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Learning from the past: the lesson of the Japanese house

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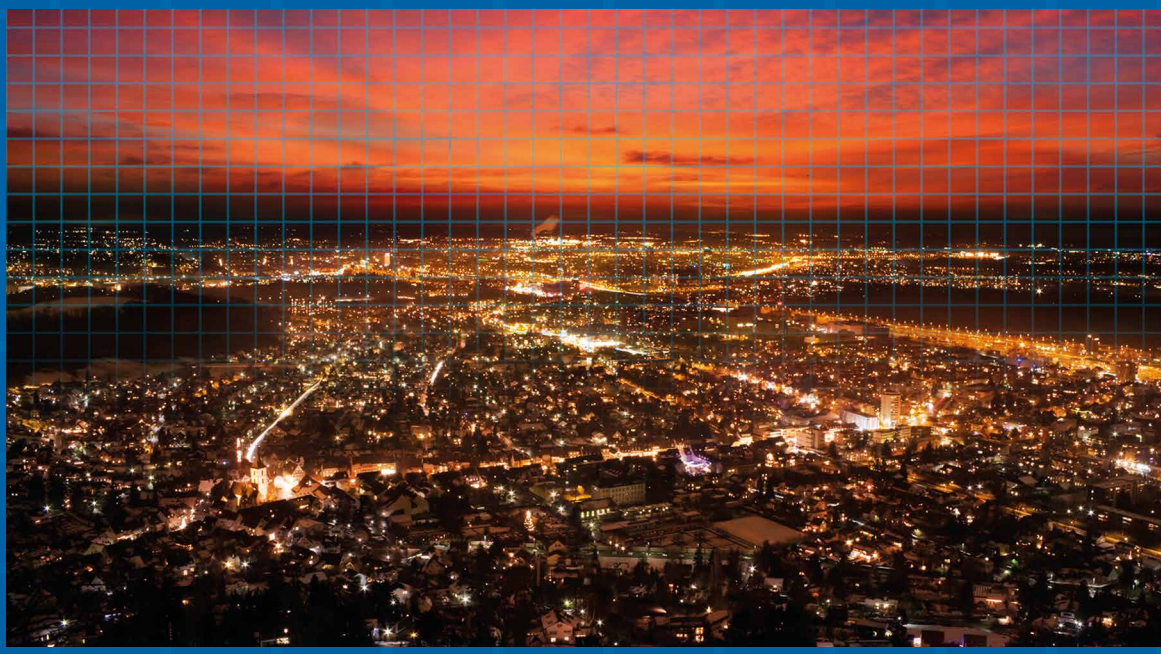

STREMAH 2017

Structural Studies, Repairs
and Maintenance of

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Fifteenth International Conference on Structural Repairs and Maintenance of Heritage Architecture

STREMAH XV

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Preface

This volume comprises selected papers on topics related to the Studies, Repairs and Maintenance of Heritage Architecture and which that are becoming increasingly important in modern society.

The rapid growth recently experienced in many regions of the world has added a particular urgency to the need to preserve our built cultural heritage. This requires the collaboration of different parties, including not only architect and engineers and scientists but also artists, socio-economic professionals and equally important, all stakeholders to ensure the effective integration of the rehabilitated buildings within the community.

The papers in this volume address a series of topics related to historical aspects and the reuse of heritage architecture, as well as technical issues on the structural integrity of different types of buildings. Restoration processes require the appropriate characterisation of materials, the modes of construction and the structural behaviour of the building. Modern computer simulation can provide accurate results demonstrating the stress state of the building and possible failure mechanisms affecting its stability. Equally important are studies related to their dynamic and earthquake behaviour aiming to provide an assessment of the seismic vulnerability of heritage buildings.

Of particular interest is the need for Heritage Buildings rehabilitation to conform to energy consumption reduction goals framed within climate change initiatives. It is necessary to encourage actions to improve energy efficiency, harmonised with both appropriate amounts of investment and transnational commitments to reduce greenhouse gas emissions.

The editors are also grateful to all authors for their excellent papers and to the reviewers for their help in ensuring the quality of this volume.

The Editors
Alicante, 2017

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LEARNING FROM THE PAST: THE LESSON OF THE JAPANESE HOUSE

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ABSTRACT
Thanks to the great spiritual value linked to it, the Japanese house is one of the oldest and most fascinating architectural constructs of the eastern world. The religion and the environment of this region have had a central role in the evolution of the domestic spaces and in the choice of materials used. The eastern architects have kept some canons of construction that modern designers still use. These models have been source of inspiration of the greatest minds of the architectural landscape of the 20th century. The following analysis tries to understand how such cultural bases have defined construction choices, carefully describing all the spaces that characterize the domestic environment. The Japanese culture concerning daily life at home is very different from ours in the west; there is a different collocation of the spiritual value assigned to some rooms in the hierarchy of project prioritization: within the eastern mindset one should guarantee the harmony of spaces that are able to satisfy the spiritual needs of everyone that lives in that house. The Japanese house is a new world: every space is evolving thanks to its versatility. Lights and shadows coexist as they mingle with nature, another factor in understanding the ideology of Japanese architects. In the following research, besides a detailed description of the central elements, incorporates where necessary a comparison with the western world of thought. All the influences will be analysed, with a particular view to the architectural features that have influenced the Modern Movement. The traditional Japanese architecture offers an important reflection, highlighting some simple points that we often forget because our western lifestyle is based increasingly on materialism. Where, if not our house, should be our refuge where we can dedicate ourselves to the search for inner harmony?
Keywords: traditional architecture, Japanese house, construction techniques, layout features, tatami, shōji.

1 INTRODUCTION

"*There is perhaps, in us Orientals, an inclination to accept limits, and circumstances, of life. We abandon ourselves to the dark, as it is, and without repulsion. Light is feeble? Let the darkness swallow us up, and we will find beauty in it. On the other hand, the Western world believes in progress, and wants to change its status. It moved from the candle to petroleum, from petroleum to gas, from gas to electricity, following a clarity that flushed out even the final particle of shadow*" [1].

The glorification of darkness places the focus on the diversity found between eastern and western aesthetics, trying to bring a higher understanding of both, bringing them back to their proper context, where they are able to reveal their true nature. The traditional Japanese home – the daughter of a school of thought and mother of a certain way of life – a kingdom of light and dark coming from the various shades of interior lighting and the use of sliding panels dividing up the various environments, is 'raped' and humiliated by the lightbulb. The writer aims to focus on how culture tends to favour one sense rather than another – for westerners this is without a doubt sight – making everything around it lifeless. The point of the matter resides in the research for harmony which, thanks in fact to this mono-dimensional sensorial accentuation, cannot possibly be found.

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1.1 General features of Japanese construction culture

Japanese construction tradition was greatly influenced by the country's two main religions: Buddhism and Shintoism. The aesthetic ideals were mainly influenced by Buddhism which had been imported from China via Korea in the mid-6th century, which states that all things are an evolution or dissolution of nothingness. 'Nothingness' should not be interpreted as empty space but rather a space of potential aimed at the search for internal peace and spiritual illumination. This simple concept of 'nothingness' gave birth to the idea of the zen aesthetic and of places dedicated to contemplation, in which essentiality prevails as a fundamental theme. On the other hand, Shintoism, the Road of the Gods, is a native Japanese religion and is considered the country's national cult. Its followers believe in a Pantheon of thousands of divinities each of whom is associated with an element from the natural world. This belief is the foundation for the interest in natural materials and the particular preference for wood, a main natural element in Japan's centuries-old forests, which is used in the construction of both religious buildings and homes. Despite the fact that Buddhism and Shintoism have different customs and rituals, the two religions have been symbolically linked various times throughout their history, sharing rituals, places and architectural styles: it is now often quite difficult to differentiate between the two in modern Japan and in the architecture of the past. Among the aspects that have influenced Japanese architecture we should mention climatic events and the surrounding environment. The normal four seasons are joined by a short rainy season at the beginning of the summer and a typhoon season at the beginning of autumn. We could thus think of the Japanese climatic year as a cycle of six seasons rather than four.

2 THE TRADITIONAL JAPANESE HOME

An important aspect of research that should be undertaken in order to best understand the fascination of traditional Japanese architecture regards materials. Among them, the two most fundamental materials on which any Japanese home must depend are wood and rice paper. Due to the very warm and damp climatic conditions (rainy seasons characterised by a humid climate), the materials used have to have low thermal capacities. Another determining factor in choice of construction was the high seismic activity of this area: the necessity to be able to survive somewhere with frequent high-magnitude earthquakes has meant there are limits. Until we have further knowledge in the structural ambit, Japanese architecture has decided to abandon the use of heavy materials such as stone and bricks. Among other things, we should remember that wood is one of the most easily-sourced raw materials in the country: the great wealth of cypress wood on the islands of Hokkaido, Shikoku and Honshu has meant that heavy import costs have been avoided. Another of the motives inferring on this choice is religious: the Shintoism religion has given a semi-spiritual worth to wood as one of the cornerstones of the belief is that of a respect for nature.

Regarding the dividing of the interiors, Japanese architecture has often used a combination of wood with another special material mentioned above, 'rice paper' which is more commonly known as *washi* (*Wa*-Japanese, *shi*-paper). This type of paper (erroneously named rice paper) is made by hand from the paper mulberry plant fibres. One of this material's most important properties is a fundamental aspect of all interior environments – the diffusion of light. In fact, this paper has a great capacity for light filtration (around 50%) decreasing intensity and guaranteeing a more suffused light. Moreover, this particular material has good resistance/consistence characteristics as well as low thermal conductivity which protects the interior environment insulating it from the humid climatic conditions during the most adverse seasons.

3 THE CONCEPT OF ASYMMETRY

One of the main aspects that distinguish the subdivision of interior spaces is the battle undertaken by Japanese architects against the geometric order so favoured by western culture as well as the Chinese one which had been significantly influenced by western thought. If western culture originates from a deserted world and sees beauty in perfect symmetry – from which moreover derives the monotheist concept – Japanese culture originated from the chaotic world of the forest, giving birth to pantheism and the inclination towards harmony in continual evolution.

It is a true eulogy of disharmony which manifests itself with a rejection of a perspective with a single escape point in the pictorial ambit while, in the architectural field, it is translated through the asymmetry of the space. According to tradition, we try to break up symmetry, which represents everything that is not innate to nature. Nature, a recurring fundamental element in the most common religions, is made up of changeable and varied features that evolve over time. According to Japanese conception, asymmetry is a synonym for curiosity: an asymmetrical design manifests as something iridescent that can only be examined through a rich and varied spiritual path. In Japanese floral compositions – better known as ikebana – the position of the main elements must be asymmetrical. Irregular forms tend to be favoured, to the detriment of symmetry which is in any case nothing more than the suffocation of evolution.

In Japanese culinary art, asymmetry manifests in the use of food containers that must each be different from the others, unlike in the western world [2].

4 THE CONCEPT OF *MA*

Ma is a concept that must be perceived in a concrete way, thus there is vast literature available on the subject some of which has been reinterpreted by western scholars. This ideogram may be conceived in different ways, depending on the ambit of use: distance, pause, interval, interruption. Perhaps the best representations of a possible translation of it are the concepts of time and space. In actual fact, its meaning is intrinsically linked to the contest within which it is used. For a musician, *ma* indicates time, or the temporal space between one note and the next; for an architect, it represents the space between two different environments, or that between two architectural elements (window and door, for example). If we attribute the definition of space to this concept, then *ma* in turn may also mean the dimension of space itself. If on the other hand, we look towards the concept of time, then again in this case *ma* may mean time itself, like an interval between two moments, a temporal scansion linked to the rhythm of a piece of music.

The concept of *ma* (Fig. 1) is thereby indissolubly linked to the concept of space and time, differentiating it from western culture that tends to disassociate time from space. It is within this very conceptualisation of space-time as a single entity that the particularity of the Japanese culture lies, uniting all artistic manifestations with a separate position compared to the western world. *Ma* is also used in the sense of place, insisting on the idea that architectural space in Japan is an experience that turns to memory, the imagination and to symbols. *Ma* is an interval, in each of its various interpretations, be it concrete or abstract; just think of wooden architecture that leaves a gap, a little ma between the various pieces, as a measure against earthquakes.

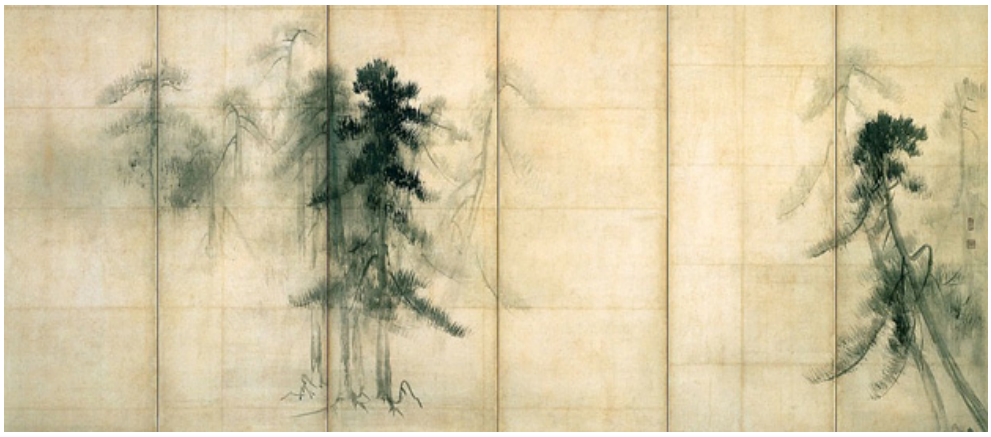

Figure 1: The concept of *ma* in Hasegawa Tohaku's painting. *(Source: www.cultur.org)*

Western thought usually talks of space in the three-dimensional meaning compared to something, a tangible object. The concept of *ma* is not made up of concrete constituent elements; rather it comes from human imagination when man experiments with these elements. Within the development of residential architecture, the central column, originally a structural requirement but which later was attributed a certain symbolic significance, is gradually replaced by outside pillars. The interiors are skilfully connected to the outside via verandas and open hallways, as they are not used to contrast the external elements but to fuse together with them and the surrounding nature. The result is that spatial continuum that so fascinates us, thanks also to the sliding walls and removable furniture. The *ma* or grey area cannot be recreated simply by turning towards rationalism and functionalism, but this awareness opens the way to new frontiers of symbolism and architectural pluralism. From what we have said, we can infer that in Japanese construction culture space is nothing more than an imaginary quality: it is not the size of the symbols but their reciprocal relationships, their placement within the all. Harmony is the common theme needed to link the concept of spirituality within the architectural complex [3].

5 LAYOUT FEATURES

5.1 The intermediary environment

This is a rather unusual space for western culture. As mentioned before, one of the distinguishing features of the traditional Japanese home is the lack of clear boundaries between the interior and the exterior. From here arises the need to create an intermediary area which aims to welcome nature in and act as a connection point between the interior and the exterior. The intermediary area is made up of three main elements: formal entrance hall, veranda, sliding walls.

5.2 Formal entrance hall

In Japanese, this area is called *genkan*. It is the reception area par excellence where shoes are removed before accessing the main area of the house. It is usually lower than the rest of the

flooring in the house; this is because its aim – also metaphorically speaking – is to keep everything that is dirty outside and preserve the inner cleanliness. This is one of the areas that have best withstood the ferocious urbanisation of the last fifty years. Even today, in the most modern homes, this area has managed to maintain its symbolic value. As well as being a service area, the entrance is also a place of reception so it is often decorated with flowers and views of the garden carefully designed to welcome guests making them feel like an integral part of the environment. You can usually find a chair in this part of the house, a symbol of the action of welcoming undertaken here. Despite having a strong symbolic value of purification, this room is very small, and decoration is often minimal. The most significant decoration in the genkan is the view over the garden. This represents something that lies beyond the western world in which the garden surrounds the building. It is important that the garden can be seen without interfering in any way with the privacy of the home.

5.3 The veranda

This transition area – *engawa* in Japanese – is designed to act as a point of connection between the inside and the outside. This part of the home is mainly required to protect the sliding doors (*shoji*), transforming the space under the guttering into an integral part of the garden. Being located in this area of transition, it allows fresh air and sunlight in, while protecting the interiors from the intense weather of the rainy season. From inside, the veranda appears to be a spontaneous extension of the flooring; it was often used as a kind of informal garden area. It is raised around ten centimetres or so above the ground but, as there are no railings, it looks like this area is actually a part of the garden. Sometimes the veranda can also be found at ground level. The two environments can be separated by a border of stones and gravel. If this border is not marked in this way, the garden may even cross the veranda and enter the home.

5.4 The interior

The environment is not divided into use, but rather each area may change its function depending on the requirements that arise throughout the day. And it is precisely this particular vision of the interior space that the oriental culture of living differentiates itself from that of the western world. Another characteristic that should be highlighted is the ease with which it is possible to transform this environment; as the roof is supported exclusively by pillars – especially in the oldest traditional homes, fierce urbanisation has changed this aspect – it is possible to create larger or smaller rooms depending on need by removing the separating panels. It is due to this particular characteristic of mobility – which marries so successfully with the concept of asymmetrical harmony of Japanese culture – that it is difficult to find excessively decorated environments. As the walls themselves are mobile, they do not allow excessive decoration and therefore the interiors are minimalist and simple. In order to guarantee the multi-functionality of the space, every room contains a built-in wardrobe – also used in the West to contain objects that are not required at a certain time of the day. So, thanks to the use of this element, it is possible to transform a dining room into a bedroom, and the inhabited cell is in constant evolution as the day progresses. Together with these elements, the *shōji* and the *tatami* metaphorically represent the beating heart of the home (Fig. 2).

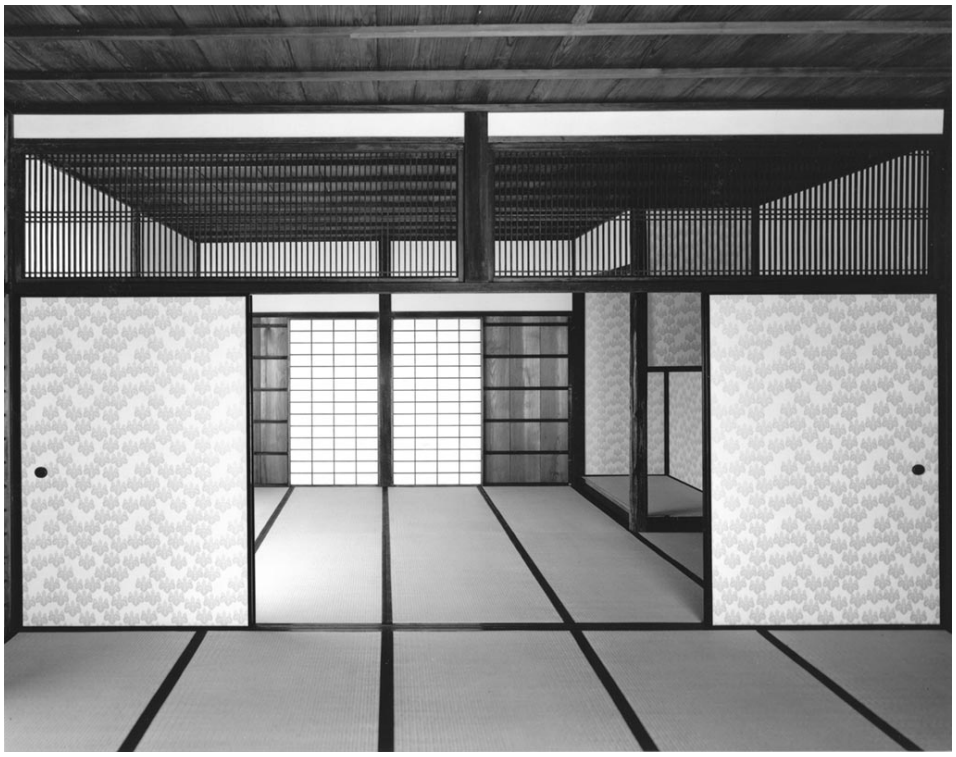

Figure 2: Katsura Imperial villa. Internal view. *(Source: www.pinterest.com)*

6 SUBSYSTEMS AND COMPONENTS

6.1 Sliding elements

These are among the most important elements both from the aesthetic and spiritual viewpoints, they are typical in traditional Japanese homes and they are also to credit for the play of light and shadow that is so appreciated and sought-after in Japanese architecture. These concealing elements combine functionality and aesthetics and provide the space with light and air. They include: *Noren* are traditional separation curtains used to separate/shield the interior from the exterior, often found on windows, walls or at the entrance to the home. They usually have vertical cuts for access and to allow both light and dark through. Made in fabric or hemp, they can also be found outside shops and restaurants to protect from sunlight and the wind; they can also sometimes be used for advertising. Used abundantly in traditional houses, they can still be found a lot in more modern homes. *Sudare* are screens made of bamboo. They are traditionally made by artisan workers who, thanks to their experience in bamboo working techniques, are able to create some truly striking compositions. They are extremely versatile in that they protect from sunlight while people inside can look out while the interior is completely concealed from the outside. Another detail worth mentioning is that these elements area height-adjustable, a main aspect in which they differ from *noren*.

6.2 *Shōji*

"*Of the refulgent sun that shines above our gardens we see nothing but a dull reflection, filtered through the opalescent paper of the shōji. This faded, indirect light is the most important aesthetic element of Japanese homes*" [1].

Shōji are sliding doors that are used to divide up rooms; they are made from a wooden frame filled with translucent paper. They originated from the Chinese world where they were used exclusively as internal partitions, considering their scarce load-bearing capacity. Thanks to the pillars that support the structure of the house, *shōji* play no structural role. Their function is to filter light from the outside and thereby regulate the illumination within. Their versatility is able to completely transform the atmosphere of the home. For those used on the outside walls, the paper is usually placed on the upper part so that the garden is visible from the more favoured perspective, sitting down, while preserving the privacy of the home from prying eyes. The paper that is used not only is perfect for dividing spaces, but it also is ideal to adjust interior lighting and air. They are in fact made of a wooden frame that slides along two runners and one or a number of dividing strips of wood between which the rice paper is placed. The paper used in traditional houses is of large weft to allow light to filter through, meaning the atmosphere within changes throughout the day, the perception inside is anything but static. The paper also has two other features that adapt to the surrounding environment: it also lets air through though, differently to how you would expect, heat loss is also kept to a minimum. The only problem with this kind of panel is that during the winter all views of the outside are blocked as wooden panels are used to protect the *shōji* from adverse weather conditions. This problem was however eventually solved with the use of glass (Fig. 3).

Figure 3: Katsura Imperial villa. Inside view into the garden. *(Source: www.pinterest.com)*

6.3 *Tatami*

Tatami is a traditional flooring in Japan. It is made of rice straw that is woven and then pressed to a thickness of six centimetres. *Tatami* strips are usually made in dark coloured fabric, and serve to protect the sides. Japanese architects make *tatami* the correct size for a person to lie down: this type of conversion is used because this flooring doesn't come in standardised dimensions. To put this into western terms, just think of the brick: bricks were in fact originally sized in reference to hand size. So *tatami* sizes have been defined in relation to the size of a human being. It is fundamental to understand this conversion to a non-standardised unit of size because it is still used today in giving the size of rooms in Japan. During the design phase of a project, a bedroom is sized in correspondence with number of *tatami* (Fig. 4).

7 COMPARISON WITH THE WEST

In order to compare the layout of Japanese homes with western houses in general we should think about it on a variety of levels: plans, public/private distinction, design outlines. One of the aspects that characterises Japanese domestic architecture is the lack of a clear distinction between interior and exterior. There is no physical border in the typical western home, but it is often surrounded by a garden, while the Japanese home is not confined to the immediate border but more around the entire property. The Japanese house is not closed off so markedly, the division between the public and private space is not as clear as in the western home, where it is easy to see whether you are inside or outside the house (Fig. 5).

Figure 4: Katsura Imperial villa. Central perspective. *(Source: www.pinterest.com)*

Figure 5: Katsura Imperial villa. A garden view. *(www.pinterest.com)*

The first sensation we have of the Japanese home is a lack of privacy: barriers do not give an actual sense of security, but have to allow light to filter through. Japanese keep their privacy through distance: thanks to the use of removable doors it is possible to create several environments to separate the more public areas of the house from the family's more intimate rooms. The western garden is often seen from the outside and the house itself is seen in the background. The Japanese one is supposed to be viewed from inside the home and designed in harmony with the rooms that surround it. This difference in perspective is indicative of the other conception that Japanese architects have of the perception of the home. Japan has been a source of inspiration for some of the most important architects in the history of architecture, starting from the Modern Movement to the contemporary period. What most attracted western architects was the minimalist conception of Japanese architecture and the close relationship between nature and tradition constructions. Among them, mention must be made of one of the major players in the Modern Movement, Frank Lloyd Wright, who, having lived in Tokyo for a period, came into direct contact with Japanese culture. Wright wrote the following in his famous autobiography on his passion for the Japanese world:

"*During my later years at the Oak Park workshop, Japanese prints had intrigued me and taught me much. The elimination of the insignificant, a process of simplification in art in which I was myself already engaged, […] found much collateral evidence in the print. And ever since I discovered the print, Japan had appealed to me as the most romantic, artistic, nature-inspired country on earth. Later I found that Japanese art and architecture really did have organic character. Their art was nearer to the earth and a more indigenous product of native conditions of life and work, therefore more nearly modern as I saw it, than any European civilization alive or dead*" [4].

The Japanese perception of beauty may be found in the concept of *wabi* (simplicity and tranquillity) and *sabi* (elegant simplicity). Contrary to an excessively decorated splendour, they suggest a more modest beauty, something that is enclosed within nature herself. What most attracted the most famous architects of the Modern Movement was the conception of minimalist architecture characterised by a simple structure together with geometrical membranes that create a composition tending towards simplicity. Another aspect that has been kept and borrowed from the Japanese conception is a love of nature and the desire to fuse with her. These characteristics would have a great influence over the Movement's architects, so much so that the similarities between some oriental and western buildings from the 20th century are surprisingly clear [5].

8 CONCLUSIONS

The analysis of the traditional domestic environment clarifies the motivations behind certain choices: we can better understand why some materials are favoured over others and why certain rooms are so distant from our own idea of home. Nature itself is a fundamental element for the Japanese world, it is impossible to think of it as something other than an integral part of the everyday. And it is to fulfil that need that the distinction between the interior and exterior is pulled down, asymmetry reigns supreme while ma rules over the space in which life evolves. This particular conception of home, so closely linked to the spiritual realm, is made possible by those elements that best characterise the domestic environment: from the *shōji* to the simple – but meaningful – *engawa.* In the traditional Japanese home each element plays a vital role in preserving the overall harmony of the everyday.

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