

Aesthetic Effect of Shadows

By

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(Received March 17, 1994)

1. Introduction

1) City panorama with beautiful shadows

The shadows of a city, which seem to have an incidental existence, can often make a significant impression on an individual. For example, the shadows of the trees on a campus, with weak light coming through red leaves, can help one to be aware of the gentleness in the changes of nature. In the evening, the silhouettes of lofty buildings and port warehouses are frequently used as typical city-scape images in the media. These, and many other beautiful shadows and images, can be among the sights available to the people living in a city. Instead, it is a fact that only a few cities with beautiful shadows can be found in our modern, urban centers.

Some examples of increasingly rare and beautiful shadows can be found in the towns built around the shrines and temples in Japan. Their atmosphere is based on exceptional compositions of architecture and an external approach to space. In these places beautiful shadows are formed by unseen patterns and devices that take into account the cultural climate. Examples are the gentle light created by the illumination of paper and other mild shadows produced by organic substances such as trees and wooden houses. Also important is establishing the proper distance between a source of light and the substance being lit. When the elements are right, shadows and light can deepen a space and transform the atmosphere of a place. Faint and dusky shadows create a realm of mystery and remind us of the ties we have to the past. These shadows are very important in creating traditional Japanese spaces. It is felt that shadows should be re-evaluated for the possibility they offer in shaping the metamorphosis of our increasingly modern townscapes to give them a more human, more life enhancing quality.

These types of shadows should be re-evaluated for their potential role in the metamorphosis of townscapes. As modern materials and architecture are turned into "modern" buildings, towns, and cities, the metamorphosis of the townscapes

we inhabit continues without letup. With it the feeling of a place is also changed. Even though new materials are used, can we nonetheless recapture a townscape with the same kinds of beautiful shadows as are found in traditional settings?

Pictures of shadows can be used as representative models distilled from the essence of the townscape. Modern and historical townscapes might be linked together by means of their common media, that is, the shadows. If so, the essence of the culture can continue on into the future. The question to be considered is whether or not traditional essences can be woven into the ongoing metamorphosis of the modern village.

When the play of light and the shadows of a town are considered to be the subject of focus, we call it a shadowscape. The images of a town produced by its shadows are formed when people perceive shadows as a subject worthy of appreciation. This study considers the images of towns where shadows play a dominant role in the impression a person gets. It also analyzes how the shadows fit into the landscape as a whole.

Seemingly, shadow is one of the elements of a townscape, and cannot simply be separated from it. However, it is clear that characteristic spaces, where shadows are recognized as visual subjects, exist in every townscape. Moreover, this shadowscape is a townscape phenomenon occurring in a particular place and time, and it can be considered as one of the characteristics in the design of the townscape. Shadows are difficult to deal with as the subject of a townscape, because they do not have a static existence. However, pictures of shadows can be grasped as representative models, purified from the townscape, and the evaluation of these can serve to deepen our understanding of the townscape and of the cultural climate.

This study focuses on static space, where image and meaning are not imposed by the designer but are created by the viewer. In most cities filled with information overload and the noises of human life, a space that offers a strong cultural meaning may itself become mentally burdensome. People seek static places for a restful change from the battering the senses receive in modern living. This static space is difficult to define in an absolute way, but we can think of it as a space which offers relief to the eyes and ears; a space in which only the passage of time makes changes. The shadows of such a place are echoed in the shadows of tree-lined streets or a building's shadows creeping across an open space with the movement of the sun.

This study is intended to help us understand the living and active role that shadows play in townscapes. Specifically, we will look at the design of space, where shadows have a graphic impact, and the design of the environment is worthy of consideration and appreciation by people.

2) Purpose of this study

Shadows, as a townscape phenomenon, can produce images unique to a particular place through the composition of the climate, and materials used in creating a street or public area. The authors have defined the composition model and basic types of shadows. These are summarized and arranged according to the characteristics of shadows that appear repeatedly in Japanese traditional space (1990). The results show that individual characteristics are identifiable even in the subtle shadows produced by mild sunbeams and material with a high absorption, such as earthen walls and pillars. A psychological evaluation has been made of the shadows in townscape pictures from Europe, and samples of typical shadows have been classified and arranged. Comparison of clear light and dry lights shadows has been grasped in terms of the design elements involved.

The purpose of this study is to clarify and summarize the samples of shadows taken from actual townscapes with an eye toward the conscious analysis of their effect. We also try to make the design characteristics (arrangement of space and material, etc.) clear. The following issues are addressed in detail:

- (1) Pictures of shadows are collected from the public spaces of traditional districts around the temples of Kyoto and from the contemporary urban districts of Kyoto and Osaka. These shadows are then classified by image analysis and their designs are compared and summarized.
- (2) The elements and design of shadows are clarified by analyzing and comparing the shadows from Japanese traditional spaces and townscapes with the shadows from the townscapes of Europe.

2. Outline of Psychological Experiment with Types of Shadows

1) Choices of shadows for the survey

The shadows to be investigated were selected from two groups, namely traditional districts around Japanese shrines and temples, and townscapes in the outer urban space. A previous study (3) showed that the shadows which reflect a Japanese sense of beauty are found in the traditional spaces around temples and homes. Moreover, the shadows found in modern towns, built of new materials such as iron, concrete, etc., do create different images in peoples' minds when they are compared with shadows found in traditional spaces.

Therefore, shadows from traditional spaces and from the new townscapes can be distinguished from each other, and can be compared in detail. The samples of shadows for evaluation were chosen as follows:

(1) Choice of shadows found in the traditional spaces around temples

First, photographs of shadows were taken around the shrines and temples of Kyoto. About 300 sample photographs were obtained. These photographs were classified and arranged according to differences in the figures of pictures and according to different combinations of composition elements (objects, screens, etc.). As a result, 30 photographs were chosen.

(2) Choice of shadows found in the urban townscape

In comparison with the traditional space, shadows in the scenery making up contemporary cityscapes are abundant, and hence it is not possible to cover them all. Therefore, the sources of shadow photographs were limited to the business and office streets in the centers of Kyoto and Osaka. Again, 300 photographs were collected. These photographs were classified and arranged in the same way. Finally, 25 photographs from each of the two collections were chosen.

2) Items for psychological evaluation

A psychological evaluation of the emotional meaning evoked by the shadows in the sample photographs was carried out, using adjective pairs at the ends of a rating scale. It is not possible in practice to establish separate ratings for each shadow in the townscape; the psychological weights determined are thus not unique to the scene in the photograph. However, because the objective of the evaluations was limited to the general types of images depicted in the shadows, the subjects were asked to watch the shadows in the photographs for the images or feelings that they brought to mind, and then answer an evaluation questionnaire. Eight sets of adjective pairs were used. The adjective pairs were selected to represent opposite extremes of feelings and the subjects were asked to rate their feelings on a 5-point scale, between the two extremes represented by each pair. A pre-experiment was carried out to determine the adjective pairs to be used. In these experiments the subjects were asked to free-associate, using regular photographs of objects as the stimuli. Based on the high frequencies of adjective pairs that resulted from the free association, eight qualities were established as separate categories for rating the photographs: 1. active-motionless, 2. cheerful-somber, 3. fluid-unchanging, 4. beautiful-ugly, 5. organic-inorganic, 6. feminine-masculine, 7. distinct-vague, 8. warm-cool

These qualities were considered to be suitable for use in the independent evaluation of the shadows.

3) Subjects and experimental procedure

The subjects were 24 students at Kyoto University. These students were

given the evaluation tables and townscape shadow photograph stimuli, and asked to respond to photographs by evaluating them with the tables provided. They were given no instructions or time constraints.

4) Analysis of shadows by image type

Classification of shadows by image type was carried out according to the following procedure:

- Step 1. The mean scores on each rating scale for each photograph were calculated. The eight evaluative categories were assumed to be independent, and cluster analysis was carried out using 8-dimensional evaluation scores.
- Step 2. The whole levels of subjects are described, the degree of dissimilarity is determined, to decide the microscopic levels for describing the characteristics of the townscape from the viewpoint of comparatively macroscopic level concepts.
- Step 3. The evaluation pairs that had high mean scores (above 0.7) were abstracted, based on each profile curve or cluster, and the evaluation of the types was specified.
- Step 4. The types were described on the basis of their cluster level on the graph (according to the categories assigned by the test subjects), and the self-evident characteristics of the respective photographs were described.

3. Shadows in the Traditional Landscape

1) Levels and types of shadows discerned by emotional evaluation of images

As a result of cluster analysis, the predominant types of shadows have a combination of "motionless" and "beautiful" qualities. These qualities were seen by our subjects in nearly all of the photographs. Four types could be abstracted whose degree of dissimilarity was 10.0. These types are defined as follows: the "mild" type seen as beautiful and feminine; the "motionless" type rated as motionless and unchanging, the "mild motionless" type having all of the above qualities; and the "vigorous" type of shadows was felt to be organic and masculine.

Additionally, in order to describe the characteristics of particular townscapes in detail, more detailed types were defined whose degree of dissimilarity was 0.8.

2) Townscape characteristics of shadow types

The townscape characteristics of each type of shadow are described as follows:

- (1) Mild shadows (beautiful, feminine, and organic)

This type includes the beautiful and organic shadows showing up in the external approach to space (type B).

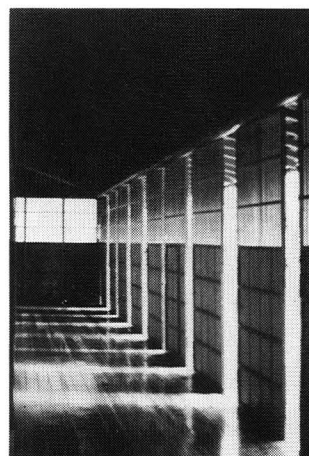
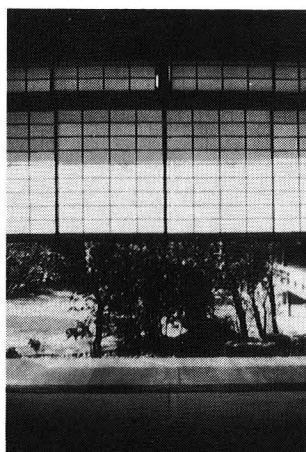


Fig. 1. Mild shadow (A) Fig. 2. Open window with sliding screen (B) Fig. 3. Geometric patterns (C)

Type A (mild shadows in external spaces, Fig. 1). This type accounts for half of the total, and shows the characteristics typical of Japanese traditional spaces. The type includes mild and beautiful shadows produced by organic subjects (e.g. trees and homes) on backgrounds with high light absorbing qualities. (e.g. stone paving).

Type B (open paper doors/windows [shoji], Fig. 2). The shadows of the Daitokuji belong to this type, where light is seen from a half-open sliding window at the boundary between the interior and exterior space. In the upper portion, the frame of the sliding window makes geometric and motionless shadows. Exceptional gentleness is represented in the union of the upper and lower shadows.

(2) Motionless Shadows (motionless, unchanging, and somber).

This type includes the dim shadows produced in darkened rooms, and the straight geometrical shadows produced by objects such as sliding windows and pillars. In these shadows the motionless condition produced by a uniform arrangement of pillars is clearly represented.

Type C (geometric patterns made by insulated materials, Fig. 3).

This type includes the distinct shadows of the continuous geometric patterns made by pillars and the frames of sliding windows. Because of the distinct contrast

between light and shadow, a beautiful symbolic brightness is created in the mind of the viewer.

Type D (twilight and indoor shade, Fig. 4). The Japanese indoor space corresponding to this type consists of partial elements, such as an alcove, an earthen wall, or an adjoining room. The hollows and corners of several objective spaces interact. The twilight coming through the shoji screen causes much of the intensity absorbed, and the continuous shadows provide a deep sense of harmony.

Type E (lighting through lattice patterns Fig. 5). This type includes light that is seen through the window slit of a back door and the geometric patterns of window lattices which give an inorganic and cool impression.

(3) Mild and motionless shadows (motionless, beautiful, organic, and somber).

Type F (shadows in shade, Fig. 6). The garden of Gio temple corresponds to this type. This garden is surrounded by trees. Dim shade is created and a motionless space is achieved. Mild shadows are formed by the light coming through the tree, and thereby organic beauty is created.

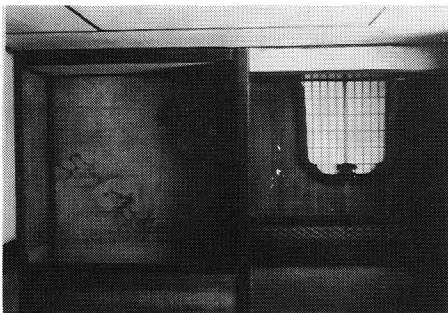


Fig. 4 Twilight and indoor shade (D)



Fig. 5 Lighting with lattice patterns (E)



Fig. 6 Shadows in shade (F)

(4) Vigorous shadow (unchanging, masculine, and organic)

Type G (shadows of large trees, Fig. 7). This type includes the shadows of the Seilen temple.

The dynamic shadows make a strong impression of vigor and of the stream of life. One can imagine a will watching over the surroundings, and feel invited to rest under the single tree. Green trees along the approach to the shrine represent an eternal symbol, and leave the Japanese mind with a hard masculine impression.



Fig. 7. shadows of large trees (G).

3) Traditional spaces and the sequence of shadows

The survey results show that typical groupings of shadows include mild shadows in the outside approach to a temple and in the garden, and motionless shadows in the rooms. When you approach traditional architecture, mild shadows with a substantial, massive feeling are encountered. The motionless shadows of geometric patterns composed by the straight lines of pillars and sliding windows make one appreciate the skill used in constructing the front entrance. Then, as you move into the buildings, you are presented with a sequence of shadows.

4. Shadows in Urban Townscapes

1) Levels and types of shadows discerned by emotional evaluation of images

The types of shadow in Japanese townscapes were determined by cluster analysis. Among the levels, two were determined to have a high degree of dissimilarity, and four types registering 9.63 could be abstracted. These types were:

- a mild type, evaluated as beautiful and feminine;
- an active type, evaluated as active and organic;
- a motionless type, evaluated as motionless and unchanging; and
- a distinct type, evaluated as masculine and inorganic.

More detailed types were defined which had a degree of dissimilarity of 5.00, which were used to describe the characteristics of townscapes in more detail.

2) Townscape characteristics of these shadow types

The townscape characteristics of these shadow types are described as follows:

(1) Mild type (beauty and feminine)

This type includes feminine shadows produced by trees along the street on a background screen of waterfronts and roads. It also encompasses feminine and mild shadows produced by various materials and colors such as iron, glass, plastic, and concrete in urban facilities and buildings. In both situations, the shadows are beautiful mirror shadows produced by urban greenery and a variety of materials.

Type A (motionless shadows produced by traditional commercial construction). In Ponto-cho Street stand ordinary commercial buildings, rooms and houses producing feminine shadows with regged outlines. The designs and colored signs and stark black and white color schemes seem to give people an organic and feminine impress.

Type B (organic shadows on tree-lined streets). This type includes reflections of trees on the surfaces of the water or the surfaces of dirt roads. The sketchy line of shadows moving warmly on the mild screen give people an organic and feminine impression.



Fig. 8. Motionless shadows (A)

Type C (distinct shadows produced by modern urban materials). These are shadows that show up in the commonplace scenery of urban streets. The civil construction, people and vehicles are the subjects. The sunlight in the late afternoon and artificial lights through arcade windows are reflected from various backdrops such as the surface of a river to create a harmony of dark images expressed in distinct shadows. Moreover, the scenes produced by various lighted signs draw a distinct two-dimensional sketch of the city. These shadows show that there can be a mildness in urban materials.

(2) Active shadows (active and organic)

Type D (signs and tumultuous lights). This type includes arcade lighting on commercial streets, where erect signboards bristle. The mixture of traffic directions and the disorder of commercial signs give cities a particular organic emotion,

but they do not carry the symbolism of sacredness that temples and churches convey. The outlines of the mixed street media, neon lights, and the shadows of people moving along the street, express the vital movement of the townscape.

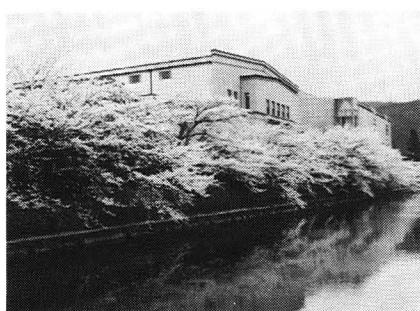


Fig. 9. Organic shadows (B)

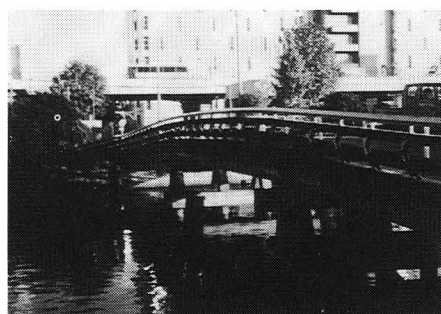


Fig. 10. Distinct shadows (C)



Fig. 11. signs and tumultuous lights (D)

(3) Motionless shadows (motionless, unchanging, and inorganica)

This type includes the shadows of large-scale construction. Because big buildings consist of simple lines and the background is inorganic, firmly fixed images are produced. These images give people the impression of a motionless, unchanging scene.

Type E (large-scale shadows produced by urban buildings). This type includes the large-scale shadows which sketch the outlines of a city making a distinct contrast between light and shadow. They include the dark shades formed in the valley between buildings. These dense shadows and shades cover the urban space, and produce dark places hiding restaurants under overhead roads. The geometric

outlines of the artificial constructions like modern buildings and overhead roads make a cool and masculine image.

Type F (mirror images in the evening). This type includes scenery in which the dim shadows of overhead roads are mirrored on the surface of the gentle light of evening. They give people a sense of motionlessness. In the evening, as the colors disappear from the scenery, to be replaced by monochrome tones, the simplified lines of the street appear, and the shadows and shades become the major visual element conveying the beauty of silent pictures.

(4) Inorganic shadows (masculine, inorganic, and distinct)

This type includes the shadows and shades associated with traffic scenes, bridges (type H) and cars (type G). These are often seen on any street. Due to their functional shapes, these shadows give people inorganic and masculine impressions.

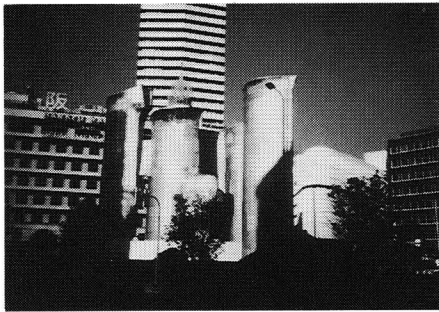


Fig. 12. Large-scale shadows (E)

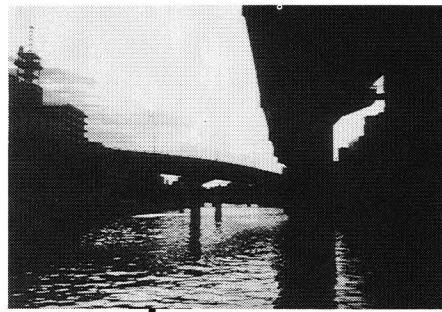


Fig. 13. Mirror images in the evening (F)

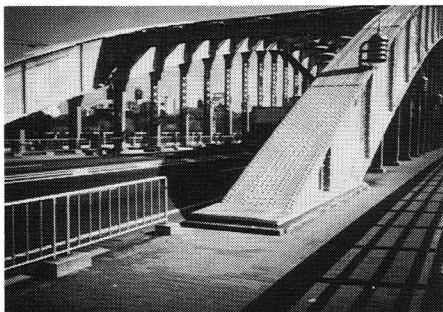


Fig. 14. Inorganic shadows (H)

3) Urban Scenes with lively shadows

Among the types of shadows described above, type C, E, and F are thought to be particularly worthy of note by designers. These types are the aspects of townscape that have been produced by the materials and construction of modern urban facilities, without conscious intent. These shadows are seen as beautiful by our evaluators and they can be the major and characteristic scenes in a city. Only the outlines of a city show up in the monochrome scenes of the evening when mixed colors and meaning are disappearing. This quietness gives people places to take a short rest. Keeping an appropriate amount of darkness is necessary to make good use of this quietness. A reconsideration of more appropriate urban lighting is urgent.

5. Conclusions and Summary

In this study, the types and townscape characteristics of shadows in Japanese traditional spaces and contemporary townscapes are classified and their designs are evaluated. In this section, this evaluation of design is summarized:

1) Comparative analysis of the shadows in townscapes and traditional Japanese spaces

The results of the study described in Section 3 and 4 provide the following macroscopic comparisons and contrasts:

- (1) Mild and motionless shadows account for a large proportion of the samples in both traditional spaces and townscapes. Mild shadows and shades are created by planting trees that have similar shapes. In contrast, motionless shadows use different elements of composition in the two different types of spaces. In the traditional space, the geometric shapes produced by traditional construction methods reveal the skill and planning of the humans involved. For contrast, the townscape can produce two kinds of feelings. One setting creates an inorganic, cold feeling with its large scale of construction and materials with strong reflective surfaces, while monochrome scenes are produced by early evening lighting and the enticing dark areas (see term 3 of Chap. 4).
- (2) "Active shadows" and "inorganic shadows" can be found in the shadows of townscapes which are not seen in the more traditional spaces. These are the shadows of transportation facilities, which are characteristics of urban function, and commercial signs which are the tools of the urban consumption culture.

2) Comparative analysis of shadows in the townscapes of Japanese and Europe

In order to clarify the unique aspects of shadows in Japanese traditional spaces and the different shadows in townscapes, an analysis of image and comparison with the shadows in European scenery is presented. Here, the European shadows to be compared are from the survey results of reference (4). There are 30 general urban scenes, including the traditional construction of Southern Europe (Italy, Spain) and Northern Europe (France, Austria).

(1) Typical shadows in both Japan and Europe

In both the traditional spaces and the townscapes of Japan, the shadows are for most part "mild shadows" with trees (accounting for 52%), and "motionless shadows" from urban construction (accounting for 57%). In contrast, in the European scenery, the characteristic shadows are "active shadows" (accounting for 57%), which provide a rhythmic and cheerful feeling, and "motionless shadows" (accounting for 37%).

(2) "Mild shadows" in Japanese spaces

Various types of material are used in Japan to make "mild shadows". Gentle sunshine passing through moist air, and gentle architecture created with stones, papers, and trees, are representative of these materials. This characteristic is rarely seen in Europe, where hewn stones are mainly used as the building materials, and the availability of trees for wood is limited.

(3) "Active Shadows" in European space

In Europe, the "day light" is very distinct, and the contrast of light with shadow is also distinct. Thus, the movement in the outlines of shadows is clearly reflected in the "active" quality they have. Because stone walls constitute the basic outlines of the streets, and the outdoors is seen only through windows in European construction, the shape of the windows is an important element in the expression of a facade. Therefore, the shape of the windows is highly elaborated. Particularly in southern Europe, shadows with keen changes in geometric shapes are formed by decorative balconies and window blinds. These shadows give people the impression of an active streetlife. Furthermore, an active impression is formed by the combination of various elements, such as construction and furniture. In Japan, "active shadows" can be found only in the signs of shopping centers.

(4) "Motionless shadow"

In all the subjects, "motionless shadow" exists, and skill of space and symbolism of the sacred precincts are expressed. These motionless shadows are produced by pillars in Europe and in Japanese construction, and they are made by the dim light in the simple enclosed space of temples.



Fig. 15. Active shadow



Fig. 16. Motionless shadow



Fig. 17. Motionless shadow

(5) "Motionless shades" of Japanese construction

Japanese buildings, like temples and tea houses, have the characteristic that their divisions of space do not strictly distinguish between the outside and inside spaces. Unchanging and quiet shadow is developed in the simple space of a alcove or by the gentle and dim lights coming out through paper sliding screens.

(6) Shadows in the outdoor spaces of Japan

"Mild and motionless shadows", that have both beautiful and motionless qualities, and "strong shadows" with masculine and organic qualities are the characteristic shadows found in Japanese traditional spaces. All of these shadows make up the townscape of the outdoors. The first is a collective form of the Japanese sense of beauty united by mild and motionless aspects; the later are the shadows made by green trees as characteristic symbols of the eternal. Together these strongly reflect the Japanese sense of beauty.

Because of the limited number of shadows included in the survey, characteristic shadows of other townscapes and man-made designs remain to be discussed as future research topics. However, the climate, construction, and the differences of street

compositions have been illustrated in the shadows obtained for this study. It is hoped that this study will have a positive influence on the consideration and design of shadows such as those produced by traditional Japanese construction and that this influence will be reflected in the contemporary urban scene composed of concrete, iron, and glass.

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