A Study of Spatial Hierarchy of Martial Arts Halls in Taiwan

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(Received Nov. 07, 2011; Accepted May 27, 2013)

ABSTRACT
At the early stage of Japanese colonial rule on Taiwan in 1895, in order to quell the Taiwanese rebellion and maintain public security, the Japanese government started building martial arts halls in Taiwan to train soldiers and police in combat skills. The design of such halls was actually evolved from the unique architectural style of Japanese martial arts halls and its traditional Bushido culture. After the retrocession of Taiwan, the National Government purposely abandoned or dismantled many shrines and buildings of traditional Japanese-style in order to remove the remnants of Japanese culture. The main subject of this paper focused on martial arts halls largely constructed by Japan during its Taiwan colonial period. In addition to tracking its historical and philosophical connotations, this study also used shape grammar to analyze its architectural plane, spatial hierarchy and construction features to prove its content. The application of shape grammars aimed to explore the spatial hierarchy and graphic composition of Taiwan martial arts halls as well as to establish its rules of common parameters.

KEYWORDS: Martial Arts Hall, Shape Grammar, Martial Art Culture, Japanese Colony

1 Introduction- History

Chinese martial arts, or Wushu, have existed for numerous centuries. Perhaps the most famous system of martial arts is the Buddhist Chan, which is known as the Chinese ancestor of Japanese Zen. The Buddhist monastery of Shaolin developed Shaolin boxing, or shaolinquan, while the Taoist Wudang Mountains School invented their sword technique as well as the practice of Taichi. Standard Chinese types of self-defense, later transmitted to Japanese systems, are performed either barehanded or armed, and may be performed solo or with partners. Although Taiwan was governed for 212 years by the Qing Dynasty and was affected by the political conflicts and wars in China, neither wushu nor warriors from the mainland had a great influence on Taiwan at the time. However, Confucianism from China strongly encouraged the development of martial arts culture (Yu, 2009). The basic hierarchy principle of Confucianism was found in the Quli of the Book-of-Rites. According to
this principle a minister should not openly remonstrate with his ruler. If the minister has thrice remonstrated and has not been heard, he should leave. In the case of service of a son to his parents, if he has remonstrated thrice to no avail, he should follow them around while crying out loud or weeping. In this way, a hierarchy is created in the world of the family, society, and martial arts without any application of force. The philosophy of the Taoist Wu-wei, or action through inaction, also encourages people to create harmony with the universe instead of fighting.

The way of the Japanese warrior, Bushido, which is known as the founding spirit of Japan, is another set of narratives that compliments Japanese Zen (Hyams, 1982). Bushido builds on the Confucian values regarding the prince and the minister, or what the Confucianists call “Shido”. In Shido, where absolute obedience and loyalty is required, “the minister [be] not a minister” does not apply. We see this with the Japanese Samurai, or warriors, who committed hara-kiri after defeat, and the Kamikaze commandos, who chose to be martyrs for their country during World War II. An early reference to the word “Samurai” appears in the Kokin Wakashu, an early Heian Waka Imperial anthology from the 10th century. Historically speaking, ancient Japanese Wushu was spread with the rise of the warriors as they grew increasing important at the behest of the emperor. This provided warriors with an institutional framework for legitimate social advancement during the Kamakura shogunate (Stavros, 2009). The warrior leadership was mainly inherited from the imperial authority which was supported by the traditional hierarchy, religious ideology, and the philosophical system of the Buddhist-Shinto (Risuke, 2007; Adolphson, 2000). Although Taiwan was only ruled by Japan for 50 years, the Japanese martial arts tradition took hold and strongly shaped Taiwanese martial arts culture.

In 1895, China ceded Taiwan to Japan after the first Sino-Japanese War. In the same year, the Japanese founded the Great Japan Martial Arts Association (GJMAA), which combined the authority of the military and the police, and held the first wushu practicing congress at Heian Jingu Shrine in Kyoto (Ito, 1967). Since judo, swordsmanship and archery require an indoor court, the first martial arts building of the GJMAA, called the Martial Arts Hall, was completed in Kyoto in 1899. It possessed the combined architectural styles of a traditional Japanese shrine, temple and palace. After 1899, martial arts halls, or Takenori halls, were constructed in every Japanese province, capital and county, including all overseas colonies, by the police and military (Japan Sports facilities Association, 1969). In early colonial Taiwan, in order to quell the Taiwanese rebellion and maintain public security, the Japanese government began training soldiers and policemen in combat skills. Hundreds of martial arts halls were built and all policemen had to attend wushu exercises (either judo or kendo) twice a week and had to graduate from the first level of judo before continuing advanced education in the police school (Hwang & Lee, 1967). During the middle period of colonization, wushu was made an obligatory course in junior high schools (Chen, 2008). Martial arts halls, or martial arts courts (wudaochangs), were also built at schools. Gradually, Japanese wushu was recognized as a sport in the physical education system, and became universal among Taiwanese people. The culture of Japanese wushu infiltrated Taiwanese society and spawned an organized, standardized, and competitive epoch in Taiwan.

With the outbreak of World War II and the Second Sino-Japanese War, the Japanese government mobilized their troops to accommodate the needs of war. The colonial government also tried to appeal to the nation’s morality by strongly encouraging young people to
participate in educational organizations in hopes that the Shinto and Kominka spirits would be embraced (Chen, 1997). As a result, martial arts halls were not only places used to practice and compete in martial arts, but also places to assemble for meetings and propagate the Kominka spirit, the byproduct of militarism (Fu, 1995). When Taiwan was restored after the Japanese occupation, the Taiwanese government purposely tried to create an atmosphere of hatred for the Japanese and tried to remove all remnants of Japanese culture. Because of this, many Japanese buildings, including shrines, were abandoned and dismantled. In recent years, due to a rising consciousness for cultural heritage preservation, these traditional buildings are being increasingly valued. With a more open social climate, the long-ignored traditional Japanese architecture had a chance for rebirth. There are many records and books related to martial art halls, but few research papers. This text will discuss the evolution of the architecture of martial arts halls, from the traditional Bushido style to the distinctive architectural space of the modern day.

1.2 The features of martial arts halls in Taiwan

1.2.1 The origin of martial arts halls

Japanese warriors adopted the rituals of state as the foundation for attacking and retreating in combat. They adopted notions of Confucianism, Taoism and Buddhist-Shinto as philosophies for self-cultivation. The ideal warrior not only practiced his martial arts, but also cultivated his morals and thoughts. To reflect this concept, the martial arts space was originally named “Daochang,” This is a translation of “bodhimanda”, a Pali word that refers to the spot under the Bodhi tree where the Buddha attained enlightenment, literally meaning "place of enlightenment". Later generations extended this name to imply the place for practicing martial arts and for self-cultivation. Therefore, both the martial arts court (Wudaochang) and the martial arts building (martial arts hall) were a place to assemble warriors, to practice martial arts and to cultivate warrior morals.

The term “martial arts hall” first appeared in Japanese history in 796 after the emperor moved the capital from Tokyo to Kyoto (Sekino, 1937). The original Japanese martial arts hall was a place to promote the warrior spirit. It was constructed to resemble a combination of a traditional Japanese shrine, a temple and a palace, and the space within was separated for the different martial arts activities. This became the prototype, both for practicing martial arts and for worshipping Shinto Buddha, the god of martial arts. Additionally, Emperor Meijitennou wore his Western-style military uniform and was responsible for the Meiji Restoration. Besides military reforms, this restoration also brought western education and architectural styles into Japanese schools, so certain martial arts halls and martial arts courts in schools were influenced by western style gyms and auditoriums. However, despite what happened in the school system, martial arts halls are still based on the aforementioned prototype, the martial arts tradition, and the samurai philosophy.

1.2.2 The spatial hierarchy of martial arts halls

After the Japanese warrior Minamoto Yoritomo took control of Japan and was appointed as shogun after defeating the Taira clan in the Gempei war of 1185, the warrior class was firmly established at Kamakura and throughout Japan. The Shinto god became favored by aristocrats, warriors and commoners as greater than the emperor and became part of the social hierarchy in ancient Japan. (Coaldrake, 1996) Later, this hierarchy was reflected in the floor plan of martial arts halls.

Martial arts halls are planned out to face the south at
the main axis. Spaces and rooms are arranged bilaterally and symmetrically based on an obvious spatial hierarchy. The axis of symmetry is located along the central line of main space, placing the shrine at the northern end facing to the south. Due to the Buddhist-Shinto religious system, the tutelary gods of the Buddhist-Shinto Amaterasu Royal God, the Meiji god, the martial arts god and the military god are all worshiped at the shrine (Okada, 1989; Nakamura, 1985). Tokugawa are shogun promoted Confucianism in that the Confucian doctrines develop the idea that people obligated to be loyal to the shogun, so Confucius is also worshiped at the shrine. The main purpose of the shrine is to combine martial arts with the spirits of Buddhist-Shinto gods. Therefore, during the Japanese colonial period, these gods were worshiped in the main Taiwanese martial arts halls in every city in ceremonies before competitions. In particular, the annual formal rite ceremony was a big event in main martial art academies. The Buddhist-Shinto Amaterasu Royal God and the Meiji god were removed from the shrines of martial art academies after World War II. Everything related to Japanese militarism and ultra-nationalism was forbidden in public spaces according to the new Japanese Constitution in 1946. Therefore, only the martial arts and military gods were left in the martial art shrines. Figures 1a and 1b show the shrine at Kaohsiung City Martial Arts Hall.

Figure 1b the shrine at Kaohsiung City Martial Arts Hall
When looking from the shrine towards the main entrance, the right side of the hall is reserved for higher nobility compared to the left, the space in front of the shrine for the highest ranked in the hierarchy, generally the closer to the shrine, the higher the ranking. In figure 2 the numbers indicate the hierarchy order. Therefore, from the shrine, in accordance with the feudal hierarchy, the space is divided for distinguished guests, officers, masters, warriors, the martial arts court and then for the ordinary visitors, as shown in the figure 3. All of the main rooms (spaces) in martial arts halls lie on the axis of symmetry; other secondary spaces are located left or right of this axis (Chen, 2010).

Figure 2 The nearer to the shrine, the higher the ranking, and the right side of the shrine is for those ranking higher than the left, so number 1 is the highest ranked, number 2 the second ranked, and so on.

Figure 3 Spatial hierarchy of Martial arts halls in Japan
A Study of Spatial Hierarchy of Martial Arts Halls in Taiwan

2 Grammar operations of the martial art halls

2.1 Four samples from the existing martial art halls in Taiwan

The Taiwanese branches of the GJMAA were established in 1906 mainly for suppressing the Taiwanese people and for police combat training, although this association also promoted archery, horsemanship and swimming. The GJMAA offices were in Taipei, Taichung and Tainan in 1900. To promote the GJMAA, the wushu practicing congress was held in May and August of 1907 in Taiwan (Taiwanese Police Association, 1925). Conforming to the administrative divisions under Japan, the government spread martial arts halls from the five states (Taipei, Hsinchu, Taichung, Tainan and Kaohsiung) to the counties, small cities and towns in Taiwan.

After interviews with elderly martial artists, reviews of documents about martial arts activities, field trips to martial arts halls, and drawings of existing martial arts halls were completed, four examples were chosen because they were larger, better preserved and were representative of martial arts halls in municipalities or counties during the Japanese colonial period. These halls are also among the eight martial arts halls which have been preserved as heritage sites or historical examples of architecture by the Council of Cultural Affairs in Taiwan. These four martial arts halls (Table 1; Fig. 4) were apparently built in the 1920s and 30s. Like their Japanese counterparts, the majority of Taiwanese martial arts halls face the south at the main axis. Their spaces and rooms are positioned bilaterally and symmetrically according to an obvious main axis just as Japanese martial arts halls.

<table>
<thead>
<tr>
<th>Name of sample</th>
<th>Time of completion</th>
<th>Location</th>
<th>The state of preservation</th>
<th>Present function</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nantou City Martial Arts Hall II</td>
<td>11/03/1937</td>
<td>Nantou County</td>
<td>Historical Architecture</td>
<td>Museum</td>
<td>By local government</td>
</tr>
<tr>
<td>Changhua City Martial Arts Hall</td>
<td>18/10/1930</td>
<td>Changhua County</td>
<td>Heritage site</td>
<td>Unused</td>
<td>Local Enterprise</td>
</tr>
<tr>
<td>Tainan City Martial Arts Hall II</td>
<td>24/10/1935</td>
<td>Tainan City</td>
<td>Heritage site</td>
<td>Auditorium</td>
<td>By Zhongyi Elementary School</td>
</tr>
<tr>
<td>Kaohsiung City Martial Arts Hall</td>
<td>19/07/1924</td>
<td>Kaohsiung City</td>
<td>Heritage site</td>
<td>Kendo Court</td>
<td>by the Taiwan Foundation of Kendo Culture</td>
</tr>
</tbody>
</table>

Table 1 Data on the four martial arts halls which were chosen as samples

Fig. 4a(a)  Fig. 4a(b)
Figure 4a Nantou City Martial Arts Hall II

Figure 4b Changhua City Martial Arts Hall
2.2 Spatial pattern of martial arts halls

2.2.1 Methodology of analyzing spatial pattern

As earlier discussed, the spaces and rooms of martial arts halls are arranged bilaterally and symmetrically in a grid system based on a spatial hierarchy at the main axis which is located along the central line. The sequence and logic of the layout of martial arts halls make it suitable to be analyzed by using a mathematical methodology. It is more efficient to work with a well-defined arithmetic knowledge of form and pattern rather than by relying wholly on abstract intuition, so shape grammar (Stiny & Gips, 1980) defines the final forms and is a process of generating designs. This methodology has also been submitted applications to form and their derivations, designs and their decompositions, designs and their functions and designs and other designs for the last three decades. This methodology differentiates between original and analytical approaches (Duarte, 2005). Original grammars are used to create new and original designs using a series...
of schema, while analytical grammars have been used to analyze and depict historical designs and styles. The former was developed by T. W. Knight, who detailed its use in a series of papers (Knight, 1994). The latter uses a set of corpora which represent the style of design and can deduce the rules of the grammar. A number of existing analyses that we considered include the plans and construction of the Palladian villas (Stiny & Mitchell, 1978; Mitchell, 1990; Sass, 2007), the space puzzle of modern apartment houses in Seoul (Seo, 2007), the grammar of Taiwanese traditional houses (Chiou & Krishnamurti, 1995; 1996), and the traditional Taiwanese temple designs (Chiou & Krishnamurti, 1997).

The purpose of using shape grammar in this paper is to approach the spatial hierarchy and organization of the plans of martial arts halls using parametric rules for these Taiwanese martial arts buildings. It may not help us to understand the original architectural design concept of the architects of these martial arts halls. However, it provides a possibility to describe the spirit and the composition of martial arts halls in terms of rules by a tree analysis diagram. After the samples are chosen, the design starts with an explanation of rule types as a method for generating floor plans. This rule system can also show the similarities and the differences among martial arts halls, individually and as a grammar, to conjecture about and reconstruct the destroyed martial arts halls in Taiwan.

2.2.2 Grammar for allocation of spaces

Each space of a martial arts hall should be defined before the grammar is built. A martial arts hall contains four categories of spaces: the shrine, the auditorium areas for martial arts teachers, executive guests and students, the judo and kendo venue, and the service spaces. Service spaces including foyers for teachers and executive guests, lavatories, bathrooms, and a kitchen, all of which are usually in an appurtenant building. The Tainan Martial Arts Hall II, which has service spaces at the ground floor, is a rare exception, but was still chosen as a sample. Rooms and spaces are identified by letters throughout grammars; the meanings of the symbols are listed in Table 2.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Space</th>
<th>Symbol</th>
<th>Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sh</td>
<td>shrine</td>
<td>Kd</td>
<td>kendo</td>
</tr>
<tr>
<td>st</td>
<td>stairs or steps</td>
<td>P</td>
<td>porch</td>
</tr>
<tr>
<td>S</td>
<td>student seats</td>
<td>A</td>
<td>aisle</td>
</tr>
<tr>
<td>T</td>
<td>teacher seats</td>
<td>B</td>
<td>bathroom</td>
</tr>
<tr>
<td>E</td>
<td>executive seats</td>
<td>K</td>
<td>kitchen</td>
</tr>
<tr>
<td>Jd</td>
<td>judo</td>
<td>V</td>
<td>VIP room</td>
</tr>
</tbody>
</table>

The spaces of martial arts halls are based on a coordinate system (Stiny & Mitchell, 1978; Downing & Flemming, 1981; Chiou & Krishnamurti, 1995). Plans are generated by the sequential and recursive application of rules from the initial shape which is the labeled shape \( \langle s_\phi, \{(0,0): A\} \rangle \) in figure 5.

![Figure 5 Initial shape](image)

Stage 1: Base for design

The shrine space, the most important part of the building, is on the main axis, which conveys the Buddhist-Shinto religious system and is the base of warriors’ philosophy. Therefore, rule 1 defines the position of a shrine in a martial arts hall, as it represents the beginning of both physical and spiritual martial art space, shown as R1 in figure 6. Rule 2 is a set of stairs used as the entrance to the appurtenant floor of the Tainan Martial Arts Hall II, which is an important exception in our samples, shown as R2 in figure 6.
Figure 6 Rules for the development of plaid grids with bilateral symmetry

R1  \((0,0)\)  →

R2  →

R3  \[\]  →  or  \[\]

R4a  →

R4b  →

R5  \[\]  →  or  \[\]  →

R6a  →

R6b  →

R7  \[\] →  \[\]

R8  \[\] →  \[\]

R9  \[\] →  \[\]

R10  \[\] →  \[\]  \[\]

R11  \[\] →  \[\]  \[\]  \[\]

R12  \[\] →  \[\]

R13  \[\]  \[\] →  \[\]  \[\]

R14  \[\] →  \[\]  \[\]

R15  \[\]  \[\] →  \[\]  \[\]

R16  \[\] →  \[\]

R17  \[\]  \[\]  \[\]  \[\] →  \[\]  \[\]

R18a  \[\]  \[\] →  \[\]  \[\]

R18b  \[\]  \[\] →  \[\]  \[\]

R19  \[\] →  \[\]

R20  \[\]  \[\]  \[\] →  \[\]  \[\]

R21  \[\]  \[\] →  \[\]  \[\]

R22  Definition of exterior walls and indoor spaces

R23  \[\] →  \[\]

R24  Definition of veranda along the exterior wall
Figure 7 This tree diagram shows the common rules and mutual layout:

1. Define initial shape
2. Locate shrine
3. Locate worship space before shrine
4. Generate spaces for martial arts venues
5. Merge spaces for judo and kendo zones
6. Merge side aisles
7. Locate stairs or steps
8. Merge main aisles
9. Definition of exterior wall and turn grids into spaces
10. Locate porch for the main gate
11. Locate veranda along the exterior wall

(Taipei City, Kaohsiung City, Tainan City, Nantou City, Changhua City, Martial Arts Hall, Martial Arts Hall, Martial Arts Hall)
Stage 2: Grid system and exterior-wall definition

The most noticeable characteristic of martial arts halls is their bilateral symmetry. This bilateral symmetry is a feature of the spatial cells as plaid grids in the plan for martial arts halls. The space is organized using labeled rectangular plaid grids in relation to the north-south axis of the coordinate system (the Palladian grammar, mentioned in 2.2.1). This shape grammar can produce the entire uniaxial planar villas published in Four Books on Architecture. According to this schema, 3*3 phalanxes can provide twenty kinds of planar spaces, while 5*3 planar spaces can produce another 210 planar spaces.

All grids generated by the rules consist of an array of cells which corresponds to Wittkower’s “Geometrical pattern” of diversely dimensioned rectangles, with (2m+1)*n where m and n are integers, m ≥0 and n>0 (Wittkower, 1952; Stiny & Mitchell, 1978). Adjacent rectangles on the grid are separated by an invisible boundary between two discriminative functions or by a set measurement of one wall width between two rooms. The dimensions of these grids are established by applying rules that derive grids. To all grids the central column is bisected by the north-south axis of the coordinate system, so all rules are described according to this axis. The rules of plaid grids are explained in figure 6. R2-3, R5, R7 and R8 are used to generate grids vertically and rules R4, R6, R9, R10 and R11 are used to generate grids horizontally. R12-21 are used to divide and merge grids for adjusting spaces. R 22 is used to define exterior walls and indoor spaces. R23 is used to add a porch for the main entrance. Rule R24 is used to define the exterior wall and space units for this new grid system and turn it into a plan. The rules for the development of plaid grids are required in order to produce the room layout for our five examples, as shown in figure 6.

2.2.3 Grammar operation by a tree analysis diagram

To demonstrate that the parametric rules can be applied to analyze our four samples, a partial tree diagram (Figure 7) is built by applying Rule 1-24. This tree diagram shows the common rules and mutual layout.

Stage 3: Allocation of room function

In figure 8, rules R 25-34 are for allocating room functions in normal martial arts halls. To start, the shrine, as defined by R25 and R26, is for the warriors to worship the gods before a formal fight. The area for the highest ranked person in the auditorium is in front of the shrine, while the positions for others are set by distance according to ranking. R27 is used to add a kitchen, a stair case and a VIP room behind a shrine. R28, R29 and R30

| R25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| R26 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| R27 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| R28 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| R29 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| R30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| R31 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| R32 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| R33 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Figure 8 Rules for the allocation of functions for martial arts halls
are used to define the parallel judo court, kendo court and aisles. Stairs are added at both flanks using R31 and R32. A porch is defined using R33, and R34 and represents the main entrance. R25-34 are shown in the tree diagram in Figure 9.

Sometimes, there is at least one more stage involved, such as generating doors and openings in floor plans and the termination of the grammar, which was seen in the famous Palladian grammar (Stiny & Mitchell, 1978; Sass, 2007). However, the spatial hierarchy and composition of martial arts halls has been clearly analyzed in the tree diagram of Figure 7 and 9. The tree diagram of this analytical grammar interprets the meaning of the spatial configuration of traditional Taiwanese martial arts halls. The parametric rules matched the spirit and philosophy of martial arts halls which has been discussed in this paper, and have also been highlighted at the left side of the tree diagram. Thus, shape grammar is a valuable tool.

3 Discussion and Conclusion

3.1 Discussion

Through the use of grammars and the interpretation of extensive indoor spaces, martial arts halls can be characterized as follows: (1) If the generation of the layout starts from the shrine, this indicates that the Shinto spirit of martial arts culture is present in the martial arts halls being studied; (2) martial arts culture is reflected in the spatial hierarchy system; (3) the floor plans of the buildings were designed symmetrically and

Figure 9 Continuance of figure 7 for allocating room functions in the tree diagram
A Study of Spatial Hierarchy of Martial Arts Halls in Taiwan

for equilibrium; (4) in the scheme of floor plan, there is an obvious medial axis, but it includes several regular and symmetric secondary axes; and (5) due to the strict hierarchical spatial system of martial arts halls, other Taiwanese martial arts halls which were not mentioned in the text, such as the Longtan Martial Arts Hall, Dasi Martial Arts Hall and the Xinhwa Martial Arts Hall, also fit the proposed grammar rules and the analysis of the space layout. Thus, by using the grammar rules in this text, other martial arts halls could also be effectively analyzed.

We can also see differences among the layouts of the four samples through the interpretation of grammar rules. It can be distinguished as follows: (1) The shrine, the Shinto spirit of martial arts culture, presents the highest-class space in the spatial hierarchy of the martial arts halls, so there is normally no other space behind the shrine room. According to the step R3, Tainan Martial Art Hall which is different from the other samples, has a staircase, VIP room and kitchen behind the shrine. However, these three spaces surround the shrine at the back side; they do not decrease the highest level of the shrine in the spatial hierarchy at all. (2) The veranda is considered an extension of the martial arts venue while the martial arts hall gathers numerous visitors. Nevertheless Changhua and Kaohsiung City martial arts halls do not generate their veranda at the step R24, their yards or patios provide the same function. (3) When the capacity of martial arts halls is larger, the spatial hierarchy of the martial arts halls also has better levels of detail. That is why the layout of Tainan City Martial Arts Hall which is larger than the other samples, provides the executive-seat space and VIP room.

After the discussion of the grammar generation process, we have revealed that martial arts halls reflect the spatial hierarchy system and the martial art culture. These spaces systematically constructed in Taiwanese martial arts halls are not only rooms for martial art activities, but also a physical manifestation of rituals. Ethical, philosophical and spiritual meanings are also highlighted with these examples. This multiplicity is very rare in other types of Taiwanese architecture from the Japanese colonial period.

3.2 Conclusion

This study provides us an understanding of the social hierarchy and the martial art philosophy behind the physical form of martial arts halls with the historical context. We presented two main points in this paper: (1) the prototype for Taiwanese martial arts halls and the philosophic context and spirit of these martial art halls; (2) shape grammar provides clear steps to explain the spatial relationship and hierarchy in martial arts halls. These rules can also be used to do precise comparative research or discover variations between martial arts halls.

The shrine indicates the significance of worship and the importance of gods, as it is located at the head of the spatial system. From here, the primary and secondary spaces are distinguished, and rooms are laid out in the martial arts hall according to this martial arts spatial culture. Thus, we present a possible way to reveal the spatial system through the application of shape grammar. This analysis touches on the motif of martial arts halls and the hierarchical relationship between masters and disciples among warriors that shows up in the symmetrical grid system. It also discusses the spiritual aspects behind hierarchical spatial order in martial arts halls, including the importance of the genius loci. This could be of interest in further research, as it is still difficult to measure the architectural value and the historical significance of the hundreds of Taiwanese martial arts halls to the Taiwanese people.

Unfortunately, martial arts halls continue to disappear at an ever increasing rate, and those left have
been changed into auditoriums or exhibition halls. This spatial culture of martial arts that once flourished in Taiwan could be lost forever if people continue to ignore it. This paper attempts to illustrate the Taiwanese architectural design of martial arts halls and how they came to be. However, there is much more to be done, including research on the sophisticated facades, the construction of martial arts halls and more histories of Taiwanese martial arts. Taiwan should not be weighed down by the experience of having been a Japanese colony and has spent the past six decades in burying its consequent aversion towards Japan. Nevertheless, the Taiwanese martial arts history should be remembered and recorded, particularly as our youth continue to train in martial arts and get animated over the spatial stories of martial arts.

ACKNOWLEDGEMENTS

Thanks to Chen Ui-nong, a research student at Feng Chia University who helped us edit drawings for this study.

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臺灣武德殿的空間層級制度

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(2011年11月7日投稿；2013年5月27日通過)

摘要
日本於1895年殖民臺灣初期，為了平靖臺灣人民的反抗與維護公共安全，於是日本政府在臺灣大量興建武德殿以訓練軍隊與警察的搏擊技藝。而臺灣武德殿的設計實是源自於日本武德殿獨特的形式與傳統的日本武道文化。在1945年臺灣光復，脫離日本統治後，國民政府為了刻意地去除殘存的日本文化，而拆毀或棄置許多日本神社與傳統日式建築。本論文的主要研究對象為日治時期在台大量興建的武德殿，除了追溯其歷史與哲學內涵外，並且以形狀文法分析其建築平面、空間層級與武德殿的建築特性以印證其內涵。形狀文法的應用主要在探討臺灣武德殿的空間層級、平面組成與建立其共同的參數規則。

關鍵詞：武德殿，形狀文法，武道文化，日本殖民地