

# THE TECTONIC FRAMEWORK OF *MINKA*: MEANING THROUGH INTENSIFICATION IN THE JAPANESE FOLKHOUSE

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*Minka*, the Japanese folkhouse, uses a space-structuring principle that is fundamentally different from the style and construction of the *sukiya-zukuri*, the well-documented “Japanese house.” A general framework defines an undifferentiated space, supports the roof structure, and carries the large roof. About two thirds of the plan is raised off the ground, and *doma*, an earthen floor area, is used as an enclosed kitchen, work space, and shelter for animals. The *minka* space-structuring method is used in farmhouses as well as townhouses. Regional factors determine variations in plan, massing, and roof styles. All *minka*, however, share common characteristics.

Rooms are partitioned off during initial construction or as necessary over time. *Minka* represents process-generated space, and the adaptability and survival of this building type is largely due to its hierarchical structure. Seven primary framework types<sup>1</sup> support the roof structure, and a secondary structure facilitates the building of walls, lean-tos, and other modifications.

In contrast, each spatial cell of a *sukiya-zukuri* house is defined by corner columns, and the ambiguous floor plan of this aggregation sits under an assortment of roofs and a hidden, complicated roof structure. Most of the posts virtually disappear at wall intersections. The occasional free-standing posts in the *sukiya-zukuri* house underscore a structural minimalism—a dematerialization of structure.

## THE PRIMARY FRAMEWORK OF *MINKA* AND THE DIMENSION OF TIME

It is easy to recognize the *jikugumi*, the primary framework, used in the dwelling, but identification of the framework type is sometimes only possible when the structure is disassembled. The precise nature and the full extent of the structure is revealed during demolition, relocation, and restoration of important *minka*. However, conformity to a pure *jikugumi* type is less important than the use of the principle of a hierarchical structure. Available materials, handicraft techniques, and regional traditions and preferences further modify the structure. Thus, each framework is unique, yet belongs to one of the types and is consistent with the local practices.

The vulnerability of some materials and building elements and their limited life span contrast with the permanence and durability of the structure. Clay walls are worn down by the elements, myscanthus thatch roofs require patching and replacement, fingers poke through paper walls, and *tatami* mats wear out. Each building component has its own replacement cycle. The more durable secondary infill structure that frames the rooms gets revamped, replaced, or added to; the



Figure 1: A modest *minka* in Kii Fudiki-no-oka, Wakayama prefecture [1990]

unpredictability of life, fortunes, changing circumstances, needs, and taste demands a response. The very survival of *minka* up until the early post-war period can be largely attributed to this adaptability.

The framework communicates a feeling of durability and permanence in addition to physical safety, thus contributing a psychological sense of stability. The large member sizes, the choice of wood, the care accorded to its finish and maintenance, and the apparent contrast with the more vulnerable building elements constitute a difference that distinguishes the structure of *minka* from the frailty of the *sukiya-zukuri*, the more delicate buildings of the “floating world.” The worn and weatherbeaten effects of time are cherished, yet the new elements and repairs

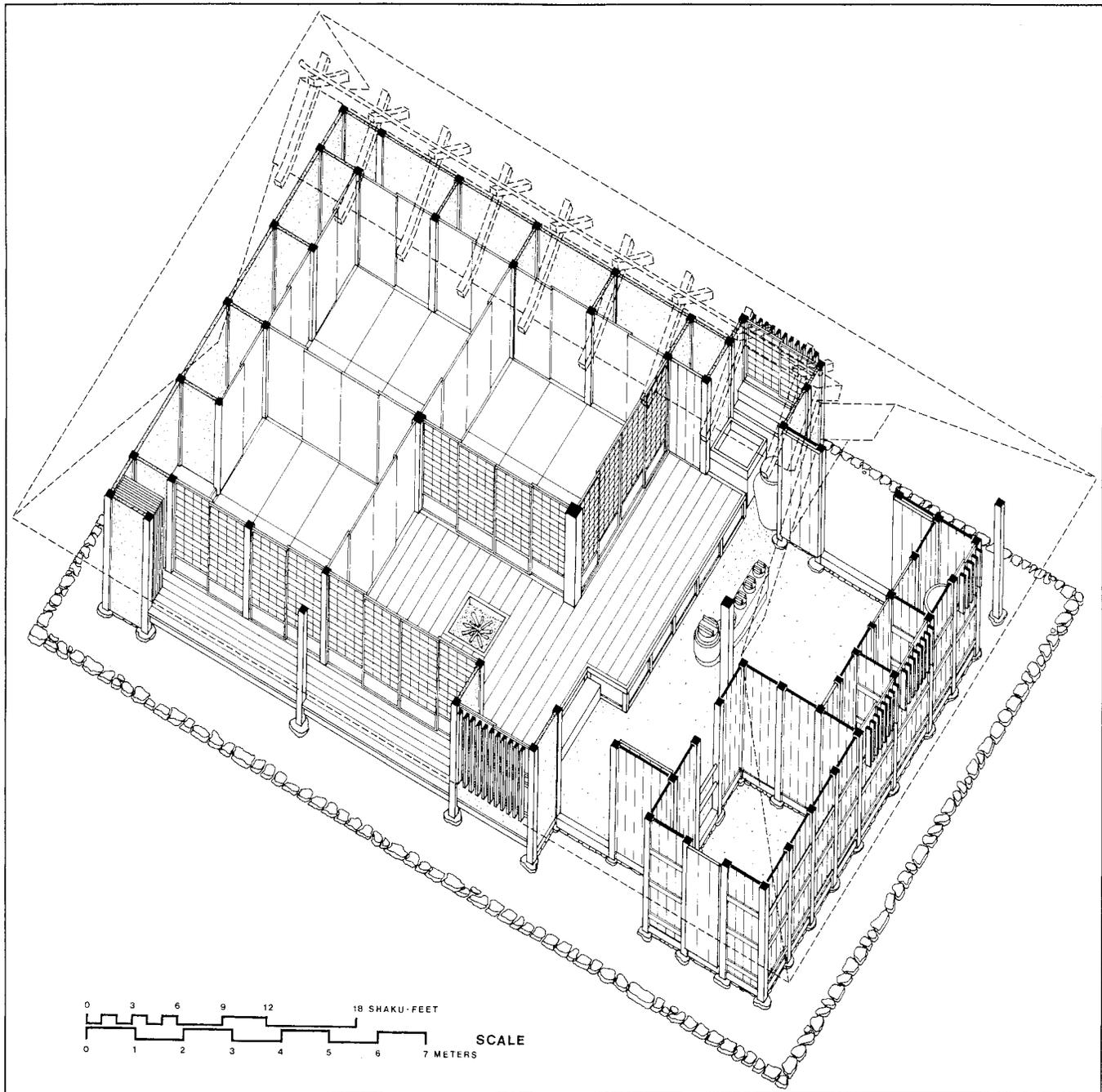


Figure 2: A typical *minka* in the Kyoto area

testify to the acceptance of the demands of life lived in the present. Without the presence of the past there is no assurance of the future, and the primary framework is also a metaphor of a structured life.

#### THE SENSORY REALM

The tactile and aural, even the olfactory qualities of *minka* affect the psychological response to the space. *Sukiya-zukuri* construction in houses, inns, restaurants, and tea houses is noted for the silken surfaces of posts which invite caress. The more refined *minka* also have such a secondary structure. However, these are primarily dwellings of common and often

very poor people. "Imperfections" of wood with knots, twists, and other deformities, the weather worn grain, and the marks of tools convey a robust vitality rather than a refined elegance. Solid wood sliding walls and the uneven width of floor boards attest to survival in natural and people-caused hardships and disasters.

*Tatami* mats mute the sound of steps and the thick thatch roof muffles the pounding of relentless rain. The structure and roof retain centuries of smoke, and soot is not cleaned off. It also coats the thatch and the lighter bamboo substructure of the roof. Smoke is the preservative of the wood and bamboo. Once every ten days uninhabited houses are smoked out to kill off insects. Understanding this beneficial process, the nose finds the smell congenial.

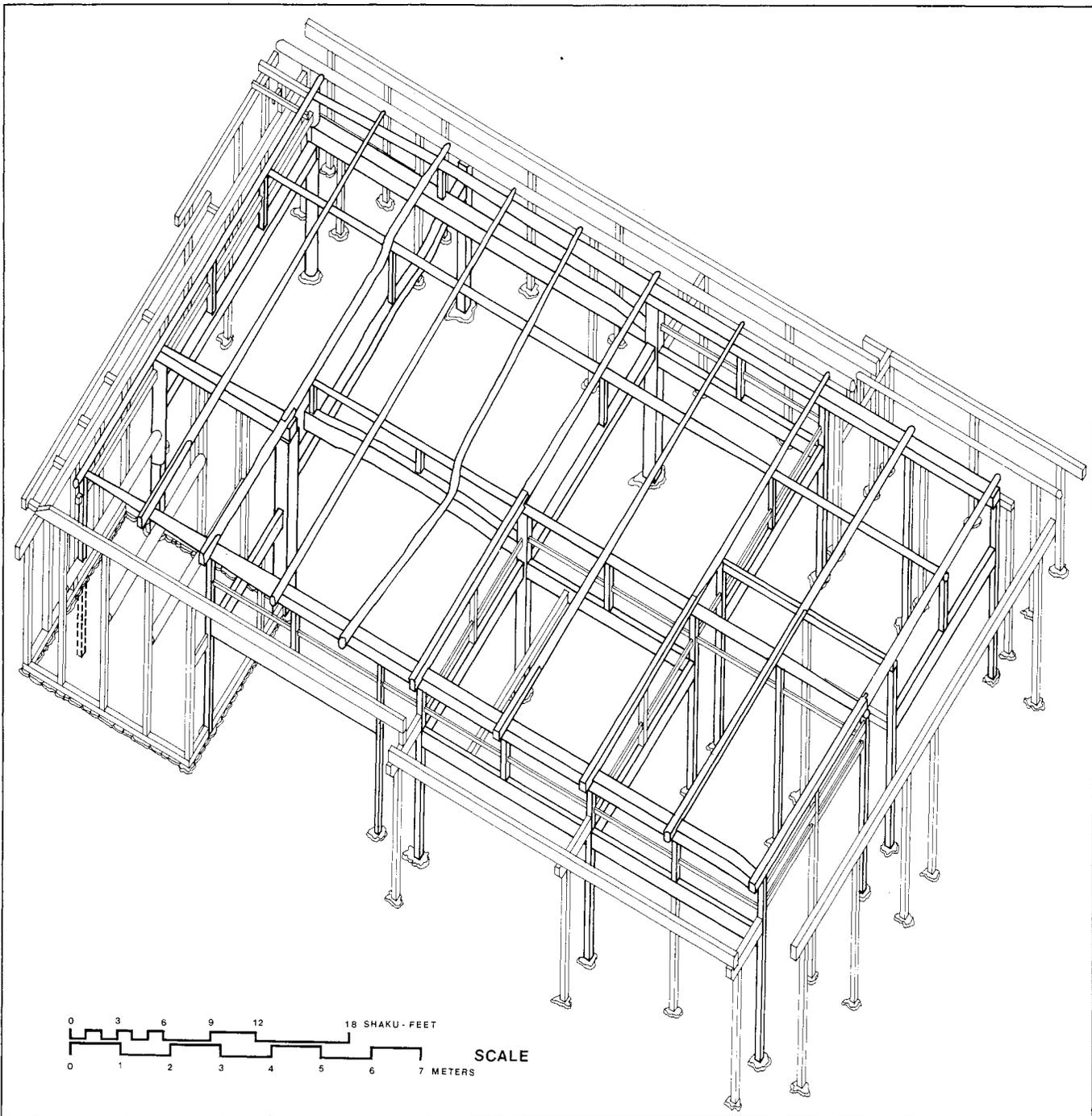


Figure 3: The primary and secondary framework of Sasaoka house, Kashiwara, Nara prefecture.

### THE STRUCTURAL ELEMENTS

As the conductors of vertical loads, posts [*hashira*] are the most important part of the framework. Square and dressed in the refined houses of village chiefs or left rough, posts vary in size and finish according to the structural task, location, and the means of the owner. The corners of posts are beveled in all but the humblest of structures. Remote mountainous areas had limited access to tools, and the hardwood structural members were shaped with an adze. Marks left by this tool are used to date buildings prior to the introduction of planes and saws, but there are many exceptions, and timber hardly altered from its natural

state found a place in the framework. Pine or hemlock posts are common, as farmers were forbidden the use of the preferred cypress and cedar. Zelkova [*kaieki*] was used for *daikoku-hashira*, the central sacred post. Parts of larger trunks may retain natural blemishes, and these are often found at the head of the post and made use of in the design of the connection with the beams.

Due to ground moisture, the posts sit on a sill beam or foundation stone. These are natural rather than dressed and, as with the stones in a garden, most of the stone is below the surface. A large rounded river boulder is placed on crushed stones and pebbles, the soil is tamped around it, and the foundation is pounded down. The stone appears to have been literally driven

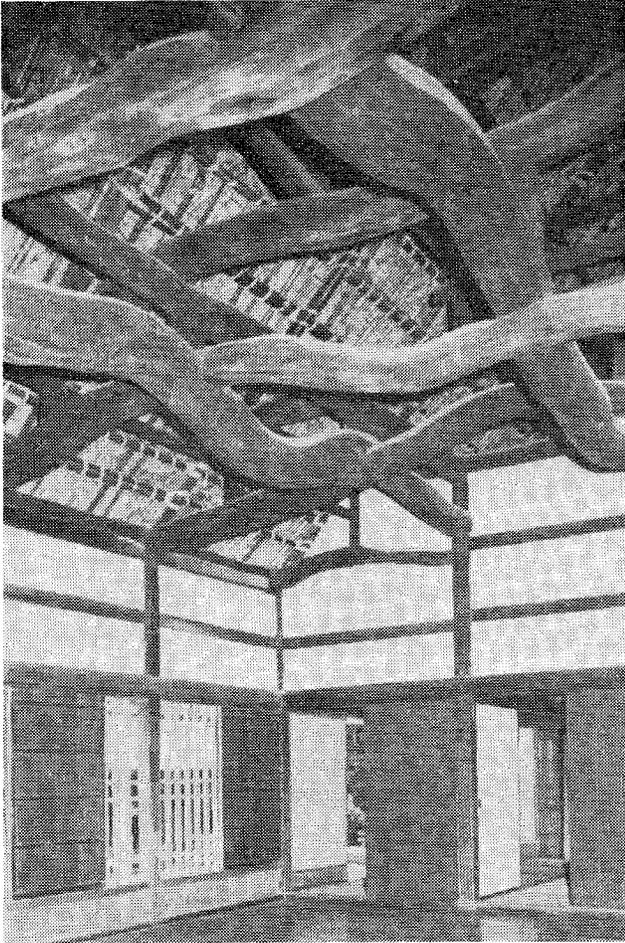


Figure 4: Beams in Sakuta house, originally located in a fishing village in Chiba prefecture and now at the open-air ethnographic museum in Kawasaki, Kanagawa prefecture [1990].

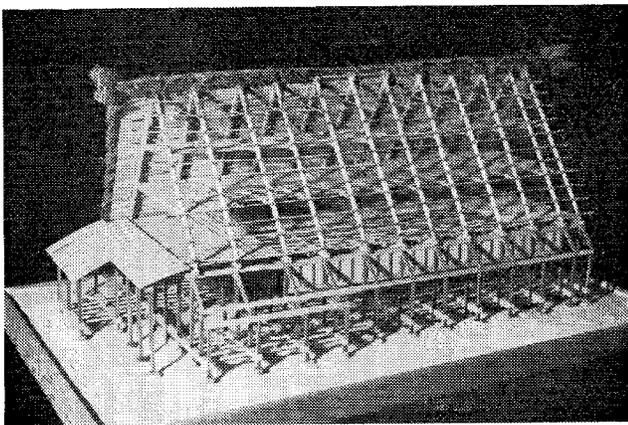


Figure 5: Sasu roof structure of Ōdo house, Masuda county, Gifu prefecture, a *gasshō-zukuri minka* with attic floors for sericulture [model by Gary Caperna, University of Oregon, 1983].

into the earth. The seat of the column is carefully shaped to the column's end by making the contours of the stone match the end treatment of the post. Earthen in color, the stone seems to grow out of the soil. The fitting between the stone and the post has a practical purpose, as the post can stand unbraced, and the entire cross section of the post bears on the foundation. However, this seat does not always result in a condition that sheds water, and

lateral bracing is non-existent. The free-standing projecting posts powerfully restate the *minka* space-structuring process during construction. The base of the column expresses its connectedness with the earth, and the dwelling grows out of it like a tree.

The shape of beams discloses that the Japanese were not unaware of the importance of depth in resistance to bending, but the proportions between the width and depth of beams hardly differ. Round beams are very common, and carefully dressed octagonal beams are present in the more refined houses.

The beam system [*hari-gumi*] spans between or over the columns and includes girders, lintels, and an assortment of bracing members. Much of the roof structure rests on the beams without posts directly below such point loads. Connections between the beams and the posts assure stability of the primary framework. There was an erroneous belief that weight would stabilize the structure, and the carpenters used members far greater in size than necessary. At times beams were piled upon beams resulting in an overbearing structure. Such a display conveys the great affluence of a well-to-do owner, as the beams were very expensive. Uneven snow loads on the Japan Sea side also contributed to a double beam system to counter the buckling and twisting tendency of the framework<sup>2</sup>. The appearance is awesome, as most of the structure of *minka* is exposed.

Curved logs that arch over the space are quite common, and trunks deformed at the base by 'gunstocking' due to slippage of soil during the growth of the tree are carefully lined up, resulting in additional height of the room. Straight timbers were difficult to obtain, but this shortage was transformed into a poetic basket weave of beams. Unenviable poverty gives rise to ingenuity and aesthetic expression, rather than a lamentation of the deprived existence. Crooked timbers become favored and highly prized; imperfection discloses the true nature of hand-crafted wood structure. A forked seat at the top of a column receives the beam; the upward curved log not only resists deflection but also "leaps" from post to post. Beauty is recognized in the simplest and most common construction, and the Zen philosophy ritualized in the tea ceremony re-emerges in the use and choice of structure.

#### THE ROOF STRUCTURE

The roof structure [*koya-gumi*] sits on top of the primary framework and may appear from below to be fused with it. However, there are four clearly defined types<sup>3</sup> and their use is determined by the framework, the pitch of the roof, roofing material, and regional customs. Here we can only touch upon two of these: *wagoya*, the low-pitched assembly of struts and ties that supports the purlins and rafters [misabeled as the "Japanese truss"], and *sasu*, the high-pitched A-frame supported by the transverse beams. *Wagoya* is used to carry the tile roofs of *maciya*, the townhouse, and *sasu* supports the thatched roofs of a wide variety of roof types throughout Japan.

The short members of the *wagoya* are connected by mortice and tendon joints and are the very epitome of Japanese building technique—small pieces working together and achieving an effect through repetition. Similar in appearance to a space frame, the trabeated arrangement communicates unity of purpose. The roof is safely supported by a common effort.

*Sasu* roof structure, on the other hand, emphasizes directness. Two poles leaning against each other and bound together carry the ridge pole, the symbol of attained summit and

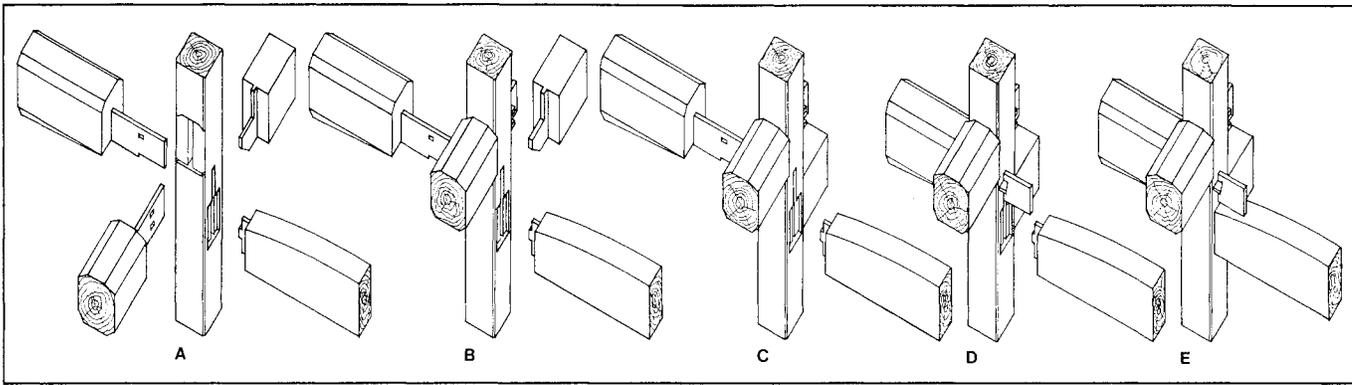


Figure 6: Detail beam framing at the sacred post. Sasaoka house, Kashiwara, Nara prefecture<sup>7</sup>

bond. This is space-making in a bold and primordial way. In small structures the triangular cross section of this attic space may remain undivided, or the poles may be joined by a layer of tie beams to carry a number of floors. Purlins, rafters, and even the pole braces are tied together with rice rope, and this work is done by the roofers. *Musubi*, the word used for the knotted-grass markings identified by Gunter Nitschke<sup>4</sup> also denotes the solidarity and life-power of community.<sup>5</sup>

#### JOINERY

The intricate joinery of the *sukiya-zukuri* house celebrates the act of connecting, yet this joinery is invisible. Construction members, once assembled, completely hide the complex connections.<sup>6</sup> The exposed structure is reduced to an abstract minimalist assembly of posts, beams, and frieze rails with few clues as to the method of joining. *Minka* employs many of the same fittings, wall components, reading window, *tokonoma* [the picture alcove], and other elements in its more refined houses, and these hardly differ from *sukiya-zukuri*. However, the exposed structure also reveals splices between beams and the intersection of beams and columns.

Differences in the size of members and the natural state of the logs call for variations and adaptations of a standardized connection. Often the column head includes a V-shaped branching in a trunk of the tree. The nesting of the beam in this seat emphasizes the receptive nature of the column, a practice common in other parts of the world. The deliberate oversizing of the structural members makes it easier to cut out the complex mortice and tendon joint.

The tied joints of the roof framing and all other bound connections in the roof are open to view and inspection. The use of rice rope, of course, requires periodic checks and replacement of rotted ropes and strings. The knotting is done with great care and awareness of the aesthetic importance of a well-tied connection. Japanese fences exemplify this fine craft. All such connections follow the prescribed number of twists, end treatment of the twine, and length. There is no other convenient and secure way for fastening bamboo and round wood poles.

#### THE INTENSIFICATION OF STRUCTURE

The structure of *minka* represents an attitude prevalent in Japanese architecture and gardens, as well as all other arts. This attitude is the Zen influence that permeates all aspects of Japanese culture. We have recognized the Japanese approach in the design of gardens through the transformation of nature. Nature is intensified and perfected to awaken us to its essence. The garden captures the mystery of the universe within the confines of a well defined boundary through symbolic use of landscape elements.

Intensification in building is the strengthening of the characteristic quality of its parts in order to capture their essence. In Japanese culture, unlike in the West, there is no separation of the physical and the psychological (8). Search for the roots of form inevitably confronts us with layers of meaning integral with external expression. Without understanding the symbolism, Japanese building is prone to a misreading. It is through intensification that the house and its systems and elements transcend building and become a work of art and a shrine for the spirit.

Okuninushi-no-mikoto, a Shinto god of the Izumo shrine, became associated with Buddhist Daikoku, the god of fields and wealth. The central post in the *minka* floor plan is called *daikoku-bashira*. *Daikoku-bashira* is indistinguishable from the other posts of *minka*. The worship of the deity and the safety of the structure become inseparable; people and their faith are intimately associated with their dwellings. *Tokobashira*, the free-standing post next to the *tokonoma* in *sukiya-zukuri*, is non-structural and an aesthetic object; *daikoku-bashira* is the most important structural post in the *minka* and a sacred member.

We also encounter Zen in the use of structure. *Jikugumi* expresses the "structuralness" of structure, the quality and state of being structure in all its myriad ways, while fulfilling its more prosaic role of holding up the roof. The sense of well being and peace of mind, undoubtedly, are linked to an awareness of the stability of structure—the fundamental requirement of any structure system. The most basic requirement of supporting the roof provides an opportunity to communicate this act of holding, resisting, and stabilizing. *Jikugumi* is not only a physical structure but a psychological framework for living.

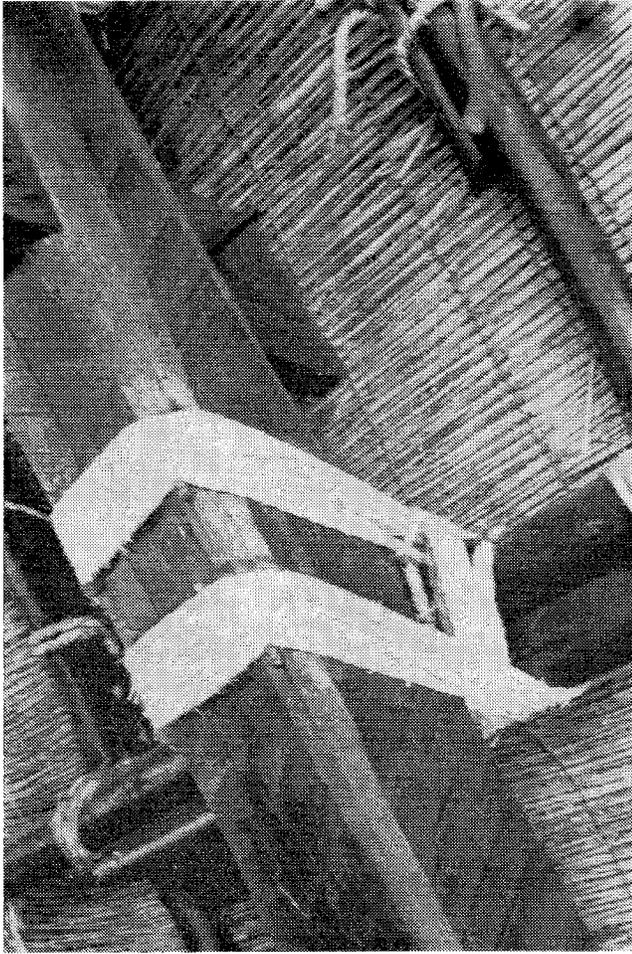


Figure 7: The tied joint of roof framing in gashō-zukuri minka. Toyama house, Hirase, Gifu prefecture [1982].

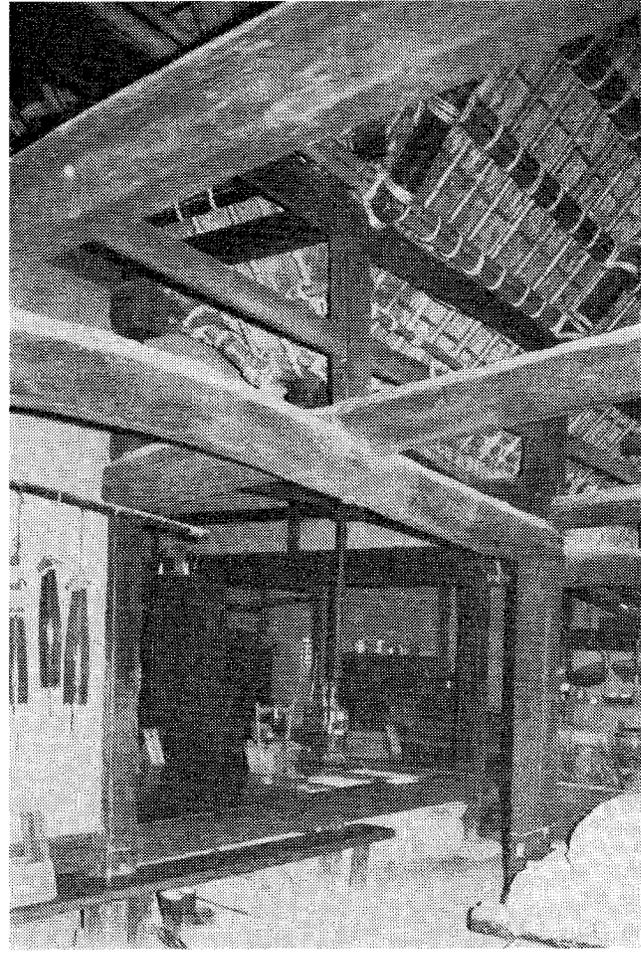


Figure 8: Daikoku-bashira, the sacred post [on right] of a kudo-zukuri minka in Tamanashi, Kyushu [1990].

#### NOTES

1. Plésums, Guntis, "Space and Structure in a Primordial Folkhouse," *Architecture*, 75 (1986):10, pp. 60-63.
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6. Engel, Heinrich, *The Japanese House*, Rutland: Tuttle, 1964, pp.101-174; Seike, Kiyoshi, *The Art of Japanese Joinery*, New York: Weatherhill/Tankosha, 1977.

7. Based on drawings in Sekino, Masaru, *Nihon no Minka*, [The Illustrated Collection of Japanese Traditional Houses], Tokyo: Gakken, 1982, vol. 3, p.165.
8. The split in the West between the physical and the psychological is largely the consequence of René Descartes' promulgation of these two realms as autonomous entities.

#### ACKNOWLEDGEMENT

Research for this paper was supported by grants from the National Endowment for the Arts, a federal agency, the University of Oregon, and the Chinese University of Hong Kong.