect people's identification, so as to better predict the trend of consumers' emotional identification of cultural and creative products in this region.

Conditional combination analysis

After introducing dummy variables, we conducted conditional path analysis, and the results are as follows.

- (1) Analysis of the path of boys' and girls' emotional identification with vernacular cultural and creative products.

We introduced gender into the research process as a dummy variable and compared the paths of "girls" and "boys". When the scenarios in which the results are accepted are discussed, it can be seen that when all the extracted conditions in the question are absent, the desire to consume does not arise regardless of gender.

In discussing the scenarios of outcome are accepted, it is evident that the conditions for girls' difficulty in generating emotional identification are more complex and diverse, and are tied to the aesthetics and culture of the product. Friendship, uniqueness, originality and elegance are often absent when guys don't develop emotional identity, in line with the inferences made in the previous conclusions in the text.

- (2) Analysis of the path of locals' and non locals' emotional identification with vernacular cultural and creative products

We introduced whether it is a local person into the research process as a virtual variable, and compared the paths of "local people" and "non-local people". We found that the consistency of all paths is greater than 0.85, and the overall consistency is greater than 0.9. The conclusion has explanatory power. When the results are accepted, unrelated to geography, the presence of all conditions leads to the creation of emotional identity between locals and foreigners.

When the result is rejected, from the results, it can be seen that the paths for non-locals to generate emotional and cognitive preferences are more complex and diversified, while the paths for locals to generate emotional and cognitive preferences are relatively single. In terms of the core conditions, locals mainly consider the cultural

deficit when it comes to the lack of emotional identity of cultural and creative products. This indicates that locals are somewhat inclusive of local products, while being more sensitive to cultural absence.

When foreigners are the core condition, it will be combined with friendliness, originality and elegance, which is consistent with the previous results.

(3) Conclusion

After the dummy variable is added, the conclusion of conditional path analysis on gender and region is clearer than that when it is not added, which explains some new problems. At the same time, the conclusions of the two analysis methods are consistent to a certain extent, which proves that the conclusion of the article is robust.

1. The analysis results of gender factors are relatively stable.
2. After the analysis about locals and foreigners, new results with more uniqueness are obtained.
3. Although there are many paths generated after adding virtual variables, the paths unrelated to gender or region can be excluded in the data processing stage, so that the results can more prominently explain the problem.

Research findings and recommendations

According to past literature, the geopolitical intention is generated as a result of personal emotional reflection. [53] Norman [36] points out in the theory of cognitive and emotional operation of design that emotion is multifaceted and complex. It is mainly divided into three levels of emotion. The final level of reflection is the understanding and meaning interpretation of things. This level is most susceptible to culture, habit and gender differences. Based on this, the article takes the traditional New Year paintings of Wuqiang area in Hebei province as the basis, extracts the patterns with cultural characteristics and applies them to clothes, and explores which emotional factors of products with geo-cultural characteristics will influence people's identification. Through the study, it can be found that:

- (1) The emotional identity of local cultural and creative products is directional.

Through the analysis of cultural and customary factors, it can be found that the degree of understanding of geo-culture by locals and foreigners is not the same as the influence path of local cultural and creative products. The local people's understanding of the local cultural environment makes their recognition path tend to be

from culture to elegance, and the recognition pays more attention to the cultural connotation and the uniqueness of the product itself. For foreigners, people's recognition path tends to be from elegance to culture, and the affinity and high-quality appearance of the product is more attractive to them who want to continue to understand the culture of the region, resulting in emotional identity. Therefore, for the design of local cultural and creative products, it is necessary to pay attention to different consumer groups and cultural backgrounds.

Through the analysis of gender factors, it can be found that gender factors will directly affect the identity and preference of local cultural and creative products. The originality and the uniqueness of the product itself are the main factors that attract boys to have an emotional identification with the local cultural and creative products; and the high-quality appearance and the cultural connotation of the product is the key to stimulating the emotional identity of girls, reflecting the innate "aesthetic" characteristics of most girls. Therefore, when designing local cultural and creative products with gender needs, attention should be paid to the presentation of gender emotional characteristics. Products can be targeted at male and female preferences to produce design behavior, integrate different gender characteristic factors, meet the different genders of the local cultural and creative products themselves and the appearance of the pursuit, thereby reducing the expected deviation of consumers.

In summary, people's identification with local cultural and creative products has a strong orientation, the design of local cultural and creative products is not only a simple "product + culture", but the role of geo-culture on people's identity is also affected by many factors. The core of identity is more in line with the emotional characteristics of consumers, highlighting psychological needs. Therefore, the core of the design of local cultural and creative products should take cultural elements as the source of creativity to meet the spiritual needs of users. In addition to cultural elements in design, it is more necessary to consider the orientation of emotions, and integrate emotional needs into the design, so as to evoke the emotional identity of consumers. At the same time, the product can maintain its nationality so that different cultural groups around the world can identify with the product, and finally achieve the purpose of cultural dissemination through consumption behavior.

- (2) The emotional identity of vernacular cultural and creative products has multiple concurrent characteristics.

Most past studies have concluded that regional identification is the basis for vernacular cultural and creative product design to distinguish itself from other products, improve recognition, and gain consumers' emotional recognition [54]. However, in the feedback from actual test subjects, we found that although cultural infusion does play a role in product development, people's emotional identification with vernacular cultural and creative products depends on a combination of causal paths, where beauty and elegance actually play a greater role than localness and humanity, which are generally perceived to reflect geo-cultural characteristics. At the same time, it is proved that gender and cultural differences will also lead to cultural differences and emotional identity differences. Although it is undeniable that the actual factors influencing the process of product identification from geo-cultural recognition to emotional identity may be more complex, including other factors such as consumption environment and social networks, this study still partially explains the primacy of the relationship between design and application of cultural and creative products. It also points out that more consideration should be given to product characteristics and usage environment in the design of different types of vernacular cultural products, and that strengthening different elements will help improve the emotional identity of this product.

In summary, the study concludes that the emotional identity of vernacular cultural products should consider the influence of multiple concurrent factors. Because no single condition can have a decisive effect on the outcome of this issue, and no single condition has a different influence and power on people's emotional identity of local cultural and creative products, no single combination of causes is a sufficient or necessary condition for forming the emotional identity of local cultural and creative products. Therefore, in the design of vernacular cultural and creative products, as much local characteristics should be incorporated as possible to avoid the piling up of convergent cultural elements; on the other hand, efforts should be made to strengthen the individuality of the products, so as to consolidate the psychological geo-identity of the products. At the same time, it should focus on reflecting its artistic value. On the basis of adhering to the geo-cultural connotation, the traditional model of cultural and creative products is broken through the shackles and appropriate innovation is made to the cultural and creative products. Through different designs of shape, color and volume, the rhythm of local cultural and creative products can be increased, which can produce irresistible regional cultural infections and trigger consumers' visual feelings, so as to achieve the goal of people's emotional recognition of local cultural and creative products.

Appendix

See Tables 15, 16, 17, 18, 19

Table 15 Necessity analysis of comprehensive single antecedent conditions

	Result condition: Generate emotional identity		Result condition: Reject emotional identity	
	Consistency	Coverage	Consistency	Coverage
Friendliness F	0.831	0.826	0.541	0.519
Localization L	0.811	0.816	0.581	0.565
Civilization C	0.825	0.809	0.600	0.569
Uniqueness U	0.838	0.839	0.580	0.560
Originality O	0.828	0.857	0.558	0.557
Beauty B	0.827	0.844	0.556	0.547
Elegance E	0.843	0.857	0.536	0.526
~ Friendliness ~ F	0.515	0.538	0.819	0.824
~ Localization ~ L	0.568	0.384	0.810	0.805
~ Civilization ~ C	0.559	0.591	0.798	0.815
~ Uniqueness ~ U	0.560	0.580	0.833	0.833
~ Originality ~ O	0.572	0.573	0.857	0.828
~ Beauty ~ B	0.556	0.564	0.842	0.825
~ Elegance ~ E	0.534	0.544	0.853	0.840
Boys	0.333	0.501	0.342	0.499
Locals	0.203	0.567	0.160	0.433

Table 16 Necessity analysis of single antecedent conditions for boys

	Result condition: Generate emotional identity		Result condition: Reject emotional identity	
	Consistency	Coverage	Consistency	Coverage
Friendliness F	0.848	0.826	0.515	0.526
Localization L	0.810	0.816	0.557	0.582
Civilization C	0.817	0.809	0.568	0.591
Uniqueness U	0.851	0.839	0.553	0.560
Originality O	0.852	0.857	0.539	0.569
Beauty B	0.859	0.844	0.513	0.533
Elegance E	0.856	0.857	0.490	0.531
~ Friendliness ~ F	0.487	0.538	0.789	0.852
~ Localization ~ L	0.558	0.384	0.777	0.819
~ Civilization ~ C	0.566	0.591	0.779	0.824
~ Uniqueness ~ U	0.521	0.580	0.783	0.828
~ Originality ~ O	0.532	0.573	0.808	0.825
~ Beauty ~ B	0.503	0.564	0.815	0.865
~ Elegance ~ E	0.522	0.544	0.852	0.867

Table 17 Necessity analysis of single antecedent conditions for women

	Result condition: Generate emotional identity		Result condition: Reject emotional identity	
	Consistency	Coverage	Consistency	Coverage
Friendliness F	0.822	0.835	0.541	0.508
Localization L	0.809	0.830	0.584	0.554
Civilization C	0.835	0.813	0.505	0.551
Uniqueness U	0.832	0.853	0.582	0.552
Originality O	0.835	0.840	0.580	0.541
Beauty B	0.812	0.858	0.560	0.548
Elegance E	0.840	0.851	0.551	0.517
~ Friendliness ~ F	0.516	0.548	0.825	0.812
~ Localization ~ L	0.565	0.595	0.820	0.799
~ Civilization ~ C	0.544	0.598	0.797	0.808
~ Uniqueness ~ U	0.563	0.593	0.845	0.823
~ Originality ~ O	0.544	0.584	0.829	0.823
~ Beauty ~ B	0.573	0.585	0.854	0.808
~ Elegance ~ E	0.523	0.557	0.841	0.830

Table 18 Necessity analysis of single antecedent conditions for locals

	Result condition: Generate emotional identity		Result condition: Reject emotional identity	
	Consistency	Coverage	Consistency	Coverage
Friendliness F	0.912	0.944	0.416	0.369
Localization L	0.852	0.878	0.448	0.396
Civilization C	0.931	0.913	0.481	0.404
Uniqueness U	0.897	0.911	0.448	0.390
Originality O	0.893	0.900	0.489	0.422
Beauty B	0.872	0.913	0.435	0.391
Elegance E	0.882	0.920	0.442	0.395
~ Friendliness ~ F	0.391	0.439	0.937	0.900
~ Localization ~ L	0.413	0.467	0.862	0.833
~ Civilization ~ C	0.392	0.469	0.896	0.918
~ Uniqueness ~ U	0.400	0.458	0.898	0.881
~ Originality ~ O	0.426	0.494	0.884	0.877
~ Beauty ~ B	0.418	0.464	0.903	0.858
~ Elegance ~ E	0.420	0.468	0.911	0.868

Table 19 Necessity analysis of single antecedent conditions for foreigners

	Result condition: Generate emotional identity		Result condition: Reject emotional identity	
	Consistency	Coverage	Consistency	Coverage
Friendliness F	0.806	0.783	0.566	0.543
Localization L	0.786	0.793	0.602	0.600
Civilization C	0.795	0.777	0.617	0.595
Uniqueness U	0.807	0.828	0.584	0.592
Originality O	0.811	0.817	0.578	0.576
Beauty B	0.791	0.839	0.555	0.581
Elegance E	0.813	0.830	0.543	0.547
~Friendliness ~F	0.529	0.553	0.773	0.798
~Localization ~L	0.604	0.606	0.793	0.786
~Civilization ~C	0.586	0.608	0.768	0.787
~Uniqueness ~U	0.603	0.595	0.830	0.809
~Originality ~O	0.579	0.581	0.816	0.810
~Beauty ~B	0.605	0.579	0.846	0.800
~Elegance ~E	0.555	0.551	0.831	0.815

Acknowledgements

Not applicable.

Author contributions

XF is responsible for project conceptualization and methodology; LY completed the data analysis and responsible for investigation; GQC completed the writing of the manuscript; XF and LY have been reviewed and edited the writing of the manuscript. All authors read and approved the final manuscript.

Funding

This research was funded by the National Social Science Foundation of China Art Project (No.20BG106).

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations**Competing interests**

The authors declare that they have no competing interests.

Received: 4 November 2022 Accepted: 26 March 2023

Published online: 10 April 2023

References

- Xiang Y. Value logic, action framework and path choice of rural cultural innovation in the new development stage (in Chinese). *J Beijing Dance Acad.* 2021;35(4):83–8.
- Luo J. Research on practice path of public library cultural creative product marketing based on SIPS model (in Chinese). *Library Work Res.* 2021;43(6):24–9.
- Patrick VM, Hollenbeck CR. Designing for all: consumer response to inclusive design. *J Consum Psychol.* 2021;31(2):360–81.
- Liu MK, Sang HL, Liang JH. Influencing factors of the development factors of cultural and creative products in rural tourism (in Chinese). *J Guizhou Univ Finance Econ.* 2021;39(05):101.
- Zhang GG, Chen XY, Law R, Zhang M. Sustainability of heritage tourism: a structural perspective from cultural identity and consumption intention. *Sustainability.* 2020;12(21):9199.
- Wang Y, Sun YH, Su YY, Jiao WJ. A study on agricultural cultural heritage tourism interpretation resources based on community participation—an example of rice-fish symbiosis system in Qingtian, Zhejiang (in Chinese). *J Tour.* 2020;35(5):75–86.
- Yin CH. On regional geographic image and regional media external communication (in Chinese). *J Northwes AF Univ.* 2013;13(2):88–91.
- Xu LP. The application of regional cultural symbols in the cultural and creative product design based on psychological resonance strategy (in Chinese). *Enterp Econ.* 2018;38(12):109–14.
- Deng XN, Qu JD, Qu Y, Wang NM, Zheng ZM, Zhang SL. Artistic practices in contemporary rural construction (in Chinese). *Acad Res.* 2016;10:51–78.
- Wang N. Rural tourism and rural cultural revival: a consumer-sponsored perspective (in Chinese). *J Tour.* 2019;34(6):6–7.
- Wang XY. Case study of innovative design of regional cultural elements in the central plains (in Chinese). *Decoration.* 2020;35(5):112–5.
- Jiang YZ. The artistic form and the development of the culturally creative products of Xiangnan Yaozu embroidery (in Chinese). *Guizhou Ethnic Stud.* 2018;39(3):128–32.
- Yan XH. Design rooted in local—a case study of cultural and creative design in Yonghe County, Shanxi Province (in Chinese). *Fine Arts Obs.* 2021;41(4):142–3.
- Xu SB. Cultural memory reconstruction on the earth: a case study of the earth art festival in Echigo Wife Area, Japan (in Chinese). *Hundreds Arts.* 2020;36(3):82–9.
- Xie CF. Application of regional cultural elements in cultural and creative product design (in Chinese). *Packag Eng.* 2020;41(8):313–6.
- Khalid HM, Helander MG. A frame work for affective customer needs in product design. *Theor Issues Ergon Sci.* 2004;5(1):27–42.
- Li MS, He MQ. A study on recognizing the design of ceramic products comprehensively. Taiwan: Institute of industrial design of National Yunlin University of Science and Technology. 2005.
- Jagtap, S. Attributes and emotions in product form design: a survey of professional industrial designers. In: Chakrabarti A, Chakrabarti D, editors. *Research into Design for communities*, volume 2: Proceedings of ICoRD. Singapore. Springer. 2017. 705–714.
- Tu JC, Liu LX, Cui YA. Study on consumers' preferences for the palace Museum's cultural and creative products from the perspective of cultural sustainability. *Sustainability.* 2019;11(13):3502.
- Hou Y. Research on the application of emotional design in cultural creative product design. *E3S Web of Conferences.* 2020. 179(4). 02119.
- Ma RG, Lin W. Exploring new ideas of cultural and creative product design based on regional culture (in Chinese). *Packag Eng.* 2022;43(10):312–8.
- Dan N. How May the Aesthetic language of artwork represent reality. In: Munz VA, Puhl K, Wang J, editors. *From the ALWS archives: a selection of papers from the international wittgenstein symposia in Kirchberg am Wechsel.* 2014.
- Leong BD, Hazel C. Culture-based knowledge towards new design thinking and practice: a dialogue. *Des Issues.* 2003;19(3):48–58.
- Baudrillard J. *For a critique of the political economy of the sign.* New York: Verso Books; 2019.
- Chai CL, Bao DF, Sun LY, Cao Y. The relative effects of different dimensions of traditional cultural elements on customer product satisfaction. *Int J Ind Ergon.* 2015;48:77–88.
- Rofianto W, Haque MG, Sunarsi D, Sapari HSH. Cultural product branding, antecedents, and its implications: a study on the context of indonesian batik. *Int J Soc Policy Law.* 2021;2(2):37–46.
- Richards G. Designing creative places: the role of creative tourism. *Ann Tour Res.* 2020;85: 102922.
- Li M. A few basic patterns of artistic identity (in Chinese). *Natl Arts.* 2021;37(4):117–31.
- Ahuvia A, Rauschnabel PA, Rindfleisch A. Is brand love materialistic? *J Prod Brand Manag.* 2020;30(3):467–80.
- Jain R, Jayesh A, Shilpa B. Customer experience—a review and research agenda. *J Serv Theory Pract.* 2017;27:3.

31. Voorn RJJ, van der Veen G, van Rompay TJL, Hegner SM, Pruy AH. Human values as added value(s) in consumer brand congruence: a comparison with traits and functional requirements. *J Brand Manag.* 2021;28(1):48–59.
32. Diener E, Cha Y, Oishi S. Reinterpreting mood induction experiments. *J Positive Psychol.* 2022. 1–11.
33. Lewis JR, Jeff S. Usability and user experience: design and evaluation. *Handbook of Human Factors Ergon.* 2021. 972–1015.
34. Maslow A. *Motivation and personality.* Beijing: China Renmin University Press; 2012.
35. Roggeveen AL, Rosengren S. From customer experience to human experience: uses of systematized and non-systematized knowledge. *J Retail Consum Serv.* 2022;67: 102967.
36. Norman D. *The design of everyday things: revised and expanded.* New York: Basic books; 2013.
37. Chatzipanagiotou K, Christodoulides G, Veloutsou C. Managing the consumer-based brand equity process: a cross-cultural perspective. *Int Bus Rev.* 2019;28(2):328–43.
38. Yang SC, Peng LH, Hsu LC. The influence of teacup shape on the cognitive perception of tea, and the sustainability value of the aesthetic and practical design of a teacup. *Sustainability.* 2019;11(24):6895.
39. Klijn EH, Nederhand J, Stevens V. The necessity of collaboration in branding: analysing the conditions for output legitimacy through qualitative comparative analysis (QCA). *Public Manag Rev.* 2022;24(5):664–82.
40. Fiss PC, Sharapov D, Cronqvist L. Opposites attract? Opportunities and challenges for integrating large-N QCA and econometric analysis. *Polit Res Quarterly.* 2013. 191–198.
41. Lindström M, Seybold PB, Hoyle DB. *Brandchild: Remarkable insights into the minds of today's global kids and their relationships with brands.* London: Kogan Page Publishers; 2003.
42. Marx A. *Towards more robust model specification in QCA results from a methodological experiment.* Philadelphia: American Sociological Association; 2006.
43. Yen HY, Lin BY, Lin RT. Qualia characteristics of cultural and creative products (in Chinese). *J Kansei.* 2014;2(1):34–61.
44. Yu L, Feng X, Wang J, Chen WQ. Research on the mechanism of emotional design in Chinese cultural and creative products. *Heritage Sci.* 2022;10(1):1–18.
45. Feng SG, Xu WT. The origin and carrier of Beijing-Tianjin-Hebei cultural circle (in Chinese). *J Hebei Univ Technol.* 2013;5(02):9–15.
46. Lane AM, Sewell DF, Terry PC, Bartram D, Nesti MS. Confirmatory factor analysis of the competitive state anxiety inventory-2. *J Sports Sci.* 1999;17(6):505–12.
47. Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. *J Mark Res.* 1981;18(1):39–50.
48. Hair JF. *Multivariate data analysis.* Kennesaw: Kennesaw State University; 2009.
49. Meng M, Zhu QH. Research on mobile social media users' continuous use behavior (in Chinese). *Modern Intell.* 2018;38(01):5–18.
50. Greckhamer T, Furnari S, Fiss PC, Aguilera RV. Studying configurations with qualitative comparative analysis: Best practices in strategy and organization research. *Strateg Organ.* 2018;16(4):482–95.
51. Goldman BM, Leland HE, Sibley DS. Optimal nonuniform prices. *Rev Econ Stud.* 1984;51(2):305–19.
52. Chen SL, Guo KX, Gong K, Ouyang TH. A research on the matching mechanism of Chinese traditional creative products and users: taking Yuxian ceramics as an example (in Chinese). *Foreign Econ Manag.* 2021;43(7):141–52.
53. Woodward K. *Questioning identity: gender, class, ethnicity.* Brandon: Psychology Press; 2004.
54. Zhang MZ, Chen X. Regional culture + regional tourism: Innovation of tourism industry development mode based on industry integration (in Chinese). *Econ Probl.* 2021;43(1):12–8.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Submit your manuscript to a SpringerOpen[®] journal and benefit from:

- Convenient online submission
- Rigorous peer review
- Open access: articles freely available online
- High visibility within the field
- Retaining the copyright to your article

Submit your next manuscript at ► [springeropen.com](https://www.springeropen.com)