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A study on the use of urban spaces in historical environments through behaviour mapping and space syntax: The case of Mudanya

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ABSTRACT

Urban spaces which play a key role in the understanding of the historical attributes of cities are effective in the formation of the behavioural patterns of the citizens with their morphological and historical characteristics. Armistice Neighbourhood, located in the Mudanya district of Bursa, where Greek and Ottoman structures exist together, has an important role in its historical significance as a place of encountering where citizens engage through social interactions. The research which started with the hypothesis that the urban spaces in front of such monumental structures should be generating more behavioural patterns focuses on revealing the reasons behind the behavioural frequency of the citizens who use the urban spaces in Mudanya. In the study, it is aimed to investigate the factors affecting the usage of urban spaces that are in front of historical buildings and to understand the relationship between the behavioural data and syntactic data. The methodology of the research was conducted in two phases; first, behavioural maps were revealed through observations of the behavioural patterns of the citizens according to the specified criteria. Second, connectivity, integration, and visibility parameters were revealed through DepthmapX and examined whether there is any significant correlation between the behavioural and syntactic dataset. As a result, the behavioural frequency in front of the Armistice House, located on the coastline where visibility is high, was more intense. Despite the high connectivity of the street near the Uğur Mumcu Cultural Centre is located, where the visibility rate was low, the behavioural frequency was less intense.

KEYWORDS

behaviour mapping, human behaviour, space syntax, urban space, historical buildings

1 INTRODUCTION

To understand the causes of human behaviour, it is necessary to examine what the physical environment is comprised of. In this context, *environment and behaviour theories* is an important theoretical field to understand the relationship between the concept of urban space and its users. When the historical attributes of the cities are considered within the framework of environment and behaviour theories, it can be asserted that historical buildings and their nearby urban environments affect and influence today's citizens' behaviour in the urban context. Thus, urban spaces play a major role in the behavioural patterns of citizens to understand the historical past, attributes, and values of any city. For that reason, historical buildings, and their surrounding urban space, have an important role in the urban memory, which exists together to enable and enhance social interactions between citizens. Social, cultural, and political changes throughout history have had certain effects on the forms of today's urban spaces and these changes affect the behavioural patterns of the citizens.

Mudanya is a district of Bursa where citizens, despite the variety of their ethnic origins, religious values, and languages, have lived together in peace throughout history. The reflections of this heterogeneous social structure can also be observed in the city's morphology, street pattern, historical buildings, and accordingly today's urban spatial domains and behavioural patterns. Within this framework, this research investigates how the social and political changes in Mudanya's history affect the behavioural frequencies of inhabitants wandering in the nearby urban space close to two significant historical buildings and searches for any significant correlations between the revealed behavioural modes and the syntactic parameters of the urban space.

The questions to be answered in the research process are as follows:

1- What kind of behavioural modes tend to occur in front of the Armistice House and Uğur Mumcu Cultural Centre?
2- Which urban space around the building is used more and what are the morphological and historical reasons behind the usage frequency?
3- How do the syntactical characteristics of the urban space affect users' behavioural patterns?

Depending on these research questions stated above, the hypothesis of the research is based on the opinion that urban spaces in front of monumental structures should be generating more behavioural patterns. Thus, the study aims to reveal the reasons behind the behavioural frequencies of the citizens who use the urban spaces in Mudanya. Based on the stated hypothesis, people using the urban region are observed to develop various behavioural patterns being affected by the reasons mentioned below;

- Occurrence of functions that prevent visual perception in front of the Uğur Mumcu Cultural Centre,

- Connectivity, visibility, and integration values in the context of space syntax theory,
- Change in the social organization of the area depends on political decisions throughout history.

For the case study, the urban space around two monumental buildings is selected in the Armistice Neighbourhood. Armistice House is on the coastline, while Uğur Mumcu Cultural Centre is away from the coastline and is located within the interior part of the neighbourhood (Figure 1).

Figure 1. Map of the Armistice Neighbourhood in Mudanya

Vantage points are selected near the buildings to reveal the behavioural settings of the citizens who act in the selected urban space. Besides, through the syntactic graphs which are generated via DepthMapX software; connectivity, integration and visibility parameters of the urban setting are revealed and evaluated comparatively with the behavioural data. As a result, the behavioural frequencies in front of the Armistice House, which is located on the shore with its high visibility, were higher. Additionally, despite the significant connectivity and integration of the roadway near the Uğur Mumcu Cultural Centre, which had a low visibility rate, the behavioural frequency was lower.

2 LITERATURE REVIEW REGARDING HUMAN BEHAVIOUR

The field of psychology comprehends how individuals act in laboratory settings during treatments, but little is known about how these and other circumstances, as well as the behaviour outcomes, are distributed outside the labs (Barker 1968, p.2). The ecological approach in environmental and behavioural psychology asserts that humans should be observed in their natural environments to see how different environmental conditions affect their behavioural preferences in various places. Within this approach, the concept of behaviour is considered to be a consequence of physical elements in space (Moore 1985, cited in Ünlü 1998, p.36). Actions and happenings can be explained by environmental components and behavioural configurations in a cause-effect relationship (Ünlü 1998, p.36). Barker (1968) explains the *behaviour setting* theory

through the notion of *milieu* and *synomorphy* terms within the scope of the ecological approach. The milieu is a spatial setting that contains artificial (i.e. streets, buildings) and natural (i.e. mountain, sea) components. So, the milieu of a behavioural setting is defined by a specific place, time, and environmental elements. Thus, behaviour is surrounded by a milieu. Moreover, there is *synomorphy* between behaviour and the milieu of the behaviour setting. There is also a synomorphy between the boundary of the behaviour and milieu (Barker 1968, pp.18-19). For instance, the physical boundaries of urban space can be parking spaces, buildings, trees, and benches that limit the behavioural pattern of the users. Physical components can lead to or control behavioural patterns. Narrow corridors can direct users from one space to another. Another example can be the lack of sitting areas which inhibits the users to sit (Barker 1968, p.29).

While various types of people tend to behave alike in places that have similar physical arrangements, but then what makes people behave differently in the same setting? Within the context of the study, the users of Armistice Park in Mudanya have different behavioural patterns differing according to their age groups according to the personal observations of the researcher. The ramp area around the statue is used through different behavioural modes; a group of teenagers uses the ramp area for their skateboard riding while the ramp is used to run and hide by 5-year-old children. Usage of the same setting differs from user to user even though the ramp is designed for people with wheelchairs or baby strollers. Barker explains this phenomenon in such a way that while one may enter the pharmacy to buy medication the other person may enter to empoison someone. The behaviour setting has no impact on the content or organization of a person's psychological reality, or life existence (Barker 1968, p.29).

According to Proshansky et al. (1970), all biological entities have a complicated interaction with their surroundings in which they modify and are modified by what they encounter. Such exchange is necessary for the continuation of life and is frequently included in definitions of the idea of life. Living includes the changes in the environment generated by the organism, and the changes that may later modify the organism, chemically, biologically, or behaviourally (Proshansky et al., 1970, p.1). Urban spaces are shaped by the organisms through the years, and this modified environment continues to modify the organisms' behaviour. In this perspective, a human's-built world is as much a social phenomenon as it is a physical reality. Whether it is a school, hospital, apartment, neighbourhood, or road, the human's-built environment is just a representation of the social structure that dictates their actions and connections with others (Proshansky et al., 1970, p.8).

Traces of such a modified environment can also be read through the historical structures that were constructed in different periods in the urban spaces of Mudanya. A built and constructed environment is a tool to evaluate the social structure of the place. In the Mudanya case, the

former church which is used as a cultural centre today and a historical building that is used as a museum today can give a lot of clues about the social organisation in the urban space.

Hall (1966) worked on the division of spatial patterns. There are three basic elements defined as fixed-feature, semifixed-feature and informal in the *microcultural* level of proxemics. The *fixed feature* comprises both material forms and the hidden, internalized designs that guide people's behaviour as they walk. Villages, towns, cities, and the surrounding countryside are not built randomly, but rather according to a pattern that evolves with time and culture (Hall 1966, p.103). Some features of *fixed-feature* space are not apparent unless human behaviour is observed. The invisible line that divides one plot from the next in suburban is also a *fixed-feature* of American society (Hall 1966, p.106). Invisible borders can differentiate one urban zone from another. If any human behaviour cannot be observed, there might be a possibility to have an invisible boundary that has a social, cultural, or syntactic reason behind it. *Fixed-feature* space is not a flexible space so, it cannot easily transform. Activities are usually identified with a specific space with the usage of fixed elements such as solid walls, and windows that cannot be moved easily. In the Mudanya urban space case, fixed features can be considered as benches, statue, trees, and buildings around the area.

Semifixed-featured space is where equipment can be movable according to different times of the day. Osmond (1957) researched how the arrangement of semifixed furniture affects human behaviour and he states that some places tend to bring people together. These spaces are called *sociopetal*. Some spaces like railway waiting areas keep them apart so that these spaces are called *sociofugal*. Later, he worked with Robert Sommer to explore how the line-up of the furniture may influence social communication between people. Appeared that certain positions and angles between chairs allow people to get in connect more easily in the hospital cafeteria (Hall 1966, p.108). Within a culture, what is sociofugal could be sociopetal in another culture. Moreover, it should not be thought that sociofugal spaces should not exist because they tend to keep people apart. It is important to create a harmony between both sociofugal and sociopetal spaces to allow behavioural patterns of all kinds of people in space. The distribution of semifixed elements in the space is important since they affect the behaviour (Hall 1966, p. 110). While designing semifixed urban furniture at the right angle can enhance the encounters and communication between the citizens, allowing sociofugal spaces for different demands of the different people can make the urban space more usable.

Informal space is in the category of spatial experience, which is possibly the most important for the individual since it comprises the distances maintained in interpersonal interactions (Hall 1966, p.111). Informal spatial patterns have clear boundaries and such significant if unspoken, the importance that they are a fundamental element of culture (Hall 1966, p.112). Hall states that sensory shifts are the causes of the periodicity of distances observed in humans (Hall 1966, p.113). He categorised distance into four which are *intimate, personal, social,* and *public*

distance. Feeling to one person or another can be an important factor while distances are identified. Moreover, environmental factors can affect the distance high noise or low levels of light can make people closer to each other (Hall 1966, p.116). In urban spaces, distances can be observed between people according to their relationship with each other.

Bechtel's *limitation* approach is a similar concept to Hall's fixed-featured space. Behaviour setting limit is where the behavioural action stops (Bechtel 1977, cited in Ünlü 1998, p.38). It can be a wall or a physical barrier that stops the behaviour. In the context of this study, it is observed that some of the Armistice Park users bring their portable chairs in case there is no empty public bench for them to sit on. Besides, behaviours in front of the Uğur Mumcu Cultural Centre are generally limited because of the unofficial custom of car parking. The space in front of the building, unfortunately, cannot be used for the urban needs of the public although there is no restriction about sitting since the parked cars are limiting the behaviour settings in front of the building.

Environmental determinism is the approach that the physical environment shapes human behaviour and changes in the urban form can also change behaviour and social interaction. Some researchers have reacted to the idea that built environments do not have a major influence on people. Social and economic environments are rather more dominant than the physical environment (Rapoport 1977, p.2). Rapaport states that settings might limit or encourage the behaviour but cannot determine or generate activities. Inhibitory environments make activities more difficult but do not always totally prevent them, even though blocking behaviour is easier than generating it (Rapoport 1977, p.3). Rapoport points out the fact that the reason why people behave differently in different settings. People behave appropriately in various settings because they adapt their actions to the culturally defined norms for appropriate behaviour in that setting. His book focuses on the interaction between humans and the environment in terms of psychological, behavioural, socio-cultural and similar aspects.

Lifestyle may turn out to be one of the most important factors determining the city's organization, due to the specific ways in which areas are arranged in terms of space, time, meaning, and communication, as well as the gathering of people homogeneous with various traits. A city is a collection of different groups, lifestyles, cultures, and subcultures within the variables of race, ethnic origins, religion, class, and income. (Rapoport 1977, p.20). Moreover, he proposed the terms which are *environmental evaluation*, *environmental cognition,* and *environmental perception.*

Additionally, Whyte was intrigued by the behaviour of people on city streets. (Whyte 1980, p.1) His book ‘‘The Social Life of Small Urban Spaces’’ is about urban spaces and he investigates why some spaces are used by people while some others are not. He started a research group called ‘‘The Street Life Project’’ to observe city spaces (Whyte 1980, p.10). Whyte and his team

made research in various urban squares in New York to investigate the reasons why some of the spaces are not crowded even though they are in the city centre. They found out that some of the urban plazas such as the plaza of the Seagram Building attracted people for sunbathing and picnicking. Another plaza was 77 Water Street was full of a young crowd. However, most of the plazas were not used by citizens especially open spaces in the central business district (Whyte 1980, p.14). Most of the users were office workers from the surrounding environment. They found out that the most crowded plazas are sociable places that constitute a group of people meeting or socializing (Whyte 1980, p.17). Also, people tend to use the place when they see other people (Whyte 1980, p.19). Another intriguing finding was people tend to state themselves near objects such as a statue and flagpoles. What is more is that people do not necessarily choose to be in the middle of a large space (Whyte 1980, p.21).

Jane Jacobs (1961) who is a journalist was the first leading figure that raised awareness of how problematic current city planning is. Since that time many researchers and theoreticians have been contributing to urban studies coming from different research fields. Lefebvre (1991), a Marxist philosopher and sociologist, was concerned with the idea of space had a strict mathematical and geometrical meaning while the concept of social space stays in the background. He is interested in *the physical nature* and the Cosmos*, the mental*-logical and formal abstractions, *and the social* aspects of space which is called logico-epistemological space, space as social practice, also the space of sensory phenomena, such as projects and projections, symbols, and utopias, as well as products of the imagination (Lefebvre 1991, p.11-12).

Gehl (2010) in ‘’Cities for People’’ focuses on the human dimension of city planning. He points out that to establish active, safe, sustainable, and healthy cities, cities must encourage urban planners and architects to strengthen pedestrianism as an integrated city regulation (Gehl 2010, p. 6). Gehl states when we examine the history of cities, we can observe how urban structures and planning have influenced human behaviour and the way cities function. The colony towns of the Roman Empire featured a fixed and ordered structure of main streets, forums, public buildings, and barracks, which reinforced their military purpose. Medieval cities' compact form, which included low walking distances, squares, and marketplaces, aided their function as trade and craftsmanship hubs (Gehl 2010, p. 9). In the 20th century, city space was simply filled with moving and parked vehicles to cope with the increasing amount of vehicle traffic. In the early 1960s, Copenhagen was one of the first cities in Europe that restrict car traffic and parking in the city centre to reclaim more space for city life. After a short time, the initiative achieved greater success and the number of pedestrians increased by 35% in the first year. Researchers from the Royal Danish Academy of Fine Arts reported that there was a major change in the city’s pedestrian urban pattern in terms of usage in the common spaces and a raise in walkability (Gehl 2010, p. 13).

Space syntax is a theory and method that has been found by Bill Hillier and Hanson in the 1970s for spatial analyses that can be used with pedestrian movement analyses to offer urban design solutions as well as research in urban studies (Hillier and Hanson 1984). Hillier *et al.* (1987) were intrigued about if spatial layout affects pedestrian movement and pattern of space use. Also, questions that these patterns do have social meanings examining through case studies in urban, suburban areas and housing estates. Moreover, Hillier *et al.* (1993) emphasized that according to natural movement theory, the urban form can determine pedestrian flow regardless of attractors. When we analyse the layout as a system of alternative pathways, we may see the configuration of *through-movement*. Configuration may be included in *to-movement* if we understand layout as a system of origins and destinations. Natural movement can be different in different cultures while reflecting the various spatial logics of the urban grid. Thus, urban grids are cultural products and can generate encountering areas with different forms (Hillier *et al.,* 1993).

Hillier (2014) emphasizes that the integrated centre of a city frequently has the shape of a *deformed wheel*, with a core, creating the major structure of public space and residential zones in the wheel's interstices. This was first discovered in a study of small towns in southern France, and London's urban areas, with its 'urban villages' at the centre (Hillier 2014, p.41). Moreover, space can have dual potentials regarding socio-cultural variety. Space can be used generatively to generate new co-presence which is not a part of the existing social structure. On the other hand, it can be used conservatively to manage co-presence in the existing social organization to aid in its reproduction. In cities, space is used in both generative and conservative modes, with the former being driven by microeconomic activity and the latter being driven by residential culture.
A spatialized sociology can be seen as well as a structure-function relationship in the dual city (Hillier 2014, p.41). Duality can be seen in Nicosia, the capital of Cyprus, a city with more than one culture. The analysed space has a Turkish area on the top right, and the Greek part is on the bottom left. Differences in geometry have been found between the two areas according to integration analyses. The Greek part is more integrated than the Turkish part. Even though there are cultural differences in the studied urban space, the city of Nicosia has a grid with a *deformed wheel* structure (Hillier 2014, p.42).

2.1 Studies Examining Human Behaviour in Urban Environments

Coates and Sanoff (1972) who observed children in their natural setting carried out research in a planned residential setting in Ridgefield Park to identify the spatial properties and usage of outdoor spaces by children. On the data sheets and a map of the site, appropriate codes were noted to define the location of observed behaviour. The site was described in terms of physical elements in addition to locational mapping such as a public sidewalk, street, parking lots and so on. Observed activity is described by behavioural density, behavioural diversity index, activity type profile and group size profile. The result of the study revealed that children's activity is more group-oriented than individual-oriented. Site planning arrangements indicate certain

behaviours, and the diversity of settings enables a wide range of expected and unexpected activities to occur.

Foster (1997) and his team worked in a competition for the Kings Cross area and Euston Road. The aim was to design a mixed community and make the isolated area into a lively space. According to axial analyses, the southern part of the area was more integrated because it was a rising place for new developers. Even most designers did not take too much attention to the northern part which is in a poor condition compared to the south. After historical research and syntactic analyses, they offered an integrated design solution that connects north and south of the King's Cross to be a hearth of the surrounding area (Foster, 1997). Moreover, in 1996, in public spaces between Trafalgar Square and Parliament Square in central London, the space syntax method was used to propose a design solution by Norman Foster's team. The area was uncomfortable, dangerous and controlled by traffic even though has a significant historic identity. The pedestrian movement was observed to identify the main problem. While tourists struggled to travel between Trafalgar Square and Parliament Square, local citizens ignored the centre of Trafalgar Square. With the help of space syntax and pedestrian flow analysis, a new staircase in Trafalgar Square and pedestrianisation were proposed to connect it with Parliament. After the implementation of the proposal in 2003, it was recorded that pedestrian movement increased by thirteen times (Space Syntax Limited, 2022).

Peponis *et al.* (1989) who investigated the morphology of Greek villages and their pedestrian movements found that the research provides evidence to back up the hypothesis that the syntactic integration qualities of urban layouts have experimentally visible effects on the distribution of pedestrian movement. The typological of urban layouts is intriguing for how these plans generate their cultural consequences. People might expect to meet other people as well as find products, services, or information at the integration core, so the core creates an encounter. However, the distinction and articulation of parts appear to be just as important in defining a town's identity. It has also aided in the identification of some characteristics that are distinctive to Greek urban culture, although they are not necessarily unique to it. Space in Greek towns operates generatively, creating opportunities for encounter, rather than conservatively, separating and isolating, local identities. The study indicates that the generative functions of space originate not only from the basic accumulation of people but also from a highly defined morphological structure.

Kubat, Ozer & Ozbil (2013) focused on the walkability of the three historical urban squares which are Sultanahmet, Beyazıt and Taksim, in Istanbul. The major goal is to investigate the existing relationship between space allocation and pedestrian activity, as well as to evaluate the efficacy of proposed pedestrianization schemes produced by local governments in these locations. Based on the findings, a pedestrian-oriented strategical framework for the study areas

and their surroundings is provided, which takes into account the existing spatial arrangement, parcel-based land-use compositions, and pedestrian movement distributions within the areas.

Ozbil Torun *et al.* (2020) conducted a post-occupancy evaluation in Istanbul's peripheral urban squares, to investigate the relationship between users' behaviour and spatial configuration. Research methodology has three-phase which are behavioural mapping through observation, cognitive evaluation with questionaries and space syntax. As a result, Avcılar Square, which is the most integrated within its urban surroundings and has a smaller average block area, has the largest diversity and intensity of activities as well as the longest duration of occupation. On the other hand, there are some contradictions between perceived environment and syntactic analysis, implying that both forms of measurements are required in the post-occupancy evaluation public space study.

3 DATASETS AND METHODS

3.1 Methodology

As it is stated in the theory of space syntax, syntactic data of a setting can be correlated with the behavioural data of that setting so that the correlations between quantitative and qualitative data are used to uncover the social logic of spaces. Space syntax provides mathematical data of the space so it can be compared with the social structure. On-site observation techniques can be used to obtain empirical data on human behavioural activities. In this research, bar graphs, the "Stationary Activities: Snapshots'' method and the ''Pedestrian Routes (Traces): Pedestrian Following'' technique is used to compare if there is a significant relationship between human behaviour and the built environment. In public squares and parks, the static snapshots technique is an excellent observation tool to collect data on numerous people's passive or active activities, and their social interactions (van Nes and Yamu 2021, p.138). By tracking pedestrian activity that disperses from specified locations, the pedestrian-following method also enables the collection of qualitative data (van Nes and Yamu 2021, p.141).

To reveal the behavioural dataset, the public areas in front of the Armistice House and Uğur Mumcu Cultural Center are selected as the areas to be observed. Because it was forbidden to go out at the weekends due to pandemic restrictions, observations were conducted between 2 p.m. and 3 p.m. on May 19th, 2021, which was the national day for the beginning of the Turkish War of Independence in 1919. For this reason, the observation day was selected specifically to see how the citizens tend to use the area when they are not obligated to go to work or school on a sunny spring day. The case study area is the urban square between Uğur Mumcu Cultural Centre, Armistice Park, Armistice Square and Armistice House. The surrounding urban space of Uğur Mumcu Cultural Centre is used as a car parking area. Armistice Park contains benches, trees and a monumental statue representing the Commander İsmet İnönü. Armistice Square, formed by 12 Eylül Street and Fevzi Paşa Street, is a large space that can be used for many purposes even for

outdoor space concerts. The area near the Armistice House on the seaside consists of a few benches toward the sea. Two vantage points were selected in such areas that are possible to see the urban space surrounding both of the monumental buildings (Figure 2).

Figure 2. Selected urban space in Mudanya (A: Armistice Building, B: Uğur Mumcu Cultural Centre)
[On the top: Collage of the selected area, On the left: Map of the case study setting,
On the right: Observed area]

3.2 A Brief History of the Case Study Setting: The Neighbourhood of Armistice

Following the occupation of Anatolian lands under the rule of the Ottoman Empire after the First World War, the Turkish War of Independence took place under the leadership of the Turkish National Movement between 1919 and 1923. In 1920, the British army invaded Mudanya to support the Greek army. After two years, the agreement to end the Independence War, Armistice of Mudanya (Mudanya Mütarekesi in Turkish), was signed by Commander İsmet İnönü in Armistice House on October 11th, 1922. Just before the proclamation of the Turkish Republic, ‘’Forced Migration Policy’’ was signed on January 30th 1923, in the city of Lausanne (Gençoğlu 2020, p.23). The migration policy was comprised of the Turkish-Greek population to be transferred between Turkey and Greece. According to the protocol from 1 May 1923, Turkish

citizens that had Greek Orthodox religion were forced to migrate to Greece, and Greek citizens who are Muslims were forced to migrate to Turkey. Both parties must have been exchanged mutually (Meray 1923, cited in Sakır 2014, p.33). So, the immigrants that came from the Island of Crete (Girit in Turkish), were settled in Halitpaşa and Armistice neighbourhoods which were the places where the Greek Orthodox religion lived in Mudanya. Therefore, today the neighbourhood is also known as a Crete Neighbourhood.

Mudanya Armistice House was constructed in the late 19th century by a Russian merchant Alexandre Ganyanot as a waterfront house. The 3-storeyed house was restored in 1930-35 and it was transformed into a museum in 1937. The building was used as a museum after the armistice of Mudanya because it has a historical importance of public victory (Sakır 2014, p.60). With the proclamation of the Turkish Republic, the buildings around the Armistice House were emptied to construct Armistice Square and Armistice Park in 1937 (Gençoğlu 2020, p.40).

Uğur Mumcu Cultural Centre, a former church called Mudanya Ayios Yeoryios, was used by the Greek Orthodox citizens for religious purposes who used to live in Mudanya before they had been forced to immigrate by the government. Although the construction date is unknown, according to written sources of Dr John Covel who lived in the 17th century, the church was used since that time. After the forced immigration from 1923 till 1950 it has been used for military warehouses and movie theatres. Since its restoration in 1993, it is now being used as a cultural centre (Aydın and Özügül 2019, p.635).

Gençoğlu (2020) detected that Mudanya is divided into three urban morphological areas. The first area has a grid street network which was the neighbourhood where Greek citizens lived before the forced migration. The second area has an organic street network, which is called Turkish or Ottoman Neighbourhood in many resources. And the third area is consisting of both features of the first and second area. Both Armistice House and Uğur Mumcu Cultural Centre are in the Greek part of the Mudanya in Armistice Neighbourhood.

The consequences of political interventions such as war and forced population exchange between countries gave a lead to social change. It can be said that these interventions have an impact on today's city morphology and the citizens' behavioural modes in this urban space around the selected historical buildings. Thus, it is hypothesized in this study that the changes in social organization in the past, changed today's citizens' patterns of usage in the urban space.

3.3 Participants of the Study and Behavioural Data

The urban space of Mudanya which was observed as the case study setting allows users to perform different activities occurring at the same time differs on their age. People bring their portable chairs to sit and meet their friends, they use scooters, bicycles, and skateboards. Flexible usage of the urban space enables citizens to use the area feeling unrestricted. Behaviour maps are

generated according to two actions which are *active* and *passive*. Active actions are considered as walking, passing by, cycling, skateboarding, playing games, car parking running, and playing ball. The frequency of each activity of these seven types of active actions was recorded through observations. Passive actions are considered as chatting, standing, watching the scenery, sitting, street music, eating-drinking, meeting, smoking, and playing with the phone. The frequency of each activity of these nine types of passive actions was also recorded through observations.

Observations were conducted depending on five different categorisations which are

(1) gender,
(2) age group,
(3) behaviour type under the classification of active or passive behaviour,
(4) duration of behaviour, and
(5) the total number of people.

Participant groups are classified based on the number of persons in each group to determine if certain behaviours occur within a social group or are performed individually. A total group of 44 participants were observed. 24 (25.5%) of them are women and 20 (45.5%) of them are men (Figure 3a). The total number of participants is 110, the total number of women is 64 (58.2%), and the total number of men is 46 (41.8%) (Figure 3b). 30 of the participants have an active behaviour style. It has been observed that the rate of women in 30 active behaviours is high. In passive behaviours, the ratio of men and women is equal (Figure 3c). Of the 44 participants, the middle age group has the highest rate with 16. While children and young people come with 10 participants, the elderly group comes with 8 participants. While there is an equality between boys and girls in the group of children, the number of female participants is high in the young-middle-aged-old group (Figure 3d). In the group of 44 participants, there were 28 (64%) actions involving 1-5 minutes of behaviour types. On the other hand, 16 participant groups (36%) included the actions of 6-minutes or more. It was observed that as the duration increases, the nature of active actions decreases. Actions such as chatting, watching the scenery, and standing, which is mostly passive behaviour types, are performed for longer periods (Figure 3e). The number of participants being alone is 13 and it constitutes 29% of the total. 71% of the behaviours occur in groups. The number of being only 1 person in the active actions, which includes a total of 30 participant groups, is 8 people and it is 26% of the total activity. Active actions in 74% were made by groups containing 2 or more people. The number of being only 1 person in passive actions, which includes 14 participants in total, is 5 people, which covers 36% of the actions. Passive actions (64%) were performed by groups of participants containing 2 or more people (Figure 3f).

Figure 3. Data of the research sample group [a: Number of participant groups by gender, b: Number of total people by gender, c: Distribution of active-passive behaviours by participant group gender, d: Distribution of age group by participant group gender, e: Distribution of behaviour duration in the participant group by active-passive behaviour type, f: Distribution of the number of people in the participant group by active-passive behaviour type]

When the behavioural results of the active actions are considered, those who walk have the highest number with 10 people together. Then, some pass by with 8 participants, those who ride a bicycle with 7 participants, those who use roller skates, skateboards, and scooters with 4 participants, and those who play games alone. When the behavioural results of the passive actions are considered, those who chat with 5 people are followed by those who stand with 3 people, those who sit with 2 people who watch the scenery, those who perform street music alone and those who eat and drink (Figure 4a). While the participants in the child and youth group exhibit more active behaviours (17 participants), only 3 participants in the young group are involved in passive actions. The children usually take part in bicycle-skating/skateboard/scooter and playground groups. While the middle-aged group of participants mainly engage in active actions such as walking, passing, and cycling, the older group mostly are engaged in passive actions such as chatting, standing, and watching the scenery around (Figure 4b).

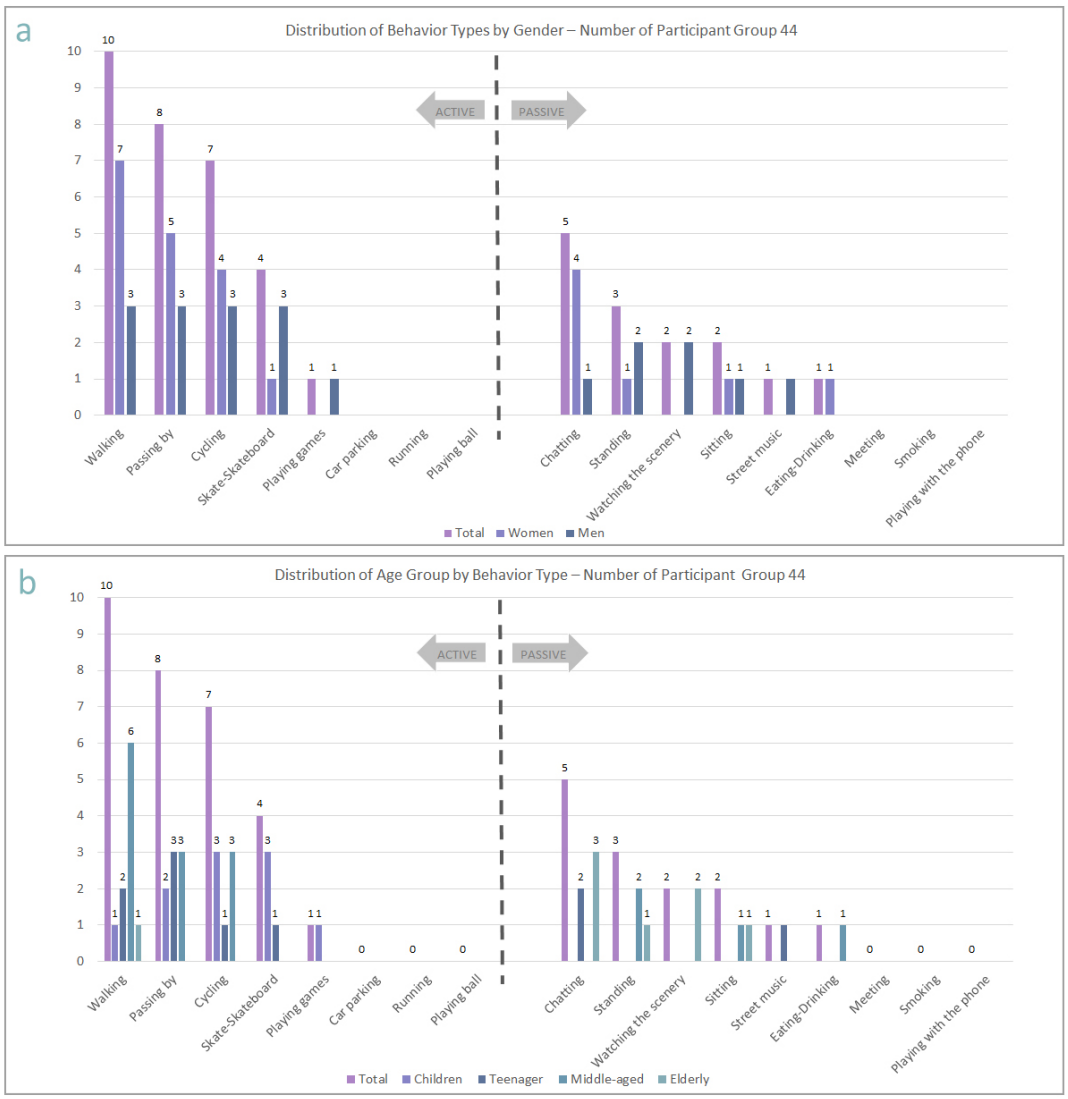

Figure 4. Data of the behavioural modes [a: Distribution of behaviour types by gender, b: Distribution of age group by behaviour type]

The duration of both the active and passive actions is also recorded. The duration of all active actions took place less than 11-15 minutes, mainly between 1-and 5 minutes, except for a bike-riding action for 26-30 minutes, a roller-skating/skateboarding/scooter action for 21-25 minutes. Passive actions such as chatting, sitting and street music performance were observed in 3 participants for over 30 minutes. Passive actions generally took place over 10 minutes (Figure 5a). In active actions, one-person action is the most common with walking (5 participant groups one person), it is observed that the number of participants in walking, passing, cycling, skating-skateboarding-scooter and playing games is 2 or more. It was observed that passive actions such as standing, watching the scenery, and sitting were mainly performed alone. While chatting takes place with 5 participants with 2 or more people, there are 5 or more people in the standing action. The actions of playing street music and eating and drinking are included in the group of 2 people (Figure 5b).

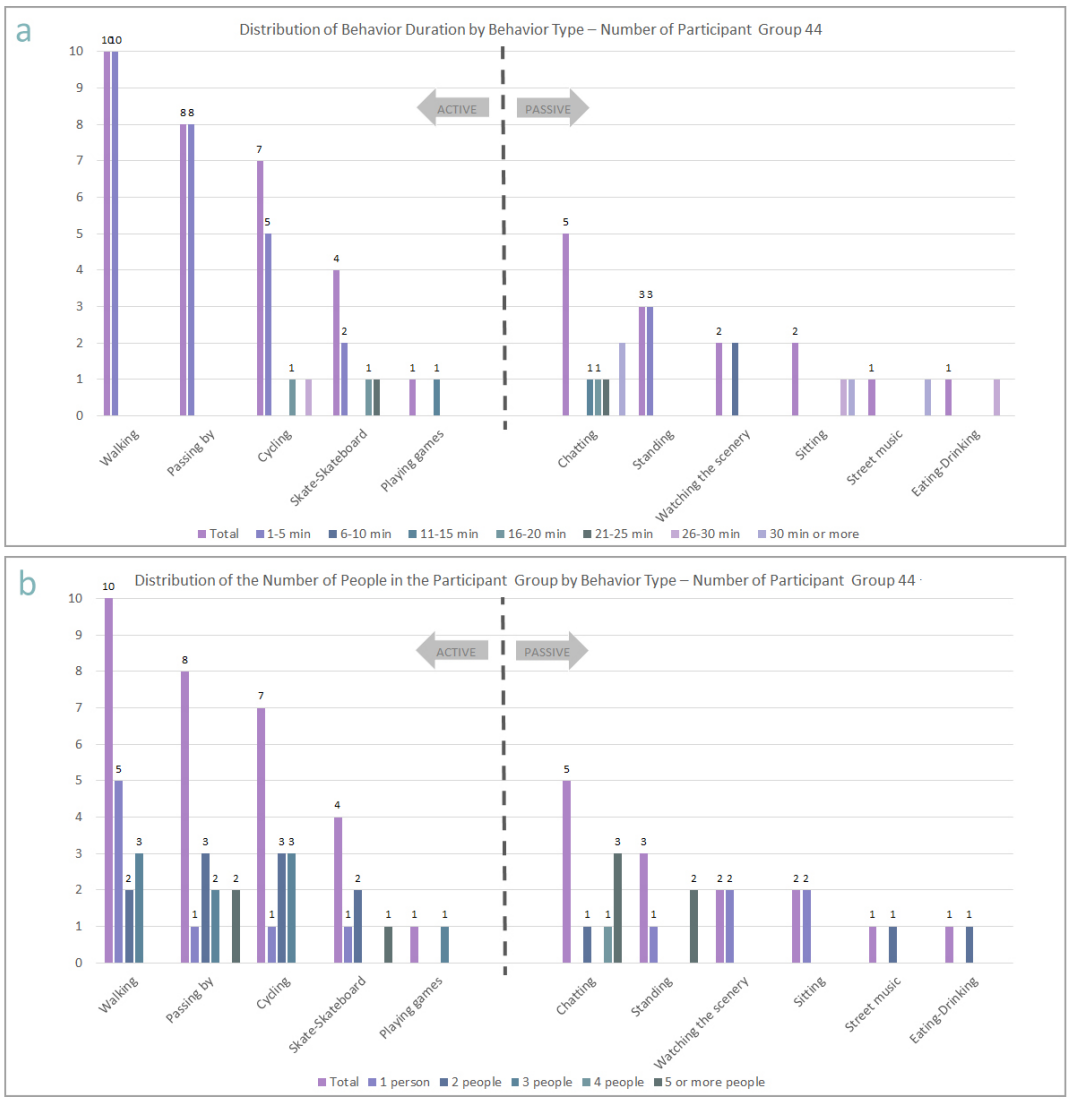

Figure 5. Data of the behavioural modes [a: Distribution of behaviour duration by behaviour type, b: Distribution of the number of people in the participant group by behaviour type]

In the behaviour maps (Figure 6), each black dot represents one person and the behaviours of each person (for 44 participants). For example, P1 (participant group number one) is an elderly woman who is in a passive action chatting with four friends of hers. The group used the area for more than 30 minutes while sitting on the benches in the park and they were observed that they also brought their portable chairs (Figure 6a). P2 (participant group number two) is a 5-year-old male child who is in an active action. He played catch and run game with his two friends and they used the area approximately for 11-15 minutes. Their actions were dependent on the ramps and the statue in the park. They were observed that they were acting in a rotational motion around the statue. The traces of their actions are represented with dashed lines as can be seen in the figure below (Figure 6b).

After demonstrating each participant group on 44 different behaviour maps, all the data were juxtaposed and represented on two final maps to see the whole passive and active actions in a cumulative way. It was revealed that the passive acts, such as standing, chatting, and watching

the scenery were intensely taking place in Armistice Park or at such angles that have a vista through Armistice House and the Sea of Marmara. Although the participants were observed in front of building B in the Armistice Park, they were observed with their backs turned toward building B (Figure 6c). It was revealed that the active actions, such as walking, passing, cycling, skating-skateboarding-scooter riding were taking place intensively in front of Building A or at such angles that see it. The ramp area around the statue in Armistice Park is also used for cycling, skating-skateboarding-scooter riding and playing games including passing by from the park diagonally using the Armistice Parks' rectangular form. The pedestrian flow was observed mostly at 12 Eylül Street and Fevzi Paşa Street. Five participants passed in front of building B and the space in front of the Uğur Mumcu Cultural Centre was observed to be only used for private car parking areas for the municipality vehicles (Figure 6d).

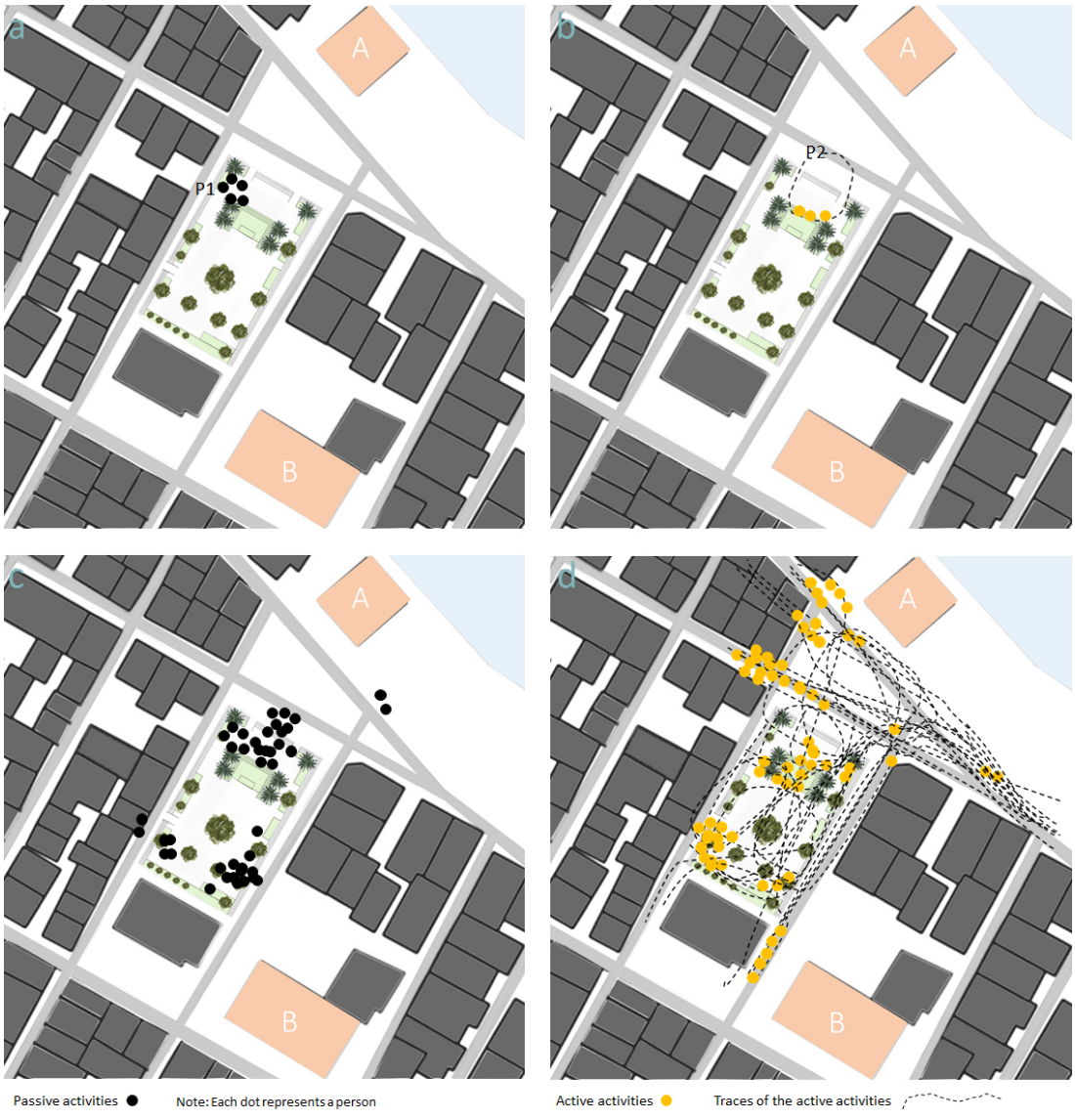

Figure 6. Passive and active activity behaviour maps Mudanya (A: Armistice House, B: Uğur Mumcu Cultural Centre) [a: Participant group number one, b: Participant group number two, c: Passive activity map, d: Active activity map]

4 RESULTS

4.1 Syntactic Analyses of the Mudanya Urban Space

As Hillier and Hanson (1984) state, connectivity takes into consideration all the street's direct links to other streets in its close neighbourhood. Connectivity value reveals which street has the most connections with other streets (Hillier and Hanson 1984, p.103). If a street relates to a lot of streets, that street has a high connectivity value. The connectivity of the Mustafa Kemal Paşa Street (in the southwest of the B) where Uğur Mumcu Cultural Centre is located is high. This street is also the street where commercial functions are concentrated and the density of vehicles flow is high. Bilgi streets' (in the northwest of the B) connectivity rate is relatively low compared to Mustafa Kemal Paşa Street. Urban space in front of the Armistice Houses' connectivity rate is low (Figure 7).

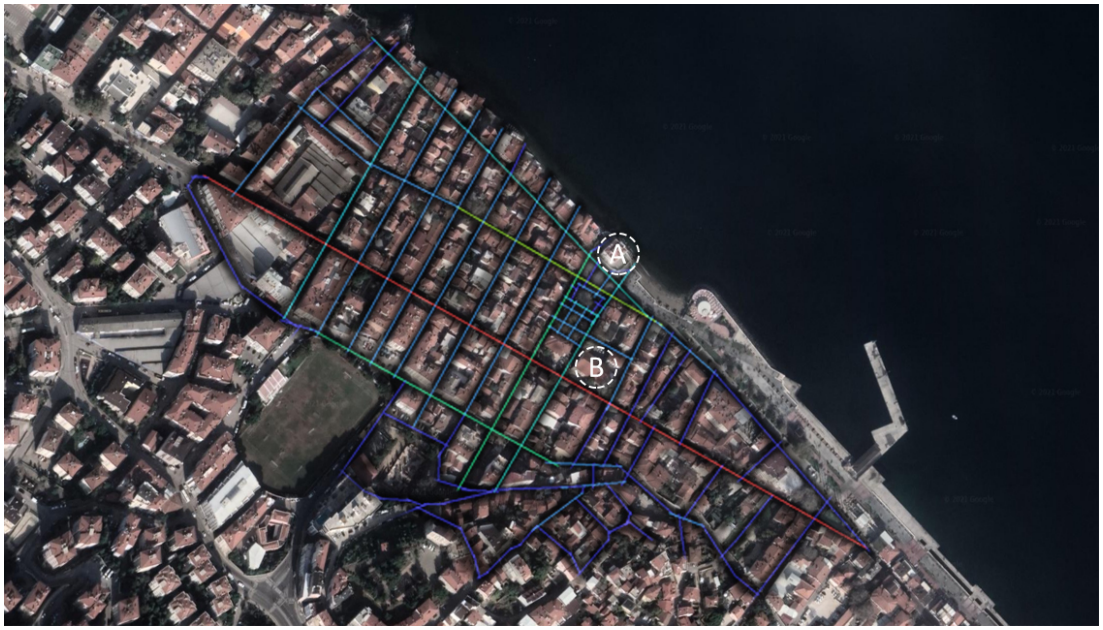

Figure 7. Connectivity graph of the Mudanya (A: Armistice House, B: Uğur Mumcu Cultural Centre)

An isovist is a part of a spatial environment that can be seen from any point in the space. This led Turner *et al.* (2001) to develop a visibility graph that is mutually visible locations in a spatial layout. Visual Graph Analysis (VGA) combines all the isovist fields from all location points of a particular space, based on the logic of an isovist analysis and a *visual graph* can demonstrate which place is more visible. Within the study, visibility is high in the area where the Armistice House is located (in the northeast of the city). Despite the high connectivity of the Mustafa Kemal Paşa Street where Uğur Mumcu Cultural Centre is located, the visibility rate is low (Figure 8).

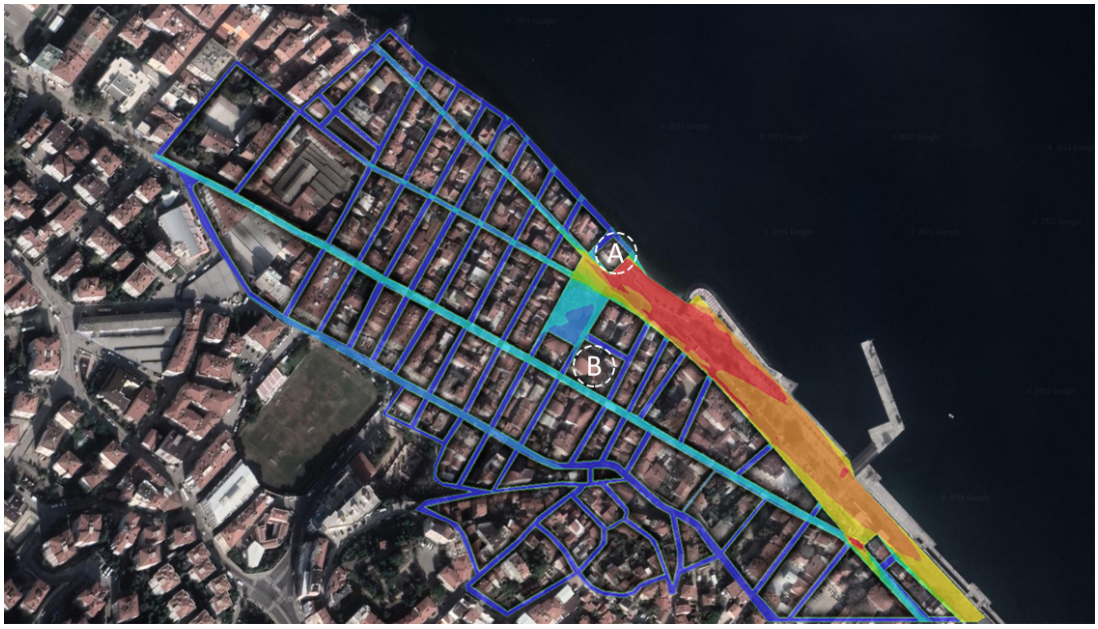

Figure 8. Visibility graph of the Mudanya (A: Armistice House, B: Uğur Mumcu Cultural Centre)

The term *integration* refers to how a street relates to all other streets in a specified street network. Integration counts how deep or shallow one line is about the others and can be called radius-n integration. If the count goes up to three steps away it is called radius-3 integration and it can also be called local integration. Radius-n integration can be referred to as global integration because it depicts integration at the global scale. (Hillier 1996, p.99). According to natural movement theory, a street with high integration value will attract more people (Hillier 1993). Two streets around the Uğur Mumcu Cultural Centre are seen to be highly integrated. The fact that most of the analysed area is the place that Greek citizens used to live in the history. Considering that the former function of the Uğur Mumcu Cultural Centre was a Church, it can be said that the reason might this building has high integration is the social and religious identity of the citizens who used to live in the neighbourhood (Figure 9).

Figure 9. Integration (HH) graph of the Mudanya (A: Armistice House, B: Uğur Mumcu Cultural Centre)

4.2 Overlapped Results of Behaviour and Syntactic Datasets

The behavioural and syntactic maps were overlapped and examined to see if there is any significant correlation between behavioural and syntactic parameters. As can be seen in the overlapping data graph, behavioural parameters are categorized under passive and active activities while syntactical parameters include visibility, connectivity, and integration analyses of the area (Figure 10).

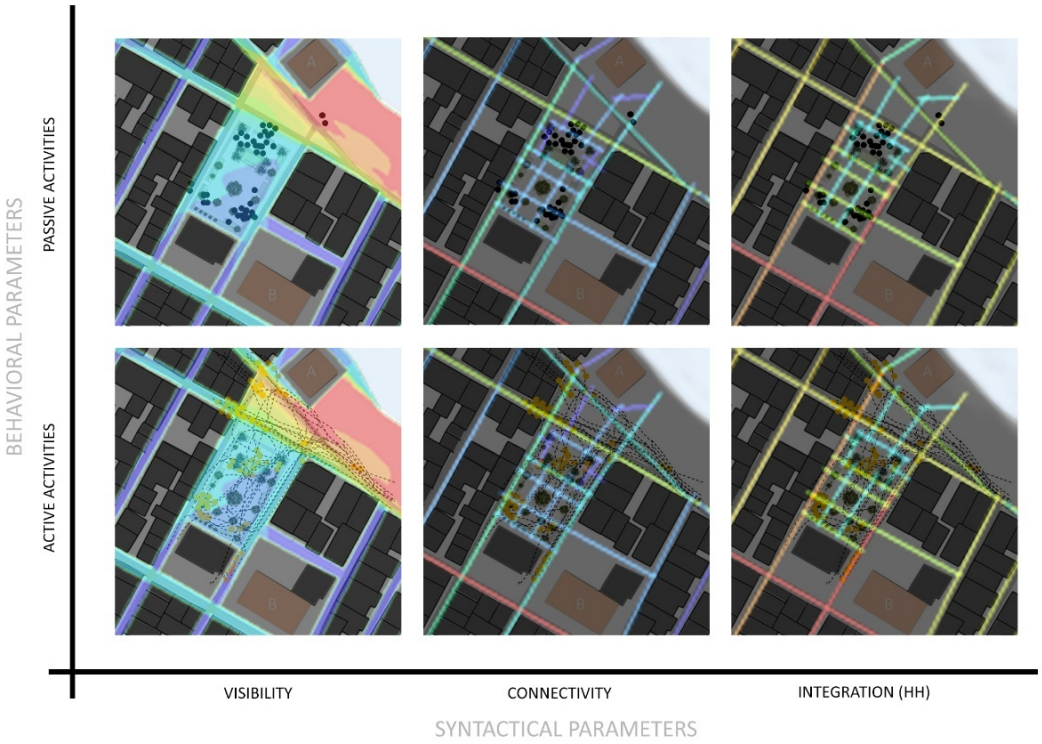

Figure 10. Graph of the Overlapping Data

A high concentration of behavioural data can be explained in front of Armistice House is the high visibility rate of the area. As it can be seen as the high concentration of the traces of active activities, active behaviours mostly occur in front of the urban spaces of the building near the coastline. The Armistice Square in front of the Armistice House is not generally used for passive behaviours. However, most of the passive behaviours happening in the Armistice Park such as chatting, standing, and sitting benefit from the shadow of the trees and benches in the park. Most of the passive behaviours are oriented towards the Armistice House and therefore the shore where the visibility rate is high.

Despite the high connectivity of the Mustafa Kemal Paşa Street (in the south of the B) near the Uğur Mumcu Cultural Centre, there are no passive activities in the street because there is no large urban space. The street is one of the main roads having a high density of vehicle movements. Even though the street has a high number of commercial functions, it has a narrow pedestrian sidewalk. This may be causing the users to walk away as fast as possible to run away from the narrow sidewalks and continuous vehicle flow. Additionally, the street is relatively

noisy because of the cars and circulation of trade so there is not a suitable physical condition for passive behaviours. Moreover, this street has a low visibility rate compared to Armistice Square. Even with the low rate of connectivity in Fevzi Paşa and 12 Eylül Street which carve out Armistice Square, the active behaviour setting density is high. In this case, visibility is a dominant parameter compared to connectivity. Relatively poor behavioural density can be explained in Bilgi Streets' (in the west of the B) with a low connectivity rate.

It can be said that Uğur Mumcu Cultural Centre is more integrated than the Armistice House. Mustafa Kemal Paşa and Bilgi Street that surround Uğur Mumcu Cultural Centre have high integration value when it is compared to the Fevzi Paşa and 12 Eylül Streets which form Armistice Square. However, the behavioural data is the exact opposite that most of the behaviours happen in front of the Armistice House. The main reason for the lack of behavioural modes in the space in front of Uğur Mumcu Cultural Centre is related to the reason that this area is used for a car parking spot. There is a barrier limiting the pedestrian behaviour but not for vehicles to enter. Since the former function of Uğur Mumcu Cultural Centre was a church, it can be said that behavioural modes in front of the building are changed through the years, but the building seems that it is still integrated into the neighbourhood according to the syntactic analyses.

5 CONCLUSIONS

As a result of this study, it can be concluded that visibility value may have a dominant role in behavioural modes as well as physical components in the urban setting. Active behavioural modes are preferred where the visibility rate of the urban space is high. A wide pedestrian road near the coastline, which has high visibility, directs the human behaviour for more active actions rather than sitting and chatting. Besides, passive behaviours are preferred in the park to benefit from the physical components such as benches and shadows of the trees even though the park is located within the interior parts of the urban space and has a low visibility rate. Nevertheless, passive behaviours in the park are mostly oriented toward the coastline and sea where the park has a high visibility rate. With this outcome, it can be asserted that it is important to design urban spaces according to visibility criteria taking into account that physical elements can have an impact on the preference of citizens' behaviour type. Additionally, despite the high connectivity and integration in the streets, the behavioural modes can be less intense because of the lack of physical elements, narrow pedestrian roads and car parking usage in the area.

Moreover, today's behavioural modes of the urban spaces can give a hint about changes in social organisation in the past. Monumental buildings and the spaces around these buildings' behaviour preferences are changing if the social organisation changes through political interventions such as invasion, war of independence and forced migration. Since the monumental buildings in historical urban spaces survived throughout history, connectivity and integration values can be contrasting the behavioural modes depending on the probable social changes in the past. The

change in ethnic origins and religious values in the social structure causes changes in the behavioural patterns of today's urban space even the physical organisation of the space and the buildings have not changed likewise in the Uğur Mumcu Cultural Centre which was used to be the church.

Furthermore, if a buildings' meaning changes because of a public historical event, the spirit of the event may lead to physical changes in the urban setting. For instance, in this case, the Armistice House was used as a residential building in the past, but after the political events which left a mark on the Turkish history, the meaning of the building was changed from the point of view of the people, and it became a symbol of the national independence and the spirit of liberation. Even this spirit can be read from the names such as Armistice Park, Armistice Square, the statue of İsmet İnönü and Mustafa Kemal Paşa Street in the urban domain. To sum up, it can be asserted that symbolic events in history might change the attitudes of the public and impose new meanings on the buildings so, such implicit phenomena affecting the societies may have an effect on the change of the urban spaces and the behavioural modes of the public in time.

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