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Comparison Study of Spatial Configuration between Korean and Western Plazas

A case study of Seoul Plaza and Trafalgar Square (UK)

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ABSTRACT

Open space is one of the most important elements of a city and provides social and recreational areas for its citizens. Well-designed plazas or squares represent a city's identity and reflect its culture. The urban development policies of Korea have acknowledged the importance of plazas and squares, and the Korean government has tried to build urban plazas. However, although they have focused on the quantitative growth of plazas, such efforts have largely overlooked plaza quality. Traditionally, in Korea, boulevards or junctions functioned as plazas, while Western plazas especially ancient Greek and Roman plazas were surrounded by buildings. As Korean and Western plazas have had different development histories, this paper compares their spatial configurations through space syntax methods. This study selects Seoul Plaza, one of the representative plazas in Korea, as a case study and compares it with Trafalgar Square (UK), which shares similar properties with Seoul Plaza and are representative plaza which applied space syntax theory. The visibility graph analysis (VGA) indicates that Seoul Plaza and Trafalgar Square have different syntactic values. The connectivity of Korean plazas shows high values on the outsides of plazas because these plazas are more open to adjacent roads, whereas Western plazas are enclosed by the surrounding buildings. Studying the spatial properties of urban plazas could help urban researchers understand the functions and aesthetics of such spaces. Understanding the visual experiences of plazas could enable the design and construction of more vibrant plazas. If we consider the spatial configuration of plazas and recognize both enclosed and open designs, we can develop specialized plans for plazas.

KEYWORDS

Plaza, Square, Spatial Configuration, Space Syntax, Visibility Graph Analysis

1 INTRODUCTION

Open space is one of the most important elements of a city and provides social and recreational areas for its citizens. Well-designed plazas or squares represent a city's identity and reflect its culture (Bendjedidi et al. 2019). The urban development policies of Korea have acknowledged the importance of plazas and squares, and the Korean government has tried to build urban plazas. However, although they have focused on the quantitative growth of plazas, such efforts have largely overlooked plaza quality (Kim and Kwon 2017). Modern Korean urban development policy regarding plazas regulates land uses, accessibility, and traffic but does not concern size, shape, location, orientation, or function and aesthetics (Kim and Kwon 2017). As urbanization has matured, the aesthetics and function of Korean plazas are receiving increasing attention from Korean citizens.

Traditionally, in Korea, boulevards or junctions functioned as plazas, whereas Western plazas especially ancient Greek and Roman plazas are surrounded by buildings (Moughtin 2003). Korean and Western plazas have had different development histories, i.e., Korean plazas have traditionally been configured as wide roads, whereas Western plazas have been configured as enclosed spaces. This paper compares the spatial configuration of Korean and Western plazas through space syntax methods. Seoul Plaza, one of the representative plazas in Korea, is selected as a case study and is compared with Trafalgar Square that shares similar properties with Seoul Plaza and are representative plaza which applied space syntax theory. Space syntax theory views urban morphology as a system and numerically describes space (Baran et al. 2008). Observers' visual experiences are measured by space syntax theory, and spatial configurations render social patterns (Hillier and Hanson 1989). Using space syntax methods, this study focuses on visual plaza configurations. The objective of this study is to examine differences between Korean and Western plazas through space syntax techniques.

The remainder of this paper is organized as follows. Section 2 reviews studies on open spaces, Western plazas, and comparison studies of Korean and Western plazas. Section 3 presents case study areas and selected measurements and methods. Section 4 describes the results of visibility graph analysis (VGA). The last section discusses and summarizes our research.

2 LITERATURE REVIEW

Research on squares or plazas is relatively limited compared to studies on open space or public open space. Many scholars have studied open space for its importance as a place where people meet one another (Lynch 1964, Sitte 1965, Gehl 1987). For example, Lynch (1964) discussed the visual characteristics of open spaces. Sitte (1965) examined ideal plaza shapes by comparing medieval European plazas. Gehl (1987) focused on people's movements in public space. Abbasi et al. (2016) applied VGA, particularly integration, to link people's movements in space. They

compared the actual observation and behavior of citizens through integration and concluded that a low integration level is related to low usage of open space.

For Western plazas, Sitte (1965) insisted that urban plazas should provide an unbroken physical enclosure (Sternberg 2000). Sitte's point of view is opposite to that of modern plazas, which are crossed by avenues. Moughtin's (2003) enclosed square is similar to Sitte's (1965) plaza. Moughtin pointed out that although Times Square in New York is called a square, its primary function is to promote the efficient movement of city traffic. He argued that higher traffic in plazas blocks the sense of enclosure, making such spaces hardly justified as urban plazas. Stanley et al. (2012) analyzed open space typology in urban history. They defined plazas as open spaces that were intentionally mostly surrounded by buildings. They noted that large, city-level plazas share distinctive characteristics such as centralized location, large size, being surrounded by landmarks, and political and symbolic meaning.

Few studies have focused on the difference between Korean and Western plazas. One example is the study by Kim (2009), who differentiated the historical concept of open space by comparing Eastern and Western plazas. They concluded that Western plazas were focal points surrounded by buildings and that Eastern plazas were street junctions. Choi et al. (2014) also explained that Korean plazas, unlike traditional European plazas, are located at road crossings and could be classified as corridor-shaped. Such structure is related to traditional urban forms, in which streets function as market or festival sites. Kim and Kwon (2017) compared Korean and Italian plazas through the space syntax approach and calculated the largest isovist area and average isovist area values for plaza entrances. They found that Italian plazas were closer to buildings, whereas Korean plazas opened onto roads.

Previous studies have largely focused on Western plazas and have not numerically measured plaza shape. Some research has used the space syntax method to describe plazas mathematically; however, they used isovist analysis, which has limitations, to describe the whole space. This research uses VGA to reflect the whole space and compares Korean and Western plazas.

3 DATASETS AND METHODS

3.1 Case Study

This study selects Seoul Plaza as a case study and compares it with Trafalgar Square (UK), which shares similar properties. Both squares have similar shapes and sizes (13,207 m^2 and 12,000 m^2, respectively) and are situated in front of a landmark building: Seoul City Hall in the case of Seoul Plaza, and the National Gallery in the case of Trafalgar Square. Seoul Plaza, a representative Korean plaza located in the city center, was a key traffic center of Seoul. Koreans gathered in the plaza when national events occurred. As Seoul Plaza was acknowledged as a space for social and recreational functions, the Seoul metropolitan government changed its

traffic-bearing roads into plazas in 2004. Note that Trafalgar Square is surrounded by buildings, whereas Seoul Plaza has 12-lane roads crossing Seoul Plaza near Deoksu Palace (Figure 1).

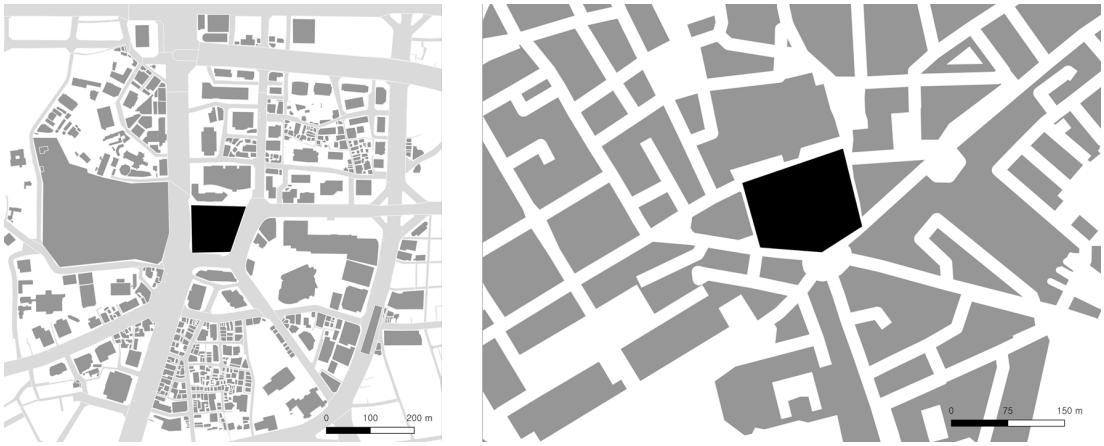

Figure 1: Sections of Seoul plaza and Trafalgar square

3.2 Visibility Graph Analysis

VGA, developed by Turner et al. (2001), was used in this analysis. VGA has the power to investigate space as a whole rather than as single isovists. To analyze the spatial structure of the plazas, we selected 4 measures: connectivity, visual integration, through vision, and angular mean depth. The first measure, connectivity, evaluates the number of direct connections to other spaces (Lee et al. 2017) and could be considered as an approximation of the isovist. The second measure, visual integration, states the visual connections within the space in the number of steps (Varoudis and Penn 2015). The third, through vision, calculates the number of lines of visibility that pass through a location (Turner 2001, Koutsolampros et al. 2019). The last measure, angular mean depth, is the average amount of angular change required to reach every other cell in the system (Koutsolampros et al. 2019). We used depthmapX 0.8 software to perform VGA.
All syntactic measurements were generated by using a 5 m grid. We obtained each area's spatial structure from the Road Name Address (https://www.juso.go.kr/) and London datastore (https://data.london.gov.uk) websites. We removed underground polygons such as subway stations and underground shopping malls and added missing building shapes; for example, Deoksu Palace in Seoul is blocked by fences. We exclude physical obstacles of plazas such as fences and monuments which could influence the sense of the plaza since we want to analyse configurations of surrounding roads and buildings, not visibilities of plazas itself. Then, we extracted buildings within a 200-meter radius buffer from the shape of each plaza.

4 RESULTS

Figures 2 and 3 show the visibility graphs for each plaza, which are colored red to dark blue to represent, respectively, "very high" to "very low" visibility. The far-left image is the base image of each plaza for VGA. The figures indicate, from left to right, connectivity, visual integration, through vision, and angular mean depth.

Figure 2 shows the visibility of Seoul Plaza. Connectivity and visual integration values show a similar pattern, with both measurement values being high near the plaza. Nonetheless, the red color, indicating a “very high” value, is not concentrated on the plaza but is instead located directly in front of Deoksugung Palace. Compared to connectivity and visual integration, vision peaks were observed at the center of the plaza and the left side road. Finally, the angular mean depth values are low in the plaza and surrounding areas. In contrast, as shown in Figure 3, connectivity and visual integration values peaked at the entrance of Trafalgar Square, and overall values on this plaza were consistently high. Through-vision values are concentrated on the square itself and peak at its entrance. Angular mean depth values are low within the square and increase outside it.

Overall, as shown in Table 1, connectivity and visual integration are focused on the outside of Seoul Plaza and focused on the entrance to Trafalgar Square. In contrast, vision shows high values in the left street and center of Seoul Plaza. In Trafalgar Square, however, the highest vision value is located at the entrance. For the angular mean depth, Seoul Plaza has wide coverage of low values, while Trafalgar Square has a low value within the plaza.

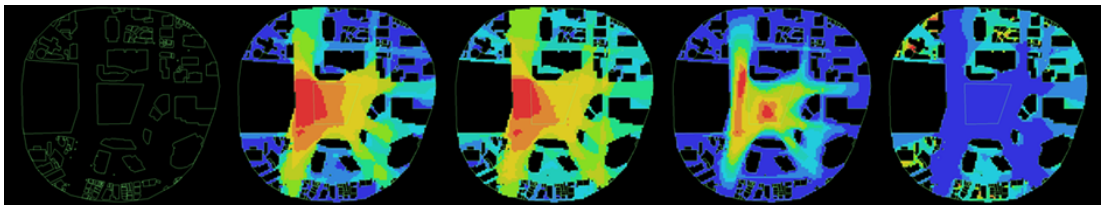

Figure 2: Seoul Plaza - left to right: base image, connectivity, visual integration, through vision, and angular mean depth

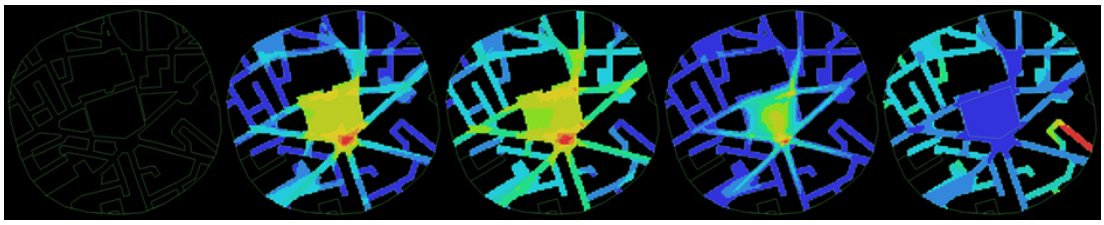

Figure 3: Trafalgar Square - left to right: base image, connectivity, visual integration, through vision, and angular mean depth

Table 1: Mean values of 4 measurements

Location		Connectivity	Visual Integration (HH)	Through Vision	Angular Mean Depth
Seoul Plaza	inside of plaza	2430.10	13.98	88223.52	0.36
	outside of plaza	1120.78	10.13	25891.07	0.63
Trafalgar Square	inside of plaza	1096.09	8.30	23442.46	0.61
	outside of plaza	348.75	5.50	4587.62	1.18

5 DISCUSSIONS AND CONCLUSIONS

This paper compares Korean and Western plazas. The results show that Seoul Plaza and Trafalgar Square have different spatial configurations. Compared to Trafalgar Square, Seoul Plaza shows high connectivity values on the outside of the plaza and high through-vision values on the inside. One reason for this difference could be that Seoul Plaza is open to wide roads, whereas Trafalgar Square is enclosed by the surrounding buildings. This structure is related to the history of the areas; Seoul Plaza was originally a traffic center, whereas Trafalgar Square was designed as a city square.

Well-designed plazas are places for social and recreational activities and form part of a city's identity. To compare Korean and Western plazas, this study conducted spatial configurational studies of the Korean and Western plazas. VGA indicated that Seoul Plaza and Trafalgar Square have different syntactic values. The connectivity of Seoul Plaza showed high values outside of the plaza because it is more open to adjacent roads, whereas Trafalgar Square is enclosed by the surrounding buildings.

In future work, more case studies and comparisons between traditional European plazas and modern plazas should be addressed. Medieval European plazas are enclosed, whereas modern plazas tend to be established at intersections of avenues. Additionally, studying space syntax of modern Korean plazas will deepen understanding of different spatial configuration of plazas and help building better plazas. It should be noted that a more accurate method to analyze open space is needed because open space is connected to buildings, not other open spaces. City-scale spatial analysis is also needed as plaza location could affect observer experience. For example, accessibility to plazas at the city scale may differ.

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