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A COMPARATIVE ANALYSIS OF URBAN ARCADES IN "ISTIKLAL STREET" ISTANBUL AND AN EVALUATION OF THEIR POTENTIALS OF USE

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Abstract

The study of urban form, referred to urban morphology, can be characterized by a number of different perspectives. This paper tries to introduce the term "urban arcade" as a highly distinctive and specific architectural form that shapes the urban environment. Although urban arcades in Istanbul used to be designed with the prevision of connecting the main street to the secondary ones, today, some of their entrances are blocked for private use, and lost their functional attractiveness. In order to explore the sustainable parameters of the urban preferences in the main historical street of Istanbul, "Istiklal Street", the urban arcades will be examined.

Urban passages are defined as "covered arcades" that mostly serve as shopping facilities. Besides they have many characteristic architectural forms, their main function is connecting two or more streets and squares to each other, and affect the urban morphology by playing significant role in urban spatial structure. With their distinctive forms, and underlined characteristics, urban arcades stand between architectural scale and urban scale.

The study, which is presented in this paper, tries to answer the questions below;

- *Does a correlation exist between the locations of the passages and their continuity in use?*
- *Does the syntactic pattern of the street orient the urban passages and their preferences?*

"Istiklal Street" is selected for the case study, which is the longest pedestrian shopping district in Istanbul. Since 1850s, Istiklal Street has become one of the most preferential local point, and today, is being visited by two million people a day for both shopping and leisure activities. The street is connecting "Taksim Square" and the old district, which is called "Galata". Within the case study, primarily the Istiklal Street will be structurally analyzed by considering the urban blocks, streets and urban arcades; secondly 8 urban arcades, which are located in the Istiklal Street, will be analyzed due to their locations in the Istiklal Street, architectural configurations, functions (entertainment, retail, food and beverage, service) and pedestrian frequencies. Although some of the existing urban arcades have been blocked and lost their function of connection in time, this study will try to understand if urban form of the Istiklal Street and configuration of the arcades' relationship has a role on this situation.

In this research, observation and data collection related with the pedestrians' preferences in the urban arcades will be comparatively studied with syntactic values of the arcades. "University of Michigan" licenced "Syntax 2D" will be used in order to make the analysis.

In conclusion, the study will try to examine how the distribution and location of urban arcades affect their potential of use, which exist in the most well-known and visited historical shopping district of Istanbul. This research aims to make a comparison of 8 urban arcades' configurations and their relationship with the main street by using syntactical analyses.

Keywords: *Pedestrian movement (natural movement, to movement, through movement), attractors (mode), configuration*
Theme: *Urban Space and Social, Economic and Cultural Phenomena*

Introduction

The study of urban form, referred to as urban morphology, can be characterized from many different perspectives. This paper attempts to introduce the term “urban passage” as a highly distinctive and specific architectural form that shapes the urban environment. Although urban passages in Istanbul used to be designed with the prevision of connecting the main street to the secondary ones, today, some of their entrances are blocked for private use and have lost their functional attractiveness. To explore the sustainable parameters of the urban preferences in the main historical street of Istanbul, “Istiklal Street”, the urban passages will be examined.

Urban passages are defined as “covered arcades” that mostly serve as shopping facilities. In addition to having many characteristic architectural forms, the main function of these passages is to connect two or more streets and squares to each other. In other words, urban passages grew from the natural movement in cities by orienting pedestrians and affect the urban morphology by playing a significant role in the urban spatial structure. With their distinctive forms and characteristics, urban passages lie between the architectural scale and the urban scale.

The study presented in this paper attempts to answer these questions:

- Does a correlation exist between the locations of the passages and their continuity in use?
- Does the syntactic pattern of the street orient the urban passages and their preferences?

Trade and social interfaces

Shopping is considered to be a social activity, and the choices made by the shopper and the shop to be visited or for both parties to be located in a particular area both constitute an ‘interface of exchange’ (Sarma, 2007). Trading is one of the most primitive of all social interfaces. Penn (2005) argues that trading consists of three main aspects: the distribution of goods, the network properties of space that distribute shoppers, and the cognitive aspects of space that allow people to coordinate their search for goods.

Trading appears to be simple; however, it raises in elementary form many of the constituent elements of social interfaces that appear in other more elaborate social forms. A study of trading can therefore help us to understand a wider range of organizations and building types. Trading is also pervasive by affecting urban form and land use patterning as well as building interiors and appears in one form or another in every society and in every period of history. Trading offers an immediate link between the social and economic aspects of society because the placement of comparative values upon goods is in itself an indicator of their social significance. In this respect, a study of the effects of architecture on trading is of direct relevance to our more general understanding of the linkages between social, spatial, and economic structures in society (Penn, 2005).

Retail Pattern and Pedestrian Movement

As Hillier (2005) mentioned, buildings and cities exist for us in two ways: as the physical forms that we build and see and as the spaces that we use and move through. In a situation where movement, configuration, and attraction were all in agreement, powerful logical reasons would exist for preferring configuration as the primary ‘cause’ of movement. Logically, the presence attractors can affect the presence of people; however, these attractors cannot affect the fixed configurational parameters that describe the spatial location. Similarly, configuration may affect movement; however, configurational parameters cannot be affected by movement, Figure 1,

(Hillier et al., 1993). Layout differences have effects on movement independent from the attractors.

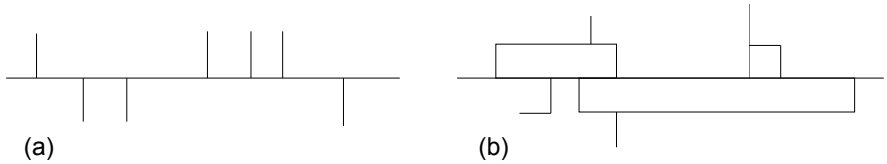

Figure 1: (a) The more central segments of the 'main street' are likely to be the most used, and the peripheral segments are likely to be the least used. (b) The two most central vertical elements, one above and one below the 'main street', would be on more of the shortest routes than the more peripheral vertical elements. (Hillier, et. all., 1993)

As Hillier (1993) illustrated in Figure 2, attractors and movement may affect each other; however, the other two relations are asymmetric. Configuration may affect the location of attractors, but the location of attractors cannot affect configuration. Likewise, configuration may affect movement, but movement cannot affect configuration. If strong correlations are observed between movement and both configuration and attractors, the only logically possible lines of influence are from configuration to both movement and attractors, with the latter two influencing each other.

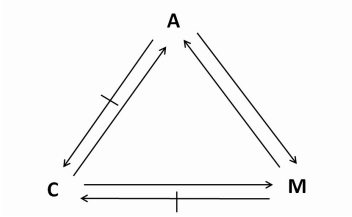

Figure 2: Attraction, configuration and movement (Hillier, et. all., 1993)

We can understand better how cities work if we draw a distinction between movement 'to' and 'from' spaces and movement 'through' spaces. Movement 'to' or 'from' spaces is primarily a function of land use, while movement 'through' spaces is primarily a function of configuration. More importantly, urban configuration creates an interface between those two types of movement. Thus, these two types of movement can be evenly balanced in some spaces and unevenly emphasized in others. Liveness, however, appears to require that both components be present and support one another. (Peponis, Ross, Rashidi, 1997)

The actual patterns of agglomeration and differentiation of retail functions that we observe in urban property use patterns appear to be strongly related to both the geometry and network topology of the urban street system. Two theories have sought to account for this phenomenon from a space syntax perspective. The first theory is the theory of natural movement (Hillier et al., 1993), which proposes that the configuration of the street grid accounts for a substantial proportion of pedestrian movement in urban areas. Retail land use is demonstrated to affect movement patterns by acting as a multiplier, transforming a linear relation between spatial integration and pedestrian flows in mono-functional residential areas into an exponential relation in mixed-use areas. The thesis is that the primary factor is urban spatial configuration, which then causes a pattern of space use that makes certain locations more attractive than others for retail. Retail occupies these locations preferentially and then becomes an attractor of new trips in its own right. The result is a multiplier in which configurationally strategic through routes become dominant retail aggregations. The result is an emergent correlation between land use, pedestrian movement and configuration that demonstrates immense stability over

time. The second theory is the theory of the movement economy (Hillier & Penn, 1992; Hillier, 1996; 1997), which proposes that as a by-product of every trip between an origin and a destination, one passes opportunities for interaction and transaction in spaces along the way. We propose that this phenomenon allows for multi-purpose trips and is the link between urban spatial configuration and movement flows that provides logic for the disposition of land uses. An additional phenomenon exists, however, which is recognizable in many different city forms and cultures. This phenomenon involves how land use patterns remain roughly similar as one travels along a street but change radically as one turns a corner.

The history of Beyoglu Arcades

"Istiklal Street", which is the longest pedestrian shopping district in Istanbul, was selected for the case study. The site also has considerable value due to its historical and economical background. Since the 1850s, Istiklal Street has become one of the most popular locales, being visited by two million people a day for both shopping and leisure activities. The street is fifteen meters wide and two kilometers long, connecting "Taksim Square" and the old district called "Galata". Within the case study, primarily Istiklal Street will be structurally analyzed by considering the urban blocks, streets and urban passages; 8 urban passages that are located in Istiklal Street will also be analyzed due to their locations and architectural configurations. Regrettably, some of the existing urban passages have been blocked and have lost their function of connection.

Figure 3: Gates connecting arcades to Istiklal Street

Described as the most important architectural form of the 19th century by Benjamin (1999), arcades provide important clues about the modern urban public life. As the public spaces on private or public property, arcades offer different spatial and social possibilities and are the areas for interaction and economic activity, which create their own rituals.

Beyoğlu, the 19th century central district of Istanbul, is an area of conglomerations of arcades that is undergoing both regeneration and renovation processes by both market and government interventions. Beyoğlu (older name: Pera) was the western face of Istanbul, where the

modernization process of Istanbul began in the 19th century. With all its European style consumption, foreign embassies, rich mansions, and non-Turkish population, Pera was the cosmopolitan district of Istanbul. In particular, the influence of French culture on the Ottoman Empire affected the life style and urban structure. Therefore, during the 19th century, various types of arcades were built on the Grand Rue de Pera (today Istiklal Street), which was the main commercial street of the non-Turkish population (Ozkan, 2008). Today, some of these arcades no longer make use of their connective characteristic by closing some of their gates or have completely lost their main functions.

Method

Comparison of the urban arcades in Beyoğlu, Istanbul raises many questions in terms of spatial configuration, social network and functional in addition to syntactic parameters such as the mean depth, integration or circularity. All of the arcades have connections to Istiklal Street, and their positions in relation to the main street are illustrated in Figure 4.

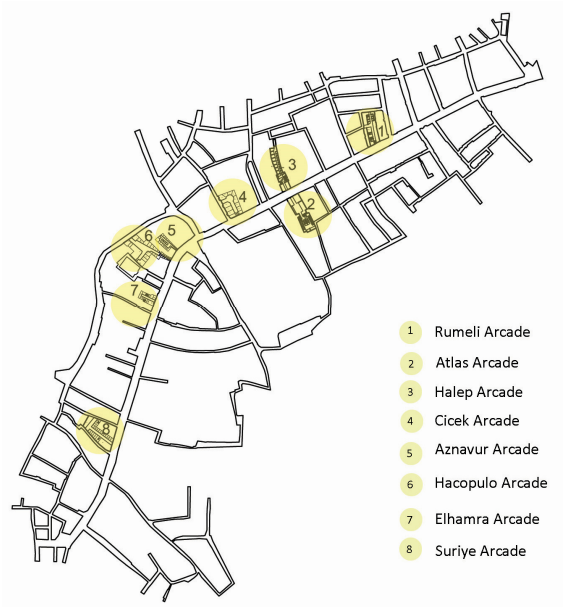

Figure 4: The pattern of the arcades on Istiklal Street

The similarities and differences of the plan layouts present the types and elements of the spatial configuration. The paths pedestrians take through this are vary greatly according to the individual. Therefore, the relation to typology, horizontal, or vertical expansions, existence of nodes, clusters, and such structural interconnections and plan typologies are among the concerns of the research.

In terms of the syntactic aspect of the research, a comparison of spatial configurations based on parameters such as mean depth and integration levels helps us to further examine the physical structure of the arcades. The depth or shallowness of spaces may be related to the determinants of pedestrian choices. As the spatial configuration presents dead ends, midloops, T/L/shaped connections, or straight connections, the depth or shallowness of spaces gain importance especially for pedestrians. Figure 5 presents the arcade accessibility graphs and open/blocked entrances of the arcades. The permissiveness, connectivity, and circularity parameters cause human activities to flow in spaces or to flow as shopping activities or they seem to be blockaded by spatial elements. Visual boundaries may affect pedestrian perception

and shopping behaviors.

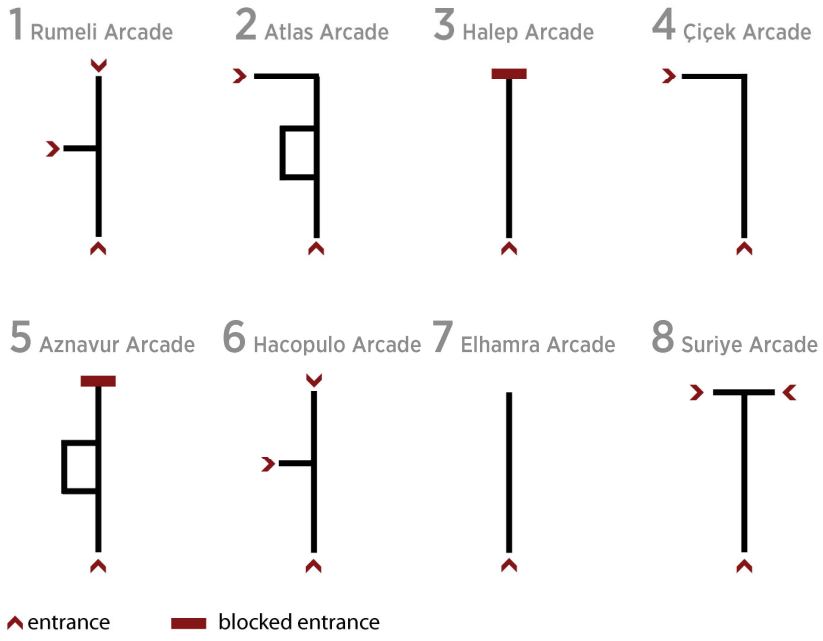

Figure 5: Arcade accessibility graphs illustrating open and blocked entrances

To be able to explore the hypothesis based on this research, two methods have been used within the case study. The first method involves observation and the collection of data related to the pedestrians' preferences for urban passages. The second method involves transforming the pattern to syntactic data with the help of the program named "Syntax 2D", licensed by the University of Michigan. Consequently, the collected data will be matched and evaluated using statistical analyses.

The observations were performed during the same day on the weekend synchronically in seven arcades of Beyoglu for ten minutes. The weekend was selected because even though Beyoglu is used throughout the week by tourists and locals, the weekend corresponds to the highest rates of movement in the week. The study was performed in the eight arcades shown in figure 3, which sustain their functions and are configurationally defined by the direct connection with İstiklal Street:

1. Rumeli Pasajı (1894)	2. Atlas Pasajı (1877)	3. Halep Pasajı (1885)	4. Çiçek Pasajı (1876)
5. Aznavur Pasajı (1883)	6. Hacopula Pasajı (1871)	7. El-Hamra Pasajı (early 20th)	8. Suriye Pasajı (1904)

There are two types of methods that are applied for the arcades in this study:

1- Analog methods:

- Gate count: Recording the frequency of the nodes (including gates) in each arcade for 10 minutes synchronically.
- Detailed data: Mapping the function of the cells in each arcade.

2- Syntactic Analysis:

- Visual space analysis including integration, circularity, mean depth, isovist area and isovist perimeter analysis.

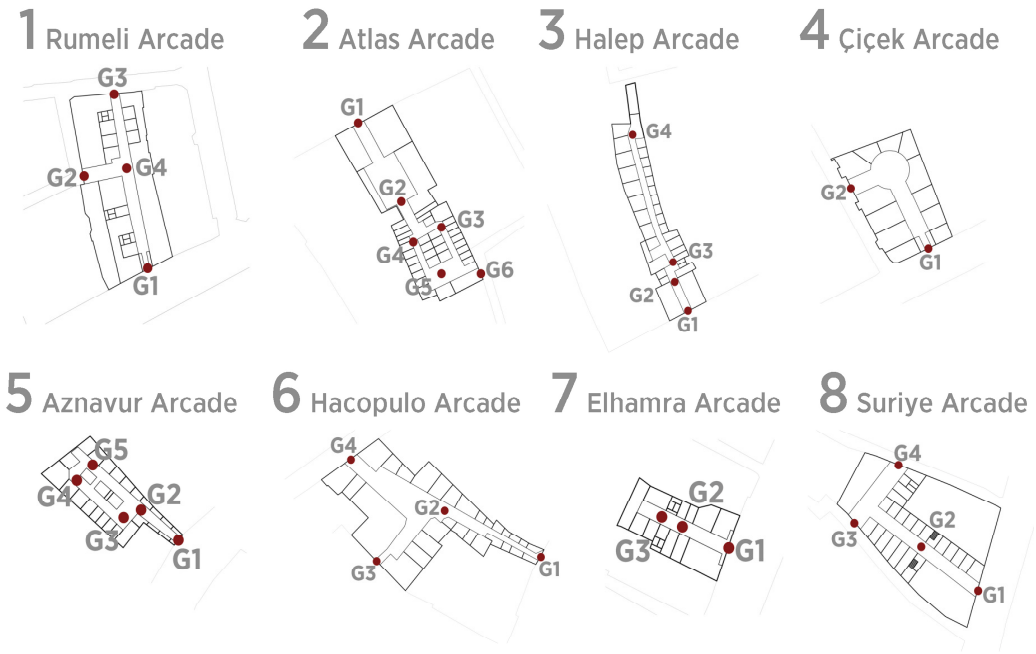

Figure 6: Figure showing the gate count nodes

Figure 7: Figure showing the distributions of sectors

Syntactic Comparisons and Analysis

Figures 8 and 9 present the integration and circularity analysis of the predefined area (Istiklal Street). The main street was observed to be a significantly integrated and signifying different characteristic in every arcade.

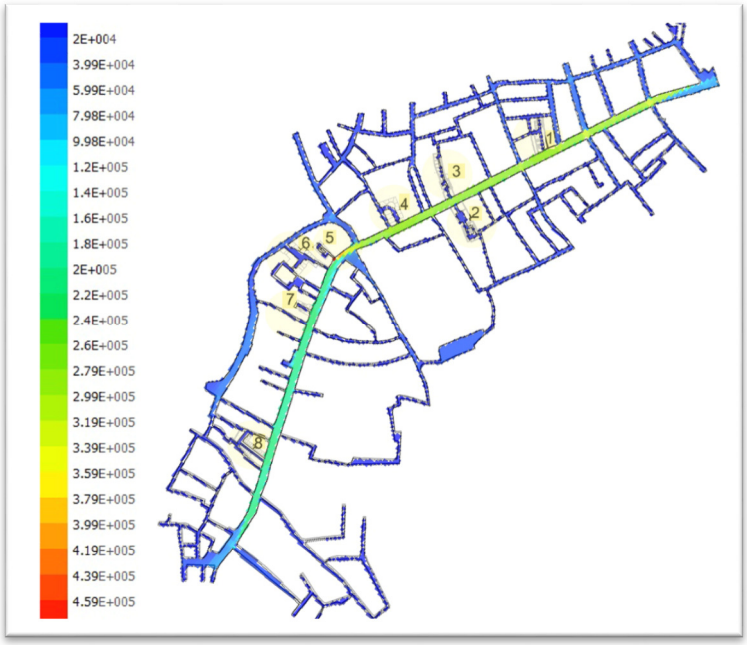

Figure 8: Integration analysis of Istiklal Street and the eight arcades

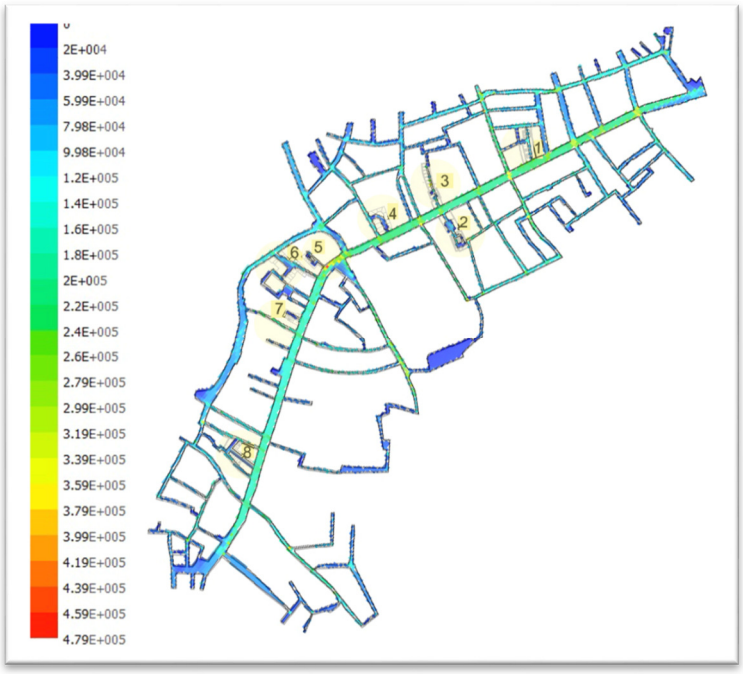

Figure 9: Circularity analysis of Istiklal Street and the eight arcades

The frequency of nodes (gate counts), the function of the cells and corridor shape characteristics of each arcade are presented in Table 1.

Table 1: Gate counts and distribution of sectors

No	Arcade	Year	Corridor Shape	Number of Entrances	Gate Number	Gate Count						Distribution of Sectors								
						Gate 1	Gate 2	Gate 3	Gate 4	Gate 5	Gate 6	Total	Entartainment		Retail		Food &Beverage		Service	
													Number	%	Number	%	Number	%	Number	%
1	Rumeli Pasajı	1894	T Shape	3	4	92	19	28	47			10	0	0	8	80	0	0	2	20
2	Atlas Pasajı	1877	L Shaped with midloop	2	6	127	109	57	42	51	6	36	2	5.6	34.0	94.4	0.0	0.0	0.0	0.0
3	Halep Pasajı	1885	Straight	1	4	161	154	94	40			33	2	6.1	31.0	93.9	0.0	0.0	0.0	0.0
4	Çiçek Pasajı	1876	L Shaped	2	2	132	50					13	0	0.0	3.0	23.1	10.0	76.9	0.0	0.0
5	Aznavur Pasajı	1883	Straight with midloop	1	6	134	131	80	17	10	1	26	0	0.0	26.0	100.0	0.0	0.0	0.0	0.0
6	Hacopulo Pasajı	1871	T Shape	3	4	206	188	2	92			26	0	0.0	22.0	84.6	4.0	15.4	0.0	0.0
7	Elhamra Pasajı	early 20th	Straight	1	3	98	49	27				6	0	0.0	5.0	83.3	0.0	0.0	1.0	16.7
8	Suriye Pasajı	1904	T Shape	3	4	44	23	23	30			19	2	10.5	3.0	15.8	11.0	57.9	3.0	15.8

Data gathered from syntactic analysis including integration, circularity, mean depth, isovist area and isovist perimeter analysis and mean depth are presented in Table 2.

Table 2: Syntactic values of each gate

	Integration	Circularity	Isovist Area	Isovist Perimeter	Mean Depth
Rumeli Gate 1	251029	279	8192	1511	3.14
Rumeli Gate 2	4404	73	296	147	4.86
Rumeli Gate 3	80498	112	482	233	4.87
Rumeli Gate 4	6469	144	388	236	4.09
Atlas Gate 1	278492	285	9092	1611	3.13
Atlas Gate 2	12453	88	498	210	4.10
Atlas Gate 3	328	41	64	51	7.01
Atlas Gate 4	6753	163	272	210	4.10
Atlas Gate 5	1399	30	125	62	6.01
Atlas Gate 6	5411	145	445	254	5.89
Halep Gate 1	282848	250	9139	1512	3.12
Halep Gate 2	8872	100	366	191	4.11
Halep Gate 3	3850	204	205	205	4.11
Halep Gate 4	1047	36	97	59	6.10
Cicek Gate 1	279061	233	9011	1451	3.13
Cicek Gate 2	7821	100	371	193	4.09
Aznavur Gate 1	479078	383	16175	2489	2.76
Aznavur Gate 2	1150	67	97	80	5.19
Aznavur Gate 3	710	44	106	68	6.19
Aznavur Gate 4	515	29	34	31	5.19
Aznavur Gate 5	2202	97	173	130	4.19
Hacopulo Gate 1	225748	252	8148	1433	3.22
Hacopulo Gate 2	11819	123	650	283	4.11
Hacopulo Gate 3	5196	116	372	208	5.06
Hacopulo Gate 4	27845	150	1525	478	4.61
Elhamra Gate 1	205267	190	7398	1185	3.35
Elhamra Gate 2	3587	42	227	98	4.33
Elhamra Gate 3	3587	47	95	96	4.33
Suriye Gate 1	195778	201	7104	1195	3.37
Suriye Gate 2	9596	60	403	155	4.30
Suriye Gate 3	9480	122	2226	522	4.34
Suriye Gate 4	10810	176	613	329	4.23

In the statistical analysis conducted with SPSS software, we observed a significant relation when we used gate count numbers (the number of people passing through a gate) as the dependent variable and integration values of these gates as the independent variable. The regression analysis between the integration values of the selected gates of urban arcades and the number of people (frequency) passing through these gates (gates and nodes inside the arcades) were positively significant ($R=0.524$; $p= 0.002 < 0.05$). One of the reasons for such a relation may be the high number of people passing through well-integrated gates of existing urban arcades and the low number of people visiting the less integrated parts of these arcades.

Second, the circularity values of the gates of each urban arcade and the number of people passing through these gates yields significant regression results ($R=0.501$; $p= 0.004 < 0.05$). This situation yields parallel results with the previous findings of integration and gate count regression analysis.

Third, we were unable to find a significant relationship when we used the gate count numbers of the entrance gates of each arcade on Istiklal Street (the number of people passing through an entrance gate of the arcade on Istiklal Street) as the dependent variable and the ratio of retail stores to all cells in an arcade as the independent variable. The regression analysis between the ratio of retail stores and the number of people (frequency) passing through the entrance gates (the main gates of the arcades) were not significantly correlated ($R=0.513$; $p= 0.194 > 0.05$).

Discussion and Conclusions

The distribution and location of urban passages that exist in the most well-known and visited historical shopping district of Istanbul affect their potential of use. The differentiation in movement creates different social frequencies in urban arcades where different shopping configurations occur. Selection and integration of the arcades inform characteristics of the spaces within the existing movement and usage patterns. Using syntactical analyses of the street, a comparison of the configurations of eight urban passages demonstrate their relations with the main street and their potential of connecting the main street with secondary ones. The urban form or location of the passages plays a role on this negative situation.

Because “urban passages” are highly distinctive and specific architectural forms that shape the urban environment and movement, their privatization as well as the effects of blocked entrances or gates in these passages could be topics for future research. In this study, two of the arcades, Halep Arcade and Aznavur Arcade (figure 5), have blocked entrances or gates that connect the arcade from the main street (Istiklal street) to secondary streets. The remaining six arcades do not have these types of blocked or privatized gates. Although Halep and Aznavur Arcades have blocked gates or entrances, number of people who are passing through the gates counted in these arcades does not change according to the blocked gates or entrances. As observed in table 1, Halep Arcade (table 1 - number 3) and Aznavur Arcade (table 1 - number 5) have some higher gate counts than the arcades that do not have blocked entrances. These findings demonstrate that the location of the arcades in the overall network of streets and the integration value (table 2, figure 8) of the main entrances (Halep arcade gate 1 and Aznavur arcade gate 1) of these arcades in relation with the main and secondary streets are more important than the frequency of the people visiting these arcades in this discussion, and the blocked entrances do not directly affect the number of people visiting these arcades. The higher the integration value of the entrance gates opening to the main street, Istiklal street, (table 2, figure 8), the more people visiting these arcades. If we examine the “to and through movement users”, we observe that there are functional differences between the arcades that are analyzed; however, these differences do not affect the frequency of people in these arcades. Therefore,

“through movement users” affect the increase in the gate count numbers in the arcades in coherence with the increasing integration values of the entrance gates of arcades. In other words, the location of the arcades in relation to the main street is attracting users to these arcades even though the arcades have some blocked entrances while they are getting connected to secondary streets. This finding is one of the striking conclusions of this study. As we consider in the theoretical part of this study, “to movement” provides reference to function of land use while “movement through” spaces is a function of configuration.

If we examine the situation of “to movement” users, we will see that they still exist and have some effect on the number of people visiting arcades such as “Cicek Arcade” and “Hacopulo Arcade”. Cicek and Hacopulo Arcades also have differences in their functions as all eight arcades analyzed in this study. These functional differences attract as many people as Halep and Aznavur Arcades and even attract a higher number of people as observed in gate 1 of Hacopulo Arcade (table 1). Although Cicek and Hacopulo have lower integration values on their entrance gates (gate 1 integration numbers on table 2) accessed from the main street than the arcades such as Halep and Aznavur Arcades, they still attract a striking number of people. This finding demonstrates the importance of “to movement” that is not oriented with the direct effect of integration values or location as well as its effect on the frequency of people visiting or passing through these arcades.

It is obvious that all eight arcades have different functions and attractive sectors that could support “to movement”; however, when we examine the results, all of the arcades have different gate count numbers that mostly reflect the strong relation with the syntactic values such as integration value and even the mean depth value (table 1 and table 2). The frequency of the people has a tendency to increase as the integration value of the gates increases, which is the main finding that “through movement” is more strong than “to movement” in this study. Only the cases discussed earlier in this conclusion for the Cicek and Hacopulo Arcades provide some exceptions because of their functional differences.

The results of the analysis support the idea that the spatial layout may affect the attractors; however, the attractors cannot affect the spatial layout. From the syntactical analysis using integration and circularity values, it is obvious that the syntactical parameters of the arcades are positively significant with the frequencies of use. The retail function does not have a very strong effect on space preferences and public frequencies. The location and integration with public space has an orientation on public use. Istiklal Street has a strong local effect on urban patterns. The place qualities as functional distributions has less of an effect than the place itself.

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