In machiya architecture, a mise is a room between the street front and house’s inner area for commercial use. Between the mise and street front, front fittings, such as shutters, sliding doors and lattice-work are fixed, and the eaves are extended to cover the outside of the mise. This paper surveys seventeenth-century townhouses with a focus on the spatial relationship among the mise, doma, and street front. It confirms that, between the mise and street front, the combination of lattice-work and sliding doors transformed the use of sliding doors or wooden shutters. Additionally, the height of the fittings and depth of the front eaves gradually increased with time. This tendency was also observed in the relationship between the mise and doma. In the mid-seventeenth century, doors were fixed in tsukidome-mizo to separate the mise from the doma; however, in the late seventeenth century, the doors were fixed in hikichigai-mizo, which enabled free access from the doma. When viewed from the street front and doma, the spatial relationship of the mise changed from a closed to an open structure. This architectural transformation possibly reflected a social change in the seventeenth century, when federal governance was established after a long warring period.

1. Introduction

Machiya (townhouses) are traditional Japanese residential buildings. Their main feature is that their front walls and eaves generally face the street. This feature is considered to be related to the origin of this building type: small row houses or gates with walls along street fronts that developed into independent buildings (Ito 2007; Noguchi 1988; Ueda and Tsuchiya 1975). Among machiya rooms, one room dedicated for commercial use (The Japan Institute of Folk House 2001), the mise, was generally positioned at the front part of the ground floor next to the doma (earthen floor) entrance. Behind the mise, the nakanoma (middle room), butsuma (Buddhist praying room), nando (sleeping room) and daidokoro (dining hall) rooms usually formed along the doma for personal use (Figure 1). In other words, the mise, which combines mi (“showing”) and se (“space”), appeared between the outer and inner areas in machiya architecture. The connection between the mise and the street front was probably evident in their architectural details, including fittings, ceilings, and their measurements. In addition, if mise are understood as intermediate room between the street and the rest of the building, the connection of the mise to the nakanoma and doma can be examined with respect to the above architectural details. Such examinations can reveal the spatial characteristics of the mise in machiya architecture.

Machiya architecture is considered to have become highly developed during the seventeenth century (Ito 1958), just after the Warring States (Sengoku) period. At that time, the construction industry and building technology developed greatly following the considerable demand for building castles, towns, and temples for military use and as symbols of power (Ota 1999). In addition, the buildings themselves seemed to have included defensive features against unexpected military attack in the political instability of the Warring States period. Castle towns were usually protected by moats and fences. In addition, several seventeenth-century machiya in Imaicho (an autonomous town centred around a Buddhism temple in Nara Prefecture) showed large hipped-gabled roofs with white plaster walls and appeared like fortifications (Figure 2). If the mise connected internal machiya areas with the street front, that spatial characteristic of the mise as an intermediate room appeared to be inconsistent with the defensive roles of buildings just after the Warring States period.
Figure 1. Ground floor plan of the Imanishi family residence (1650).

Figure 2. Front elevation of the Imanishi family residence (1650).
After the establishment of the Tokugawa federal government in 1603, Japan dramatically entered a peaceful era. Accordingly, the social roles of buildings gradually transformed. Castles became administrative centres rather than military bastions. In several goten (a residential building complex in castle grounds) palaces, fusuma paper sliding doors between the first and second chambers in the main hall became omitted: it may be supposed that a direct connection between the two chambers was established following power stabilization in the late seventeenth century (Hirai 1965). With that political stability, economic growth and mercantile development had flourished by the end of that century. The space and architecture of the mise may, therefore, have undergone transformation in response to the great change from the Warring States period to the peaceful Edo period. In light of Japan’s social environment in the century, this paper undertook a socio-spatial examination of early machiya architecture.

As part of a building survey of a machiya in Takehara (Takehara City Educational Board 2017), a historic commercial town on the Seto Inland Sea, a comparative study was made of 12 seventeenth-century machiya structures throughout Japan. As a result, several characteristics of mise fittings, ceilings, and measurements emerged. Using the survey data, this paper clarifies the architectural details of mise and their spatial transformation during the seventeenth century, considering the social changes of the period.

This paper comprised three sections and conclusion. First, 12 seventeenth-century machiya and their distribution are briefly summarized as basic information for analysis. In the second section, the relationship between the mise and street front are examined with regard to measurements, types of fittings, and depth of front eave considering the spatial transformation according to the age of the structure. The third section examines the relationship between the mise and doma. With the apprentice’s quarters on the mezzanine floor and the earthen floor connected directly to the entrance, the doma might be regarded as an outer area, and became gradually integrated with the inner rooms. In conclusion, the analysis is summarized considering the social change from the Warring States to the peaceful Edo period of the seventeenth century.

Traditional Japanese architecture, particularly residential buildings, is generally influenced by regional characteristics. However, that characteristic is not the main area of interest of this study: in contrast to abundant existing eighteenth- and nineteenth-century machiya structures, few seventeenth-century buildings remain; that does not permit an easy assessment of regional features of seventeenth-century structures. Oba (2004) observed that the regional significance of machiya architecture emerged gradually through the influence of those in Kyoto; that is where machiya architecture is believed to have originated. Accordingly, this paper examines all seventeenth-century machiya architecture rather than each locality, although several mentions are made of regional characteristics and other architectural details.

2. Seventeenth-century townhouses in Japan

Recent developments in scientific analysis, such as radiocarbon dating (Fujita 2015), have revealed several machiya structures dating back to the seventeenth century. However, in those structures, it is usually difficult to determine the original floor plans and sections, which often underwent remodelling. Therefore, this paper investigated 12 machiya structures designated as Important Cultural Properties by the Japanese government; the emphasis was on accuracy of the year of construction and whether their floor plans and sections were restored or preserved in their original conditions (Table 1, Figure 4).

Among those machiya, the oldest is the Kuriyama family residence in Gojo, Nara Prefecture. Its construction year of 1607 is attested by a munafuda. The building has a large tiled roof, although the front eave is considered a later addition (Aoyama et al. 1959; The Research Committee of the History of Gojo City 1958). Of those 12 structures, 10 have an entrance on the eave side. In contrast, the Ubugata family residence in Numata (late seventeenth century) and the Yamaguchi family residence in Sakai (early seventeenth century) have an entrance on the gable side. However, the original location of the entrance of the Yamaguchi family residence demands consideration: it later underwent remodelling (Sakai City 2011). Most of those 12 structures range from 10 to 15 m in their front width and from 10 to 20 m in their depth; exceptions are the Nakamura and Sugiyama family residences, which both exceed 20 m in front width.

Considering the definition of machiya noted above (i.e. street-front facades), several particular architectural details are evident among those 12 structures. In the Nakamura family residence in Gose, three rooms along the doma were detached from the street front even though the building was classified as a machiya by several publications (Suzuki 1980). Part of the Sugiyama family residence in Tondabayashi, including the mise, was rebuilt during the early eighteenth

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Footnotes:

2 The Kihara family residence is thought to have been built in 1665 according to the date carved on the face of onigawara: however, Oba (2004) examined a historic household register and found that it was built after 1679. In the Japanese traditional pan-tiled roof, onigawara, large plates with ogre faces, are placed at either end of the ridge and are sometimes carved with the craftsman’s name and date.

3 A munafuda is a board usually set up at the ridge of the roof structure to celebrate completion of the framework. It includes the names of clients, carpenters and dates; thus, it is a valuable reference for a building’s background.
Table 1. Seventeenth-century machiya.

| No | Residence | Location (Prefecture) | Construction | Roof type | Entrance position | Width (m.) | Depth (m.) |
|----|-----------|-----------------------|--------------|-----------|-------------------|------------|-----------|
| 1  | Ubegata   | Numata (Gunma)        | Late 17th century | Gabled    | Gable             | 12.0       | 18.9      |
| 2  | Osumi     | Ritto (Shiga)         | 1688          | Gabled    | Eave              | 19.40      | 19.07     |
| 3  | Nakamura  | Gose (Nara)           | 1632          | Hipped-gabled | Eave             | 22.1       | 11.2      |
| 4  | Imanishi  | Imaicho (Nara)        | 1650          | Hipped-gabled | Eave             | 15.85      | 13.83     |
| 5  | Toyoda    | Imaicho (Nara)        | 1662          | Hipped-gabled | Eave             | 11.95      | 11.74     |
| 6  | Otomura   | Imaicho (Nara)        | Late 17th century | Gabled    | Eave              | 11.65      | 10.7      |
| 7  | Kuriyama  | Gojo (Nara)           | 1607          | Hipped-gabled | Eave             | 16.9       | 13.1      |
| 8  | Sugiyama  | Tondabayashi (Osaka)  | Mid. 17th century | Hipped-gabled | Eave             | 24.5       | 11.9      |
| 9  | Yamaguchi | Sakai (Osaka)         | ca. 1615      | Gabled    | Gable             | 9.4        | 13.8      |
| 10 | Okada     | Iumi (Hyogo)          | 1674          | Gabled    | Eave              | 15.4       | 14.8      |
| 11 | Kihara    | Takaya (Hiroshima)    | Late 17th century | Gabled    | Eave              | 12.6       | 15.5      |
| 12 | Kikuya    | Hagi (Yamaguchi)      | Mid. 17th century | Gabled    | Eave              | 13.0       | 14.9      |

*The construction years and sizes were basically derived from the Agency for Cultural Affairs, Government of Japan (2009).

This century; however, original mid-seventeenth century columns exist between the doma and floored rooms (The Japanese Association for Conservation of Architectural Monuments 1987). The Yamaguchi family residence in Sakai later underwent remodelling of the front part of the building, where the mise is normally located (Sakai City 2011; Osaka Prefecture Educational Board 1967). The following analysis takes those particularities into consideration.

3. Relationship among mise, nakanoma, and street front

This section examines the transverse cross-section among the mise, nakanoma, and street front, as well as their transformation during the seventeenth century. In traditional Japanese residential buildings, the structure usually comprises the main area supporting the roof-structure and the surrounding attached area (Figure 3). The architecture of those two areas is clearly divided. A main area covered with long beams was used for sitting rooms; areas covered with lean-to roofs attached to the main structure were used for engawa (verandas) or small spaces, such as tokonoma (decorative alcoves) and oshiiire (closets). Further, attached areas were sometimes incorporated into the main area by extending beams and removing columns. In machiya architecture, the attached area or lean-to roof was built in front of the main area, which create a stepped difference in the façade between the lower and upper roofs. The mise’s front fittings were placed at the edge of this attached area.

Considering the types of front fittings, the combination of lattice-work for outer fittings and sliding doors for inner fittings was common in the mid-seventeenth century; however, some front fittings in the early seventeenth century were replaced by later remodelling (Table 2). The lattice-work was usually encased between the lintel and floor, while the sliding doors were easily removable. Behind these fittings, the mise was semi-open towards the street front. In the late seventeenth century, wooden shutters or sliding doors without lattice-work became noteworthy features. Once the shutters or sliding doors were opened, the mise became visible and easily accessible from the street front; that was in contrast to the early seventeenth century, when the mise was separated from the street front by double fittings.

Figure 3. Transverse cross-section of the Imanishi family residence (1650).
The height of front fittings gradually increased during the seventeenth century from 1.5 to 1.7 m (Figure 5). Notably, the front fitting in the Osumi family residence measures 1.8 m; that probably enhanced the building’s connection to the busiest and most important route to Edo (the former name of Tokyo) at that time, the Tōkaidō. By contrast, the height difference between the ground level and mise floor gradually diminished during the seventeenth century. The mise floor became increasingly lower until it was easily reachable from the street front.

From the above analysis, it is evident that the mise originated as a closed structure with double fittings at a low height and was clearly divided from the ground...
level. Its architectural features gradually transformed during the seventeenth century: it became an open structure with single fittings at a greater height such that the mise floor was easily accessible from the street front. Thus, the connection of the mise to the street front was a significant development by the end of the seventeenth century.

The relationship of the mise with the nakanoma was not, though, so clear as that with the street front. With the mise, the ceiling was 2 to 2.5 m high, but the differences in the ceiling heights between the mise and nakanoma were haphazard (Figure 6). It is difficult to identify trends in the differences in floor levels between the mise and nakanoma; however, with several structures, clear architectural distinctions are evident in the differences between the ceiling and floor levels for the mise and nakanoma (Table 3, Figure 7).

The depth of the front eaves of the machiya increased gradually during the seventeenth century (Table 4). In machiya architecture, the eaves extending from the attached portion covered the area just outside the mise, where customers passing on the street front might rest and look inside. Merchants also made use of that area outside the mise as a commercial space for selling goods or stocking them temporally before loading (Tsumagi 2019). Among those 12 structures, there were exceptionally deep areas with the Kikuya, Osumi and Ubugata family residences. In the Kikuya and Ubugata residences, the front attached portions are completely dedicated to the space outside the mise. The Kikuya family residence faces the main street leading to the castle in Hagi; therefore, it can be assumed that the created open space was used for semi-public purposes. With the Osumi family residence, a deep front eave was achieved by extending a double beam from the main structure. Facing the Tôkaidô, the large area of that machiya under the front eave was probably required for semi-public purposes (Figures 8–11).

To summarize the architectural details of the mise, nakanoma, and street front, the mid-seventeenth century mise had a closed structure with double fittings; that became an open structure with single fittings and high lintels. The area just outside the mise had deep eaves; they were particularly conspicuous in late-seventeenth century machiya. Thus, the connection between the mise and the street front became more significant in the course of that century.

4. Relationship between mise and doma

In the machiya architecture of the seventeenth century, the doma was not designed for family members but for outsiders. For example, the upper floor above the doma entrance in the residence of the Imanichi family, to which the governance of Imaicho was delegated, was allegedly used as a prison (Nara Prefecture Educational Board 1962). With the Toyoda and Sugiyama family residences, a small room above the shimomise (a small room opposite the mise) was used for apprentices. The small door for that upper room was high in the wall (The Japanese Association for Conservation of Architectural Monuments 1987; Nara Prefecture Educational Board 1976). According to interviews with the current owners, young apprentice boys were unable to leave those rooms if the proprietor removed the ladders leading up to those rooms. From such narratives, it is necessary reconsider the general understanding of the doma as a place where family members passed through as a part of the residence.

In traditional residential buildings in Japan, the wooden sliding doors between rooms were generally partitioned with hikichigai-mizo (double bypassing doors); a few lines of grooves (normally two, but sometimes three or more) were carved on the door sill for the fittings. The grooves were carved to either side of the door sill, so the fittings were able to slide freely. However, another type of door sill, called a tsukidome-mizo, was also used in residential buildings; in contrast to the hikichigai-mizo, with the tsukidome-mizo a few
lines of grooves stopped in the middle of the door sill. Therefore, some fittings did not move to the end of the door sill with the *tsukidome-mizo*. The *suriage do*, which was used between the *mise* and *doma* of the Otomura family residence, is to slide up a wooden shutter between the columns.

Regarding the types of fittings and door sills in *machiya* architecture (Table 5), the combination of

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**Table 3. Ceiling heights and differences in ceiling and floor levels between the *mise* and nakanoma.**

| No. | Residence | Construction | Ceiling height (mm) | Ceiling level difference between the *mise* and nakanoma (mm) | Floor level difference between the *mise* and the front attached area (mm) | Floor level difference between the *mise* and nakanoma (mm) |
|-----|-----------|--------------|---------------------|---------------------------------------------------------------|------------------------------------------------------------------------|---------------------------------------------------------------|
| 7   | Kuriyama  | 1607         | -                   | -                                                             | -                                                                      | -                                                             |
| 9   | Yamaguchi | ca. 1615     | -                   | -                                                             | -                                                                      | -                                                             |
| 3   | Nakamura  | 1632         | 3615                | 0                                                             | -                                                                      | 0                                                             |
| 4   | Imanishi  | 1650         | 2223                | 130                                                           | 0                                                                      | 170                                                           |
| 5   | Toyoda    | 1662         | 2311                | 303                                                           | 0                                                                      | 165                                                           |
| 10  | Okada     | 1674         | 2149                | 515                                                           | 55                                                                     | 0                                                             |
| 12  | Kikuya    | Mid. 17th century | -                   | -                                                             | (ground)                                                               | 118                                                           |
| 2   | Osumi     | 1688         | 2565                | 930                                                           | (ground)                                                               | 0                                                             |
| 1   | Ubugata   | Late 17th century | 2243              | -                                                             | (ground)                                                               | 0                                                             |
| 11  | Kihara    | Late 17th century | 2775              | 55                                                            | 57                                                                     | - 55                                                          |
| 6   | Otomura   | Late 17th century | 2141              | 374                                                           | 0                                                                      | 161                                                           |

*1* Data are unavailable because of later remodelling with the Kuriyama and Yamaguchi family residences.

*2* With the Nakamura family residence, the room next to the entrance, normally the *mise* in *machiya* architecture, was detached from the street front. Therefore, this house was not examined.

*3* The *mise* with the Kikuya family residence and nakanoma with the Ubugata family residence lack a ceiling.

*4* With the Kihara family residences, the nakanoma floor levels are lower than those of the *mise*.

*5* The Sugiyama family residence is excluded here because the area was from the early eighteenth century.

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**Figure 6. Height of ceiling and ceiling-level differences between the *mise* and nakanoma.**

**Figure 7. Detailed section of the *mise* of the Okada family residence (1674).**
wooden doors and tsukidome-mizo was most evident in early and mid-seventeenth centuries, while hikichigai-mizo and suriage-do appeared in the mid-seventeenth century. With the Osumi family residence, the mise was partitioned from doma without any fittings. In the Ubugata family residence, which was only built in the Kanto region among the 12 structures, the mise was divided from doma with the wall.

The fittings with the hikichigai-mizo were able to move more freely between the columns than with the tsukidome-mizo, where several fittings were fixed on the door sill. By contrast, the suriage-do provided free access to the mise from the doma once the wooden shutter was slid up. Finally, an arrangement without any fittings assured easy access to the mise from the doma. To summarize aspects related to door fixation, access to the mise from the doma changed from fixed to unfixed fittings during the seventeenth century.

The heights of the fittings and differences in levels between the doma and top of the mise door sill were almost the same in all the 12 examined structures (Tables 5–Tables 6, Figure 12). Several mid-seventeenth-century structures showed considerable

| No. | Residence | Construction | Depth of front eave (mm) |
|-----|-----------|--------------|--------------------------|
| 7   | Kuriyama  | 1607         | -                        |
| 9   | Yamaguchi | ca. 1615     | -                        |
| 3   | Nakamura  | 1632         | -                        |
| 4   | Imanishi  | 1650         | 606                      |
| 5   | Toyoda    | 1662         | 482                      |
| 10  | Okada     | 1674         | 608                      |
| 8   | Sugiyama  | Mid. 17th century | 600                   |
| 12  | Kikuya    | Mid. 17th century | 1821               |
| 2   | Osumi     | 1688         | 1530                     |
| 1   | Ubugata   | Late 17th century | 1593                |
| 11  | Kihara    | Late 17th century | 679                 |
| 6   | Otomura   | Late 17th century | 840                 |

*With the Suiyama family residence, the depth is measured in front of the doma.

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Figure 8. Detailed section of the mise of the Kikuya family residence (mid. 17th century) residence.

Figure 9. Detailed section of the mise of the Osumi family residence (1688).

Figure 10. Detailed section of the mise of the Ubugata family residence (late 17th century).
Figure 11. Detailed section of the mise of the Kihara family residence (late 17th century).

Table 5. Types of fittings and door sills, fitting height, and differences in level between the doma and top of the mise door sill.

| No. | Residence | Construction | Type of fitting | Type of door sill | Fitting height (mm) | Difference between doma and the top of door sill (mm) |
|-----|-----------|--------------|-----------------|-------------------|--------------------|---------------------------------------------------|
| 7   | Kuriyama  | 1607         | Wooden door     | Hikichigai-mizo  | 1760               | 490                                               |
| 9   | Yamaguchi | 1607         | Wooden door     | Tsukidome-mizo   | 1785               | 606                                               |
| 3   | Nakamura  | 1632         | Wooden door     | Tsukidome-mizo   | 1748               | 523                                               |
| 4   | Imanishi  | 1650         | Wooden door     | Tsukidome-mizo   | 1740               | 745                                               |
| 5   | Toyoda    | 1662         | Wooden door     | Tsukidome-mizo   | 1749               | 583                                               |
| 10  | Okada     | 1674         | Wooden door     | Hikichigai-mizo  | 1754               | 677                                               |
| 8   | Sugiyama  | Mid-17th century | Wooden door | Tsukidome-mizo | 1763 | 671                                               |
| 12  | Kikuya    | Mid-17th century | Wooden door | Tsukidome-mizo | 1757 | 641                                               |
| 2   | Osumi     | 1688         | None            | None              | 1727               | 453                                               |
| 1   | Ubugata   | Late 17th century | Wall         | Wall              | 1852               | 415                                               |
| 11  | Kihara    | Late 17th century | Wooden door | Hikichigai-mizo | 1720 | 645                                               |
| 6   | Otomura   | Late 17th century | Wooden door | Suriage-do       | 1723               | 489                                               |

*1The fittings and door sill in the Kuriyama family residence were remodelled later.
*2The Yamaguchi family residence later underwent heavy remodelling. This paper examined the details between the nakanoma and doma. Nakanoma was built around 1615.

Table 6. Mise and doma ceiling heights and their ceiling height differences.

| No. | Residence | Construction | Mise ceiling height (mm) | Doma ceiling height (mm) | Ceiling height difference between mise and doma (mm) |
|-----|-----------|--------------|--------------------------|--------------------------|---------------------------------------------------|
| 7   | Kuriyama  | 1607         | 2907                     | -                        | -                                                 |
| 9   | Yamaguchi | ca. 1615     | 2941                     | 4482                     | 1018                                              |
| 3   | Nakamura  | 1632         | 2941                     | 2968                     | 0                                                 |
| 4   | Imanishi  | 1650         | 2223                     | 2769                     | - 717                                             |
| 5   | Toyoda    | 1662         | 2466                     | 2826                     | 0                                                 |
| 10  | Okada     | 1674         | 2149                     | 2826                     | 0                                                 |
| 8   | Sugiyama  | Mid-17th century | 2704                     | 4472                     | 1097                                              |
| 12  | Kikuya    | Mid-17th century | -                        | -                        | -                                                 |
| 2   | Osumi     | 1688         | 2565                     | 2646                     | 0                                                 |
| 1   | Ubugata   | Late 17th century | 2243                     | 2646                     | 0                                                 |
| 11  | Kihara    | Late 17th century | 2775                     | 3030                     | - 390                                             |
| 6   | Otomura   | Late 17th century | 2093                     | 2420                     | - 127                                             |

*1The ceiling of the Kuriyama family residence dates from a later remodelling.
*2The doma in the Yamaguchi family residence has no ceiling.
*3According to the reports of restoration work, the columns between mise and nakanoma in the Sugiyama family residence are original mid-seventeenth-century structures. This study measured the present ceiling and floor levels, while admitting the possibility of later remodelling.
*4Both the doma and mise in the Kikuya family residence lack ceilings.
*5Measured from the mise ceiling

Differences in the ceiling heights between the mise and doma; however, the ceilings with most structures, particularly those built in the late seventeenth century, were at the same level (Figure 13).

Thus, early-seventeenth-century mise were closed structures with respect to the types of fittings, ceilings, heights, and level differences between the mise and the doma. In those decades, the wooden
doors of the *mise* were fixed on the door sill, which restricted free access from the *doma*, and there was a great difference in their ceiling heights. Accordingly, the *doma* was probably regarded an outside area when viewed from within the *mise*. However, that spatial relationship changed in the late seventeenth century. Unfixed doors became commonly used between the *mise* and the *doma*, which offered easier access than in the early seventeenth century. In addition, their ceilings were at the same levels. Therefore, the *mise* became connected with the *doma* in the late seventeenth century.

The steps between the floored rooms and the *doma* were arranged in the several mid-seventeenth-century *machiya* structures. Those devices possibly enhanced the spatial character of the separation between the two areas by restricting the access between them (Figures 14–15).

5. Conclusion

This paper investigated the spatial relationship of *mise* in seventeenth-century *machiya* architecture with regard to fittings and measurements. It examined the transverse cross sections among the *mise*, *nakanoma*, and street front as well as between the *mise* and *doma*.

In the early and mid-seventeenth century, the *mise* was a closed structure; it was separated from the street front by means of double fittings of low height. Additionally, it was separated from the *doma* through fixed *tsukidome-mizo* fittings and different ceiling levels. In the early and mid-seventeenth century, the *doma* was possibly regarded as an outside area for
From the eighteenth century, the front fittings of *machiya* architecture incorporated *shitomi-do* (wooden shutters that opened up horizontally) or *suriaje-do*. Lattice-work then became widespread under the influence of Kyoto’s *machiya* architecture (Oba 2004). Considering the characteristics of *shitomi-do* and *suriaje-do*, which both allow free access from the street front, those designs can be regarded as following the open-structure trend of the late seventeenth century.

**Disclosure statement**

No potential conflict of interest was reported by the authors.

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Figures 1–3: Nara Prefecture Educational Board (1962).
Figures 4–15: Authors’ drawings