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Scale transformation of place brands: a visual study of Xinhepu, Guangzhou

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Place branding has become a popular strategy to promote place visibility and place image communication and gains attention in the field of city planning, geography, and place management. The contribution of geographical knowledge has been emphasized and discussed in recent place branding studies, including the role of geographical scale in branding strategies and management. However, current research mainly places the issues of scale from the top-down perspective of branding governance, and the bottom-up processes based on local culture and embodied experiences are overlooked. Drawing on participatory-based visual methodology, in the article, a combination of self-directed photography, photo evaluation, eye-tracking experiment, and interview are employed to the scale transformation performance of place brands from the perspective of embodied experience. Taking Xinhepu in Guangzhou, China as a case study, the results show that both residents and nonresidents do not limit their perception of the Xinhepu brand to a microscale space but point to the city of Guangzhou. Specifically, the process of scale transformation of place brands is characterized by the interaction of temporal and spatial factors that provide possibilities for scale transformation. The physical landscape in space plays a role in place branding, while in time scale, Xinhepu connects Guangzhou's past and present and is a microcosm of the city's image and historical development; thus, in people's embodied perception, Xinhepu can be transformed into a city brand through place culture creation. The article can provide a new explanation for the construction of place branding at multiple geographical scales and explore how the body's unconscious, nonrepresentational rhythms play a role in place brand scale transformation.

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Introduction

A place brand is the associative information network based on the vision, language, and other types of behavioral expression of a place in people's minds, and it is reflected through the strategic objectives, communication, culture, and values of place stakeholders and the overall spatial design of the place (Braun and Zenker, 2011). In recent years, the study of place brands has no longer been considered a topic limited to marketing and communication, but its 'geographical dimension' is being emphasized (Kavaratzis and Hatch, 2013). Given that the objects and processes of place branding cannot escape their sociospatial context and historical imprint and are inevitably influenced by spatial interconnections (Andersson, 2015; Pike, 2009), the geographic perspective has contributed to this research by highlighting the contribution of inter- and intraregional interactions to the branding process (Pasquinelli, 2013).

Place brands as understood from a geographic perspective no longer exist in a single space, and much attention has been given to the spatial relationships in which place brands are embedded, particularly the impact of multilevel geographic spaces on branding. The number of studies in the field of place brands in cities has grown exponentially over the last four decades, with numerous scholars compiling and summarizing research in the field (Oguztimur and Akturan, 2016), nation brands (Wu, 2017), regional brands (Lu and De Jong, 2019), and rural brands (De San Eugenio-Vela and Barniol-Carcasona, 2015), among other multiscale branding studies, also emerging. The study of brand and branding is increasingly linked to geographic space, as reflected in the application of place brands at the spatial level at different scales, which continues to gain increasing attention.

Understanding the various geographical dimensions of place branding is important (Boisen et al., 2011), but studies of place brands tend to focus independently on one or more specific spatial levels (Syssner, 2010), ignoring small-scale or marginal places (Andersson, 2015) and lacking an even more relational perspective on place brands at different scales. Indeed, place branding is an ongoing process that links the various scales and spatial relationships involved in place (Kavaratzis, 2009; Kavaratzis and Kalandides, 2015). Far from consisting of explicit processes that occur within prefixed scale boundaries, urban, regional, and national brands converge in an intertwined mechanism of practices (Giovanardi, 2015). For example, the idea of multilevel governance in place brands highlights how relationships between places at different scales influence place branding (Syssner, 2010; Audouin, 2022).

However, interactions between different geographical scales are not only present in governance structures but are also reflected in bottom-up processes based on local culture and embodied experiences (Sang, 2021). The profound influence of culture on local development determines its role as an effective tool for place branding (Anholt, 2016) and in branding at different scales (Dastgerdi and De Luca, 2019; Kolotouchkina and Seisdedos, 2016; Porter, 2020; Zhao, 2015). Place branding is built on people's understanding, identification, and construction of the meaning of place culture (Kavaratzis and Hatch, 2013), and people's perception of place culture can be cross-scale (Lewicka, 2010). With the recent emphasis of human geographers on the body and the prevalence of nonrepresentational theories, local culture is considered formed in 'body-space' interactions (Anderson, 2020). The meaning of place is not fixed but cocreated through embodied practices (Kavaratzis and Hatch, 2021). At the body scale, human sensory expressions can directly convey the subject's feelings and mental states, and visual responses, in particular, are often the first experience of geographic space for people (Rose, 2014). However, the relationship between the body and place brand is underexplored in current research (Macpherson, 2010).

We selected the Xinhepu historic district in Guangzhou, China, as a case study and used a visual research methodology centered around an eye-tracking experiment to explore how the place brand undergoes a scale transformation from the perspective of audience embodiment perception. Specifically, we focus on answering two questions. First, does the embodied perception of Xinhepu by subjects with different identities reflect the scale transformation of the place brand? Second, what role do embodied perceptions play in the scale transformation of place brands? The main contributions of the article are as follows: first, to provide a new explanation for the construction of place branding at multiple geographical scales by applying the theory of 'scale transformation' in cultural geography and to explore the multi-scale characteristics of place brands and their scale transformation from a bottom-up perspective instead of governance; second, to focus on the relationship between the body and the meaning construction of place brands based on the visual research method and to explore the relationship between the body and the meaning of place brands constructs, exploring how the body's unconscious, nonrepresentational rhythms play a role in place brand scale transformation.

The visual research process of Xinhepu strings together the structure of this study, in which we collect people's evaluations of Xinhepu's brand attributes through photo evaluations; and use eye-tracking experiments to obtain eye-movement data of subjects with different identities to analyze how people's perceptions of Xinhepu are reflected in the larger-scale urban culture level; and further, explore how Xinhepu's place brand is transformed into a city brand through place. Through the interviews of the participants, we further explore how the local brand of Xinhepu is transformed into a city brand through local culture creation, thus providing a reference for city brand management and small regional culture construction.

Literature review

Scale transformation of place brands. Brands are abstract characteristics, images, and mental images that consumers recall when they associate with a specific symbol, product, service, organization, or place (Kavaratzis and Ashworth, 2005; Simeon, 2006), embodying associated physical and psychosocial attributes and beliefs (Claudia and Sally, 2001). A place brand is developed from the concept of a brand, which involves numerous stakeholders internally (Hospers, 2010) and has more complex dimensions and uncontrollability than the product (Nagaynay and Lee, 2020). Sense of place theory (Nogué and de San-Eugenio-Vela, 2018), spatial production theory (Kavaratzis and Hatch, 2021), and structuration theory (Pedeliento and Kavaratzis, 2019) are increasingly used in brand research to reveal the characteristics of different places. Hankinson (2004) identifies four meanings of place branding based on his observations and assessments in different fields, such as urban planning, marketing, and tourism: place branding as a form of communication; place branding as a perceived entity; place branding as an enhancement of place value; and place branding as an expansion of relational networks. These meanings provide insights into some relatively general directions of place branding and contain reflections on locality and relationality.

In terms of locality, place brands are rooted in geography, and brands and branding themselves are geographically distinct and uneven in terms of their spatiotemporal representation, visibility, fixity, and mobility (Pike, 2009). 'Scale' is a central concept in geography (Howitt, 1998) and is a framework for delineating different spatial scales, both horizontally (size of territory) and vertically (level of hierarchy) (Taylor, 1982; Swyngedouw, 1997).

Using the spatial scale of geography to understand place brands, the implementation of branding processes usually adheres to a large extent to the regulation of certain scales, such as the city level, the regional level, and the national level, resulting in labels such as city brand, regional brand and national brand (Giovanardi, 2015).

Scale is not a fixed hierarchy but a socially constructed dimension (Delaney and Leitner, 1997). With the 'scale turn' in human geography, there has been a shift from a realist to a constructivist understanding of scale, where scale is seen as a product of broader social, political, economic, and cultural processes (MacKinnon, 2011), implying that there is interaction between different levels of scale (Paasi, 2004). With hot topics such as assemblage theory, complexity theory, and actor-networks theory reconfiguring relationships (Müller, 2015; Thrift, 1999), scales are also viewed in terms of fluid and changing relationships. Understanding place brands through the relational lens of scale is influenced not only by the same level of space but also by higher and lower levels of place; spatial levels can also work in reverse when a particular place defines an entire region (Aharon and Alfasi, 2022). Studies have been conducted to extend the discussion of the relational nature of place brand scales by considering the spatial interaction of brands as joining a network of associations (Giovanardi, 2015; Zenker and Jacobsen, 2015).

In the cultural dimension, place brands are influenced by the culture of the upper and lower levels, and scale transformation is an important aspect of this relational nature, which is understood as the transformation of cultural meanings between small and large regions, including descending and ascending scales (Zhou and Zhang, 2015). Downscaling refers to the decomposition of the cultural or cultural goals of a large region into those of a small region; upscaling is the integration of the cultural or cultural goals of a small region into those of a higher region (Zhou and Cheng, 2013). At the same time, place brands at different spatial levels interact with each other and are closely related to the multilevel governance of regions (Ye and Björner, 2018). The practice of place branding is complex, as there are close links between countries, regions, cities, and smaller areas involving multiple levels of governance (Wu, 2000). The multilevel governance perspective provides a way for local governments to navigate between higher-level goals and actual development needs at the regional level (Lu et al., 2017) and is a way to understand the dynamic interrelationships within and between different levels of governance and government (Peters and Pierre, 2001).

There has been a focus on multiple scales in current research, and a fixed macro-meso-micro set or other scaling network framework has been generally developed (Jessop et al., 2008). However, most of these studies only summarize the corresponding patterns of each research scale, and the research scales are fragmented, lacking cross-scale interactions and excavation of cultural meanings of the phenomena (Giovanardi, 2015). Scale boundaries are understood as given, predetermined, and immutable, with brands at different spatial levels involving multiple independent sets of procedures and mechanisms and implemented by different actors (Dinnie, 2007; Peirce and Ritchie, 2007). This local and simplified understanding treats scale boundaries as hierarchies of nested locations. What is important for place brands is not the subscale but how scales are organically related and in what ways smaller scales are nested under larger scales, completing the decomposition of larger-scale cultural function goals with more finely tuned cultural function goals at their own scales. By clarifying the logic of the scale transformation of place branding, it is easy for us to provide regional scale transformation relationships that are conducive to urban cultural development and thus provide mechanisms for the multilevel governance of place brands from a cultural perspective.

Visual analysis method of place brand perception. Local people are not the passive beneficiaries of place brands; rather, they actively interpret the meaning of place brands (Rebelo et al., 2020), and the scale transformation of place brands also needs to be realized through the human perception of place culture. Understanding the changes in local people's emotions, memory and identity will enable us to expand the narrow perspective of marketing a city as a commodity and replace it with a new brand governance philosophy. Moreover, the meaning of a place is not fixed; rather, it is jointly created through concrete practice (Kavaratzis and Hatch, 2021). As a subjective and perceptual phenomenon, the place brand image is formed by the audience through the emotional interpretation of the brand (Dobni, 1990). Emotion is understood as a key factor in guiding human beings to experience a place (Wood and Smith, 2004), which means that place branding works through the subconscious to some extent (Eshuis and Edwards, 2012). The main purpose of brand activities is to maximize the emotional relationship between the self and the place, awaken people's feelings for the place (Nogué and de San-Eugenio-Vela, 2018), and establish a deeper and more lasting relationship with people (Lafferty, 2001).

However, research on place brands rarely starts with the emotional concept of the geospatial experience of the body (Dinnie, 2009; Govers and Go, 2016). As the smallest scale at which place brands can be perceived, the body is the result of cultural and cognitive habits, which requires us to shift to a more complex process of understanding the body (MacPherson, 2010). The generation of a spatial emotional imprint often requires forms of representation, such as text, image, and discourse (Datta, 2012), to be translated by the brain. Emotions interact with various social and natural environmental factors, especially landscapes with visual advantages, which can directly connect with emotions in the brain. Therefore, visual expression can often better convey a subject's feelings, emotions, senses, and various emotional states (Rose, 2014). Under the influence of the 'cultural turn' (Barnett, 1998), the studies not only focus on the production and representation of spatial visual discourse but also interpret and analyze the emotional experience of space through various visual methods (Datta, 2012; Rose, 2014). The cultural meaning of everyday life is constructed through vision. Therefore, the methods used to study visual symbols, including content analysis, the symbolic image method, psychoanalysis, and discourse analysis (Rose, 2002), can be applied to the cultural dimension of brand research to provide more theoretical and practical insights for place branding.

On the one hand, using visual methods of image stimulation to extract information and relevant data from respondents, such as self-directed photography and photo evaluation, can better reflect the respondents' perception of space and analyze the experience of the research subject from the perspective of explicit attitudes. Many scientific studies have helped to explore the different perceptions and experiences of people in different places based on the different informational characteristics reflected by self-directed photographic imaging materials (Aitken and Wingate, 1993; Lombard, 2013). In emotional measurement, photo evaluation can provide a good practical spatial simulation (Russell et al., 1981), and it has also been applied in many studies (Wang et al., 2020). On the other hand, with the rise of the 'neural turn' (Korf, 2008; Pykett, 2018) in human geography research, more mature neuroscience methods, such as eye-tracking experiments, can intuitively and accurately reflect the visual key points of experimental participants. Additionally, they can objectively quantify their emotional and psychological activities and perceptual processes based on the changes in their physical visual sense (Dupont et al., 2016) to better capture the implicit attitudes of the respondents. An eye tracker can record
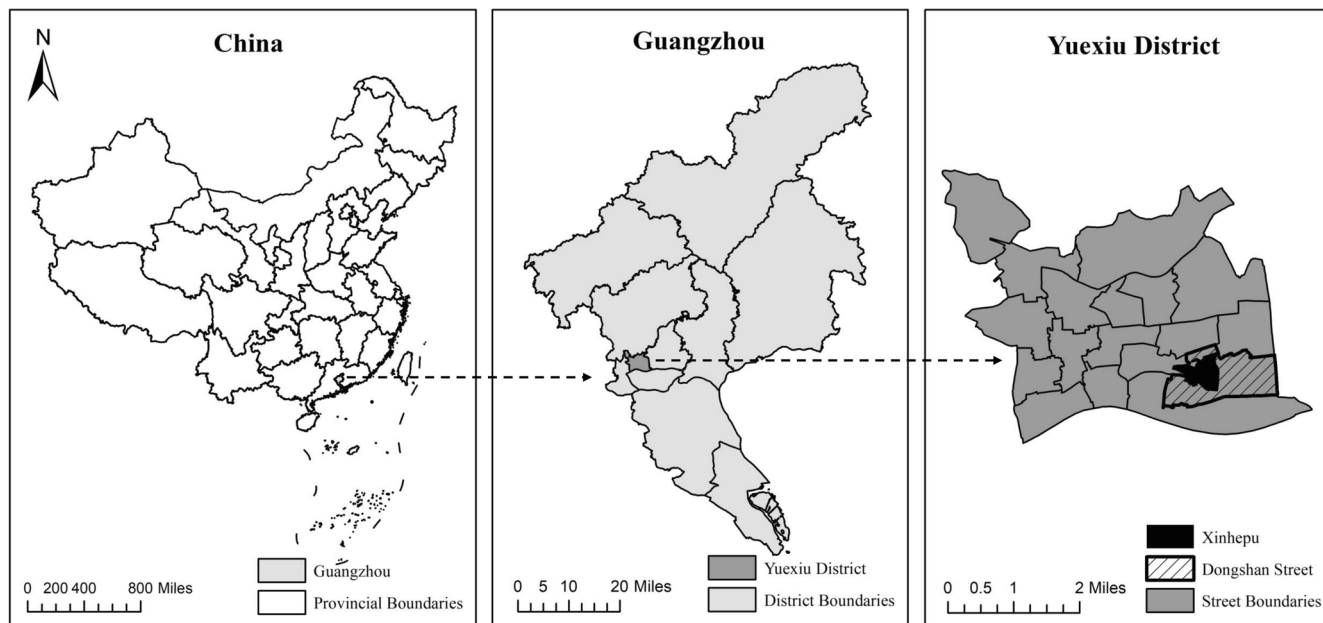
Fig. 1 Location map of Xinhepu. This map gives the exact location of Xinhepu in Yuexiu district, Guangzhou, China. The image is not subject to copyright.

Table 1 The four steps of the methodologies.		
Steps	**Methods**	**Participants**
Production	Self-directed photography	Local residents
Selection	Photo evaluation	People who have been to Xinhepu
Perception	Eye-tracking experiment	Local residents (experimental group) and nonlocal residents who have been to Xinhepu (control group)
Reflection	Semistructured interviews	Subjects participating in the three stages above

physiological data such as the pupil's response, fixation point, and fixation time, show the dynamic changes in subjects' emotions and cognition, and more truly reflect the state of subjects during the experiment (Roberts et al., 2016). The eye-tracking method is also widely used in discussions at the spatial level (Wang and Sparks, 2016; Yuan et al., 2022). When applying visual methods to place brand research, there is still a gap, and based on this, we hope to develop synthetic visual research to dissect whether there are scale-transforming associations embedded in place brand perception.

Research design

Case location: Xinhepu, Guangzhou. In 2000, the first list of 'historic and cultural districts' was proposed by the Guangzhou government, and the Xinhepu area in Yuexiu District (Fig. 1) was one of them. Due to its long history, Xinhepu has occupied an important position in the preservation of Guangzhou's history, culture, and heritage. As an important part of the old city of Guangzhou, the Xinhepu area is the origin and core of the 'old Guangzhou' culture, and the streets and architecture still represent the local and historical culture. During the Republican era (1911–1949), Xinhepu was a residential area of overseas Chinese, wealthy merchants and dignitaries. The architecture, gardens, and streets interweaving Western and Chinese styles were constructed. These materials are reserved today and comprise one of the largest surviving clusters of low-rise courtyard-style modern historical buildings in Guangzhou.

The Guangzhou government promoted the Xinhepu brand and transformed the Xinhepu area from a residential space into a space for art, leisure, and consumption. In our long field observation, the main audience attracted to Xinhepu currently

is youth. Most old high schools are located in Xinhepu, which makes this area carry the collective memories of local young people. Many young people would like to hang out in the Xinhepu area. There are many cafés, galleries, and hand-made product shops operated by graduated young people, and the inner spaces are decorated to appeal to the youth. Xinhepu, as a new brand, is widely communicated on social media and has become a popular place in the platform used by young people.

Methodology. In this study, we designed a participatory-based visual methodology. The participatory approach is to engage the research objects in the research and invite them to coproduce and coexplain the 'data' (Schubotz, 2019). Instead of the representation of visual elements, we focus more on how the participants produce the visual materials and how they understand the meaning of visual elements. The whole process of visual analysis is driven by the actions of the participants rather than being controlled by the researchers. We designed the four steps of visual methods: production, selection, perception, and reflection (Table 1). First, we used self-directed photography to invite participants to take photos by themselves. We observed and talked with them in the process to understand visual element production. Second, we used photo evaluation to select the photos based on the brand attributes. A questionnaire survey was applied to allow participants to sift through the visual elements themselves to identify those with a strong brand attribute. Third, we used eye-tracking, which can capture the watching process to determine the visual process of participants. Eye-tracking, a biosensing tool, can be helpful in obtaining the embodied reaction of people and the unconscious process beyond the subjectivity of self-report (Spinney, 2015). Last, we used interviews to make participants

Table 2 Basic information of survey subjects.

Research Stage	Information		Number	Proportion
Self-directed photography	Gender	Male	2	22.2%
		Female	7	77.8%
	Age	18–25	9	100%
	Education	College, bachelor, and above	9	100%
	Whether or not a local resident	Yes	9	100%
	Total		9	100%
Photo evaluation	Gender	Male	64	31.5%
		Female	139	68.5%
	Age	<18	1	0.5%
		18–25	189	93.1%
		26–30	5	2.5%
		31–40	6	2.9%
		41–50	1	0.5%
		51–60	0	0%
		>60	1	0.5%
	Education	Primary school and below	2	1.0%
		Junior high school	1	0.5%
		High school and junior college	6	2.9%
		College, bachelor, and above	194	95.6%
	Whether or not a local resident	Yes	68	33.5%
		No	135	66.5%
	Total		203	100%
Eye-tracking experiment	Gender	Male	14	46.7%
		Female	16	53.3%
	Age	18–25	30	100%
	Education	College, bachelor, and above	30	100%
	Whether or not a local resident	Yes	15	50%
		No	15	50%
	Total		30	100%

reflect and explain the eye-tracking results. The results obtained from biosensing techniques often only tell us about what is, not the cause. We need to incorporate qualitative methods for contextualization and to deepen the understanding of what is being studied (Creswell and Clark, 2007; Osborne and Jones, 2017).

Self-directed photography. To obtain photographic materials of the case site, 9 residents with a deep knowledge of Xinhepu, i.e., long-term residents of the neighborhood, were asked to participate in self-help photography, and their information is shown in Table 2. A total of 418 photographic images were collected by asking them to take photographs according to the scope of Xinhepu. These photographs cover essentially all the exterior visual elements of the study area. To filter the 400 photos collected from the self-help photography, we looked for five experts with urban and landscape planning backgrounds and some knowledge of Xinhepu to select 40–50 photos that they thought were representative of Xinhepu and screened out photos that were not the right size, blurred, had too many text elements, had too many people or had people looking directly at the camera, etc., that might have an impact on the perception of the landscape. The 22 photos with a repetition rate of more than 50% were selected as the base data for the next stage of photo evaluation and eye-movement experiment (Fig. 2).

Photo evaluation. Place branding operates on the basis of place brand attributes (Jacobsen, 2012), where the brand core represents the identity of a place and is the blueprint for developing and communicating a place brand, which can be defined by three dimensions: functional, symbolic, and experiential attributes (Hankinson, 2004). Among them, functional attributes relate to the function of the space, building, or facility; symbolic attributes satisfy the need for social recognition and personal expression; and

experiential attributes are linked to the perception of the destination (Echtner and Ritchie, 1991; Keller, 1993; Sirgy and Su, 2000). The public's perception and evaluation of these three brand attributes can thus help to understand different subjects' perceptions of the core of place branding. We designed a photo-evaluated questionnaire based on the three main dimensions of brand attributes to analyze the perception of brand attributes in Xinhepu. The questionnaire was divided into two parts: (1) a five-point Likert scale (minimum 1 and maximum 5 points) was used to measure the evaluation of functional, symbolic, and experiential attributes of the pictured location by those who had visited Xinhepu; (2) demographic data such as gender, age, and income were collected, and their basic information is shown in Table 2. Since Xinhepu is currently attracting more young people, the questionnaire was filled out mainly by college students. A total of 204 questionnaires for photo evaluation were collected for the study, of which a total of 203 were valid.

Eye-tracking experiment. The eye-tracking experiment was carried out using an EyeLink Portable Duo eye-tracking system. The participants viewed 22 photos. Several studies have shown that eye movements do not differ significantly by demographic attributes such as nationality or gender (Elsadek et al., 2019) but may be influenced by professional or local background (Dupont et al., 2015). Additionally, students have higher levels of knowledge in independent thinking and action, are thought to perceive and evaluate visual elements faster and more accurately (Guo et al., 2021), and have as many preferences and a wide range of esthetics as possible (Gao et al., 2020). Therefore, we recruited 30 students as voluntary participants, half of whom were local residents of Xinhepu (the experimental group) and the other half were non-local residents who had visited Xinhepu (the control group) and covered a diverse range of professional backgrounds to analyze how people's perceptions of Xinhepu are reflected in the larger

Fig. 2 Photos for the photo evaluation and eye-tracking experiment. The 22 images with serial numbers on display were obtained through self-directed photography and expert screening and were used in the subsequent research process. The photos are produced by participants who consented to the photos being published and reproduced and are not subject to copyright.

Category	Photos	Functional attributes	Symbolic attributes	Experiential attributes	Mean
The five highest-rated photos	E25	4.192	3.911	3.768	3.957
	A05	**4.291**	3.956	3.606	3.951
	D44	3.852	**4.049**	3.675	3.859
	A28	3.759	3.852	**3.877**	3.823
	I26	3.882	3.778	3.68	3.78
The five lowest-rated photos	I40	3.443	3.453	3.271	3.389
	H10	3.414	3.36	3.251	3.342
	H50	3.394	3.369	3.256	3.34
	I19	3.3	3.31	3.187	3.266
	I14	3.325	3.034	3.034	3.131

Table 3 Photo evaluation scores of Xinhepu's place brand attributes.

Note: Bold indicates the highest score of each dimension.

scale of the city's cultural dimensions. All participants had normal or corrected-to-normal visual acuity and normal color vision, meeting the experimental requirements.

Before the experiment began, the participants were informed of the task, which was to watch the photographs carefully. After eye-movement correction was completed, the experiment began. The photos appear one by one in random order, and participants click on the space bar of the keyboard at the end of viewing a photo to move on to the next photo. There was a 1 s gap between each pair of photos, which helped to reduce the effect of the previous photo on the next. The indexes of the eye-tracking experiment include the hotspot map, average fixation duration, and pupil change.

Semistructured interviews. After the self-directed photography, photo evaluation, and eye-tracking experiment were completed, semistructured interviews were conducted with the participants to further analyze the scale transformation mechanism of Xinhepu's place brand.

Research findings
Evaluation of the brand attributes of Xinhepu based on photo evaluation. The photos we gained from the self-directed photograph can present the key brand image of Xinhepu because the average score of each picture was higher than 3 in the evaluation of brand attributes. Table 3 shows that the top 5 photos with the highest scores represent the Peizheng secondary school, the Peizheng primary school, Dongshan Hall, Kuiyuan, and the Xinhepu Historical and Cultural Museum, which are basically cultural relic protection units with high utilization rates. The participants had a high evaluation of the brand attributes of historical public buildings in Xinhepu. These elements with higher scores show richer historical and cultural values and correspond to the representative buildings publicized by the government. The five pictures with the lowest scores feature private houses, all of which are general historical buildings.

Comparing the three brand attribute dimensions, we observed that the pictures with the highest functional attribute score feature the Peizheng primary school. As the first 'high-reputation education area' in Guangzhou, there are many basic educational schools and institutions in the area of Xinhepu, where many young students gather. The picture with the highest symbolic attribute score features Dongshan Hall. As one of the early historical buildings mixing Chinese with Western styles, it is representative of the cultural brand of the Dongshan Exotic Houses. The picture with the highest experiential attribute score features the Kuiyuan Art Museum, which reflects the cultural diversity of the integration of the old and the new among many emerging art museums, exhibition halls, and cafes in Xinhepu.

Results of the eye-tracking experiment
Visual focus of spatial elements. In the eye-tracking experiment, the hotspot map is used to analyze the participants' visual focus on spatial elements to identify the brand attributes to which they pay attention. The hotspot map obtained from an eye-tracking experiment can reflect the participants' attention to
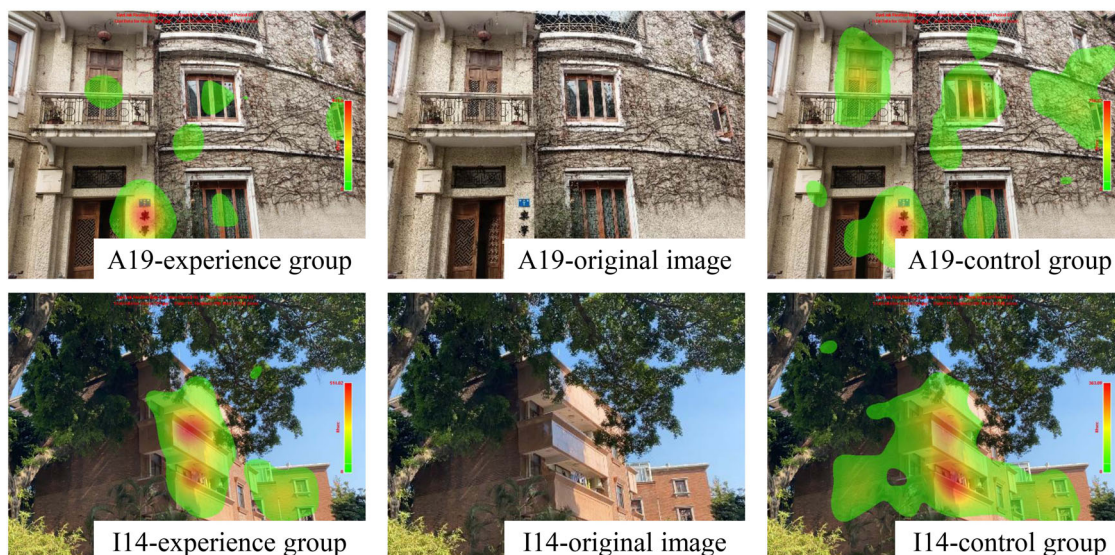
Fig. 3 Comparison of hotspot images and original images in the eye-tracking experiment. The leftmost column of images in the figure is the hotspot map of the experimental group, the middle image is the original image, and the rightmost column of images is the hotspot map of the control group. The photos are produced by participants who consented to the photos being published and reproduced and are not subject to copyright.

Table 4 Results of the Mann–Whitney *U*-test.					
Statistical indicators	**Mean**		**U**	**z**	**p**
	Experience group	**Control group**			
Total number of fixation points	16.320	22.729	18755.500	−4.758	0.000**
Fixation duration	4255.804	5756.244	21169.000	−3.004	0.003**
Average fixation duration	260.476	254.389	23573.500	−1.261	0.207
Pupil change value	252.089	267.209	23424.500	−1.369	0.171
Note: **$p < 0.01$.					

specific images and map the fixation duration and fixation counts onto visual parameters (Holmqvist et al., 2011). If the color of an area in the hotspot map is redder, then the longer the subjects stare and the more concentrated the gaze area, the stronger their degree of interest. In our results, the fixation area of the experimental group was basically larger than that of the control group, but the main fixation hot spots were the same. Two examples are shown in Fig. 3. The total number of fixation points of nonresidents is generally greater than that of residents due to nonresidents' lower familiarity with the elements in the figure and their longer fixation time. Combined with evidence from interviews, the main concerns of the two groups are similar, and they tend to pay attention to the doors, windows, balconies, and words in the architectural photos because detailed designs, such as location signs, carved flowers, and balcony columns, are concentrated in these places, which are symbols with historical and esthetic value. At the same time, the participants think that these architectural elements and their architectural styles can reflect local characteristics to a certain extent, and the overall street atmosphere created by these buildings, landscapes, and people is a symbol of old Guangzhou culture.

Red brick, green tiles, and antique doors and windows are the major features here. There is also some colored glass in the building. Artistic characters are widely used and have historical charm in writing. Its architecture gives me the feeling of being antique, I can feel the stronger flavor of old Guangzhou and have some associations with past memories. (Interviewee 2-12)

Overall, people with or without local experience, are all concerned with the same spatial elements. They all connect the cultural symbols of Xinhepu with the image of old Guangzhou on a larger scale.

Spatial perception and emotional arousal. In data obtained from an eye-tracking experiment, the average fixation time, which is the ratio of fixation time to the total number of fixation points, can reflect subjects' cognitive processing of pictures. The change in pupil diameter can accurately reflect the ongoing thinking activities of the brain and is related to psychological activities such as emotion (Roberts et al., 2016). Therefore, this study used the average fixation time and pupil change value as the main indicators to compare the degree of emotional arousal of the experimental group and control group in the process of looking at pictures. The nonparametric test was used to study the differences in the total number of fixation points, fixation duration, average fixation time, and pupil change between the two groups. Since there were only two groups, the Mann–Whitney *U*-test statistic was used for analysis. Table 4 shows that there is a significant difference in the total number of fixation points and fixation duration between the experimental group and the control group ($p < 0.01$), which corresponds to the results of the hotspot map because residents are more familiar with the content of the pictures.

However, there was no significant difference in the average fixation time and pupil change value between the different groups of samples ($p > 0.05$). This result indicates that the experimental

images produced visual stimulation with a similar level of intensity for individuals regardless of whether they were local residents, and it could be objectively determined that the elements in the pictures were able to arouse the interest of the subjects. Residents and nonresidents have the same degree of emotional response to Xinhepu's place brand. The interviews also show that the two groups have the same emotional interpretation of Xinhepu. Xinhepu is regarded as the epitome of Guangzhou and has been transformed into a city brand through local construction.

It is like a microcosm of Guangzhou. There's everything. You can not only find the elderly here leisurely enjoying their life in retirement but also see young people starting businesses here and struggling here and doing something they like to do. It is a diversified place. (Interviewees 1-13)

Scale transformation mechanism of Xinhepu's place brand
Xinhepu is considered a place where Guangzhou's past can be perceived and can map out the city's urban cultural characteristics, making its place brand perceived as Guangzhou's city brand. In the process of scale transformation, historical heritage, and material landscape constitute the scale transformation of Xinhepu's place brand from both temporal and spatial dimensions. The physical landscape in space makes the place a brand, while the mapping of the place on the temporal scale to the historical culture of the city achieves the scale transformation of the place brand. Ultimately, the result of scale transformation is perceived by people.

Continuation of the historical lineage. On the temporal scale, as a nonmaterial element, the particularity of the historical evolution of Xinhepu provides sufficient conditions for the scale transformation of Xinhepu's place brand. In the 20th century, after the revolution of 1911, overseas Chinese absorbed foreign design ideas and returned home to build real estate in Xinhepu. Therefore, the planar layout and facade modeling of buildings were influenced by foreign culture, mostly Western classical architectural style, and many military and political dignitaries also built villas and residences here. The flow of overseas Chinese brought new landscape forms and new directions for urban culture and development. This new force connects the past of Xinhepu and the present of Guangzhou. Xinhepu played the role of a 'window of cultural exchange between China and foreign countries' in the early stage. It represents not only the modern historical memory of Guangzhou but also an attitude of innovation pursuit. This tolerance toward emerging culture is consistent with the current open and diversified urban image of Guangzhou.

Over time, as a fertile land for new things, Xinhepu has always injected new blood into the city and the country. Not only is today's Xinhepu not shackled by mainstream culture, but it also brings a living space to countless minority cultures. Emerging art galleries, trendy shops, and cutting-edge design companies are located here. The collision of various cultures continues to inject new meanings into the local characteristics of Xinhepu. Cultural diversity has also attracted more young people to Xinhepu so that Dongshan's memory will not be forgotten over time. In the context of globalization, Guangzhou is becoming a place of multiculturalism. The blending of the old and the new is not only a current regional characteristic of Xinhepu but also the key cultural meaning of Guangzhou.

Personally, I think there are two elements representing Xinhepu. One is the foreign-style buildings, which integrate Chinese and foreign styles, and the other is some novel literary cafes and art galleries in recent years. (Interviewee C)

The local culture of Xinhepu changes the local identity by implanting new meanings and symbols, constituting an integral part of the local image and the core of the final place brand (Hatch and Schultz, 2002), and the corresponding relationship between local and urban construction and development promotes the local culture as a city brand. At the same time, local perceptions and identities formed over time have become the driving force of branding (Kavaratzis and Hatch, 2013), providing important conditions for scale transformation. The demolition plan for the Xinhepu area in 2020 triggered a heated discussion. In the end, due to public appeals, it was temporarily decided that some cultural buildings would not be demolished. Dongshan residents showed a strong sense of belonging and pride in this process, and their external communication affected the effectiveness of city branding (Braun et al., 2013). For them, preserving Xinhepu's landmarks is not only to protect local memory but also to perpetuate Dongshan culture. The respect for people's 'Dongshan feelings' in the final decision is also the embodiment of Guangzhou's diversity and inclusiveness, establishing a new connection between old and new Guangzhou people.

It was said that everything from the Yuexiu Library to Guigang Street would be demolished, but a lot of old things are preserved here, and there are a lot of life memories here, so I do not want it to be demolished. Dongshan is still unique in Guangzhou, but if it is demolished, it will be gone. (Interviewee 1-11)

Conservation of the physical landscape. Using an authentic local culture to promote a place's differences from other places is considered the key to improving the attractiveness of the place (Kalekin-Fishman, 2011). Most commonly, culture appears as an integral part of local identity and is expressed in the place brand narrative (Jensen, 2007). On the spatial scale, place branding depends on the construction of landmark buildings (Evans, 2015). Thus, the protection and renewal of Xinhepu's material landscape promote the construction of its place brands and provide the possibility of the scale transformation of its place brand, which requires the joint efforts of stakeholders. In the pictures above with a high brand attribute evaluation, there are three main elements, i.e., Dongshan foreign-style houses, educational facilities, and art exhibition halls, which are elements with strong brand symbolic, functional and experiential brand attributes. In the interviews with residents and nonresidents, these three types of landmark buildings were also unanimously recognized as the most representative elements of Xinhepu. These buildings shape Xinhepu's local identity and logo through the presentation of visual symbols. The emotional experience of constructing space through cognitive translation can effectively promote the perception and recognition of local culture.

In the results of the eye-tracking experiment hotspot map, the detailed design of doors, windows, columns, and balconies is considered to reflect certain local characteristics, which together constitute the landmark buildings of Xinhepu. With the protection and renovation of these building details by relevant departments and the owners and users of these buildings, local culture is expressed across scales through the 'building details–building unit–building complex-block-area-city' path. In addition, characters play an important role in highlighting landmark buildings. Many respondents said that in the cultural interpretation of Xinhepu, the characters outside the buildings attract special attention. In recent years, the newly built signboards of 'Xinhepu' and 'Dongshan' have made more people understand this place more intuitively and improved the level of attention given to this place. On a smaller scale, the naming of single-family buildings and the installation of plaques that provide a textual introduction also reflect the
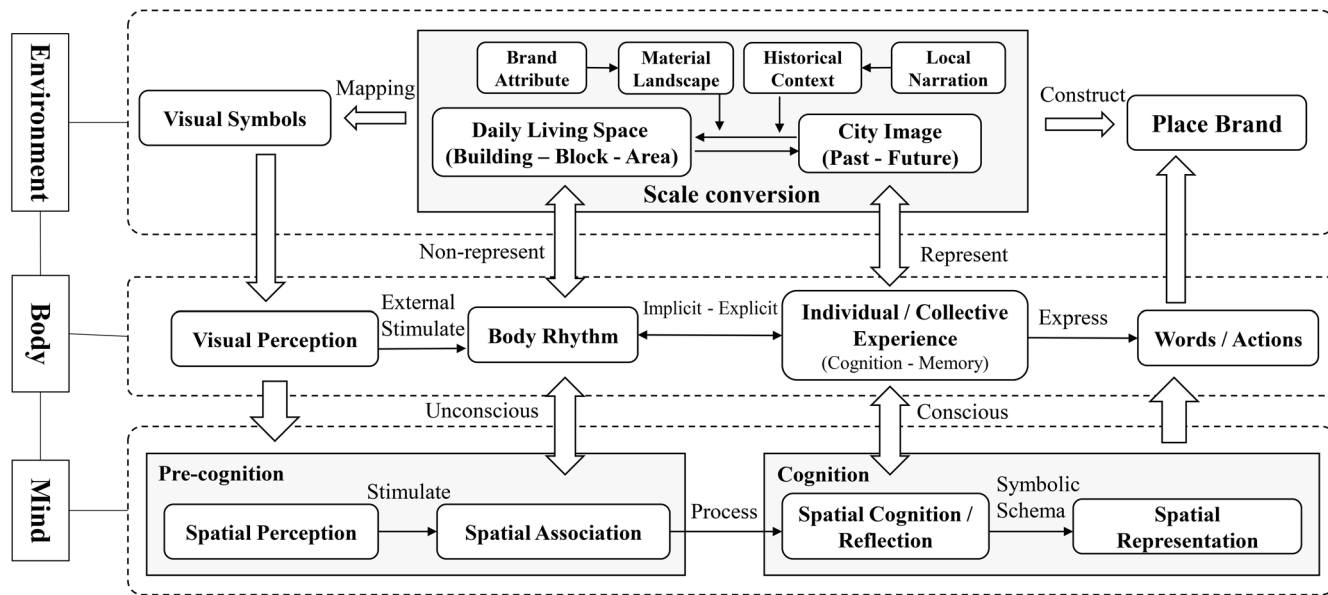
Fig. 4 Mechanism of scale transformation of place brands. The block diagram gives an indication of how the elements interact and influence the scale transformation of the place brand. The image is produced by the authors.

importance of historical buildings, highlighting the cultural value of Xinhepu.

Many places have also been named and introduced with plaques and words. For example, the Dongshan Young Master Park here has made Dongshan history a billboard (photo C11). Before, there was only a small sign on the grass, but now, it is obvious. The sign in the photo is also new (photo G07). In fact, it also highlights these cultural things in the new era. (Interviewee 1-08)

Perception of body scale. The scale transformation of place brands in Xinhepu is given by the perception, association, and imagination of the recipients, rather than through top-down marketing and governance, which we demonstrate through an eye-movement experimental approach is not only thinking that exists at the level of consciousness but can also be reflected in the body's rhythms. As many current place branding studies emphasize, place brand value is created from the audience's perception, association, and imagination of the brand (Kavaratzis and Kalandides, 2015), but it is rarely combined with embodied experience. People's memories of old Guangzhou and their urban imagination of Guangzhou's East-meets-West fusion can be projected onto body behavior, resulting in an automated, unconscious cognitive processing of the place brand of Xinhepu. The result of the processing does not point to the valuable elements emphasized in the preservation of Xinhepu itself or the historical and cultural district but to the city's image on a higher scale. This echoes the issue of multilayered governance of place branding, where the cross-scale nature of branding lies not only in the multilayered governance structure of the city or region but also in the fact that people's embodied experience is beyond the local scale.

In Xinhepu, the perception of its place brand has experienced a bottom-up transformation (Fig. 4). The visual symbols in the physical landscape are cognitively translated to form a spatial perception and emotional experience, stimulating the spatial associations of the audience. On the one hand, based on nonrepresentation theory (Thrift, 2008), the implicit emotion in the sensory exploration of specific places is transformed into the space of everyday life. On the other hand, spatial associations are processed to form spatial cognitions and reflections, forming individual or collective experiences, discourses, or actions and, ultimately, forming a historical context, which is reflected in the

image of the city's past and future, and constructing a place brand. Under the influence of the material landscape and historical context, the microlevel space of everyday life and macrolevel urban image change the audience's level of perception, making the place brands of small regions rise to the scale of the city. Specifically, not only is Xinhepu a micro place, but it also has a unique cultural significance on a larger temporal or spatial scale. It can also be used as a representative of Guangzhou and even Lingnan culture. The cultural significance of this landscape, space, or place is recognized by more people, and its importance appears.

Conclusion and discussion

The study used a combination of self-directed photography, photo evaluation, eye-tracking experiments, and semistructured interviews to discuss the performance and mechanisms of scale transformation of the place brand in Xinhepu, Guangzhou. The study found that, in terms of the external attitudes presented by the results of the photo evaluation, the aspects of the place brand attributes of Xinhepu that were rated higher reflected the connection with the city's culture, presenting the representative educational culture, historical architecture and emerging culture of old Guangzhou. From the implicit attitudes presented by the results of the eye-tracking experiment, the results of the embodied perception of Xinhepu by subjects with different identities are similar; reflected in the larger scale of the city brand, their spatial concerns and emotional interpretations of Xinhepu are focused on the key elements of the city's cultural lineage. The process of scale transformation of place brands is characterized by the interaction of temporal and spatial factors that provide possibilities for scale transformation. The physical landscape in space plays a role in place branding, while in time scale, Xinhepu connects Guangzhou's past and present and is a microcosm of the city's image and historical development; thus, in people's embodied perception, Xinhepu can be transformed into a city brand through place culture creation.

However, scale transformation is only an internal logic that needs to be combined with actual local governance through external means. In terms of brand governance, the main body of governance often has scale, and the governance of Xinhepu may focus on performing work from the microlevel of this space.

Guangzhou's urban brand governance is completed by the Guangzhou municipal government, and there is often a lack of interconnection between different levels of governance. Multilevel governance can usually be analyzed vertically (Liesbet and Gary, 2003), which essentially combines the top-down and bottom-up actions of interdependent governments at all levels. At this time, we should consider a multilevel governance mode that organically combines architectural protection, block governance, and urban governance, put Xinhepu in the position of an urban brand, and depict the higher-scale urban cultural significance contained in Xinhepu on the micro material landscape with the discourse system and narrative mode of the urban brand. Similarly, governance at the microlevel also needs to consider the objectives and guidelines at the urban level and transform them into objectives that are applicable to their own level to develop a place brand where the guidance provided by higher levels of government intersects with the local environment and preferences.

In terms of practical role and meaning, understanding the logic of transformation between small-scale regional brands and large-scale regional brands can position the cultural development of small-scale regions. Extending to other cases, for example, in many tourist places, tourists inevitably perceive a country or a city through small-scale space. Using the means of local culture gives the opportunity to realize the upward push of the brand on the scale and to organically integrate small-scale cultural construction with the branding and management of the whole city. The development of a region needs to value cultural symbols with local characteristics in the physical landscape and seek to be recognized at a higher scale of value meaning, thus functioning in a larger region. The understanding of a place also needs to fit its brand attributes from a large-scale region, embedding it to be viewed at a higher scale, realizing the unification of the brand core of the historical period with the brand core of the present, and making a place function at a larger historical stage. In terms of theoretical significance, there are many studies on different scales of place brands, but fewer studies have explored the scale relationship of place brands, and it is hoped that this study will stimulate more thinking and discussion. However, this study has limitations. In the visual research design phase, we did not strictly restrict the number of participants in the survey with different demographics, which may have led to an imbalance in the number of demographics in the sample and biased the results of the study. Although Xinhepu presently attracts a more youthful group, the scale transformation of place brands is still a process practiced by a variety of individuals. Therefore, future studies should incorporate more diverse group surveys to enhance the perceived brand experience process.

Data availability

The datasets generated and analyzed during the current study are not publicly available but are available from the corresponding author upon reasonable request.

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Author contributions
JZ: conceptualization; methodology; validation; Data curation; writing—original draft. ML: conceptualization; methodology; investigation; writing—review & editing; supervision. MW: Resources; Writing—review & editing; supervision; funding acquisition. YL: methodology; investigation; data curation

Competing interests
The authors declare no competing interests.

Ethical approval
The study was conducted under the review and approval of the Ethics Committee of South China Normal University (No. SCNU-GEO-2021-020).

Informed consent
Informed consent was obtained from all research participants. Participation was voluntary and did not place any strain of power on the participants. Participants consent to the reproduction and publication of the texts, and images they produce in the course of research.

Additional information
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