

*The Sound Exchange of Movement:  
A Study on the Current Soundscape Conditions of Taiwan's Metro System*

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**Abstract**

Soundscape developed in Europe and Canada. In 1996, it was incorporated into urban planning in Japan. In recent years, Taiwan has begun attaching value to the conceptual application of soundscape, which is reflected on the actuation of the 2015 Taipei Soundscape project. The development of the rapid transit in Taiwan is entering into its second decade, where metro systems are operational in both Taipei and Kaohsiung. The present study aimed to investigate the soundscape conditions of the Taiwan's Metro Systems, where urban transportation compositions can be created by the sounds of travelling and transiting passengers.

The present study adopted a Interviewing and an observational research method to collect the sounds along the main transport lines and at the central hubs of the Taipei and Kaohsiung Metro Systems. Finally, the present study adopted the ecological triangle and Soundscape Triangle to analyze the differences between the soundscapes of the two metro systems. In terms of acoustic features, environmental sounds were more easily recorded in the Kaohsiung Metro during the day, and human-caused sounds were more easily recorded during the evening peak period. By contrast, Taipei Metro were more easily recorded during the morning off-peak period, and human-caused sounds were more easily recorded during the remainder of the time. In terms of passengers' sound impressions, the departure sound employed by both Metro Systems stimulated a sense of anxiety. The findings of the present study can serve as reference for the future planning of urban metro systems to form favorable urban imagery.

Keywords: Soundscape, Rapid transit, Taiwan, Metro Systems, Ecological triangle

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## **Introduction**

Human have five perceptions to received messages: vision, hearing, smell, taste, touch. Getting about 65% of the human experience from the vision, and 25% from hearing, and 10% from touch. In the past, human knowledge is evident from vision, but hearing compared to less susceptible to block. Jacques Attali (1977) mentioned that vision as a Western ideology to understand the world in the past, but found that hearing also has considerable explanatory power.

In recent years, Taiwan's concern about the soundscape, including Professor Wang Chin-Shou had held in 1998 "Hsinchu's 10 piece of soundscapes" voting activities. In 2015, "Soundscape Association of Taiwan" was founded to learn more about the various levels of study and promotion of soundscape research. In the same year, the Department of Cultural Affairs in Taipei City Government proposed "Taipei Soundscape Project" to increase the soundscape characteristic of Taipei Metro system. World Design Capital 2016 in Taipei which is advocating a "Public Policy by Design" project, so the concept of soundscape into the current Train melody changes and advocate the art of music into the living environment are led by the new executive heads in Taipei taking office administrative team. Kaohsiung Metro has gradually integrated into the "one-stop one-music" project in recent years. The music creators invited to shape the city's image.

In a long term, city design can pay more attention to type of space, functions, colors and more visual functions but ignore hearing experience. Ge (2004) thought environmental sound should design positively listening space and contents, rousing people wonderful memories to create space and atmosphere. As a unique city image not only deliver background of city and features, but also can express residents spirits directly and response feedback and feelings to city.

A good image of the city is not only an asset for the city's economic development, but also to impress residents in mind to create a good external environment. Therefore, the Metro system applied the concept of soundscape environment, whether it is a local song style train melody or simply a warning sound, Metro soundscape is a direction worth to explore. In this study, the observer understudied the current situation and a preliminary investigation interviews, provided the development of metro in city sound design for the given reference in the future.

We want to understand nowadays Taiwan's Metro soundscape situations and passengers' feelings for instances two Metro Systems in Taiwan. Through this research to understand soundscape in Taiwan developing and situations.

1. To understand Taiwan two Metro - Kaohsiung city and Taipei city soundscape situations and comparing analysis.
2. To understand passengers' feelings of sounds when passengers are taking the Metro.

## Literature

### 1. Soundscape

The word Soundscape was combined with sound and landscape. In the contrast to the landscape, soundscape was the appearance of hearing sense, and landscape was explained as the sound image and meanings in the soundscape. The soundscape concept was mentioned by Canadian composer R.Murray Schafer in 1960. He created the world soundscape project the core concept was acoustic Ecology. He tried to located the sound environment for the humanity and the ecological environment in the world which the noise. Besides the negative noise, he also discovered exists the positive sound in the environment. In 1993, World Forum of Acoustic Ecology set up to collect the world soundscape organization. In 1996, Ministry of the Environment, Government of Japan open for selection, "100 Soundscapes of Japan", a collection worth preserving sound landscape. Taiwan in 1998 led to "Hsinchu's 10 piece of soundscapes 'oting activities by Professor Wang. In 2015, the Department of Cultural Affairs in Taipei City Government proposed "Taipei Soundscape Project" to increase the soundscape characteristic of Taipei Metro system. In the same year, a group of Taiwanese loving soundscapes, they hope the experts and participants from all levels to understand the soundscape, and the creation of "Soundscape Association of Taiwan" as the marketing platform.

In 1998, professor Wang according to Tilly and Schafer's combination theory to investigated soundscape in Hsinchu . Tilly's theory included three components: Social actor, social container and social output also called Ecological Triangle. And Schafer's theory Soundscape Triangle included soundmark, signal and keynote. Then, I based on this research theory as my research model. Through this research model to understand voice and space landscape have close relationship.

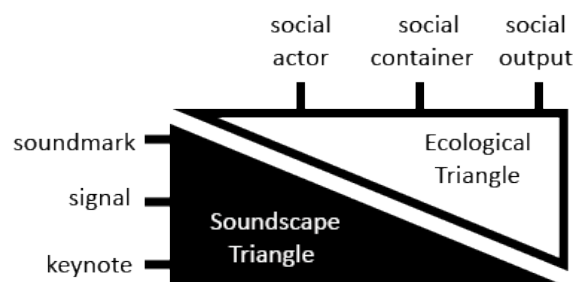


Figure 1: soundscape research model

### 2. Sound and City

Lynch (1960) points out that people perceive the city is not static, but it fragment and mixed many things. Therefore, people's senses operate simultaneously, the perception of the city called image of the city. In a long term, city design can pay more attention to type of space, functions, colors and more visual functions but ignore hearing experience. The city is one kind of time art, cannot regard as merely the city own existence the things, but should its understanding for the city which feels from residents (Lynch, 1960). Wang (2007) comparing Asian cities metro soundscape to discover MRT soundscape just not a combination include social actor, social container and social output. Adding to three components such as, soundmark, signal

and keynote also become city feature. According to above literature review we can understand city image not only can create city assets, but also have a good expression to residents. City image can create a good external and internal environment.

Kaohsiung Metro was a second MRT in Taiwan. In 2014, Kaohsiung Metro increasing commercial sounds for rents and through the alarm to promote an advertisement and the reminder effect. In 2015, the Kaohsiung Metro purpose a concept about “one station, one song”. This purpose will enhance Kaohsiung Metro’s local characteristics. Another MRT system located in Taipei. Taipei Metro was a first MRT in Taiwan. In 2015, Taipei Metro system start to carry out Taipei MRT soundscape Trilogy. Through this project make people have different listening experience and Taipei imagination.

Lee (2013) mentioned that when the visual landscape of modern city life impression monopoly, whether people should also look for a separate strung by the sound, through the man-made city landscape and natural landscape at the junction of spatial memory? Kevin Lynch (1960) thought if people can real recognize the location, they will reveal their feelings, such as, pleasant and kindness. It will enhance people agree to their location and make sure the quality. Therefore, we face the plan of city image should positively to add sound design. Through sound perceptions to rouse the people feelings about space, region and atmosphere to create city image of hearing.

### **3. Environmental sound and people’s relationship**

The relationship between person, sound and the environment, are complementary link with additional different values and cultural meaning in them. For example: Railway noise can be converted into sound with historical memory. If the city planner or government wants to raise quality of public space, then they have to through the sound to understand residents’ thinking (Ranjit, 2014). Even among the different regions, different use of space will have a different sound characteristics, and people will have different preferences in sound. Wei (2008) thought people had different emotions, basing on this points it will affect people’s feeling about environment reaction. Paul A. Bell described Environment consciousness including cognitive, emotional, interpretive and evaluative elements, these elements operate simultaneously in several forms feel. When we situated one location, the cognition process involving people what can we do in the location and visual, hearing and else images. Besides, we will compare to the past experience and this situation. It means cognition process also in the perception.

Hsiao, Fang (2013) proposed that people have a preference for the sound of water, wind chimes, birds and other natural soundscape, but they does not like the traffic soundscape. Tokyo's train melody in the past were used mechanical monotone sound, that sound made people feel melancholy and too long, people feel pressure and oppression. Hiroshi Tamaki Interpreted this monotonous mechanical sound as "suicide music." Therefore, during the city planning, the space may be increased a natural sound, with the sound of water and birds into city design, reduce the anxiety people feel.

#### 4. Brief summary

Sounds are always present in our lives, but we are always unconsciously choose to hear the sound, everyone knows when we close our eyes, it will begin receiving the attention to sounds we don't notice. In the city, traffic sound represent as the city sound. When we hear the traffic sound will easily think the city and base on people have different lifestyle, experience and emotions.

Lee (2013) the city traffic soundscape regard as a fast and slow song rhythms. It not just focus on flow about city space, traffic and people and it also want to attach and sparse to the city, they want to escape dependence contradictions complex. The present study aimed to investigate the soundscape conditions of the Taipei and Kaohsiung Metro Systems, where unique urban transportation compositions can be created by the sounds of travelling and transiting passengers.

#### Methods

This research according to soundscape theory is to explore Kaohsiung city and Taipei city Metro Systems in Taiwan, to understand Metro Systems social container, social actor and social output in the soundscape and derives two metro soundscape situation different and people's feeling.

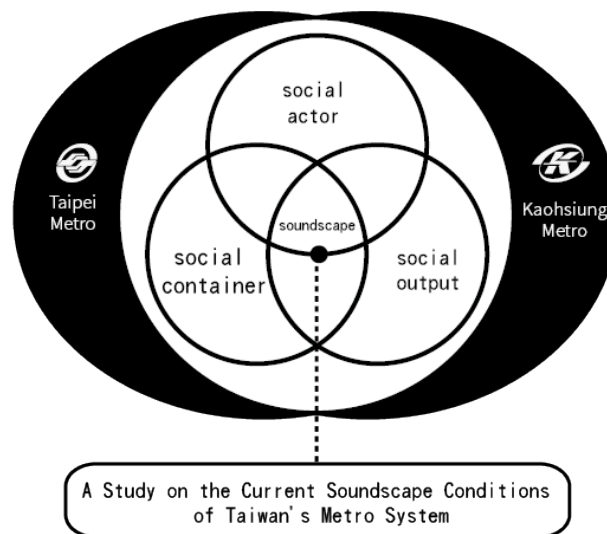


Figure 2: research model

#### 1. Research field and liniments

Using Taipei Metro and Kaohsiung Metro as the geographical scope of the study. Discussion collected through field study and investigate, and interviews with nearly half of the year to take metro over two time passengers, to export the Metro soundscape investigation report. Because the research Oriented is quite complex, in consideration of objective factors of manpower, material resources, through the following instructions to limit the scope of the research:

1.1 In this study, Kaohsiung Metro and Taipei Metro were as the spatial scope of this study. The other MRT is under construction and planning is not to explore the range. Both Kaohsiung Metro and Taipei Metro limits are the central transfer station platform interior and important intersection routes. Kaohsiung Metro will limit Gangshan South Station carriage traveling to Siaogang Station carriage, Daliao Station carriage travel to Sizihwan station carriage, and Formosa Boulevard Station platform. Taipei Metro will limit Xindian Station carriage traveling to Tamsui Station carriage, Dingpu Station carriage travel to Taipei Nangang Exhibition Center station carriage, and Taipei Main Station platform.

1.2 In this research we just analysis metro soundscape and investigate passengers feeling in Taiwan. Metro development related research, Metro noise, physiological reactions are not oriented within the scope of this study.

1.3 Past studies have shown that: the sample of students can basically be considered a parent sample mean, and the results of the assessment of a sample of students and the general public is considered consistent (Lee, 1998). Therefore, Preliminary respondents are limited to the student population and nearly half of the year to take the metro by the respondents.

## **2. Research steps**

According to the study background and purpose of this study to the status of field observation, collected sound through soundscape Analysis and Discussion dissimilarity between two MRT soundscape; then based on field observation and collected sound use to conduct interviews with the passenger about space and sound experience. Overall research is divided into three phases:

### **First step : Field study and investigate in Metro's soundscape.**

The main steps of Kaohsiung and Taipei MRT were the conduct of field observation and understanding of the current situation. We observed Taipei and Kaohsiung metro station's situation in the weekend. Using Shotgun Microphone to collect our data. In this research we used Listening walk to collect the sounds along the main transport lines and at the central hubs of the Taipei and Kaohsiung Metro Systems. This way allows us to re-activate hearing and enhance awareness making soundscape studies more easily overlooked or difficult to talk about the expression of the sound environment.

### **Second step : To investigate passenger's feeling about Metro station**

We will interview respondents using video and record to collect data. In this research we interviewed five respondents in order to understand residents' city space and sound image. In this process it will be recorded as a record.

### **Third step : Comprehensive Analysis and induction**

With application of 2 theories, Ecological Triangle and Soundscape Triangle to analyze our data. In addition to the Taipei Metro and Kaohsiung Metro sound analyze the current situation, this study will further analyze the Taipei Metro and Kaohsiung Metro soundscape different place and same place. Through this interview to analyze and find soundscape developing and situation in Taiwan Metro systems.

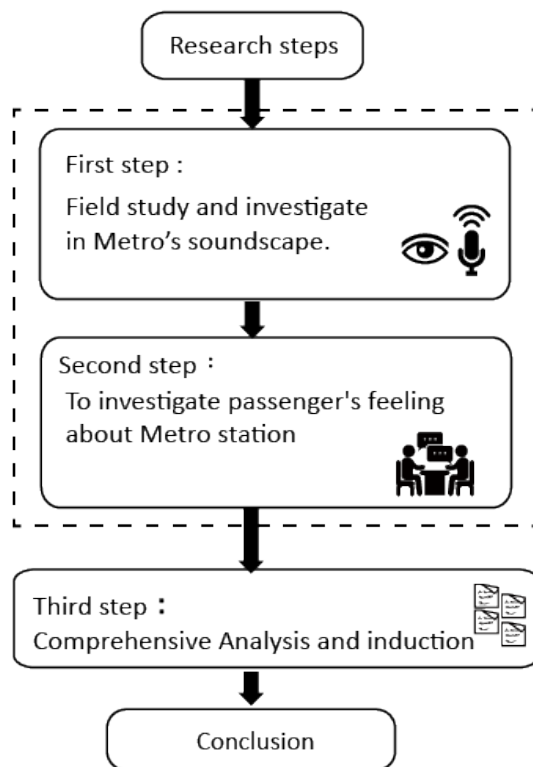


Figure 3: research model

## Major findings

### 1. Field observation

This study contains a viewing angle of the platform and carriage traveling passenger, space and sound feeling. The range can be divided into inner Kaohsiung and Taipei Metro central transfer station platform and carriages. After entering Taipei and Kaohsiung Metro space, observation and records sound, results of the analysis are as follows:

Kaohsiung Metro observe time on a weekend morning and afternoon, leading to fewer passengers in the carriage exceptionally quiet inside, closer to the terminal station, passengers were fewer in carriage making the train operating sound had become increasingly evident, in the afternoon to evening, passengers increased in the number of many making crowded and noisy in carriage. In addition, the train were moving Formosa Boulevard station carriage to Gangshan South station carriage, Zuoying (THSR) station will gradually influx of passengers, carrying large pieces of luggage on this station. Ciaotou Sugar Refinery Station is a tourist attraction, so get off more on tourists. Formosa Boulevard Station of the platform had fewer passengers in broad daylight, so they could hear the distinct sound of the broadcast, into the afternoon, because the station had more passengers, the train melody and broadcast sound becomes relatively inconspicuous. This study is based on analyze the Kaohsiung Metro observations by Ecological Triangle.

Observed Taipei Metro was weekend in the morning and at noon, the carriage was slightly and crowded in the morning until noon, close to the terminal station was only slightly reduce the number of passenger. Afternoon to evening the number of passengers were more crowded, that could not use visual to determine passenger's age range, increasing the number of chat sound led to increase gradually to cover up the broadcast sound. Taipei metro platforms are all busy in each period, a considerable number of passengers in the platform, the number jumped significantly in the afternoon to the evening, the platform is relatively very noisy, but the train melody and broadcast the sound becomes obvious with respect to carriage. This study is based on analyze the Taipei Metro observations by Ecological Triangle.

Comprehensive comparison: Passengers in both side are with less facial expression, and focus on personal activities. Their move relies on train melody which shows the sound is effective. The difference between to the Taipei Metro platform and Kaohsiung Metro platform, the Taipei Metro platform had more and talk louder passengers. Observing the space segment of platform, Taipei Main Station of Taipei Metro was large and complex, but feeling of space had a lot of passenger making more crowded and oppression. Formosa Boulevard platform of Kaohsiung Metro in contrast, although the space is small, but people feel more relaxed. Because there had less passenger than Taipei Main Station of Taipei Metro.

Observing the carriage of the Kaohsiung Metro passengers, in addition to the tourist have more obvious conversation, movement and facial expressions, most other identity must be local residents, using a cell phone, or watching marquees, or slight conversation with a friend, without too much reaction for what was happening around. In Taipei MRT carriages, mostly passenger as same as Kaohsiung passenger mostly use the phone, face to every corner, or watching marquees, but many the number of people and thus become noisy chatter.

## **2. Field Sound collection**

The study was actually collecting sounds on passenger's sound and space's sound in the Taipei and Kaohsiung Metro platform and carriages, the sound data were analyzed as follows:

In Kaohsiung Metro, soundscape of Formosa Boulevard Station were mostly tourists discussing sound, with air-conditioning operation sound and television advertising sound. In addition, the train melody of platform rent to advertising company, can not only advertise but also has prompt function. And the train melody of Formosa Boulevard Station had a strong Taiwanese folk song style. In the process of moving metro, carriage can be record to the train melody from various stations, metro operation have obvious sound in carriages, which is a unique metro soundscape. In which, Ciaotou Sugar Refinery station's soundscape had many sound of children and parents, and the Kaohsiung International Airport station had luggage dragging sound. From the beginning of the afternoon, because the passenger were increasing to let the platform and carriage have increased sound, so the platform and carriages had full of man-made sounds.



Because of using a large amount of Taipei Metro, therefore, air-conditioning operation sound and functioning of the carriage sound more susceptible to human conversation coverage. Taipei Main Station platforms of Taipei Metro played elegant music as train melody who composed by Summer Lei called "Travel". In addition, the platform has a lot of busy footsteps and waiting of people chatter sound, and the most obvious was closing warning sound. Which you can several special sound to record in the carriage, for example, it is closed warning sound. Additionally, the transfer station and Terminal station reminder melody is "The Wind Rises" which composed by Ken Chou. Although the platform and the carriage in the morning to noon has rendered many people status, and in the afternoon due to full passenger, the carriage and the platform presents sounds were complicated in all the time, many kinds of man-made sound, the carriage due to passenger voice prompts to result broadcast was not obvious.

The above observation and comparison: The study found that the Kaohsiung MRT morning hours on weekends, platform or the carriage were slightly quiet; will continue into the afternoon to especially in the evening time had a large number of people sound. Therefore, the record of soundscape, the space environment overall sound mainly in the morning; in afternoon, passenger sound were getting loud. The soundscape of Taipei metro recorded, In the weekend morning, the carriage sound and the platform sound were rendered many people crowded, in the afternoon after, passenger's sound filled out. And therefore, closing to the terminal station only to record with the overall mechanical environment sound in the morning, and each time can easily to record people action sound.

In addition, the warning sound of the door switch in each of the two cities are not the same, the Taipei Metro warning sound are loud and urgent, Kaohsiung MRT closed warning sound volume will be smaller and not urgent. Two cities metro's train melody has be varied, for example: the Formosa Boulevard of Kaohsiung Metro used Taiwan Folk music style for train melody, the purpose was promoted the cultural characteristics of the music, while the platforms of Taipei metro was a elegant piano genre of music for train melody, will desired object art into people's lives. So, the Taiwan's Metro soundscape presented their different style.

### **3. Passenger's imagery and interview to Metro soundscape**

In this study, respondents were five people, were all groups of students, one man in Taipei, one man in Kaohsiung, others of three respondents lived outside the county, taking over Taipei and Kaohsiung metro within six months, the frequency of use are once or twice in a month. In addition to the two respondents were residents, another respondents were traveler to visit the two cities. After the interview as the transcript and analyzed, results are as follows:

In part of Kaohsiung Metro, all the respondents have obvious reaction in Formosa Boulevard station of the platform train melody, but three of respondents feel abrupt that the sound is not suitable as an train melody function. Respondents had no consistent response to the sound impression of the carriage inside, only talking sound, the trains running sound, air condition sound had particularly impressed. Respondents had the overall impression of platform space, Respondents feel the Formosa Boulevard station had many people and spacious. They had impression with spacious

and fewer people in carriages space, feeling lonely and tight.

Respondents said that have obvious reaction in Taipei Main Station of the platform train melody, they feel the train melody is soft and relaxing, and they remembered the space of the platform were having many passengers were crowded and noisy at platform. In carriage, they have obvious reaction to warning Sound in carriage, feeling warning sound of door closing is uncomfortable, rush, and interrupting. The carriage are too crowded and even asphyxia, but respondent E as Taipei resident felt not lonely due to crowded people.

Respondents impressed overall impression of the two cities metro: Taipei Metro was obviously considered crowded, noisy and even indifferent impression. And Kaohsiung Metro was most of impression that relatively spacious and fewer people. The interview can be understood by the sound impression, even though most respondents were completely unable to hum the melody, but their impression of sound have stayed in the train melody.

By the above comparison, whether MRT are fewer people, or silence, crowded, can cause users to feel tight. The Train melody in Kaohsiung Metro is quite conflict due to too joyous but complicated. The Train melody in Taipei Metro is melodic and relaxing but duration is too long. As for the result, we can know that Metro sounds affect to passengers' perception.

## **Conclusion**

This study was aimed to explore the soundscape of Taiwan Metro development status and passenger feeling preliminary analysis. By study found: Kaohsiung MRT presented as open space impression and space platform train melody prompted the most vulnerable to auditory attention, and observed classification classified as belonging to the signal of the Soundscape Triangle. Although the aim is to create train melody prompted local specialties. However, most respondents aren't agree and comment it's not easy to recognize as train reminder. Taipei Metro partial rendering space crowded, many people the impression that there are feelings of oppression. Train melody in Taipei Metro is most attractive and release negative emotion. However, the melody is too long and become more like background music which loss it's functionality. This train melody observed classification classified as belonging to the signal of the Soundscape Triangle.

Both cities focus on enhancing travel experience by using sound. No matter the purpose is to build up local feature or promote of the arts, train melody need to be reviewed the real functionality. Sound design need to consider the thinking of both passengers and designers. Otherwise relegated to few people and sound designer insist. Cities are a dimensional container with power and complication. With a good strategy, people will be more accomplishment. If the sound design take into account the views and feelings of both the designer and the passengers, will be able to achieve the feature and aesthetic feeling can cultivate between both. We need to check which is the reason between the city created a pressing Soundscape, or the soundscape created a pressing city. The soundscape of the city Metro can be developed and research in the future.

## References

- Chin-Shou Wang. (2001). *Imagine Environmental Sociology*. Taipei: liwen.
- Chin-Shou Wang. (2001). Soundscape of urban expression: Tale of environmental sociology imagination. *National Taiwan University of Building and Planning Research. Article*, 10, 89-98.
- Djellali D., Chadli M., & Semidor C. (2014). Soundscapes of Old Centers in a Sustainable Development Perspective. *Case of the" Rue de la Lyre*. *Advances in Applied Acoustics*, 3, 15-24.
- GE Jian., & ZHAO Xiu-main. (2004). Explication and design of soundscape in urban landscape. *Journal of Zhejiang University (Engineering Science)*, 38, 994-999.
- Hiroki Tamaki. (1998). *Developing countries Japan of sound - advice of just intonation*. Tokyo: Creative publishing.
- Jen-Feng Hsiao., & Chih-Fang Fang. (2013). The Physiological and Psychological Reactions of Natural Soundscape and Traffic Noise. *National Chin-Yi University of Technology (GTEA)*, 5, 450-455.
- Lynch K. (1960). *The image of the city (Vol. 11)*. UAS: MIT press.
- Ranjit K. (1999). *Research Methodology: A Step-by-Step Guide for Beginners*. London: SAGE.
- Schafer, R. M. (1977). *The soundscape: Our Sonic Environment and the Turning of the world*, Vermont: Destiny Books.
- Tilly C. (1974). *An urban world*. USA: Little, Brown.
- Wei Zhi Fen. (1995). *Environmental Psychology*. Taipei: Wu-Nan.
- Zhi ming Lee. (1996). *The sound of city and memory*. Taipei: Linking.
- Yang Qing tian. (1996). *Introduction to the principles of shape*. Taipei: Yi Fong Tang.

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