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The Regional Architectural Sign System and the Logic of Cultural Formation in Traditional Dwellings around Chaohu Lake: A Semiotic Perspective

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Abstract:

Traditional dwellings around Chaohu Lake, located in the Jianghuai cultural region of central Anhui, exhibit hybrid architectural features shaped by natural conditions, migration, trade, and modern social changes. Existing studies, however, tend to list isolated elements such as horse-head walls and grey tiles, lacking a systematic framework that links materials, components, spatial organisation, and settlement environment. Drawing on architectural semiotics, this paper constructs a threetiered sign system—component, spatial, and environmental—based on secondary analysis of documented cases including Sanhe Ancient Town, Changlinhe and northern lakeside residences, Zhegao's Beizha Old Street, and the "Jiulong Cuanzhu" migrant villages.

Findings show that at the component level, grey bricks, small black tiles, flush or overhanging gable roofs, hollow brick walls, simplified horsehead walls, and restrained ornamentation produce a lowsaturation, plain, and solid visual character. At the spatial level, a longitudinal sequence of lower hall–passage hall–upper hall forms the core, complemented by mixed commercial–residential combinations (shops in front and dwellings behind) and defensive structures such as fortified towers, reflecting domestic order, commerce, and security needs. At the environmental level, water systems, streets and lanes, and settlement clusters generate a pattern adapted to hydrology, with gradual transitions from public to private spaces. These three levels are interconnected rather than isolated.

The paper argues that the regional identity of Chaohu Lake dwellings does not rely on any unique symbol, but on a relational system formed through selective adaptation and recombination of multiple architectural traditions—southern skywells and columnandtie construction, northern courtyards and postandlintel construction, and Huizhou decorative motifs—under local climate, materials, and socioeconomic conditions. This identity is coshaped by hydrology, migration, commerce, and modern social change. The findings imply that heritage conservation should preserve not just visual motifs but the integrated logic of materials, spatial sequences, and environmental relationships.

Keywords:

traditional dwellings around Chaohu Lake; architectural semiotics; regional architectural signs; spatial sequence; sign system; logic of cultural formation

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1.Introduction

1.1. Research Background and Significance

1.1.1. Practical Challenges in Preserving the Regional Culture of Traditional Dwellings

Traditional dwellings are an architectural type formed through long-term interactions among specific natural conditions, local materials, construction techniques, and social life. Their value lies not only in the dates and architectural forms of individual buildings, but also in the relationships between buildings, family structures, modes of production, and settlement environments. As urban and rural construction practices have become increasingly standardised, some regions have tended to reproduce selected visual elements—such as pitched roofs, black roof tiles, horse-head walls, and timber lattice windows—in the conservation of traditional buildings and the shaping of regional character. Although such practices can create an immediately recognisable traditional image, they risk reducing complex regional architectural cultures to a limited set of formal labels. Existing studies indicate that regional architectural identity is not determined by any isolated component; rather, it is jointly shaped by climatic conditions, cultural traditions, materials and construction technologies, and social practices. The transplantation of signs detached from their original spatial rules and lived contexts is therefore unlikely to sustain the full cultural meaning of traditional architecture [1][2].

Research on traditional dwellings therefore needs to move beyond asking ‘which traditional elements are present’ to examining ‘how these elements constitute a regional architectural culture’. Semiotics provides an appropriate analytical framework for this shift: architectural materials, components, spaces, and environments can all be understood as vehicles of meaning. Their regional significance derives not only from their external forms, but also from the combinatory relationships among different signs and the local experiences to which they refer.

1.1.2. The Regional Research Significance of Traditional Dwellings around Chaohu Lake

The area around Chaohu Lake lies within the Jianghuai cultural region of central Anhui. Geographically, it connects the Yangtze and Huai River basins; historically, it has experienced population migration, commercial exchange, and sustained interaction among multiple regional cultures. Existing studies generally include Hefei’s Binhu area, the urban area of Chaohu, and the lakeside towns of Changlinhe, Sanhe, Zhegao, Tongyang, and Huanglu within the principal study area. The region has an extensive water network and convenient transport connections. Migration from Jiangxi, Huizhou, and Jiangsu since the Ming dynasty further intensified the composite character of its local culture.

Under the combined influence of multiple natural and human factors, traditional dwellings around Chaohu Lake display pronounced transitional characteristics. Their spatial arrangements include both skywells and halls organised across multiple courtyards, as well as northern-style courtyard layouts. Structurally, column-and-tie construction and post-and-lintel construction are used in combination. Flush gable roofs and overhanging gable roofs predominate, while some buildings incorporate Huizhou architectural forms such as horse-head walls, door hoods, and carving. At the same time, exposed brick walls, relatively restrained ornamentation, and the defensive towers and lookout facilities found in some modern-era residential compounds

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distinguish them from typical traditional dwellings in southern Anhui [3]. These features make traditional dwellings around Chaohu Lake an important subject through which to understand the selection, synthesis, and localisation of architectural cultures within the transitional Jianghuai region.

1.2. Existing Research and Outstanding Issues

1.2.1. Research on the Architectural Characteristics of Traditional Dwellings around Chaohu Lake

Existing studies have examined traditional architecture around Chaohu Lake through different cases and at different scales. Research on Sanhe Ancient Town has focused on waterfront patterns, street-and-lane spaces, mixed commercial–residential buildings, and the blending of northern and southern architectural character. Studies of the former residences of notable figures have summarised regional dwelling characteristics in terms of layout, form, structure, and ornamentation. Research on Zhegao has emphasised decorative signs such as horse-head walls, colours, and brick, timber, and stone carvings. Cultural landscape studies have further extended the analysis to residence gates, enclosure walls, streets and lanes, ponds, and ancient trees [3][4][5][6]. For example, the formation of Sanhe Ancient Town was closely associated with its water-network topography, commercial and transport activities, and interactions among diverse populations. Its architectural character combines features of a water town with the synthesis of northern and southern traditions characteristic of the Jianghuai region.

These studies provide substantial case material for the present research, but their objects of analysis and classification criteria are inconsistent. Some focus on individual buildings, whereas others concentrate on ornamentation or landscape. The same architectural characteristic may also be classified variously as morphology, architectural character, cultural landscape, or a regional element. Consequently, although existing research has identified ‘which characteristics’ are present in traditional dwellings around Chaohu Lake, it has not yet established a unified explanatory framework linking architectural components, spatial organisation, and settlement environments.

1.2.2. The Application of Architectural Semiotics to the Study of Traditional Dwellings

Architectural semiotics examines how perceptible architectural forms signify sociocultural meanings. Relevant studies no longer restrict architectural signs to motifs and ornamentation; instead, they regard materials, components, spatial relationships, patterns of repetition, and environmental positioning as integral to the production of meaning. The meanings of architectural signs are not fixed: the same form may simultaneously perform technical, utilitarian, aesthetic, and symbolic functions, while its specific meanings depend on the social and spatial context in which it is situated [7][8].

Current research on architectural signs around Chaohu Lake concentrates mainly on the decorative motifs, materials, and colours of Zhegao Ancient Town. Discussion has not yet fully extended to the hall–skywell–courtyard spatial sequence or to the environmental relationships among water systems, streets and lanes, and residential compounds [5]. It is therefore necessary to expand the analytical scale beyond existing studies of decorative signs and to incorporate architectural composition, spatial organisation, and settlement environments into a single sign system.

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1.2.3. Research Gaps

Taken together, existing research presents three principal limitations. First, architectural materials, roofs, walls, courtyards, and streets and lanes are frequently described as parallel elements, without establishing a hierarchical progression from individual components to the overall environment. Second, some studies tend to infer local character or cultural spirit directly from architectural forms, without adequately distinguishing practical functions, broadly shared cultural connotations, and region-specific meanings. Third, the 'synthesis of northern and southern traditions' has become an important interpretation of architecture around Chaohu Lake, yet there remains no systematic account of the levels at which different architectural traditions have been combined, simplified, and adapted.

Regional architectural culture does not necessarily depend on components unique to a particular locality; it may also emerge from specific combinations of widely shared signs and their enduring associations with local life [9]. Accordingly, this study does not treat the identification of 'signs unique to the Chaohu Lake region' as its sole objective. Instead, it focuses on how different architectural signs collectively constitute a recognisable structure of regional culture.

1.3. Research Aims and Approach

1.3.1. Research Aims and Questions

Drawing on existing scholarship and materials from representative cases, this study seeks to establish a basic classification of regional architectural signs in traditional dwellings around Chaohu Lake and to explain the cultural characteristics and formative contexts that they embody. It addresses three research questions: first, what component, spatial, and environmental signs are found in traditional dwellings around Chaohu Lake; second, through what relationships do signs at different levels collectively express regional architectural culture; and third, how have the hydrological environment, cultural exchange, domestic life, commerce and transport, and modern-era social change influenced the formation and combination of these signs?

This study examines common tendencies identifiable from the existing literature. It neither attempts to demonstrate that any particular form is unique to the Chaohu Lake region nor interprets the factors shaping its architectural culture as rigorously verified causal mechanisms.

1.3.2. Research Approach and Principal Contribution

The research proceeds through four stages: literature synthesis, sign classification, case comparison, and cultural interpretation. First, architectural characteristics are extracted from studies of traditional dwellings, historic districts, former residences of notable figures, and historic villages around Chaohu Lake. Second, the identified characteristics are classified into three levels of signs: component, spatial, and environmental. Third, the shared characteristics and local differences of Sanhe, Changlinhe, Zhegao, and villages along the northern shore of Chaohu Lake are compared. Finally, the logic underlying the formation of regional architectural culture is interpreted in relation to the natural environment and sociohistorical context.

The principal contribution of this study lies not in identifying a new architectural type, but in systematically restructuring existing findings. By organising dispersed evidence concerning materials, components,

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spaces, and environmental characteristics into an interconnected sign system, the study argues that the regionality of traditional dwellings around Chaohu Lake is primarily embodied in the overall relationships produced through the local selection and combination of multiple architectural traditions, rather than in the presumed exclusivity of any isolated form.

2.Theoretical Foundations and Analytical Framework

2.1. Fundamental Theories of Architectural Semiotics

2.1.1. The Form and Meaning of Architectural Signs

Semiotics concerns the relationship between perceptible forms and cultural meanings. Saussure's signifier–signified relation indicates that a sign comprises both an external form and a meaning assigned through social and cultural processes. Peirce, by contrast, emphasises that signification is not fixed but is continuously generated through the relationship among the sign vehicle, referent, and interpretant. Architecture can therefore be understood as a complex sign system. Materials, components, colours, proportions, ornamentation, and spatial forms constitute its perceptible dimension, whereas the lived experiences, social orders, aesthetic values, and cultural memories embodied in architecture constitute its semantic content [8][10].

Architectural form and cultural meaning, however, do not correspond in a simple one-to-one relationship. A single component often performs multiple structural, environmental, utilitarian, and symbolic functions. A horse-head wall, for example, primarily serves purposes of spatial separation and fire protection, but within a particular regional context it may also signify status and convey aesthetic or auspicious meanings. Accordingly, this study first identifies the form and practical function of each architectural sign and then interprets its meaning in relation to local history and cultural context, thereby avoiding the direct inference of an abstract cultural spirit from outward appearance.

2.1.2. The Hierarchical Relationships among Architectural Signs

Architectural signs are not isolated elements. Basic components—including materials, beams and columns, doors and windows, and ornamentation—are combined to form roofs, walls, and rooms. Rooms are subsequently organised into halls, skywells, and courtyards, while multiple buildings, together with streets and lanes, water bodies, and public spaces, constitute villages or market towns. Through this process of composition from individual parts to an integrated whole, architectural meaning resides not only in individual components but also in spatial sequences, positional relationships, and the overall environment.

Previous research, following the logic of architectural language, has divided Chinese traditional dwellings into four levels: vocabulary, syntax, style, and text. Vocabulary refers primarily to materials and components; syntax concerns the combination of architectural parts; style addresses spatial rules such as axial organisation, spatial arrangement, adaptation, and borrowing; and text encompasses courtyards, villages, and market towns [10]. Given the available source material and the length constraints of a standard journal article, this study condenses this system into three levels—component signs, spatial signs, and environmental signs—to maintain both analytical completeness and operational feasibility. Research on spatial configuration has similarly

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demonstrated that the compositional relationships of traditional buildings can reflect the lifestyles and socio-cultural conditions of particular regions and should not be regarded merely as formal composition .

2.2. The Formation of Regional Culture in Traditional Dwellings

2.2.1. The Natural Environment and Adaptation in Local Building Practices

Traditional dwellings are, in the first instance, products of residents' adaptation to local natural conditions. Climate, hydrology, topography, and the availability of materials influence settlement location, building orientation, roof pitch, wall construction, opening configurations, and courtyard dimensions. Previous studies have found that traditional dwellings in China's hot-summer and cold-winter climatic zone respond to local climatic conditions through settlement layouts, internal spatial organisation, shading, ventilation, and building envelopes, reflecting accumulated experience in passive environmental control [11].

Natural conditions, however, do not automatically generate a particular architectural form. Environmental constraints are transformed into relatively stable technical and spatial rules only through the understanding, selection, and building practices of residents and craftspeople. Regional architecture should therefore be understood as the product of interactions among the natural environment, local knowledge, and building traditions. Regions with similar climatic conditions may nevertheless develop different dwelling types because of differences in materials, culture, and modes of production [12].

2.2.2. Sociocultural Conditions and the Evolution of Architectural Form

Traditional dwellings are also influenced by family relationships, ritual concepts, economic activities, population migration, and the transmission of building techniques. Family size and intergenerational relationships affect the organisation of halls, side rooms, and courtyards, whereas commercial activities may alter the ways in which buildings relate to streets. As social relationships change, residential patterns, lineage networks, and public spaces within traditional villages are correspondingly reconfigured [13].

The influence of population migration on regional architectural culture usually takes the form of selective retention and localised adaptation. Migrants may retain the layouts and principal spaces of dwellings from their places of origin while incorporating the materials, structural systems, and construction methods of the receiving region. Through the borrowing and exchange of building techniques among different groups, local architectural characteristics incorporating multiple cultural sources gradually emerge [14]. The coexistence of skywells and courtyards, together with the hybrid use of column-and-tie and post-and-lintel construction in dwellings around Chaohu Lake, should therefore be understood within this process of cultural exchange and local adaptation rather than being reduced to a static notion of 'north–south synthesis'.

2.3. Analytical Framework

2.3.1. Analysis of Component Signs

Component signs are the most immediate and readily identifiable material forms in traditional dwellings. They primarily include architectural materials, colours, beams and columns, roofs, walls, doors and windows, and ornamentation in brick, timber, and stone carving. Previous research has similarly treated timber, earth,

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brick and stone, roof tiles, paint, and various architectural components as the basic units of traditional architectural language, emphasising both their functional properties and cultural recognisability [10].

The analysis of component signs in this study proceeds through three dimensions. The first concerns external characteristics such as material properties, form, and colour; the second addresses practical functions such as load-bearing, protection, ventilation, fire prevention, and ornamentation; and the third examines the aesthetic and symbolic meanings assigned by local culture. Studies of architectural classification indicate that regional architecture cannot be identified independently of climatic, cultural, and geographical conditions. Architectural characteristics must instead be understood through their specific combinations within a particular region [15].

2.3.2. Analysis of Spatial Signs

Spatial signs refer to the relationships of use and order generated when architectural components are combined according to particular rules. They primarily include halls, skywells, courtyards, axes, spatial depth, interior–exterior relationships, mixed commercial–residential arrangements, and defensive spaces. Their meanings generally cannot be determined from individual spatial names alone but must be analysed in relation to their positions, dimensions, modes of connection, and users.

This study focuses on how halls, skywells, and courtyards form spatial sequences extending from the exterior to the interior and how hierarchies between primary and secondary spaces, as well as relationships between public and private realms, are expressed spatially. It also considers how commercial activities, domestic life, and security requirements have transformed the layouts of traditional dwellings. Previous research has demonstrated that the spatial configurations of traditional dwellings can accommodate social interaction and everyday customs, while changes in social relationships can further promote the reconfiguration of residential and village spaces [13][16].

2.3.3. Environmental Signs and the Approach to Cultural Interpretation

Environmental signs extend the scale of analysis from individual dwellings to water systems, streets and lanes, roads, building frontages, settlement clusters, and public spaces. Previous research has treated courtyards, villages, and market towns as complete texts within architectural language and has indicated that settlement layouts are influenced by water sources, topography, defence, lineage-based settlement, transport, and trade [10]. Regional culture is therefore embodied not only in the outward appearance of buildings but also in the relationships between architecture and natural and social spaces.

This study follows an interpretative sequence of ‘sign form–use function–cultural meaning–formative factor’. It first describes observable architectural forms and environmental relationships, then analyses their functions in production, dwelling, transport, and social interaction, and finally interprets their cultural implications in relation to natural conditions and sociohistorical contexts. Traditional village space results from continuous interactions among natural, economic, and social environments; consequently, its cultural meanings are dynamic rather than fixed at the moment of initial formation [17]. This interpretative approach reduces the subjectivity involved in deriving cultural meanings directly from form and provides a consistent framework for the case-based synthesis presented in Section 4 (Table 1).

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Table 1. Types of Architectural Signs, Analytical Content, and Dimensions of Cultural Interpretation

Primary category	Principal sign elements	Formal analysis	Functional analysis	Cultural interpretation
Component signs	Materials, colours, roofs, walls, doors and windows, and ornamentation	Material properties, form, colour, and construction	Load-bearing, moisture protection, drainage, daylighting, and ornamentation	Local materials, economy of construction, and aesthetic preferences
Spatial signs	Halls, skywells, courtyards, axes, mixed commercial–residential arrangements, and defensive spaces	Scale, position, sequence, and modes of enclosure	Dwelling, ritual practices, commercial activities, circulation, and defence	Domestic order, commercial life, and security conditions
Environmental signs	Water systems, streets and lanes, building frontages, and settlement clusters	Site selection, street-network structure, and cluster morphology	Transport, drainage, commerce, and public interaction	Adaptation to the water environment, migrant settlement, and local identity

3. Study Area and Research Methods

3.1. Study Area and Representative Cases

3.1.1. Overview of the Chaohu Lake Region

In this study, the Chaohu Lake region refers primarily to the towns and villages surrounding the lake that maintain close environmental, historical, and cultural connections with it. Existing studies generally include Hefei Binhu New Area, the urban area of Chaohu, and the lakeside towns of Changlinhe, Sanhe, Zhegao, Tongyang, Huanglu, and Zhongmiao within the study area. Located in the Jianghuai cultural region of central Anhui, the area consists mainly of plains, hills, and lakeside water networks and is comparatively well connected by both land and water transport [3].

The Chaohu Lake region is not an internally homogeneous unit of architectural culture. Its towns differ in architectural form because of variations in waterfront conditions, population origins, economic functions, and historical trajectories. This study therefore does not attempt to define a rigid cultural boundary. Instead, it draws on traditional dwellings, historic villages, and historic towns repeatedly examined in the existing literature to identify shared tendencies and representative variations within the regional architectural culture.

3.1.2. Selection of Representative Cases

This study adopts a representative-case selection strategy and focuses on Sanhe Ancient Town, traditional residential compounds in Changlinhe and along the northern shore of Chaohu Lake, Beizha Old Street in Zhegao Ancient Town, and the Jiulong Cuanzhu (‘Nine Dragons Gathering around a Pearl’) migrant villages. Sanhe Ancient Town has an extensive water network and a long history of commercial development, making it suitable for examining waterfront streets and lanes and mixed commercial–residential buildings. The residential compounds in Changlinhe and along the northern shore of the lake embody domestic life, defensive requirements, and Huai Army culture during the late Qing and Republican periods. Beizha Old Street in

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Zhegao retains comparatively complete architectural evidence, including horse-head walls, carved doors and windows, and residential compounds organised across multiple courtyards. The Jiulong Cuanzhu villages supplement these cases by illustrating the overall spatial morphology of migrant settlements (Table 2).

Table 2. Representative Cases, Sign Characteristics, and Source Materials

Case	Principal type	Representative features	Primary analytical level(s)	Principal source materials
Sanhe Ancient Town	Waterfront commercial historic town	Water systems, commercial streets, mixed commercial–residential dwellings, skywells, and courtyards	Spatial signs and environmental signs	Studies of historic-town character and former residences of notable figures
Changlinhe and residential compounds along the northern shore	Residential compounds from the late Qing and Republican periods	Multiple courtyards, axes, hybrid structural systems, and fortified towers	Component signs and spatial signs	Studies of former residences of notable figures and the utilisation of traditional buildings
Beizha Old Street, Zhegao	Historic riverside street	Horse-head walls, doors and windows, colours, and brick, timber, and stone carvings	Component signs	Studies of architectural decorative signs
Jiulong Cuanzhu (‘Nine Dragons Gathering around a Pearl’) villages	Migrant villages	Ponds, roads, and settlement clusters	Environmental signs	Studies of historic settlements and migrant villages

Existing research indicates that the former residences of notable figures around Chaohu Lake are concentrated mainly in Changlinhe and Sanhe and date primarily from the late Qing and Republican periods. Their functions include both exclusively residential use and combined commercial–residential use. The cases above were selected principally on the basis of the completeness of the available documentation and their typological variation; they do not constitute a statistical sample of all traditional dwellings around Chaohu Lake.

3.2. Research Materials

3.2.1. Literature on Traditional Dwellings around Chaohu Lake

The research materials were drawn primarily from published studies of traditional dwellings, former residences of notable figures, historic-town character, architectural ornamentation, cultural landscapes, and the utilisation of traditional buildings around Chaohu Lake. These sources cover building dates, functions, materials, roofs, walls, structural systems, courtyards, streets and lanes, and settlement morphology. Their analytical scales vary. Studies of former residences focus primarily on layout and structure; research on Zhegao concentrates on colour and decorative signs; studies of Sanhe examine water-town spaces and commercial streets and lanes; and cultural landscape research incorporates residence gates, enclosure walls, ponds, and ancient trees into its analysis [4][5].

Rather than undertaking new architectural surveys or systematic fieldwork, this study conducts a secondary synthesis of the available materials. A data matrix comprising ‘research source–case location–architectural characteristic–cultural interpretation’ was established to support the subsequent classification of signs and

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comparison of cases.

3.2.2. Historical, Cultural, and Local Contextual Materials

Supplementary materials principally concern population migration, waterborne commerce, local society, Huai Army activities, and traditional ways of life in the Chaohu Lake region. Existing research indicates that migrants from Jiangxi, Huizhou, and Jiangsu settled in the region from the Ming dynasty onwards. Huai Army activities during the late Qing period and the development of modern commerce also influenced certain towns and residential compounds [3].

These materials are used primarily to interpret the historical contexts in which architectural signs emerged and changed. Migration-related sources, for example, help explain the coexistence of skywells, courtyards, and different structural systems. Commercial histories support the analysis of mixed commercial–residential spaces along streets, while evidence concerning modern social conditions helps explain defensive facilities such as fortified towers and observation openings. The morphology of traditional villages results from long-term interactions between natural environments and sociocultural conditions; a single factor is therefore generally insufficient to explain their spatial evolution [17].

3.3. Research Methods

3.3.1. Literature Synthesis

Descriptions of architectural materials, forms, structures, spaces, and environments were first extracted from the selected studies. Terms with different names but similar meanings were then consolidated. For example, ‘small black tiles’ and ‘dark-grey tiles’ were grouped under roof-covering materials, while horse-head walls, flush gable walls, and exposed brick walls were recorded as distinct wall forms. Features mentioned in multiple studies were treated as significant elements of the regional analysis. Phenomena found only in individual former residences or exceptional residential compounds retained their case-specific status and were not directly generalised as common regional characteristics.

This method was used to establish a clear and comparable classification of architectural characteristics rather than to calculate frequencies of occurrence or undertake statistical inference. Research on the classification of traditional architecture emphasises that visible architectural elements should be systematically organised in relation to climatic, cultural, and geographical contexts rather than being assessed solely through stylistic labels [15].

3.3.2. Classification of Architectural Signs

Following the analytical framework established in Section 2, the architectural characteristics extracted from the literature were classified as component signs, spatial signs, or environmental signs. Component signs include materials, colours, roofs, walls, doors and windows, and ornamentation. Spatial signs include halls, skywells, courtyards, axes, mixed commercial–residential configurations, and defensive spaces. Environmental signs include water systems, streets and lanes, building frontages, and settlement clusters.

Each category of signs was analysed in terms of form, function, and meaning. The analysis first identifies

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the material or spatial form of a sign, then explains its utilitarian and technical functions, and finally interprets its cultural meaning within the local context. The meaning of a sign depends on the relationship among its form, referent, and interpretative context, and the same architectural element may carry multiple meanings [8].

3.3.3. Case Comparison and Cultural Interpretation

Following the classification of signs, a qualitative comparison was conducted among Sanhe, Changlinhe, Zhegao, and the migrant villages along the northern shore of Chaohu Lake. The comparison examined architectural forms shared among the cases as well as local variations associated with commercial functions, migrant backgrounds, social status, and natural conditions. The study neither assigns numerical weights to individual signs nor seeks to determine whether a particular form is unique to the Chaohu Lake region. Instead, it examines how architectural signs originating from different traditions were combined and adapted within the local environment.

Cultural interpretation was undertaken through five principal dimensions: the natural environment, population migration, domestic life, commerce and transport, and modern social change. Interpretations were based on corroboration among multiple studies and were expressed through appropriately qualified formulations, such as ‘may have been influenced by’ and ‘indicates a discernible tendency’. Cross-cultural research on dwellings suggests that contact between different architectural traditions generally involves the retention, borrowing, and localised reconfiguration of existing forms rather than the complete replacement of one tradition by another [14].

4. Results: Regional Architectural Signs and the Logic of Cultural Formation in Traditional Dwellings around Chaohu Lake

Based on a synthesis of the relevant literature and representative cases, the architectural signs of traditional dwellings around Chaohu Lake can be classified into three levels: component signs, spatial signs, and environmental signs. The following sections examine these three levels in sequence. It should be noted that the findings represent relatively consistent observations in the existing literature. They do not imply that every sign occurs universally throughout the Chaohu Lake region or that any of these signs is unique to the area. Their regionality is primarily embodied in the ways multiple architectural forms have been combined and adapted within the natural and social environments of the Jianghuai region.

4.1. Component Signs and Their Cultural Characteristics

4.1.1. Signs of Materials, Colours, Roofs, and Walls

Brick, timber, stone, and roof tiles constitute the principal building materials of traditional dwellings around Chaohu Lake. Roofs are generally covered with small black tiles, while walls are predominantly constructed of grey bricks. Timber is used primarily in roof frames, columns, doors and windows, and interior partition doors, whereas stone is employed for column bases, wall foundations, steps, and other locations exposed to moisture or required to bear substantial loads. These materials are not distinctive in themselves. Their regional characteristics are manifested primarily in their combination, construction methods, and the retention of

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their natural colours.

Flush gable roofs and overhanging gable roofs are the most common roof types. Main ridges are generally constructed with stacked black tiles and display relatively restrained ornamentation. Some larger residential compounds feature drip tiles and decorative eave tiles, together with small petal- or gourd-shaped ornaments at the centre of the roof ridge. Compared with the richly ornamented traditional dwellings of southern Anhui, roofs around Chaohu Lake place greater emphasis on the basic functions of shelter and drainage and are generally straightforward in construction. In Sanhe, the roof covering composed of small black tiles is comparatively thin, with concave pan tiles and convex cover tiles arranged longitudinally to facilitate rapid drainage under conditions of substantial rainfall [6].

Walls are among the more readily recognisable component signs of traditional dwellings around Chaohu Lake. Their lower sections are generally built of solid grey brick or stone to improve load-bearing capacity, resist moisture, and protect against rainwater erosion. The upper sections commonly employ hollow brickwork in bond patterns such as yimian sandou, yimian wudou, and wumian kongdou. Hollow brick walls reduce the quantity of bricks required, lessen wall weight, and provide a degree of thermal insulation. External walls generally retain the natural colours of grey or greyish-yellow bricks and are seldom entirely rendered in white. This produces a low-saturation palette in which grey, yellow, white, and dark-brown timber tones are visually coordinated. Studies of former residences of notable figures further indicate that most external walls contain relatively few windows, creating a visually substantial and enclosed appearance. Horse-head walls are more frequently found around Sanhe on the southern shore of Chaohu Lake, whereas they occur only in some residential compounds along the northern shore.

The material and colour characteristics of these dwellings were therefore not produced solely through the pursuit of a particular visual style. Rather, they gradually emerged in response to practical requirements concerning moisture resistance, drainage, material economy, and ease of maintenance. Grey bricks, small black tiles, hollow brick walls, and low-saturation colours collectively produce a restrained and substantial architectural image. In this context, ‘restraint’ is primarily a consequence of material technologies and economy of construction and should not be directly equated with an abstract local character (Table 3).

4.1.2. Signs of Doors, Windows, Components, and Ornamentation

Ornamentation in traditional dwellings around Chaohu Lake is concentrated mainly at entrances, doors and windows, roof ridges, beams and tie-beams, sparrow braces, and column bases. Doors, windows, and architectural components in ordinary residential compounds are comparatively simple in form. Entrances generally consist of simplified shangzi-type gateways or plaque-fronted entrance heads, while door leaves are predominantly made of solid timber planks in dark-brown or reddish-brown tones. Partition doors and sill-wall windows are common in interiors. Some residential compounds in Sanhe feature brick-built door hoods and inscribed plaques. The doors and windows, drum-shaped bearing stones, and timber-frame ornamentation of Beizha Old Street in Zhegao are more elaborate and display a comparatively evident influence from Huizhou building techniques.

Doors and windows primarily serve access, daylighting, ventilation, and spatial division. Decorative expression is subsequently introduced through elements such as lattice centres, lower panels, and intermediate

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panels. Traditional dwellings in Sanhe commonly feature grid motifs, cracked-ice patterns, geometric designs, and stylised vegetal motifs. Their compositions and carvings are comparatively restrained and robust, although their proportions and tonal relationships are generally harmonious. Doors and windows along Zhegao Old Street make greater use of openwork and relief carving. Their motifs include key-fret patterns, scrolling foliage, flowers and birds, and geometric designs. Ornamental elements are integrated with the structures of doors and windows rather than being entirely separated from their practical functions [5].

The subjects represented in brick, timber, and stone carving derive primarily from everyday life, natural forms, and traditional auspicious culture. Motifs depicting magpies, plum blossoms, bamboo, clouds, interlocking floral scrolls, and auspicious animals commonly express wishes for good fortune, longevity, moral integrity, and family prosperity. These meanings, however, are widely found in Chinese traditional dwellings and cannot be regarded as cultural features exclusive to the Chaohu Lake region. Regional variation is more evident in the degree of elaboration, choice of materials, location of ornamentation, and relationship between decorative details and the overall architectural character.

A comparison of the cases indicates that ornamentation around Chaohu Lake generally follows a principle of 'functional priority and restrained decoration'. Historic towns such as Zhegao, which were more strongly influenced by Huizhou culture, contain richer ornamentation, whereas Sanhe and ordinary former residences of notable figures are comparatively restrained. This pattern does not constitute a uniform decorative style. Rather, it reflects variations in economic conditions, household status, and craft techniques developed on the basis of broadly shared materials [8].

4.2. Spatial Signs and Their Cultural Characteristics

4.2.1. Halls, Skywells, Courtyards, and Axial Order

The basic spaces of traditional dwellings around Chaohu Lake comprise halls, skywells, courtyards, and side rooms. Qing-period residential compounds, including a number dating from the late Qing, generally organise their principal spaces along a longitudinal axis, forming continuous sequences such as 'lower hall–skywell–passage hall–skywell–upper hall'. Halls occupy the centre of the axis, while side rooms are arranged on either side. Multiple spatial units are connected by courtyards or lanes, creating residential compounds with clearly differentiated yet interrelated primary and secondary spaces. Cases such as the Former Residence of Yang Zhenning, the Former Residence of Wu Yuren, and the Wu Family Garden display multi-courtyard axes of varying lengths.

Different halls perform distinct functions within the spatial sequence. The lower hall connects the entrance with the inner compound and functions as a transitional space between exterior and interior. The passage hall links the front and rear skywells while accommodating circulation and everyday activities. Located deeper within the compound, the upper hall is used primarily for receiving important guests, conducting family discussions, and performing rituals. Through their dimensions, positions, and order of access, these halls create a progression from exterior to interior and from public to private space. This spatial order responds to the practical requirements of everyday life while also expressing traditional family relationships and ritual concepts.

Skywells and courtyards together constitute the open spaces within residential compounds, although they

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differ in scale and mode of enclosure. Skywells are generally small and enclosed by roofs on all sides. They provide daylighting, ventilation, drainage, and circulation. Courtyards are larger, less completely enclosed, and more variable in form according to topography and the arrangement of buildings. Some skywells employ a roof-drainage arrangement known as sishui guitang, literally 'four waters returning to the hall', and are associated with symbolic meanings such as the accumulation of wealth and the continuity of the family lineage. Such symbolic interpretations should, however, follow rather than replace an explanation of the underlying drainage function.

The distinctive feature of dwellings around Chaohu Lake lies not merely in the coexistence of skywells and courtyards, but in their incorporation into the same residential sequence. Skywells organise compact units of halls and side rooms, whereas courtyards connect separate building clusters or accommodate differences in ground level. This combination brings together the compactness of southern skywell dwellings and the openness of northern courtyard dwellings. It represents the reconfiguration of different spatial traditions in response to practical domestic requirements rather than their simple juxtaposition [16](Table 3).

4.2.2. Mixed Commercial–Residential and Defensive Spaces

Traditional dwellings around Chaohu Lake do not all perform exclusively residential functions. In historic towns such as Sanhe and Zhegao, some buildings follow layouts characterised by 'a shop in front and a dwelling behind', 'a shop below and a dwelling above', or combinations of residential and storage space. Shops and workshops in Sanhe Ancient Town are arranged along the main commercial streets. Buildings generally comprise one or two storeys, with commercial activities on the ground floor and living spaces above, or with a street-facing shop connected to a multi-courtyard residential compound behind. The street-facing side is comparatively open, while the internal residential areas become progressively more private through sequences of skywells, courtyards, and lanes[6].

Mixed commercial–residential spaces reflect a way of life that combined waterborne trade with household-based business. Street frontages accommodated the display of goods, commercial transactions, and social interaction, while halls and courtyards at the rear maintained the spatial order of domestic life. Commercial and residential functions were not completely separated. Instead, spatial depth and the arrangement of gateways and lanes produced a gradual transition from public commercial activity to private family life.

Some residential compounds dating from the late Qing and Republican periods also contain fortified towers, observation apertures, and high enclosing walls. In cases such as the Former Residence of Wei Lihuang, the Residence of Song Shike, and the Li Family Compound, fortified towers are generally positioned at the sides of the building complex. They are approximately three storeys high and contain small observation and firing apertures, providing both surveillance and defence. These facilities reflect the influence of modern social instability and security concerns on residential space and may also have been associated with the social status and wealth of property owners and with Huai Army activities.

Defensive spaces, however, occur primarily in larger residential compounds dating from particular historical periods and cannot be generalised as a shared characteristic of all traditional dwellings around Chaohu Lake. Compared with ordinary halls and skywells, fortified towers are more appropriately understood as exceptional signs associated with particular periods and social strata. They demonstrate that traditional dwell-

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ings were not fixed types transmitted without change but continuously adjusted their spatial structures in response to commercial development, security conditions, and changing residential requirements.

4.3. Environmental Signs and Their Cultural Characteristics

4.3.1. Water Systems, Settlement Location, and Street-and-Lane Spaces

Chaohu Lake and its surrounding rivers, channels, ponds, and polder systems constitute an important natural basis for the formation of traditional settlements in the region. Existing research indicates that traditional dwellings were commonly located in relation to water bodies, topography, and transport conditions, producing patterns of waterside habitation, streets extending along rivers, and settlements adapted to the terrain. Water bodies provided water for domestic and productive purposes while also supporting transport, drainage, flood control, and commercial connections. Water systems were therefore not merely landscape backgrounds external to architecture, but important environmental signs that actively structured settlement morphology.

Sanhe Ancient Town most clearly demonstrates the role of water systems in organising settlement space. The Fengle, Hangbu, and Xiaonan rivers together establish the basic structure of the historic town. Commercial streets developed along the waterways, wharves functioned as transfer points between waterborne and overland transport, and main streets and subsidiary lanes extended inland to connect shops and dwellings. This produced a spatial relationship in which ‘water systems formed the foundation, streets and lanes provided the framework, and buildings functioned as nodes’. Beizha Old Street in Zhegao extends along the Zhegao River, while settlements such as Zhongmiao were influenced by lakeside topography. Although their specific forms differ, these cases all demonstrate strong adaptive relationships among dwellings, roads, and water bodies.

Within this relationship, streets and lanes supported circulation while also serving as public spaces for social interaction, commercial transactions, and everyday activities. Traditional streets and lanes around Chaohu Lake are generally narrow, and their alignments change in response to rivers, topography, and residential plot boundaries. Some dwellings feature rounded wall corners at lane intersections to facilitate passage and reduce collisions with wall surfaces. This indicates that architectural boundaries were not entirely closed but were locally adjusted through long-term use to accommodate shared circulation.

The characteristics of the region’s water environment should therefore not be reduced to the visual image of a ‘water town’. Their deeper significance lies in the integrated organisation of production, transport, commerce, and residential space through water systems. Through prolonged water-oriented living, residents transformed hydrological conditions into rules governing settlement location, streets and lanes, and building frontages, thereby producing relatively stable local spatial experience.

4.3.2. Settlement Clusters and Overall Spatial Morphology

Traditional villages and historic towns around Chaohu Lake were generally not created through the implementation of a regular axial grid at a single point in time. Instead, they developed incrementally around water systems, roads, and residential plots. Individual buildings formed small clusters through courtyards or continuous street-front houses and were connected to main streets by subsidiary lanes. Main streets accommodated

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transport, commerce, and public interaction, while dwellings extended behind the street frontage or into subsidiary lanes. This produced an overall structure characterised by gradual transitions among public, semi-public, and private spaces.

Settlements did not respond uniformly to natural conditions. Sanhe Ancient Town developed linear and branching patterns along waterways and commercial streets. Beizha Old Street in Zhegao was organised primarily around a riverside street. Some ordinary villages formed comparatively compact building clusters around ponds, roads, and lineage residences. Streets and lanes, ponds, ancient trees, courtyard walls, and dwellings were interconnected, collectively forming a regional cultural landscape extending beyond individual buildings [4].

The Jiulong Cuanzhu migrant villages constitute another representative type along the northern shore of Chaohu Lake. Studies based on spatial imagery and field surveys have identified similarities among several villages in their overall morphology, internal ponds, and spatial organisation and have related these characteristics to historical migration [18]. This case suggests that village morphology was influenced not only by natural conditions but may also retain the spatial memories of migrant groups. The available evidence, however, is insufficient to demonstrate that all settlements of a similar form share the same origins. This study therefore treats the pattern only as a representative type of migrant settlement cluster.

Environmental signs consequently display two principal characteristics. On the one hand, settlements developed organically in relation to water systems and topography and demonstrate considerable adaptability. On the other hand, streets and lanes, courtyards, and building clusters maintained a discernible order. In this context, ‘organic’ does not mean ruleless. Rather, it refers to a local spatial order produced through the combined influence of natural conditions, property boundaries, family relationships, and shared circulation (Table 3).

Table 3. Regional Architectural Sign System and Case Evidence for Traditional Dwellings around Chaohu Lake

Sign level	Sign category	Principal forms	Practical functions	Possible cultural meanings	Representative cases
Component signs	Roofs	Flush gable roofs, overhanging gable roofs, and small black tiles	Shelter and drainage	Adaptation to the local climate	Sanhe and Changlinhe
Component signs	Walls	Solid grey-brick walls, hollow brick walls, and horse-head walls	Load-bearing, moisture resistance, thermal insulation, and fire protection	Practical adaptation and cultural transmission	Sanhe and Zhegao
Component signs	Door and window ornamentation	Shangzi-type gateways, sill-wall windows, and geometric and vegetal motifs	Access, daylighting, ventilation, and ornamentation	Auspicious aspirations and restrained ornamentation	Zhegao and Sanhe

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Sign level	Sign category	Principal forms	Practical functions	Possible cultural meanings	Representative cases
Spatial signs	Hall axis	Lower hall–passage hall–upper hall	Circulation, reception, family discussion, and ritual activities	Family ritual and spatial order	Changlinhe and Sanhe
Spatial signs	Skywells and courtyards	Coexistence of small skywells and larger courtyards	Daylighting, ventilation, drainage, and domestic activities	Adaptation between northern and southern spatial forms	Multiple cases
Spatial signs	Mixed commercial–residential and defensive spaces	Shop in front and dwelling behind; fortified towers	Commerce, dwelling, and security	Commercial development and modern social change	Sanhe and residential compounds along the northern shore
Environmental signs	Water systems and streets and lanes	Streets extending along rivers and subsidiary lanes leading to dwellings	Transport, commerce, and social interaction	Water-oriented ways of life	Sanhe and Zhegao
Environmental signs	Settlement clusters	Ponds, roads, and residential clusters	Organisation of everyday life and public connections	Migration and traditions of collective settlement	Jiulong Cuanzhu villages

4.4. Characteristics and Formative Logic of Regional Architectural Culture

4.4.1. Synthesis and Localised Adaptation of Northern and Southern Architectural Cultures

The cultural characteristic most frequently attributed to traditional dwellings around Chaohu Lake is the coexistence of northern and southern architectural forms. Their spaces contain skywells and column-and-tie construction commonly associated with southern dwellings, as well as larger courtyards, post-and-lintel construction, and flush gable roofs. Some areas also incorporated Huizhou architectural forms, including horse-head walls, door hoods, and brick, timber, and stone carvings. Existing cases indicate that column-and-tie and post-and-lintel construction were not invariably used as separate systems. Instead, they could be combined within the same building according to spatial span and material requirements. Post-and-lintel construction was used in the central bay to enlarge the internal space, whereas column-and-tie construction was employed in secondary bays and gable-wall sections to reduce material consumption.

This phenomenon should not be understood solely through the superficial observation that the dwellings ‘possess both northern and southern characteristics’. Architectural forms introduced into the Chaohu Lake region were not reproduced in their entirety but were modified by local climate, materials, economic conditions, and requirements of use. The horse-head walls of Sanhe, for example, are simpler in form and ornamentation than those of southern Anhui, while their walls more frequently retain the natural appearance of grey brick. Skywells are also commonly incorporated into residential sequences containing larger courtyards.

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The cultural synthesis evident in traditional dwellings around Chaohu Lake is therefore better understood as a process of localised adaptation. Architectural forms originating from different regions were selected, simplified, and recombined, gradually becoming building practices suited to living conditions in the Jianghuai region. Their regionality lies not in the complete preservation of any particular northern or southern style, but in the formation of relatively stable relationships among selected elements of both traditions[1][14].

4.4.2. Adaptation to the Water Environment and a Cultural Orientation towards Practicality

The Chaohu Lake region has an extensive water network and comparatively substantial rainfall. Traditional dwellings developed corresponding adaptive strategies in their roofs, walls, skywells, and settlement layouts. Pitched roofs covered with small black tiles facilitate drainage. Walls constructed with solid masonry in their lower sections and hollow brickwork above combine moisture resistance and thermal insulation with reduced material consumption. Skywells support daylighting, ventilation, and drainage, while dwellings and streets and lanes are arranged, as far as possible, in relation to terrain and water bodies.

These constructions are not isolated technical measures. Through repeated use over extended periods, they gradually became established as local building practices. Building exteriors are seldom extensively rendered, ornamentation on doors, windows, and roof ridges generally remains restrained, and material selection emphasises local availability and economy. These characteristics collectively produce an overall orientation towards functionality, durability, and restrained ornamentation [11].

'Practicality' does not, however, imply an absence of aesthetic consideration. Black tiles, grey bricks, timber components, and greyish-yellow walls create a unified low-saturation palette. The bonding textures of hollow brick walls, the lines of roof ridges, and simplified door hoods also display a clear formal order. Aesthetic qualities are not applied as additions external to construction technology but emerge through the treatment of materials and functions. Traditional dwellings around Chaohu Lake therefore embody a building ethos that integrates functionality, economy, and restrained aesthetics.

4.4.3. Migration, Commerce, Defence, and Modern Social Change

Population migration constitutes an important historical context for the formation of architectural culture around Chaohu Lake. Existing studies record migration from Jiangxi, Huizhou, and Jiangsu into the region from the Ming dynasty onwards, bringing different living customs and building practices into the area. Migrant cultures did not subsequently remain independent but were incorporated into local architecture through long-term cohabitation and exchanges among craftspeople. The influence of Huizhou ornamentation in Zhegao and the spatial morphology of migrant villages along the northern shore can both be interpreted, to some extent, within this historical context.

Waterborne transport and commercial development encouraged the formation of mixed commercial–residential buildings in towns such as Sanhe, Zhegao, and Tongyang. Street-facing shops, layouts with shops in front and dwellings behind, and multi-courtyard compounds maintained connections between commercial activity and family life within the same building. The circulation of merchants, craftspeople, and commodities also facilitated the transmission of building techniques and ornamental forms.

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Warfare, security risks, and Huai Army activities during the late Qing and Republican periods further influenced some residential compounds. Fortified towers, high walls, and small observation apertures enhanced residential defence, although such forms were concentrated primarily in properties associated with particular social identities and economic conditions. During the Republican period, some dwellings also featured increased numbers of windows in external walls, reduced axial symmetry, Western-style doors and windows, and external verandas, indicating that traditional dwellings continued to respond to changing social concepts and domestic requirements.

Migration, commerce, and defence therefore did not each correspond to a single fixed architectural sign. Rather, they jointly contributed to changes in architectural form at different historical stages. This study treats them as factors in the formation of regional culture rather than as rigorously verified, unilinear causal mechanisms [13] (Table 4).

Table 4. Regional Cultural Characteristics, Formative Factors, and Their Expression through Architectural Signs

Regional cultural characteristic	Principal formative factors	Expression through architectural signs	Interpretative boundary
Synthesis of northern and southern architectural cultures	Jianghuai geographical location, migration, and exchanges among craftspeople	Coexistence of skywells and courtyards; hybrid use of column-and-tie and post-and-lintel construction	Not a simple addition of northern and southern forms
Localised adaptation	Climate, materials, and economic conditions	Simplified horse-head walls, restrained ornamentation, and exposed brick walls	Introduced forms were selectively retained and simplified
Adaptation to the water environment	Lake and river networks, rainfall, and waterborne transport	Pitched roofs, skywell drainage, and streets extending along rivers	Should not be interpreted solely as a water-town aesthetic
Practicality and restrained ornamentation	Material conditions and economy of construction	Hollow brick walls, exposed natural materials, and simplified doors and windows	Should not be equated with a fixed local character
Commerce and modern transformation	Waterborne commerce and social change	Shops in front and dwellings behind, increased window openings, and Western-style components	Displays clear historical variation
Defensive orientation	Warfare, security conditions, and the status of property owners	High walls, fortified towers, and observation apertures	Found only in some exceptional residential compounds

4.4.4. Regional Architectural Culture Centred on Combinations of Signs

An integrated examination of the component, spatial, and environmental levels indicates that grey bricks, small black tiles, horse-head walls, skywells, courtyards, and auspicious motifs found in traditional dwellings around Chaohu Lake are not unique to the region. Merely listing these individual forms is therefore insufficient to explain its regional architectural culture. What possesses greater explanatory value is the combinatory relationship established among different signs.

At the component level, flush or overhanging gable roofs, grey-brick hollow walls, low-saturation materials, and restrained ornamentation collectively produce a plain and substantial architectural image. At the spatial level, skywells and courtyards jointly organise halls and side rooms, while column-and-tie and post-

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and-lintel construction are combined according to functional requirements. At the environmental level, water systems, streets and lanes, commercial frontages, and residential clusters are interconnected. These levels do not operate independently but collectively respond to the local climate, domestic life, commercial activities, and historical change [9][15].

On this basis, this study conceptualises the regional culture of traditional dwellings around Chaohu Lake as a relational sign system. Its characteristics derive not from any architectural sign exclusive to the region, but from an overall order produced as forms of diverse origins underwent prolonged processes of selection, simplification, adaptation, and combination within the transitional environment of the Jianghuai region. This interpretation also suggests that the conservation of regional architecture should not be confined to the reproduction of horse-head walls, black tiles, or timber lattice windows. Equal attention should be paid to material logics, courtyard sequences, relationships between water systems and streets, and the functions of everyday life.

5. Conclusions

5.1. Principal Conclusions

5.1.1. The Regional Architectural Sign System of Traditional Dwellings around Chaohu Lake

Drawing on studies of traditional dwellings, former residences of notable figures, the architectural character of historic towns, and historic villages around Chaohu Lake, this study has identified regional architectural signs at three levels: component, spatial, and environmental. Component signs primarily comprise grey bricks, small black tiles, timber and stone components, flush and overhanging gable roofs, hollow brick walls, simplified horse-head walls, and the restrained use of door hoods and carving. Visually, these dwellings are characterised by the prominent expression of natural material colours, an overall subdued palette, visually substantial walls, and ornamentation that is generally less elaborate than that of Huizhou dwellings in southern Anhui. The former residences of notable figures around Chaohu Lake commonly feature blue-grey tiled roofs and grey-brick walls. Some buildings flexibly combine post-and-lintel and column-and-tie construction, thereby accommodating spatial requirements while reducing material consumption [3][6].

At the spatial level, regional characteristics are manifested primarily in the relationships among halls, skywells, courtyards, side rooms, and lanes. Traditional residential compounds generally organise lower halls, passage halls, and upper halls along a longitudinal axis. Skywells provide daylighting, ventilation, drainage, and circulation, whereas larger courtyards connect different building units or accommodate variations in terrain. Historic commercial towns also contain composite commercial–residential configurations, including shops in front and dwellings behind and shops below with living spaces above. Some residential compounds dating from the late Qing and Republican periods incorporate defensive spaces such as fortified towers. At the environmental level, the principal signs comprise water systems, streets and lanes, building frontages, and settlement clusters. In Sanhe, streets extend along rivers and wharves connect commercial spaces; Beizha Old Street in Zhegao follows the course of the river; and some villages along the northern shore of Chaohu Lake

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form building clusters around ponds and roads [15].

The regional architectural signs of traditional dwellings around Chaohu Lake therefore do not constitute a list of isolated forms. Rather, they form a multilevel system comprising materials, structural systems, spatial sequences, and settlement environments. Individual components acquire a more complete regional cultural meaning only when situated within specific architectural and environmental relationships.

5.1.2. Regional Cultural Characteristics and Their Formative Logic

Traditional dwellings around Chaohu Lake display an overall synthesis of northern and southern architectural forms, adaptation to the water environment, and the coexistence of practicality and restrained ornamentation. Southern features—including skywells, column-and-tie construction, and horse-head walls—occur alongside northern courtyards, post-and-lintel construction, and flush gable roofs, sometimes within the same building. This synthesis, however, is not a simple accumulation of different forms. It results from the selection, simplification, and recombination of introduced architectural traditions in response to local climate, material conditions, domestic life, and economic capacity.

Chaohu Lake and its surrounding river network first influenced settlement location, the development of streets and lanes, and architectural drainage systems. Waterborne transport and commercial activities further encouraged the formation of riverside streets, wharves, and mixed commercial–residential buildings. Population migration since the Ming dynasty facilitated the transmission of different architectural forms and craft techniques. Warfare, Huai Army activities, and security conditions during the late Qing and Republican periods influenced the high walls, fortified towers, and observation facilities found in some residential compounds. The available evidence further indicates that Republican-period dwellings gradually incorporated more openings in external walls and less rigid axial symmetry. Some also adopted Western-style doors and windows and external verandas, reflecting the continuing adaptation of traditional forms to changing ways of life and social conditions[14] [17].

The regionality of traditional dwellings around Chaohu Lake is therefore not founded on any architectural sign unique to the locality. Instead, it is embodied primarily in the relatively stable combinations of multiple architectural signs within a particular natural and social environment. The process through which this culture developed can be summarised as follows: different architectural traditions circulated and came into contact; they were subsequently selected, adapted, and reorganised through local practices of everyday life; and they ultimately formed a relational sign system characterised by both the transitional qualities of the Jianghuai region and adaptation to local conditions.

5.2. Research Contributions and Limitations

5.2.1. Research Contribution and Conservation Implications

The principal contribution of this study lies in integrating the dispersed evidence concerning materials, components, spaces, and settlement characteristics in existing research into three interrelated levels: component signs, spatial signs, and environmental signs. It further clarifies the relationships among these levels. Compared with approaches that merely list traditional elements such as horse-head walls, black tiles, and

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timber windows, this framework places greater emphasis on the position, function, and mode of combination of each sign within the architectural whole. It therefore supports a more systematic understanding of the regional culture embodied in traditional dwellings around Chaohu Lake.

This understanding has direct implications for the conservation of traditional buildings and regionally responsive design. Conservation should not be confined to building façades and ornamental components but should also address the spatial sequences formed by halls, skywells, and courtyards, as well as the environmental relationships among water systems, streets and lanes, and residential clusters. When damaged buildings are repaired, priority should be given to maintaining local materials, construction methods, and spatial scales. A limited selection of visual signs, such as horse-head walls and Huizhou-style carving, should not be imposed as a standardised label of regional architectural character.

Similarly, new construction and regeneration projects should not simply reproduce traditional components. Instead, the material logics, spatial relationships, and modes of environmental adaptation embodied in traditional architecture should be reinterpreted in accordance with contemporary functions. The continuity of regional culture can avoid the superficial reproduction and homogenisation of traditional signs only when it extends beyond outward form to engage with architectural organisation and the logic of everyday life [1][2].

5.2.2. Research Limitations and Future Directions

This study is based primarily on a secondary synthesis of existing literature and publicly available case materials. It can therefore identify only those architectural characteristics that recur in the currently available evidence and cannot accurately determine the actual geographical distribution or frequency of different signs across the Chaohu Lake region. Existing materials are also disproportionately concentrated on former residences of notable figures, historic districts, and officially designated heritage buildings. For example, the documented former residences of notable figures are located mainly in Changlinhe and Sanhe and were mostly constructed during the late Qing and Republican periods. Ordinary dwellings and other areas around the lake are consequently under-represented.

Future research should expand the sample to include ordinary dwellings and different subregions around Chaohu Lake. Architectural documentation, local historical records, and resident interviews could be combined to test the relationships between sign forms and cultural meanings. Cross-regional comparisons should also be undertaken to distinguish among signs widely shared by Chinese traditional dwellings, signs common to the Jianghuai region, and highly recognisable combinations of signs specific to the Chaohu Lake region. Such research would enable the regional architectural sign system proposed in this study to be revised and further developed [15][17].

Author Contributions

(1) Conceptualization: 1, 2; Methodology: 1, 2,3; Software: 1, 2,3; Validation: 1, 2,3;

(2) Formal analysis: 1, 2,3; Investigation: 1, 2; Resources: 1, 2, 3; Data Curation: 1, 2;

(3) Writing – original draft preparation: 1, 2, 3; Writing – review and editing: 1; Visualization: 1; Supervi-

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sion: 1;

(4) Project administration: 1, 2; Funding acquisition: 1, 2.

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