Field Report

Tradition and Thermal Performance: An Investigation of New-Vernacular Dwellings in Campinas, Brazil

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This report is based on an investigation of the thermal performance characteristics of new-vernacular houses in the region of Campinas, Brazil. The study included the administration of a questionnaire to a group of self-builders representing a segment of the local low-income population and an analysis of drawings and photographs of the houses of sample families.

On the basis of this work and earlier work in the region by the authors, the report presents a discussion of the meaning of tradition in relation to thermal performance, with special consideration given to the verandah as an important design element. The results of the investigation suggest that the meaning of tradition for this population is more related to simple ways of building than to awareness of a particular local vernacular.

The self-building process has been called the “new vernacular,” and in recent decades it has been linked to the concept of tradition. The discussion here, however, questions the continuing relevance of supposedly local traditional elements to today’s owner-built houses. In particular, it uses the theme of thermal performance to assess the knowledge of self-builders with regard to traditional ways of construction.

In Brazil, traditional colonial houses, especially rural ones, provide a valuable architectural legacy. In particular, this vernacular architecture incorporates specific details that improve thermal performance in hot, humid climates. Among such elements are the verandah, generous roof overhangs, tall windows, high ceilings, and thick, light-colored...
exterior walls. Nowadays, owner-built houses, or the new vernacular, have lost many of these elements, and this report suggests some reasons why.

The report presents data from a case study in the region of the city of Campinas in the state of São Paulo, Brazil. This area has many owner-built houses, and this investigation is part of continuing research by the authors on them.

In broad terms, the study set out to question both the meaning of tradition, as expressed by self-builders, the origin of construction standards established by this group, and possible links between these and colonial building traditions. Construction techniques passed down through time were investigated, as was the presence of traditional building elements in self-built houses. The verandah was singled out for in-depth analysis, since verandahs (representing a broad category of architectural elements) are inexpensive to build, can both contribute to environmental comfort in Brazil’s predominantly hot climate, and can add useful space to small new-vernacular dwellings.

**THE VALUE OF TRADITIONAL WAYS OF BUILDING**

Investigations of the humanization of architecture have linked traditional ways of building to satisfaction. “Tradition” and “traditional” are common words, often found in sociological and architectural literature; however, their meaning is not precise. The literal meaning of tradition is “that which has been handed down.” In relation to architecture, it therefore refers to modes of building coming from the past and sanctioned by existing practices. Since tradition mostly evokes qualities perceived as good or desirable, typical, unmodernized landscapes with barns or cottages are considered to have deep aesthetic appeal. On the other hand, “tradition,” as an act, is not considered “creative.”

Tradition can accommodate small changes, but not radical innovation; therefore, it may have negative connotations in modern societies, which value rapid change. In popular terms, “tradition” is often associated with such psychological aspects as feelings of safety, habits, or behavior related to domestic activity. Privacy, territoriality, and community spirit are other positive aspects popularly associated with tradition.

Vernacular architecture is generally considered to emerge from time-honored tradition. Hassan Fathy emphasized its importance by pointing out that traditional societies possess knowledge of great value, especially in relation to bioclimatic vernacular design. The term “bioclimatic design” first appeared in English-language literature on environmental comfort in 1953 in the works of the brothers Olgyay. They defined it as follows:

**Bioclimatic design in architecture is to ensure the existence and well-being of biological organisms within the given climatic conditions (primarily of humans, but protecting biodiversity). Bioclimatic architecture relies heavily on architectural science, especially architectural energetics, but goes well beyond that. It rejects energy-wasteful and inhuman environments and fashion-dominated architecture. It returns to basic human needs and values, [and] it encourages regionalism.**

Szokolay further argued that bioclimatic design employs appropriate technologies dictated by the task and given socioeconomic conditions, therefore avoiding the trap of romantic neo-primitivism.

Strategies of bioclimatic design depend on an accurate climatic definition, including monthly measures of maximum and minimum average temperatures, temperature range, solar radiation, wind direction and speed, precipitation, and relative humidity. Specific conditions suggest design strategies in a number of areas: orientation in relation to sun and wind; exterior ground treatment and landscaping; wall thickness, construction materials, and color; shading and roof design; ventilation between ceiling and roof (often termed attic ventilation); location and size of window and door openings; and the presence of cross-ventilation.

In bioclimatic design literature, examples of vernacular architecture have often been used to illustrate climate-appropriate strategies, with specific strategies being related to specific vernacular designs. The value of building the traditional way — i.e., encouraging the repetition of good custom versus innovation — has been repeatedly emphasized. But this has often been done without checking for satisfaction of a full range of design needs (for example, sanitation, lighting, heating, and functional separation), leading to an attitude of romantic neo-primitivism.

Nevertheless, since traditional buildings are often rich in detail, especially as these contribute to thermal performance, it is important to emphasize that this way of building should continue to be valued, and lessons related to it should continue to be incorporated in the design of houses. Today, in particular, attention to climate-conscious traditional design may help ensure an enhanced degree of comfort, especially for low-income self-builder families.

**TRADITIONAL WAYS OF BUILDING IN BRAZIL**

The traditional Brazilian urban house was based on an imported Portuguese building models. Because of its colonial roots, it cannot be considered a true example of vernacular architecture (fig. 1). However, rural versions exemplify a vernacular sensibility through the presence of a sheltering roof and a generous verandah (figs. 2, 3).
Brazilian colonial towns were composed of long, narrow lots, and, as was also customary in sixteenth-century Portugal, houses were built without setbacks, but elevated in relation to the street for privacy. Since the lots were very narrow, only the front and back areas of the house had access to natural light and ventilation. These houses also often had internal sleeping quarters, or alcoves, as shown in Figure 1.

Variations of this house type evolved over time. For example, a later version sited along the side of the lot, permitted a narrow verandah, mainly used for service and social circulation (Fig. 4). In some cases this circulation space was not covered, and therefore did not technically constitute a verandah. At the end of the nineteenth century, new setbacks were enforced for sanitary reasons, and a small urban side garden became common.

The Portuguese colonial model spread over the vast Brazilian territory in forms that did not always respect the new, generally mild to hot climate. Buildings were generally built of clay, their walls thick and often whitewashed, reducing internal heat gain. Openings were generous in relation to room area, and permitted hot air to escape from tall windows. However, in relation to orientation, cross-ventilation, and shading (with either brise soleils or vegetation), the colonial vernacular was not specifically climate conscious. Vegetation was also not incorporated as a building or urban design element. On the other hand, the verandah was used to improve environmental comfort, and can be shown to be a fairly constant element in the historical development of the Brazilian house.
The important relation of the verandah has also played an important social role in many cultures. For example, in the eighteenth century as a domestic addition to houses owned by British military personnel in India and the Caribbean. The residential porch also appeared in nineteenth-century North America, where it expressed openness and provided comfort. In such houses the social rooms were often elevated, and many front entrances were preceded by a generous verandah which served as an observation post and extension of the parlor for visitors. Thus, the verandah was part of a privacy gradient, allowing only family and close friends to be admitted to indoor spaces.

In Brazil the verandah appeared early in colonial times as a feature of large rural estate houses. In such houses the verandah was part of a privacy gradient, allowing only family and close friends to be admitted to indoor spaces.

The medieval Portuguese urban house did not have generous verandahs, however, and neither did its Brazilian urban counterpart. As shown in Figures 1 and 4, it may have had a narrow front balcony on the second floor to observe the street, featuring wooden privacy screens, a design feature imported from Arab architecture. A utilitarian rear verandah, as an extension to the kitchen, was also common; and in many simple houses the kitchen itself was defined only by a roof extension or porch, since cooking could be a hot, dirty activity.

In the nineteenth century verandahs became more prevalent in urban housing. They served as an extension of indoor spaces for many domestic activities, and were often integrated with the new urban garden. The middle-class house of the 1930s and 40s valued the verandah as a family and leisure space. Houses could even have several verandahs in various forms: balconies, terraces, or front and back porches. Simpler houses often had a front verandah to observe city life and a back porch for service activities, such as washing and drying clothes and cooking over a wood-fueled stove or oven.

Brazilian residential architecture has been continually influenced by European stylistic developments. Thus, in Brazilian modernist houses of the 1920s and afterward, terraces were typically covered but by an extension of the roofline, or by a lowering of the roof. This made sun protection less efficient; indeed, the terrace was often added to the design as an aesthetic feature only. However, in the 1950s architects like Lucio Costa revived the functions of the colonial verandah as a shaded outdoor space linked to the social activities of the house. Trellises also appeared to lower the roofline and increase sun control.

However, in the 1960s and 70s family activities around the television reduced the importance of the verandah in the typical Brazilian home. In upper-class houses the arrival of air conditioning contributed to this loss. Urban crime rates have also had an effect, forcing most domestic activities indoors to rooms with barred windows.

In the last twenty years greater importance has been given to natural conditioning of spaces through the concepts of bioclimatic architecture. It has been recognized that a verandah can provide a shaded air cushion for the most exposed facades of a house, reducing indoor heat gain. It can also shade window

VERANDAHS AS IMPORTANT DESIGN ELEMENTS

As a general class of architectural element, verandahs can be described as semi-open, covered spaces attached to buildings. Porches, balconies and terraces can fall into this category. Verandahs provide transition from public to private space, and they can shield a house from sun and rain, improving the thermal performance of a building in a hot, humid climate. They can also provide shaded, useful space for a number of activities.

In functional terms related to residential design, the verandah can be considered an extension of the house to the outdoors. It can provide extra kitchen or living room space, or it can serve as a sleeping porch allowing residents to take advantage of cool night breezes. Verandahs can also integrate a house with its garden, or (when raised) they can facilitate observation of the street without ostensive involvement.

In the history of architecture, verandahs appear in descriptions of indigenous buildings discovered by Columbus, and are part of the vernacular architecture of many parts of the world. One well-known verandah form, the loggia of Italian Renaissance palaces, provides indoor-outdoor articulation through an open colonnade. In traditional Japanese houses, the engawa, marked by wooden flooring in contrast to the mats of indoor rooms, provided a similar outdoor-indoor transition space. The important relation of the engawa to the garden was highlighted by stone steps which led up to it.

In many Asian countries today the extra space provided by the verandah, or balcony, is considered important for families living in small houses or apartments. A balcony is sometimes used to create a minute garden, a feature with great appeal in crowded cities devoid of green areas. The balcony can also serve as a private worship place. In Beijing the custom of sleeping under the stars continues on hot, humid summer nights; during the winter this same space may be used as a place to store coal for heating.

The verandah has also played an important social role in many cultures. For example, in the eighteenth century as a domestic addition to houses owned by British military personnel in India and the Caribbean. The residential porch also appeared in nineteenth-century North America, where it expressed openness and provided comfort. Insect screening became a popular feature of porches in the southern United States, especially for evening use and outdoor sleeping. In most other parts of the world, however, the verandah is not screened, and can thus probably only be used in favorable conditions.
glass, avoiding the greenhouse effect; and the long overhang of a verandah can protect windows during rainstorms, allowing them to be kept open to provide a cooling effect.

The verandah has also been noted for the important role it may play in the humanization of architecture. Researchers frequently stress its ability to provide a transition, an extension of the house that integrates indoor and outdoor spaces and creates a place for social contact and contemplation of nature. Alexander et al. included the verandah in design recommendations for integrating indoor and outdoor living spaces; however, they argued that verandahs must be adequately dimensioned for domestic activities, and recommended a minimum two-meter depth.17

Such recommendations, however, may not be valid when questions of cost arise, as in the case of Brazilian self-builders. In Brazilian cities, economic problems and urban pressures force families to build on very small lots. Under these conditions the porch is often eliminated from the architectural program of self-built houses, and priority is given instead to indoor functional areas. Moreover, in government housing developments, even though a verandah may be part of the original design, it is frequently turned into additional indoor space by occupants.18

THE LOCAL SELF-BUILDING PHENOMENON

Self-building of homes by owner-families is the predominant mode of housing production in many parts of the world, and various authors have hailed it as a positive force for reducing the enormous housing deficit. Several aspects of this phenomenon have been studied, including the evolution of self-built construction over time and its relation to the meaning of home. Some studies have, however, lamented the alienation of self-built houses from tradition and the lack of construction quality in the vast areas of self-built houses on the outskirts of cities worldwide.19

In Brazil, around 60 percent of housing production is self-built.20 There has been no national housing program in Brazil since 1986, leaving low-income families few options other than informal residential production. As a result slums have appeared near city centers, and self-built houses have been constructed on the urban fringes.

Brusky and Fortuna have divided the low-income population of Brazil into three groups in relation to the minimum wage (MW), which in 2005 was approximately US $150 per month.21 Salaries from 0 to 2 MW typify a very low-income group; from 2 to 3 MW a low-level group; and from 3 to 6 MW a medium-low group. Self-builders correspond to the second and third tiers, but their income is generally insufficient to acquire a home through the regular housing market, which is aimed at middle- and upper-income families.

A distinction should be noted here between self-building and spontaneous construction by squatters.22 In Brazil, as in many developing countries, spontaneous housing occurs on land without tenure through clandestine occupation or invasion. This type of building, in so-called favelas, is synonymous with extreme poverty, and the poor housing quality in these slums has many negative impacts on their inhabitants, as well as on the urban environment as a whole.

In contrast, most owner-built settlements in Brazil occur on land acquired with tenure, as part of sanctioned urban growth. This phenomenon has been widespread in the region of Campinas. The city of Campinas is located about 100 kilometers from São Paulo, and as São Paulo has grown into the most populous city in Brazil, there has been a spillover impact on Campinas. In the last forty years the city region has doubled in population to approximately one million inhabitants.23 This growth has occurred mainly at the fringes of the city through subdivisions, which may be entirely private, or in some cases may be supported by the municipal government.

Access to urban land by a large low-income population, through the acquisition of lots from small land speculators or local government housing agencies, allows the speedy construction of crude minimum houses. Once occupied, these are then continually modified, and can take twenty years or more to be finished. Because the self-building process lacks proper design and planning stages, the result is frequent transformation during a lengthy construction period.24

An extensive study of self-built houses, considering the characteristics of self-construction, house ownership, and income level, was undertaken in the city of Campinas in 1994 by Kowaltowski et al.25 Five among the 97 self-built settlements and three of 33 public housing developments in the region were randomly selected. A total of 64 self-built houses and 95 single-family units in public developments were then selected for more extensive study. Public housing projects were included in the sample, because owners extensively modify their units after occupation, and so they can to some extent be considered “owner-rebuilt.”

As part of the study, owners were asked a series of standard questions about family size, construction detailing, house evolution, satisfaction, preferences, and habits. The houses were then extensively observed, analyzed and classified as to plan type. Important features, such as functional building area, number of rooms, and finishing details, were also recorded. Environmental comfort was specifically assessed through analysis of window and door orientations, provisions for ventilation and shading, and use of construction materials and exterior wall colors. A shorter questionnaire on preferences of plan type and house facades was further tested in 404 homes to gain information for the development of a technical aid system.26

From these results, it was possible to conclude that self-built houses predominantly follow the specific schematic plan shown as Type 1 in the accompanying drawing (fig. 5). This house is based on a program of two bedrooms, a living room, kitchen, and bathroom, with a small outside service or
laundry area. The second most common plan, with a one-bedroom program, is shown as Type 2, and is found at the back of the lot. Type 3 is a common variation of Type 2 with two possible orientations along the sides of a lot.

An analysis of facades as part of the 1994 study indicated that many self-builders imitate the stylistic tendencies of houses in the middle-class suburbs in Campinas, which often try to reproduce the local colonial style. This “colonial” style often makes use of a triple-arched window (refer to fig. 1). However, such reference to older models, possibly indicating the permanence of tradition, is not carried beyond the front facade, and little consideration is shown for other important attributes of tradition. The claim that the self-building process gives rise to what are often characterized as new traditional environments must therefore be carefully qualified.

Rapoport has devised an important approach to analyzing a specific form of building as vernacular or traditional. This collection of attributes of traditionality and additional product and process characteristics of the vernacular were useful for the analysis of owner-built settlements in Campinas.

The first set of Rapoport’s attributes is primarily concerned with the definition of traditionality, and many statements were found to not be applicable to owner-built houses in Campinas. In particular, the local case employed a Western development model and did not involve ritualistic elements and strong symbolism. What could be singled out for valid discussion in relation to both the traditional Brazilian house and new self-building were the following attributes: small scale; reliance on social conventions; informal controls; little individual selection or expression; acceptance of things (especially well-being, status and technology); schemata and models; working by example; non-reflectiveness; a self-evident or natural way of doing things; accepting the past; rejecting or ignoring modernism; conservatism; repetition; slow change; low novelty; little variability; limited material resources; not wholly economically rational; not essentially technological; with diffuse knowledge and skills; and with low work or activity specialization.

Attributes which do not apply to the Brazilian vernacular in its traditional form and the new urban evolution were as follows: grass-roots; high level of local authority; strong constraints (other than economic and physical lot conditions); group oriented; low conflict; not market oriented; and land seen in terms of social relations.

Due mainly to low-quality design solutions, local new-vernacular dwellings were found in many cases to present low environmental comfort levels, especially in terms of thermal qualities. The local new-vernacular was found therefore to lack most of the positive characteristics of traditional Brazilian architecture — which has been singled out for special praise for its intelligent solutions to climatic problems.

The Campinas region has a mixed climate. Summers are hot and humid. Winters are mild, dry, characterized by strong solar radiation during the day and cool nights with clear skies. The research showed that most self-builder families are unaware of important design issues related to such climate conditions. In particular, awareness of the orientation of openings, cross-ventilation, and the positive effect of verandahs was not deliberately and adequately incorporated in the design of houses. To improve this situation and increase the quality of houses, a better understanding of the
self-building phenomenon is needed, including investigation of the design references used by this population. This understanding may then be incorporated into design assistance programs for low-income families in Brazil.

THERMAL PERFORMANCE AND TRADITION IN THE LOCAL NEW VERNACULAR

To expand knowledge on the new vernacular, a further investigation of owner-built houses was undertaken in the region of Campinas in 2002. As a continuation of the 1994 work, new questionnaires were administered to a sample of self-builder families, and sample houses were studied through drawings and photographs.

The study specifically set out to investigate the meaning of tradition in relation to house design and construction. As such, it took into account background data on interviewees such as their age, sex, place of birth, and employment. Studies on the humanization of architecture and the historical development of the Brazilian house were used to formulate the questionnaire. The results of this inquiry are presented here in table form (Tables 1, 2).

A special effort was made in the design of the questionnaire to employ iconography that could be easily understood by self-builders. This iconography is represented in Table 2, along with the evaluations and observations made by the sample population. Other observations were made on traditional elements found in sample houses, and builders were asked to evaluate the importance of these elements in relation to thermal performance. Knowledge of concepts of bioclimatic architecture were also tested, and the results were analyzed through simple percentage representations.

Due to difficulties in obtaining precise data on the number of owner-built houses in the region of Campinas, the study sample was based on known self-built neighborhoods. Data from the local housing agency (Cohab-Campinas) was also used to define the sample. In the end, five neighborhoods, with a minimum urban infrastructure, and where families had bought their residential lots, were selected. The sample was divided proportionately according to the size of the five neighborhoods and comprised a total of 151 lots, representing approximately 10 percent of the total number of lots (1,654) in these areas. The selection of the individual houses was based on an effort to cover the total area of each neighborhood. The final sample of questionnaires was divided as follows: Jardim São José, 65; Jardim São Luís, 64; Jardim Aruanã, 8; Jardim Conceição, 6; and Jardim Anchieta, 6.

The fieldwork was undertaken in November 2002, under summer conditions, and questionnaires were always applied during the day so that opinions on thermal performance related directly to hot conditions. All residents were asked for permission to have the researchers draw the plan of their houses and photograph their front facades.

The accompanying images exemplify some of the houses of the study (Figs. 6, 7). As can be seen, a wide range of house designs is present in the owner-built suburbs of Campinas. The house plans follow the schematics presented in Figure 5, but larger houses and even two-story examples exist. However, most examples were very small houses with no external finishing.

When comparing traditional vernacular architecture with these new urban dwellings, one notices the loss of several important elements. For example, the self-built dwellings lack efficient use of resources and a good relation to natural elements such as vegetation.” This means that an effective response to climate can only be sustained through the use of adequate building materials.

One important finding of the study was that when asked to define the “traditional house,” most people described a simple house with few rooms. This was also considered the most common house, equal to the ones built by government housing agencies. When asked to rate the “concept of tradition” in relation to housing, the majority of people considered it positive, although they associated it with simplicity, and even poverty.

The answers in relation to images of house facades reinforce the idea that, among low-income populations, what is common is considered traditional (Refer to Table 2). These results also reinforce the idea that the population associates their own desired house with the concept of traditional architecture, and that this concept is not linked to historical examples of Brazilian colonial architecture. Some results did attribute tradition to old buildings; but in this case the reference was to a more classic meaning of tradition.

The architectural program of the traditional house, as described by owner-built families, also had little to do with the colonial house and its historical functions. For example, the windowless sleeping nooks seen in Figure 1 have been forgotten. Instead, most sample respondents described their desired house program as generally similar to that of middle-class houses in the Campinas region. This includes three bedrooms, a living room, dining area, kitchen, two bathrooms, closed-in laundry, and covered parking attached to the house for two cars.

Sample respondents did not specifically understand the concept of thermal performance. In answer to questions, they described the attributes of a desired comfortable house, not building construction elements that might provide adequate and healthy conditions. When asked to relate specific traditional building elements to thermal comfort, the majority of respondents considered high ceilings most important. New-vernacular houses must comply with local code requirements stipulating a minimum ceiling height of 2.70m for habitable rooms. By contrast, urban Brazilian colonial houses often had ceilings as high as 3.50m or more. A ceiling slab was also considered important by most people, although colonial houses did not have this feature. Morning sun in the bedrooms was mentioned as a positive design aspect, but the analysis of sample houses did not confirm an easterly location for sleeping quarters.
Table 1. Case study results: opinions of the population of self-builders and observations of houses.

<table>
<thead>
<tr>
<th>No.</th>
<th>Item of inquiry</th>
<th>Response (majority or percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Origin of self-builder families</td>
<td>Campinas region</td>
</tr>
<tr>
<td>2</td>
<td>Urban or rural background</td>
<td>Urban</td>
</tr>
<tr>
<td>3</td>
<td>Sex of respondent</td>
<td>Women</td>
</tr>
<tr>
<td>4</td>
<td>Profession of respondent</td>
<td>Housewife or domestic help</td>
</tr>
<tr>
<td>5</td>
<td>Family income</td>
<td>Between US $50 and $250</td>
</tr>
<tr>
<td>6</td>
<td>Family size</td>
<td>From 3 to 5 members</td>
</tr>
<tr>
<td>7</td>
<td>Size of building site</td>
<td>~150m²</td>
</tr>
<tr>
<td>8</td>
<td>Number of houses on the site</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Indoor (functional) area</td>
<td>From 25 to 128m², majority ~40m²</td>
</tr>
<tr>
<td>10</td>
<td>Definition of a traditional house</td>
<td>Simple, common house (few rooms)</td>
</tr>
<tr>
<td>11</td>
<td>Rating of the concept of tradition:</td>
<td>In general = positive</td>
</tr>
<tr>
<td>12</td>
<td>Rating tradition and house construction</td>
<td>Considered to represent simplicity and poverty</td>
</tr>
</tbody>
</table>
| 13  | Architectural program of a traditional house | • 2 bedrooms, living room, kitchen, bathroom  
|     |                                        | • The desired house program included a dining nook, third bedroom, garage and laundry  
|     |                                        | • Common present day program  
|     |                                        | • Colonial house program not known                                                                                                                             |
| 14  | Construction details that relate to thermal comfort, in order of importance | 1. Type of roof tile  
|     |                                        | 2. Verandah  
|     |                                        | 3. Vegetation around the house  
|     |                                        | 4. Room size  
|     |                                        | 5. Size of openings  
|     |                                        | 6. Ceiling slab  
|     |                                        | 7. Orientation of openings  
|     |                                        | 8. Morning sun  
|     |                                        | 9. Long roof overhang  
|     |                                        | 10. Type of window  
|     |                                        | 11. External wall thickness  
|     |                                        | 12. Type of construction material of external walls  
|     |                                        | 13. External wall color not considered  
|     |                                        | 14. Roof design (shape) to prevent rain infiltration                                                                                                           |
| 15  | Construction details not incorporated in house design that might improve thermal comfort | • Verandah  
|     |                                        | • Vegetation  
|     |                                        | • Orientation of openings  
|     |                                        | • Size of openings  
|     |                                        | • Thick external walls  
|     |                                        | • Light external colors                                                                                                                                           |
| 16  | Construction details that have a negative effect on thermal comfort | • Small openings  
|     |                                        | • High lot walls  
|     |                                        | • Orientation of openings unrelated to predominant wind direction  
|     |                                        | • Site paved with concrete around structures                                                                                                                        |
| 17  | Verandahs                              | • Present in 40 percent of previous house  
|     |                                        | • Present in 30 percent of present house  
|     |                                        | • Predominant use for laundry  
|     |                                        | • 24 percent with simple benches (sitting and chatting)  
|     |                                        | • Simple roof extension  
|     |                                        | • Narrow covered area  
|     |                                        | • Incorporation into the indoor space not intended  
|     |                                        | • Important place to gather the family and relax (25 percent)  
|     |                                        | • Used to observe street-life (15 percent)  
|     |                                        | • Importance as an indoor temperature control element recognized by 80 percent  
|     |                                        | • Valued it as a shading device  
|     |                                        | • Reduction in indoor air speed recognized by 10 percent  
|     |                                        | • Protection element against rain recognized by 87 percent                                                                                                        |
External wall thickness was considered an important construction detail, but external wall colors were not recognized as having an influence on heat gain. Vegetation around the house was seen as an important factor in thermal performance, but in reality few trees have been planted, and bare earth surrounded most houses. Concrete paving was also common around dwellings, and in general, ease of cleaning and maintenance were major factors cited in the choice of exterior materials. Because of concerns for security, a two-meter-high wall was seen as essential around the perimeter of a lot. Sample

**Table 2. Case study results: rating by the population of self-builders of examples of house facades.**

<table>
<thead>
<tr>
<th>Examples of houses, ratings, and opinions</th>
<th>Rating house design references</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td></td>
</tr>
<tr>
<td>1. 17 percent considered this urban colonial house traditional</td>
<td></td>
</tr>
<tr>
<td>2. Design elements associated to tradition:</td>
<td></td>
</tr>
<tr>
<td>• Simple facade</td>
<td></td>
</tr>
<tr>
<td>• Arched windows</td>
<td></td>
</tr>
<tr>
<td>• Old</td>
<td></td>
</tr>
<tr>
<td>• Belonging to history</td>
<td></td>
</tr>
<tr>
<td>3. Traditional design elements related to thermal comfort:</td>
<td></td>
</tr>
<tr>
<td>• High ceilings (66 percent)</td>
<td></td>
</tr>
<tr>
<td>• Hidden roof (12 percent)</td>
<td></td>
</tr>
<tr>
<td>• Tall windows (6 percent)</td>
<td></td>
</tr>
<tr>
<td><strong>B</strong></td>
<td></td>
</tr>
<tr>
<td>1. Considered traditional by 47 percent of respondents</td>
<td></td>
</tr>
<tr>
<td>2. Design elements associated to tradition:</td>
<td></td>
</tr>
<tr>
<td>• Most common type of house in the region</td>
<td></td>
</tr>
<tr>
<td>• Presence of a garage</td>
<td></td>
</tr>
<tr>
<td>• Simple roof line</td>
<td></td>
</tr>
<tr>
<td>3. Considered most comfortable by 30 percent of respondents</td>
<td></td>
</tr>
<tr>
<td><strong>C</strong></td>
<td></td>
</tr>
<tr>
<td>1. Considered traditional by 6 percent of respondents</td>
<td></td>
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<tr>
<td>2. Design elements associated to tradition:</td>
<td></td>
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<tr>
<td>• Simple facade</td>
<td></td>
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<tr>
<td><strong>D</strong></td>
<td></td>
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<tr>
<td>1. Considered traditional by 24 percent of respondents</td>
<td></td>
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<tr>
<td>2. Design elements associated to tradition:</td>
<td></td>
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<tr>
<td>• Rural (garden) setting</td>
<td></td>
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<tr>
<td>• Presence of verandah</td>
<td></td>
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<tr>
<td>3. Considered most comfortable by the majority of respondents</td>
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</table>
respondents did not recognize these walls as wind barriers with a negative effect on thermal comfort within the house.

Attitudes toward verandahs were investigated in depth. Only one-third of the sample houses had verandahs, most being simple extensions of the eaves. Few porches were large enough for domestic activities, although the back porch was considered important as a service or laundry area. The accompanying photos show some examples of houses with porches as simple roof extensions (fig. 8).

In general, the population did recognize the verandah’s importance as an indoor temperature control element and shading and rain protection device. However, the orientation

**Figure 6A–C (right).** Examples of one-story self-built houses from the 2002 survey in the region of Campinas.

**Figure 7 (below).** Example of a two-story self-built house from the 2002 survey in the Campinas region.
of actual verandahs did not follow specific sun-shading recommendations. Rather, the position primarily reflected the siting of houses in relation to the street.

QUALITY OF THE LOCAL NEW VERNACULAR

Some conclusions can be made from the results of these investigations. Most significantly, the self-builder population of the Campinas region does not have a clear understanding of traditional building as a historical concept. Although most consider “tradition” positive, they primarily associate the traditional house with a simple dwelling.

The verandah is considered an essential element of the traditional house; however, it is not recognized as essential in its identification. Arched windows and doors are given more importance; yet while these are often part of the Brazilian traditional house facade, they also belong to the present-day aesthetic desires of the sample population. The verandah is rated highly as a building element that improved thermal performance. However, the population does not seem to have a strong attachment to it, since only service porches (laundry areas) are built today.

At the same time, some myths exist in relation to thermal performance among self-builders. In particular, although high ceilings are not present in self-built houses, the population attributes internal thermal comfort essentially to this feature. According to bioclimatic architectural recommendations, proper roof detailing and insulation can substitute for the positive effect of high ceilings. Thus, in practice, an adequate ceiling slab or insulated wooden ceiling, a ventilated attic, and moisture-absorbing roofing materials (such as ceramic tiles) can compensate for the lack of a high ceiling. This indicates that the local self-builder population has only a superficial understanding of the role of building components in improving thermal performance.

To better correspond to the definition of the vernacular, self-built houses clearly need adjustments to their design, especially concerning environmental performance as related to light, air, sunshine and indoor temperature. To improve thermal comfort, there should be greater concern for ventilation, insulation, and the thermal resistance of materials. Through the principles of bioclimatic design it should be possible to add climate-responsive attributes to the small suburban houses in Campinas in ways that take account of socioeconomic factors.

Analyzing the program of traditional and local self-built houses, one also notes the disappearance of the sleeping alcoves of the colonial house. These dark, unventilated spaces existed for reasons of privacy and security. Self-builders today prefer the healthier bedroom with windows, which offers the chance for proper ventilation and lighting. However, the size of window openings is not necessarily related to bedroom area, indicating that self-builders are unaware of the importance of this relationship. Instead, cost is the main factor in choosing windows, meaning these are often inadequately sized.

With regard to window position, self-builders state there is a relationship between solar orientation and comfort. However, a self-builder determines the location of the house first, and consequently the orientation of the openings — in relation to the street, not the sun. This practice is attributed to the difficulty of siting the minimum program on a small, narrow lot.

The fact that the population considered house “d” in Table 2 the most comfortable house is one indication that most people are aware of the importance of vegetation for thermal comfort. The role of greenery as a humanizing design element has been confirmed by Kowaltowski. But again, reality does not reflect opinion, since most self-built houses have few trees, and streets are largely devoid of vegetation. Most data on tradition and the vernacular stress the importance of this relation, and point out that architectural form grows out of deep understanding of climate and
A profound relation with nature seems to have been lost. This understanding needs to be recovered if self-built suburbs are to become better places through the provision of favorable microclimates and a conscious collaboration of the population in the preservation of vegetation.

The authors’ experience with a design assistance program for low-income families gave further insights into the specific needs of this population in terms of improving the designs of their homes. Principally, self-builders need access to technical arguments behind good practice. For example, they need to be told how the high level of solar exposure in subtropical climates makes shading using roof overhangs, verandahs and trees necessary. A discussion of lot conditions and the position and orientation of the house could also help avoid design features which may negatively affect function, comfort and privacy. Experience has also shown that the dreams of owner-builders are complex and may not always be feasible on small lots. For example, many families expect to be able to solve more than their own housing problems.

A further conclusion is that the local building tradition is still fairly intact, with simple design forms and use of ceramic materials for walls and roofing. However, other traditional elements have been lost, such as thick outer walls, large and high openings, and generous verandahs for leisure and kitchen activities. There is a further tendency to substitute low-cost readymade products, such as standard-sized doors and windows, for products that could improve thermal performance. This tendency shows a lack of deeper understanding about the relation between design and comfort.

Further investigations are needed to improve local housing quality, including technical measurements to accurately establish the conditions of owner-built houses. These should include an assessment of the influence of verandahs on lighting and thermal conditions in typical self-built houses. The verandah, as a transition space and a climate-mitigating element in a region with hot and humid summers, should be part of the local residential design repertoire, and ways should be found to encourage a renewed use of covered, shaded open spaces in housing. Building porches should be recommended, especially on western facades and to provide poor families with an inexpensive comfortable extension of their functional space.

Ventilation conditions also need further investigation, since the proper placement and dimensioning of windows can positively influence thermal performance in hot, humid climates. Furthermore, the presence of vegetation around the house and along streets must be assessed. Self-built environments, with and without vegetation, need to be evaluated to improve awareness of the value of vegetation.

In general, this study of the new vernacular has revealed a less than desirable level of construction quality in large numbers of houses in the Campinas region. This can be attributed to the loss of traditional construction and comfort elements in the design and building of houses. The fundamental basis of self-built houses, namely size and shape of the urban lot, must be investigated, due to its stunting influence. Often the layout of new-vernacular settlements is not ideal for the siting of desirable house designs. Orientation of streets does not take into account sun exposure or prevailing wind direction, and owner-builders possess little understanding of technical concepts of thermal performance to compensate for the flaws in individual house designs.

A TENUOUS LINK

This study has shown that the link to traditional ways of building in Brazil is tenuous. The many discussions in architectural literature calling for a renewed interest in the vernacular must therefore be qualified in the Brazilian context.

Globalization’s influence on architecture and urban developments has been questioned recently, and the search for local environmental flavor is increasingly discussed in this context. People are seen as being tired of the leveling effects of sameness, seeking a foothold in the past and a sense of tradition. Attempts are being made, especially in housing projects, to reinstate continuity with the past and return to vernacular traditions. As Rowe has stated, “it is the distinctly regional nature of most vernacular traditions that is advantageous in resisting the homogenizing influence of modernity, and hence a source of future possibilities.”

When looking at the local new vernacular, on the other hand, it becomes clear that this building activity is less about resisting the temporal destruction of spatial distinctions than about aspirations. Typical owner-built houses, at least in the Brazilian urban context, invariably imitate a perceived middle-class style of building, which is removed from local colonial vernacular traditions. Rowe has discussed such imitations as an attempt to legitimize otherwise less than adequate conditions and provide a sense of social stability for self-builder families.

While in some countries architectural tendencies have found positive inspiration in the traditional ways of building, in Brazil, the new vernacular has lost its historical link, and efforts are necessary to improve housing production among owner-builders through innovative and responsible assistance programs and educational efforts.
References


15. Ibid.


17. See Alexander et al., A Pattern Language.


24. Kowaltowski and Pina, “Transformações de Casas Populares.”


26. The results of this survey are described in publications listed in the previous note.

28. Ibid. p.83.
29. Labaki and Kowaltowski, “Bioclimatic and Vernacular Design in Urban Settlements in Brazil.”
32. Kowaltowski, “Arquitetura e Humanização.”
33. Fathy, Natural Energy and Vernacular Architecture; and Rapoport, “On the Attributes of Tradition.”
34. Labaki and Kowaltowski, “Bioclimatic and Vernacular Design in Urban Settlements in Brazil.”
36. Rowe, Modernity and Housing, p.279.
37. Ibid., pp.279–81.

All drawings and photographs are by the authors.