

CROWD ORIENTED PUBLIC SPACE APPROACH ON THE ISTIKLAL
STREET, ISTANBUL: MANY PEOPLE, IN THE SAME PLACE, AT THE
SAME TIME

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY



BY
NESLİŞAH KESİCİ

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
URBAN DESIGN IN CITY AND REGIONAL PLANNING

JULY 2021

Approval of the thesis:

**CROWD ORIENTED PUBLIC SPACE APPROACH ON THE ISTIKLAL
STREET, ISTANBUL: MANY PEOPLE, IN THE SAME PLACE, AT THE
SAME TIME**

submitted by **NESLİŞAH KESİCİ** in partial fulfillment of the requirements for the
degree of **Master of Science in Urban Design in City in Regional Planning,**
Middle East Technical University by,

Prof. Dr. Halil Kalıpçılar
Dean, Graduate School of **Natural and Applied Sciences**

Prof. Dr. Serap Kayasü
Head of the Department, **City and Regional Planning**

Prof. Dr. Anlı Ataöv Demirkan
Supervisor, **City and Regional Planning, METU**

Examining Committee Members:

Assoc. Prof. Dr. Yücel Can Severcan
City and Regional Planning, METU

Prof. Dr. Anlı Ataöv Demirkan
City and Regional Planning, METU

Assist. Prof. Dr. A. Burak Büyükcivelek
City and Regional Planning, METU

Prof. Dr. Burak Pak
Architecture, KU Leuven

Assoc. Prof. Dr. Nilgün Çolpan Erkan
Urban and Regional Planning, Yildiz Technical University

Date: 13.07.2021



I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Surname : Neslişah Kesici

Signature :

ABSTRACT

CROWD ORIENTED PUBLIC SPACE APPROACH ON THE ISTIKLAL STREET, ISTANBUL: MANY PEOPLE, IN THE SAME PLACE, AT THE SAME TIME

Kesici, Neslişah

Master of Science, Urban Design in City and Regional Planning

Supervisor: Prof. Dr. Anlı Ataöv Demirkan

July 2021, 149 pages

The concepts of public space and crowd have been in a close relationship in every period of history. Especially in today's metropolises, this relationship leads to significant changes and transformations in urban dynamics. Approaches on human-oriented public space focus on the relationship between space and people but people is often dealt as an individual but not as a crowd. People's spatial perception and behavior also rely on many other people who are present in the same space at the same time. This thesis aims at making theoretical, methodological and practical professional contributions to the existing human-oriented public space approaches by establishing the relationship between the space and crowding. It does that by reviewing multi-disciplinary studies on the crowd and public space approaches in association with global trends. This association allows identifying different aspects of the crowd including social and psychological, the behavior of the crowd triggered by that in public space, physical movement dynamics, crowd management, public life activities and the use of the crowd as a resource.

Istiklal Street, the most iconic pedestrian street in a crowded metropolis like Istanbul, is chosen as the case study area for analyzing the social and physical aspects of the

crowd. Istiklal Street is a living system consisted of three main public squares and various small public spaces along two pedestrian street segments. The crowd data is collected from the local newspaper and internet news archive. Observable videos and text contents of 80 cases documented on crowding events between 2006 and 2019 on the Istiklal Street were systematically watched and scanned to identify crowding types and the characteristics of the places where crowding occurred.

The analytical part was conducted in three phases. First, the network analysis of social and physical aspects helped group the cases with similar crowd patterns, which revealed three basic contexts including daily life, mass gathering and chaos. Second, the creative mapping method was used to illustrate the relationship of crowd contexts with different social identities and physical dynamics with spatial features. To do that, the macro and micro scale spatial analysis maps were overlapped with the maps representing locations of crowding cases containing the social and physical analysis. Third, The synthesis of the findings is made by interpreting the relationship between those layers was interpreted separately in reference to different evaluation criteria obtained from the literature synthesis. Respectively, for everyday life crowds, the attributes of attractiveness, capacity, functionality and legibility are used. Mass gathering crowds are based on the criteria of inclusivity, memorability, and permeability. Chaotic crowds deal with the relationship between space and crowding on the principles of public safety, controllability and evacuation.

The result of the study covers the evaluation of crowded cases in the sections of three squares and two street segments on Istiklal Street. In addition, there are some suggestions such as simulation, design guideline and crowd management application that can improve the relationship between public space and crowd in the final part of the thesis

Keywords: Crowd Analysis, Public Space Design and Management, Everyday Life, Mass Gathering Event, Chaos-Emergency Planning

ÖZ

İSTANBUL İSTİKLAL CADDESİ'NDE KALABALIK ODAKLI KAMUSAL MEKAN YAKLAŞIMI: ÇOK SAYIDA İNSAN, AYNI ZAMANDA, AYNI MEKANDA

Kesici, Neslişah

Yüksek Lisans, Kentsel Tasarım, Şehir ve Bölge Planlama

Tez Yöneticisi: Prof. Dr. Anlı Ataöv Demirkan

Temmuz 2021, 149 sayfa

Kamusal alan ve kalabalık kavramları tarihin her döneminde yakın bir ilişki içerisinde olmuştur. Özellikle günümüz metropollerinde bu ilişki kentsel dinamiklerde önemli değişim ve dönüşümlere yol açmaktadır. İnsan odaklı kamusal alan yaklaşımları, mekan ve insanlar arasındaki ilişkiye odaklanır, ancak insanlar genellikle bir kalabalık olarak değil, bir birey olarak ele alınır. İnsanların mekansal algısı ve davranışı aynı anda aynı mekanda bulunan diğer birçok insana da bağlıdır. Bu tez, mekan ve kalabalık arasındaki ilişkiyi kurarak mevcut insan odaklı kamusal alan yaklaşımlarına teorik, metodolojik ve uygulamaya yönelik katkılar sağlamayı amaçlamaktadır. Bunu, küresel eğilimlerle bağlantılı olarak farklı disiplinlerin kalabalık çalışmaları ve kamusal alan yaklaşımlarını ilişkilendirerek yapar. Bu ilişkilendirme, kalabalığın sosyal ve psikolojik dahil olmak üzere farklı yönlerini, kalabalığın kamusal alanda tetiklediği davranışları, fiziksel hareket dinamiklerini, kalabalık yönetimini, kamusal yaşam aktivitelerini ve kalabalığın bir kaynak olarak kullanımını tanımlamaya olanak tanır.

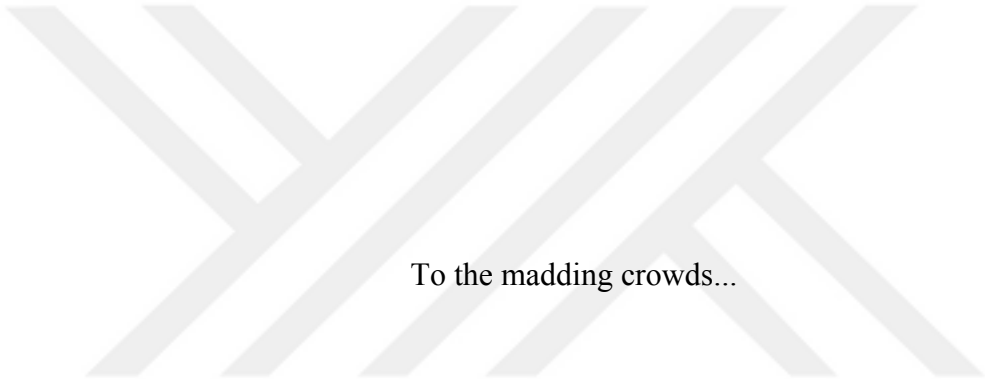
İstanbul gibi kalabalık bir metropolün en ikonik yaya caddesi olan İstiklal Caddesi, kalabalığın sosyal ve fiziksel yönlerini analiz etmek için çalışma alanı olarak

seçilmiştir. İstiklal Caddesi, iki yaya caddesi boyunca üç ana meydan ve çeşitli küçük kamusal alanlardan oluşan canlı bir sistemdir. Kalabalığa ilişkin veriler, yerel gazete ve internet haber arşivi taramasıyla elde edilmiştir. 2006-2019 yılları arasında İstiklal Caddesi'ndeki kalabalığa ilişkin belgelenen 80 vakanın gözlemlenebilir videoları izlenerek ve metin içerikleri incelenerek kalabalık türleri ve kalabalıklaşmanın meydana geldiği yerlerin özellikleri tespit edilmiştir.

Analitik kısım üç aşamada gerçekleştirilmiştir. İlk olarak, kalabalığın sosyal ve fiziksel yönlerinin ağ analizi, gündelik yaşam, toplanma ve kargaşa gibi üç temel bağlamı ortaya çıkaran benzer kalabalık örüntülerine sahip vakaları gruplandırır. İkinci olarak, farklı sosyal kimliklere ve fiziksel dinamiklere sahip kalabalık bağlamlarının mekansal özelliklerle ilişkisini göstermek için yaratıcı haritalama yöntemi kullanılır. Bunu yapmak için, makro ve mikro ölçekli mekansal analiz haritaları, sosyal ve fiziksel analizi içeren kalabalıkların konumlarını temsil eden haritalarla karşılaştırılmıştır. Son olarak, literatür sentezindeki değerlendirme kriterleri üzerinden, sentez harita katmanları arasındaki ilişki sonucunda ortaya çıkan bulgular yorumlanır. Gündelik yaşamdaki kalabalıklar için çekicilik, kapasite, işlevsellik ve okunabilirlik özellikleri kullanılır. Toplanma kalabalıkları, kapsayıcılık, akılda kalıcılık ve geçirgenlik kriterlerine dayanmaktadır. Kargaşa kalabalıkları, kamu güvenliği, kontrol edilebilirlik ve tahliye ilkeleri üzerinde alan ve kalabalık arasındaki ilişkiyi değerlendirmektedir.

Çalışmanın sonuç kısmı, İstiklal Caddesi'ndeki üç meydan ve iki sokak kesitine ait kalabalık vakalarının mekanla kurduğu ilişkinin değerlendirmesini kapsamaktadır. Buna ek olarak, tezin son bölümünde kamusal alan ve kalabalık ilişkisini geliştirebilecek simülasyon, tasarım kılavuzu ve kalabalık yönetimi uygulaması gibi öneriler bulunmaktadır.

Anahtar Kelimeler: Kalabalık Analizi, Kamusal Mekân Tasarımı ve Yönetim, Gündelik Yaşam, Kitle Etkinlikleri, Kaos-Acil Durum Planlaması



To the madding crowds...

ACKNOWLEDGMENTS

The people I had the chance to meet who supported me and fed me with their ideas during this long and tiring research process deserve a special thanks.

First and foremost, I would like to express sincere gratitude to my supervisor Prof. Dr. Anlı Ataöv Demirkan, who has contributed to this research with her positive guidance, insights, and encouragements. I am especially grateful to her for patiently trying to understand my thoughts and to guide me in the direction of her scientific knowledge and experience.

I would like to thank to examining committee members; Assoc. Prof. Dr. Yücel Can Severcan, Assist. Prof. Dr. Burak Büyükcivelek, Prof. Dr. Burak Pak and Assoc. Prof. Dr. Nilgün Çolpan Erkan for their valuable participation and contributions to the thesis.

I would also like to express my admiration for Jan Gehl, whose conceptualization and visualization approaches I have greatly benefited from in this thesis, for his books "Cities for People" and "How to Study Public Life", which inspired me to think human-oriented about public space.

My indispensable teammate, Gamze Dinç, has never left me alone with her presence and has always been someone who pulls me up with her life energy. Ayşegül Erçin and Irmak Bilir are the most valuable friends that the urban design program has given me. The intellectual background and studio experiences of Assoc. Prof. Dr. Tolga İslam, Rüya Erkan and Araf Öykü Türken, who are my most entertaining and productive colleagues, have also brought different perspectives in this thesis. I would also like to thank Damla Tüfekli, Birtan Yılmaz and Emre Çelebi, with whom we have formed an amateur thesis committee, for their contribution to the thesis for their informative discussion environment.

My dear mother, Sevtap Koç, has made countless sacrifices throughout my education and has always supported me under all circumstances, so she has a great effort in this thesis as much as I did. I would also like to thank the remaining members of my beautiful family of six, my grandmother Fatma, grandfather Erol, aunt Mehtap and cousin Almira for their presence and support.

My patient, understanding and wise Sevgilim (Emre) Söylemez, everything I need in this difficult process, I am very lucky that life brought you to me as a soulmate, teammate and playmate. The presence of you and our adorable cat Harvey in our home made this process easier and more enjoyable for me.



TABLE OF CONTENTS

ABSTRACT	v
ÖZ	vii
ACKNOWLEDGMENTS	x
TABLE OF CONTENTS	xii
LIST OF TABLES	xv
LIST OF FIGURES	xvi
CHAPTERS	
1 INTRODUCTION	1
1.1 Context and Problem Definition	1
1.2 Aim of the Study and Research Questions	4
1.3 Methodological Framework	6
1.4 Structure of the Thesis	9
2 AN OVERVIEW OF THE CROWD AND PUBLIC SPACE	13
2.1 Global Crowding Trends	17
2.2 Crowd Studies	19
2.2.1 Understanding Crowd Behaviors	20
2.2.2 Analyzing and Modelling Crowd Movements	22
2.2.3 Planning for Crowd Safety and Management	25
2.2.4 Generating Crowd-Sourced Data	28
2.3 Public Space Studies	30
2.3.1 Environmental Perception and Spatial Behavior	31
2.3.2 Spatial Form and Pedestrian Studies	34

2.3.3	Public Space Activities and Street Life	37
2.3.4	Smart Tools and Civic Placemaking.....	41
2.4	Evaluation of the Literature Review	44
3	THE CROWD PHENOMENON ON THE İSTİKLAL STREET.....	47
3.1	Evolution of The Crowd.....	48
3.2	Social Identity of Crowd	53
3.2.1	Composition.....	54
3.2.2	Motivation.....	57
3.2.3	Emotion.....	61
3.2.4	Organization.....	64
3.3	Physical Dynamics of Crowd.....	66
3.3.1	Size.....	67
3.3.2	Duration	69
3.3.3	Behavior.....	70
3.3.4	Form.....	72
3.4	Complexity of Crowd Contexts.....	75
4	THE CROWD AND PUBLIC SPACE RELATIONSHIP ON THE İSTİKLAL STREET	79
4.1	Crowd Analysis	80
4.1.1	Everyday Life Crowds	81
4.1.2	Mass Gathering Crowds.....	87
4.1.3	Chaotic Crowds.....	93
4.2	Spatial Analysis.....	98
4.2.1	Macro Scale Analysis	99

4.2.2	Micro Scale Analysis.....	103
4.3	Assessment of the Crowd and Public Space Relationship.....	110
4.3.1	Assessment Criteria	113
4.3.2	Squares	115
4.3.3	Street Segments	118
4.4	Improving the Crowd and Public Space Relationship	120
5	CONCLUSION	123
5.1	Theoretical Reflections of the Crowd-Oriented Public Space Approach.....	125
5.2	Limitations of the Methodology and Research Process.....	127
5.3	Practical Professional Contributions for Public Space Design and Management	128
5.4	Suggestions and Further Studies.....	130
	REFERENCES	135
	APPENDICES	
A.	Sources of Crowd Cases	147
B.	Categorization of Crowd Cases	148

LIST OF TABLES

TABLES

Table 1.1. Methodological Framework.....	7
Table 4.1. Proportional distribution of crowd contexts	80
Table 4.2. Proportional distribution of everyday life crowds	81
Table 4.3. Frequencies and percentages of everyday life composition	82
Table 4.4. Frequencies and percentages of everyday life motivation.....	83
Table 4.5. Frequencies and percentages of everyday life emotion	84
Table 4.6. Frequencies and percentages of everyday life organization	84
Table 4.7. Frequencies and percentages of everyday life size and duration.....	85
Table 4.8. Frequencies and percentages of everyday life form and behavior.....	86
Table 4.9. Proportional distribution of mass gathering crowds	87
Table 4.10. Frequencies and percentages mass gathering composition.....	88
Table 4.11. Frequencies and percentages of mass gathering motivation.....	89
Table 4.12. Frequencies and percentages of mass gathering emotion.....	90
Table 4.13. Frequencies and percentages of mass gathering organization	90
Table 4.14. Frequencies and percentages of mass gathering size and duration.....	92
Table 4.15. Frequencies and percentages of mass gathering form and behavior....	92
Table 4.16. Proportional distribution of chaotic crowds.....	94
Table 4.17. Frequencies and percentages of chaos composition	95
Table 4.18. Frequencies and percentages of chaos motivation.....	95
Table 4.19. Frequencies and percentages of chaos emotion	96
Table 4.20. Frequencies and percentages of chaos organization	96
Table 4.21. Frequencies and percentages of chaos size and duration.....	97
Table 4.22. Frequencies and percentages of chaos form and behavior.....	98
Table 4.23. Assessment criteria	114

LIST OF FIGURES

FIGURES

Figure 1.1. Structure and the conceptual flow of the thesis	12
Figure 2.1. Crowd in public space, literature synthesis scheme	15
Figure 2.2. Experiment for crowd dynamics (Helbing, Buzna, Johansson, & Werner, 2015, pp. 6-7)	22
Figure 2.3. Flocking rules of Reynolds (Pelechano & Malkawi, 2008, p. 378)	23
Figure 2.4. Cellular automation model (Burstedde, Klauck, Schadschneider, & Zittartz, 2001, p. 511)	24
Figure 2.5. Agent-based simulation (PedSim, 2021)	24
Figure 2.6. Crowd management principles (National Disaster Management Authority, 2014, p. 11)	26
Figure 2.7. Crowd management application (Notting Hill Carnival Crowd Movement Data Book, 2017, p. 43)	27
Figure 2.8. Technological background for crowd sourced data (GSMA Smart Cities, 2019, p. 10)	29
Figure 2.9 Participatory Sensing and Crowd Management in Public Spaces, Lord Mayor's Show (Franke, Lukowicz, Wirz, & Mitleton, 2013)	30
Figure 2.10. Maslow's Hierarchy of Needs (McLeod, 2018, p. 1)	32
Figure 2.11. Proxemics (Hall, 1968, p. 93)	33
Figure 2.12. A scheme of the cognitive environment that guides the collection of existing information in the environment. by Garling and Golledge (1989, p. 215)	34
Figure 2.13. Five elements of Lynch (1960) to define image of the city	35
Figure 2.14. Serial vision by Cullen (1961)	36
Figure 2.15. Pattern typologies by Alexander (1977)	36
Figure 2.16. Grid scheme and pedestrian marking (Whyte, 1980)	39
Figure 2.17. Environmental quality and pedestrian activities (Gehl, Life between buildings: using public space., 2011)	39
Figure 2.18. Social interactions correlated to street traffic by Appleyard (1981)	40
Figure 2.19. Gehl's diagrams for people and place (Gehl, 2011, p. 200)	41

Figure 2.20. Form and function comparison between traditional and crowdsourced data (Crooks, et al., 2015, p. 9).....	43
Figure 3.1. The crowd of Istiklal Street in the timeline	49
Figure 3.2. Crowd cases by key periods of the timeline	52
Figure 3.3. Social identity of the crowd	53
Figure 3.4 Crowd composition categories	55
Figure 3.5. Crowd composition formed by individuals (personal archive)	55
Figure 3.6. Mixed composition passive crowd groups (Snapshots from the video sections of case 11 and case 77).....	56
Figure 3.7. Special composition active groups (Snapshots from video sections of case 66 and case 54).....	57
Figure 3.8. Istiklal Street crowd motivation categories	58
Figure 3.9. Casual motivated crowds (Snapshots from video sections of case 29 and case 31)	58
Figure 3.10. Celebration motivated crowds (Snapshots from video sections of case 65 and case 67).....	59
Figure 3.11. Activism motivated crowds (Snapshots from video sections of case 52 and case 51).....	59
Figure 3.12. Demand motivated crowds (Snapshots from video sections of case 40 and case 42).....	60
Figure 3.13. Panic motivated crowds (Snapshots from video sections of case 12 and case 10)	60
Figure 3.14. Conflict motivated crowds (Snapshots from video sections of case 2 and case 16).....	61
Figure 3.15. Istiklal Street crowd emotion categories	62
Figure 3.16. Crowds that impose positive and negative emotions (Snapshots from video sections of case 74 and case 31).....	63
Figure 3.17. Excited and depressed emotions of the crowd (Snapshots from video sections of case 46 and case 43).....	63
Figure 3.18. Istiklal Street crowd organization categories.....	64

Figure 3.19. Crowds organized by the authority and civil society (Snapshots from video sections of case 50 and case 44)	65
Figure 3.20. Spontaneous and police-controlled crowds (Snapshots from video sections of case 78 and case 23)	66
Figure 3.21. Physical dynamics of crowd	67
Figure 3.22. Istiklal Street crowd size categories	68
Figure 3.23. Crowds of different sizes and densities (Snapshots from video sections of case 25 and case 27)	69
Figure 3.24. Istiklal Street crowd duration categories	70
Figure 3.25. Long-term and short-term crowds (Snapshots from video sections of case 34 and case 11)	70
Figure 3.26. Istiklal Street crowd behavior categories	71
Figure 3.27. Sitting, standing, and walking behaviors of the crowds (Snapshots from video sections of case 43, case 67 and case 19)	72
Figure 3.28. Unidirectional and bidirectional flows of walking crowds (Snapshots from video sections of case 71 and case 26)	72
Figure 3.29. Istiklal Street crowd form categories	73
Figure 3.30. Area-formed crowds (Snapshots from video sections of case 1 and case 19)	74
Figure 3.31. Point-formed crowds (Snapshots from video sections of case 60 and case 79)	74
Figure 3.32. Line-formed crowds (Snapshots from video sections of case 64 and case 41)	75
Figure 3.33. The network analysis of crowd parameters produced with “Gephi” network analysis and visualization tool	76
Figure 3.34. Crowd pattern of everyday life, mass gathering and chaos	77
Figure 4.1. Location distribution of crowd contexts	81
Figure 4.2. Location distribution of the everyday life crowds	82
Figure 4.3. Location distribution of the mass gathering crowds	88
Figure 4.4. Location distribution of the chaotic crowds	94

Figure 4.5. Natural and environmental zoning	100
Figure 4.6. Accessibility and integration map	102
Figure 4.7. Solid-void map	104
Figure 4.8. Land use map.....	106
Figure 4.9. Perceivable spatial elements map (Beyoğlu District Chronological Distribution of Registered Landmarks and Civil Architecture, 2008).....	107
Figure 4.10. Public safety elements and emergency map	109
Figure 4.11. The crowd and space relationship on the Istiklal Street	111
Figure 5.1. Sample crowd oriented public space design guideline for Istiklal Street	131
Figure 5.2. Sample crowd simulation on Istiklal Street.....	133
Figure 5.3. Sample crowd management app interface	134

CHAPTER 1

INTRODUCTION

1.1 Context and Problem Definition

Public space is the center of attraction for citizens as it is a place to see, hear, acquire information, and interact with other citizens. With the effect of this attractiveness, many people in the same space at the same time create the crowd phenomenon in the public space. It is not only the gathering effect of the public space that triggers the formation of the crowd. Crowds also produce their own space, as Lefebvre (2017, p. 42) claims, “*The substance is the crowd (or molecules, corpuscles), it is a body. The crowd is a body, the body is a crowd (of cells, of liquids, of organs)*”. From the agora in ancient Greece to the transportation hubs in today's metropolises, public space has been associated with the crowd phenomenon. With the industrial revolution, the overcrowding in cities brought some inadequacies such as housing, infrastructure, and green areas. Rapid and unplanned urbanization under these problems, public space lost its importance and public life was neglected.

The significance of public space and public life has been brought into the attention of social sciences by thinkers like Jane Jacobs since the 1960s (Gehl & Svarre, 2013). Crowds in city centers, motivated by everyday life motivation such as shopping, home-work travel, socializing and recreation, were drawn to residential areas in the suburbs. Due to income inequality and social inequality in post-industrial societies, the crowds that created everyday life were replaced by the reaction of the crowds that organized social movements. In the 1980s, due to the global competition of cities, public space design for mass gathering events came to the fore as a strategy of crowding the public space (Still, 2014). Planning and management of many people

gathering in the same place has also set itself as an issue in the agenda of cities for mass gathering events like sports competitions, religious rituals, festivals, millennium celebrations. In order to be prepared for chaotic situations, many studies carried out with a focus on risk assessment and emergency evacuation (Challenger, Clegg, & Robinson, 2009). With the Covid-19 pandemic, the crowd has turned into one of the most critical chaotic situations experienced in public space. The public space has been abandoned and the phenomenon of crowd in public spaces has turned into a risk factor. All of the social distance rules and lockdowns target to disperse the generation of the crowd in public space. Such changes in the meaning of the relationship between public space and crowding in history requires a need of in-depth understanding of crowd phenomenon in public space and exploring design clues for how public space can accommodate it. The crowd in public space refers to people who are in the same place in a daily race and rush, a community that needs to be planned for unity and solidarity in a mass gathering event, and a big number of people who needs to be managed in a chaotic situation.

The crowd phenomenon is explored in reference to its social, physical and spatial aspects in different disciplines including social psychology, computer modelling, event management and big data analytics. Social psychology looks at the driving forces of crowd behavior and the social identity of the crowd. Reicher (2001, p. 18) explains the social sciences approach to the crowd phenomenon as *“Crowds are the elephant man of social sciences. They are viewed as something strange, something pathological, something monstrous. At the same time they are viewed with awe and with fascination”*. Natural sciences like computer modelling, artificial intelligence and applied mathematics examined the complex decision making mechanism and movement dynamics of the crowd. Research and practice on mass gathering event management, risk assessment and evacuation planning deal with the crowd in terms of organization and management. Furthermore, technological developments in IoT and big data is interested in the transformation of the crowd into a system producing, and evaluating data. Surowieck (2004) names this as "The wisdom of the crowds".

Despite the significance of the crowd phenomenon in urban design and planning particularly in the analysis, design and management of public space, review of existing literature shows that there is a lack of a crowd-oriented holistic public space approach. Studies in everyday life, human-oriented design, and environmental psychology examine the phenomenon of crowd in reference to its social aspects such as activities, social relations (e.g., Goffman, 1966; Whyte, 1980; Lefebvre, 1991; Gehl, 2013). The compositional characteristics of the crowd that affect the spatial perception, behavior and movement of individuals are often ignored. Studies, on the other hand, which take a closer look at the compositional aspects of the crowd highlight pedestrian traffic, crowd optimization in public spaces and public transportation (e.g., Fruin, 1971; Hillier & Hanson, 1984; Al-Kodmany, 2013). These studies intend to understand the crowd phenomenon through pedestrian counting and density estimation but they ignore the social aspects of the crowd. The crowd character and behavior as well as its relation to space are also often disregarded.

The spatial character of public space can affect both the social and physical aspects of the crowd phenomenon. Additionally, the crowd both defines the identity of the place with its social aspects and produces its own space with its physical aspects as De Certeau (1980, p. 97) mentions “*The particular spaces of the city are created by innumerable actions, all of which bear the imprint of people's intentions.*”. Changes in the history of urbanization and the deficiencies of current public space approaches in understanding the human-space interaction call for a holistic and interdisciplinary crowd-oriented public space approach to understand the relationship between public space and crowding.

A crowd-oriented public space approach should be tested with the spatial characteristics of a public space that stands out with its crowdedness. To do that, this study takes the Istiklal Street as an iconic crowd space and an integrated public space system in the context of a metropolis like Istanbul, and explores the potential relationship between crowding and public space. Istiklal Caddesi is a 1.4 km long pedestrian street connecting Taksim and Tünel squares in Beyoğlu district. This place has a multi-layered structure as it is a meeting and interaction space for

different social segments of the society and people from different cultures. The street is busy day and night, seven days a week due to important socio-cultural events as well as commercial activities.

1.2 Aim of the Study and Research Questions

Gehl and Svarre (2013, p. 2) offers the metaphor of meteorology to explain research on public life: *“Like the weather, life is difficult to predict... Masses of data have been gathered over the years concerning the interaction of life and space in cities, and just like meteorologists’ knowledge about the weather, this data can provide greater understanding of city life and predict how it will presumably unfold in the given framework.”*. Inspired by the metaphor of Gehl and Svarre, this thesis also argues that crowding and its relationship with space is just as like that and the understanding of how that relationship takes place deserves a closer scientific look. To form the basis of a crowd oriented public space approach, this thesis intends to respond to the following main research question: “How can the crowd phenomenon be explained in relation to the spatial characteristics of the Istiklal Street in Istanbul?” In order to respond this question, the study tries to answer two analytical and one interpretative sub research questions. These are: (1) “What is the social and physical crowd character of the Istiklal Street?” (2) “What are the human oriented spatial characteristics of the Istiklal Street?” (3) “What is the relationship between crowding and space on the Istiklal Street?”

To answer these questions, the thesis, first, draws the complex nature of social and physical aspects of the crowd phenomenon in the Istiklal Street in reference to three contexts of the crowd including everyday life, mass gathering, and chaos. Second, the thesis examines the physical characteristics of the street at two different scales, macro and micro to show both the physical construction of the space at the district level and the relations that may exist between different physical attributes at the street level. Third, the thesis develops a systematic interpretation on the spatial pattern of the crowding character and behavior on the Istiklal Street and its possible

linkages to the existing spatial characteristics. By revealing the research outcomes, this thesis aims to contribute in three ways including theoretical, methodological, and practical professional.

First, the crowd-oriented public space approach aims at making a theoretical contribution to spatial studies by combining an interdisciplinary concept, crowding, with the existing human oriented public space research. The thesis theoretically discusses public space not only as a spatial attribute and its relation to people at the individual level but also the social and physical character of many people coming together for different reasons in the same place at the same time. Accordingly, while studies on crowding highlight findings on crowd behavior, movement, safety and management as well as the crowd as a source of data, studies of public space examine issues including spatial behavior, form, activities, pedestrian mobility and street life as well as smart urbanism and participation.

Second, this thesis makes a methodological contribution to existing public space studies by integrating a variety of analytical and visualization tools in the synthesis of the crowd-space relationship, which in fact draws references from two different disciplines. The methodological framework evolved from within the application of methods and techniques frequently used in public space and, in turn, is eventually constructed upon the findings of their application. Thus, the categorization of crowd data, the identification of crowd contexts, spatial analysis techniques and relating crowd contexts to spatial data are accordingly identified. To do that, the crowd events in the Istiklal Street were documented from the pictures and videos of newspapers as far back as it was possible. The crowd and spatial data were extracted in line with significant indicators highlighted in theory. They were first categorized according to crowd contexts then systematized in reference to the parts and segments of the street. Both the frequency and the quality of appearance of each variable, both crowd-related and spatial, was identified. This, in turn, created the database for the analysis. Correlation matrices and mapping both relational and for separate indicators were produced.

Third, practical professional contribution of the thesis is linked to how spatial design can accommodate different types of crowds and how these crowds can be managed to enhance people's safety and well-being in public space. Research outcomes allow making an interpretation of possible design guidelines for designers and the methodology used to reveal that can be applied in crowd-friendly public space design processes. This approach can be a resource for practices that aim at improving the negative effects on the quality of everyday life, guiding the planning and management of mass events, and determining the stages of preparation and intervention against possible chaotic situations.

1.3 Methodological Framework

This thesis develops the methodological framework of a crowd-oriented public space approach. The factors that determine the relationship between crowding and public space are revealed in the synthesis of literature reviews on these two concepts. The Istiklal Street is chosen as the case area because it offers an integrated public space system consisting of two street segments while bringing three squares together. The Istiklal Street represents an iconic pedestrian street that is famous for being the most crowded street of Istanbul, a metropolis of 16 million inhabitants (İBB , 2021). The popularity of the street makes it possible to attract the attention of the news. This, in turn, makes available many written and visual data on the crowds. As can be seen in Table 1.1, the methodological framework is designed to detail the methodological components in relation to the research questions of the thesis.

Accordingly, the *1st Research Question* aims at exploring the physical and social characteristics of the crowd on Istiklal Street. The *2nd Research Question* aims at revealing the human-oriented spatial features of Istiklal Street. The *3rd Research Question* examines the association between crowding and the Istiklal Street, which is an integrated public space itself. This section presents the methodological approach developed for each research question, including cases, variables, data gathering and analysis techniques.

Table 1.1. Methodological Framework

RQ	Cases	Data Gathering	Variables	Data Analysis	Findings
RQ1: <i>What is the social and physical crowd character of the Istiklal Street?</i>	News text, photo and 1-minute video recording of 80 crowd cases between 2006 and 2019.	News archive scanning with the concepts of "Crowd" and "Istiklal Street".	-Composition -Motivation -Emotion -Organization -Size -Duration -Form -Behavior	Categorization with video observation and content analysis of news text. Grouping categories by Gephi Network Analysis.	Crowd characteristics of Everyday life crowds, Mass gathering crowds and Chaotic crowds
RQ2: <i>What are the spatial characteristics of the Istiklal Street?</i>	Beyoğlu district in macro scale and Istiklal Street in micro scale	Conservation and implementation plans, previous studies in the field, aerial photos, site observation	-Zoning -Accessibility -Land use -Spatial elements -Solid-Void -Safety elements	Spatial analysis by geographical information systems and mapping by visualizing programs.	Spatial characteristics of squares and street segments
RQ3: <i>What is the relationship between crowd and space on the Istiklal Street?</i>	Everyday life, mass gathering and chaotic crowds in squares and street segments	Findings of the first and second research questions	-Attractiveness -Capacity -Functionality -Legibility -Inclusiveness -Memorability -Permeability -Public Safety -Controllability -Evacuation	Basic statistics and location based creative mapping on crowd data. Overlapping the crowd map and spatial analysis maps.	Assessment of the relationship of three crowd types and the 5 parts of the street

RQ1: *What is the social and physical crowd character of the Istiklal Street?*

To access detailed and various case related information about the crowd on the Istiklal Street, this study chose to access the crowded situations that have taken place on the street in the past. This allowed understand crowding in line with social and spatial breaking points of the street history. Otherwise, it would not be possible to directly observe the cases of crowding in a limited period and particularly during

Covid 19 restrictions and lockdowns. Additionally, to understand the social and physical character of the crowd from an analytical point of view, it was needed to create a database of crowd cases on the Istiklal Street. Local and digital press news obtained by searching the Turkish words "İstiklal Caddesi" and "kalabalık" on the "Google News" search engine form the database of this research. In case of accessing more than one news source belonging to the same crowd situation, only one new source was evaluated. In addition, news that could not be accessed on at least one minute video recordings were not taken into consideration, as it would not be possible to observe crowd situations. If the video of the news is longer than one minute, the one-minute scene that most strongly reflects the character of the crowd was clipped in line with the news headline. A total of 80 news texts and news related videos between 2006 and 2019 were accessed (see appendix A).

The social and physical variables extracted from the crowd literature are used to guide the content analysis technique applied the news texts and the observation of 1-minute video segments. This data was categorically classified in reference to the social parameters including composition, motivation, organization, and emotion, and the physical parameters including size, duration, behavior, and form. These categories are too complex to understand the context of crowding cases in public space. For this reason, crowd patterns should be analyzed with an inductive approach over the repetition and frequency relationship between the categories. As a result of the analysis made with Gephi social network analysis technique, cases with similar crowd patterns express three different contexts of the crowd such as everyday life, mass gathering and chaos.

RQ2: *What are the human oriented characteristics of the Istiklal Street?*

This research question aims at applying a spatial analysis method. It does that by integrating human design indicators at macro and micro scales. The macro scale analysis covers the Beyoğlu district and its periphery. It includes spatial attributes including natural and environmental zoning, network and transportation. The micro scale analysis covers Taksim, Galatasaray and Tünel squares and the street segments

between these squares. This analysis used spatial attributes including solid-void, land use, perceived spatial elements and public safety. Macro and micro scale data was gathered from urban conservation and implementation plans, previous studies in the field, site observation and aerial photos. The analyses were presented via Geographic information systems and visualization programs.

RQ3: *What is the relationship between crowding and space on the Istiklal Street?*

This research question aims at descriptively examining the overlap of crowd analysis with spatial analysis. To do that, creative mapping was used to combine spatial characteristics with social and physical parameters everyday life, mass gathering and chaos crowds. For creative mapping, the location of crowded cases are positioned in Taksim, Galatasaray, Tünel squares or Taksim-Galatasaray and Tünel-Galatasaray segments. Additionally, simple statistics of the social and physical crowd analyses were comparatively integrated to these five different parts of the street. Crowd maps were created by using the frequency of social and physical parameters, calculating their percentages, and by locationally positioning them on the map with a presentation of the location's spatial characteristics.

Moreover, the relationship between crowd-oriented parameters for everyday life, mass gathering and chaotic crowds with spatial parameters of public space also revealed that certain character of the place may foster certain type of crowd context. Respectively, everyday life crowding may affect the attractiveness, capacity, functionality, and legibility of public space. Mass gathering crowding may affect the inclusiveness, memorability, and permeability of public space. Chaotic crowding may affect public safety, controllability, evacuation of a public space in an emergency.

1.4 Structure of the Thesis

This thesis includes five main chapters. Figure 1.1 shows the flow of the thesis as designed through the relationships established between chapters. Accordingly, each

chapter is constructed upon what is discussed in the previous chapter. As an introduction, Chapter 1 covers the definition of the problem that forms the basis of the research topic, the methodological approaches developed on the contextual framework, and the general structure of the thesis with research questions.

The following part, Chapter 2 provides a synthesis of the theoretical framework on the relationship between human oriented approaches in public space and multi-disciplinary crowd studies, with the impact of breaks in global trends in the history of urbanization. The cartesian of these two concepts, constitutes the main structure of the thesis because of revealing a set of variables that is used to guide the crowd and spatial analysis. Crowd studies such as behavior, movement modeling, safety, management, and crowdsourced data set the variable parameters for the social identity of the crowd in the next chapter. Literature sources that provide input to physical dynamics in crowd analysis are related to both public space studies and crowd studies. Spatial behavior, form, pedestrian mobility, public space activities, street life and participation, which are human-oriented public space approaches, form the basis of macro and micro scale spatial analyzes in the literature.

Chapter 3 discusses the crowd phenomenon in public space through the case of the Istiklal Street. This chapter includes the crowd analysis of social identity based on composition, motivation, emotion, and organization categories and an analysis of physical dynamics based on size, duration, behavior, form categories. Finally, this chapter explains the everyday life, mass gathering and chaos contexts of the crowd on the clusters in the dataset created with these categories for each crowd event on Istiklal Street.

Chapter 4 presents the relationship between crowd analysis and spatial analysis. Crowd analysis covers the context of three main crowd typologies, everyday life, mass gathering and chaos. It is based on associating the categories of social identity and physical dynamics with their position on the street with the basic statistical method for each context. On the other hand, spatial analysis covers the context of two main spatial typologies Taksim-Galatasaray, Tünel-Galatasaray street segments

and Taksim, Galatasaray, Tünel squares. This part presents the analysis of the case study site at two scales including macro and micro through which it deciphers the physical features of the Istiklal Street in terms of the zoning, accessibility, land-use, solid-void pattern, perceived and safety/emergency attributes. The last part of this chapter contains findings that explain the evaluation of different types of crowds in public space. These findings conceptualized by some principles. For example, attractiveness, capacity, functionality, and legibility for everyday life crowds, inclusiveness, memorability, and permeability for mass gathering crowds and public safety, controllability, evacuation for chaotic crowds.

As a conclusion, Chapter 5 makes a critical evaluation on the potentials and limitations of the research findings for the theoretical, methodological, and professional practical contributions of crowd oriented public space approach.

CROWD ORIENTED PUBLIC SPACE APPROACH

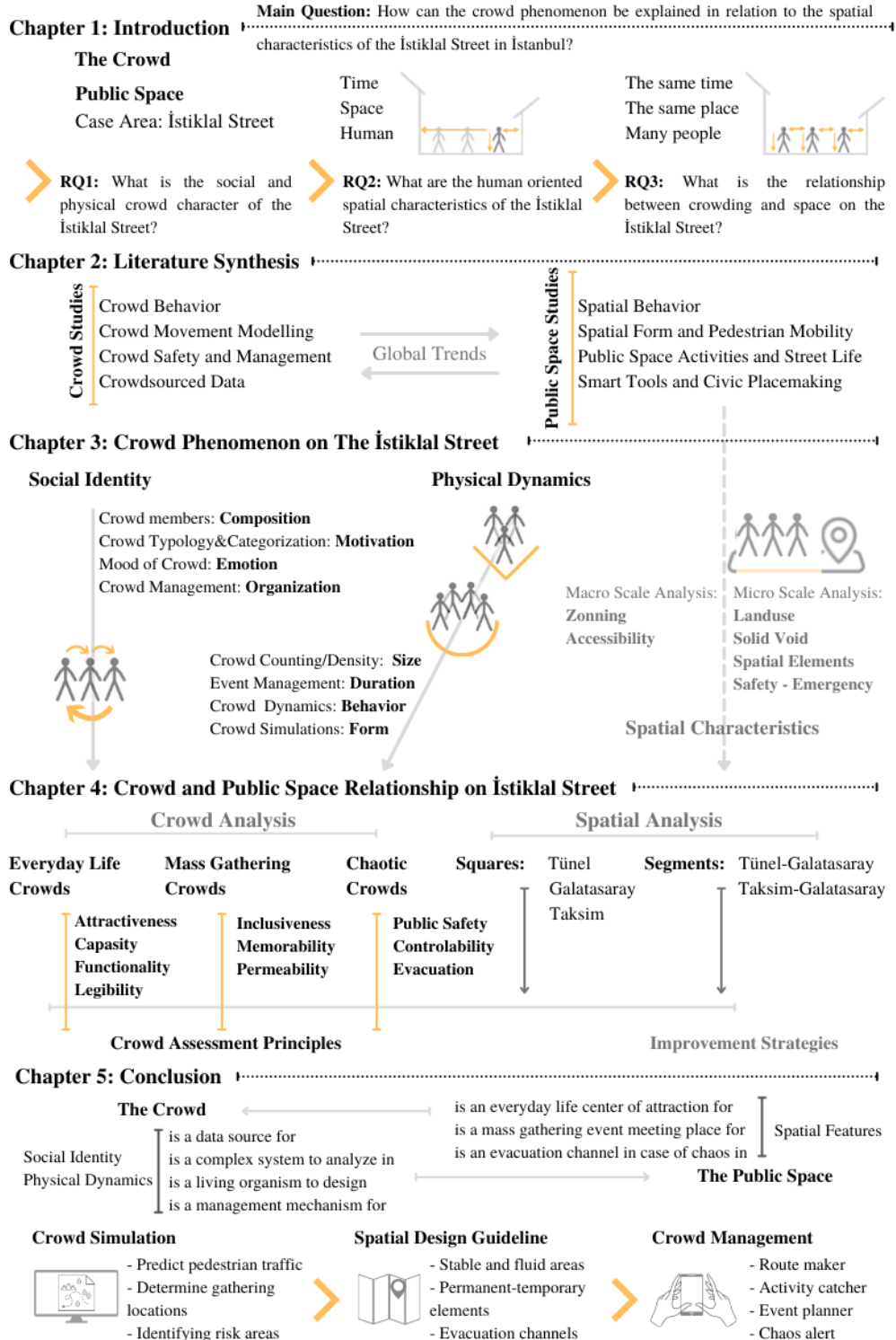


Figure 1.1. Structure and the conceptual flow of the thesis

CHAPTER 2

AN OVERVIEW OF THE CROWD AND PUBLIC SPACE

This chapter includes theoretical discussions of the crowd-oriented public space approach based on the synthesis literature of different disciplines' research to the concept of crowd and human-centered public space research. The first part of this chapter includes evolution of global trends in urbanism that can affect the relationship between public space and crowd. The emergence of crowds in the urban areas begins with the rapid urbanization that lasted from the industrial revolution to the 1960s. The following period covers economic growth and urban dispersal that lasted from the 1960s to the 1980s. Afterwards, the effects of globalization and competitive cities dominate urban crowds that lasted from the 1980s to the millennium. The period called the age of technology, started in the 2000s and lasted until 2020. The last is an uncertain period that will affect our perspective on the public space in the future due to the Covid-19 pandemic that spread all over the world in 2020.

The second part aims to explain the approach of different disciplines to the crowd phenomenon by relating it to changes in the global trends. This part discusses the crowd approaches which address an understanding of crowd behaviors, analyzing and modelling of crowd movements, planning for crowd safety and management and generation of crowd sourced data. On the other hand, the third part aims to explain the approach of the urbanism discipline to the public space by associating it with the global trends mentioned in the first part. This part includes some public space approaches on environmental perception and spatial behavior, spatial form and pedestrian studies, public space activities and street life and smart urbanism and

citizen participation. The last part aims to synthesize the approach of different disciplines to the crowd phenomenon and the approach of the urbanism discipline to the public space on the basis of paradigm shifts in urbanism to constitute the main structure of the thesis.

Figure 2.1 shows the structure of the overview of crowd and public space literature synthesis. The yellow lines in the image show the approaches to the crowd, and the gray lines show the schematic flow of the approaches to the public space. The leftmost column contains multidisciplinary sources on the crowd, and the rightmost column includes sources on human-centered public space research, along with the year of construction and the author. In the diagram that summarizes the literature synthesis, critical periods and global trends for grouping these resources are associated with significant urbanization dynamics in the years 1960, 1980, 2000 and 2020 over twenty-year periods. As a result of this association, similar approaches of both literatures in four different periods come to the fore. Behavioral studies have an important role in both crowd and public space studies in the period until the 1960s. The period until the 1980s focuses on physical movement and factors that promote the form of the movement. Until the 2000s, new perspectives are developed on the control and management of crowd events. Until the Covid-19 pandemic in 2020, there is a trend towards the potential of the crowd to generate resources and data. In the boxes located at the very center of the diagram, there is the expression of how the relationship between crowd and public space is established by different approaches in different periods. The social identity defined by composition, motivation, emotion, and organization of a crowd establish social and environmental behavior in public space. The physical features defined by size, duration, behavior, and form of a crowd are predictable because crowd movements are influenced by spatial characteristics. The crowd is manageable for public activities, safety and efficiency by producing and processing the information. Finally, the crowd itself has the ability to generate data about the space, evaluate the information in the data and organize the urban space without the need for any central power.

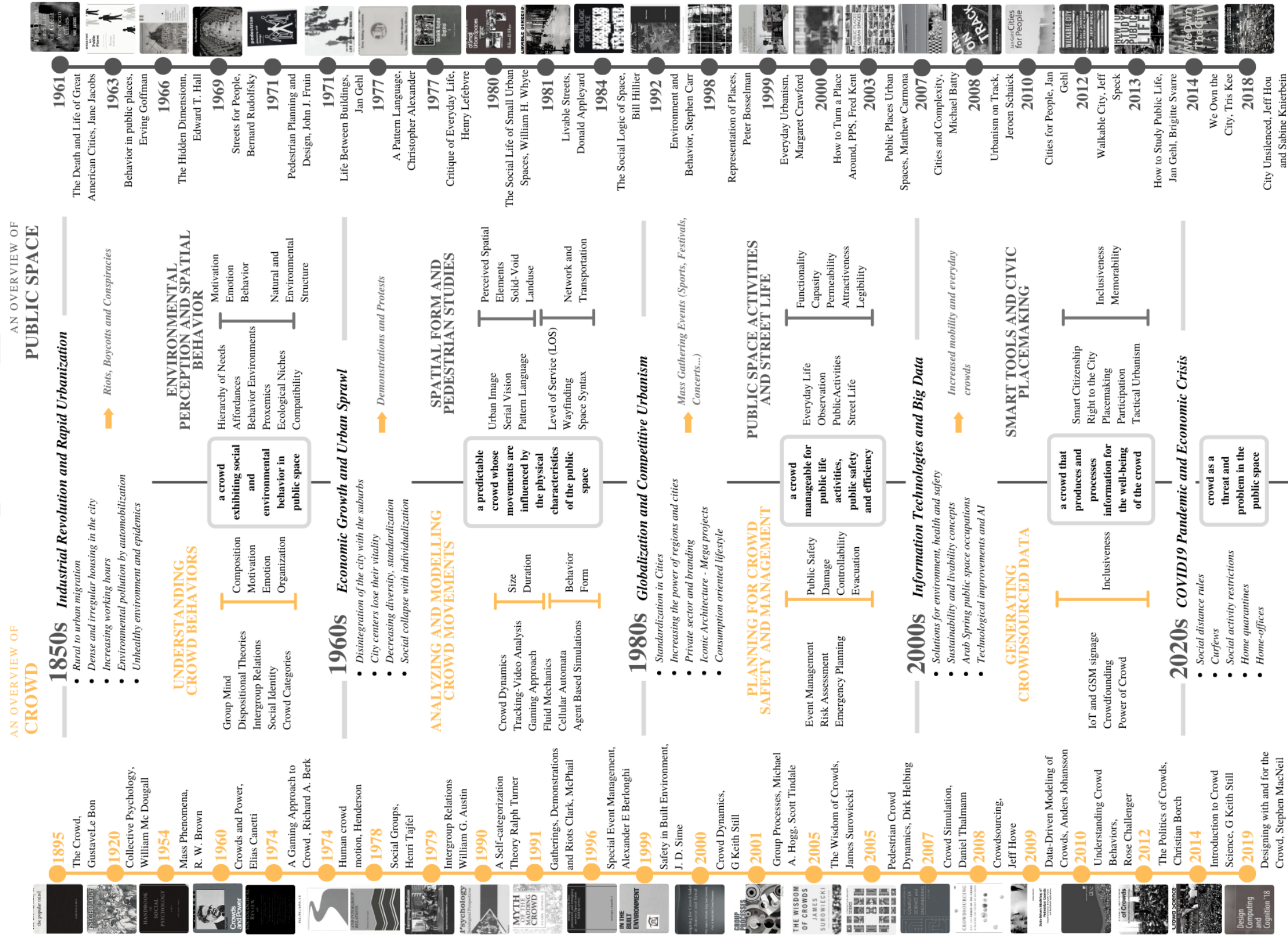


Figure 2.1.Crowd in public space, literature synthesis scheme



2.1 Global Crowding Trends

Throughout the history of urbanization, the phenomenon of crowding has significantly affected the cities. With the industrial revolution and rapid urbanization, important changes took place in the traditional city due to crowding (Mumford, 1961). The compact and walled of the medieval city was intensified by migration from rural to urban areas (Mumford, 1961). Accommodation and infrastructure facilities in the cities started to be insufficient so some epidemics arose (Mumford, 1961). The narrow and organic street texture of the traditional city has linearized for automobile traffic (Mumford, 1961). As a result of the increase in industrial activities and automobiles and the decrease in green areas in the city center, environmental pollution problem started in the cities (Mumford, 1961). The increase in working hours has eliminated the time people spend for their recreational needs (Mumford, 1961). People moved away from public places such as streets and squares and started to spend time in indoor and individual spaces such as factories and houses (Jacobs J. , 1961). The public's voice was raised against racist discriminatory behavior, bad living and exploitative working conditions, and income injustice among the worker and boss (Jacobs J. , 1961).

With the migration waves in the 1960s, social movements of the cosmopolitan crowds began due to reasons such as the right to the city, social justice, and income inequality (Mingione, 2005). In this period when urban dynamics were challenged by economic crises, the construction industry was developed as a solution for the consumption balance of the crowded masses migrating to the city (Mingione, 2005). The construction sector focused on the suburbs and a standard understanding of life emerged. Social life weakened, people moved away from the city, individuality came to the fore (Sennett, 2005). The diversity in the cities has decreased, it has become uniform due to the fast and ergonomic construction conditions (Sennett, 2005). As a result of all this, urban centers lost their vitality, public spaces were left to the tolerance of experts and administrators, and the public spaces of the city center

turned into a rift zone because they did not have any concern for public life (Sennett, 2005).

In the 1980s, with the neoliberal economic approach, cities also became a commodity providing economic input. With the effect of globalization, public space and mass activities became an element of urban branding and strategies (Sennett, 2005). Branding competition of cities has led to important initiatives in architecture and public spaces (Harvey, 1996). Mega projects such as airports, shopping malls, culture and arts buildings and star architectural pieces (towers, bridges, hotels...) gained momentum in this period (Harvey, 1996). At the same time, places where large masses can come together and events such as concerts, sports competitions and festivals have increased (Harvey, 1996). Pedestrianization efforts on many streets in vehicle use were carried out to stimulate shops and commerce on the street (Harvey, 2005). At the same time, these streets were defined as pedestrian-friendly places and cinema, food and drink street activities etc. were increased so that people could spend as much time as possible in these places and consume as much as possible (Harvey, 2005).

With the increasing technology in the 2000s, the approach to the distribution of central power and knowledge to individuals gained momentum. Technological developments such as mobile phone usage, internet and artificial intelligence affected cities as well (Crooks, et al., 2015). The concept of sustainability and livability came to the fore for the improvement of cities in health, environment, and safety issues (Crooks, et al., 2015). Public awareness and urban culture about urban decisions and practices increased (Crooks, et al., 2015). Understanding the need to involve the public in this process to prevent these movements, the authorities developed a "participatory planning" approach (Sorensen & Okata, , 2011). Cities began to be planned with the help of technological possibilities, the cooperation of the public and the guidance of experts.

Due to the pandemic that stopped urban life in the 2020s, the crowd turned into a threat to be avoided in the public space. It is currently not possible to determine the actual effects of this period. With 2020, significant differences occurred in public life, individualization and time spent in residential spaces increased due to quarantine, curfew restrictions, social distance rules. Many people started to work home office, so the home-work routine, which is a necessity of everyday life, was abandoned. In addition, socializing places such as restaurants and cafes were closed. Getting together in public places is forbidden. For these reasons, public life was abandoned, the routine of everyday life was disrupted, and socialization decreased. We will be able to observe the social and spatial consequences of these affecting public life in detail in later periods.

2.2 Crowd Studies

Research studies for understanding the crowd date back to the 19th century. Social psychologists developed crowd behavior theories to understand triggers of public riots and rebellions (Reicher S. , 2001). In the 1960s, the complex dynamics of crowd behavior in social psychology led sciences such as applied mathematics and physics to start analyzing and modeling crowd movements. (Still, 2000) In the 1980s, the problem of crowd management and risk assessment of the event emerged with the spread of mass gathering events. Crowd analyzes and simulations have been used to pre-plan the problems arising from a crowded emergency and to develop solution strategies. In the 2000s, with technological developments and smart devices, the participation of the crowd in crowd management started to come to the fore. Thanks to internet of things IoT and global positioning system GPS technologies, crowdsourced data was obtained. The widespread use of smart device applications enabled the crowd to be organized and the crowd management plan to be revised.

2.2.1 Understanding Crowd Behaviors

Researchers in the field of social psychology made the first scientific studies to focus on crowds in social movements, protests, and riots (Hogg & Rinella, 2018). Social psychologists conducted studies on the sociological and psychological triggers that affect the formation of crowds and the behavior of crowd members. In this section, the perspective of traditional theories based on group psychology, sociology-based dispositional theories and finally the modern crowd approach expressed in a complex multi-level relationship are discussed.

Gustave Le Bon, one of the most famous psychologists of the 19th century, generated the origins of traditional approach of crowd behaviors to understand social movements in French Revolution. According to Le Bon (1895) the crowd creates a collective mind that makes crowd members feel, think, and act quite differently from a situation if they were isolated (Reicher S. , 2001). McDougall developed the idea of group mind with the emotionality of the crowd. According to McDougall (1920), individual under the influence of collective emotion, loses the power of criticism and gets the same emotion. In contrast, Sigmund Freud (1921) claims that crowd members are aware of the signs of emotion in the crowd, but because of indirect impulses, they do not prevent the transmission of common mind and emotion. These traditional crowd approaches on group mind explain the triggers of crowd behavior with irrationality, emotionality, suggestibility, destructiveness spontaneity, anonymity, uniformity (Wijermans & Wijermans, 2011).

The transition of the crowd phenomenon from psychological approaches to sociological approaches begins with Allport. Allport (1920) explains the mental process of inter individual network that performing the same behavior of individuals in a crowd. Canetti also (1984) worked on inter individual relations of crowd members to categorize crowds based on emotions. Brown (1954) uses taxonomy method to express different compositions of crowds by using crowd behaviors as a parameter. Turner and Killian (1972) created emergent norm perspective by claiming that collective behaviors occur under emerging norms. Turner and Killian (1972)

also make a crowd classification approach based on emergent norms of crowd members. Momboisse (1970) introduced a new approach to crowd classification and defines crowds through the shared interests of the crowd group. Reicher and Potter (1985) emphasized that; there is a need to recognize and understand the different social-cognitive perspectives of the in-group and the out-group. Waddington (1987) seeks to understand the irregularities of crowds in public space through riots and social protest. Waddington (1987) aims to analyze the motives that trigger crime, anger, insurrection and rebellion. In addition, Waddington classify these triggers at six levels: structural, political, ideological, cultural, contextual, situational, and interactional.

The modern foundation of crowd behavior established on “Social Identity Model (SIM)” and “Elaborated Social Identity Model (ESIM)” (Hogg & Rinella, 2018). Tajfel define social identity as a part of an individual's cognition in a single and socially independent manner (Tajfel, 1978). Reicher (1984) describe the social identity model as the transition from personal to social identity rather than loss of identity of individuals. According to the social identity model, people do not lose the ability to reason, they focus on the perspectives, norms and interests associated with social identity (Reicher S. D., 1984). In addition, Reicher also makes an explanation for elaborated social identity as: elaborated social identity model suggests that social identities are not only expressed by the crowd but can change particularly depending on the individual and intergroup dynamics.

According to the modern social psychology approach, crowd behavior is generated by individuals. Context dependent crowd behaviors are based on complex mental relationships between inter individual level and intra individuals level (Wijermans & Wijermans, 2011). As a result of modern crowd foundation principles, the complex social and psychological dynamics of the crowd parameters must be analyzed to understand the triggers of the crowd behavior. The findings obtained to systematically address the complex structure of crowd behavior in social psychology have accelerated the studies of crowd dynamics analysis and modeling of crowd movements.

2.2.2 Analyzing and Modelling Crowd Movements

The findings on crowd behaviors by social psychology have made significant contributions to the field of modeling crowd movements. The complex decision-making process and physical movement of the crowd has attracted attention in the field of applied mathematics. Video analysis methods such as tracking, and density estimation also been developed to detect crowd movements. Artificial intelligence and virtual reality were used to understand pedestrians with complex decision-making processes and dynamic behavior in response to an environmental perception. Using crowd simulations in public space design allows the performance of the design to be tested. On the other hand, in crowd management, simulations can test whether human behavior is progressing as predicted in the event or evacuation plan (Thalmann, 2007).

Helbing et al. (2005) conducted some experiments to understand the movement dynamics of the crowd. As seen in Figure 2.2, these experiments revealed principles of self-organized crowd behavior in different scenarios such as unidirectional flow, bidirectional flow, intersecting flows, and bottleneck effect. For example, to spend the least effort, to walk from the right, to imitate the behavior of the person in front in the same direction. In addition, Dirk Helbing and Peter Molnar (2001) developed “Social Force Model” to claim that pedestrian motions, emerged from both personal environment and internal motivations.

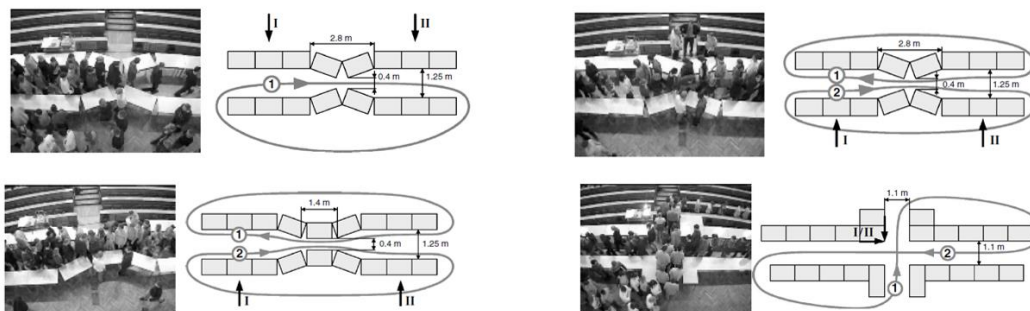


Figure 2.2. Experiment for crowd dynamics (Helbing, Buzna, Johansson, & Werner, 2015, pp. 6-7)

Tracking has been proposed to localize the interested object in time-space for analyzing crowd camera records. Crowd scenes increase the complexity of tracking because there are multiple moving objects in the scene. Some techniques are developed based on the color, geometry, and other features for tracking. Berk's "Game Theory" (1974) forms the basis of the crowd modelling. Game theory is the study of mathematical models of strategic interaction among rational decision-makers. With the 1970s, a new approach developed on flow dynamics such as fluids, gas kinetics, and other physical systems to simulate crowd movements (Henderson, 1971). In these models, there is an approach that tries to understand the route choices that are based on the conscious choices and needs of the pedestrians beyond the inevitable external dynamics.

Reynold (1987) tried to model the reality of lively agents (bird flocks) as artificial life. As shown in Figure 2.3. Reynold used the laws of physics and the fluidity of the substances to simulate agents in the crowd.

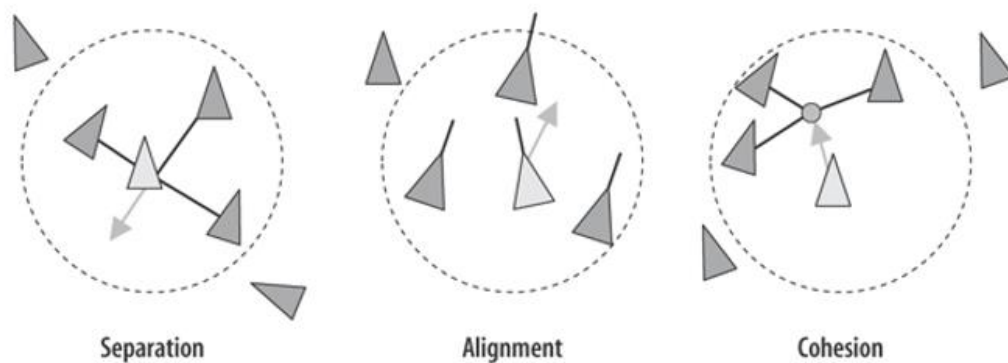


Figure 2.3. Flocking rules of Reynolds (Pelechano & Malkawi, 2008, p. 378)

Kirchner and Schadschneider's (2002) research on pedestrian dynamics "Cellular Automation Models" used as a crowd simulation. Each agent is represented by a dynamic cell as shown in Figure 2.4. Likewise, spatial elements (barrier, entrance ...) are represented by static cells. Dynamic cells have the ability to turn into neighbor cells so agents can navigate to route selection. At the same time, agents in neighboring cells are affected by each other's behavior.

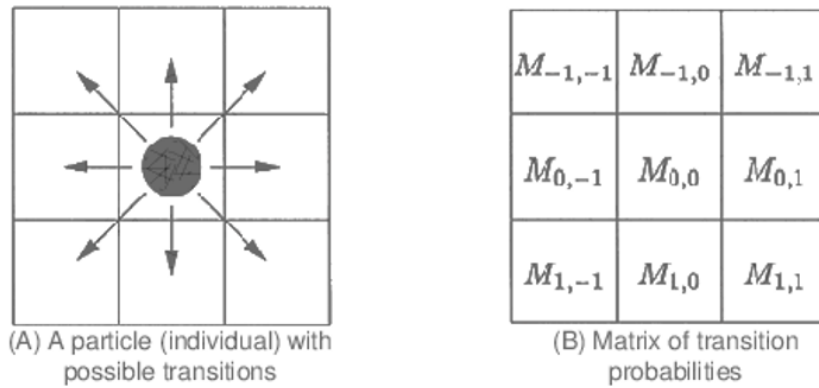


Figure 2.4. Cellular automation model (Burstedde, Klauck, Schadschneider, & Zittartz, 2001, p. 511)

Lastly, agent-based simulations enable to model more complex and realistic motion patterns. One of the earliest agent-based models in concept was Thomas Schelling's segregation model, which was discussed in his paper "Dynamic Models of Segregation" in 1971. Intelligent and autonomous agents have an ability to perceive their environment. In addition, agents can generate intentions, make their own decisions and perform rational behaviors. according to various sets of underlying simulation rules. Individual attributes, such as age, gender, mobility, size and walking speed can be assigned randomly to agents. In Figure 2.5, gate, destination, route, agents and obstacles are represented in an agent-based simulation via PedSim example.

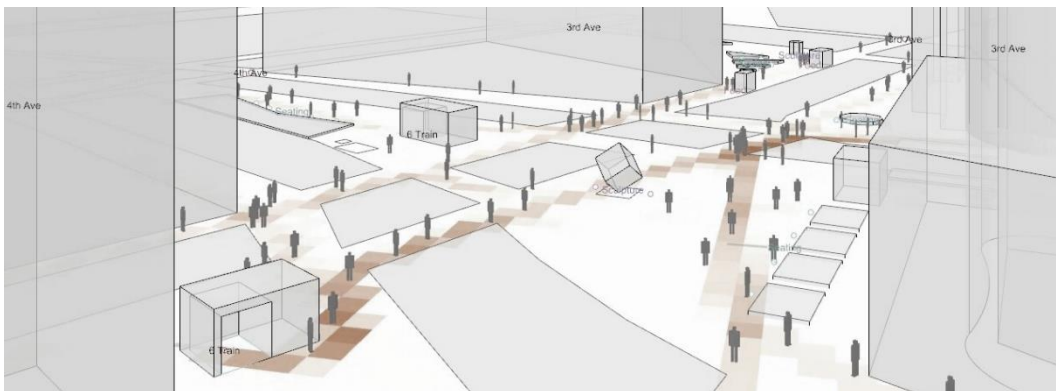


Figure 2.5. Agent-based simulation (PedSim, 2021)

Beyond being an analysis method, crowd simulations brought other perspectives on crowd management. Modeling the complex physical movement of crowds made crowd behavior predictable. In this way, venue managers or event managers can simulate the behavior of the crowd in case of an emergency, make risk assessments and plan activities.

2.2.3 Planning for Crowd Safety and Management

Mass gathering events have gained importance in social life since the 1980s. The presence of many people in the same place at the same time brought some risks. These risks may occur because of disasters such as fire, earthquake, and bomb explosion, in addition to the disruptions in the organization of the crowd. The death of 95 fans during a match at Hillsborough Stadium in 1989 and 270 pilgrims during a religious ritual in Mecca in 1994 may be an example of crowd catastrophes (Still, 2000). To prevent such disasters, crowd management and risk assessment studies have been developed in mass places such as stadiums, sacred venues, concert halls and train stations.

There are many published reports on crowd management. According to Health and Safety Executive Report (2000) , safe and trouble-free event requires good planning. The measures in the event plan should be adequate and appropriate for the expected number and type of visitors. Risk assessment describes how to systematically identify threats for crowd safety. Contingency planning and procedures are crucial to evacuating the crowd and controlling the crisis. Effective communication among staff helps to respond quickly and appropriately if problems arise. Monitoring crowds ensures that plans are properly implemented, and potential problems are resolved quickly. Examining the problems and findings experienced in the crowd event can provide updates in the plan of the next crowd events (Health and Safety Executive, 2000). As shown in Figure 2.6., an effective crowd management should be determined according to the type of event, the characteristics of the audience, the

motivating reasons, the venue of the event and stakeholders for the event (National Disaster Management Authority, 2014).

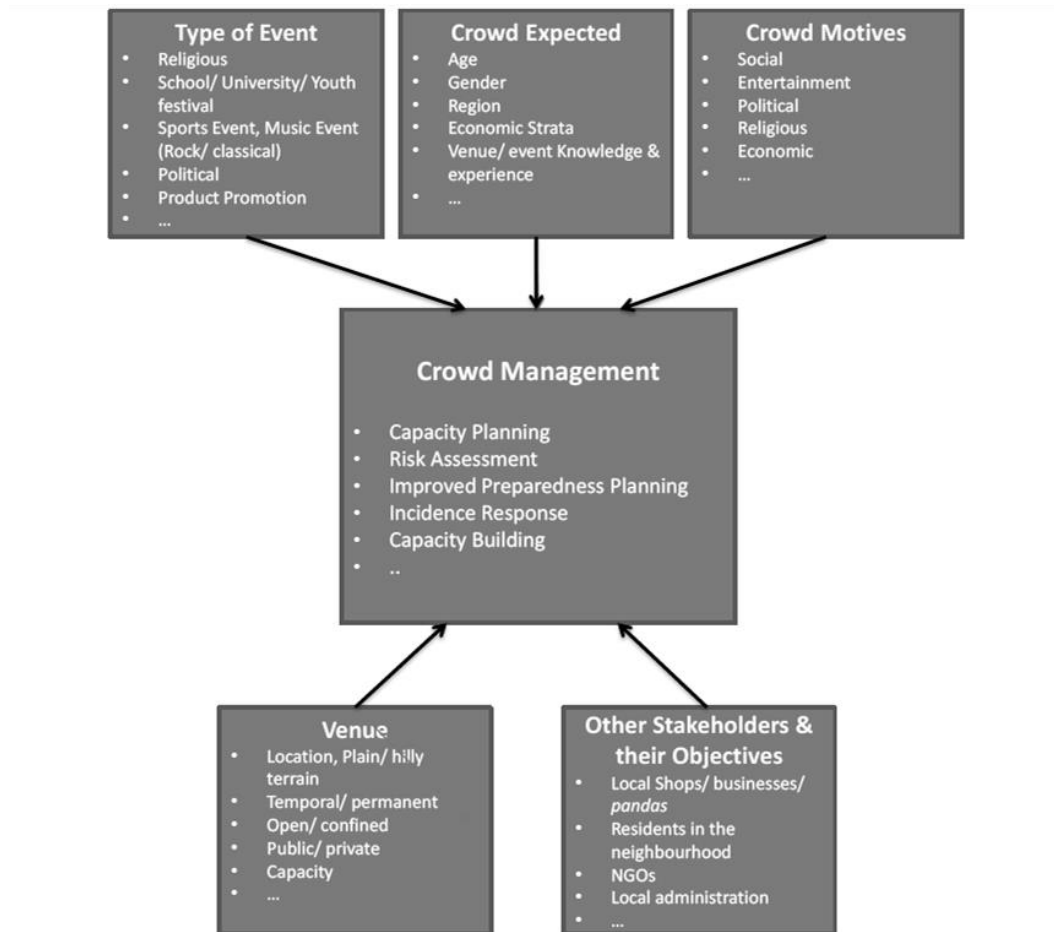


Figure 2.6. Crowd management principles (National Disaster Management Authority, 2014, p. 11)

Berlonghi conducted the first studies on crowd management with his book “Event Management” (1995). Berlonghi (1995) also made a context-based interpretation of the crowd classification for the management and safety of a crowd. Sime (1999) focuses on people's panic behavior through disaster risk assessment rather than event planning. Sime brings new approaches such as emergency response, pedestrian evacuation, and abnormal situation detection. In addition to researches on crowd

management and risk assessment, there are also many crowd managements projects for mass gathering events. As an example, a crowd guide plan and app were created for Notting Hill Carnival (Figure 2.7). With the data collected from the carnival in 2016, actions to be taken and precautions were determined before, during and after the event. Some strategies were developed for the participants' access to the area, smooth and rapid transition from ticket control, satisfaction and disruption of the music and event areas at the carnival.

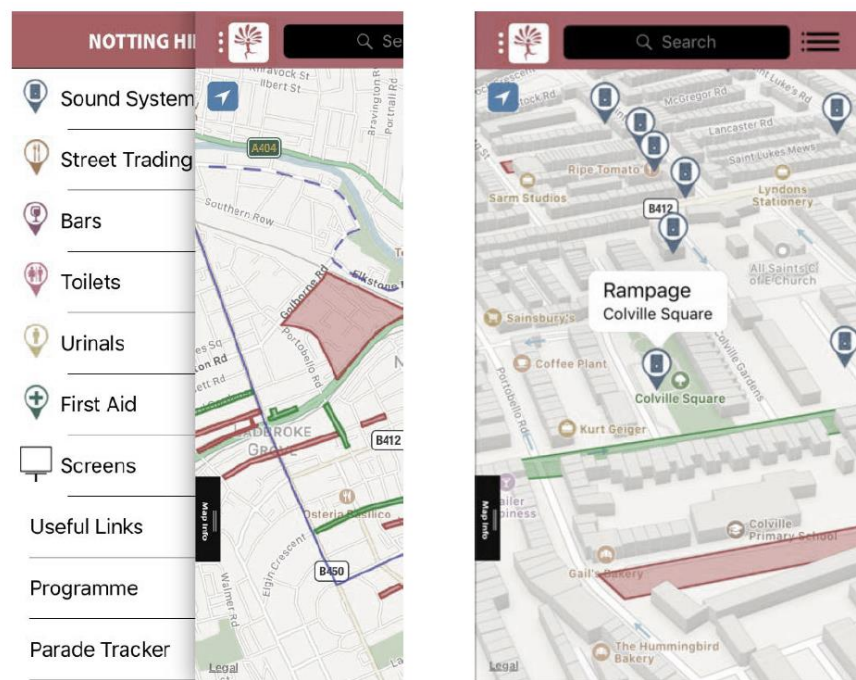


Figure 2.7. Crowd management application (Notting Hill Carnival Crowd Movement Data Book, 2017, p. 43)

In addition to spatial and organizational strategies, to inform and direct the participants, an activity app that the participants can use on their smartphones is developed and crowd management is provided. In 2007, another crowd management project was carried out at Jamarat Bridge, a sacred place where the stampede that resulted in many deaths was experienced (Al-Kodmany, 2013). As a solution, spatial changes and measures developed by an agent-based simulation were transformed into strategies. Expert opinion and surveillance may not be sufficient for an effective

crowd management, cooperation with the crowd is required. The crowd participating in the event or using the public space is a data source. Evaluating this data, which consists of the behavior and tendencies of the crowd, helps to develop a crowd-specific management approach. At the same time, crowd members can play a role in crowd management with some smart apps.

2.2.4 Generating Crowd-Sourced Data

Technological advances in video analysis, tracking and detecting have become an important method for crowd management studies (Johnsson, 2009). Thus, the crowd has become a source of analysis that can collect large-scale data. Smart devices and internet of things (IoT) enabled interaction with the crowd members. Crowd members have become a data source thanks to access to crowd location data. In addition, apps developed for mass gathering events and crowded public spaces on smart phones enabled crowd members to benefit from the data generated by the crowd. Thus, the crowd took a position both producing and benefiting from the data.

Beyond using the crowd as a complex system need to be analyzed, the importance of crowd sanctioning power became apparent (Borch, 2012). According to Howe (2006), “Crowdsourcing” expresses that crowd management and decision-making process can be done directly by the crowd instead of the researcher who is an outside eye. In order to include the crowd in this decision-making and management process, interfaces that communicate between the data producer and the data evaluator, such as apps specially designed for smart phones and wearable devices that provide location data, have been developed (Macneil, et al., 2018). As shown in Figure 2.8. technological solutions developed to generate data from the crowd can be network-led, mobile phone-led, personal / wearable device-led and sensor-led.

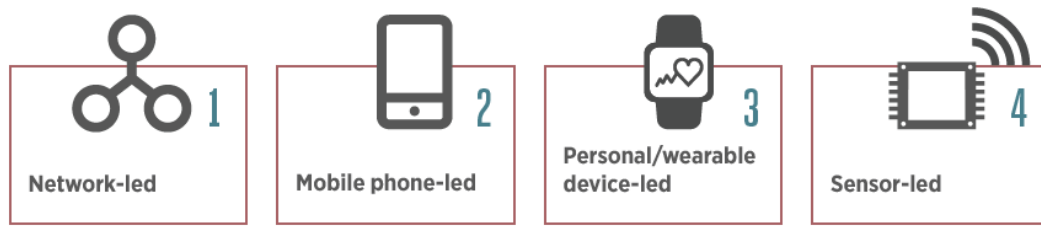


Figure 2.8. Technological background for crowd sourced data (GSMA Smart Cities, 2019, p. 10)

One of the first uses of crowd data is public transportation capacity optimization in crowded cities. Singapore have been carried out Star-Hub innovation, developed on big data of Grid360 app, is a good example of optimization in mobility (GSMA Smart Cities, 2019). Star-Hub aims to provide efficient and comfortable access to citizens even in the farthest parts of the city in Singapore, which makes significant investments in public transportation due to the overcrowd (GSMA Smart Cities, 2019). In addition to public transportation, crowd-sourced data is important in optimizing pedestrian density. Mass gathering events that take place in big cities such as New Year celebrations and rallies can cause crowds to stop everyday life and disrupt pedestrian access (Franke, Lukowicz , & Blanke, 2015). As an example, during the Lord Major's Show, crowd profiles are created through the signals of the participants to prevent the everyday life in the city from interrupting (Figure 2.9). A pedestrian who is not interested in the event can plan the travel route according to the crowd density via an app that shows crowd profile data and offers route suggestions. Sharing the data generated by the crowd with the crowd to manage mass gathering events and access based on both pedestrian and public transportation has brought a new and interactive perspective against the disruptions that may arise from the crowd.



Figure 2.9 Participatory Sensing and Crowd Management in Public Spaces, Lord Mayor's Show (Franke, Lukowicz, Wirz, & Mitleton, 2013)

2.3 Public Space Studies

Since the beginning of the 19th century, the social life was abandoned by the citizens, together with the public spaces in the city centers that turned into collapsed areas due to the unhealthy environmental conditions and intense construction pressure due to industrialization. Jane Jacobs was the first of the intellectuals who thought that the crowd withdrawing from the public space represented the loss of urban memory and the deterioration of social cohesion. Jacobs attributes this situation to the alienation of urban spaces from human-centered spatial approaches due to mechanization and construction technologies. Since this thesis tries to understand the relationship of the crowd phenomenon with the space, it only deals with people-oriented studies among the studies on public space. In this direction, human-oriented crowd studies are handled with four different approaches. Approaches that try to understand the interaction of humans with space in terms of behavioral and perceptual aspects emerged with the influence of neuropsychology, which was a popular research area before the 1960s. Since behavioral and perceptual space studies are focused on the

individual, interpersonal consideration of the crowd phenomenon and this approach can be an important input to the social identity of the crowd-oriented public space approach. In the period after the 1960s, the approach to understanding human behavior and spatial movement through the form of space and the methods developed for this come to the fore. Considering this aspect, these studies focusing on form and movement can be a guide to understand the physical characteristics of the crowd. Street life and public space activities of globalized cities in the 1980s become an important competitive element. This approach includes important research and methods focused on understanding everyday life in public space and observing activities in public space. At the core of these works, it focuses on attracting the ideal crowd level to the space or event and ensuring the order of this crowd in public spaces or mass events. Thanks to the technology and knowledge that became widespread in the 2000s, the participation of the public in urban decisions and practices gains importance. Crowds in cities become decision makers, thinkers, and implementers on public space in line with participation and smart urbanization approaches.

2.3.1 Environmental Perception and Spatial Behavior

From the early 20th century, neuropsychologists' study on the relationship between environmental perception and individuals' behavior (McLeod, 2018). Maslow (1943), one of the pioneers in behavioral psychology, explains the individual's five different needs with a hierarchical order in his work "A Theory of Human Motivation" (Figure 2.10). Maslow (1943) claims that the motivation of an individual's behavior is the result of five basic needs initiatives: physiological needs, safety needs, social needs, esteem needs, and self-actualization.

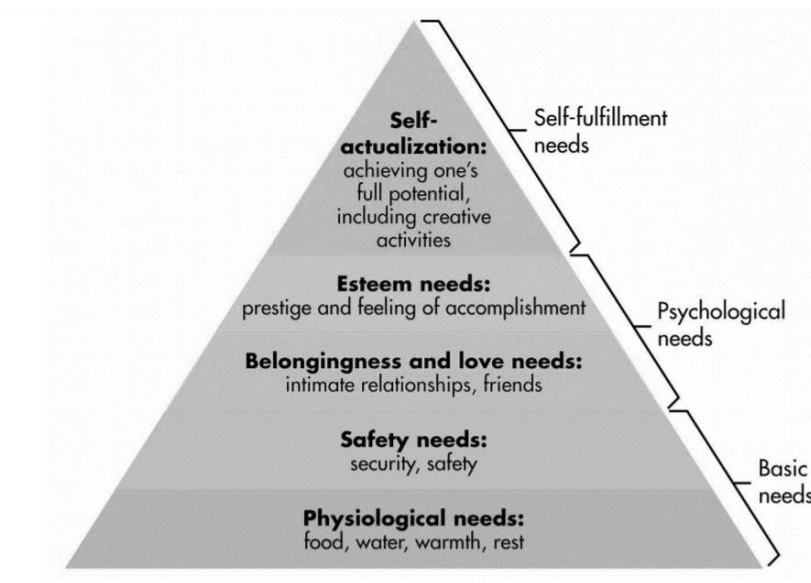


Figure 2.10. Maslow's Hierarchy of Needs (McLeod, 2018, p. 1)

According to Gibson's "The Affordance Theory" (1979) the factor that determines the behavior of individuals is not only behavioral motivation, but also about what opportunities the environment provides to the individual. According to Gibson, people tend to change their surroundings to improve their adaptability (Gibson, 1979). Behavioral environments, mediate structures that help explain the relationship between the dynamic behavior of individuals and the stable social structure (Barker, 1968). Spatial factors drive behavior, but among many possibilities, only a few behaviors are more likely due to environmental factors.

The environmental perception that motivates individual behavior is influenced not only by space but also by other people sharing the same space. Goffman's (1966) work "Behaviors in Public Space", made important determinations on the interactions of people in the public space. In addition, Hall (1968) and Sommer (1969) have conducted studies focusing on the physical relationship of people. They examined the ways of socialization by making use of people's cultural and anthropological structures as shown in Figure 2.11. One of the most important findings here is "Proxemics" which means social distance (Sommer, 1969).

According to the “proxemics” concept of Hall and Sommer, social distance defined by four categories: intimate, personal, social and public.

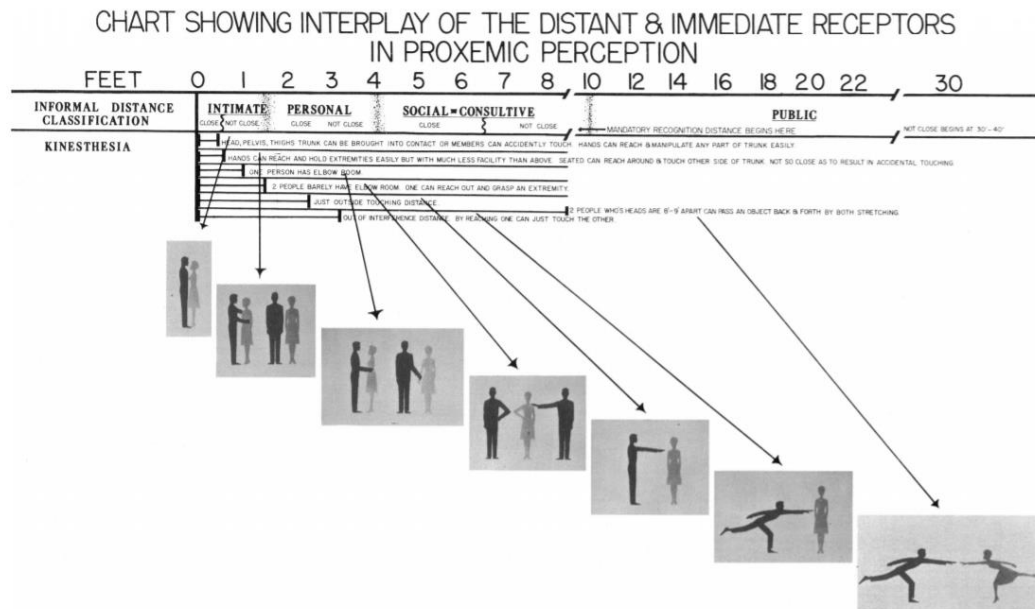


Figure 2.11. Proxemics (Hall, 1968, p. 93)

Rapoport (1977) defines the behavior and environmental relationships of individuals through ecological niches. According to Rapoport (1977), the operational environment is the real world modeled by our cognitive environment (Rapoport, 2008). Cognitive environment, on the other hand, is the environment that we interpret in our minds depending on the operational environment which is not real. Garling and Golledge (1989) also have worked on the mental perception process between the physical environment and the cognitive environment (Figure 2.12).

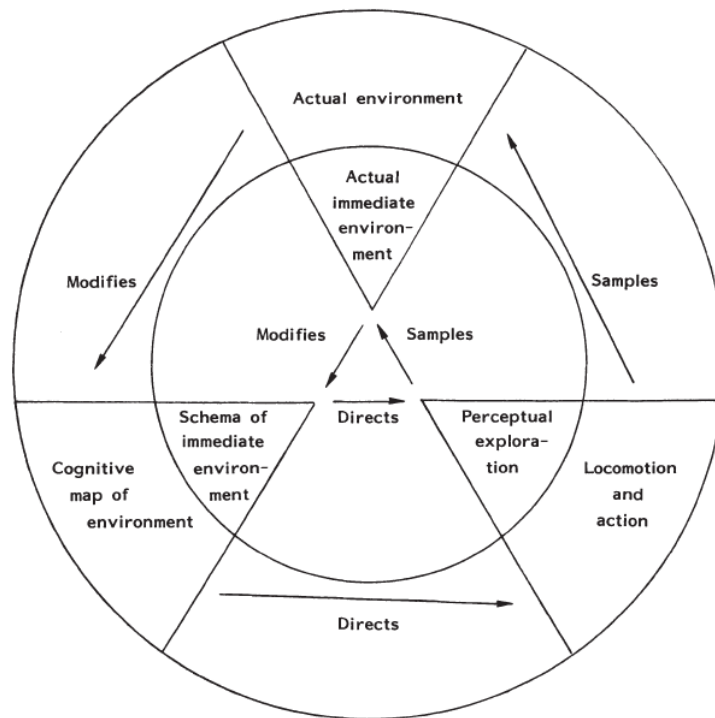


Figure 2.12. A scheme of the cognitive environment that guides the collection of existing information in the environment. by Garling and Golledge (1989, p. 215).

Norman (1995) uses the concept of compatibility with an example of human-machine interaction to express the possibilities of action that can be easily perceived by an actor. Norman reveals that the behavior depends not only on the physical abilities of an actor, but also on his goals, beliefs and past experiences. Discussions that human behavior is not accidental and can be directed by spatial organization emerged with this study (Norman, 1995). Focusing on perceived suitability has developed a new approach in space design with a human-oriented design approach.

2.3.2 Spatial Form and Pedestrian Studies

After the Industrial Revolution, important figures for urbanism such as Sitte (1888), Howard (1902) and Le Corbusier (1923) developed ideal urban forms in order to find solutions for polluted, unhealthy and dense urban spaces due to rapid urbanization. The effects of modernism on planning and architecture on 20th century

ideology were defined by the Athenian Charter in 1933. (Gehl & Svarre, 2013). The discussions between form and function triggered some studies on the form and function of the space and their effects on the user of the space.

The first of these is the approach of Lynch, Alexander and Cullen, which focuses on the spatial form. The second refers to the approaches that focus on the pedestrian and pedestrian movements of Fruin, Garling and Hillier. Kevin Lynch (1960) conducted studies to understand the image of a city through people's experience of space. Lynch attempted to understand the space through people's perception by interviewing people over the legibility of the space. As the findings of his studies, he reached the conclusion that people perceive and describe space through 5 elements (Figure 2.13).

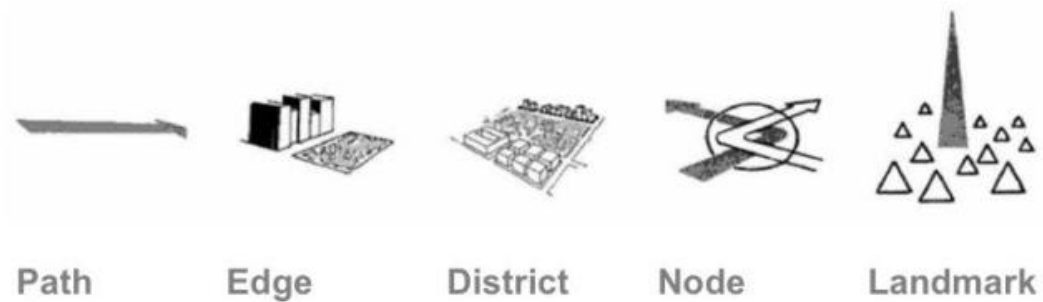


Figure 2.13. Five elements of Lynch (1960) to define image of the city

Cullen (1961) conducted a sensory analytical work on experiencing the space from the human eye. With the concept of "Serial Vision", people perceive the space as photo frames taken consecutively (Figure 2.14).

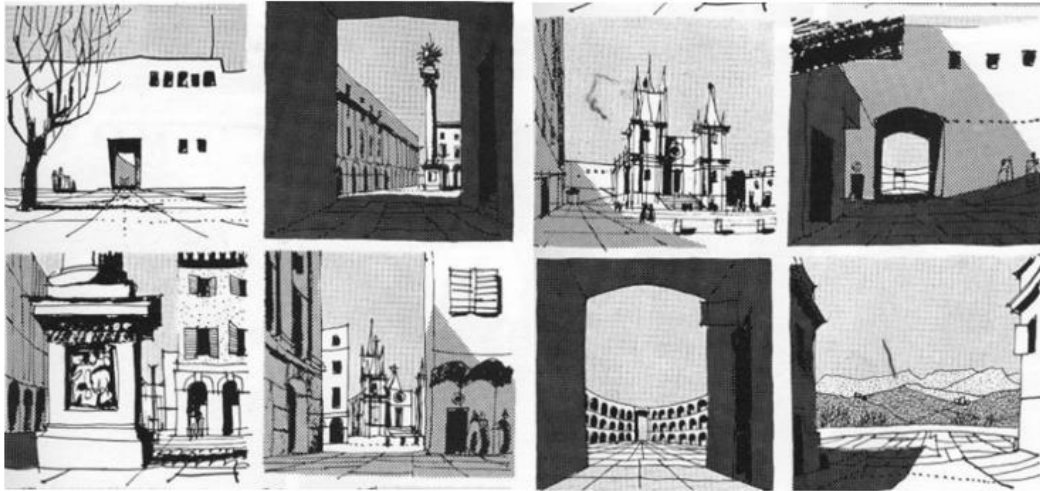


Figure 2.14. Serial vision by Cullen (1961)

Alexander (1977) claimed that the space is a pattern and that it interact with people. Alexander argued that the space has a common language stemming from its unique pattern and it is this language which allows the communication with people who experience the space (Figure 2.15).

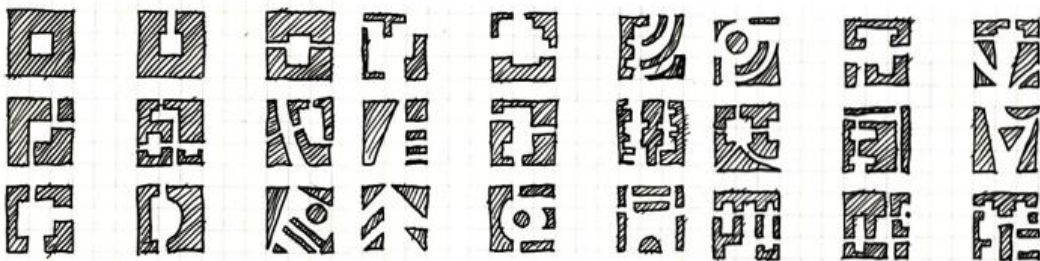


Figure 2.15. Pattern typologies by Alexander (1977)

Fruin (1971) adopts an approach of naming the situation of pedestrians in public space. He focuses on the density of relations rather than the relationship of pedestrians to each other. Trying to set standards on pedestrians in traffic planning, Fruin has developed standards for pedestrian spaces such as stops and sidewalks according to density categories. Categories, which Fruin (1971) calls "Level of Service, LOS" for pedestrian spaces, express the relationship between pedestrian flow velocity and pedestrian density.

Reaching a destination is shaped by the complexity of space organization according to wayfinding studies. Two factors are determined as the key factors in wayfinding. The first one is differentiation, visual access, and layout for route choice, decision-making mechanism in the process of choosing one among many different route alternatives (Garling & Golledge, 1989). The second one is wayfinding support system signage, maps, or information cues to decide among alternatives of action in spatial context such as selecting a location for shopping, looking for a restaurant (Weisman, 1981).

Space syntax, which was designed to measure social life by giving coefficients to the space developed by Hillier and Hanson (1984). This method, which allows making inferences about the social logic in the space by putting different data such as pedestrian counts and land uses into an algorithm, was later expanded to include data such as geographic information systems and GPS data.

Bosselmann (1998) planned to develop a method for testing the performance of designers' spatial decisions to be implemented. Representations such as mapping, concept representations, section plans can be understood by experts. Bosselmann analyzed the tools to express the visualization of the design and simulation of its performance at a level that everyone can understand, so that modeling and virtual reality studies started to show up in planning. The new perspective that Bosselmann gained led to two important planning approaches. First, the public also had the right to know the design decisions made for the city and to see them before they were built. Second, new technologies were needed, the results of which could be understood before the plans were implemented.

2.3.3 Public Space Activities and Street Life

Throughout history, public space and public life have consistently evolved according to the conditions and needs of society (Gehl & Svarre, 2013). However, these needs were ignored in the rapid growth of cities with modernism. Until the 1960s, the

solutions produced for urban space were deterministic and far from being human-oriented. A new approach was adopted that the public space is produced by people, not by an architect, urban designer, or local government because of the failure of form-oriented spaces. Jacobs (1961) emphasize this as "*Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody.*" (p. 72) Place and space discussions also start on the basis of these thoughts. The element that defines the volume of space may be represented by buildings, but the element that defines a place is the people who live in that space and give life to the space (Friedmann, 2010).

Michael de Certeau's (1980) book "The Practice of Everyday Life", examines how people change the way they personalize mass culture, from utilitarian objects to street plans, rituals, laws and language. In addition, Lefebvre (1991) emphasize that a careful look at everyday life is sufficient to understand the political order in the cities without any extraordinary circumstances. In this period, the focus was on developing different methods to analyze public life. The first of these is William H. Whyte, who aimed at making an analysis through the preference of public spaces in the city. Whyte developed various observation techniques to analyze social life through the behavior of people in public spaces in the city. Observation methods shown in Figure 2.16, such as placing time-lapse cameras and evaluating the time of people's presence in the space, dividing the public space into grids and examining the human behavior in each grid with spatial factors, making some groupings while observing the public space users (Whyte, 1980).

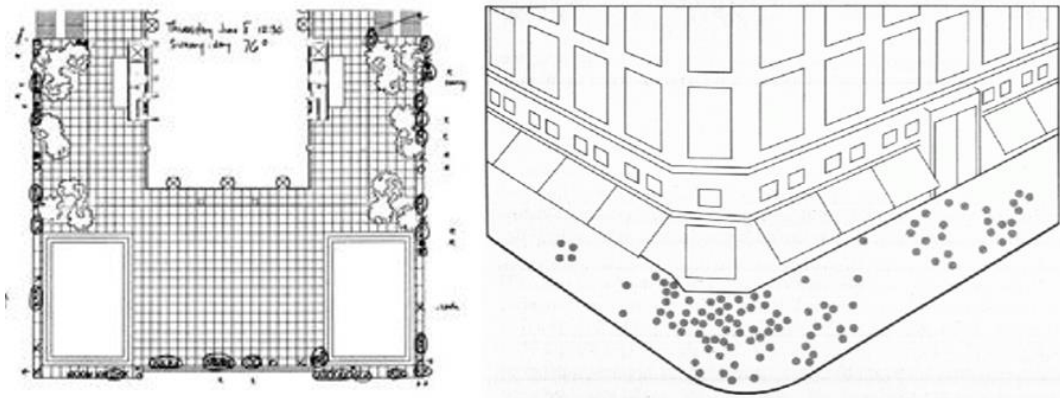


Figure 2.16. Grid scheme and pedestrian marking (Whyte, 1980)

Jan Gehl is another researcher who observes human activities to examine their relationship with public space features (Gehl, 2011). Gehl claims that in necessary, optional, and social activities, people are associated with values related to the physical characteristics and quality of the space (Figure 2.17). Jan Gehl (2013), also made significant contributions with his publications “Cities for People” and “How to Study Public Life” (Gehl & Svarre, 2013) in which he gathered his people-oriented city approach and methods of studying public life.

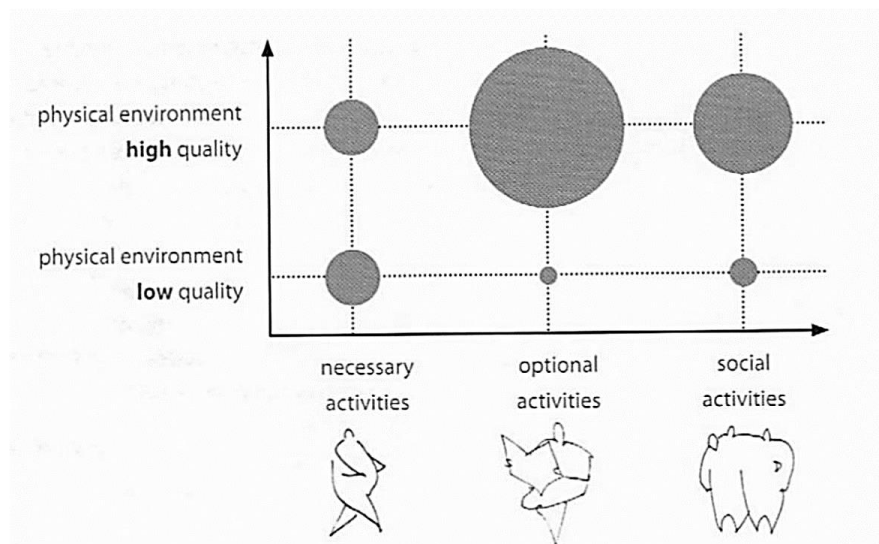


Figure 2.17. Environmental quality and pedestrian activities (Gehl, Life between buildings: using public space., 2011)

Researchers who make examinations on the quality of public space evaluate some other criteria beyond public space activities. Kent's (2019) formations such as "Projects for Public Space PPS" aimed to increase the quality of public space by designing human oriented public spaces through "Placemaking". The concept of placemaking includes factors such as sociality, accessibility-connections, comfort-image and uses-activities that should be taken into account in human-oriented space production (PPS, 2020).

Human-oriented walkable cities emerged as a model under the influence of the “New Urbanism” movement (Speck, 2018). With this approach, discussions began on the relationship between two different forms of public space, such as the square and the street, with the human factor. Rudolfsky (1969) revealed the importance of a street to public life and what the street means to the life of the people (Figure 2.18). In addition, an approach to pedestrian-friendly space become important in urban design, which can stimulate public life. For this, Appleyard's (1981) highlighted life in the city streets and the importance of the street for pedestrian experience in “Livable Streets”. They reminded the characteristics of the streets of the neighborhoods where pedestrians, children and women are valued instead of the vehicles in traditional cities and revealed the design principles.

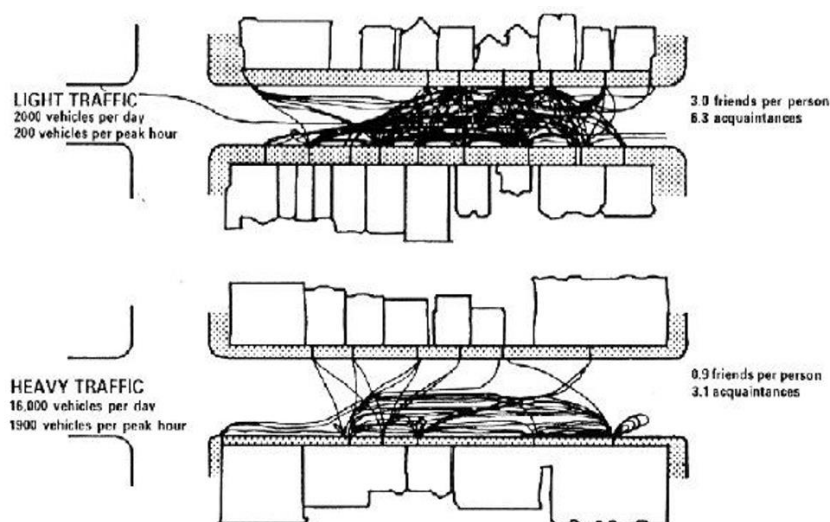


Figure 2.18. Social interactions correlated to street traffic by Appleyard (1981)

Likewise, Jacobs (1993) focused on the characteristics of the monumental streets that take place in the urban image in “Great Streets” book. Jacobs (1993, p. 12) discussed the avenue's being a social life and urban movement channel beyond being a public space in terms of its design quality as "Streets are places of social and commercial encounter and exchange. They are where you meet people - which is a basic reason to have cities in any case.". Gehl (2011) systematize the relationship of the street as a canal space with pedestrian behavior based on social relations in the public space with the concepts of reduce-increase, close in-open up, repel-invite, segregate-integrate and disperse-assemble (Figure 2.19). This approach, which adopts a people-oriented public space by observing everyday life activities and street life, triggers participation-oriented approaches by claiming the right of citizens to think, design and produce their own spaces.

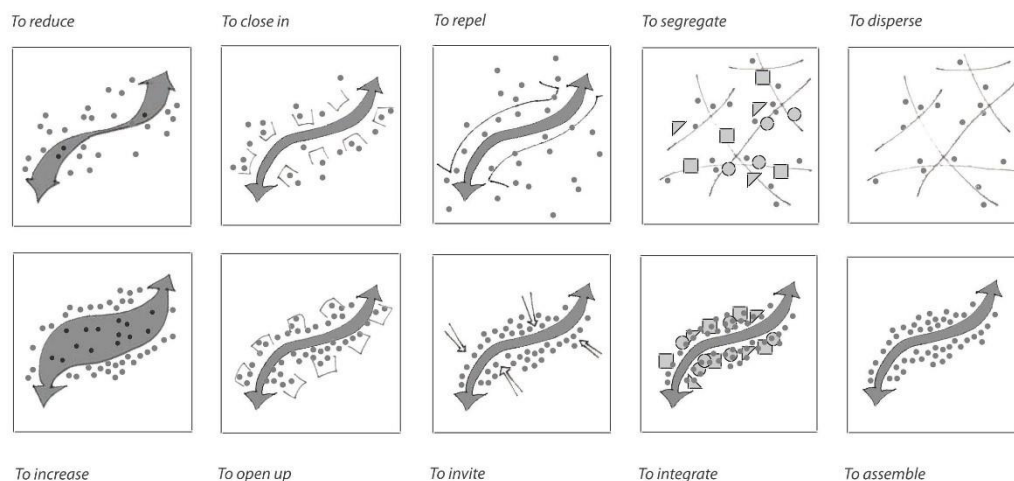


Figure 2.19. Gehl's diagrams for people and place (Gehl, 2011, p. 200)

2.3.4 Smart Tools and Civic Placemaking

Half of the world's population live in cities and the borders of rural and urban areas began to disappear. Cities have become complex and crowded. The understanding and analysis of this phenomenon including its components, actors and their relationships required the use of technology (Sorensen & Okata, , 2011). In order to

understand such a large, crowded and complex city, Batty (2009) tried to understand the city through. Technology has become the most important tool for understanding and analyzing cities with multiple actors and layers (Schaick, 2008). At the point where human observation was insufficient to understand the mobility in urban space, urban studies used technology for people's use to generate data (Hanzl, 2017).

Opening urban knowledge to interaction with citizens and stakeholders through digitalization has developed a smart city approach. 'Smart cities' is an approach to describe cities running by smart people who pass big data from computing to the engagement in innovation, creativity, and entrepreneurship (Kitchin, 2014). Big data, the knowledge of smart cities, is assumed to provide an environment for predicting and realizing more efficient, sustainable, competitive, productive, open and transparent cities (Kitchin, 2014). Big data for smart cities can be produced by experts using various high-tech location-based methods as well as by the help of smart devices and interfaces in collaboration with the citizens.

The crowdsourcing approach aims to distribute the power of thinking, implementation, and decision-making for the well-being of cities from the central authority to the civic citizens. Crowdsourced urbanism intends to directly feed bottom-up and community-centered planning in a city's-built environment. (Mistra Urban Futures, 2018) According to the research of Crooks et al. (2015), there are some explicit and implicit differences of spatial data between the traditional and crowdsourced urban form and function as shown in Figure 2.20.

	Form		Function	
	Traditional	Crowdsourced	Traditional	Crowdsourced
Explicit	National mapping datasets Cadastral records	Open-source, collaborative, user-generated mapping (e.g. OpenStreetMap, Google Maps)	Socioeconomic data (e.g. census, tax records, land-use data, address-point products)	Location-based social networking applications (e.g. Foursquare, Geo-Wiki WikiMapia) Citizen geo-narratives
Implicit	Authoritative geo-narrative (e.g. edited books, tourist guides)	Geolocated trajectories Open-source unstructured geo-narrative (e.g. travel blogs)	Travel guides (e.g. Lonely Planet, Michelin Guide) Digital trails	Social media content (e.g. Twitter, Flickr). Activity patterns (e.g. transaction and transportation data)

Figure 2.20. Form and function comparison between traditional and crowdsourced data (Crooks, et al., 2015, p. 9)

Looking at these research, crowdsourced spatial data is more diverse, more interactive, and more flexible than traditional spatial data. Crowdsourcing also gives citizens a say in their spaces and thus strengthens their sense of attachment and belonging. "We Own the City" (Kee & Miazzo, 2014) and "City Unsilenced" (Hou, Knierbein, & Monteiro, 2017) are important studies to establish the relationship between the right to the city, an idea and a slogan that was first proposed by Lefebvre (1991), and citizen participation.

Another approach based on citizen participation is tactical urbanism. Tactical urbanism, which can be defined as small-scale, non-governmental organization improvements, is on the rise, as well as large-scale and authority-organized efforts to address urban problems. Actions that take place in the direction of tactics are often referred to as "guerrilla urbanism", "pop-up urbanism", "city restoration" or "DIY urbanism" (Lydon, Bartman, Garcia, & Preston, 2012). De Certeau (1980) describes how 'tactics' within the everyday life have an innate power to react, to resist and to reclaim. Under the leadership of PPS, "Cheaper, lighter and quicker" discourse, the understanding of intervention in public space with temporary but impressive strategies emerged (Kent, 2019). In the relationship between space and people, which develops with smart urbanism, citizen participation and tactical urbanism

approaches, human beings have moved from being a passive factor affected by space to a factor affecting space.

2.4 Evaluation of the Literature Review

This part aims to synthesize the literature knowledge of crowd phenomenon from different disciplines and the literature knowledge of public space from urban studies. The reason for creating such a synthesis approach on two different concepts is to constitute the main structure of the thesis based on the main research question. Literature synthesis is handled with four main approaches. The first one, the crowd is a complex behavioral phenomenon associated with social and spatial elements. The second one, the crowd is a dynamic system whose behavior can be predicted and simulated to regulate the form and functions of the public space. The third one, the crowd is a living organism that needs to be observed and managed for an attractive and safe everyday life. The last one, the crowd is a resource that can generate data for decisions and arrangements to be made in their own public spaces.

Firstly, research that deal with the triggers of human behavior such as social psychology and organizational psychology, investigate the interaction of crowd phenomena and behavior of crowd members. The contributions of this approach to a crowd-oriented public space understanding are social characteristics of a crowd such as composition, motivation, emotion and organization. Environmental perception and spatial behavior studies also investigate the effect of space on social and environmental behavior. The contributions of this approach to a crowd-oriented public space understanding are effects of natural and environmental structure on motivation, emotion, and behavior of people. On the relationship of these two approaches, crowd is a complex behavioral phenomenon associated with social and spatial elements.

Secondly, applied mathematics and computer modelling disciplines conduct research on predicting crowd movements by expressing complex decision-making processes

of the crowd with algorithms. The contributions of these studies to a crowd-oriented public space analysis are physical characteristics of a crowd such as size, duration, behavior, and form. Urban design approaches and real estate valuation projects work on the optimization of the form of the public space and the efficiency of functions. The contributions of these approaches to a crowd-oriented public space understanding are the spatial analyses of a public space such as land use, solid-void relations, perceptible spatial elements, transportation, and network. To synthesize these two approaches, the crowd is a dynamic system whose behavior can be predicted and simulated to regulate the form and functions of the public space.

Thirdly, sciences dealing with event management, disaster planning and risk assessment conduct research on the planning and control of crowd phenomenon. The contributions of these approaches to a crowd-oriented public space assessment are public safety, damage, controllability, and evacuation strategies in chaotic situations. Public space activities and street life approaches examine the production of everyday life and human-oriented spaces by observing the public life and the use of public space. The contributions of these approaches to a crowd-oriented public space assessment are functionality, capacity, attractiveness, and legibility of public space for a livable everyday life. In the light of this information, the crowd is a living organism that needs to be observed and managed for an attractive and safe everyday life.

Finally, sciences such as artificial intelligence and tracking, methods of obtaining data from the crowd, produce and process big data. The contributions of these approaches to a crowd-oriented public space strategy is inclusiveness and interactivity of spatial decisions. Smart urbanism and citizen participation in public space planning focus on generating more democratic and citizen-oriented ideas rather than central decision-making and expert opinion. The contributions of these approaches to a crowd-oriented public space strategy is increasing sense of belonging and strengthen spatial memory. At the intersection of these two approaches, the crowd is a resource that can generate data for decisions and arrangements to be made in their own public spaces.



CHAPTER 3

THE CROWD PHENOMENON ON THE İSTİKLAL STREET

This chapter presents the analysis of the crowd phenomenon in the Istiklal Street. This is done in four analytical phases: historical timeline, social identity, physical dynamics and complexity of the crowd. The historical analysis aims to understand how the crowd phenomenon in the Istiklal Street, Beyoğlu has changed in the historical process between the 16th century and the 21st century. This helps to release the character of the street life that eventually creates the crowd occurring in the Istiklal Street from the past to today in these periods; crowding of everyday life until World War I in 1800s, displacement of crowds until 1960s, recrowding with public events until 2013 Gezi Park Protests and circulating crowds until Covid-19 pandemic. In order to understand the social and physical characteristics of the crowd phenomenon in Istiklal Street, it is necessary to access analytical cases containing detailed data. In the second and third phases, 80 crowd cases as documented via newspapers and videos between 2006 and 2020 are analyzed in terms of their social components as well as in terms of how they physically appear in space.

The social components include the composition, motivation, emotion, and organization of the crowd. The physical aspects refer to the size, duration, behavior, and form of the crowd. These variables are common for all public spaces but categories should be considered specific to the Istiklal Street. Lastly, the chapter provides a method of grouping the complex crowd categories specific to the place with an aim to seek existing crowd patterns in the Istiklal Street. The complex pattern of crowd categories is gathered in three groups by network analysis, everyday life, mass gathering and chaos. The crowds that make up the everyday life are compositionally inclusive. They are generally motivated by casual purposes with positive emotions. They are spontaneously organized. Everyday life crowds can be medium or large size in long or short-term, they show walking and standing behavior

in all physical forms. Mass gathering crowds consist of mixed groups. They are motivated for purposes such as activism or celebration with positive or negative emotions. They are organized by civil society or authority. Mass gathering crowds can be of any size and duration physically, exhibiting any behavior in any form. Chaotic crowds consist of young and male groups with specific demographic structures. They are formed in situations of panic and conflict. They may require police control because of being unorganized. Although chaotic crowds can physically present at all scales, they are short-term. In addition, they show standing and walking behaviors with point and area form.

3.1 Evolution of The Crowd

This section presents a historical overview of the critical changes that led to the emergence of a crowd phenomenon on the Istiklal Street in reference to the existing documentation about the crowd. This historical analysis goes as far back as to the 1500s and covers as latest as the Covid-19 pandemic of the 2020s. This analysis reveals how the crowd phenomenon has changed and the driving forces that stimulated that change through history. Figure 3.1 shows that the Istiklal Street can be assessed in four remarkable periods when the crowd is considered within the life context of the street. This analysis intends to draw a rather general framework on how the crowd character of the street changes through time. It does not provide a detailed description of that change. By doing so, this analysis aims at understanding the historical contextual characteristics of the street and emerged opportunities for accommodating varying types of crowd. Respectively, in the first period covering three centuries from the 1500s to the 1800s, the street turns into an important center of attraction for Istanbul, and thus, an increase in the crowd on the street is observed. In the second period lasting between WW1 and the 1960s, changes in sociological dynamics and migrations are considered as the displacement of the crowd from the street and thereby, the deprivation of the street from the crowd. In the third period between 1977 and 1999, some attempts are made to make the deserted street a center

of attraction and the focus of the crowd again. In the fourth period between the beginning of the 2000s until today, although the crowd occasionally withdrew from the street due to the influence of social riots, clashes, and terrorist acts, it always continued to exist on the street.

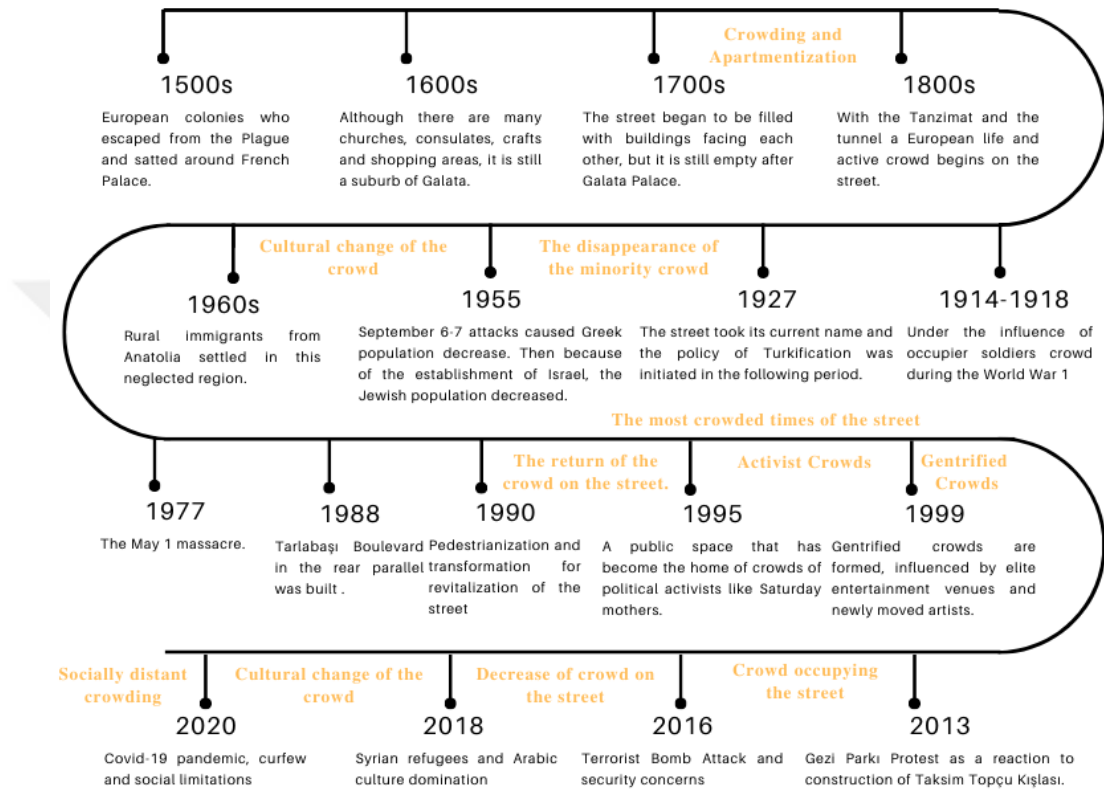


Figure 3.1. The crowd of Istiklal Street in the timeline

There are four important periods for the crowd of Istiklal Street based on the timetable. In the first period, the street turns into an important center of attraction for Istanbul and the crowd on the street is increasing. In the second period, changing sociological dynamics and migrations are considered as the displacement of the crowd on the street. In the third period, some attempts are made to make the deserted street a center of attraction and the focus of the crowd again. In the fourth period, although the crowd occasionally withdrew on the street under the influence of social riots, clashes, and terrorist acts, it always continued to exist on the street.

From the 16th century to the 20th century, the crowd phenomenon in the Istiklal Street was characterized by the daily life significance of street events affecting the motivation and size of the crowd. Istiklal Street was a path along vineyard houses until the 16th century (Kuban, 2017). With the colonies escaping from Europe because of the plague epidemic, settlements began to intensify around the French Palace built on the “Grand Rue de Pera” (Avcı, 1994). Despite the increase in the Muslim population because of the establishment of Galata Mevlevihane, there was a crowd profile mostly composed of non-Muslim citizens (Avcı, 1994). In the 17th century, consulates, churches, public buildings, the arts and crafts activities on the street increased in Pera. In the 18th century, apartments increased on the street from Galata Tower to Galata Palace and commercial fronts began to form (Eyice, 1994). With the reform of Tanzimat in the 19th century, the European lifestyle was adopted and “Cadde-i Kebir”, as it was called at that time, gained its present appearance (Akin, 1998). In the same period, many of the buildings on the street were greatly damaged in the great fires that took place (Avcı, 1994).

The period following the World War I can be referred to as a chaotic period due to displacements that significantly affect the composition of the crowd in Beyoğlu. After the war, the name of the street was changed to Istiklal Street with the declaration of the Republic (Batur, 2001). During this period, the street hosted important mass gathering events and official ceremonies. In the following period, because of the 6-7 September events caused by the policies of Turkification, the Greek people migrated from the Beyoğlu district (Batur, 2001). In addition, the Jewish people moved off the street with the establishment of Israel (Batur, 2001). These events led to the decline of the cosmopolitan and non-Muslim dominant structure on the street. With the effect of 1960s rural-to-urban migration, immigrants coming from Anatolia filled the spaces evacuated by the minority people (Batur, 2001). During this period, security, building quality and environmental pollution problems emerged on the street. As a result, the street has turned into a blighted area.

Along with the 1970s, many re-crowding developments took place so that the street would regain its former vitality for Istanbul to join the competition of global cities.

In addition to the routine crowd of everyday life, social activities and activist actions changed both the motivation, organization and emotion of the crowd on the street. Due to the unfortunate events that took place in the workers' protests on May 1, 1977, the confidence in public security in Taksim square decreased (Batur, 2001). In the 1980s, the mayor of that time, Bedrettin Dalan, expanded the Tarlabası Boulevard to correct the deteriorating image of the street. Dalan aimed to make a pedestrian-oriented Istiklal Street for revitalization (Batur, 2001). Istiklal Street turned into a shopping street with restorations in addition to pedestrianization. With the increasing popularity of Beyoğlu, activists who wanted to make their voices heard by the authority and the public became one of the main actors of the street. The pioneers of this change were the Saturday Mothers, who protested every Saturday in front of Galatasaray High School in search of their missing children (Adanalı, 2011). The reunification of the street with its cosmopolitan structure triggered the artists of the period to settle in Cihangir and Asmalı Mescit (Adanalı, 2011). Under the leadership of Babylon, which opened in 1999, the consumption value and quality of the street increased and became gentrified. With the changing crowd profile, socializing places (cafe, restaurant and bar) and culture and arts venues (cinema, theater and gallery) have increased (Adanalı, 2011). With the replacement of the houses on the street by shops and offices, Istiklal Street experienced its most crowded period in this period.

Since the beginning of the millennium, the crowd on the street has experienced complex circulations, both socially and physically. Istiklal Street became the venue for the whole city to come together and celebrate the New Year with enthusiasm. In 2013, the crowd gathered for days to protest Taksim Topçu Kışlası project and they invaded both Istiklal Street and Taksim Square. After the resistance, in which clashes with the security forces took place, all demonstrations and actions in Taksim square were restricted and police interventions against protests are hardened (Mert, 2021). Later, with the chaotic atmosphere of the bomb attack in 2016, security concerns increase, and the street becomes desolate. As seen before in the history of the street, a different crowd takes its place and dominates its own culture, with the withdrawal of the existing crowd. The growing interest of tourists from the Middle East countries

and those who settled in Istanbul after the civil war in Syria completely changed the composition of the crowd on the street. (Akyol, 2021). With the Covid-19 outbreak in early 2019, international restrictions and social distance rules reduced crowds in public spaces. However, when we look at Istiklal Street, despite all the precautions, the crowd on the street has not decreased.

Crowd cases with detailed social and physical data obtained by scanning the news archive on Istiklal Street take place in the last historical period in the timeline. The proportional distribution of 80 crowd cases based on critical points in the recent historical process can be useful in understanding the interaction of crowd with socio-spatial factors. Figure 3.2 shows that, 22% of the cases occur between 2006 and 2013, the year that the Gezi Park events took place. 20% of the cases take place in the period from 2013 to 2016, when the terrorist bomb attack took place on the street. 30% of the cases belong to the period of popularization of the street for Syrian immigrants and Middle Eastern tourists between 2016-2018. Finally, 28% of cases occur between 2019 and 2020, the early stages of the Covid-19 pandemic.

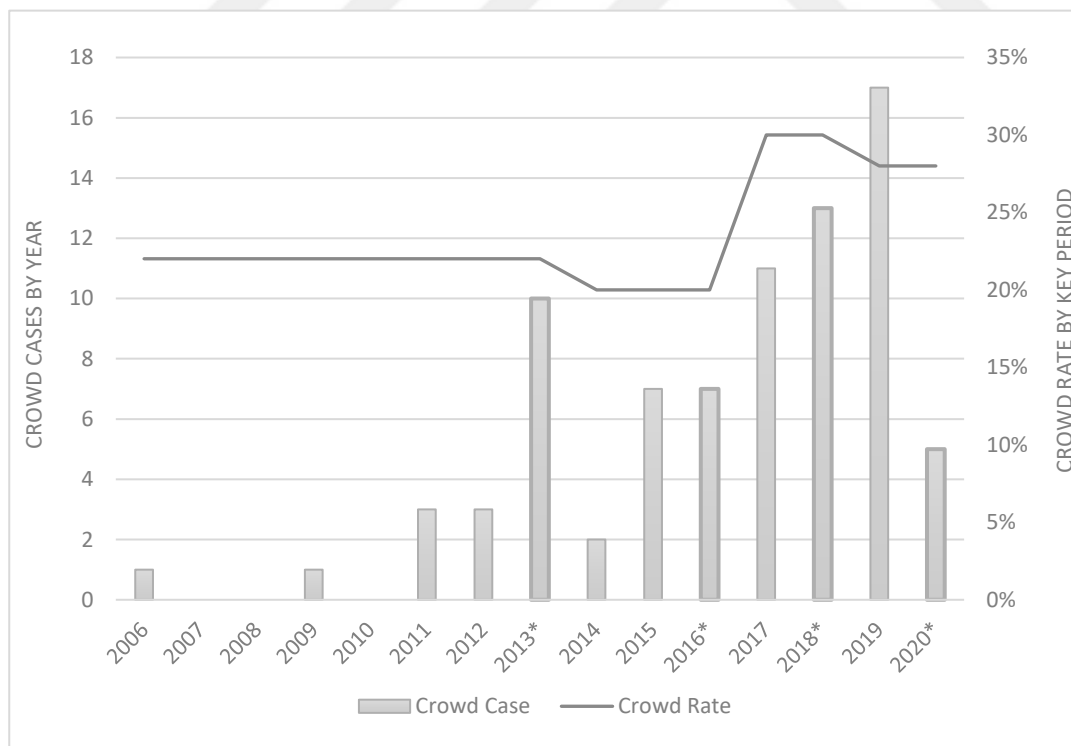


Figure 3.2. Crowd cases by key periods of the timeline

3.2 Social Identity of Crowd

The origin of the word “crowd” means rush in the old English word "crūdan" (Online Etymology Dictionary, 2020). Despite the meaning associated with the origin of the word, there is not a single and precise definition of crowd. The common crowd approach in both social psychology studies is that: “*The crowd is a large group of people that gathered in the same place at the same time*” (Lofland, 1985, p. 3). According to the crowd explanation of Neville and Reicher (2018) “*A crowd is only a crowd when individuals share a social identity.*”, the crowd is not just a large number of people present in the space, but that the social identity of the crowd must be investigated. Figure 3.3 shows that the social identity of the crowd is explained in four ways based on the synthesis of crowd and public space literatures in Chapter 2. These include composition, motivation, emotion, and organization. Composition represents who is making up the crowd. Motivation refers to the reason why the crowd is formed. Emotion means the mood of the crowd. Organization shows the way the crowd come together. This section discusses the findings for these components in line with the findings from previous studies.

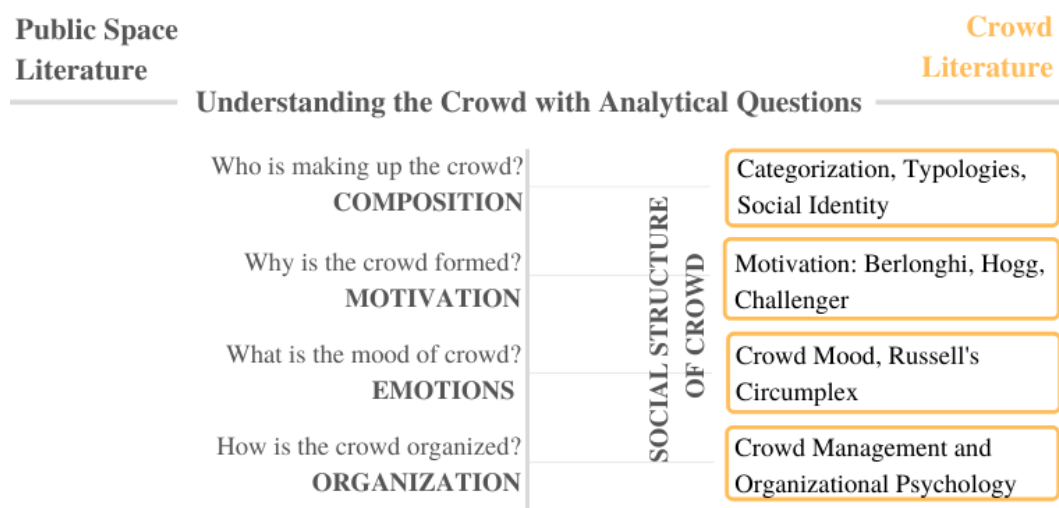


Figure 3.3. Social identity of the crowd

3.2.1 Composition

In reference to a crowd phenomenon, Brown and Lewis (1998, p. 649) defines the notion of "composition" as "...a compact gathering or collection of people with connotations of homogeneity of characteristics and unanimity of behavior.". This study also adopts this definition and asserts that the distribution of individuals making up the crowd is salient to understand the composition of the crowd. Challenger et al. (2010) highlight the "heterogeneity of crowd membership" to draw attention to the distribution of individual characteristics in the crowd. Turner and Killian (1972) categorize different crowd compositions according to the crowd membership. The crowd, which does not have a distinct common feature in its composition, appears homogeneous because it shows a distribution of individuals as a mass. Having said that individuals, in such crowd phenomenon, can contain different characteristics depending on age, gender and perception. Different individual characteristics in a crowd composition have different advantages and disadvantages in the crowd behavior. Individuals with physical and mental limitations require larger zones of comfort and safety. While crowd tolerance of both children and elder age groups is low (Alsolami, Embi, & Enegbuma, 2017), young people have higher crowd adaptation and crowd tolerance (Challenger, Clegg, & Robinson, 2009). The gender factor also demonstrates physical and mental differences between men and women, leading to the differentiation in the crowd perception of individuals (Yudengar & Ravishankar, 2018).

Since the database of this study consists of news texts and videos, observable information on crowd composition is limited, such as physical distance, average age, and gender. As seen in Figure 3.4, the compositional characteristics of the crowd cases in Istiklal Street were analyzed at two levels, individual and group level. The crowd cases on Istiklal street are half composed of individual and group level compositions. Group crowds of mixed demographics are twice as large as crowds of specific demographics. Although the crowds in the active group composition are mostly young people, there are also groups of men and women.

Crowd Composition Categories

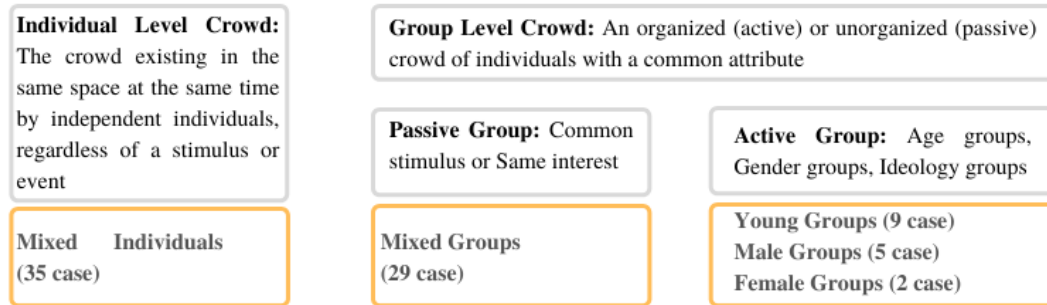


Figure 3.4 Crowd composition categories

Crowds composed of individuals are homogeneous with a similar demographic distribution, although they may differ in terms of age, gender, and opinion (Figure 3.5). These crowds exist independently of an event in everyday life. Although the crowds examined at the individual level are affected by environmental stimuli (space and people), they act with individual decision mechanisms. No special conditions are required to participate in individual-level crowds, so they are inclusive for public life. It is necessary to take priority groups such as children, elders and women, as the basis to develop an optimized thinking for everyone (Mitchell D. , 2003).



Figure 3.5. Crowd composition formed by individuals (personal archive)

According to the social group definition of Myers, (2005), gathering of more than two people is sufficient to form a group. Inclusiveness of group level crowd is weaker compared to individual level crowds (Hogg & Rinella, 2018). Groups can be active or passive based on their organizational structure. Passive groups are mostly formed by common stimulus or interest of unrelated individuals. They are unorganized because they have no purpose to bring the crowded group together. For

example, because of an external factor, bomb explosion, individuals become a passive group of victims. Another example, independent individuals with a common interest in music form a large group by making a cluster around a street performer (Figure 3.6).



Figure 3.6. Mixed composition passive crowd groups (Snapshots from the video sections of case 11 and case 77)

If the individuals forming the crowd have certain common features such as age and gender, they compose an active group. (Hogg & Rinella, 2018). Active groups are usually organized crowds. To participate in an active group, it is necessary to have the common feature of the crowd or to be interested in the common feature of the group. Therefore, the inclusiveness of these crowds is limited. For example, the common feature of the football fanatics except for supporting the same team is consisting of excited and enthusiastic young men. Such a group can easily be distinguished from other actors in public life. Another example, young women group constitute the dominant composition of the group, although there may be some men to support an action held on Feminist Night March (Figure 3.7).



Figure 3.7. Special composition active groups (Snapshots from video sections of case 66 and case 54)

3.2.2 Motivation

Sharma (2000, p. 298) makes an explanation of the crowd phenomenon as “...*they are present in a common environment, and all the individuals present in the crowd usually share a common goal.*”. With reference to this explanation, the reason that triggers people to be in the same place at the same time creates the context of the crowd. Momboisse (1970) use the crowd motivation to classify the crowds of different purposes as "aggressive, expressive, conventional and casual". Wijermans (2011) and Challenger (2010) also examine the crowd through the motivation as a result of an internal trigger such as desire, need, purpose, goal or an external trigger such as sound, image, an event (Hogg & Rinella, 2018). Berlonghi (1995) names the crowd-triggering factors in mass gatherings as "Crowd Catalysts" such as operational circumstances, event activities, performers actions, spectator factors, security or police factors, social factors, weather conditions, natural disasters and manmade disasters.

In the analysis of the Istiklal Street case area, motivation categories based on observations in one-minute video clips because triggers of the crowd are not always stable and understandable. Figure 3.8 shows the categorization and case distribution for the motivation of the crowd. Crowds on Istiklal Street are formed by casual, celebration, activism, demanding, panic and conflict driving forces. Almost a quarter

of the crowd cases motivated by both casual and activist reasons. Subsequently, conflict and then celebration motivations influence the formation of the crowd. Finally, a small amount of demanding and panic factors trigger the crowd cases.

Crowd Motivation Categories

Casual : socializing weather cond. streetart shopping religious	Celebration: newyear festivals concerts sports competitions	Activism: parades ceremonies protests riots notifiers	Demanding: service admiration freeloading	Panic: fire terrorist attack bomb explosion	Conflict: police intervention lynching harassment
(25 case)	(9 case)	(22 case)	6 case)	(4 case)	(14 case)

Figure 3.8. Istiklal Street crowd motivation categories

Casual motivations are permanent and spontaneous motivations of everyday life. Driving forces of casual crowds are socializing, weather conditions, street art, shopping, religious. Casual motivations often arise from the intersection of different individual motivations at the same time, in the same location (Figure 3.9). Although they are affected by all the events and situations that take place in the public place, crowds that do not rely on a specific event.



Figure 3.9. Casual motivated crowds (Snapshots from video sections of case 29 and case 31)

Celebration motivation takes place depending on a specific mass gathering event such as new year, festivals, concerts or sports competitions. Celebrations can

increase the attractiveness of the public space by stimulating the sociability of public life. Celebrations composed of spectators focused around an event or participants who make up the event (Figure 3.10). Motivation of celebration can exhibit a ritualistic behavior, occurring with frequencies on a specific date.



Figure 3.10. Celebration motivated crowds (Snapshots from video sections of case 65 and case 67)

Activist crowds aim to raise public awareness and to seek public rights by organizing parades, ceremonies and protests (Figure 3.11). They are crowds who often come together in a specific location at a specific time with a common motivation.



Figure 3.11. Activism motivated crowds (Snapshots from video sections of case 52 and case 51)

Individuals who aim to achieve something with individual motivations form demanding crowds for using a service, meeting with a celebrity and freeloading (Figure 3.12). Demand oriented crowds tend to create a chaos due to its competitive

nature. On the other hand, demanding crowds can also organize themselves in a queue until their demands are met.



Figure 3.12. Demand motivated crowds (Snapshots from video sections of case 40 and case 42)

The panic motivation of the crowd is generally triggered by unexpected negative external factors such as fire, terrorist attack, bomb explosion (Figure 3.13). In addition, the crowds can move with panic motivation by a manmade disaster like the stampede that occurs during the crowd. It is a type of motivation that occurs at individual level without an organization. Panic motivation is temporary due to its short-term existence in the space but, it can cause great material and moral damages.



Figure 3.13. Panic motivated crowds (Snapshots from video sections of case 12 and case 10)

Crowds with motivation of conflict represent the greatest threat to the safety and sustainability of public life. Police intervention in unauthorized demonstrations, lynching attempts by football fans, and alcohol-related group fights at New Year's

Eve celebrations are examples of conflict motivation for Istiklal Street (Figure 3.14). Conflict motivation is chaotic in terms of its controllability and manageability because these crowds display anger-based behavior. In some cases, violence is produced by the crowd, in some other cases it is directed towards the crowd.



Figure 3.14. Conflict motivated crowds (Snapshots from video sections of case 2 and case 16)

3.2.3 Emotion

Researchers in social psychology carry out many studies on the “crowd mood” to understand emotion of the crowd members. Reicher (2001, p. 201) describe the mood of crowd as “...*different psychological crowds with different identities and different intentions co-existing within the physical crowd.*” Zeitz (2009) classifies crowds based on three different emotional categories such as active, passive and non-energetic. Canetti (1984) also characterizes crowd types through the emotional expressions of crowd members. In addition, Challenger (2010) use the concept “event atmosphere” to describe the emotion of the crowd that directly affect the social event. The method of this research is to categorize the moods of crowd cases by observing gestures and facial expressions in 1-minute case video segments of crowd members. Emotion categories that represent crowd mood based on Russell's (1980) "A Circumplex Model of Affect" study. According to Russell's chart (Figure 3.15), there are six observable types of two main emotion categories positive

emotions such as excited, pleasant, relaxed and negative emotions such as nervous, unpleasant, depressed.

Crowd Emotion Categories

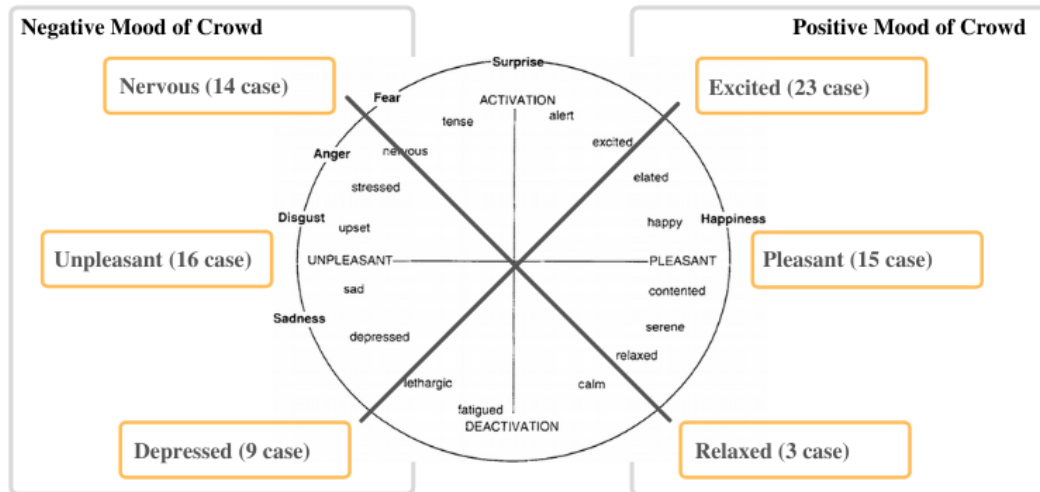


Figure 3.15. Istiklal Street crowd emotion categories

The number of positive-mode and negative-mode crowding cases in Istiklal Street is almost equal. Excitement is the most frequently observed emotion that creates the positive mood of the crowd. While the feeling of satisfaction is observed as the second, the least observed is the feeling of relaxation. Second, the negative mood of the crowd consists of feelings of unpleasant, depressed, and nervous. The most common negative emotions of the crowd cases are unpleasant and nervous. Among the negative emotions, feeling of being depressed is the least common.

The most basic feeling evoked by the crowd in public spaces is curiosity. Curiosity affects the spatial orientation of individuals. For example, a crowd with positive emotions evokes curiosity and attracts people. On the other hand, a crowd that arouses threatening feelings also triggers a sense of curiosity but leads people to go away for individual security reasons. In other words, the mood of the crowd affects public space positive or negative by changing the atmosphere of crowded place as interesting or to be avoided (Figure 3.16).



Figure 3.16. Crowds that impose positive and negative emotions (Snapshots from video sections of case 74 and case 31)

Experiencing the public space in the crowd plays an important role in the formation of spatial memory and sense of belonging. The emotional state, which is shaped in parallel with the motivation of the crowd, can also affect those existing outside the crowd. Tajfel (1978, p. 63) describes the transition of the mood of crowd members as "the mood of the crowd is contagious". For example, a cheerful crowd creates a similar feeling in those around them, and a tense crowd increases tension in public life (Figure 3.17). Certain psychological disorders such as agoraphobia and enoclophobia may also play a role in the perception of the mood of the crowd. For individuals with these disorders, more than the mode of the crowd, the crowd itself is unsettling. (Veld & Gelder, 2015)



Figure 3.17. Excited and depressed emotions of the crowd (Snapshots from video sections of case 46 and case 43)

3.2.4 Organization

Thouless (2014, p. 115) define the crowd phenomenon by its spontaneously organized nature *"A crowd is transitory contiguous group organized with completely permeable boundaries, spontaneously formed as a result of some common interest"*. Wijermans (2011) evaluate the organization of intergroup relations based on "harmony and relationship" among the crowd members. In addition, Güvenç (2005) categorizes crowds as "organized crowds" and "unorganized crowds". According to Güvenç, the organization of the crowd is provided by the authority or civil society. In this research, the categorization of the organization of the crowd is based on the observation of 1-minute videos and the content analysis of news texts. The organization of the crowd is divided into two according to the time factor, the pre-organized crowds to organize a gathering of people and the post-organized crowds to organize people who have come together (Figure 3.18). Crowds aiming to bring people together in public spaces can be organized by civil society or authority. On the other hand, the organization of people gathered can be spontaneous or it can take place under police control.

Crowd Organization Categories



Figure 3.18. Istiklal Street crowd organization categories

The pre-organized and post-organized crowds on Istiklal Street are almost equal. Pre-organized crowds organized by civil society are almost twice as large as those organized by authority. On the other hand, spontaneity in organized crowds is slightly higher than under police control.

In pre-organized crowds, the place, meeting time, participants and activities are determined before the formation of the crowd. Organized crowds come together towards a common goal, with or without a leader. For example, in a ceremony organized by the authority, it is determined where the protocol will sit and when the wreath will be released. Another example is that in a crowd organized by civil society, the people standing in the front row, banners, slogans, and the time to stop and make a statement are determined before the protest action (Figure 3.19).



Figure 3.19. Crowds organized by the authority and civil society (Snapshots from video sections of case 50 and case 44)

Some crowds exist in public spaces without being organized beforehand. After the formation of the crowd, they can organize themselves spontaneously by showing harmonious behaviors. For example, the crowd gathered around a performance artist dancing on the street can organize a stage by standing equidistant in a circle. As another example of spontaneous organization, people in the crowd tend to walk without bumping into each other and tend to follow the person in the same direction (Figure 3.20). There are also cases of crowds organized later under police control because of a situation that require intervention such as unauthorized demonstration or conflict.



Figure 3.20. Spontaneous and police-controlled crowds (Snapshots from video sections of case 78 and case 23)

3.3 Physical Dynamics of Crowd

The physical dynamics of the crowd are based on a large number of people in the same space at the same time. Physical dynamics of a crowd may affect the environmental perception, the image that the place evokes in the mind beyond its physical characteristics, of crowd members. (Rapoport, 1977). Therefore, in addition to the social identity of the crowd, physical dynamics are also important to understand the relationship between crowd phenomenon and public space. Figure 3.21 shows that the physical dynamics of the crowd is explained in four ways based on the synthesis of crowd and public space literatures in Chapter 2. These include size, duration, behavior, and form. Size represents the scale of the crowd with the quantitative size of the individuals who make up the crowd. Duration refers to the length of the crowd being together and the time of being in the space. Behavior examines the physical activities of crowd members that occur with the decision-making process in space. The form shows the spatial shape that the crowd in the space takes while performing their physical actions. This section discusses the findings for these components in line with the findings from previous studies.

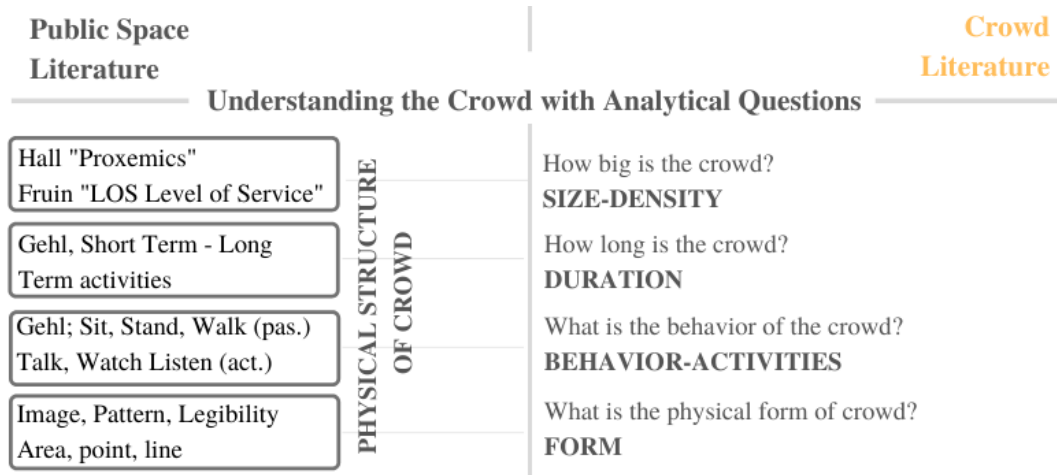


Figure 3.21. Physical dynamics of crowd

3.3.1 Size

Young and Kimball (1951, p. 94) emphasize the size of the crowd as “A crowd is a gathering of a considerable number of persons around a center or point of common attraction.”. The most perceptible physical feature of the crowd is its size, relative to quantitative density. There are many different quantitative methods to understand the size of the crowd. The most basic of these is pedestrian counting method. In addition, there are some crowd density estimation techniques with different technologies such as video tracking, counter, heatmaps. Hall's (1968) concept of "proxemics" gives an idea about the size of the crowd, beyond defining the relationships of individuals according to inter individual distance to each other. For example, if there is no relationship between two pedestrians in a non-crowded space, the distance is at least 2 to 4 meters. However, if the public space is crowded, this distance may be even zero. Fruin (1971) classify pedestrian density compositions for different public spaces such as sidewalks, bus stops, pedestrian paths.

Fruin's (1971) standards "LoS, Level of Service" examines the crowd at 6 different levels according to the number of people per square meter and the speed of pedestrians at the moment of movement. In this research, there are 3 different crowd sizes parallel to Fruin's (1971) categories. The categorization of crowd sizes based

on the approximate number of people and proximity between people. This data is obtained by observation from one-minute video clips. LoS A and B are categorized as small size crowds, LoS C and D - medium size crowds and LoS E and F - large scale crowds. Figure 3.22 shows small, medium and large size categories of the crowded cases on the Istiklal Street. Almost half of the crowding cases on Istiklal Street are large-scale crowds. A quarter of the street crowds are medium-sized, while small-scale crowds are extremely rare. In line with this information, Istiklal Street is an iconic public space with large-scale crowds.

Crowd Size Categories			Density (pedestrian per square meter)
S	Level of Service A		≤ 0.08
	Level of Service B		$0.08 - 0.27$
M	Level of Service C		$0.27 - 0.45$
	Level of Service D		$0.45 - 0.69$
L	Level of Service E		$0.69 - 1.66$
	Level of Service F		≥ 1.66
S	Small Scale Dozens of peop. (10-100) (9 case)	M	Medium Scale Hundreds of peop. (100-1000) (24 case)
		L	Large Scale Thousands of peop. (1000+) (47 case)

Figure 3.22. Istiklal Street crowd size categories

Expressing the crowd only with the number of people may be insufficient in some cases. Although some crowds consist of fewer people, they are larger crowds that can be perceived larger due to the small distance between individuals. Both the size and density attributes of the crowd also affects the feel of the enclosure in the space surrounded by loose spatial elements (Figure 3.23).



Figure 3.23. Crowds of different sizes and densities (Snapshots from video sections of case 25 and case 27)

3.3.2 Duration

The crowd phenomenon is constant in public space, it may exist every season, every day, and every hour. In addition, there may be some annually, monthly, and weekly periods of increase in the density of the crowd in some public spaces. However, understanding the duration of the crowd is a significant factor in terms of the physical presence in the space. Blumer and Shibutani (1973, p. 92) emphasize the time-dependent definition of crowd with the phrase *"A crowd is a large number of people who gather together with a common short-term or long-term purpose."* Challenger et al. (2010) introduce the concept of "duration of crowd" and Gehl and Svarre (2013) also mention about duration of pedestrians in a public space in the book *"How to Study Public Life"*. They both examine the concept of duration in public life with the question of "how long".

In this analysis, the duration of the crowd as a time dependent variable is categorized according to "how long?" question. Crowds lasting more than 12 hours, half a day are called as "long term". On the other hand, crowds that last less than 12 hours, half a day are called as "short term". Categorizing the duration of the crowd as long or short is based on an estimated inference from the motivation and organization of the crowd. According to the duration categories of the crowd cases shown on Figure 3.24, the short-term crowds are slightly higher than the long-term crowds.

Crowd Duration Categories

Short Term Crowds: temporary, less than 12 hours (half a day)	Long Term Crowds: permanent, more than 12 hours (half a day)
(45 case)	(35 case)

Figure 3.24. Istiklal Street crowd duration categories

The duration of the crowd represents the amount of crowd members experiencing the space and influencing public life. However, the excess of the time the crowd is present in the space does not always mean that the crowd has more influence in the space. It may be easy to adapt some type of long-term crowds and their effects can be tolerated in time. On the other hand, a destroyer crowd that develops suddenly and lasts for a very short time leaves deeper traces in the spatial memory and creates a shock effect in public life (Figure 3.25).



Figure 3.25. Long-term and short-term crowds (Snapshots from video sections of case 34 and case 11)

3.3.3 Behavior

In behavioral psychology, there is a change from an unwise crowd behavior approach acting with aggressive impulses to a dynamic crowd behavior approach emerging from the complex relationships of individuals (Wijermans & Wijermans, 2011). McPhail (1991, p. 185) describes this complex behavior pattern of crowd as “...two

or more persons engaged in one or more behaviors judged common or concerted in one or more dimensions.”. Brown (1954) categorizes crowds according to their dominant behavior such as lynching, terrorization, escape, acquisitive and expressive. In addition, studies on crowd dynamics explain crowd behaviors with specific concepts such as oscillation at bottlenecks, clogging effect, bidirectional flow, unidirectional flow, counterflows intersecting area (Helbing D. B., 2005). Focusing on the public space, Gehl (2013) categorizes the activities of the crowd as necessary, social, and optional. In addition, he develops a detailed perspective on behavior in public spaces by associating these categories with basic actions such as "sit, stand and walk" (Gehl & Svarre, 2013).

For this categorization, walking, sitting, and standing behaviors are observed in one-minute video sections. According to the observable behavior categories of the crowd members, cases on Istiklal Street mostly consist of crowds exhibiting standing and walking behaviors (Figure 3.26). Even though Istiklal Street has three important squares, it is remarkable that the crowds showing the sitting behavior are almost negligible.

Crowd Behavior Categories



Figure 3.26. Istiklal Street crowd behavior categories

According to the behavior of the crowd, the relationship that the members of the crowd establish with the place differs. For example, a crowd with stagnant behavior stays in the place for a longer period of time and perpetuates the perception of the crowd. However, crowds on the move have a shorter time to experience the place. On the other hand, the effect of a stationary crowd may be more limited, but a moving crowd may make the space dynamic (Figure 3.27).



Figure 3.27. Sitting, standing, and walking behaviors of the crowds (Snapshots from video sections of case 43, case 67 and case 19)

Dynamic crowds expressing a walking behavior can be unidirectional and bidirectional. Unidirectional flow can also be seen in an organized crowd with a determined route or in crowds trying to escape in a panic. Bidirectional dynamic flows are dominant in pedestrian spaces in everyday life (Figure 3.28).



Figure 3.28. Unidirectional and bidirectional flows of walking crowds (Snapshots from video sections of case 71 and case 26)

3.3.4 Form

Public space is produced by societies as a necessity of everyday life with spaces shaped by people according to Lefebvre's (1991) concept, "Appropriation of Public Space". Lefebvre_(1991, p. 96) describes the power of people to shape their own space with the phrase "*Appropriation of public spaces allows citizens to take part in the production of urban space, beyond the mere inhabitation/fruiting of the already formed urban space by giving citizens the right to completely manage and use their*

everyday life.”. Lynch (1960), on the other hand, focuses on the power of human perception of space by processing the city image in mental maps. Lynch describes the five main elements that make up the city image over three main geometric units such as area, line, and point. Image of the city is symbolized by the areal form for the districts, the point form for both the node and the landmark, and the line form for both the edge and path (Lynch, 1960).

The form of the crowd is as important as the form of the buildings in the public space because the crowd also occupies a volume in the space. The crowd can create a sense of enclosure in the space, define edges or become an obstacle that limits movement depending on the physical form of crowd members. In this research, observations are made on 1-minute video sections in order to determine the physical form of crowd cases. According to the form produced by the crowds on Istiklal Street, almost half of the cases are in the areal form. The other half of the cases consist of linear and point crowds in approximately equal proportions (Figure 3.29).

Crowd Form Categories

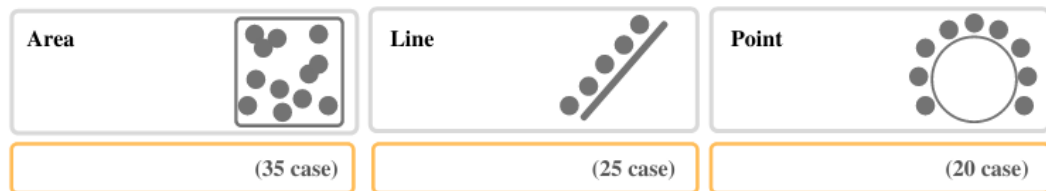


Figure 3.29. Istiklal Street crowd form categories

Areal crowds do not form any special form in the space. It can be defined as the situation in which pedestrians cover the entire area, just like gas molecules emitted in a closed container (Figure 3.30). They are crowd forms that are problematic in terms of perceptibility and permeability of the public space.



Figure 3.30. Area-formed crowds (Snapshots from video sections of case 1 and case 19)

The crowds shaped around a punctual interest are mostly in the form of semicircles or circles (Figure 3.31). For example, street artists communicate with the street by turning their backs on a corner or sides in a public space. Those who want to watch this street performer create a stage-like closed area around a corner or edge. Point-shape crowds affect the permeability of public space in the right proportion to the radius of the crowd.



Figure 3.31. Point-formed crowds (Snapshots from video sections of case 60 and case 79)

Crowds in linear form may exhibit stagnant behaviors such as sitting and standing, as well as walking behavior (Figure 3.32). The linear continuity of line-shape crowds may define an edge in the public space. In addition, the linear crowd in a street does not adversely affect the permeability of the public space. Linear crowd in a street may or may not negatively affect the permeability of public space, depending on its orientation.



Figure 3.32. Line-formed crowds (Snapshots from video sections of case 64 and case 41)

3.4 Complexity of Crowd Contexts

The crowd phenomenon emerges as a dynamic system with the gathering of crowd members as a complex organism. Mitchell (2009, p. 4) describes complex systems as *“large numbers of relatively simple entities organize themselves, without the benefit of any central controller, into a collective whole that creates patterns, uses information, and, in some cases, evolves and learns”*. Dynamic systems aim to describe systems that exhibit very complex changing behavior at the macroscopic level resulting from the collective action of relatively simple components at the microscopic level (Batty, 2009). The bottom-up approach makes it possible to analyze the complexity of the crowd through the relationship between the components of the crowd (Bellomo, Piccoli, & Tosin, 2012). The categories of social and physical parameters defined in this study are the smallest units of the crowd that can be observed. This section aims to examine crowd contexts based on the complex relationship of crowd parameters and dynamic system of crowd pattern. Social identity and physical dynamics of crowd cases on Istiklal Street are analyzed according to the categories determined in the previous sections. This method of the research based on Gephi network analysis (Figure 3.33) to model the categories of a total of 80 crowd cases obtained from the case area and the linear relationship between these categories.

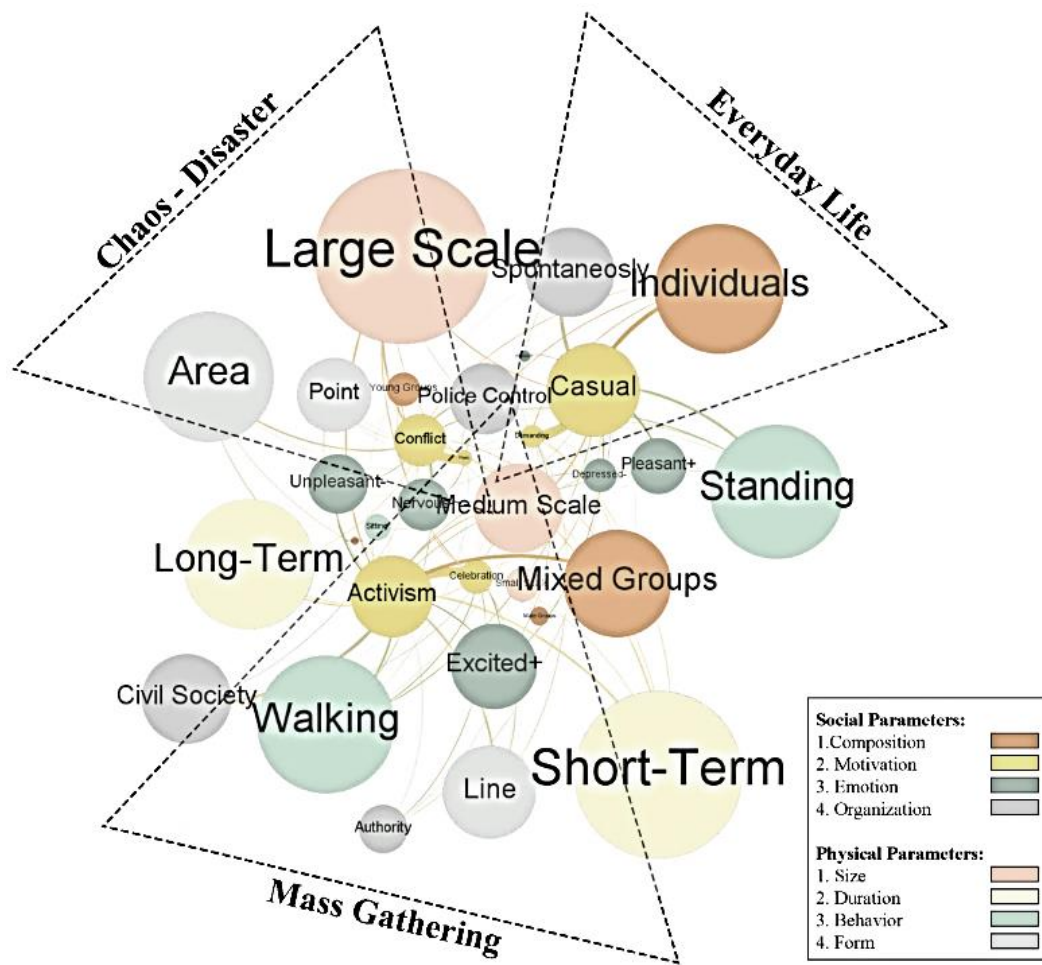


Figure 3.33. The network analysis of crowd parameters produced with “Gephi” network analysis and visualization tool.

In this direction, firstly nodes are processed into network analysis. Nodes consist of 21 categories of composition, motivation, emotion, organization that determine the social identity of the crowd, and 11 categories of size, duration, behavior and form, which determine the physical dynamics of the crowd. The size of the nodes varies according to the frequency of the category in the number of cases. The color of the nodes shown in the legend in terms of the color of their social and physical parameters (Figure 3.33). Secondly, edges are based on motivation, which is the parameter that will most affect the crowd context. The source of the edges comes from 6 different motivation categories and sets targets for other categories. The 105

linear relationships established by this method define the edges. Each linear relationship with the same source and destination increases the thickness of the edge by one unit. Edges get their color from the color of the source node (Figure 3.33). The layouts offered by the program are used to make the relationship between nodes and edges readable and meaningful. The OpenOrd layout is chosen because it highlights clustering between categories. As a result of the network analysis, it is seen that the categories focus on three main groups (Figure 3.34). According to the pattern of the categories in this group, crowd cases are named as everyday life, mass gathering and chaos.

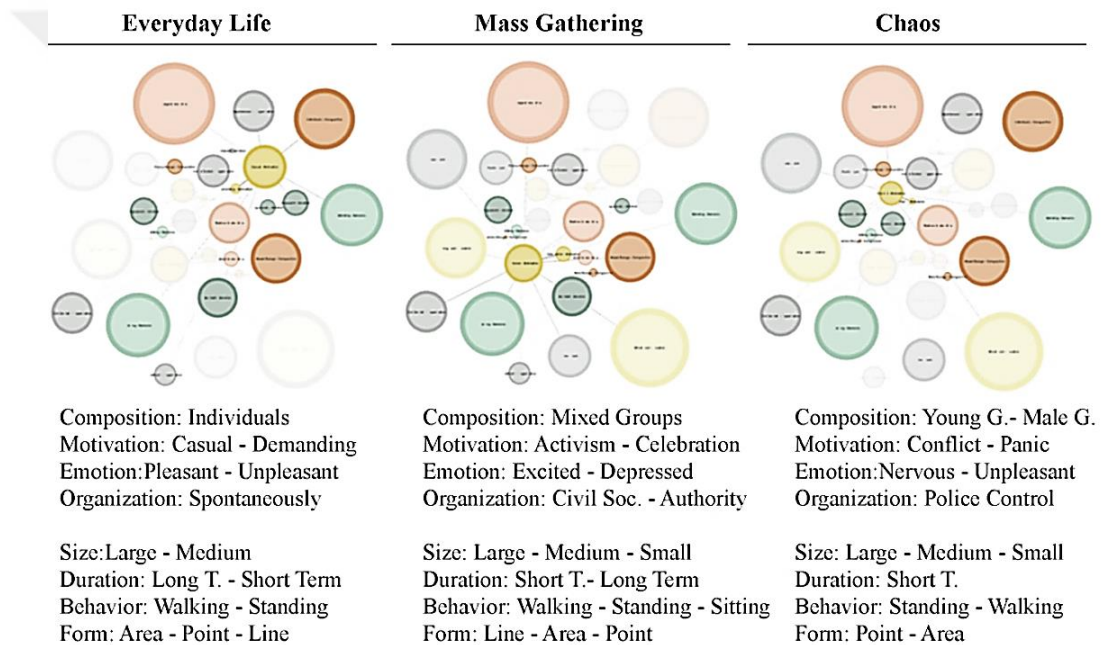


Figure 3.34. Crowd pattern of everyday life, mass gathering and chaos

The first cluster of categories is called everyday life crowds because the formation of the crowd is spontaneous, not due to any event. The crowds that make up the everyday life routine of Istiklal Street usually composed of people with mixed demographics at the individual. These individuals are coincidentally in the same place at the same time with their personal motivations such as casual or demand. Although the mood of the everyday life crowds in the place is mostly pleasure, there is also an unpleasant mood in some cases. The members of the crowd that make up

the everyday life do not require any pre-organization; they are self-organized. Self-organizing everyday life crowd members can be large or medium-sized, or they can be in the space in the long or short term. They perform walking and standing behaviors in their own spaces, which they define in the form of area, point or line.

The group clustered secondly is called mass gatherings because it takes place in connection with a public event. Mass gathering crowds usually consist of mixed demographic groups with motivations such as activism or celebration. Because they contain sharp emotions such as excited or depressed, they can create significant changes in the routine mood of public life. Mass gatherings come together with a preliminary organization by civil society or authority. Mass gathering crowds physically occur at any scale. Although these crowds exist for a short time, there are also long-term cases. The fact that they can exhibit all kinds of spatial behavior in the place they define in the form of area, line and point clearly shows that they create a significant diversity in public space.

The last group of categories is called chaos because the categories collected in this cluster constitute a negativity or problem related to the crowd. Chaotic crowds often differ from other crowd contexts in that they consist of individuals with specific demographics. They are often motivated by a conflict or panic that can cause feelings of negative and dissatisfaction. There is post-organization under police control, as many of chaotic crowds can harm public safety. Chaotic crowds can be of any scale, but they are short-lived. They perform their standing and walking behaviors in point and area form.

CHAPTER 4

THE CROWD AND PUBLIC SPACE RELATIONSHIP ON THE İSTİKLAL STREET

The purpose of this chapter is to present the relationship between crowd and public space through the example of Istiklal Street, a public space system that includes many and different types of crowd cases and integrated with square and street segments. To do that, three different analysis are presented. The first part shows the analysis of the social and physical aspects of crowd cases in the Istiklal Street in three life situations including everyday life, mass gathering and chaos. Crowd analysis focuses on three nodes and two paths of the street. Three nodes include Tünel, Galatasaray and Taksim squares. The paths include the section between Tünel and Galatasaray and the section between Taksim and Galatasaray. The second part presents the analysis at two different scales including the macro and micro scales. The macro-scale analysis focuses on the natural-environmental structure and network-transportation systems of the street. The micro scale analysis focuses on solid-void, land use, perceptible spatial elements and public safety elements.

The last section presents and elaboration on relationship between the crowd phenomenon and existing spatial attributes of the street. This analysis is done for each identified section of the street to highlight crowd-space relationship differences between sections. The evaluation method deals with the meaningful relationship of categorical data about crowd and place with each other in three groups for everyday life, mass gathering and chaos crowds. Everyday life crowds have an impact on the attractiveness, capacity, functionality and legibility of public space in terms of their social identity and physical dynamics. Mass gathering crowds affect the inclusiveness, memorability and permeability of the public space according to the sociospatial attributes of the event and crowd members. Chaotic crowds have an

impact on public safety, controllability in an emergency, and evacuation, within their degree of influence in the space.

4.1 Crowd Analysis

As shown in Chapter 3, this study uses composition, motivation, emotion, organization as the social attributes and size, duration, behavior, form as physical attributes of the crowd phenomenon in Istiklal Street within the general framework of three different crowd contexts including everyday life crowds, mass gathering crowds and chaotic crowds. It aims at revealing meaningful patterns between these attributes. This section aims at presenting meaningful patterns of these social and physical attributes within three crowd contexts in 5 different segments of the street including Taksim Square, Taksim and Galatasaray section, Galatasaray Square, Tünel and Galatasaray section, and Tünel Square.

Table 4.1 shows the proportional distribution of crowd contexts in Istiklal Street in reference to 80 observed cases. Accordingly, 38% of crowd events represents everyday life events, 39% mass gathering and 23% chaos. As shown in Figure 4.1, chaotic crowds mainly occur in the Taksim and Galatasaray squares and in their vicinities. Mass gathering crowd is observed in all squares. Everyday life crowd mainly occur along the paths in between squares but also across the squares.

Table 4.1. Proportional distribution of crowd contexts

	Everyday Life	Mass Gathering	Chaos
Crowd Cases %	38%	39%	23%

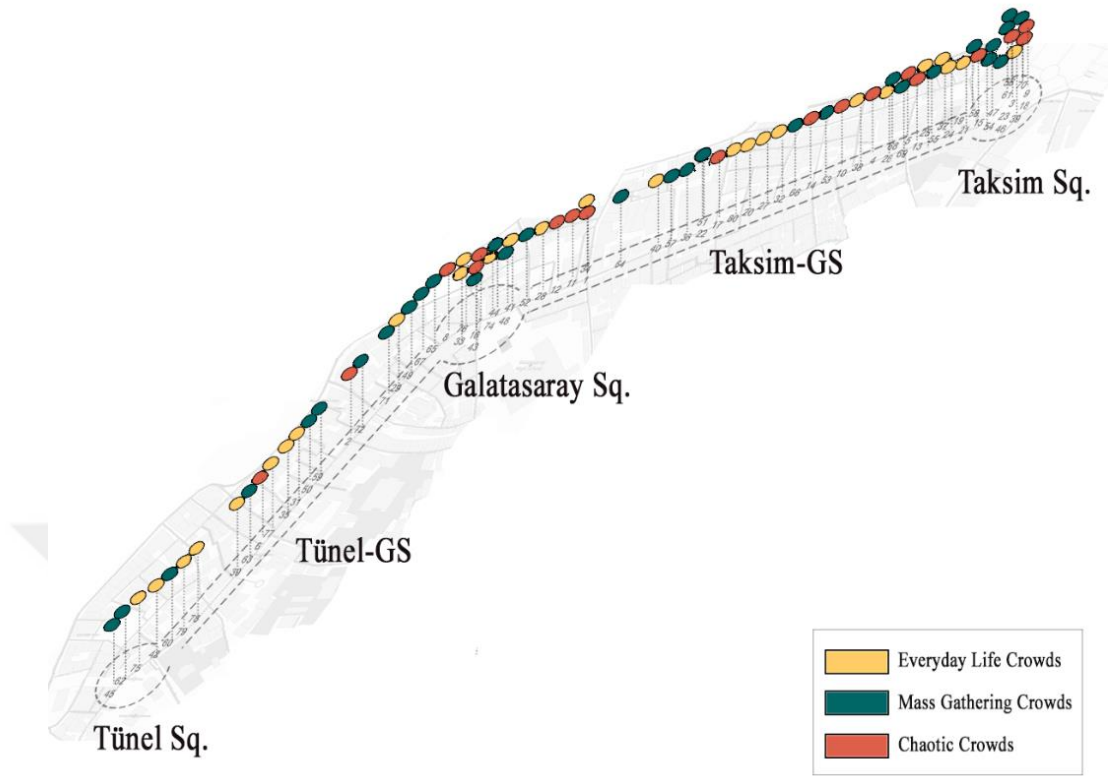


Figure 4.1. Location distribution of crowd contexts

4.1.1 Everyday Life Crowds

Results show a homogenous distribution of everyday life crowd on the Istiklal Street (Figure 4.2). 50% of everyday life crowd occurs between Taksim and Galatasaray, and 23% between Tünel and Galatasaray. The rest one forth (27%) occurs in Galatasaray Square (13%), Tünel Square (7%) and in Taksim Square (7%) (Table 4.2).

Table 4.2. Proportional distribution of everyday life crowds

Everyday Life	Tünel	Tünel - GS	Galatasaray	Taksim-GS	Taksim
Spatial %	7%	23%	13%	50%	7%

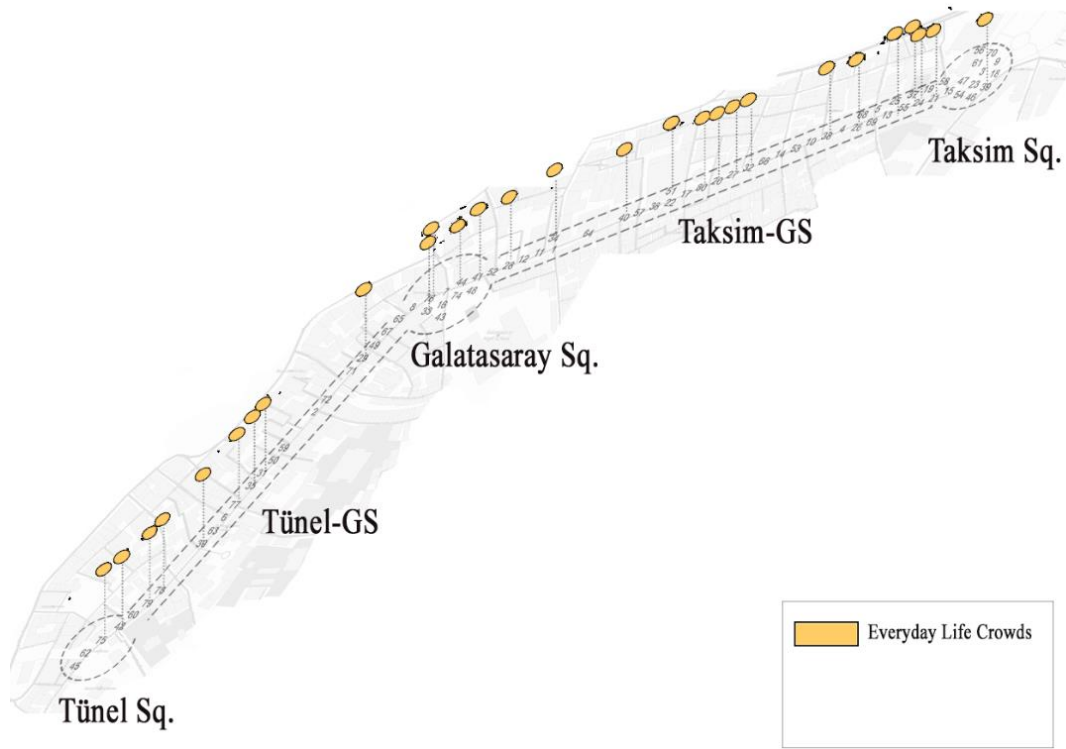


Figure 4.2. Location distribution of the everyday life crowds

The social identity and affective response of everyday life crowds is analyzed on reference to the composition, motivation, emotion and organization of crowd cases. Respectively, results show that almost all everyday life crowds (90%) is composed of individuals from different gender and age groups. The rest is represented by mixed (7%) groups (Table 4.3). The composition of young (1%) groups are negligible. While individuals with mixed composition gather all along the Istiklal Street, mixed groups are seen along Taksim and Galatasaray segment.

Table 4.3. Frequencies and percentages of everyday life composition

Composition	Tünel	Tünel - GS	Galatasaray	Taksim-GS	Taksim
Mix Individuals					
27 (90%)	2	7	3	13	2
Mix Groups					
2 (7%)	-	-	-	2	-

Table 4.3. continued.

Young Groups	-	-	1	-	-
1 (3%)					

The motivation of everyday life crowds consists of 80% casual and 20% demanding (Table 4.4). According to the observed cases on the Istiklal Street, casual crowds refer to daily activities such as socializing, shopping, and wandering. Demanding crowds refer to goal-oriented crowds such as accessing a service and gaining an interest. Results show that casually motivated crowds occur all along the street with particular concentration on the segments between Taksim and Galatasaray as well as between Galatasaray and Tünel. Results show that the demanding crowds take place on the Taksim and Galatasaray segment.

Table 4.4. Frequencies and percentages of everyday life motivation

Motivation	Tünel	Tünel - GS	Galatasaray	Taksim-GS	Taksim
Casual					
24 (80%)	1	7	3	12	1
Demand					
6 (20%)	1	-	1	3	1

The emotion of everyday life crowds consists of 77% positive and 23% negative feelings (Table 4.5). While three fourth refers to positive feelings (77%) including excited, pleasant and relaxed, one fourth refers to negative feelings (23%) including unpleasant, nervous and depressed. The crowd events conveying positive emotional dimensions spread homogeneously throughout the street but also conspicuously accumulates on Tünel and Galatasaray segment. The crowd events conveying negative emotions, on the other hand, are clustered along the Taksim and Galatasaray segment.

Table 4.5. Frequencies and percentages of everyday life emotion

Emotion	Tünel	Tünel - GS	Galatasaray	Taksim-GS	Taksim
Positive 23 (77%)	1	7	3	11	1
Negative 7 (23%)	1	-	1	4	1

Results show that the organization of everyday life crowds happen spontaneously, by the authority, under police control and by the civil society (Table 4.6). Three fourth of crowds (79%) is organized spontaneously and one fifth by the authority (15%) and by police control (3%). The spontaneously organized crowd is distributed throughout the street. The authority-driven organization clusters along the Taksim and Galatasaray segment.

Table 4.6. Frequencies and percentages of everyday life organization

Organization	Tünel	Tünel-GS	Galatasaray	Taksim-GS	Taksim
Spontaneous 23 (79%)	1	7	3	11	1
Authority 5 (15%)	1	-	-	3	1
Police Control 1 (3%)	-	-	-	1	-
Civil Society 1 (3%)	-	-	1	-	-

These findings reveal four patterns in terms of social identity of everyday life crowd on the Istiklal Street. First, everyday life crowding conveys an inclusive character. Second, the motivations of everyday life are mainly driven by casual reasons such as socializing, sunny weather and shopping. Additionally, the concentration of

demanding crowds in between Taksim and Galatasaray is remarkable because it represents that the services, places and events preferred by the crowd are concentrated in this part of the street. Third, although the everyday life crowding conveys mainly positive emotions, crowd events generating negative emotions also exist and they mainly occur on the Taksim and Galatasaray section. Finally, everyday life crowd is organized mainly spontaneously, but the role of the authority in the organization of the crowd also stands out in the Taksim and Galatasaray section.

The physical structure of everyday life crowds analyzed in terms of the size, duration, form and behavior (Table 4.7 and 4.8). Accordingly, almost half of everyday life crowds (43%) is medium in size. The other half occur in large (37%) and small (20%) sizes. Results show that large crowds take place on the Taksim and Galatasaray segment with no crowd occurrence at Tünel Square. Medium sized crowds take place along the Taksim-Galatasaray and Tünel-Galatasaray segments with no crowd occurrence at Taksim Square. Small crowds mainly take place along the Taksim and Galatasaray segment with no occurrences at Galatasaray and Taksim squares. The duration of everyday life crowding lasts equally long (50%) and short (50%) terms. While short term crowding takes place all along the Istiklal Street with a visible concentration along the Taksim and Galatasaray segment, the long-term crowds is not seen at all at the Tünel square, but also spread along the Taksim and Galatasaray segment.

Table 4.7. Frequencies and percentages of everyday life size and duration

Size & Duration	Tünel	Tünel-GS	Galatasaray	Taksim-GS	Taksim
Large 11 (37%)	-	1	1	7	2
Medium 13 (43%)	1	5	3	4	-
Small 6 (20%)	1	1	-	4	-
Long-T. 15 (50%)	-	4	2	8	1
Short-T. 15 (50%)	2	3	2	7	1

As shown in Table 4.8, the form of half of everyday life crowds covers an area (50%). The rest almost equally occurs as point (30%) and as line (%20). Crowding in all forms visibly clusters along the Taksim and Galatasaray segment. Crowding with a point form does not occur at the Tünel Square and crowding with a linear form is not observed at the Taksim Square. The behavior of more than half of everyday life crowds consists of standing (60%). One third consists of walking (30%) and the rest (10%) shows the sitting. While standing and sitting occur along the Taksim-Galatasaray and Tünel-Galatasaray segments, walking occurs only along the Taksim and Galatasaray segment. No walking is observed at any squares.

Table 4.8. Frequencies and percentages of everyday life form and behavior

Form & Behavior	Tünel	Tünel - GS	Galatasaray	Taksim-GS	Taksim
Area 15 (50%)	1	4	1	8	1
Line 6 (20%)	1	1	1	3	-
Point 9 (30%)	-	2	2	4	1
Walking 9 (30%)	-	1	-	8	-
Standing 18(60%)	2	5	4	5	2
Sitting 3 (10%)	-	1	-	2	-

These findings reveal two major conclusions about the physical structure of everyday life crowding on the Istiklal Street. First, large-scale and long-term crowds cluster along the Taksim and Galatasaray segment. This may indicate this section of the street as a hot zone which may result in problems with crowd density. On the other hand, although the Tünel is a square, it includes small-scale and short-term crowds, probably due to the public transportation station opening up to the square. Additionally, small and medium-sized crowds are not seen in Galatasaray and

Taksim squares. Second, while areal and point crowds are expected to occur at the squares due to their conformity to the form, these forms accumulate along the Taksim and Galatasaray segment. Linear forms are expected to be seen in the street segments, but this ratio is quite low in the Galatasaray and Tünel segment compared to the Taksim and Galatasaray segment. It is noteworthy that standing behavior is high in street segments. The walking behavior shows an uneven distribution in the segments of the street, it is much higher in the Taksim and Galatasaray segment than in the Galatasaray and Tünel segment. Sitting behavior in everyday life takes place in Taksim-GS and Tünel-GS segments.

4.1.2 Mass Gathering Crowds

The results of the distribution of the mass gathering cases show the differences in the sections on Istiklal Street (Figure 4.3). According to the Table 4.9, more than half of the mass gathering crowd cases on Istiklal Street consist of cases between Taksim and Galatasaray (38%) and between Tünel and Galatasaray (28%). The remaining two-fifths of the mass gathering crowds are largely made up of cases in Taksim (15%) and Galatasaray (13) squares, which are twice as frequent as in Tünel (6%) square.

Table 4.9. Proportional distribution of mass gathering crowds

Mass Gathering	Tünel	Tünel - GS	Galatasaray	Taksim-GS	Taksim
Spatial %	6%	28%	13%	38%	15%

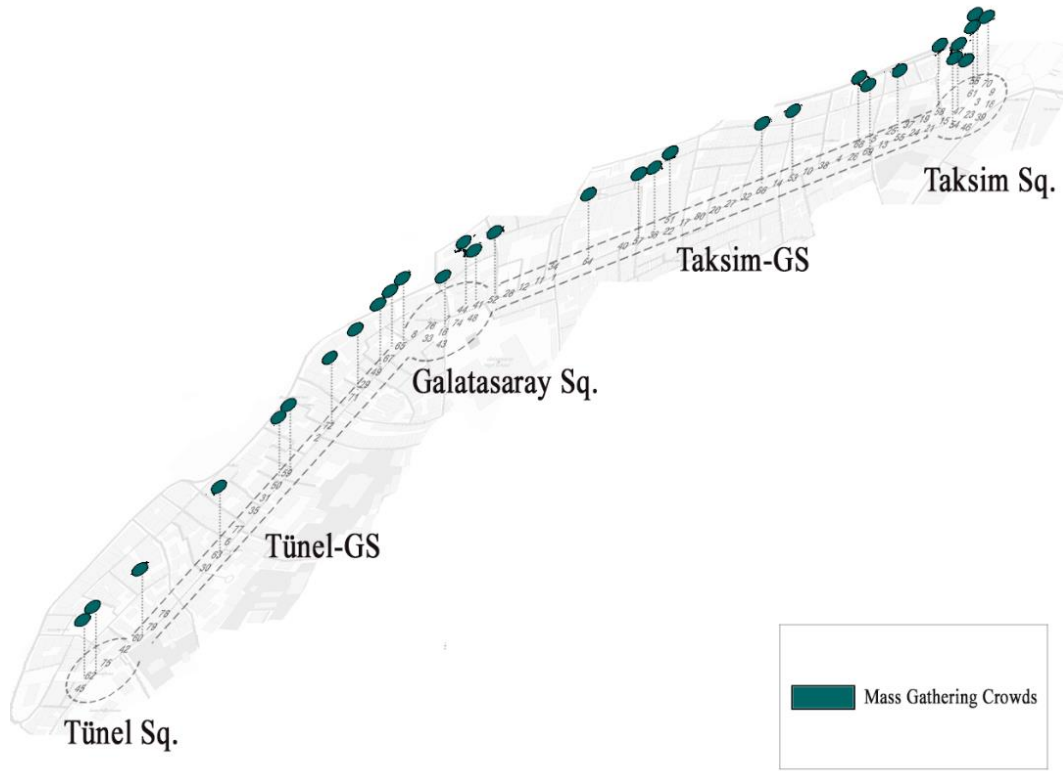


Figure 4.3. Location distribution of the mass gathering crowds

The social identity of mass gathering crowds analyzed on composition, motivation, emotion and organization concepts. Considering the results, the composition of the mass gathering crowds comprised the largest proportion (72%) of mixed groups of all ages and genders (Table 4.10). The remaining 30% of the mass gathering crowds consist of young groups (13%) and male groups (9%). The proportion of both female groups (1%) and individuals (1%) in mass gatherings is negligible. According to the spatial distribution of crowd composition, mixed groups are in almost every part of the street. Young groups focus on Taksim square and the section between Tünel and Galatasaray. Male groups focus on the section between Taksim and Galatasaray.

Table 4.10. Frequencies and percentages mass gathering composition

Composition	Tünel	Tünel - GS	Galatasaray	Taksim-GS	Taksim
Mixed Groups	2	6	4	8	3

Table 4.10. continued.

23 (72%)					
Young Groups					
4 (13%)	-	2	-	-	2
Male Groups					
3 (9%)	-	1	-	2	-
Female Groups					
1 (3%)	-	-	-	1	-
Individuals					
1 (3%)	-	-	-	1	-

The majority mass gathering crowds are motivated by activism (69%) such as protest and parade. The small portion of mass gatherings motivated by celebration (28%) such as new year and national ceremonies. Casual (3%) motivation is negligible for mass gathering. Crowds with activist purposes exists in every part of the street but especially focus on Taksim and Galatasaray segment (Table 4.11). Crowds gathering for a celebration focus first in Tünel and Galatasaray segment, second between Taksim and Galatasaray segment and last in Taksim square.

Table 4.11. Frequencies and percentages of mass gathering motivation

Motivation	Tünel	Tünel GS	Galatasaray	Taksim-GS	Taksim
Activism					
22 (69%)	2	5	4	8	3
Celebration					
9 (28%)	-	4	-	3	2
Casual					
1 (3%)	-	-	-	1	-

Mass gathering crowds carry positive (56%) and negative (44%) emotions in almost equal proportions (Table 4.12). Although there is an equality in the positive and

negative mood of the mass gathering crowds, there is a difference in the spatial distribution of emotions. Positive emotions are observed in every part of the street but especially focus on the part between Taksim and Galatasaray and between Tünel and Galatasaray. On the other hand, negative emotions focus on first Taksim and Galatasaray segment and second on Tünel and Galatasaray segment and last on the Galatasaray square.

Table 4.12. Frequencies and percentages of mass gathering emotion

Emotion	Tünel	Tünel - GS	Galatasaray	Taksim-GS	Taksim
Positive 18 (56%)	1	6	1	7	3
Negative 14 (44%)	1	3	3	5	2

According to the Table 4.13, three-fifths of mass gathering crowd cases are organized by civil society (63%). In the remaining mass gathering cases, the crowds organized by the authority (28%) are three times the crowds organized under police control (9%). Crowds organized by civil society are observed in every part of the street but mainly focus on the part between Taksim and Galatasaray. The authority dominates the organization of mass gatherings on Tünel and Galatasaray segment and Taksim Square. Police controlled mass gatherings are centered between Taksim and Galatasaray.

Table 4.13. Frequencies and percentages of mass gathering organization

Organization	Tünel	Tünel-GS	Galatasaray	Taksim-GS	Taksim
Civil Society 20 (63%)	2	4	3	9	2
Authority 9 (28%)	-	4	1	1	3

Table 4.13. continued.

Police Control	-	1	-	2	-
3 (9%)					

These findings show that, mass gathering crowds on the Istiklal Street have four main patterns in terms of social identity. Firstly, the mass gathering events of the crowd on Istiklal Street are demographically inclusive although, the focus of male groups between Taksim and Galatasaray cannot be ignored. In addition, the mass gatherings of young groups in Taksim and the section between Tünel and Galatasaray are remarkable. Secondly, it is surprising that mass gathering crowds of both activism and celebration focus on the street segments instead of the squares. Thirdly, not only positive emotions but also negative emotions focus on the segment between Taksim and Galatasaray. Lastly, mass gathering events on Istiklal Street are mostly organized by civil society. On the other hand, the role of the authority in the Tünel and Galatasaray segment and Taksim square. In addition, mass gathering organization of crowd under police control in the part between Taksim and Galatasaray is also remarkable.

The physical dynamics of mass gathering crowds analyzed in terms of size, duration, form and behavior of the crowd (Table 4.14 and 4.15). More than half of mass gathering crowds are large in size (60%). The remaining mass gathering crowds consist of medium-size crowds (31%) and quite a few small-size crowds (9%). According to the results shown on Table 4.14, large crowds are observed especially on street segments between Tünel, Galatasaray and Taksim. Medium size crowds focus on the segment between Taksim and Galatasaray. On the other hand, no cases observed in Tünel square. Small size crowds exist only in between Tünel and Galatasaray. The duration of mass gathering crowds lasts equally short (56%) and (%44) long terms. Both short-term and long-term crowds mainly takes place on street segments between Taksim, Galatasaray and Tünel. In addition, it is surprising that crowd cases in the Tünel square do not last long.

Table 4.14. Frequencies and percentages of mass gathering size and duration

Size & Duration	Tünel	Tünel-GS	Galatasaray	Taksim-GS	Taksim
Large 19 (60%)	1	5	2	7	4
Medium 10 (31%)	-	2	2	5	1
Small 3 (9%)	1	2	-	-	-
Long-T. 14 (44%)	-	4	2	4	4
Short-T. 18 (56%)	2	5	2	8	1

More than half of the mass gathering crowds form as line (56%). The remaining half of the mass gathering crowds form as area (%25) and point (%19) in almost equal proportions (Table 4.15). Mass gatherings shape in linear forms on the part between Tünel and Galatasaray. Areal forms mainly focus on the part between Taksim and Galatasaray. Point formed crowds focus on Taksim and Galatasaray. It is surprising that there is no areal and point formed mass gatherings in Tünel square.

According to Table 4.15, the behavior of the of mass gathering crowds consists of walking (66%) at the highest rate. The remaining mass gatherings show attitudes of standing (%25) and rarely sitting (%9). Mass gathering crowds usually prefer to walk on the street segments between Taksim, Galatasaray and Tünel. Standing behavior, is observed on both street segments but there is no case in Galatasaray Square. Sitting behavior only exists between Galatasaray and Taksim squares.

Table 4.15. Frequencies and percentages of mass gathering form and behavior

Form & Behavior	Tünel	Tünel - GS	Galatasaray	Taksim-GS	Taksim
Area 12 (25%)	-	1	-	8	3
Line 16 (56%)	2	6	3	3	2
Point 7 (19%)	-	2	1	4	-

Table 4.15. continued.

Walking	2	6	3	6	4
21 (66%)					
Standing	2	3	-	4	1
10 (25%)					
Sitting	-	-	1	2	-
3 (9%)					

The findings show that, there are two main conclusions regarding the physical dynamics of mass gatherings in Istiklal Street. Firstly, it is surprising that, long-term and large-scale mass gathering crowds occur in street segments instead of squares. On the other hand, although Tünel square is not congested with mass gathering crowds as Taksim and Galatasaray, it also can provide space for mass gathering events in terms of both size and duration. Secondly, the fact that mass gatherings in the area form take place in the area between Taksim and Galatasaray instead of the squares is incompatible in terms of the form and function of the space. On the other hand, there is no such inconsistency as the walking behavior is seen in the street segments, connection channels between squares. In addition to these, it is noteworthy that there are no mass gathering crowds in the form of points gathered around a point of interest in Taksim and Tünel squares. The static behavior of mass gathering crowds, such as sitting or standing, is expected to be high in squares with meeting and dispersal areas, whereas it is surprisingly high in street segments.

4.1.3 Chaotic Crowds

The findings of the spatial distribution of chaotic crowd cases presents a significant difference in Istiklal Street (Figure 4.4). Half of the chaotic crowd cases takes place on the street segment between Taksim and Galatasaray squares (Table 4.16). The remaining half of the chaotic crowds consists of cases first in Taksim (22%), second in Galatasaray (17%) and last in between Tünel and Galatasaray (11%). It is remarkable that, here is not any chaotic crowd case in Tünel square.

Table 4.16. Proportional distribution of chaotic crowds

Chaos-Disaster	Tünel	Tünel - GS	Galatasaray	Taksim-GS	Taksim
Spatial %	0%	11%	17%	50%	22%

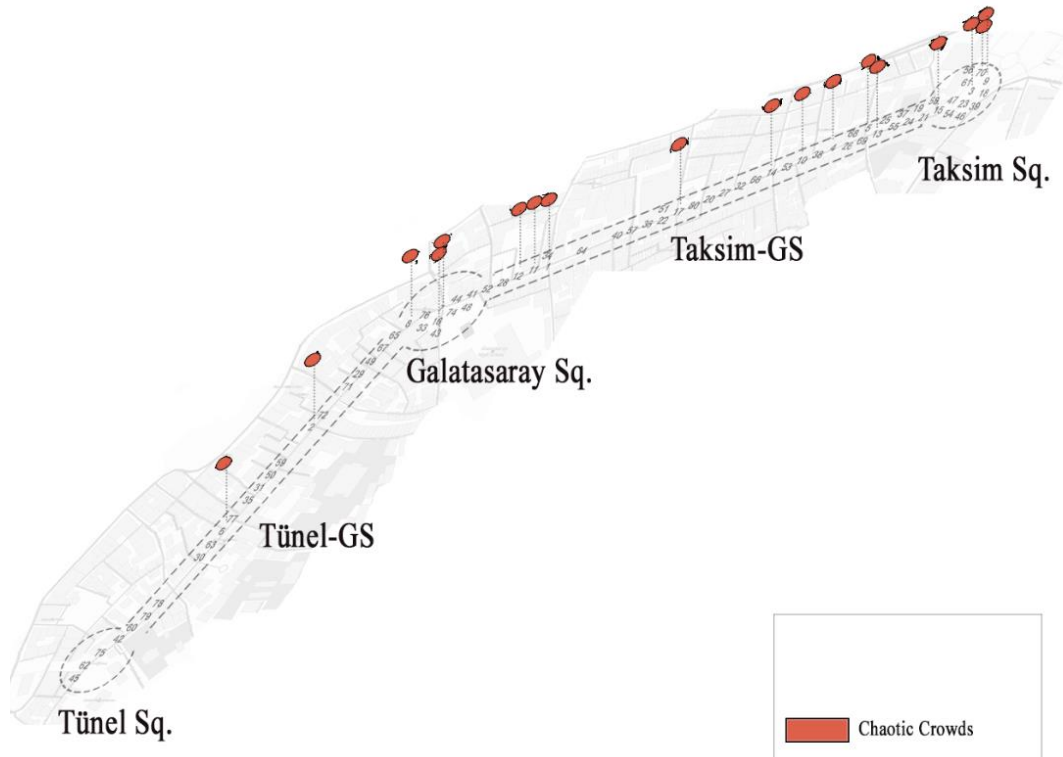


Figure 4.4. Location distribution of the chaotic crowds

The social identity of chaotic crowds analyzed in terms of composition, motivation, emotion, and organization parameters. Two-fifths of the chaotic crowds consist of individuals with mixed age and gender composition (Table 4.17). The remaining composition of the chaotic crowds consists of young groups (27%), mixed groups (17%), male groups (11%) and female groups (6%). The only remarkable interpretation in terms of the spatial distribution of composition is that, chaotic crowds by both mixed individuals, young groups and mixed groups are observed on the part between Taksim and Galatasaray unlike other parts of the street.

Table 4.17. Frequencies and percentages of chaos composition

Composition	Tünel	Tünel - GS	Galatasaray	Taksim-GS	Taksim
Mix Individuals 7 (39%)	-	-	-	6	1
Young Groups 5 (27%)	-	1	1	2	1
Mix Groups 4 (17%)	-	-	2	2	-
Male Groups 2 (11%)	-	1	-	-	1
Female Groups 1 (6%)	-	-	-	-	1

Chaotic crowds are formed by the motivations of panic (22%) and conflict (78%), which is four times more than panic. According to the spatial distribution of crowd motivation in Table 4.18, clashing crowds are seen between Taksim and Galatasaray. On the other hand, crowds due to an element of panic are experienced only in the part between Taksim and Galatasaray.

Table 4.18. Frequencies and percentages of chaos motivation

Motivation	Tünel	Tünel - GS	Galatasaray	Taksim-GS	Taksim
Conflict 14 (78%)	-	2	3	5	4
Panic 4 (22%)	-	-	-	4	-

The atmosphere of chaotic crowds is mostly a negative mood composed of emotions such as anger and dissatisfaction. In addition, most of these negative emotions focus on the segment between Taksim and Galatasaray according to the Table 4.19.

Table 4.19. Frequencies and percentages of chaos emotion

Emotion	Tünel	Tünel - GS	Galatasaray	Taksim-GS	Taksim
Negative 18 (100%)	-	2	3	9	4

The organization of chaotic crowds is mostly done under police control (77%). Civil society (17%) constitutes the majority of the remaining chaotic cases and spontaneous (6%) organizations constitute a negligible portion (Table 4.20). The most significant finding that can be obtained from these data is that the crowds organized under police control are dominant in the Galatasaray and Taksim squares and the area between these two squares.

Table 4.20. Frequencies and percentages of chaos organization

Organization	Tünel	Tünel-GS	Galatasaray	Taksim-GS	Taksim
Police Control 14 (77%)	-	-	3	7	4
Civil Society 3 (17%)	-	2	-	1	-
Spontaneous 1 (6%)	-	-	-	1	-

There are four findings regarding the social identity of chaotic crowds in Istiklal Street. Firstly, the chaotic crowds on Istiklal Street take place between Taksim and Galatasaray by individuals and groups with a mixed demographic structure as well as by young groups. Secondly, in addition to crowds that are mostly motivated by

conflict, chaotic crowds are formed with a panic factor. Thirdly, chaotic crowds all have negative emotions. Lastly, organization of chaotic crowds often controlled by police.

The physical dynamics of chaotic crowds analyzed in terms of size, duration, form and behavior factors (Table 4.21 and 4.22). Almost all chaotic crowds in Istiklal Street is created by large-scale crowds, with the exception of the 6% medium-scale crowds (Table 4.21). Most large sized crowds observed between Taksim and Galatasaray. Although most of the chaotic crowds on Istiklal Street are short-term, there are also long-term chaos cases. It is surprising that, both long-term chaotic cases occur in the segment between Taksim and Galatasaray. On the other hand, short-term chaos cases not only seen in the part between Taksim and Galatasaray, but also in Galatasaray and Taksim squares.

Table 4.21. Frequencies and percentages of chaos size and duration

Size & Duration	Tünel	Tünel-GS	Galatasaray	Taksim-GS	Taksim
Large 17 (60%)	-	1	3	9	4
Medium 1 (31%)	-	1	-	-	-
Long-T. 5 (44%)	-	1	-	3	1
Short-T. 13 (56%)	-	1	3	6	3

More than half of the chaotic crowds take shape in areal (66%) form. The remaining chaotic cases consist of point (28%) form with the exception of 6% linear form. According to the Table 4.22, both areal and point forms are observed between Taksim and Galatasaray. More than half of the chaotic crowds perform standing (56%) behavior. The remaining cases are observed while the crowd members are walking (38%) and sitting 6%. In addition, not only walking but also standing behavior is most frequent between Taksim and Galatasaray.

Table 4.22. Frequencies and percentages of chaos form and behavior

Form & Behavior	Tünel	Tünel - GS	Galatasaray	Taksim-GS	Taksim
Area 12 (66%)	-	1	2	6	3
Line 1 (6%)	-	1	-	-	-
Point 5 (28%)	-	-	1	3	1
Walking 7 (38%)	-	1	1	4	1
Standing 10 (56%)	-	1	1	5	3
Sitting 1 (6%)	-	-	1	-	-

The findings reveal two main conclusions regarding the physical dynamics of chaotic crowds in Istiklal Street. Firstly, because of the existence of long-term chaotic crowds, the part between Taksim and Galatasaray may be problematic in terms of public safety. On the other contrary, the other part of the street, between Tünel and Galatasaray, the decreasing frequency of chaos cases may be a positive factor for the public life's image of security. Secondly, chaotic crowds performing stable behaviors such as sitting and standing can obstruct pedestrian traffic on the part between Taksim and Galatasaray. On the other hand, moving chaotic crowds may cause shock effect by increasing the stress level of public life.

4.2 Spatial Analysis

Chapter 2 discusses a literature review on socio-spatial approaches in urban studies and the features of public space that can relate to crowd. This section presents a spatial analysis to reveal the relationship between the crowd and spatial characteristics on the Istiklal Street. It does that by examining the space at two scales

including macro and micro. The macro scale includes the area covering the Beyoğlu district as well as the neighboring districts. The analysis at this scale consists of visual documentations and creating maps on the natural and environmental structure and the transportation network. The micro-scale consists of buildings and street elements of the Istiklal Street extending from the Taksim Square to the Tünel Square. This analysis uses solid void, land use, perceptible spatial attributes and public safety elements as the major components of visual documentation and analysis maps. The data for the analysis at both scales is provided from site observations and the existing conservation plan prepared by the local government, the Beyoğlu Municipality's geographical information systems, aerial photographs, and previous studies on the Istiklal Street.

4.2.1 Macro Scale Analysis

Istiklal Street is a public space used by not only Istanbul residents but also the visitors of Istanbul. Trying to understand this place, which is identified with the crowd image in the city, only through the spatial features on the street may be insufficient. For this reason, macro scale spatial analyzes of natural-environmental structure and network-transportation are also discussed in the subtitles of this section. Istiklal Street is a partially straight street descending from Taksim to Tünel with an average slope of 3.4% due to its location on the ridge of a sloping land. However, Tünel Square is surrounded by a 9% very sloping land. Especially in the segment of the street between Galatasaray and Tünel, a geographic threshold feature is observed in the Tepebaşı region boundary due to the slope in the northeast and southwest segments. The biggest slope on the street is from Taksim to Galatasaray Square at a rate of about 6% (Figure 4.5).

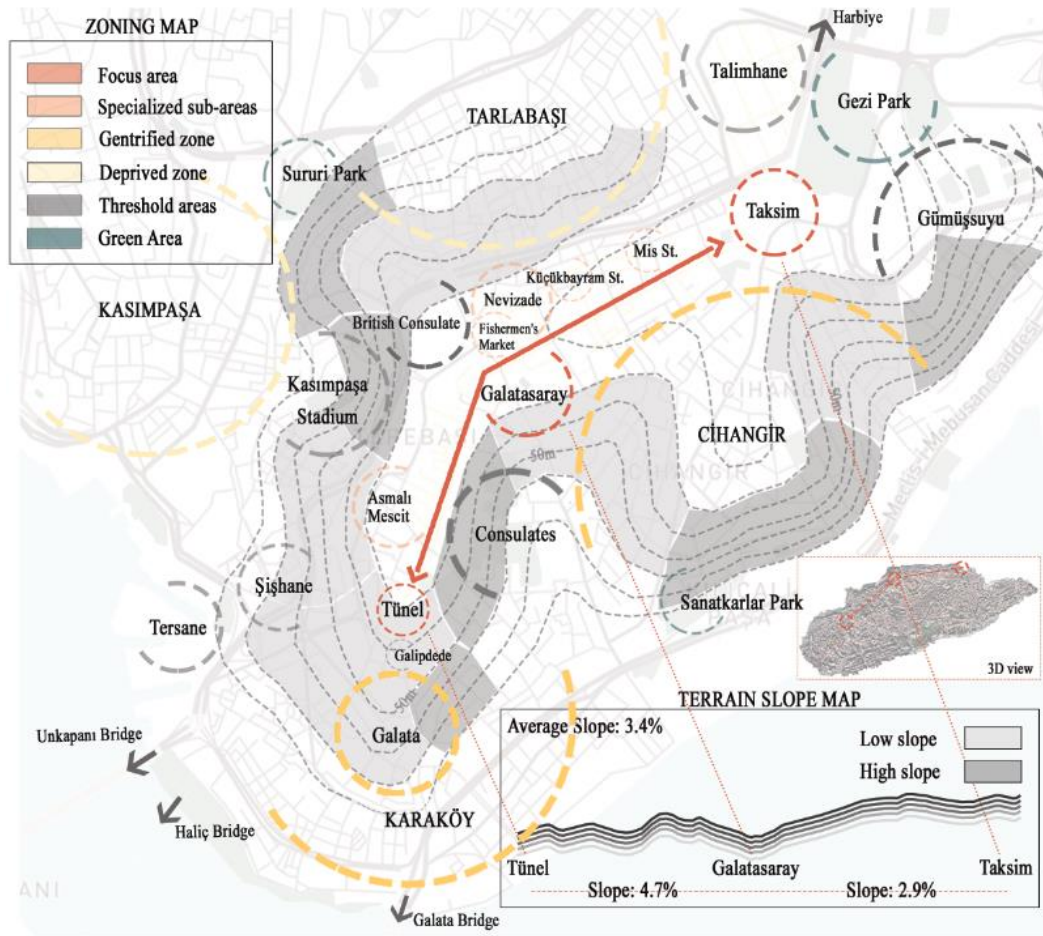


Figure 4.5. Natural and environmental zoning

Istiklal Street connects Harbiye, Gümüşsuyu and Talimhane on the north with Karaköy on the south and Eminönü on the other side of the Golden Horn. The integration of Istiklal Street with the Kasımpaşa district in the northeast direction is weaker than the integration in the south with the Cihangir district. The reason for this is the high slope of the land and the division of the area by main vehicle roads such as Tarlabası Boulevard and Refik Saydam Street. Some large spatial uses (such as Kasımpaşa Stadium, British Consulate and TRT Building) located in the section between Galatasaray and Tünel show the characteristics of a buffer zone for the impact area of the street. Istiklal Street, especially with its segment between Taksim and Galatasaray, is located at the intersection of Tarlabası, the residential area of the low-medium socioeconomic income group, and Cihangir, the residential area of the

middle-high income group. At the same time, this segment of the street features a center for both neighborhoods where they can meet their daily and weekly needs. Some of the back streets and sub-regions on the street are specialized by showing similar features in themselves. For example, areas such as Fishermen's Bazaar, Mis Street where restaurant cafes and bars are specialized, Nevizade, Asmalı Mescit, Meşrutiyet Street where luxury hotels and restaurants are specialized, Küçük Bayram Street where brothels and escorts are specialized, Galipdede Street where musical equipment is specialized create different micro-ecosystems on İstiklal Street (Beyoğlu District Urban Protected Site Cultural and Natural Assets Inventory, 2008).

There are various transportation possibilities such as metro, funicular and bus in Taksim and Tünel Squares, which can be considered as the main entrances of İstiklal Street (Figure 4.6). However, due to the very long walking distance of Şişhane underpass connections, the Taksim exit of the M2 Metro line is preferred more frequently (TMMOB Peyzaj Mimarları Odası, 2012). In addition, some public transport axes in the 500-meter walkable area of the Tünel square are not preferred as often as Taksim due to the high slope in this area. In addition, due to the bus axis on Tarlabası Boulevard, the street is open to public transportation from the northwest direction. However, there is no public transport facility within 500 meters of walking distance to the southeast of the street. In addition to all these, a nostalgic tram on the street carries passengers between Taksim Galatasaray and Tünel.

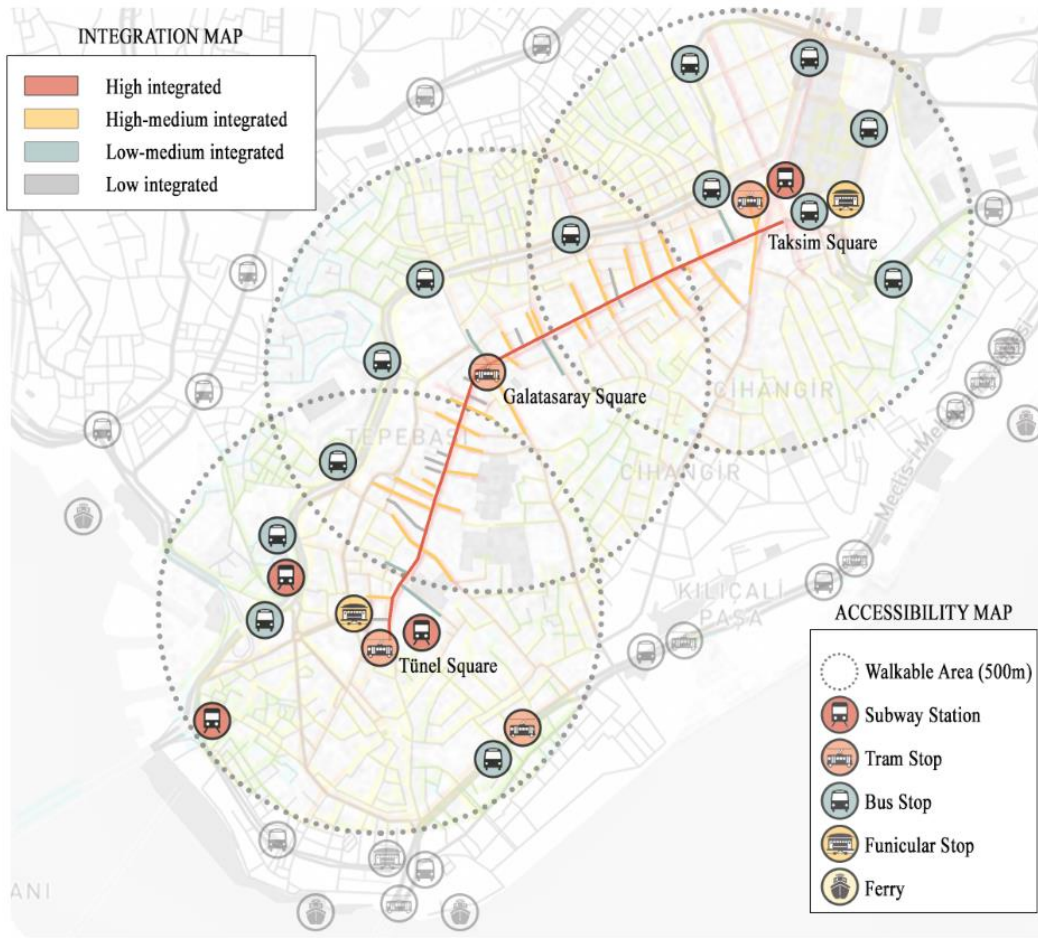


Figure 4.6. Accessibility and integration map

Istiklal Street is a pedestrianized public space that has been closed to vehicle traffic since the 1980s (Arslanlı, Dökmeci, & Kolcu, 2017). Vehicle access is provided by side streets and Yeni Çarşı Street, which is the main vehicle axis that connects to Galatasaray Square. In addition, Tarlabası Boulevard and Siraselviler Avenue, which are parallel to the street, are open to vehicle access. There are one discontinuous and four continuous vehicle roads in the Taksim-Galatasaray segment. There are two discontinuous and two continuous vehicle roads in the Galatasaray-Tünel segment. There are three multi-story car parks focusing between Tünel-GS and many other smaller car parks. Istiklal Street is the main part of a pedestrian system coming from Gezi Park and continuing through the Tünel towards Galata Tower. In the Taksim-Galatasaray segment, two continuous and eight discontinuous, 16 discontinuous

pedestrian paths in the Galatasaray-Tünel segment are connected to the street and feed this pedestrian system. The transportation connections of the street are interpreted through the integration analysis made with the Space Syntax method (Eyüboğlu, Kubat, & Ertekin, 2007, pp. 3005-3006). There are 15 side street connections that are connected at right angles to the segment between Taksim and Galatasaray. 11 of them are medium-high, two of them are low-medium and two of them are low integrated connections. There are 20 side streets connected to the segment between Tünel and Galatasaray with narrow angles. 12 of them are medium-high, two of them are medium-low and 6 of them are low-integration connection.

4.2.2 Micro Scale Analysis

Istiklal Street is a mobility system that connects the important sub-areas of the Beyoğlu district. To understand the relationship between public space and the crowd, this section examines the Beyoğlu Street on the basis of solid void, land use, perceived spatial elements and public safety indicators.

Solid void analysis in Istiklal Street shows the relationship between the buildings and open spaces to produce information about the sense of enclosure of space and human capacity. This analysis is based on revealing the relationship between the building floor areas and heights and the width of the street space between the buildings through observations. According to the analysis shown Figure 4.7, there are three areas on Istiklal Street that can be defined as squares in terms of solid-void relations. The largest of these is Taksim, followed by Galatasaray and Tünel. The part where the most significant differences are experienced in terms of solid void relations in street segments is between Tünel and Galatasaray. In this respect, although this part of the street offers diversity, it also causes spaces that will create congestion problems for the crowd. On the other hand, the segment between Taksim and Galatasaray is more monotonous in this respect.



Figure 4.7. Solid-void map

From the solid-void relations of Istiklal Street, there are bottlenecks (e.g., 3) and expansions (e.g., 5) in some parts of the cross section of the street. Expansions are seen at the Şişhane metro entrance and Odakule, in addition to Taksim, Galatasaray and Tünel Squares. Bottlenecks is at the entrance of Taksim, between Odakule-Tünel and between Odakule-Galatasaray. The sense of enclosure in Istiklal Street can be understood by looking at the relationship between open space and mass height (Acarlı, Kiper, & Korkut, 2019). When the surroundings of the squares are compared, it is observed that there is a full enclosure in Tünel, a semi-enclosure in Galatasaray and a weak enclosure in Taksim. There is a strong sense of enclosure in

the Taksim-GS and Tünel-GS segments due to the relationship between open space and building heights.

There is a wide variety in the functional distribution on Istiklal Street (Figure 4.8). Retail trade on the street concentrates primarily between Taksim-GS, secondly between Tünel-GS and thirdly in Tünel Square. In addition, there are two shopping malls, Demirören and Grand Pera, in the Taksim-GS segment on the street. Eating, drinking and socializing functions such as restaurant café bar are directly facing the street in the Tünel-GS segment. In the segment between Taksim-GS, these functions take place more intensely in the back streets. Finally, functions such as restaurants, cafés, bars are densely found on the facades facing all squares. Touristic accommodation function is in almost all the back streets of the street. Some facades facing the street in all of the buildings or on the upper floors also have this function. Cinemas and theaters, among the culture and arts venues, are concentrated in the Taksim-GS section of the street. On the other hand, art galleries are also concentrated in the Tünel -GS segment. Functions such as office and bank show an important density between Tünel-GS and especially towards Galatasaray Square. Government agency and consulates focus on Tünel-GS segment and Taksim entrance. Galatasaray High School is the biggest educational focus on the street. There are different prayer structures on the street, but they are not focused on a specific area.

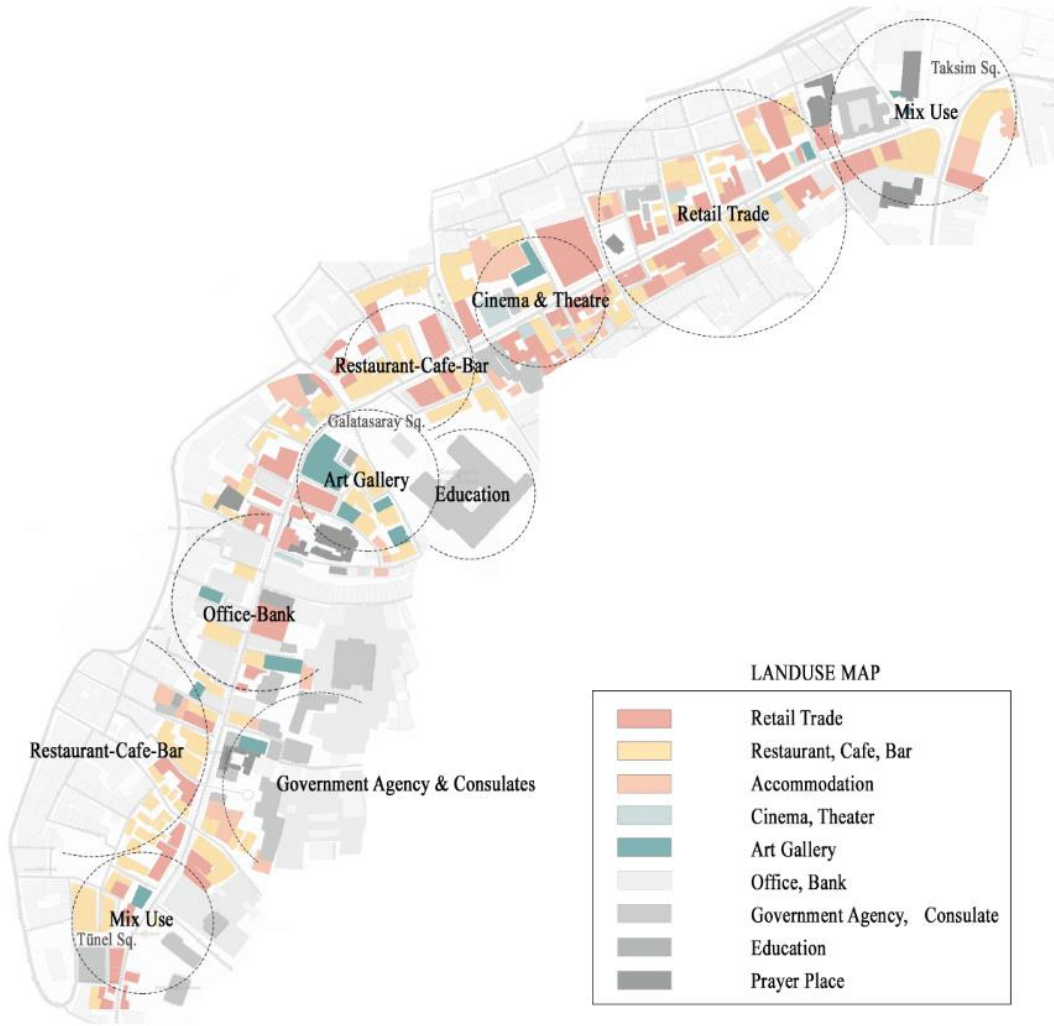


Figure 4.8. Land use map

Perceptible spatial elements of the Istiklal Street can direct the behavior of the crowd members by affecting their environmental perception. Therefore, elements such as historical monuments, facade features, sculptures and street sellers are observed and shown on Figure 4.9. Perceptible spatial elements such as monumental buildings, passages, sculptures and trees are more common in the section between Tünel and Galatasaray. On the other hand, between Taksim and Galatasaray, corner facades and street vendors are more dominant in spatial elements.

Monumental buildings are concentrated in the Tünel-GS segment. Civil architecture examples focus on Taksim-GS. All of the squares are surrounded by both civil and monumental structures. Corner structures affect the spatial perception at least as much as buildings with monumental and civil architectural features. Identification with corner buildings in the squares is very strong in Galatasaray, especially due to the Yapı Kredi Cultural Center and Tünel. On the street segments, there are three corner buildings between Tünel-GS and five corner buildings between Taksim-GS.



Figure 4.9. Perceivable spatial elements map (Beyoğlu District Chronological Distribution of Registered Landmarks and Civil Architecture, 2008)

Attractive facades with some features such as architectural detail, color and showcase are two in the Taksim-GS segment and three in the T nel-GS segment (Tekin & G ltekin, 2017). Another perceivable element that creates a facade is the wall and magnificent doors. Especially the walls and entrance doors of some consulates and prayer units are perceptual elements that can affect spatial memory. There are three remarkable walls and doors in both the T nel-GS segment and the Taksim-GS segment. There is also an important wall and door element belonging to the high school in Galatasaray Square. The nostalgic tram on the street periodically creates a linear space between Taksim and T nel. Even the track of the tram creates the effect of dividing the street into two. Another linear element that affects the spatial perception on the street is the passages. There are five passages in the T nel-GS segment. For example, Suriye, Terkos, Elhamra, Orientale, Hazzopulo passages. In the Taksim-GS segment, there are 4 passages that focus close to Galatasaray. For example, Atlas,    ek, Avrupa, Halep passages.

There are sculptures in three squares on the street and in Odakule. These; "Cumhuriyet Anıtı (*Republic Monument*)" in Taksim, "Cumhuriyet'in 50. Yıl Anıtı (*Republic's 50th Anniversary Monument*)" in Galatasaray, "A ık S t n (*Open Column*)" in T nel and "G ktaşı Heykeli (*Meteorite Statue*)" in Odakule. The "Akdeniz Heykeli (*Mediterranean Statue*)", which can be perceived from the permeable fa ade of the Yapı Kredi Culture and Arts building, is not considered as a sculpture since it is not located in the open area. Trees are frequently found in pots in the T nel-GS segment. Trees become sparse in the Taksim-GS segment. In this segment, only trees are seen in front of the H seyin A a Mosque and the French Consulate. The squares where the trees are most prominent are Galatasaray, T nel and finally Taksim entrance. Finally, peddlers pick places at the busiest points at regular intervals along the street. However, no peddlers were observed in the T nel Square.

An analysis was made on the observed locations of the emergency response teams and surveillance mechanisms on the street (Figure 4.10). First, police stations are focused close to the Taksim-GS segment. There are private security of shopping

malls and consulates at 5 equidistant points on the street. On the street, police cars focus on Galatasaray square. However, no police car was observed in the GS-Tünel segment close to Galatasaray. As a medical aid team, ambulances are only included in the Taksim-GS segment. In the Tünel-GS segment, there is a lack of a healthcare team that can intervene in an emergency. There are permanent police barricades in all three squares. There is an overly intrusive attitude towards social events that can take place in the squares. Another element that provides continuous surveillance and control on the street is surveillance cameras equally spaced across the street. Many shops also have their own security cameras.

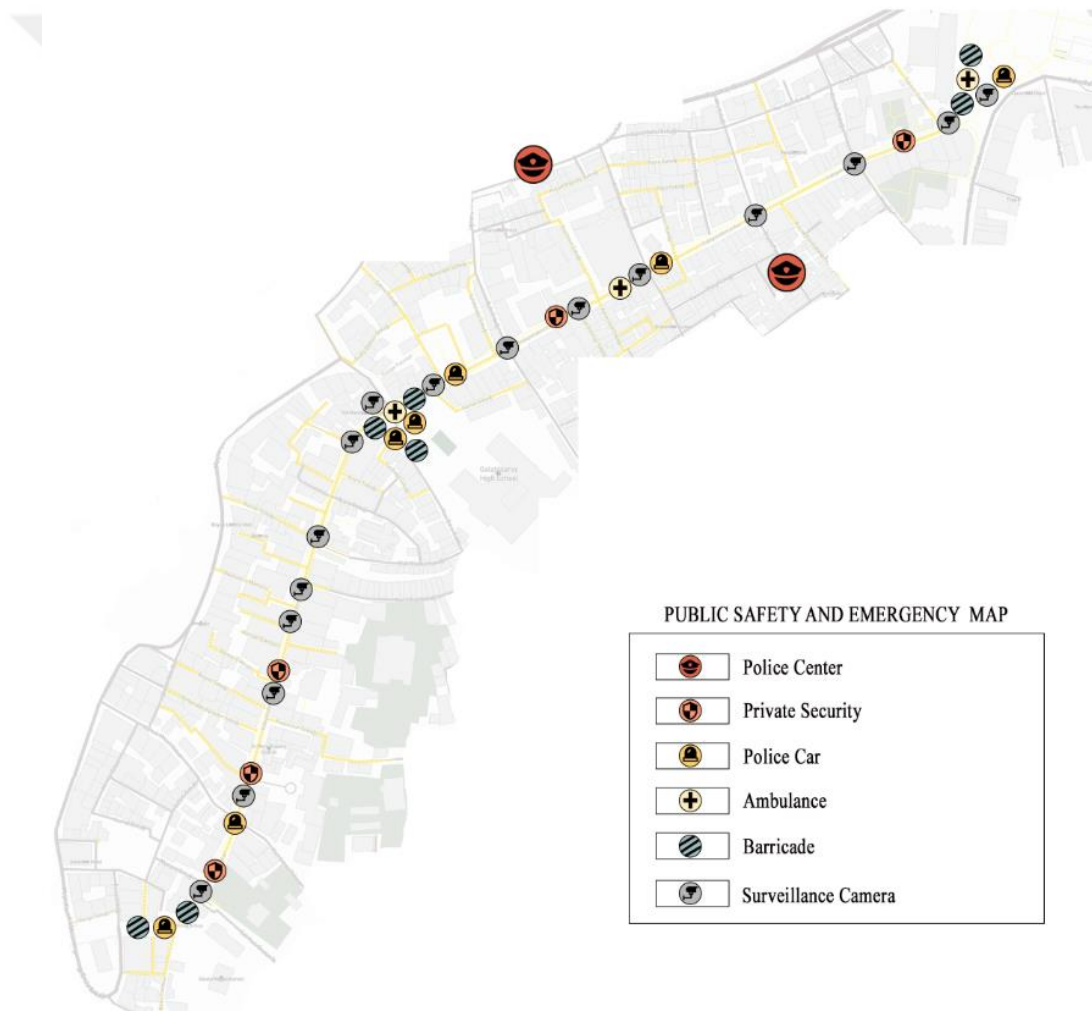


Figure 4.10. Public safety elements and emergency map

4.3 Assessment of the Crowd and Public Space Relationship

Public space attracts the crowd in the city, albeit for different reasons and at different times. At the same time, a place with a crowd contains publicity in its structure. De Certeau describes the existence of the crowd in space as “Steps and intersecting paths shape spaces, mingling like ants. They knit the spaces by bringing them together. Public spaces are created by countless actions of people.” (De Certeau, 1980, p. 97). This section examines the relationship between the social and physical parameters of the crowd cases on Istiklal Street and the spatial characteristics of the street. To do that, the crowd cases and spatial features are assessed within their own contexts.

In Figure 4.11, firstly, all the concepts that define the social identity and physical dynamics of everyday life, mass gathering, and chaotic crowds are listed. Afterwards, spatial analyzes at micro and macro scales and the crowd analysis maps are overlapped. The reason for doing this in this part of the study is to display the crowds and space on Istiklal Street in a meaningful whole by combining the statistical and visual data collected.

These dimensions are summarized as follows; (i) The crowd contexts of the observed cases are everyday life, mass gathering, and chaos; (ii) The places considered in different contexts on the street are squares such as Tünel, Galatasaray and Taksim, and street segments such as Tünel-GS and Taksim-GS. Moreover, the assessment of the relationships is done across these dimensions with a focus on square-crowd and street-crowd.

ASSESSMENT OF THE CROWD AND SPACE RELATIONSHIP İSTIKLAL STREET

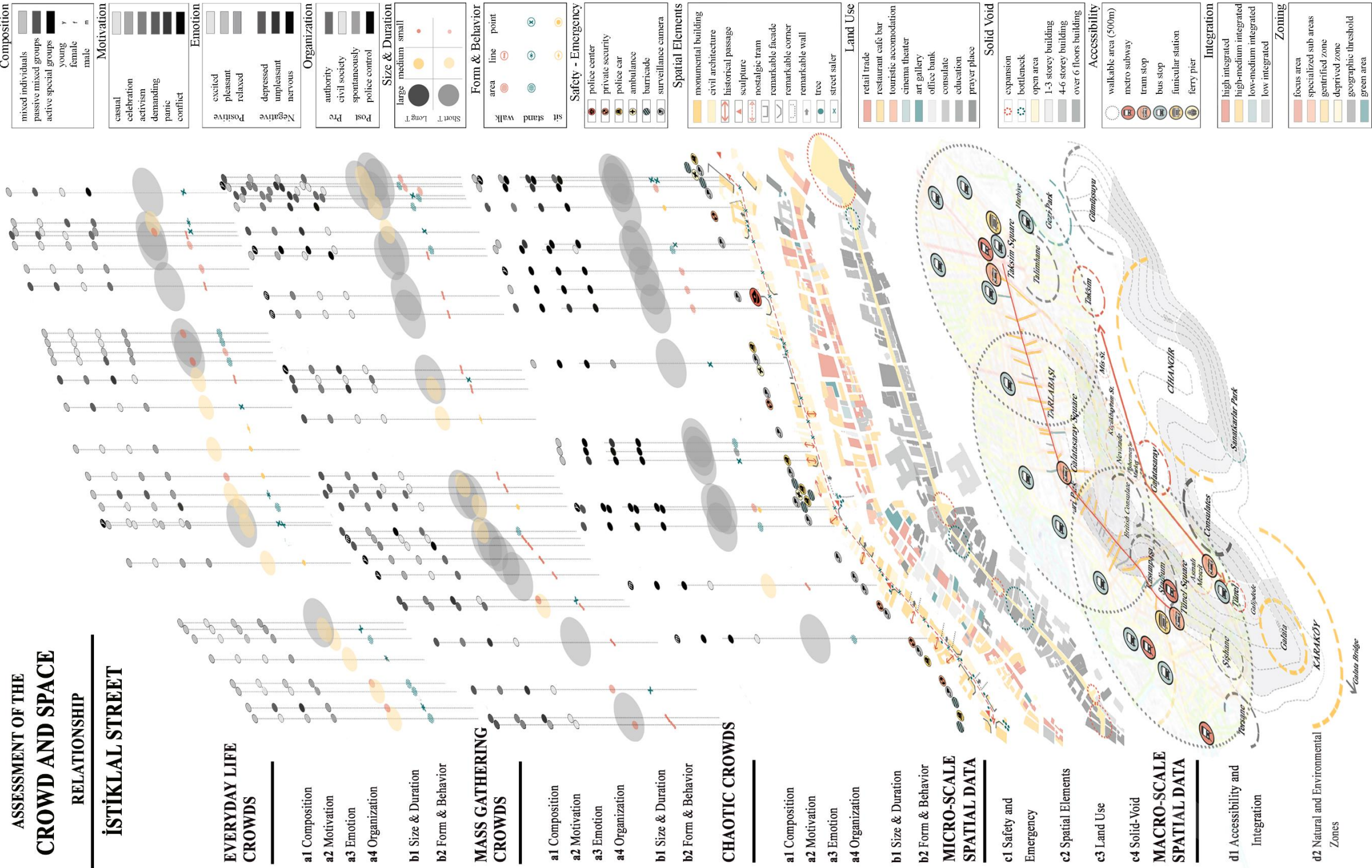


Figure 4.11. The crowd and space relationship on the Istiklal Street



4.3.1 Assessment Criteria

The square is a public space surrounded by buildings with important functions, expanding at the confluence of streets. The street is the canal space that connects urban functions and spaces. Streets connect not only the places where they begin and end, but also the two facing facades along the space they extend. In order to evaluate the relationship of the crowd in Istiklal Street with spatial characteristics, it is necessary to define the relationship between everyday life, mass gathering and chaos crowd typologies with square and street segment space typologies, through some concepts.

These relations are constructed through Figure 4.11, representation of the characteristics of the crowd and the place. The data encoded with the letters "a" and "b" in this image are the data for the crowd. In addition, data encoded with "c" and "d" are spatial data. While determining the assessment criteria, the meaningful relationship between "a" and "b", that is, one or both of the data belonging to the crowd, with the "c" and "d", that is, the spatial data, is used.

According to Table 4.23, crowd and space assessment criteria for everyday life is attractiveness, capacity, functionality, and legibility. Everyday life crowds can affect the attractiveness of the public space spatial elements (c2) and solid void relations(c4) positively or negatively in terms of their form and behavior (b2). In addition, depending on the density factor, size and duration (b1) of the crowd is in constant interaction with the land use (c4) and accessibility (d1). The concept of functionality, which can be defined as the suitability of the space for purpose and use, deals with the relationship of the motivation (a2) of the crowd with land use (c3) and environmental structure (d2). The legibility of public space is affected by the form and behavior (b2) of the crowd, in addition to solid void relations (c4) and natural and environmental zones (d2).

Table 4.23. Assessment criteria

	Everyday Life	Mass Gathering	Chaos
Squares:	Attractiveness	Inclusiveness	Public Safety
Tünel	(b2-c2-c4)	(a1-d1-d2)	(a2-a4-c1)
Galatasaray	Capacity	Memorability	Controllability
Taksim	(b1-c4-d1)	(a2-a3-c2)	(b1-c1-c4)
Street Segment:	Functionality	Permeability	Evacuation
Tünel-Galatasaray	(a2-c3-d2)	(b1-b2-d1)	(b2-c3-d1)
Taksim-Galatasaray	Legibility		
	(b2-c4-d2)		

Mass gathering crowds have an impact on public space in terms of inclusiveness, memorability and permeability assessment principles (Table 4.23). The inclusiveness of public space depends on the composition (a1) of the mass gathering crowd that makes up the public life, as well as the accessibility (d1) and environmental structure (d2) of the space. In addition to the perceptible spatial elements (c2) that make up the spatial memory, the motivation (a2) and emotions (a3) of the crowd members affect the memorability of mass gathering in the spatial experience. Mass gathering crowds affect the permeability of pedestrian flow not only by accessibility and integration (d1) of the public space, but also its physical aspects to size-duration (b1) and form-behavior (b2).

Public safety, controllability and evacuation factors of chaotic crowds have an impact on public space in terms of attractiveness, capacity, functionality, legibility assessment principles (Table 4.23). The damage that chaotic crowds can cause to public safety is related to the motivation (a2) and organization(a4) of the crowd in addition to the security elements (c1) in the space. Spatial security elements(c1) and escape area. (c4), which vary according to the size and duration (b1) of the crowd, affect the controllability of the emergency during chaos. The factors affecting

evacuability in a chaotic crowd are land use (c3) and the presence of integrated accessible(d1) channels depending on the behavior and form (b2) of the crowd.

4.3.2 Squares

In this section, the crowd phenomenon in Tünel, Galatasaray and Taksim squares, the crowd collection and distribution nodes of Istiklal Street, is interpreted to the assessment criteria.

Tünel square is the public space where the everyday life crowd cases are observed at the lowest rate. Although there are too many spatially attractive elements in the Tünel square, the reason for the low number of crowd cases may be the poor integration of the place due to the topographic and environmental thresholds. In addition, the weakness of individual vehicle connections despite having public transportation facilities such as metro and funicular may also be effective in the weakness of integration. Short-term and small-scale crowd cases prove that the Tünel square contains a crowd of everyday life below its capacity. Although the functions around the Tünel square are extroverted and public, large, and introverted land uses such as the consulates in this part may adversely affect the vitality of the space. Moreover, although the feeling of encirclement is a strong and defined square, Tünel square is more functional towards Galata tower, so the visibility of the square is poor.

Tünel square is also a potential area for mass gathering crowds. Mass gathering events taking place in the Tünel square are demographically inclusive. Moreover, mass gatherings often carry positive emotions in spatial memory. Since there is not a busy square in everyday life, the masses collected in this place do not affect the permeability of the place and pedestrian flow negatively.

The fact that chaotic crowds are not observed in Tünel Square is an important positive aspect for this place. Since the chaotic crowd case is not seen in the Tünel square, it does not pose a problem in terms of public safety. Therefore, there may not be a need for safety barricades, which are common on this part of the street.

Secondly, since there is no dense crowd here, it can be controlled in an emergency. In a situation that requires evacuation, the evacuation of the space is problematic due to the topographic thresholds, surrounding functions and accessibility.

Since Galatasaray Square is located right in the middle of the street, everyday life crowd cases on Istiklal Street are seen at the highest rate. Galatasaray Square has many attractive spatial elements but seating areas that allow sitting in addition to standing behavior can increase the attractiveness of the space. Galatasaray Square is a large-scale place with a capacity for long-term crowds, but it may be necessary to define static spaces for small and medium-sized crowds. In terms of functionality, the most obvious element around the square is Galatasaray High School. The high school's wall is not a permeable and interactive façade, which can be an important opportunity for public arts and events. The square, located in the middle of the street, has a strong legibility because it is surrounded by very important public buildings such as Galatasaray High School and Cultural Center. However, it is unfavorable in terms of orientation that the square continues at an acute angle in the direction of the Tünel. Since the form of the square is not geometric, the vehicle traffic that cuts the square perpendicularly increases the complex perception of the crowd in the space.

Galatasaray Square is also an iconic area for mass gathering events. The mass gathering events in Galatasaray square are inclusive for the crowd, but the presence of young groups cannot be ignored. In addition to the Galatasaray sports club and Galatasaray high school, which triggers crowded events in the spatial memory, the square has also been identified with social movements such as Saturday mothers. These crowds cause negative emotions in public life as well as positivity. Since the square, where large and medium-sized crowds are seen, is a flow area in the middle of the street, it is necessary to define static and flow spaces.

The impact of chaotic crowds on public life and public safety in Galatasaray Square is also very critical. Conflict situations that develop in Galatasaray Square, especially with the crowd and police intervention, pose a threat to public security. The emergency and response teams on the street focus the most on Galatasaray square,

so there is no shortage of controllability of chaotic crowds. There are many people in the square who need to be evacuated in an emergency due to functions such as educational institutions, cultural centers and commercial areas. However, since both north and south connections in this part of the street are very strong, it is suitable for evacuation in case of emergency.

Taksim Square is significant for everyday life crowds as it is the main entrance and exit gate of the everyday life on Istiklal Street. Taksim Square, which is problematic in terms of spatial enclosure, does not compromise the attractiveness of everyday life for the crowds. Although Taksim Square is one of the largest squares in the city, it is a busy area with a capacity problem for areal form large-scale and long-term crowds, especially since it gets narrower at the entrance of Istiklal Street. In addition, there is no everyday life place for small and medium groups because of high density and speed pedestrian flow. On the other hand, although the square has various public functions around it, there is a weakness in the square functions as it has undefined facades in the direction of Gezi Park. In addition, the only stable activity is standing in the square because of the lack of sitting areas. There is also a problem of orientation and legibility due to the narrowing at the entrance of Taksim Square to Istiklal Street and the problem of the border definition.

Taksim square is also an iconic square for mass gathering events throughout the city. There are three important factors in the spatial relationship of the mass gathering crowds in Taksim Square. The mass gathering events in Taksim are inclusive for the crowd. In addition, the presence of young groups should be considered. Moreover, crowd cases carrying many negative emotions that may cause negative perception in spatial memory took place in this important square. The fact that the Taksim entrance of the street is the most frequently used axis and the narrowing of the space here may cause large-scale and long-term mass gathering events to have a negative effect on pedestrian permeability. Therefore, stationery and flow areas should be carefully designed in this section.

In addition to all these positive features, Taksim Square also hosts chaotic crowds that negatively affect public space security and spatial memory. There are three important factors in the spatial relationship of the chaotic crowds in Taksim Square. There is an intensive security and emergency team in Taksim square. Despite this, the fact that there are many chaotic crowd cases in the square creates a feeling of insecurity in the perception of the place. Taksim Square is a controllable public space as it is an accessible area, but it is low in control because it is a very large and undefined space. In addition, Taksim square can be considered as an emergency meeting and dispersal area for the whole street, as it is an area with many different alternatives in terms of transportation.

4.3.3 Street Segments

In this section, the crowd phenomenon in street segments between three squares, Taksim, Galatasaray and Tünel, the crowd circulation channels of Istiklal Street, is interpreted to the assessment criteria. There are significant differences between the two linear elements that make up Istiklal Street, the part between Tünel Galatasaray and Taksim Galatasaray. While less and non-problematic crowds are observed between Tünel and Galatasaray, the other section between Taksim and Galatasaray has a large number of crowd cases of all typologies.

The everyday life crowds between Tünel and Galatasaray have effects that will revive public life and public space activities. There are four important factors in the spatial relationship of the everyday life crowds in Tünel-Galatasaray segment. Although the spatial elements are attractive, the non-public land uses on the street negatively affect the attractive feature of the place. Due to the narrowing of the street section between Odakule and Galatasaray Square, there is a capacity problem for the long-term and large-scale everyday life crowds. Due to introverted functions such as large public buildings, consulates, and banks in this segment of the street, the attractiveness of the place, which depends on façade interaction for everyday life, is

weak for the crowd. There is no situation that negatively affects the crowd in this segment in terms of spatial legibility.

Mass gathering events between Tünel and Galatasaray leave positive traces in spatial memory, helping to ensure social cohesion by bringing the crowds together. The part between Tünel and Galatasaray squares are demographically inclusive. The mass gathering motivation that stands out on this part of the street is the celebrations. Celebrations are socially unifying activities as well as the positive emotions they leave in the spatial memory. The most negative impact of mass gathering events on this part of the street on pedestrian flow and space permeability may be due to the narrowing in the cross section between Odakule and Galatasaray Square.

Tünel-Galatasaray is the street segment which is less problematic in terms of public safety compared to Taksim-Galatasaray segment due to the low number of chaotic crowd cases. Chaotic crowds are difficult to controllability due to fewer access connections to this segment of the street. In addition, it is not a problematic area in terms of evacuation due to both the low number of chaotic crowd cases and the large use of space in this segment of the street.

The segment between Taksim and Galatasaray is an attractive public space for the crowd of everyday life, especially due to the diversity in land use and the interactivity on its facades. Since this section of the street is a hot zone, pedestrian circulation is very intense and brings with it a capacity problem in the space. The intensity of mixed commercial uses on the street is compatible with the functionality of the public space. The crowds in this segment of the street are mostly in the form of fields, which can weaken the spatial legibility in the linear street.

The section of the street between Taksim and Galatasaray is inclusive in terms of mass gathering events. However, the mass gathering events of the male fan groups in this segment cannot be ignored. In this section of the street, although mass gathering events carry positive emotions, a negative image remains in the spatial memory due to overcrowding. One of the most critical sections in terms of the spatial

permeability of mass events is the part of the street, especially close to the Taksim entrance.

The high proportion of chaotic crowds between Taksim and Galatasaray segments poses a problem for public safety. Although there are intense security measures and security personnel on this part of the street, its controllability is low due to the density of crowded and chaotic events on the street. Many vehicle and pedestrian axes that perpendicular to this part of the street can be used as an evacuation channel in a possible emergency. However, since there are many workplaces and pedestrians in this segment of the street, the number of people who need to prepare an evacuation plan is very high.

4.4 Improving the Crowd and Public Space Relationship

For everyday life crowds, the square enables to come together and interact, to spend time taking advantage of the attractive design and pleasant functions of the place, to pause and relax in comfort. In addition, for everyday life crowds, the street not only connects two important venues, but also connects people who live in different places. Streets are places of encounter and interaction. Streets should be walkable comfortably, vehicle traffic does not create security concerns for pedestrians, and their façades should be permeable and extroverted and multifunctional.

For mass gathering event crowds, the square is a place where citizens can present their feelings and thoughts to the public, share visual and audio information with each other, celebrate an event in the social memory or create an environment of solidarity against common injustice. For mass gathering event crowds, the street is an opportunity to spread the event to more places and people. Both the social effect and the dynamism of the crowd activity that moves along the street as a cortege increase. However, this crowd can have negative effects on the flow of everyday life.

For chaotic crowds, the square is in some cases an evacuation area where escape routes and response channels must be determined. On the other hand, it is a gathering

focus in disaster management in some emergency situations. For chaotic crowds, the street is a place of escape and evacuation. Streets that turn into evacuation channels in the event of a chaos in the crowd are expected to be strongly connected, guiding and with high capacity.

According to the principles developed on the relationship between crowd context and public space, there are attractiveness, capacity, functionality and legibility factors in everyday life crowds, inclusiveness, memorability and permeability factors in mass gathering crowds, and finally, public safety, controllability and evacuation factors in chaotic crowds. Based on these principles, an evaluation has been made on the relationship between the street segments and the squares of Istiklal Street and the crowds in the squares.



CHAPTER 5

CONCLUSION

This thesis seeks opportunities to develop a crowd-oriented approach in public space design. To do that, it intends to answer the main research question, “*How can the crowd phenomenon be explained in relation to the spatial characteristics of the Istiklal Street in Istanbul?*”. The literature review on both the crowd phenomenon and the human-oriented public space establishes the theoretical basis of the thesis on the main research question. The approaches in the literature on these two concepts reveal the social and physical aspects of the crowd phenomenon and the spatial aspects of public space that focus on people. The thesis, constructed in this direction, aims to answer three sub-research questions regarding the phenomenon of crowding, spatial characters, and the relationship between crowding and public space.

The first sub-research question, “*What is the social and physical crowd character of the Istiklal Street?*” aims at searching for the aspects affecting social identity and physical dynamics of the crowd phenomenon on the Istiklal Street. Grouping the crowd cases with similar patterns on the street according to this analysis reveals three different crowd contexts including everyday life, mass gathering and chaos. The second research question, “*What are the human oriented spatial characteristics of the Istiklal Street?*” aims at analyzing the macro and micro scale spatial characteristics that affect human behavior, perception and movement on the Istiklal Street. This analysis is done in five parts of the street including three squares, Taksim, Galatasaray and Tünel, and two street segments between these squares.

In line with the last research question, “*What is the relationship between crowding and space on the Istiklal Street?*”, the pattern of everyday life, mass gathering, and chaotic crowds are assessed in five parts of the Istiklal Street analyzed with macro and micro scale spatial characteristics. This evaluation is defined together with the

assessment criteria regarding the relationship of everyday life, mass gathering and chaos crowds with the public space. Assessment criteria are conceptualized in the following terms: attractiveness, capacity, functionality, and legibility for everyday life crowds, inclusiveness, memorability, and permeability for mass gathering crowds and public safety, controllability, evacuation for chaotic crowds. As the concluding remarks of the research findings, this chapter discusses the contribution of the thesis theoretically, methodologically and practical professionally. By doing that, it assesses existing theoretical discussions in reference to the study findings for the crowd oriented public space approach, limitations of the research process as well as the methodology, and the practical professional contributions for public space design and management and its effects on future studies.

The theoretical contribution of the thesis is to bring forth a new perspective to human oriented public space studies by integrating multidisciplinary concepts of the crowd phenomenon. This new perspective, beyond the human-oriented approach in public space research, deals with the concept of crowding with a focus on interindividual relations with social and physical characteristics of the environment. The thesis methodologically contributes by integrating a variety of analytical and visualization methods to illustrate the relationship between crowding and public space, which are in fact dealt separately in previous studies. Respectively, the categorization of crowd data, the identification of crowd contexts, mapping and correlational analysis between crowd contexts with spatial characters are done within this framework. Practical professionally, the thesis contributes by linking public space design and management with the goodness of three types of crowds including everyday life, mass gathering and chaos. The main findings showing the relationship between public space and crowding can be used in public space design and crowding management for the well-being of public space.

5.1 Theoretical Reflections of the Crowd-Oriented Public Space Approach

Research outcomes models an integrated framework that considers crowding and public space together while previous studies discuss these two separately. It does that by deciphering each aspect, crowd and space, in reference to how relevant intellectual work has evolved through time and by combining the theoretical findings in the application of a case study in one of the busiest and symbolically most used public streets. The literature on the crowd phenomenon from different disciplines deals with the triggers of the behavior (e.g., Reicher, 2001; Wijermans, 2011; Turner, 1990), modeling of the movement (e.g., Helbing et.al., 2001; Still, 2000; Johansson, 2009), planning for event management (e.g., Challenger et al., 2010; Berlonghi, 1996) and generating crowdsourced data (e.g., Howe, 2008; Surowiecki, 2005). Human-centered public space literature is built upon environmental perception and behavior (e.g., Goffman, 1963, Hall, 1966), spatial form and pedestrian studies (e.g., Hillier&Hanson, 1984; Fruin, 1971), public space activities and street life (e.g., Whyte, 1980; Lefebvre, 1991; Gehl, 2013), smart tools and civic placemaking (e.g., Speck, 2012; Schaick, 2008) concepts. In fact, crowding happens in public space and public space allows the generation of crowding, thus, there should be a close link between the two calling for a deserved attention.

Review of literature on public space reveals concepts such as composition, motivation, emotion and organization of the crowd's social identity while concepts such as size, duration, behavior and form represent the physical dynamics of the crowd. Considering them together brings an interindividual crowd-oriented perspective to human-centered public space approaches. The meaningful pattern of the crowd analysis conducted in line with these concepts in the Istiklal Street shows that the crowd in public space can be explained in the contexts of everyday life, mass gathering, and chaos. Accordingly, this study shows that everyday life crowds are drawn to places which are attractive, functional, and legible as well as the places having the capacity to accommodate people. Places which are inclusive, memorable, and permeable draw mass gathering crowds. For chaotic crowds, the safety

significance of places, the controllability and evacuation possibilities in space appear salient. Although this provides an overall framework for the spatial characteristics of crowd-oriented public space, different parts of the Istiklal Street convey different potentials to accommodate crowding. This section discusses this in reference to the existing theoretical discussions.

Taksim Square has always been a very popular public space for mass gathering crowds stimulated by protests and celebrations. At the same time, Taksim represents the most significant entrance and exit gate of the Istiklal Street for daily life crowds. Although this square has a weak sense of enclosure, perceptibility and orientation in spatial terms, it is an iconic event and show-space throughout the city due to its suitability for large-capacity crowds.

In terms of the frequency of crowding cases, the hottest zone of the street is between Taksim and Galatasaray squares. This may be due to the absence of topographical and environmental thresholds in this part of the street, the connection to Taksim square and the effect of commercial land uses. In this part of the street, which is the richest in terms of the diversity of crowding cases, there are both negative and positive aspects of the crowd. Negative emotions occur high in everyday life crowd cases and chaotic crowds threaten public safety. This study argues that the capacity and controllability of the place may allow this in this part of the street.

Cases of crowding in Galatasaray Square shows a wide variety. This may be caused by the square being in the very center of the street and functioning as an important node. Galatasaray Square, where the sense of being surrounded is strong, has a symbolic importance for Galatasaray High School community and Galatasaray team fans as well as activist mass gatherings like Saturday Mothers. The strong connection channels opening to the Galatasaray Square can make this gathering place a place of escape or conflict upon a police intervention or disagreement between two groups.

Between the Tünel and Galatasaray squares, the positive features of daily life and mass gathering crowds are dominant in the form of celebrations, street art performances and the like events. This segment is spatially characterized with its

inward facing façades such as consulates and office buildings. Although these façades do not allow much of interaction with the street, they become suitable for street art. The only negative factor regarding the crowd in this part of the street is the density caused by the narrowing character of the street, particularly in closer parts to the Galatasaray Square.

Although the Tünel square is a spatially attractive, large-capacity, multi-functional and safe area, this study shows that the square is not preferable for neither everyday life or mass gathering crowds. This may be due to its accessibility limitations due to the geographical barriers and closed large areas by walls such as consulates. Thus, the crowding capacity of the Tünel square remains below its potential.

5.2 Limitations of the Methodology and Research Process

The study created its own methodology due to three major limitations that have been encountered in the research process. These limitations are related to the selection of data gathering methods and techniques conditioned by externalities of the time when this thesis is conducted, and the content of the data used in this research.

First, live data on crowding could not be used. Direct observation is not selected as a data gathering technique because sufficient number of cases could not be achieved within the timeframe of this thesis study. Moreover, security camera footage recording of the street could be used but it is often not accessible due to privacy reasons of buildings. Also, this research is conducted during Covid-19 pandemic process which applied severe restrictions of social distancing and lockdowns. Street observations would be biased.

Second, while the crowding cases come from different periods, the spatial analysis of this study draws a framework that is valid only today. This conveys a potential of time-space incompatibility. Although the theoretical framework on crowding is constructed to include a historical perspective, its integration to the inquiry is achieved through the use of indicators highlighted across studies since the 1960s to

analyze today's spatial arrangements. Additionally, the inquiry used only news texts and 1-minute video clips. It applied text analysis and video screen observation to extract data on the selected indicators. The inquiry excluded longer videos due to the technical difficulties that naked eye observation could hinder, and thus, potentials for bias were inhibited in such data gathering process.

Third, the inquiry used only the sequential appearance of the crowd through history and intended to understand its compositional and behavioral pattern in the case of a selected street. Due to the pandemic conditions and the methods chosen to gather data, the inquiry approached to the crowd phenomenon in public spaces as an outsider. It did not include the human experience, which remains as a potential area for future research. Additionally, the content of this research may have some implications on the ethical side of publicity in urban space. The crowd phenomenon conveys a great deal of social and political aspects of public life. This thesis examines the crowd from a formal point of view rather than from a socio-political one. It sees that citizens have the right to act whenever they want in public places and that spatial arrangements should facilitate that. This research does not intend to make any restrictive implications against the will of citizens who would like to self-organize spontaneously and independently in public space. This study aims at seeking spatial design opportunities that can accommodate the daily life crowd, ensure the efficiency of mass gatherings and prevent possible chaos.

5.3 Practical Professional Contributions for Public Space Design and Management

The crowd-oriented public space approach, developed in reference to an assessment of occurred crowd cases on the Istiklal Street, has three contributions to public space design practice. First, this study revealed the social, physical and spatial parameters that can be used in the analysis of the crowd in public space design. Secondly, the crowd in public space is defined in the context of everyday life, mass gathering and chaos about which design implications can vary for the same place. Finally, although

public space design sensitive to the crowd phenomenon takes its reference from a case study, the methodological framework can be applied universally in urban design practices.

Additionally, the crowd-oriented public space approach has two contributions to public space management research and practice. First, crowd members can be a collaborator in public space management with smart devices and participation. The crowd management strategies are useful in the continuity and comfort of daily life in public spaces, mass events can be planned, and public safety can be ensured in chaotic situations. In this way, it is the crowd itself that can manage and direct the space created by the crowd.

Second, by creating a big data set about crowding in public space, spatial management strategies can be developed in cooperation with local governments and users. The findings from the case of the Istiklal Street can guide these attempts.

The spatial features of attractiveness, capacity, functionality and legibility may give some clues to manage the behavior, movements and density of everyday life crowds. Although daily life crowds have a spontaneous organization, some managerial approaches can be adopted to improve the quality and user experience of the space and to make the use of space efficient. The type of street activities and the choice of place in public space are directly related to the composition, motivation, emotion and organization of the crowd. The design of the public space, on the other hand, is highly related to the size duration behavior and form of the daily life crowds.

The inclusiveness, memorability, and permeability of mass gathering crowds may be planned and scheduled in order not to disturb the daily routine of life. For example, the number of participants, the audience addressed, the noise level, the size of the area needed, and the location of the event may be planned before the event. The safety of mass gathering crowds is as important as the location selection. The place should be able to be intervened and evacuated in case of problematic events are experienced.

Information on chaotic crowds provides insight into the crowd that needs to be controlled and evacuated through crisis management. The effect of chaotic crowds is not the same in every part of public space. For this reason, large-scale and long-term crowded areas in public space should be identified and included in emergency action plans as a priority area in case of chaos. Crowds such as the elderly, children and the disabled, who may have disadvantages for escaping in an emergency situation should be prioritized.

5.4 Suggestions and Further Studies

This section describes further suggestions that can make practical professional contributions for a crowd-oriented public space approach. The first is the crowd-oriented public space design guideline developed for the Istiklal Street. This guideline consists of temporary and permanent spatial elements and design principles on the basis of research findings on the relationship between crowd and public space. Figure 5.1 shows an initial framework for such a guideline. This guideline may cover spatial strategies such as floor design for spatial division, venue selections for mass gatherings of different sizes, façade design, street stage design, urban furniture, spatial orientation elements, counterflow separation elements and the like. Furthermore, these design elements may vary according to different segments of the street.

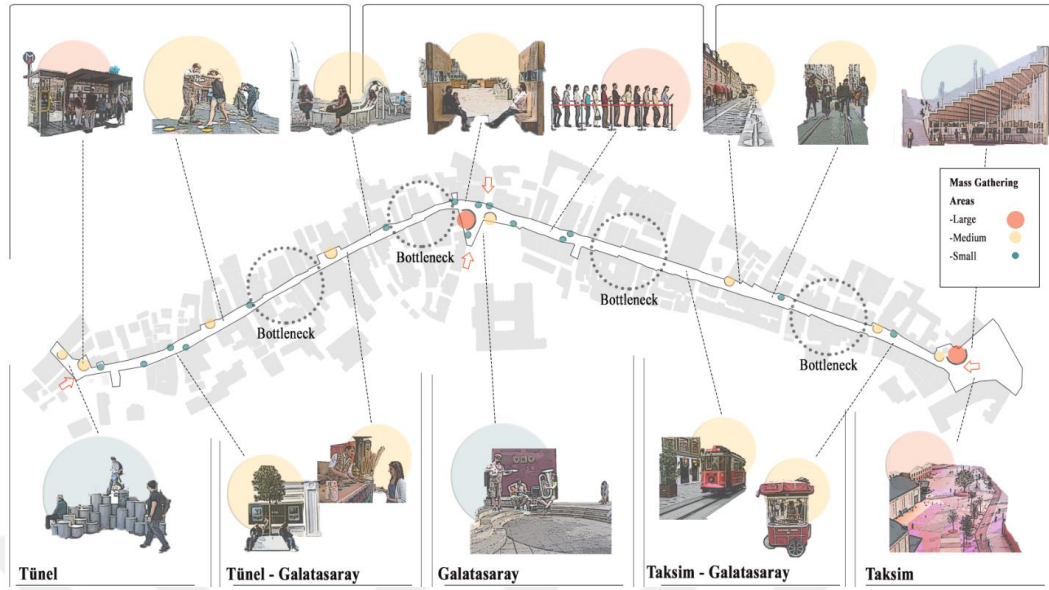


Figure 5.1. Sample crowd oriented public space design guideline for Istiklal Street

In the Tünel Square, striking urban furniture or floor arrangements with seating functions can allow stable activities for medium-sized crowded groups. A reclining design can maintain the order during waiting at the tram stop. The narrowing sections between Tünel and Galatasaray should be maintained as they are because any design intervention may potentially constitute a physical obstacle for the crowd. Stable street elements can be installed in widen cross sections to accommodate small and medium sized crowd groups. These areas can be furnished by street art and seating elements to catalyze the liveliness of the place. To prevent the confusion caused by vehicular and pedestrian traffic in the Galatasaray Square, movement areas and stationary areas can be visually accentuated by flooring. Gathering areas can be defined for groups of different sizes and activities with alternatives. In the street segment between Taksim and Galatasaray, evacuation channels should be made apparent with some signal and guiding elements in this hot zone area. The tram serves as a natural separator in this segment of counter flows. In the Taksim Square, the lack of enclosure can be eliminated, and pedestrian orientation can be provided by some mass gathering platforms and by using a distinct ground texture.

The second one is about understanding the effects of mass gathering events and chaotic situations on daily life through a simulation with spatial relations on the Istiklal Street. Such a simulation can test the effects of size, duration and form of mass gathering crowds on everyday life pedestrian circulation. Moreover, since the simulation predict daily life crowd movements, it can practice escape routes in different scenarios depending on the number of people that need to be evacuated from the place in case of possible chaotic situations.

As shown in Figure 5.2, virtual pedestrians in the simulation, prepared by PedSim pedestrian simulation software, move from the entrance door to the exit door with the determined coefficient frequency. Virtual pedestrians, who are at a certain distance to each other, perceive the buildings on the street as obstacles within a view angle and continue their movement on the street. During this movement, the heat map be created by virtual pedestrians painting the cells that they pass. According to this heatmap, the congested and calm locations can help formulate strategies for mass gathering areas and chaos risk assessment.

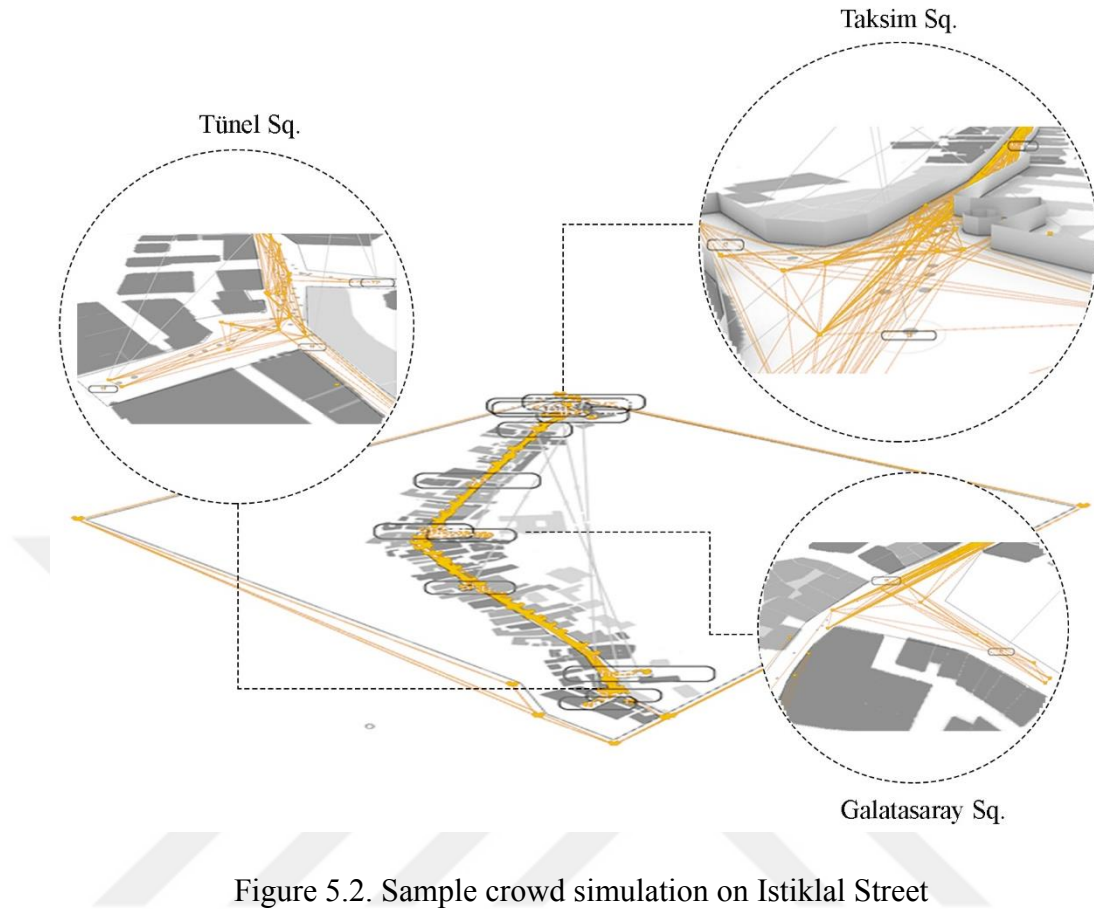


Figure 5.2. Sample crowd simulation on Istiklal Street

The third one is based on establishing a digital platform for the spatial management of the crowd. For this, the sample application interface called "perapp" for smartphones can be developed in cooperation with the local government, non-governmental organizations, workplaces and visitors to ensure the participation of the crowd on the street in spatial management. An illustration of possible app interfaces are shown in Figure 5.3.

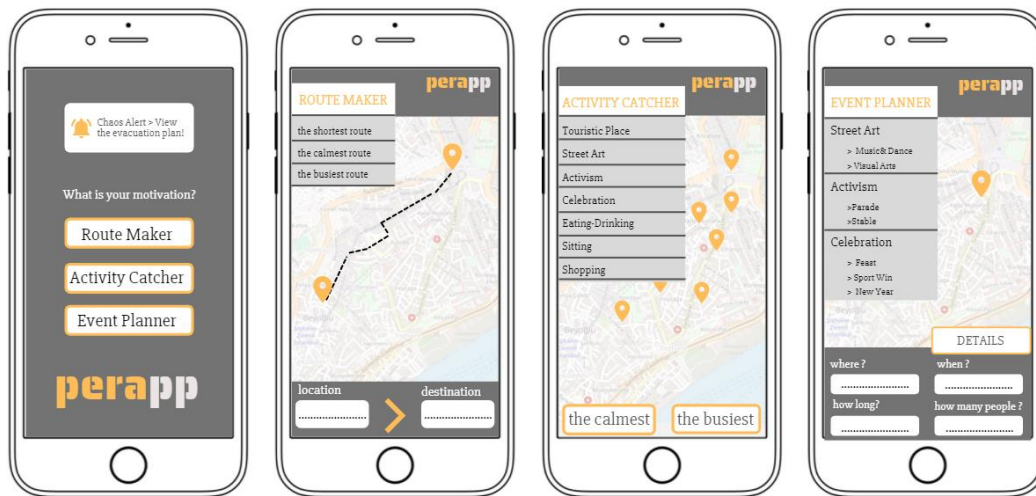


Figure 5.3. Sample crowd management app interface

This application may include three particularities. First, in the route maker option, users can create the shortest, calmest and busiest route from their current point to the point to which they want to reach. Second, the activity catcher option can allow users to choose the calmest and busiest route for different activity venues on the street such as food and beverage, culture, and street art. Finally, the event planner option can determine the most suitable event venue for a person who wants to organize an activity on the Istiklal Street. In addition to these features, there can also be a chaos alert and emergency evacuation feature with an ability to notify app users in case of a possible emergency and to make an evacuation plan appropriate to the location.

REFERENCES

- Acarlı, B., Kiper, T., & Korkut, A. (2019). Kent Meydanlarının Fiziksel Mekan Kalitesi: İstanbul Taksim Meydanı ve Yakın Çevresi. *Kent Akademisi* 12:1, 29-41.
- Adanalı, Y. A. (2011). De-spatialized space as neoliberal utopia: Gentrified İstiklal street and commercialized urban spaces. *Red Thread*, 1-13.
- Akın, N. (1998). *Ondokuzuncu Yüzyılın İkinci Yarısında Galata ve Pera*. İstanbul: Literatür Yayıncılık.
- Akyol, K. (2021, 03 21). Taksim'in Batı'dan Doğu'ya yolculuğu. Retrieved from Dolce Welle: <https://www.dw.com/tr/taksim>
- Alexander, C. (1977). *A pattern language: towns, buildings, construction*. . Oxford: Oxford university press.
- Al-Kodmany, K. (2013). Crowd management and urban design: New scientific approaches. *Urban Design International* Vol. 18, 282–295.
- Allport, F. H. (1920). The influence of the group upon association and thought. *Journal of Experimental Psychology*, 159-182.
- Alsolami, B. M., Embi, M. R., & Enegbuma, W. I. (2017). The Influence of Sustainable Physical Factors on Hajj Crowd. *Chemical Engineering transactions*, 409-414.
- Appleyard, B., & Appleyard, D. (1981). *Livable Streets*. Elsevier.
- Arslanlı, K. Y., Dökmeci, V., & Kolcu, H. (2017). The effect of the pedestrianization of İstiklal Caddesi on land values and the transformation of urban land use. *ITU A|Z* Vol 14 No 2, 31-41.
- Avcı, S. (1994). Beyoğlu İlçesi. In *Dünden Bugüne İstanbul Ansiklopedisi* , Cilt 3 (pp. 220-221). Kültür Bakanlığı ve Tarih Vakfı.

- Barker, R. G. (1968). *Ecological Psychology: Concepts and Methods for Studying the Environment of Human Behavior*. Stanford, CA: Stanford University Press.
- Batty, M. (2009). *Cities as Complex Systems: Scaling, Interactions, Networks, Dynamics*. UCL Centre for Advanced Spatial Analysis .
- Batur, A. (2001). Galata and Pera A Short History: Urban Development Architecture and Today. *ARI: The Bulletin of the Istanbul Technical University*, 55(1), 1-10.
- Bellomo, N., Piccoli, B., & Tosin, A. (2012). *Modelling Crowd Dynamics from a Complex System Viewpoint. Mathematical Models and Methods in Applied Sciences Vol. 22*.
- Berk, R. (1974). A gaming approach to crowd behaviour. *American Sociological Review*, 39, 355-373.
- Berlonghi, A. E. (1995). Understanding and Planning for Different Spectator Crowds. *Safety Science*, 239-247.
- Blumer, H., & Shibutani, T. (1973). *Human nature and collective behavior: Papers in honor of Herbert Blumer*. Transaction Publishers.
- Borch, C. (2012). *The politics of crowds: An alternative history of sociology*. . Cambridge University Press.
- Bosselmann, P. (1998). *Representation of Places: Reality and Realism in City Design* . University of California Press.
- Brown, C., & Lewis, E. L. (1998). Protesting the invasion of Cambodia: A case study of crowd behavior and demonstration leadership. *Polity* 30, 645-665.
- Brown, R. W. (1954). Mass Phenomena. In G. Lindzey, *The Handbook of Social Psychology* (pp. 833-876.). Cambridge: Addison-Wesley.

- Burstedde, C., Klauck, K., Schadschneider, A., & Zittartz, J. (2001). Simulation of pedestrian dynamics using a two-dimensional cellular automaton. *Physica A: Statistical Mechanics and its Applications.*, 507-525.
- Canetti, E. (1984). *Crowds and Power*. Macmillan.
- Challenger, R., Clegg, C. W., & Robinson, M. A. (2009). *Understanding Crowd: Supporting Events*. York: The Cabinet Office Emergency Planning College.
- Challenger, R., Clegg, C. W., Robinson, M. A., & Leigh, M. (2010). *Understanding Crowd Behaviors Volume 1: Practical Guidance and Lessons Identified*. London: TSO (The Stationery Office).
- Corbusier, L. (1923). *The city of to-morrow and its planning*. Courier Corporation.
- Crooks, A., Pfoser, D., Jenkins, A., Croitoru, A., Stefanidis, A., & Duncan, S. (2015). Crowdsourcing urban form and function. *International Journal of Geographical*, 1-22.
- Cullen, G. (1961). *The Concise Townscape*. New York: Architectural Press.
- De Certeau, M. J. (1980). On the oppositional practices of everyday life. *Social text*, (3), 3-43.
- Eyice, S. (1994). Galata. In *Dünden bugüne İstanbul Ansiklopedisi III* (pp. 381-385). İstanbul: Kültür Bakanlığı ve Tarih Vakfı.
- Eyüboğlu, E., Kubat, A. S., & Ertekin, Ö. (2007). A New Urban Planning Approach for the Regeneration of an Historical Area within Istanbul's Central Business District. *Journal of Urban Design*, 12:2, 295-312.
- Franke, T., Lukowicz, P., & Blanke, U. (2015). Smart crowds in smart cities: real life, city scale deployments of a smartphone based participatory crowd management platform. *Journal of Internet Services and Applications*, 1-19.

- Franke, T., Lukowicz, P., Wirz, M., & Mitleton, K. E. (2013). Participatory sensing and crowd management in public spaces. 11th annual international conference on Mobile systems, applications, and services, (pp. 485-486).
- Freud, S. (1921). Group psychology and the analysis of the ego. J. Strachey.
- Friedmann, J. (2010). Place and Place-Making in Cities: A Global Perspective. . Planning Theory & Practice 11, 149-165.
- Fruin, J. J. (1971). Designing for pedestrians: A level-of-service concept. Washington: Highway Research Board.
- Garling, T., & Golledge, R. G. (1989). Environmental Perception and Cognition. In E. H. al., Advance in Environment, Behavior and Design (pp. 203-236). New York: Plenum Press.
- Gehl, J. (2011). Life between buildings: using public space. Island press.
- Gehl, J. (2013). Cities for people. Island press.
- Gehl, J., & Svarre, B. (2013). How to study public life. Washington: Island press.
- Gibson, J. J. (1979). The Theory of Affordances. The Ecological Approach to Visual Perception.
- Goffman, E. (1966). Behavior in Public Places. New York: The Free Press.
- GSMA Smart Cities. (2019). GSMA Smart Cities Guide: Crowd Management. Connected Living.
- Güvenç, M. (2005). Metropoliten bir alan olarak İstanbul'da kalabalıkların ürettiği mekanların okunması (Doctoral Thesis). İstanbul: İstanbul Kültür Üniversitesi.
- Hall, E. T. (1968). Proxemics. Current Anthropology, 83-108.
- Hanzl, M. &. (2017). Analyses of human behaviour in public spaces. ISOCARP-OAPA 2017.

- Harvey, D. (1996). Postmodernliğin Durumu. İstanbul: Metis Yayınları.
- Harvey, D. (2005). Neoliberalizmin Kısa Tarihi. Sel Yayıncılık.
- Health and Safety Executive. (2000). Managing crowds safely: A guide for organisers at events and venues. Richmond: HSE Books.
- Helbing, D. B. (2005). Self-organized pedestrian crowd dynamics: Experiments, simulations, and design solutions. *Transportation science*, 1-24.
- Helbing, D., Buzna, L., Johansson, A., & Werner, T. (2015). Self-Organized Pedestrian Crowd Dynamics: Experiments, Simulations, and Design Solutions. *Transportation Science* 39(1), 1-24.
- Helbing, D., Molnar, P., Farkas, I. J., & Bolay, K. (2001). Self-organizing pedestrian movement. *Environment and Planning B: Planning and Design*, 28, 361-383.
- Henderson, L. F. (1971). The statistics of crowd fluids. *Nature* 229,, 381–383.
- Hillier, B., & Hanson, J. (1984). *The Social Logic of Space*. Cambridge University Press.
- Hogg, M. A., & Rinella, M. J. (2018). Social identities and shared realities. *Current Opinion in Psychology*, 6-10.
- Hou, J., Knierbein, S., & Monteiro, B. (2017). *City Unsilenced: Urban Resistance and Public Space in the Age of Shrinking Democracy*. Routledge.
- Howard, E. (1902). *Garten Cities of To-morrow*. . BoD–Books on Demand.
- Howe, J. (2006). The rise of crowdsourcing. *Wired magazine* 14(6), 1-4.
- İBB . (2021, May 13). Retrieved from İBB Açık Veri Portalı Nüfus: <https://data.ibb.gov.tr/dataset/nufus-bilgileri>
- İstanbul Metropolitan Municipality. (2008). *Beyoğlu District Chronological Distribution of Registered Landmarks and Civil Architecture*. İstanbul.

- İstanbul Metropolitan Municipality. (2008). Beyoğlu District Urban Protected Site Cultural and Natural Assets Inventory. İstanbul.
- Jacobs, A. B. (1993). Great Streets. MIT Press.
- Jacobs, J. (1961). The Death and Life of Great American Cities. Vintage.
- Johnsson, A. (2009). Data-Driven Modeling of Pedestrian Crowds: Crowd Simulation, Computer Vision, and Real-World Applications. VDM Verlag Dr. Müller.
- Kee, T., & Miazzo, F. (2014). We Own the City: Enabling Community Practice in Architecture and Urban Planning. Valiz/Trancity.
- Kent, E. (2019). Leading urban change with people powered public spaces. The history, and new directions, of the Placemaking movement. The Journal of Public Space, 127-134.
- Kirchner, A., & Schadschneider, A. (2002). Simulation of evacuation processes using bionics-inspired cellular automaton model for pedestrian dynamics. Physica A, 312, 260-276.
- Kitchin, R. (2014). The real-time city? Big data and smart urbanism. GeoJournal, 1–14.
- Kuban, D. (2017). İstanbul - Bir Kent Tarihi. İstanbul: Türkiye İş Bankası Kültür Yayınları.
- Le Bon, G. (1895). The crowd: A study of the popular mind. . Courier Corporation.
- Lefebvre, H. (1991). The production of space (Vol. 142). Oxford: Blackwell.
- Lefebvre, H. (2017). Ritimanaliz: Mekan, Zaman ve Gündelik Hayat. Sel Yayıncılık.
- Lofland, L. H. (1985). The social shaping of emotion: The case of grief. Symbolic Interaction.

- Lydon, M., Bartman, D., Garcia, T., & Preston, R. (2012). Short Term Action Long Term Change. Tactical urbanism vol. 2:.
- Lynch, K. (1960). The image of the city (Vol. 11). MIT press.
- Macneil, S., Abdellahi, S., Maher, M., Kim, J., Mahzoon, M. J., & Grace, K. (2018). Designing with and for the Crowd: A Cognitive Study of Design Processes in NatureNet.
- Maslow, A. H. (1943). A theory of human motivation . Psychological review 50(4), 370-396.
- McDougall, W. (1920). The Group Mind. London: Cambridge University Press.
- McLeod, S. (2018). Maslow's Hierarchy of Needs. Simply Psychology, 1-16.
- McPhail, C. (1991). The Myth of the Madding Crowd. New York: Aldine De Gruyter.
- Mert, A. (2021). Üç Ekoloji. Yeni İnsan Yayınevi.
- Mingione, E. (2005). Urban Social Change: A SocioHistorical Framework of Analysis. In Y. Kazepov, Cities of Europe (pp. 65-67). Blackwell Publishing.
- Mistra Urban Futures. (2018). Crowdsourcing the City. London: New Cities.
- Mitchell, D. (2003). The right to the city: Social justice and the fight for public space. New York: Guilford press.
- Mitchell, M. (2009). Complexity: A guided tour. Oxford University Press.
- Momboisse, R. M. (1970). Riots, Revolts and Insurrections. Springfield: Charles C. Thomas .
- Mumford, L. (1961). The City in History. Harcourt, Brace and World.
- Myers, D. G. (2005). Social Psychology. McGraw-Hill.

- National Disaster Management Authority, N. (2014). A Guide for State Government, Local Authorities, Administrators and Organizers. Government of India.
- Neville , F. G., & Reicher, S. D. (2018). Crowds, social identities, and the shaping of everyday social relations. In C. J. Hewer, & E. Lyons, Political Psychology: A Social Psychological Approach (pp. 231-252). John Wiley & Sons.
- Norman, D. A. (1995). The psychopathology of everyday things. Readings in Human–Computer Interaction, 5-21.
- Notting Hill Carnival Crowd Movement Data Book. (2017). Notting Hill Carnival Crowd Movement Data Book. London: Movement Strategies.
- Online Etymology Dictionary. (2020, 05 23). Retrieved from Online Etymology Dictionary: <https://www.etymonline.com/>
- PedSim. (2021, 04 21). Retrieved from food4Rhino: <https://www.food4rhino.com/app/pedsim>
- Pelechano, N., & Malkawi, A. (2008). Evacuation simulation models: Challenges in modeling high rise building evacuation with cellular automata approaches. Automation in Construction, 17, 377-385.
- PPS. (2020, 12 04). Retrieved from PPS: <https://www.pps.org/article/you-asked-we-answered-6-examples-of-what-makes-a-great-public-space>
- Rapoport, A. (1977). Human aspects of urban form: towards a man—environment approach to urban form and design. Elsevier. Pergamon Press.
- Rapoport, A. (2008). Some further thoughts on culture and environment. International Journal of Architectural Research, 2(1), 16-39.

- Reicher, S. (2001). The psychology of crowd dynamics. In M. A. S. Tindale, Blackwell Handbook of Social Psychology: Group Processes (pp. 182-208). Oxford: Blackwell Publishing.
- Reicher, S. D. (1984). The St. Pauls' Riot: An explanation of the limits of crowd action in terms of a social identity model. . European Journal of Social Psychology, 14, 1-21.
- Reicher, S., & Potter, J. (1985). Psychological theory as intergroup perspective: A comparative analysis of 'scientific' and 'lay' accounts of crowd events. Human Relations, 38, 167-189.
- Reynolds, C. (1987). Flocks, herds, and schools: A distributed behavioral model. Computer Graphics, 21 , 25–34.
- Rudolfsky, B. (1969). Streets for people.
- Russell, J. (1980). A Circumplex Model of Affect. Journal of Personality and Social Psychology, 1161-1178.
- Schaick, J. &. (2008). Urbanism on track: Application of tracking technologies in urbanism (Vol. 1). . IOS Press.
- Sennett, R. (2005). Capitalism and the City: Globalization, Flexibility, and Indifference. In Y. Kazepov, Cities of Europe (pp. 109-122). Blackwell .
- Sharma, A. (2000). Crowd-behavior prediction using subjective factor based multiagent. IEEE International Conference on Systems (pp. 298-300). Man and Cybernetics.
- Sime, J. D. (1999). Crowd facilities, management and communications in disasters. Facilities, 17, 313-324.
- Sitte, C. (1888). The art of building cities: city building according to its artistic fundamentals. New York: Ravenio Books.
- Sommer, R. (1969). Personal Space. The Behavioral Basis of Design.

- Sorensen, A., & Okata, J. (2011). *Megacities: Urban Form, Governance, and Sustainability*. Springer.
- Speck, J. (2018). *Walkable city rules: 101 steps to making better places*. Island Press.
- Still, G. K. (2000). *Crowd Dynamics*. University of Warwick.
- Still, G. K. (2014). *Introduction to crowd science*. CRC Press.
- Surowieck, J. (2004). *The Wisdom of Crowds*.
- Tajfel, H. (1978). *Differentiation between Social Groups : Studies in the Social Psychology of Intergroup Relations*. London: Academic Press.
- Tekin, İ., & Gültekin, A. A. (2017). Rebuilding of Beyoğlu-İstiklal Street: A Comparative Analysis of Urban Transformation through Sections along the Street 2004-2014. *METU JFA* 34:2, 153-179.
- Thalmann, D. (2007). Crowd simulation. In *Wiley encyclopedia of computer science and engineering*.
- Thouless, R. H. (2014). Problems of terminology in the social sciences. In *The Study of Society (RLE Social Theory): Methods and Problems* (p. 115).
- TMMOB Peyzaj Mimarları Odası. (2012). *Taksim Meydan Düzenlemesi*. İstanbul: TMMOB.
- Turner, R. H., & Killian, L. M. (1972). *Collective Behavior* (2nd Ed.). Englewood Cliffs: NJ: Prentice-Hall.
- Veld, E. M., & Gelder, B. (2015). From personal fear to mass panic: The neurological basis of crowd perception. *Human Brain Mapping*, 2338 - 2351.
- Waddington, D. P. (1987). *Policing Public Disorder: Theory and Practice*. Cullompton, UK: Willan Publishing.

Weisman, J. (1981). Evaluating Architectural Legibility: Way-Finding in the Built Environment. *Environment and Behavior* 13(2), 189–204.

Whyte, W. H. (1980). *The social life of small urban spaces*. New York: Project for Public Spaces.

Wijermans, F. E., & Wijermans, N. (2011). *Understanding Crowd Behaviour: Simulating Situated Individuals*. Groningen: University of Groningen.

Young, K. (1951). *Handbook of Social Psychology*. Lincoln: Routledge and Kegan Paul.

Yudengar, P., & Ravishankar, K. V. (2018). Crowd behavioural analysis at a mass gathering event. *Journal of KONBiN*, 4-50.

Zeitz, K. M., Tan, H. M., & Zeitz, C. J. (2009). Crowd Behavior at Mass Gatherings: A Literature Review. *Prehospital Disaster Medicine*, 32-38.



APPENDICES

A. Sources of Crowd Cases

Case	Date	Source	URL No	URL Link
1	2019	Türkiye Gazetesi	URL 1	https://youtu.be/QPj5t1LJ--ho
2	2017	Meydan	URL 2	https://youtu.be/063pZ41Vja0
3	2012	TürkiyeGündem	URL 3	https://youtu.be/tIXQl5RXeas
4	2013	Euronews	URL 4	https://youtu.be/2Rjckq-kAYw
5	2013	VICE News	URL 5	https://youtu.be/12RiAVLnVg
6	2013	Diren Gezi	URL 6	https://youtu.be/snlW7BXU7Q
7	2013	Özgür Gelecek	URL 7	https://youtu.be/cE1Hxf-53Bs
8	2015	AI Jazeera Türk	URL 8	https://youtu.be/ADyIRZmkHBU
9	2018	Haberler W/ETTE	URL 9	https://youtu.be/UpKuM0YQk
10	2019	Show Ana Haber	URL 10	https://youtu.be/6R8ALzPfsQg
11	2016	HaberTürk	URL 11	https://youtu.be/9UfZPd6dEAU
12	2017	İhlas Haber Ajansı	URL 12	https://youtu.be/41NYyodDY6f
13	2018	İhlas Haber Ajansı	URL 13	https://youtu.be/ty3sOvUurmo
14	2019	BBC News Türkçe	URL 14	https://youtu.be/dm899sa0_Oo
15	2017	Demirören Haber Ajansı	URL 15	https://youtu.be/kmtO1p3mBN0
16	2018	Pir Haber Ajansı	URL 16	https://youtu.be/vomIC3Bwmqg
17	2013	Güncel Haber Merkezi	URL 17	https://youtu.be/Mo-Qx_BQo7g
18	2018	Fox Haber	URL 18	https://youtu.be/O_yq1UkaTMs
19	2018	İhlas Haber Ajansı	URL 19	https://youtu.be/xH13y9IbQE
20	2019	İstanbul Street Tour	URL 20	https://youtu.be/mB1i2H-vxOw
21	2020	Son Dakika Haber	URL 21	https://youtu.be/xyb2oZe7mvw
22	2020	İhlas Haber Ajansı	URL 22	https://youtu.be/NRnPI8RuGk
23	2020	Yerelin Gündemi	URL 23	https://youtu.be/FX1k86KXQGs
24	2020	Haber Dünyası	URL 24	https://youtu.be/qasIDR4_MMU
25	2018	NetGazete	URL 25	https://youtu.be/turCzH_9i3ng
26	2014	İstiklal	URL 26	https://youtu.be/c6Cj66j_LfEs
27	2015	Beyoğlu	URL 27	https://youtu.be/c6Cj66j_LfEs
28	2018	Beyoğlu	URL 28	https://youtu.be/hWnY1ZkH_R0
29	2017	Beyoğlu	URL 29	https://youtu.be/Qv-0W_g8E0Y
30	2019	Viyana Kahvesi	URL 30	https://youtu.be/O257gZ3HDUY
31	2019	Doğan Haber Ajansı	URL 31	https://youtu.be/mB1i2H-vxOw
32	2014	İstiklal Caddesi	URL 32	https://youtu.be/teYWAZ/j1m20
33	2017	Ulusal Kanal	URL 33	https://youtu.be/147d8pmmPdS
34	2015	İstiklal Caddesi	URL 34	https://youtu.be/CcnkBgWAh6o
35	2017	notonlyistanbul.com	URL 35	https://youtu.be/wFvqgUfScY
36	2011	Demirören Haber Ajansı	URL 36	https://youtu.be/x8asX-pTVSM
37	2019	Beyaz Haber	URL 37	https://youtu.be/SvCf7cdK8s
38	2019	Demirören Haber Ajansı	URL 38	https://youtu.be/rMwg2krs3a0
39	2018	İstiklal Gazetesi	URL 39	https://youtu.be/FuF7qnb7MiA
40	2019	Demirören Haber Ajansı	URL 40	https://youtu.be/sqYMSfVmxE

Case	Date	Source	URL No	URL Link
41	2019	İhlas Haber Ajansı	URL 41	https://youtu.be/TT4nabeN4B8
42	2015	İstiklal Gazetesi	URL 42	https://youtu.be/L4sRDhTynRs
43	2018	Can Haber	URL 43	https://youtu.be/dw40DYBdBlk
44	2017	İstiklal Gazetesi	URL 44	https://youtu.be/al_hggA048v8
45	2019	Demirören Haber Ajansı	URL 45	https://youtu.be/bD8eN4Rbgyg
46	2013	Metroşer	URL 46	https://youtu.be/bPR-f64xrKU
47	2017	Demirören Haber Ajansı	URL 47	https://youtu.be/MOOH0UJT7mu8
48	2016	Medyascope	URL 48	https://youtu.be/N3Sbmgco7Y
49	2015	Haber TV	URL 49	https://youtu.be/P-sGid48wvl
50	2016	Beyoğlu Belediyesi	URL 50	https://youtu.be/EcX91JAzeEE
51	2012	Show Haber	URL 51	https://youtu.be/UvIdk9hQwvIk
52	2013	haberstar	URL 52	https://youtu.be/K8_BCHfKmi8
53	2016	Show Haber	URL 53	https://youtu.be/_rOMeNv61eU
54	2017	Amerika'nın Sesi	URL 54	https://youtu.be/FSKv3xIdyvo
55	2006	Ulusal Kanal	URL 55	https://youtu.be/NnmhQ2lT0Vw
56	2013	Ulusal Kanal	URL 56	https://youtu.be/_YOKxxII_rk
57	2011	Ulusal Kanal	URL 57	https://youtu.be/LabKeXhknf_g
58	2018	Gazete Duvar	URL 58	https://youtu.be/6mse4q_nDco
59	2013	İemiz Giysi Kampanyası	URL 59	https://youtu.be/GGm7F-QaC3Y
60	2016	Beyoğlu Kent Savunması	URL 60	https://youtu.be/4VhSL8MSNE
61	2018	Gazete Ne Haber	URL 61	https://youtu.be/KLUEX0R3h3Y
62	2017	İhlas Haber Ajansı	URL 62	https://youtu.be/nb1on0mNHLM
63	2012	İME	URL 63	https://youtu.be/L1-JDAI-YuU
64	2013	İhlas Haber Ajansı	URL 64	https://youtu.be/rMNS_zwl99Y
65	2019	Sokağın Sesi	URL 65	https://youtu.be/YcNknwUENE
66	2019	İME	URL 66	https://youtu.be/wGzIQ8IH_uw
67	2018	İME	URL 67	https://youtu.be/0skx2k7y_hc
68	2011	İstiklal Gazetesi	URL 68	https://youtu.be/2_81hr_TyoM
69	2017	Habertürk TV	URL 69	https://youtu.be/LWKeI6bpI9I
70	2019	İhlas Haber Ajansı	URL 70	https://youtu.be/00s6vKOHKE
71	2016	Beyoğlu Belediyesi	URL 71	https://youtu.be/u5Gf-X_CDgcU
72	2015	İhlas Haber Ajansı	URL 72	https://youtu.be/bDDXp5rLHD4
73	2016	İhlas Haber Ajansı	URL 73	https://youtu.be/cAQhXe50hc
74	2015	Muhteşem Yüzyıl: Kösem	URL 74	https://youtu.be/K35t4CRxege
75	2020	Sokağın Sesi	URL 75	https://youtu.be/1342om30NY
76	2009	Sokağın Sesi	URL 76	https://youtu.be/fFokDexCkFQ
77	2018	Sokağın Sesi	URL 77	https://youtu.be/nKHs52QeYsM
78	2019	Sokağın Sesi	URL 78	https://youtu.be/ADyWnFcxmWw
79	2019	Sokağın Sesi	URL 79	https://youtu.be/m61aUMz5dWw
80	2019	Sokağın Sesi	URL 80	https://youtu.be/RVgKfEgp3k

B. Categorization of Crowd Cases

Case	Context	SOCIAL PARAMETERS				Location	PHYSICAL PARAMETERS			
		Composition	Motivation	Organization	Emotion		Size	Duration	Behavior	Form
1	Chaos	individuals	conflict	police control	unpleasant	Taksim-GS	large scale	short term	standing	area
2	Chaos	male group	conflict	civil society	nervous	Tünel-GS	medium scale	short term	walking	line
3	Chaos	male group	conflict	police control	nervous	Taksim	large scale	short term	standing	area
4	Chaos	young group	conflict	police control	nervous	Taksim-GS	large scale	long term	walking	area
5	Chaos	young group	conflict	civil society	nervous	Taksim-GS	large scale	long term	standing	area
6	Chaos	young group	conflict	civil society	nervous	Tünel-GS	large scale	long term	standing	area
7	Chaos	young group	conflict	police control	nervous	GS Square	large scale	short term	walking	area
8	Chaos	mix group	conflict	police control	nervous	GS Square	large scale	short term	standing	area
9	Chaos	individuals	conflict	police control	unpleasant	Taksim	large scale	short term	standing	area
10	Chaos	individuals	panic	police control	nervous	Taksim-GS	large scale	short term	walking	area
11	Chaos	individuals	panic	police control	nervous	Taksim-GS	large scale	short term	walking	area
12	Chaos	individuals	panic	police control	nervous	Taksim-GS	large scale	short term	standing	point
13	Chaos	individuals	panic	police control	nervous	Taksim-GS	large scale	short term	standing	point
14	Chaos	mix group	conflict	police control	unpleasant	Taksim-GS	large scale	long term	walking	area
15	Chaos	female group	conflict	police control	unpleasant	Taksim	large scale	long term	standing	area
16	Chaos	mix group	conflict	police control	nervous	GS Square	large scale	short term	sitting	point
17	Chaos	individuals	conflict	spontaneously	nervous	Taksim-GS	large scale	short term	standing	point
18	Chaos	young group	conflict	police control	nervous	Taksim	large scale	short term	standing	point
19	Everyday Life	individuals	casual	spontaneously	pleasant	Taksim-GS	large scale	long term	walking	area
20	Everyday Life	individuals	casual	spontaneously	pleasant	Taksim-GS	large scale	long term	walking	area
21	Everyday Life	individuals	casual	authority	depressed	Taksim-GS	medium scale	long term	standing	line
22	Everyday Life	individuals	casual	police control	depressed	Taksim-GS	medium scale	long term	walking	area
23	Everyday Life	individuals	casual	authority	depressed	Taksim	large scale	long term	standing	area
24	Everyday Life	individuals	casual	spontaneously	unpleasant	Taksim-GS	small scale	long term	standing	point
25	Everyday Life	individuals	casual	spontaneously	pleasant	Taksim-GS	large scale	long term	walking	area
26	Everyday Life	individuals	casual	spontaneously	pleasant	Taksim-GS	large scale	long term	walking	area
27	Everyday Life	individuals	casual	spontaneously	pleasant	Taksim-GS	large scale	long term	walking	area
28	Everyday Life	individuals	casual	spontaneously	relaxed	Taksim-GS	small scale	short term	sitting	point
29	Everyday Life	individuals	casual	spontaneously	relaxed	Tünel-GS	medium scale	long term	sitting	point
30	Everyday Life	individuals	casual	spontaneously	excited	Tünel-GS	medium scale	long term	standing	line
31	Everyday Life	individuals	casual	spontaneously	pleasant	Tünel-GS	large scale	long term	walking	area
32	Everyday Life	individuals	casual	spontaneously	excited	Taksim-GS	small scale	short term	standing	area
33	Everyday Life	individuals	casual	spontaneously	pleasant	GS Square	medium scale	long term	standing	point
34	Everyday Life	individuals	casual	spontaneously	excited	Taksim-GS	medium scale	short term	sitting	point
35	Everyday Life	individuals	casual	spontaneously	pleasant	Tünel-GS	medium scale	long term	standing	point
36	Mass Gathering	mix group	casual	authority	excited	Taksim-GS	large scale	short term	standing	point
37	Everyday Life	mix group	demanding	authority	excited	Taksim-GS	large scale	short term	walking	line
38	Everyday Life	mix group	demanding	authority	excited	Taksim-GS	large scale	short term	walking	line
39	Everyday Life	individuals	demanding	police control	excited	Taksim	large scale	short term	standing	point
40	Everyday Life	individuals	demanding	spontaneously	excited	Taksim-GS	medium scale	short term	standing	point

Case	Context	Composition	Motivation	Organization	Emotion	Location	Size	Duration	Behavior	Form
41	Everyday Life	individuals	demanding	spontaneously	depressed	GS Square	medium scale	long term	standing	line
42	Everyday Life	individuals	demanding	spontaneously	unpleasant	Tünel	small scale	short term	standing	line
43	Mass Gathering	mix group	activism	civil society	depressed	GS Square	medium scale	short term	sitting	point
44	Mass Gathering	mix group	activism	authority	depressed	GS Square	large scale	long term	walking	line
45	Mass Gathering	mix group	activism	civil society	relaxed	Tünel	small scale	short term	walking	line
46	Mass Gathering	mix group	activism	civil society	excited	Taksim	large scale	long term	walking	area
47	Mass Gathering	mix group	activism	authority	unpleasant	Taksim	large scale	long term	walking	line
48	Mass Gathering	mix group	activism	civil society	excited	GS Square	large scale	long term	walking	line
49	Mass Gathering	mix group	activism	police control	excited	Tünel-GS	large scale	short term	walking	line
50	Mass Gathering	mix group	activism	authority	depressed	Tünel-GS	medium scale	short term	walking	line
51	Mass Gathering	mix group	activism	civil society	unpleasant	Taksim-GS	large scale	long term	walking	line
52	Mass Gathering	mix group	activism	civil society	depressed	GS Square	medium scale	short term	walking	line
53	Mass Gathering	male group	activism	civil society	excited	Taksim-GS	large scale	long term	walking	line
54	Mass Gathering	female group	activism	civil society	excited	Taksim-GS	large scale	short term	walking	area
55	Mass Gathering	mix group	activism	civil society	unpleasant	Taksim-GS	medium scale	short term	standing	point
56	Mass Gathering	young group	activism	civil society	unpleasant	Taksim	large scale	long term	walking	area
57	Mass Gathering	mix group	activism	civil society	unpleasant	Taksim-GS	medium scale	long term	standing	point
58	Mass Gathering	mix group	activism	police control	unpleasant	Taksim-GS	medium scale	short term	sitting	area
59	Mass Gathering	mix group	activism	civil society	unpleasant	Tünel-GS	small scale	short term	standing	point
60	Mass Gathering	mix group	activism	civil society	unpleasant	Tünel-GS	small scale	short term	standing	point
61	Mass Gathering	mix group	activism	civil society	unpleasant	Taksim-GS	medium scale	short term	standing	area
62	Mass Gathering	mix group	activism	civil society	unpleasant	Tünel	large scale	short term	walking	line
63	Mass Gathering	mix group	activism	civil society	excited	Tünel-GS	large scale	long term	walking	line
64	Mass Gathering	mix group	activism	civil society	excited	Taksim-GS	medium scale	short term	sitting	line
65	Mass Gathering	mix group	celebration	authority	excited	Tünel-GS	medium scale	short term	standing	area
66	Mass Gathering	male group	celebration	civil society	excited	Taksim-GS	large scale	long term	walking	line
67	Mass Gathering	male group	celebration	civil society	excited	Tünel-GS	large scale	long term	walking	line
68	Mass Gathering	individuals	celebration	police control	excited	Taksim-GS	large scale	short term	walking	line
69	Mass Gathering	mix group	celebration	civil society	excited	Taksim-GS	large scale	short term	walking	area
70	Mass Gathering	mix group	celebration	authority	pleasant	Taksim	medium scale	short term	standing	area
71	Mass Gathering	young group	celebration	authority	pleasant	Tünel-GS	large scale	long term	walking	line
72	Mass Gathering	young group	celebration	authority	excited	Tünel-GS	large scale	long term	walking	line
73	Mass Gathering	young group	celebration	authority	pleasant	Taksim	large scale	long term	walking	line
74	Everyday Life	individuals	casual	spontaneously	pleasant	GS Square	medium scale	short term	standing	area
75	Everyday Life	individuals	casual	spontaneously	pleasant	Tünel	medium scale	short term	standing	area
76	Everyday Life	young group	casual	civil society	excited	GS Square	large scale	short term	standing	point
77	Everyday Life	individuals	casual	spontaneously	pleasant	Tünel-GS	medium scale	short term	standing	area
78	Everyday Life	individuals	casual	spontaneously	pleasant	Tünel-GS	small scale	short term	standing	area
79	Everyday Life	individuals	casual	spontaneously	excited	Tünel-GS	medium scale	short term	standing	area
80	Everyday Life	individuals	casual	spontaneously	depressed	Taksim-GS	small scale	short term	standing	area