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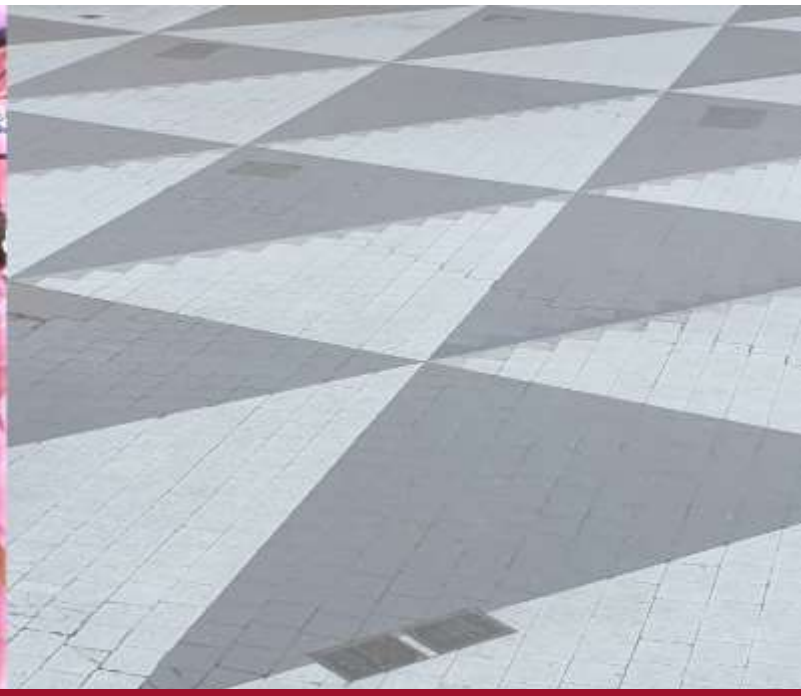
Human Behaviour & Urban Squares

A Public Life Study of Kungsträdgården and Sergels Torg

JOHAN MATTSSON



KTH

SKOLAN FÖR ARKITEKTUR OCH SAMHÄLLSBYGGNAD

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Abstract

Some public squares experience large amounts of human activity and some experience very little, even though external conditions between them create comparable opportunities for public life. The field of public life studies observes the human activity of public spaces and presents principles that predicts human public behaviour to gain a better understanding for what elements of space people are attracted to. The human staying activity at two central public square in Stockholm – Kungsträdgården and Sergels Torg – was studied with the methodology of public life studies as outlined in Gehl & Svarre (2013) *How to Study Public Life*. A stationary activity mapping was performed for the two squares where female, male, sitting and standing activity was registered. The result show that Kungsträdgården attracts more than twice the staying activity as Sergels Torg, and that the two squares are mirror images of each other in terms of gender and activity proportions, with Kungsträdgården being predominately female and sitting and Sergels Torg male and standing. The principles, theories, previous observations and hypotheses from a selection of the most seminal works within the public life studies field frame the seven themes used to analyse the human stationary activity at the two squares; Sitting, Standing, Thermal Comfort, Psychological Comfort, Sensory Comfort, Aesthetics and Human Interaction.

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Introduction

Imagine a finite quantity of space. Imagine an infinite number of possible compositions of this finite quantity of space. Imagine having the responsibility to prioritise between this infinite number of possible compositions of this finite quantity of space and choose the design that will become reality. What domain is confined by this responsibility? What principles dictate a responsible decision? What guides these principles?

Finitude is the plight of reality. Every tree will fall, everyone alive will die and the third planet from the sun consist of a finite quantity of space. What is to be done with space is hence a question worth asking. A finite supply can't satisfy an infinite demand. Prioritisation between alternatives is better described as a necessity than the product of a hierarchy of interests or needs, even though it is a product of such hierarchies. That meaningful needs reign supreme in these hierarchies is the burden of humanity. The responsibility to choose is the responsibility to make a meaningful choice.

The single constant throughout million years of human history – and consequently future – is humans. Humans will remain as long as human development persist. Technology will change, philosophy will change, politics will change, the climate will change, humans won't. True social sustainability can only be found in a greater understanding of how humans operate and how to best accommodate space to the requirements necessitated by the limitations of the human apparatus to in turn ensure a genuine well-being of humans. The greater focus area of the study would roughly approximate to that of the eleventh United Nations Sustainable Development Goal that is concerned with making cities inclusive, safe, resilient and sustainable and specifically the target to provide universal access to safe, inclusive and accessible, public spaces (UN, 2015).

Social sustainability is achieved when an extended set of human needs are satisfied. These needs include basic needs of food and health but also needs that allow for self-determination such as leisure and social relationships (Littig & Grießler, 2005). The classic Brundtland report (WCED, 1987) definition of sustainability additionally require development to satisfy the current needs whilst not compromising the capacity for future generations to satisfy theirs. The result is a development that satisfies the needs of humans presently and in the future, the needs that won't change, the intrinsic needs, the inescapable human needs, the fundamental limitations of human beings. What are the needs that are needs today but will also be needs of future generations? The question then worth investigating is: How to identify invariant human needs?

The central issue can be conceptualised accordingly: Are spaces designed for humans to be in them, are they designed according to human needs? If not, what does that mean? If there are no places to be, is being possible? If there is nowhere to go, where does one go? In crass terms; Why live if forced to live in an unsatisfying space? Okay, that's seems like it would be an issue worth solving. The next questions to answer would then be: How to evaluate if a design contains qualities that would support human needs?

Focus of this work has been on the extended needs of people to become autonomous self-determining beings rather than the basic needs. The reasoning for this can be found in the growing global middle-class and dramatic decrease in global poverty that can be observed in the first decade of the 21st century (Kochhar, 2015), and the enormous decrease in extreme global poverty the last 50 years (Roser & Ortiz-Ospina, 2019). The basic needs of humans are provided for in correlation with combatting poverty. This can be observed in the connection between poverty and infant mortality rates (Gortmaker, 1979), maternal mortality rates, sub-

par access to social protection, sub-par access to health care, higher levels of decease, sub-par access to education, higher insecurity and overall higher risks (OECD, 2003).

Many human needs have been increasingly satisfied on the global scale over the last two centuries, especially in basic education, literacy, democracy, vaccination and health (Roser, 2019). The fact of the matter is that human progress is a sufficient vessel for satisfying basic human needs. But these changes at the global scale can only offer so much in terms of supporting people to become autonomous beings that have the responsibility to shape their lives into decent existences. A democratic regime change is necessary to enable freedom of speech but if there are no forums to express this speech, free speech won't occur.

The connection between human needs for autonomy and what Jan Gehl (2010) calls *optional activities* is evident. *Optional activities* are those activities people perform when faced with a free choice to do anything. To clarify: What would *a human* do if provided with time and alternatives to do anything? These activities may be seen as too free to abide by any intrinsic human need, but close inspection of public behaviour reveals that the acts people choose to do freely follow patterns that are observable across time and regions (Whyte, 1980; Cooper Marcus & Francis, 1990; Gehl, 2010; Gehl & Svarre, 2013). Cross-cultural, time-invariant, subconscious behavioural patterns of optional activities would indicate the existence of human needs that, unlike basic needs, are satisfied through autonomous processes. This autonomy should also be considered a human need in itself as autonomous, self-regulated and volitional behaviour is associated with well-being, lower stress levels and more rewarding relationships and socialisation (Weinstein et al, 2012).

In order to achieve autonomy, people must experience their behaviour to be self-endorsed and in harmony with their interests and values (Weinstein et al, 2012). But what if there are no opportunities to make decisions that are congruent with one's interests and values? What if autonomous behaviour is precluded by the absence of options that could instil a feeling of autonomy? In order for people to become autonomous, self-determined beings, there needs to exist an alternative worth choosing. The lesser of two evils isn't an autonomous decision. The enforcement of a decision does not automatically produce autonomy, it might combat it. This issue is especially applicable to the area of urban design as every decision made by plaza-users depends on the provisioning of an element that allow for a certain decision to be made. If someone wants to rest their legs by sitting down, there needs to be seating provided. If someone is only provided the option to stand, they might as well not, and instead walk away.

The greatest argument for spaces to be created successfully, that they justify autonomous decisions and people will choose to spend time in them, is in their success. The most obvious examples can be found in the old medieval and renaissance Italian cities that experience excessive tourist activity from all corners of the earth (Sitte, 1889). These are places worth spending the spare income accumulated over a year on because they speak to people on a deeper level, they satisfy Human needs.

There needs to be options that humans would choose, both because it satisfies the need for autonomy but also because these choices are derived from intrinsic human needs. The question worth investigating is thus: What are the options in public space humans voluntarily choose as a product of unconscious needs or desideratum? It is the purpose of this study to investigate this.

Ontological foundation

The methodological, epistemological and ontological basis of this study can be found in the philosophical study of existentialism. This won't suffice as an explanation. The fundamental truism of existentialism is that existence precedes essence. This will definitely not suffice.

Essence is a descriptive concept that inspire the creation of something. Let's take a pen for example. A pen is derived from both a concept of what a pen should do, write, and from a concept of a technique of how to produce a pen. The pen is produced in a certain way that makes it a pen and has itself a definite purpose. A pen couldn't be produced before the concept of a pen exists. The essence of a pen, the formula and properties that enables its definition and production, precedes its existence (Sartre, 1947).

The existentialist claim is that there is at least one being which existence comes before the essence of it, humans. There is no concept that can define human beings. The human reality is defined by the materialisation of its existence. People start off as nothing, goes on to do something, and will be defined by what they did. Humans are nothing but what they make of themselves. The essence of a human can only be defined after she is thrown into existence and wills herself into being (ibid.).

An example of how existentialism is applied to a situation is the story of a young man that is faced with the conundrum of having to choose between either going to war, fighting for his country, or staying with his mother, that were lonely and found only comfort in her son. There is a conflict between two moralities that both depend on the strength of the feeling towards the different moralities, between his love for his mother and desire for action, adventure and vengeance. The young man was conflicted. How to measure the magnitude of feelings? How will he know that his love for his mother is stronger than his desire for war? Simply in the fact that he chooses to stay with her, existentialism argues. The strength of affection is defined by performing the action that confirms it. Now, the young man may have been playacting, choosing to stay with his mother as a charade, distinction between the two is virtually impossible (ibid.).

The only distinction can be found in the autonomy or authenticity of the decision. Because the young man would himself know the act was a charade, an act of pretending, it becomes unauthentic, the act isn't a real representation of the young man. It needs to be explained that autonomy and authenticity is not the same as independence, external pressure may exist, in fact they almost always do, autonomy is found in the consent to these influences. Autonomy is defined by how self-endorsed a decision is (Ryan & Deci, 2004). In conclusion, in existential theory, humans are what they do and an authentic and autonomous being is one that actions are self-endorsed and real (not pretend).

Another way to explain it: An authentic, autonomous person is a person whose desires and beliefs are in congruence with her actions. A unity underlying a person's actions must exist in order for autonomy to be realised. But as existentialism central theme claims; *existence precedes essence*. The actions of a person precede the concept inspiring them. Hence, must desires and beliefs (essence/concept) be in congruence with actions (existence) for a person to be an authentic, autonomous being, not the other way around. The autonomy of a person can only be internally determined after she acts.

This connection between autonomy and existentialism influences all aspects of the study. The main inquiry questions what design qualities in public space are autonomously chosen over other? A possible method for answering this would be to perform a questionnaire with questions about what qualities are appreciated over other? This method is not compatible with existentialism as it would utilise the conceptions people have about themselves – "what are the qualities a person like me would prefer?" or "what are qualities I am expected to prefer?"

– as an indicator for what people would have chosen if faced with the alternatives presented. Using direct observation and behavioural mapping that monitor actions and behaviours in public space offer a more accurate representation of what people would autonomously choose, as it, unlike a questionnaire, actually observes actions rather than conceptions and perceptions. The consent to influences and conditions that characterises autonomous decision-making (Ryan & Deci, 2004) is exemplified in the proclivity towards certain qualities as determined by a systemisation of behaviours in public space. A representation, nonetheless, there is no way of knowing exactly what actions are autonomous and what are not. This is where overall popularity across spaces or sub-spaces can come in handy as widening the horizon of the study will put the activity at one site into context and the probability that qualities that justifies autonomous are present. This ought to also be put into context with previous studies using similar methods.

The epistemology of the study is directly derived from the preference for existence rather than essence. How to know what qualities people autonomously choose? Look not at what people say they like, look to what they do, and their proclivity will reveal itself. The human reality is the determinant for future human behaviour. The connection to this theoretical framework and consequent epistemology can be found in Jan Gehl's & Birgitte Svarre's (2013) recommendation to perform public life studies without questioning the observed participants and William H. Whyte's (1980) observation that what people describe about their preferences and what they actually do is very different.

Other associations to existentialism can be found in Gehl's (2010) and Camillo Sitte's (1889) devotions to tradition, that a history of human experiences is more insightful for creating spaces for people than modernist theories of cities as collections of individual buildings and traffic areas in the case of Gehl, or perfect mathematical and geometrical designs of space for Sitte. Jane Jacobs (1961) and Sitte (1889) both assert that people endowed with the responsibility to form city space should be heavily invested in gathering information about what cities are instead of being concerned with what it ought to be.

In summary, the underlying theory influencing all aspects of the study could be approximated to a sort of applied existentialism. Ontologically, human reality is defined as what humans do, how they act, public life is determined by public behaviour. Epistemology is closely connected to the ontological claim; knowledge of public life is gathered from observing the actions of people in public. Traces of this ontology and epistemology is found in the methodology used to perform the study and the literature studied to retain information regarding previous work in the field.

Background

Cities were once made with the human experience as the fundamental guideline. Medieval cities were mainly focused on fulfilling human needs (Gehl & Svarre, 2013). This could to some degree be contributed to the fact that humans were the only inhabitants of cities. Whilst contending against the statement that humans are the only dwellers of cities may seem moronic, it would be in line with many urban planning ideas of how cities ought to be formed. Cities became places for automobiles and projections of ideologies. The prevailing perspective that influenced planner was found from the seat in an airplane or automobile rather than the sidewalk, as evidenced in Brasilia's pilot plan (Holston, 1989).

Before the 1960's, planning was closer tied to the tradition of city development as a process of people-oriented space creation because the quality of outdoor spaces in cities directly affected the life of cities which in turn was an essential factor for the wealth of cities. It was in the interest of those who built cities that cities were made to accommodate the natural behaviours

and needs of the people walking and staying in them. They built traditions, formulas for how to accommodate the human experience. 1960 and onwards was instead characterised by a development of modernistic ideologies and conceptions of the city as, fundamentally, a machine with separate functions and parts. The emphasis on the connection between human and civic form was replaced with concerns of bigger systems such as traffic. The understanding of the interplay between human activity and public space was forgotten (Gehl, 2010).

In 1961 Jane Jacobs published her seminal work *The Death and Life of Great American Cities*, where she attacks the dominant planning regime of the time, that of project planning and decentralism. This changed everything, it is possible that more than just Jacobs shared her thought, in fact there is no doubt that many agreed with her whole-heartily, but no-one expressed this disagreement as effectively or as profoundly. Jacobs critiques the people in charge of building cities for being too obsessed with ideas foreign to cities instead of observing what cities actually are. The emphasis on wishes, oversimplifications and superstitions have blinded urban planning and design and the adventure of probing the real world hasn't begun (Jacobs, 1961).

One of Jacobs many admirers were William H. Whyte, he accepted the challenge of trying to understand cities. Whyte (1980) probes 1970's New York in the hopes of finding out how people interacted with spaces in the city and to produce recommendations for how this information ought to influence city building through design policies. The result is one of, if not the, most influential work in the field that Whyte popularised, public life studies. Whyte found the factors that correlated with popularity of spaces, identified how people interacted with elements based on the design of these elements, how people interacted in relation to other people and the physical environment, qualities that attracted activity, conditions that suffices staying behaviours and which activities attracts other activity (Whyte, 1980).

The field of public life studies, which origin can be attributed to Jane Jacobs and her book in 1961, gained traction in city councils in the late 1980's as cities were competing against other cities as a product of rapid globalisation. Goals of health, sustainability and social responsibility was on the agenda and public life studies offered suitable tools for documentation of developments that was then also used in economic purposes to attract tourist, investors and taxpayers in a growing competitive market of cities (Gehl & Svarre, 2013).

In 1990, Clare Cooper Marcus and Carolyn Francis publish *People Places – Design Guidelines for Urban Open Space*. This book utilises many of the findings Whyte (1980) found in New York and fortifies or contrast these findings with studies from, amongst other, Vancouver and San Francisco. The added data is used to challenge some of the findings as previous observed interactions are scrutinised. For example, is the theory that females as exceptionally picky challenged and ideas of creating spaces that are specially design for certain groups of people is presented (Cooper Marcus & Francis, 1990).

Politicians and planners became increasingly critical of the pressures from functionalist planning and cars in the 1990's, as a result, public life studies became more common place. Governments worked with academic institutions to produce these studies until the turn of the century when the private sector started to consult the cities (Gehl & Svarre, 2013).

The most influential 21st century public life advocate and author is Danish architect Jan Gehl who utilises many different sources to present findings regarding the interaction between public life and space. Gehl have performed public life studies for over 60 years and is a big fan of Whyte's, Jacobs' and Cooper Marcus' work. Gehl have coined the phrases for many of the ideas that can be dated back to Whyte's original inquiry, such as the 'edge effect' and the 'piano effect'. A fundamental insight that Gehl offers is that many spaces and the life within them are

similar to other life in spaces. There is an underlying reason for why humans and space interact in the way it does. It is not by chance. Gehl provides connections back to the evolutionary human sensory apparatus and cave men behaviour as reasons for why some places work and others don't (Gehl, 2010; Gehl & Svarre, 2013).

The common thread for all these authors is this: Cities might be losing the connection to the human experience. Jacobs (1961) blame ideological ideas of utopias and wish-fulfilment. Whyte (1980) sees the rise of megastructures that create different versions of the same city, visitor city and citizen city, indoor and outdoor. Cooper Marcus & Francis (1990) attribute the loss to the loss of necessary reasons to be in public but contends that the loss of reason to be in public magnifies the need for public spaces rather than diminishing it. Gehl (2010) identifies traffic concerns as the culprit.

Nowadays, public life studies are used by governments from all corners of the world to identify the status of the life in their cities. Purposes for using these tools range from identifying which areas require special interventions, measuring the impact of those interventions or qualifying the interaction between public behaviour and public space. Comparable methods applied to different cities at different times are used to produce data that in turn is used to draw conclusions about the interaction between public life and space. Comparison is enabled by the similarities of tools and methods used and generalisations regarding the prioritisation of public spaces and human behaviour, as well as an understanding of societal developments, can be presented (Gehl & Svarre, 2013).

Cities have gone from containing spaces built for people to containing spaces that are built for different functions devoid of human-scales. If not fostered, the human experience might be lost in the process of making cities. This is in part because there is no longer an obvious necessary reason for making cities for humans. It is however obvious that some spaces are more appreciated than other, this must mean that there are better and worse ways of making a space. How to define a good space then? Don't rely on any metaphysical or conceptual idealisation of reality, observe how a good space is defined by the people using it.

Definition of a square

The definition of a public square or plaza used in this work follows a descriptive interpretation of what defines the public space as such. There are ideas about what public squares ought to be, and in a sense is this study concerned with that same inquiry as well. Gehl (2010) would distinguish squares as spaces for staying in, as a destination, rather than passing spaces which usually defines streets. Cooper Marcus & Francis (1990), J.B. Jackson (1985), Kevin Lynch (1981) and Jacobs (1961) agrees with this normative definition and it is a useful distinction between street and square, but it ought not to be forgotten that it is a normative assertion rather than a descriptive one. The more descriptive indicators of a square provided by Cooper Marcus & Francis (1990) are here used as determinates for public squares. Specifically, that squares are predominately paved with hard surfaces (50% or more), located outdoors, being publicly available and a space where cars are excluded.

Aim

To investigate the interaction of public human life and urban squares in order to identify descriptive relationships between design and behaviour based on the outcomes of the current research in public life studies.

Research questions

The focus area for the study is human-centred urban design. Human-centred means a development that prioritises human needs and interests over other interests that might exist and promotes inclusive, sociable and liveable urban environments (Jacobs, 1961; Whyte, 1980; Cooper Marcus & Francis, 1990; Gehl, 2010; Mehta, 2013; Yang, 2016). The questions this research aims to answer are the following:

1. What are the design qualities of outdoor public urban squares that promote a human-centred experience of outdoor public urban squares, according to the selected academic literature of public life studies?
2. Which of these hypotheses can be observed in the two Stockholm outdoor public urban squares studied?
3. What relationship between stationary human activity and design is observable in the two outdoor public urban squares investigated in this study?

The research question, and the study in general, regard two squares in Stockholm city centre. Hence are relations, correlation, insight and findings only directly relevant to the interaction between behaviour and form in these squares. Greater generalisations of the of the identified interactions are only possible with background to the universality of them in other studies. The exact same considerations need to be made to contextual conditions such as season of the year. This study was performed in the start of the summer in April – if the study was performed in the middle of winter, or at the end of the summer, the interaction between space and activity would most likely produce a somewhat different relationship. A common change in activity between seasons is the attraction to sun-kissed spaces (Whyte, 1980), that sunlight matters a lot in the beginning of the summer but fades of and shaded spaces become more important at the end of the summer.

Objectives

In order to answer the research question was six actionable objectives executed. These constitute the chronological sequence of tasks performed. They describe how the aim is accomplished. In the methodology chapter following is it described what methods was used to complete these objectives:

1. Examine the main literary works in the public life studies field as they relate to public squares
2. Summarise, from the literature, the principles regarding the interaction between human behaviour and public squares
3. Observe and note the stationary human activity at Sergels Torg and Körsbärsdammen at Kungsträdgården
4. Convert the observations into
    a. ArcMap
    b. Microsoft Excel
5. Portray the stationary human activity through
    a. maps
    b. tables
    c. charts

6. Analyse and compare, with background to the principles, the stationary human activity through
    a. maps
    b. tables
    c. charts

Methodology

The methods used in the study can be divided into two categories, descriptive and analytical. First will literary works be summarised, and relevant information related to the aim, research questions and objectives of the study will be extracted. This along with the stationary activity mapping of the two Stockholm squares denote the descriptive methods as they are used to decipher what the literature says on the subject and what the public life of the two squares demonstrates. The analytical method is the comparison between the two sources of information, theoretical hypotheses from the literature and the statistical data from the field study.

Literature study

In order to accomplish objectives 1 & 2, the appropriate literature was identified. Delimitation of literature was performed on the basis of relevance to the specific area of urban squares and not public space in general, scale of focus to single public squares and not neighbourhoods or cities and congruence to the existentialist focus on actions rather than abstractions or conceptualisations. The literature was also selected to represent a chronological evolution within the field, not a perfect interval between the literature but a general representation of the main insights throughout history. How seminal the works are was another factor, greater originality and influence necessitates greater inspection.

Sitte's (1889) *The Art of Building Cities* was published long before the public life studies field was created but direct reference to the book can be found in many of the influential works within the field (Jacobs, 1961; Cooper Marcus & Francis, 1990; Gehl, 2010; Gehl & Svarre, 2013). Sitte's book bridges the gap between art and civic design, he sees public squares as the greatest source of transcendental beauty for regular people.

Jacobs' (1961) *The Death and Life of Great American Cities* signifies the birth of the public life studies field and is frequently referenced to in articles and books written on any aspect of urban planning and design (Whyte, 1980; Cooper Marcus & Francis, 1990; Gehl, 2010; Hirt & Zahm, 2012; Gehl & Svarre, 2013). The book is an attack on what Jacobs say as a fundamentally backwards urban development field that ignores the human experience and ignores what cities are really about, people.

Whyte's (1980) *The Social Life of Small Urban Spaces* is referred to by many authors in the field as an influential contributor and researcher (Jacobs, 1961; Cooper Marcus & Francis, 1990; Gehl, 2010; Gehl & Svarre, 2013) The book, which is a report from a public life study on several public space in New York, explores how humans interacts with the urban environment.

Cooper Marcus' & Francis' (1990) *People Places* is especially influential in terms of insights regarding the necessity of consideration for different needs between groups of people (Gehl, 2010). Cooper Marcus & Francis provide a thorough overview of the existing findings in the field of public life studies.

Gehl's (2010) *Cities for People* along with the rest of his work is highly influential on the development of cities and the field of public life studies (Matan & Newman, 2016). *Cities for People* combines Gehl's original work with other historical findings within the field to present

interaction between public life and form. These five books were studied to frame the theoretical background of the study.

The theoretical framework includes a number of previously observed interactions between behaviour and public design. These will be referred to as hypotheses. Hypotheses was extracted from the theoretical literature and categorised into themes.

An additional literary work was studied to guide the methodological aspect of the work, Gehl's & Svarre's (2013) *How to Study Public Life*. This book contains the greatest collection of up-to-date methods for performing public life studies and relevant information on previous works.

Public life study methods

The methods used in this study to accomplish objective 3 closely follows the recommendations for public life studies as outlined in *How to Study Public Life* (Gehl & Svarre, 2013). A detailed overview of the book can be found in the literary study section of this work. This study answered four fundamental question regarding the observed activity at the study sites: how many, who, what and where. Specifically; *How many:* were staying in this space? *Who:* were the people, female or male? *What:* were they doing, sitting or standing? *Where:* did the activity occur?

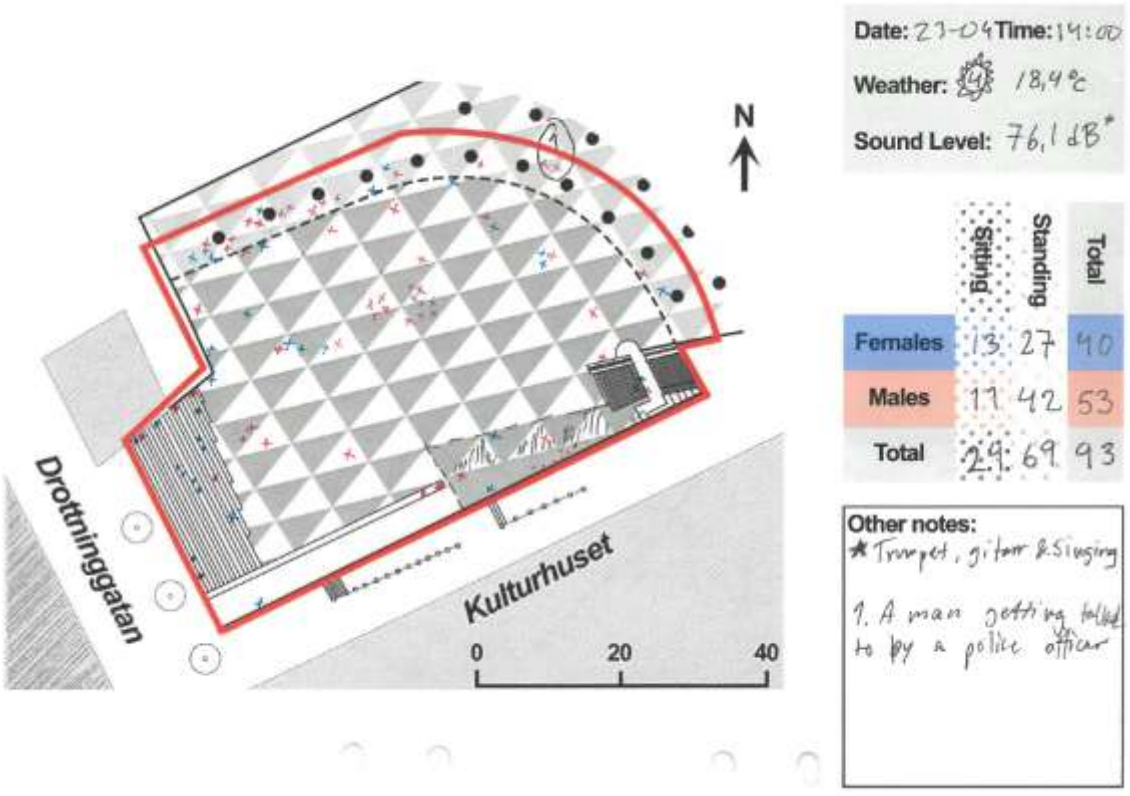


Figure 1 - Marking sheet for Sergels Torg

The tools used to obtain the data that was required in order to answer these questions were counting, mapping, photographing and keeping a diary. Mapping, or behavioural mapping, was performed by marking the location of a stationary activity at a site on a printed plan of the site (see Figure 1 & 2). Stationary activity was defined as people staying in one place (Gehl & Svarre, 2013). Stationary Activity Mapping was performed every hour for ten minutes for all hours between 08:00 and 17:00.

Three mapping days were executed for each square, three weekdays were chosen to investigate how the spaces are used the majority of the time, as weekdays and weekends have different activity patterns (Gehl & Svarre, 2013), investigating weekdays and weekends in the same study would produce two different activity patterns and the clarity of the interaction between public space and stationary activity may be deteriorated by an internally diverging result. Exactly how weekdays and weekends differ at these squares will be left unknown, such an inquiry would've provided interesting data into the interaction between public life and public space, but this delimitation is necessary in order to present a coherent result. Two different resulting interactions would always be present. Additionally, is the study performed with limited resources, meaning that further study days weren't an option. The result would be two categories of data (weekdays and weekends) that would've been sparser and hence less valid.

April 17th, 18th and 19th for Kungsträdgården and April 15th, 23rd and 25th for Sergels Torg were the selected study days. Counting was inadvertently enabled through mapping, by simply counting the amount of markings. Because mapping is performed manually, the registrar was able to make qualitative distinction between the type of users and the type of activity at the sites. Distinction between the genders of users and between sitting or standing activity was performed through different colours and signs in the markings. Blue markings indicated female users; red indicated males. A dot indicated sitting activity and a cross indicated standing activity. A blue cross, for example, indicated the occurrence of a standing female.

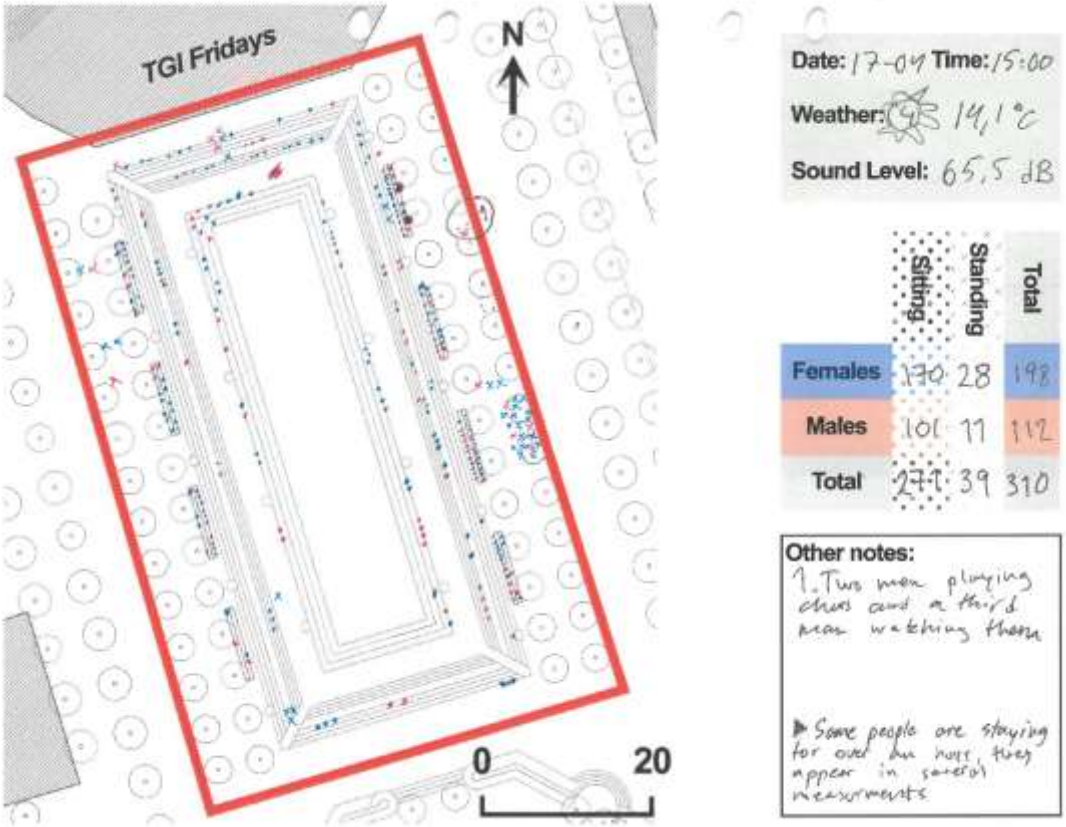


Figure 2 - Marking sheet for Kungsträdgården

The marking sheet where the site plan of the study area, and consequently where markings for activity is noted, had a table for counting the amount of activity, who the users were and how many of these users were sitting or standing (see Figure 1 & 2). The sheet also included designated space for registering the date, time, weather (temperature and sky conditions) and decibel levels. Temperature was measured with a thermometer, sky conditions was classified into four categories (clear (4), partly cloudy (3), overcast (2) and rain (1)) and decibel levels measured with an Android application developed by the Swedish Work Environment Authority called "Buller" (AV, 2018).

Answering of all four questions were thus enable by the two tools counting and mapping. Photographing and keeping a diary was utilised to provide a greater understanding of the qualitative aspect (why activity is occurring at this part of the site, why are females attracted to this place, why are people sitting in this space) underlying the four questions. These tools acted as supplement to the main quantitative information gathered through behavioural mapping. An additional question that was answered was *when*, as in when does activity occurs, when does the most activity occurs, when does the least, and so on.

Photographing enabled the possibility to analyse a situation after it occurred, documentation of an observed behaviour and descriptive demonstration of an identified phenomenon. Keeping a diary was used to produce details that can't be observed through any other tools. Notes from the diary acted as qualitative explanatory data, complimentary to the quantitative data.

Virtually any occurrence in public life can be registered (Gehl & Svarre, 2013), how many are sitting, how many are standing, how many are talking, how many are walking, what gender are the users, how old are they, did people come in a group, how many are looking at their phones and so on. The selection of gender (female or male), posture (sitting or standing) and the location of these interconnected categories is determined partly by the limitations of the execution of the method, but also by the focus area of the research. Only the relevant information necessary to answer the research questions will be gathered. There would be no reason to gather information on how many people are wearing sunglasses if such information wouldn't further the completion towards the aim of the study or answering of the research questions.

The limitations of the execution of the method is foremost found in the ability of the registrar to gather a certain type of data. To register the gender and posture of public space users require resources – specifically time – to also note the age or grouping of the users would further require additional time. With public life being notedly ephemeral (Gehl, 2010), the registrar needs to be able to note occurrences in a timely manner, which puts a restraint on what is realistically possible to register. An alternative study, with the same supply of registrars and resources, could possibly study age and grouping. To focus on gender, posture, age and grouping in the same case study would however be unlikely to execute successfully with these limited resources.

The decision to study stationary activity instead of moving activity or both forms of activity is rooted in the accessibility of stationary activity. The classification of a stationary activity is clearer than that of a moving activity. Stationary activity has a singular location whilst moving, by definition, have a path of locations. To register a moving activity through, for example, tracing, requires the registrar to follow one pedestrian and mark the movement path of this one user. This would answer *where* activity occurs, to answer *how many* would require a head count at a certain through-point. Combining these two questions would be increasingly difficult as it wouldn't be possible to follow every person that walks past the registrar. It would either require an insurmountable number of registrars or a technology such as camera surveillance (Karndacharuk et al, 2013) or GPS trackers (Gehl & Svarre, 2013). Hence, stationary activity is a desirably accessible option.

More importantly however, is the fact that stationary activity plays a more vital part in making cities lively. The measurement of stationary activity is a greater indicator for city quality than moving activity, as heavy pedestrian flows could indicate the absence of sufficient transit alternatives or poorly distributed functions in the city. Stationary activity almost always requires an inviting element, an element of sufficient city quality is necessary to produce staying activity. The absolute majority of staying activity is optional activity. A space must be

perceived as beautiful, pleasant, meaningful and enjoyable for people to voluntarily choose to spend time in it. Similar reasoning follows the selection of squares as a focus area, squares signal staying activity whilst streets signal moving activity (Gehl, 2010).

The stationary activity at two Stockholm squares was studied. With two study sites it was possible to compare data, determine which square experienced most activity, at what time, where and by which group of users. It was also possible to compare differences in micro-climate between the two squares. The popularity of a certain sub-space within a square is put into context with other spaces in the other square. By including two squares, comparison in terms of observable interactions between form and activity was enabled. Were hypotheses present in both squares? Are there space specific phenomena?

The two squares studied in this work was Sergels Torg and Körsbärsdammen (the cherry pond) at the north end of Kungsträdgården. The two squares have very similar surrounding activities, with similar density and land-uses of surrounding buildings. This proximity creates a similarity of potential clientele, both in magnitude and demography. The two locations are also in the absolute centre of the city with T-Centralen, the cities most used transit hub by far, directly connected to Sergels Torg. This centrality provides the greatest natural passing activity, hence the greatest number of people that either choose to pass through or stay. Sergels Torg is more central than Kungsträdgården, experiencing greater natural passing activity. If the two squares were designed exactly the same, Sergels Torg would logically experience greater staying activity. The two squares differ in their perception, Kungsträdgården have long been a favourable public space for Stockholmers (Askergren, 1994; Nolin, 2019) whilst Sergels Torg have a reputation as a space for illegal drug related activity (Franzén, 2002). The stationary activities in these squares are reportedly different, with Kungsträdgården constituting the greatest usage of all urban spaces in the city core and Sergels Torg being one of the least used (Gehl, 1991).

The similarities in terms of location and surrounding functions along with the discrepancy in reputation and usage indicates that there is a fundamental difference between the two spaces. If most other factors are neutralised, the differences derived from the designs of the squares are accentuated. Explanations for activity, that aren't directly induced by the existing physical elements at the site, become insignificant if the two study sites have similar surroundings. By neutralising the external variables, factors regarding the physical design of the squares gain further importance.

Visualisation of data

The observations were converted into data in ArcMap and Microsoft Excel, to accomplish objective 4a and 4b. In ArcMap, the stationary activity noted in the behavioural mapping of the sites were transformed points on a plan of the sited. The points were then used to create a density map through the Spatial Analysis tool Point Density. One density map exists for every occasion that stationary activity was mapped, ten maps for each study day. The maps were then able to be combined do demonstrate the overall activity density for a whole day and for all days together. This was the method for achieving objective 5a.

Point Density tool was a preferable tool over the distance tool. Distance demonstrate the gradual decrease or increase of value as extruding out from each point. This would not have been informative. The important information is the location of stationary activity, not the proximity to activity. In other studies, on the effect of green areas or amenities (Karlsson et al, 2016), distance to these elements are pivotal. In this study however, the direct interaction between an element and human behaviour was the relevant data. The resulting product was an aggregate for the temporal systemic spatial behavioural patterns of people.

The steps to create the density maps:

Notes from behavioural mapping → Shapefile points in ArcMap → Data Management Tool: Merge → Spatial Analyst Tool: Point Density.

Behavioural mapping produces markings on site plans over the squares (objective 3). The markings were converted manually into points on a shapefile in ArcMap (objective 4a) for every mapping occasion (one time each hour between 8:00 and 17:00, for three days). Because type of stationary activity and type of user was recorded, four shapefiles for each occasion was created (for sitting females, standing females, sitting males and standing males). The first step in ArcMap was to go into Environments, Processing extent, Raster analysis - Cell size and Mask and set them all to the study area, this is necessary in order to perform the analysis within the study area.

These shapefiles were used to create density maps through the tool Point Density. Shapefiles were merged to combine the information from multiple shapefiles, such as the sitting activity of both gender over a whole day (sitting females for every hour + sitting males for every hour = sitting activity for the whole day). These merged shapefiles were then used to create density maps for either a certain time of day or for a certain use (sitting or standing) or user (female or male).

The data produced from the behavioural mapping were also converted into spreadsheets in Microsoft Excel (in congruence with objective 4b), where categorisations was made by gender (male and female) and type of activity (sitting and standing), as well as the interconnected categories of sitting females, sitting males, standing females and standing males. These categories of data were then used to visualise the information through tables and charts to accomplish objectives 5b and 5c respectively.

Analysis of stationary activity mapping

The themes and hypotheses extracted from the literature study provided the framework through which analysis of the produced data was executed. The result from the comparative behavioural mapping of Sergels Torg and Körsbärsdammen at Kungsträdgården, as visualised through maps, tables and charts, were put in relation to the different hypotheses about public life—space interaction from the academic literature as well as to desk-gathered information about the history and design of the two squares. This accomplished objectives 6a, b and c.

The representation of the behavioural mapping, as portrayed through the process outlined in the section on visualisation of data, was analysed through manual visual analysis. Meaning that the researcher investigated the density maps with ‘the naked eye’ to determine if a hypothesis from the literature study was observable. The conditions that constitute evidence for the existence of any phenomenon – as predicted by the hypotheses – is clarified at the end of the literature study. This definition of what would constitute an observable life—space interaction is compared to the visual presentation of the data, manually, as in, for example; “a congregation of standing activity along the edges of the square is observable in the aggregated map, which is indicative of the existence of an ‘edge effect’ for standing activity”.

This method was selected to invite greater discussion and interaction regarding the results of the study. The analysis is thus also in accordance with the recommendations of Gehl & Svarre (2013) by including the human factor into the analytical aspect of the work. The qualitative aspect of the study is found in the answering of the question *why* the outcomes of the four questions – *how many* were staying in this space, *who* were the people, female or male, *what* were they doing, sitting or standing and *where* did the activity occur – were as they were.

To understand the implications of the study, what the results means, the data needs to be explained, interpreted and rendered through the theoretical framework of the analyst. The data provides the basis for analysis, but the analysis is dictated by the analyst (May, 2005). The analysis is thus the culmination of gathered data and the analyst interpretation of said data. Alternative analysis from an analyst with an alternative theoretical framework could potentially entail equal legitimacy. The quantitative data could therefore be interpreted by other researchers, providing opportunities for discussion.

An alternative method could've been to create different zones within the study sites and empirically determining which experienced greater activity to confirm or deny the existence of any hypothesis. Such a method would produce empirically and quantitatively satisfactory data and a method that would've been repeatable across at least time and possibly sites. It would however be a restrictive and rigid methodology to analyse the gathered data. Conditions for the observability of a phenomenon would require very specific data. Perhaps most importantly, it wouldn't allow for analysis of any unforeseeable interaction between public life and space.

Unforeseeable relationships between behaviour and form are one aspect of the original analysis. The other is foreseeable relationships that aren't covered in the selected literature. An example of foreseeable is the congregation of sitting and standing activity, theories regarding such a relationship wasn't identified in the literature study and requires original discussion. Unforeseeable relationships are unforeseeable, as in, they aren't predicted. There might, for example, be a congregation around a physical element that can't be explained by any theories from the selected literature.

The difference between foreseeable and unforeseeable is that a foreseeable relationship, such as the relationship between standing and sitting activity, is grounded in an original hypothesis regarding this interaction, namely that standing and sitting activity will be separated into different spaces to indicate the existence of sitting-designated spaces and standing-designated spaces. An example of an unforeseen interaction could be the hypothetical congregation of activity at the black coloured triangles at Sergels Torg, such a hypothesis isn't founded in any predictable reason.

Delimitation

The reasons for why people choose to spend time in any space are manifold and complex in nature (Whyte, 1980; Cooper Marcus & Francis, 1990; Gehl, 2010). Explaining why stationary activity occurs can be executed at different scales and through different lenses. The density of population and diversity of functions surrounding a square will have an impact on the magnitude and variety of usage of that square. Specifically, a higher population density and a higher diversity of functions leads to greater activity (Jacobs-Crisioni et al, 2014). That scale of neighbourhoods and that lens of land use will provide a different explanation for a discrepancy in activity between two sites than the outcomes of this study that focuses on the physical design elements of squares at the micro level of cities.

Not to say that aspects of population density or diversity of functions don't affect human activity, quite the contrary, it very much does, which is why these study sites were selected. It's impossible to create a perfect test situation when dealing with human behaviours, but an attempt is made to create a comparable test bed of human behaviour and its interaction with public space. The similar surrounding densities and land-uses create two squares with comparable external conditions, hence should disparities between them be the result of design differences.

The main focus of the study is to investigate the relationship between public form and public life. Other space-specific attributes such as events, policies, land-use at street level and programming have an impact on the usage of spaces (Whyte, 1980), will only receive limited consideration. These are important aspects to investigate and ought to be specifically considered by decision-makers in charge of designing and maintaining urban spaces. They are however, as Gehl would call it, fleeting and flexible element of the city. Important elements but not able to provide the fundamentals for people-friendly spaces, such qualities are created through considerate fixed elements (Gehl, 2010).

The utility of a manual methodology for data gathering is that the occurrence of fleeting and flexible elements can be noted by the registrar. If, let's say, a Scandinavian outgrowth of the *Gilets jaunes* protested as Sergels Torg at one o'clock in the afternoon, the registrar will be able to jot this down and when analysing the results afterward will be able to provide a perfect explanation for why activity skyrocketed at this occasion. Not to say that demonstrations aren't a valuable reason for why people visit public spaces. It is. The fleeting and flexible elements aren't ignored as much as they are out-ranked – in the hierarchy of needs for spaces – by fixed elements. Which is why in-depth analysis of those elements aren't performed.

The stationary activity mapping was limited by the number of registrars. Because the mapping was performed by a single researcher, some activity was naturally missed. The missed activity, whilst it will produce data that isn't completely accurate, won't affect the overall content of the study too much. If activity was high enough to be missed by the registrar, that only accentuates the disparity between that already exist. Further significance and gravity are given to the identified reasons behind the registered discrepancy in the data.

Kungsträdgården – Background

History

The area around Jakob's church was used by medieval Stockholmers to grow cabbage and spices. At that time, in the 1430's, the space is referred to as 'konungens kålgård' which can be literally translated into the king's cabbage garden. Fruit, vegetables and spices was cultivated for the royal kitchen. Examples of the produce was pear, radish, dill, cherry, red onion and parsley. The park had a Dutch gardener in the middle of the 16th century and along with an expansion on the park in 1562, a French gardener is tasked with creating the parks own garden of Eden. The attempt to transform the cultivation garden into a garden of Eden is resumed in 1619 when Gustav II Adolf employs a gardener for this explicit purpose. Planks where erected as walls around the park to keep unwanted visitors out of it, the garden was only to be used by the king and his court. A building to store spices during winter was built, and on behalf of queen Kristina was a bower made out of stone built so the royals could have a place for "several fun and satisfying moments" (Askergren, 1994).

In 1648 the park has been divided into several quarters by fences. The different quarters allegedly contained smaller parterres adorned with boxwood and flowers, no continuous renaissance style layout was present, but details of the park were in renaissance fashion. A desire for a royal layout in modern fashion was still desired. At the time, Sweden were at the dawn of its era of power and needed to manifest its might. The park was framed with palaces placed in or in connection to the park in the middle of the 17th century to represent the royal supremacy. Gardener André Mollet was hired in 1648, but not until 1661 can changes be observed. The smaller quarters have been replaced with a large parterre and uniform layout, the southern part of the park have four areas with flowers and boxwood patterns with a central metal pole standing in between them. The park added some foreign plants, glass-clad flowerpots and pyramids in wood, all in colourful palettes of red and blue (ibid.).

In the 1690's, Nicodemus Tessin the younger executed a big transformation of the park. The large double rowed avenues were planted, bosquets were planted and an orangery in the northern end of the park was finished. The park with its boxwood hedges, water features and large flowerbeds in embroidery pattern is finally the garden of Eden that it for so long was meant to be. The axial oriented orangery acted as an important landmark in the park. Between the northern and the southern bosquets is a large parterre acting as a hall without a roof. The bosquets with their cavities are chambers for the royal court to spend time in. The old paling around the park is upgraded to walls at several places, with the south part getting a large gate and the west and east side getting gates as well (ibid.).

In the 1760's, the park was opened up to the well-off portions of the public and the park becomes a public party place. The finer details of the park started to decay in the end of the 1770's, the northern bosquet is cut in half and the smaller grass lawns in the middle of the bosquets are gone. Sometime in the last decades of the 18th century, the space becomes accessible for everyone. The park is at this point commonly referenced in Stockholm literature. Further simplification of the park design occurs in the end of the 18th century when the middle parterre is turned into a grass field and the bosquets gets a far more liberal shrubbery (ibid.).

In 1795, the orangery is turned into a dance saloon called Vauxhallen that was very popular and frequently used by the public. Vauxhallen was abruptly closed in 1801 and the building was used as an arsenal instead. This led to the place losing its lively and festive character and not until 1817, when the old orangery and former dance saloon was transformed into a facility that offered a treatment service based on an allegedly particular healthy water source, similar to a spa, could the place attract the activity back to the park (ibid.).

Some of the trees in the park were cut down in the beginning of the 19th century in order to allow more light into the space. The southern wall was demolished and in the 1810's were all plantings removed. The only remaining elements were the avenues, and these in a sparser condition. Times were uncertain and the king didn't want to spend money on a garden, the place became a suitable parade-ground (ibid.).

In 1821, the statue of Karl XIII was raised in the middle of the park and received major critique and was perceived as conventional and embarrassingly bad. The use of guards was necessary to protect the stature from vandalism. The old orangery was demolished in 1852 and the avenue was expanded over where the orangery just to stand around 1860. Even when the place had a desert quality in the middle of the 19th century, people enjoyed it as a promenade area. The large sand part in the middle of the park wasn't used because of the unescapable heat, but the avenues worked as intended. The sand field became a quagmire most of the year except during summer, a common occurrence were herds of young boys playing in the dirt in the afternoons. The western avenue closest to Jakob's church was the prominent parade path for shoeing off the latest fashion. But this changed when the theatre was built at the eastern avenue, and by the 1860's, the eastern avenue was the preferred avenue for promenades (ibid.).

At this point, people grew tired of the sand field and in 1856 it was decided that the park was going to be redesigned. Two alternatives were presented, an English layout and a French one. The English was decided upon, but not until 1868 was a simplified version of the plan with grass lawns, fountains and flower groupings executed with a more basic shape and one fountain instead of two. The fountain is Molins fountains and the statue of Karl XII was erected in the southern part, the two still standing today (ibid.).

The plan had grass plantings with gravel shaped like crosses. The grass plantings were adorned with flowers and bushes, in the middle of the crosses were the statues and the fountain. In 1875 the city took over maintenance of the park and the first order of business was to combat youth playing around the state of Karl XIII by planting grass fields in an oval shape around the statue. The vegetation in the park was strong at the turn of the century, the avenue was tight, and the shrubbery of the lawns were high. The place was lively with people strolling down the avenues and pathways, kids playing around Karl XIII's statue, at the dismay of the 1875 efforts to stop it (ibid.).

In 1911 the northern part of the park needed an upgrade; the edges of the lawns were adorned with rose bushes and lilac, and four pyramids poplars were planted. These were the only modifications for a long time. The park lost its status in the beginning of the 20th century, no longer being the preferred outdoor living room of the city's inhabitants, starting to be forgotten. It is unclear exactly why this occurred, it could be that the promenade culture that characterised the 19th century was absent in the life's of 1930's and 40's Stockholmers (ibid.)

In honour of the 700-year anniversary of the city, it was decided that a Nordic contest was to be held in 1951, and the subject of the contest was Kungsträdgården. The city received many proposals, but many were radical and necessitated demolishment of the statues and the fountain. The city was looking for a face lift rather than a complete rearrangement. In could be argued that the city prioritised the historical remnants of the place over its liveliness (ibid.).

But the life did return to the park, in 1953 the committee gave architect Erik Glemme the assignment to improve the park. Glemme introduce an outdoor stage just north of Molins fountain, a café called 'Sju Sekel' at the spot where the old orangery used to stand and a few small ponds and a big fountain outside of the café. The elm groove at Karl XII's statue was accompanied by a small tearoom, the eastern avenue got several small kiosks and the western avenue had now a beer hall next to it. The additions along with decorations in the form of flags

and flowerpots gave Kungsträdgården a festive character that was appreciated by many citizens. The ice-rink was introduced in 1962 and have made its appearance at wintertime ever since (ibid.).

The expansion of the subway system was planned in the 1960's to have its newest line end it Kungsträdgården. The proposed position of the station in 1968 in between the elm groove and Molins fountain would mean the removal of the groove at least, this was met with great resistance from the public. The project was continued despite of this, and a decision to cut down the elms was made in April 1971, without a motivation. In May 1971, when the groove was going to be deforested, the irritated citizens of Stockholm occupied the groove and forced the city to relocate the station to Blasieholms square. The groove and the tearoom were saved (ibid.).

Changes were made to the northern part in 1968 with concrete elements, shrubbery and a fountain. Sju Sekel was replaced by a building in 1986 that hosted a café and a night club. The experience of the park towards the end of the 20th century was a culmination of different interventions dating back to the 1860's (ibid.). In 1998, Kungsträdgården was being redesigned again, this time through a competition in connection to Stockholm's nomination as cultural capital of Europe. Aleksander Wolodarski (2018), architect for the city, and jury member for the committee, wasn't convinced by any of the proposals and instead presented his own idea that eventually won. Wolodarski wanted to reconnect to the baroque characteristics he felt the park lost in the 1953 redesign and create a place people could and wanted to stay in for a longer time.

Wolodarski introduces a submerged pond with surrounding bleacher steps and sculptures – in the form of urns – that creates fractionate rooms for sitting and enclosed the pond with greenery that embeds the place (Nolin, 2019). Japanese cherry trees were added to create a romantic element that broke the strict nature of the public realm, plants at surface level wasn't desirable as they would be trampled by people. The trees functions in the same way umbrellas do, they provide an upwards enclosing feature, a ceiling, a room (Wolodarski, 2018). Three pavilions were added along the eastern side of the northern part of the eastern avenue in 2004. The pavilions contain cafés and other eateries, they are scaled to surrounding lime-trees and have large glass-façades facing toward the park (Södergruppen, 2011).

Design

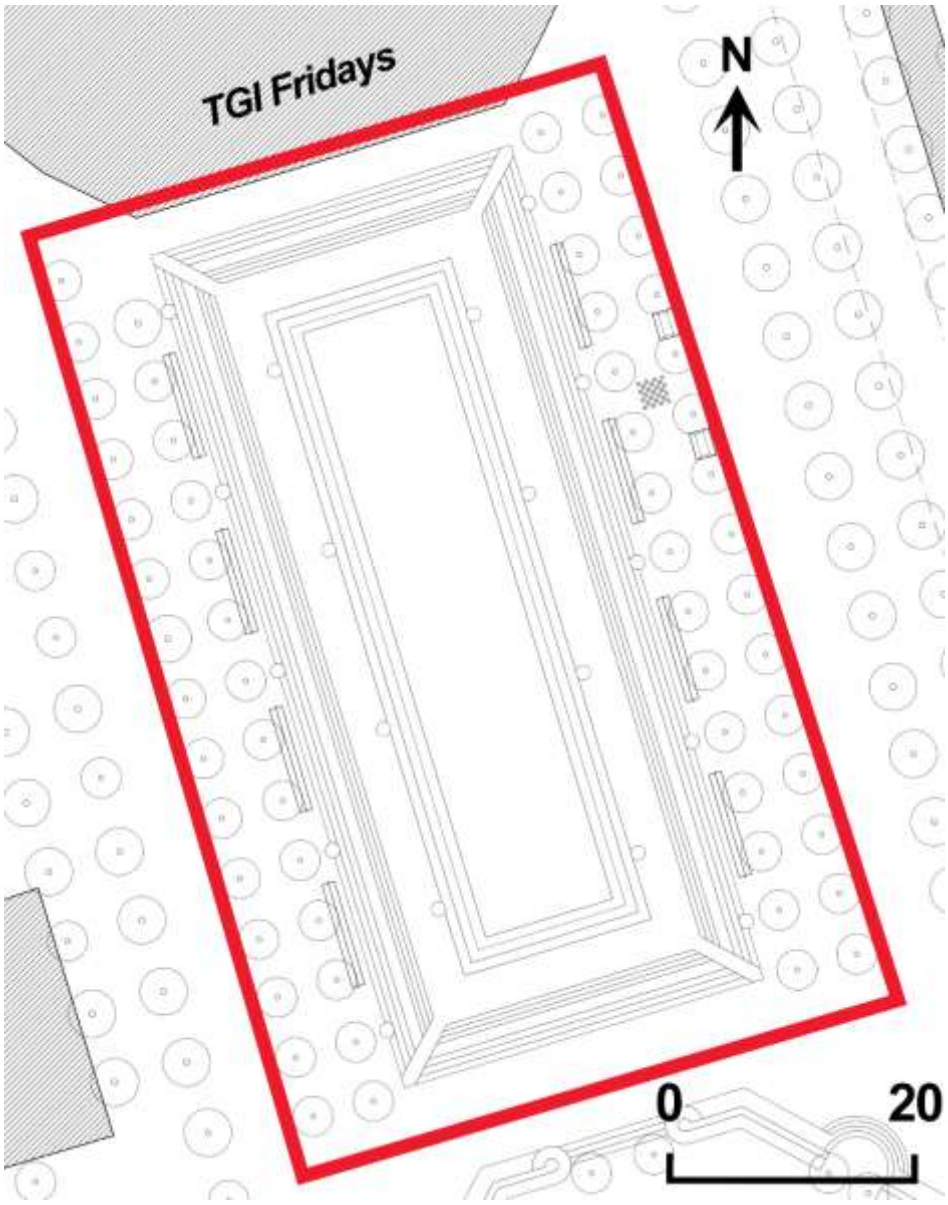


Figure 3 - The cherry pond at Kungsträdgården, study area marked in red

The total study area, the main pond area including the Japanese cherry trees, is about 4000 square metres. The total dimensions of the study area are approximately 50 by 80 metres. The centre of the square is a rectangular shaped pond with fountains. The dimensions of the pond are about 10 by 50 metres. The pond is dry for a large portion of the year but do contain water from the end of April. Extruding outward in four direction from the rectangular pond is the lower flight of bleachers with four levels of steps and four evenly distributed flower-urns on each long-side of the pond. The urns are one and a half metre tall and approximately one metre in diameter. Continuing outward comes a plateau of about five metres followed by a second, upper flight of bleachers with seven levels, divided into one set of four levels and one set of tree levels by a smaller, one metre plateau.

The top of the upper, long-side bleachers is adorned with a second set of flower-urns, this time five evenly distributed urns that together with the lower set of urns create a zig-zag pattern of sculptures. The upper urns are in fact two lower urns stacked atop each other. Between the upper urns are linear wooden benches, facing both the pond but also the Japanese cherry trees

in the opposite direction. The benches are located as to be somewhat under the cherry trees. The cherry trees are located in two rows of 15 on each long side of the pond. Except for the inner west side row that have 14 trees. The corners of the upper bleachers have ramps instead of a natural meeting of the two linear flights of steps, as the lower bleachers have. There are also two wooden picnic tables located in the north-east section of the space along with an oversized chess board painted on the ground and regular chess boards painted on the picnic tables.

There are four main seating alternatives, the benches, the picnic tables, the upper and the lower flight of bleachers. The benches are 36 cm deep in both directions, the picnic tables are 30 cm deep and the bleachers are all 45 cm deep. The suggested effective capacity, as determined by the guidelines for seating outlined by Whyte (1980) (see literature study section on effective capacity for further explanation), for the benches is 136, for the picnic tables is 8, for the upper flight of bleachers is 630 and for the lower flight of bleachers is 272. In total is the suggested effective capacity 1046.

Use

Gehl (1990) investigated the park in 1990 and came to a number of conclusions regarding the usage of it. The entirety of the park creates a place that is internationally unique in its varied supply of possible activities. The place is activating and lively with places for child's play, chess-play, scenes and cafés that encourage interaction, play and watching. The park is a cross between a traditional city park, a city square and a playground for all ages. The space can be described as a mix between a garden oasis that offers a wide variety of plants, conveying the image of a garden with water features, and a grand public space as the heart of the city that can host a diverse and massive population with different activities such as al-fresco lunches, art shows, rallies, outdoor cafés, exhibits and concerts (Cooper Marcus & Francis, 1990). On summer days, between 1200 and 1600 visitors are always present in the park from lunch-hour until late in the evening. Gehl (1990) describes the park as wonderful. Other notes include that the park is located well for sun and wind conditions. This can be supported by a 2018 master thesis from Uppsala Landscape Architecture Programme that performed a shade study for the park (Axling & Sandstöm, 2018).

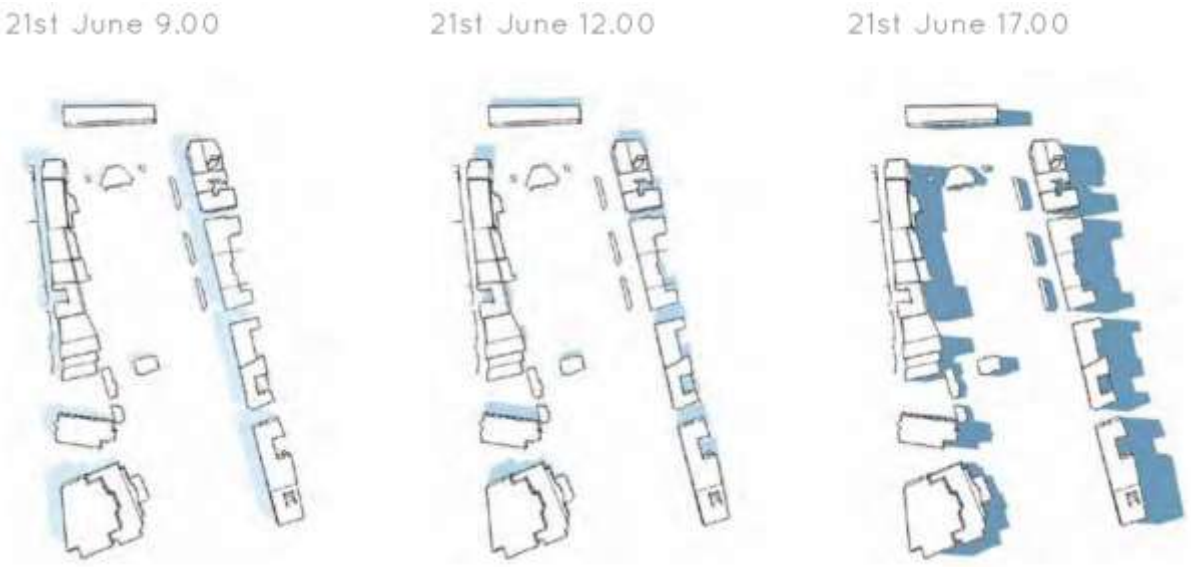


Figure 4 - Shade study by Axling & Sandström (2018).

On a summer day, the average stationary activity between noon and four was 1426 for the entire park, according to Gehl's (1990) study in 1990. This is for the whole park, which entails an area of 45000 square metres. The biggest activity of those were people sitting at cafés, the second and third most common activities was people sitting on benches closely followed by people standing. The fourth most popular activity was sitting on secondary seating, the fifth was cultural activities and the sixth was commercial activity. It is worth noting that Kungsträdgården was far and away the most popular public space in Stockholm City, at least in total visitation numbers. The second most popular space – Hötorget – experienced 419 people, less than a third of the activity occurring at Kungsträdgården. Important to note is that this study was executed before the north part of the park, which is the focus for this inquiry, was redesigned. The activity intensity may have changed due to Wolodarski's new design around the pond.

Sergels Torg – Background

History

The city of Stockholm underwent extremely rapid development at the turn of the 20th century and the slum-like neighbourhoods in southern Norrmalm, and Klara especially, was the subject for extensive reconstruction considerations. There had long been a demand for a solution to the rendezvous point between the two main transport directions created back in the 17th century's city plan. The complexity of the situation meant that progress on a proposal wasn't made until the latter part of the 1920's (Rörby & Lindvall, 1999).

In 1928, city plan director Albert Lilienberg suggest in the master plan that Sveavägen ought to be extended to Gustav Adolf square and create a north-south spatial connection. A popular international architecture contest with proposals from, amongst others, Le Corbusier and Alvar Aalto is held between 1932 and 1933. Architect Paul Hedqvist presents an alternative to the Lilienberg plan in 1938 where Sveavägen isn't extended to the square, and instead stops at Klarabergsgatan—Hamngatan to create a west-east connection spot (ibid.).

The continuation of the Lilienberg plan is performed by the planning office whilst the traffic department works with the Hedqvist proposal throughout the first half of the 1940's until 1945 when the city assembly decides that the traffic department's plan is the one that will act as basis for continued development of the plan. A year later and the proposal contain Sveaplatsen which is a miniature park completely surrounded by car traffic on all sides. The place can be accessed by pedestrian tunnels under the streets. The area adjacent to Drottninggatan is inhabited by an octagonal building (ibid.).

The altitude of the square moves up and down between 1947 to 1952 but in 1957, an official proposal is presented by the city where the space have two levels, the upper for vehicles and the lower for pedestrians. The lower level continues in an open space towards Drottninggatan, but a long building is places between the square and the street. The possibility to have vehicles in the lower level is examined in 1958 but it is found to be impossible to achieve (ibid.).

Stockholm planning office visits Wien in 1959 and – directly inspired by the Opernpassage – decides to place a fountain above the central square and plan a circular glass-clad restaurant at the middle of it. The connection to Drottninggatan is now made with a wide staircase. David Helldén, the architectural driving force of the project, spends his Christmas with his friend Piet Hein. Helldén is concerned with the shape of the middle part of the square, he wants a shape with a continuously varied curve. After some time, Hein comes up with a mathematical formula that is now known as the super ellipse that will create such a curve and can be described as the crossing of a rectangle and an oval (ibid.). The formula is as follows:

$$x^{2^1/_2} + y^{2^1/_2} = 1$$

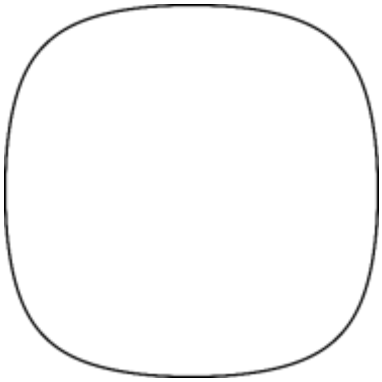


Figure 5 - Super ellipse

Image 1 - Sergels Torg super ellipse (Bengtsson, 2011)

In 1960, the final proposal is presented and approved. The super ellipse is observable in both the form of the fountain and the underlying structure that is supposed to contain a restaurant. The triangle pattern at the lower level surface is a representation of the altitude line and the place is re-named to Sergels Torg after suggestion from famous troubadour and Stockholmer Evert Taube. The fountain is planned to be adorned with an art piece descriptively called "cristal-vertical accent in glass and steel" in 1964 as a result of a contest (Rörby & Lindvall, 1999).

Between 1965 and 1966 a Nordic architectural contest is held to determine what ought to be built at the southern border of the square, the winner was the glass-clad and concrete structures building that is called Kulturhuset and is a cultural centre in the city. An alternate proposal was called Corso and was the result of the combined efforts of Ralph Erskine, Léonie Geisendorf and Anders Tengbom. Corso was a continuous pedestrian area that stretched from the circulation area at Sergels Torg all the way down to Gustav Adolf square (ibid.)

The square is finished in 1967 but the restaurant isn't completed. Kulturhuset is built in 1974, but still, no restaurant. The design of the space begins to be questioned in 1991, a number of proposals that suggest extensive changes to the fundamental design is worked on from both private initiatives and the city. The city proposes that the place could be turned into a sculpture garden. The radical proposals are all rejected by the city and in 1997 focus is instead directed towards executing smaller changes on detail level, the crystal sculpture gets new lighting. In 1998 the new political majority presented that until 2002 the square ought to be totally transformed into a pre-industrial town square (ibid.).

The new majority included the Stockholm Party which main issues are concerns for a more human small-scale city that maintain the traditional physical elements and prioritises people over cars. As a result of this coalition between the Stockholm Party and the right-wing alliance, a renewal of Sergels Torg was put at the top of the agenda. In November of 1998, Stella Fare and Mikael Söderlind presented the new design for Sergels Torg. Sergels Torg was deemed a non-human space that ought to be transformed into a human space (Franzén, 2002).

In the plan, the square was to be moved up to street level and be accompanied by two flats along the western and eastern side of the square in order to make the space more intimate and smaller. Populating the square through the flats was also an attempt to combat the thriving criminal activity that the square had become famous for. The flats would be in traditional style, creating an overall more traditional atmosphere with a smaller, enclosed 'small-town' square. The opposition turned down this proposal in 1999, instead favouring an improvement of the

square, rather than a complete redesign. In the end, the renewal project wasn't executed. By the summer of 2001, pragmatism had come in the way (ibid.).

The square has gone through additional proposals after this as well, such as installing a glass wall between the lower-east and lower-west side of the square in 2007 (Ståhle, 2007), but virtually no changes have been made to the design of the public space. The square was renovated between the years 2012 and 2018, changing the sealing layer to combat leakage and amplifying the concrete structure to ensuring that it won't breaking under future pressures from traffic (Rasmussen Eklund, 2018).

Design

The square is designed in the, so called, *Großstadt* manner with a characteristic modernistic focus on traffic. Separation of traffic is performed in the vertical orientation, with motorised traffic occurring at ground level and pedestrian traffic taking place one storey down in connection to the public transit station. The dominant spatial practice of the space is thus transport, with thousands of people passing by the space every hour, on their journey to another destination in the city. The square is sunken, meaning that it is located beneath street level (Franzén, 2002).

The eastern boundary of the place is far from distinct, going from an open space in the west to underground pathways in the east. Kulturhuset, a cultural institution, is the large building at the southern border of the space. The northern side has a number of stores. The connection to the westmost adjacent street –Drottinggatan – is made through a large set of steps. The most characteristic aspect of the square is the aesthetics surface patterns with black and white triangles. Other than that, there isn't much to describe the square with. The square's given name – "Sergels Torg" – describes the design quite well. "Platt" is Swedish for flat (such as a flat surface), "Sergels Torg" is thus the defined singular literal description for something flat (ibid.).

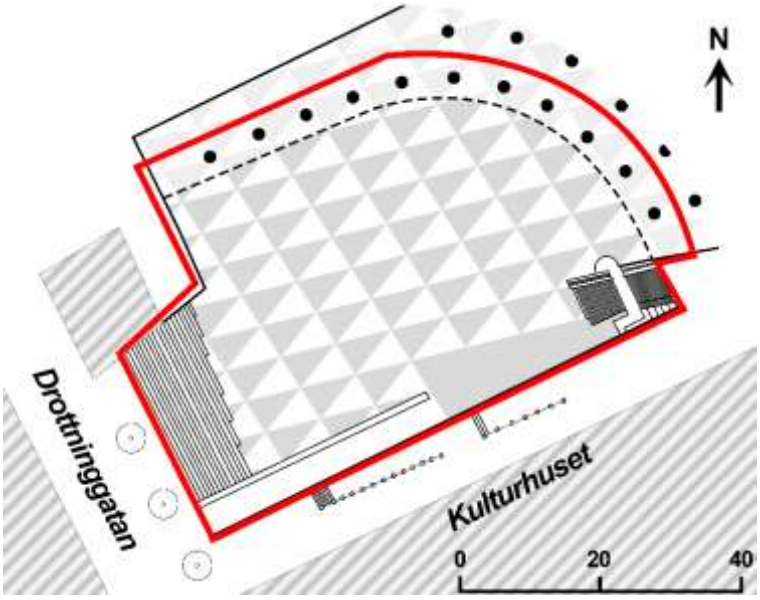


Figure 6 - Site plan of Sergels Torg, study area marked in red

The western stairs are accompanied by a ramp and straight across from it is a second set of steps. The transition from the open-air portion of the square is somewhat distinguished by a row of support pillars. The roughly evenly spaced eleven pillars are circular and approximately half a metre in diameter. The square is inclined but the average altitude difference between

the street and the square is about three metres. The study area, which include the open part of the square, all the steps and the area just beyond the row of pillars, is about 4000 square metres. The shape of the study area isn't quadrangular, but the approximate total dimensions of the space are 55 by 70 metres.

In terms of sitting places, four locations can be identified, the western steps, the eastern steps, the larger steps next to the upper part of the eastern steps and the end of the ramp wall. The western steps are 39 cm deep, the eastern steps are 33 cm deep, the larger steps next to the upper part of the eastern steps are 66 cm deep and the end of the ramp wall offer a sitting depth of 42 cm. The suggested effective capacity, as determined by the guidelines for seating outlined by Whyte (1980), for the western steps is 282, for the eastern steps is 128, for the larger steps next to the upper part of the eastern steps is 7 and for the end of the ramp wall is 2. In total the suggested effective capacity is 419. The Kulturhuset café at plaza level offer outdoor seating with regular café chairs at the end of April. There are 40 chairs at this open-air café seating, adding on an additional 40 seats in effective capacity. When the outdoor café is open, the suggested effective capacity for the entire study area is thus 459.

Use

Gehl (1990) investigated the square in 1990 and came to a number of conclusions regarding the usage of it. The underground area has a low ceiling with few spatial qualities, the most attractive element by far is the western flight of stairs toward Drottninggatan. The square experienced 180 stationary activities on average between noon and four on summer days. There are three main stationary activities, standing activity and people sitting at secondary seating are the most common activities and the third is cultural activities.

Quickly after its conception, Sergels Torg became a location for heavy drug trafficking, the square is central and haven't got that many residents living in the immediate vicinity making it a viable place to sell drugs. Young people appropriated the space, they would come in from the suburbs and made the square there home away from home. The coupling of these two uses is documented in two documentaries by Stefan Jarl, *Dom kallar oss mods* and *Ett anständigt liv*. In the latter, one of the leading characters of the film dies due to an overdose in a public toilet close to Sergels Torg in the middle of the documentary. This connotation to drugs became the square's lasting reputation as most media coverages on drug activity usually take stamp in the use occurring at the place. Frequent police interventions have attempted to combat this activity at the square, but to no avail. The main effect of these campaign was that the reputation of the square, as a location for criminal business, has been reinforced (Franzén, 2002).

Sergels Torg is a typical transit foyer with its primary function as a space to provide easy access to transit terminals and its majority of activity being walking. This heavy pedestrian flow can however encourage people-lookers. The popularity of the space for teenagers isn't a surprise either. As the location become a hotspot for teenage groups because of its proximity to the public transport station (Cooper Marcus & Francis, 1990).

But the space wasn't only used for drug-related activity and pedestrians, a big part of Sergels Torg are the demonstrations. The square is still the foremost demonstrations spot in Stockholm with demonstrations of all scales. Everything from a hunger strike to a silent minute for the murdered Swedish Prime Minister Olof Palme has been held at the square. The square also became the location for national celebrations, specifically in the area of sports (Franzén, 2002). More recently the square acted as mourning place in remembrance of the victims of the 2017 truck attack at Drottninggatan.

Image 2 - Stockholm Culture Festival 2010 (Ainali, 2010)

Image 5 - Leila Khaled speaks at May day rally arranged by the Communist Party in Stockholm (Wiman, 2011)

Image 4 - Happy supporters celebrating Sweden's World Championship gold in hockey at the Sergel's Square in Stockholm, 19 May 2013 (Fouganthin, 2013)

Image 3 - Flowers at the steps at Sergels Torg after the terrorist attack in 2017 (Ellgaard, 2017)

With this in mind can the square be, according to its use, be interpreted as a grand public space, specifically a city plaza. The grand public space is the location for the annual Christmas manifestation, which occurs at Sergels Torg. The city plaza is centrally located and a place for performers and political rallies, which also occurs at Sergels Torg (Cooper Marcus & Francis, 1990).

The square is, as previously mentioned to large degree a pedestrian space for people to move through. As observable in Figure 7, the main flow is from the transit station entrance in the west side of the square to the underground pathways under the fountain and away towards the shopping area in the east. Secondary flows are from the west flight of stairs towards the underground pathways and the north as well as a secondary path from the transit entrance to the east flight of stairs (Ståhle, 2007).

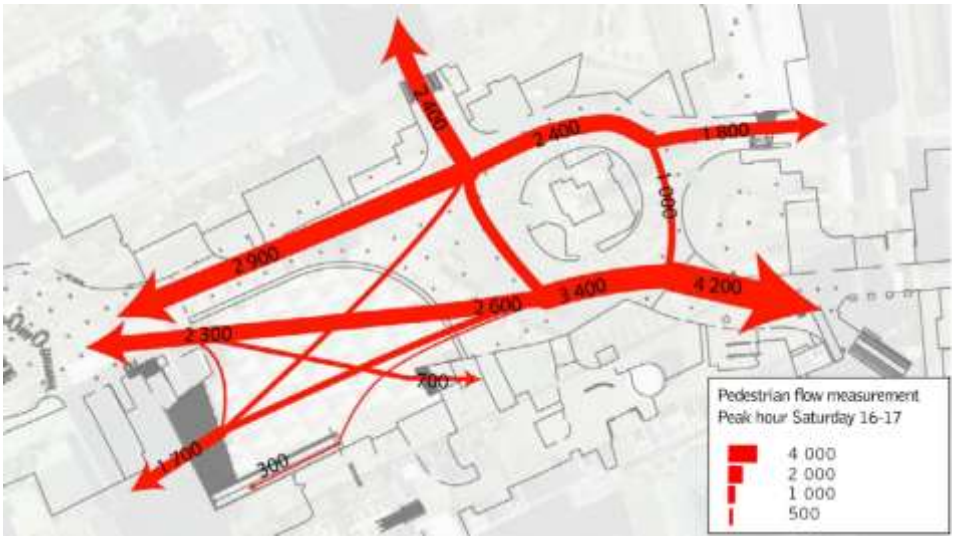


Figure 7 - Pedestrian flow measurement (Ståhle, 2007).

The vast majority of the staying activity at the square is occurring at the part open to the air, with special hotspots of activity taking place along the rows of pillars. There is a congregation of people watching something located in the east part of the open square close to the edge to the underground portion. This edge area between the underground and open-air is a preferable spot for people to speak out or demonstrate about something because its acoustic location, its over-head cover from rain and high exposure to the passing pedestrian flow. Otherwise are '*people talking to someone*' the most popular activity at the square (Ståhle, 2007).

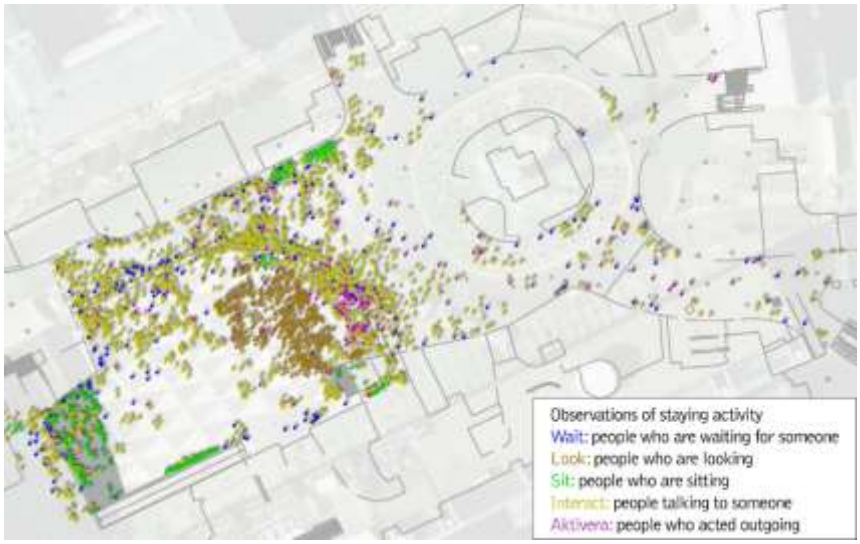


Figure 8 - Observations of staying activity, activities were registered for five minutes for the time intervals: 9-10, 12-13, 15-16, 18-19, 21-22 for two days, Sunday 23/4 and Wednesday 26/4, 2006 (Ståhle, 2007).

The maintenance project group in Stockholm city, *City I Samverkan*, performed a survey for Sergels Torg between the years 2017 and 2018 where they asked 200 square users how they perceived the square and the result showed an improvement in perception (Nedstam, 2018). However, the results aren't desirably reliable as the weather conditions for the survey period in 2018 were superior to the conditions for the 2017 survey period, by their own admission. This coupled with the fact that the greatest improvements were in the category *Safe and secure*, that would increase with an increase in activity (Jacobs, 1961) that in turn increases

with better weather (Whyte, 1980; Cooper Marcus & Francis, 1990; Gehl, 2010; Gehl & Svarre, 2013).

Literature Study

Thematic Literature Summary

The thematic summary focuses on the key elements that influence human behaviour in public space within the chosen reference literature. Hypotheses about public life public space interaction from the selected literature is categorised into seven themes that also outline the analytical part of the work. The hypotheses are analysed with background to the observation criterions described in the table at the end of the summary.

Theme	Hypothesis	Source	Observation Criteria
Sitting Factors in public squares that influence human sitting activity	Optimal Seating Location	Gehl (2010)	Indication for the importance of these factors would be observable through the identification of a proclivity, cluster or increase in sitting activity for situations that offer 1) a pleasurable microclimate in terms of a combination of acceptable temperature and sky conditions, 2) an acceptable auditory level and pollution level, 3) a stimulating view, and 4) a psychologically comforting location in the space, such as along the edge or accompanied by other physical elements.
	Optimal Seating Attributes	Whyte (1980)	Indication for the importance of these factors would be observable through the identification of a proclivity, cluster or increase in sitting activity for situations that offer 1) acceptable sitting height, 2) acceptable sitting depth, 3) mobile seating options, 4) grouped instead of isolated seating, and 5) many different types of seating alternatives.
	Tree Effect	Whyte (1980)	Indication for the importance of this effect would be observable through the identification of a proclivity or cluster in sitting activity for situations that offer the possibility to sit under a tree.
Standing Factors in public squares that influence human standing activity	100 Percent Spot	Whyte (1980)	Indication for the existence of this phenomenon would be observable through the identification of a proclivity or cluster in standing activity for areas that also experience excessive moving activity.
	Triangulation Effect	Whyte (1980)	Indication for the importance of this effect would be observable through the identification of a proclivity, cluster or increase in standing activity for situations

			that offers external stimuli through e.g. protesters, performers and musicians.
<u>Thermal Comfort</u> Factors of thermal comfort that influence human stationary activity	Sun	Jacobs (1961)	Indication for the importance of this factor would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offers sunlight.
	Suntraps	Whyte (1980)	Indication for the importance of this factor would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offers sunlight, acceptable temperature and acceptable wind conditions.
	Desirable Microclimate	Cooper Marcus & Francis (1990)	Indication for the importance of these factor would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offers sunlight, acceptable temperature and acceptable wind conditions.
<u>Psychological Comfort</u> Factors in public squares that has psychological influence on human stationary activity	Amphitheatre Effect	Whyte (1980)	Indication for the existence of this effect would be observable through the identification of 1) a distribution between street level stationary activity and sunken plaza stationary activity that approximated to the relationship of about 80% at the street level, or 2) significantly less stationary activity in sunken plaza compared to plazas that aren't sunken, which might be explained by the sub-optimal psychological experience, as outlined by Whyte (1980) and Cooper Marcus & Francis (1990), of visiting a sunken plaza.
	Optimal Elevation	Cooper Marcus & Francis (1990)	Indication for the importance of this factor would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offers such elevation.
	Enclosure	Sitte (1889), Jacobs (1961), Cooper Marcus &	Indication for the importance of this factor would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offers enclosure through the means described.

		Francis (1990)	
	Subspaces	Cooper Marcus & Francis (1990), Gehl (2010)	Indication for the importance of this factor would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offers sub-divided spaces, through the means described, compared to situations that offer large undefined spaces.
	Edge Effect	Gehl (2010)	Indication for the existence of this effect would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offer edges.
	Piano Effect	Gehl (2010)	Indication for the existence of this effect would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offer defining physical support elements.
	Niche Effect	Gehl (2010)	Indication for the existence of this effect would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offer niches.
<u>Sensory Comfort</u> Factors in public squares that has sensory influence on human stationary activity	Optimal Square Dimensions	Sitte (1889), Cooper Marcus & Francis (1990), Gehl (2010)	Indication for the importance of these factors would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offer any of the dimensions mentioned in the selected literature.
	Intricacy	Jacobs (1961)	Indication for the importance of this factor would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offer any intricacy inducing elements.
	Water Effect	Whyte (1980), Cooper Marcus & Francis (1990)	Indication for the importance of this factor would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offer water features.

	Desirable Auditory Conditions	Gehl (2010)	Indication for the importance of this factor would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offer desirable auditory levels.
<u>Aesthetics</u> Factors in public squares that has aesthtitcal influences on stationary activity	Planting	Cooper Marcus & Francis (1990)	Indication for the importance of this factor would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offer visually interesting plants.
	Side Principle	Sitte (1889)	Indication for the importance of this factor would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offer side-located monuments.
	Visual Complexity	Cooper Marcus & Francis (1990)	Indication for the importance of this factor would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offer a variety of visual elements through textures, colours, landscape element, seating alternatives.
<u>Human Interaction</u> Factors in public squares that impacts human interactions	Multiplier Effect	Whyte (1980), Gehl (2010)	Indication for the existence of this effect would be observable through the identification of clusters, rather than even distribution, in stationary activity.
	Effective Capacity	Whyte (1980)	Indication for the existence of this phenomenon would be observable through the identification of a relationship between the number of sitters at a site and the number of seats available that is in accordance with the rule of thumb.
	Centering	Jacobs (1961)	Indication for the existence of this phenomenon would be observable through the identification of a proclivity, cluster or increase in stationary activity for situations that offer a centering focus area.

	Male & Female Users	Cooper Marcus & Francis (1990)	Indication for the existence of this phenomenon would be observable through the identification of a proclivity, cluster or increase in female and male stationary activity for situations that accommodate for the conditions outlined above.

Table 1 - Themes, hypotheses, sources and observation criteria

Sitting

Optimal Seating Location

According to Gehl (2010), seating location can be contributed to four aspects: microclimate, protection, view and placement. Microclimate means enjoying pleasurable temperature and sunlight generally. Protection in the form of noise reduction so conversation is possible and protection from polluting elements of the city. A view is appreciated, can come in the form of good architecture, trees, flowers, water, art or the people at the site. Placement is then the spatial advantages of a location, that aren't connected to the three preceding aspects. This would mean the psychological experience of a location. For example, the sense of belonging and companionship that is connected to sitting with one's back against a wall in contrast to the isolation experienced when being placed in the geometrical centre of a space, being maximally separated from everything else.

Optimal Seating Attributes

These attributes are derived from Whyte's (1980) work in New York and can be divided into sitting height, depth, mobility, grouping and social comfortability. Between 30 to 91 centimetres, is the recommendations for sitting height. The recommendation for sitting depth was at least 76 centimetres but preferable 91 centimetres, if two people are to sit comfortably back-to-back (half for one-direction seating). This depth allows ledges to be sittable from both sides comfortably. Whilst this wouldn't double the usage of the space it would offer the privilege of choice, in other words, social comfort. Mobile sitting options provide and almost infinite number of alternatives, to sit in groups, sit alone, in the sun, in the shade, face the theatre of the sidewalk, to sit in internal contemplation and so on. The grouping of seating is necessary to combat isolated seating, the lone seat is awkward because it forces people to be alone. Social comfortability is approximated to diversity or variety, meaning that there are many types of seating at a space, in the sun, to the side, in the shade, in the back, in groups, up front and off alone.

Tree Effect

The 'tree effect' asserts that, in accordance with Whyte (1980), sitting activity should cluster under trees. The finest place to sit, according to all observations executed over Whyte's project, is overlooking the scene of the public life whilst residing under the comfortable protection of a tree. The tree functions as enclosure in the same way a street cafe's umbrellas does. Trees also provide desirable micro-climate control; their shade cools people down.

Standing

100 Percent Spot

Instead of moving out of the main pedestrian flow, people opted to stand smack down in the middle of it, sometimes even moving into it. Whyte utilises the real-estate term, the 100% location, to describe this phenomenon (Whyte, 1980).

Triangulation Effect

Triangulation occurs when an external stimulus arouses common interest by strangers, inciting the possibility of communication between them. Some action links the two people together and provides opportunity for them to exchange comments. Examples of elements that elicit a triangulation effect are sculptures, musicians and entertainers (Whyte, 1980).

Thermal Comfort

Sun

The presence of sunlight has been noted to have an impact on the activity of public space users. But the mention of it in the public life study field can be tracked back to Jacobs (1961), she observed that parts of squares that experience no sunlight are severely less used than those that are in the sun. Gehl (2010) also asserts that taking sunlight into consideration is important to provide areas that attracts human activity.

Suntraps

Whyte (1980) adds onto this idea that sunlight is vital for providing a pleasurable setting but adds that warmth is equally as important as sunlight. Whyte observed that sunny days are not the days that plazas are used the most, it is the hot days, overcast or sunny, that draws the most people to the plazas. Important variable is also the relative warmth, as in days that are warmer than the days before it. The first warm day in spring is usually a peak day even though that temperature would be deemed too cold later in the year. Suntraps are spaces that effectively utilises the warmth naturally provided by the sun. If warmth is as – if not more – important than sunlight, then how can warmth be properly produced? Whyte proposes the concept of suntraps. To create suntraps, consideration needs to be taken to winds and drafts as much as to the sun. These places are usually smaller public spaces enclosed on three sides. These spaces don't just offer a desirable micro-climate, it is also a space of psychological comfortability.

Desirable Microclimate

The microclimate in a plaza or urban open space is important to achieve desirable comfort that would justify spending time in them. The pivotal factors that affect outdoor comfort are sun, temperature, wind and humidity. Consideration to the movement of sunlight in the plaza must be taken to optimise the sunlight conditions for summer and winter seasons. Cooper Marcus & Francis (1990) refer to Gehl's (1987) and Pushkarev & Zupan (1975) works to confirm that at a temperature of 13 ºC, there is a considerable increase in pleasure activity, activity that is made from pleasure rather than obligation. Spaces that will experience temperatures up to 24 ºC ought to provide shaded areas and seating. With tall buildings, wind phenomenon such as wakes, cornerflows and downwashes that are created from high-rise buildings deflecting winds downwards making sitting, standing and walking increasingly difficult. The solution for this, Cooper Marcus & Francis argues, can be found in alternative building envelopes and by

coordinating relationships between the sizes and shapes of surrounding buildings to the affected area.

Psychological Comfort

Amphitheatre Effect

A bad constellation between streets and a plaza is to have a sunken plaza where the plaza is located on a considerately lower level than the conjoining streets. They are dead spaces where people feel like they're being watched without watching back. The people at the bottom of a sunken plaza constitute the show and the people above the audience in an amphitheatre. The problem is that the people visiting sunken plazas are not visiting the plaza, they're in the rafters of the plaza. About 80%, Whyte (1980) shows, of the people at the plaza is standing above at street level.

Optimal Elevation

Level changes in plazas are visual component that have psychological impact on the plaza users. A plaza that entail some sort of modest but noticeable change is generally preferred to a plaza with no level change at all. There are also practical reasons for utilising level change, it can separate seating and walking circulation, it may function as a temporary platform for performances and speeches and it can become a divider of space that creates smaller human-scale subspaces. The elevation change will automatically provide a vantage point for people watchers, which is a considerate proportion of plaza users, to stand and look down at the people at the lower level. The fascination of people watching is thus enhanced by this element. Copper Marcus & Francis (1990) refer to Gordon Cullen's (1961) ideas about level changes in the city, specifically that height in the townscape equates to privilege, which would explain the prevalence to watch people from a vantage point.

Enclosure

The presence of buildings around squares is necessary to encourage maximum usage. The buildings offer enclosure if they surround the space efficiently. Definite places that are shaped by the surrounding buildings signifies the existence of place rather than the absence of construction. The space becomes an area of great importance, a special feature, not a left-over. Undefined land around buildings are repelling to people. Public space users are looking for settings that accommodates their needs, not the needs of people within the buildings. The buildings are the backdrop, the square is the foreground (Jacobs, 1961).

Enclosure is, to Sitte (1889), one of if not the defining characteristic of a public square. A simile to a room is brought up to make the argument that what constitute a place is to a great extent the solid masses enclosing it. A room without walls isn't a room, a square without enclosure isn't a square.

The principle for achieving desirable enclosure of public squares depends on the distribution of permeable and impermeable elements in connection to the square. In other words, how much of the square is in contact with roads contra buildings. The principle is three-pronged, first, that squares are to have only one street at each corner of the square. The second is to have each connecting street running in different directions. The third prong suggest that the incoming streets ought to enter the square at right angles to the visual lines. Figure 1 demonstrate how if a person enters the square from the street in the bottom right corner, they

wouldn't look right into another street opening, rather see a house façade. This is the effect of proper enclosure. As Sitte (1889, p. 21) puts it:

> *From any part of the square there is but one exit on the streets opening into it, and the enclosure of buildings is not broken*

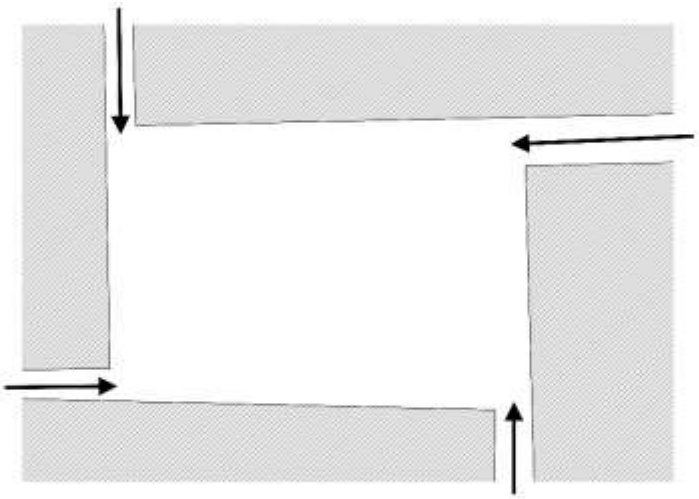


Figure 9 - Sittean enclosure principle

Sitte also highlight some of the methods used to create further enclosure of public squares. Specifically, how the ancient master utilised archways and portals to create segmentation of large areas. This segmentation then creates a 'closing in' feeling in the square. Other enclosure elements include columns with porticos (ibid.).

Enclosure may not only come from buildings and street compositions however, rows of trees and subtle level changes can function as a boundary articulator, defining where a space ends and another begins (Cooper Marcus & Francis, 1990). Trees (Whyte, 1980) and umbrellas (Cooper Marcus & Francis, 1990) offer an overhead enclosed experience for public space users.

Subspaces

Large open spaces without furniture, planting and other people have an intimidating presence, Cooper Marcus & Francis (1990) argues. Most people prefer the enclosed experience over the exposed experience, this will lead to spaces that are left open and un-defined will have people quickly passing through or staying to the edges. Subspaces can be created through planting, seating, level change and construction. These division aren't just visually pleasing aspects of spatial design that allow spaces to be perceived as more densely occupied than if the space was left ambiguously undivided, they also encourage users to locate their own enclosed niches of space and linger.

Careful consideration needs to be taken to how an effective subspace that create this effect of division whilst not creating a space that is segregated to other spaces, a clear but subtle distinction of spatial division is necessary. The size of these subspaces is also an important factor, make it too small and it will be perceived as a private room that one shouldn't intrude open, make it too big and people will feel intimidated or alienated if they're sitting there alone

(ibid.). These smaller spaces can be produced from utilising colonnades and archways, rows of bollards and rows of trees where pedestrians can feel intimacy whilst still getting a view of the larger city space (Gehl, 2010).

Edge Effect

People tend to seek out places at the edges of space when staying for a while. The utility of this position comes from being away from the natural pedestrian flow and thus becoming a discreet addition rather than a noticeable nuisance. Benefits such as improved microclimate by protection from wind and rain as well as a protected backside is joined by advantages like being able to watch the maximum amount of activity and the provision of psychological and physical support to create a location truly worthy of spending a longer period of time at (Gehl, 2010).

The origin for this preference for edge space can, according to Gehl (ibid.), be tracked back to the cavemen, sitting with their back up against the wall of the cave. The phenomenon can also be observed at ball rooms where people stand along the walls of the hall as "wall-flowers" between dances. Prime real estate along edges are especially important in public spaces where strangers reside. No one wants to stand alone in a vast expanse of emptiness that naturally accentuates one's isolation. If accompanied by a façade, people can at least look to it for support.

Piano Effect

Humans are drawn to columns, furniture or corners along the aforementioned edge that can support a prolonged stay and aid in distinguishing the place from being merely a place along the wall to one with a well-defined character. The effects name come from the observed prevalence of party guests to position themselves along walls close to a supporting furniture, such as a piano. The wall provides a safe and unpretentious position whilst the piano offers company and an object for the guest to "be in charge of". The support points in the edge zone can also take the form of inventories, façade details and equipment. Even though edges have an innate gravitational effect on people intending to stay for a while, combining the edge zone with good façades will conceive the most attractive staying place possible. Smooth, closed façades without defining details doesn't produce an image inviting passers-by to stop or stay (Gehl, 2010).

Niche Effect

The edge zone must give the potential user the perception that it is a comfortable place suitable for residing in for a longer period. This can be achieved through the use of façade elements like steps, columns, 'caves' and niches, where the two latter are the most attractive alternatives. The niche offers a position of comfortability through physical support, protection against weather, a view of the passing scene and the psychological safety of being able to appear only partially in the public sphere but also the choice to move into the action if an exciting occurrence necessitates it (Gehl, 2010).

Sensory Comfort

Optimal Square Dimensions

Squares of depth are deeper than they are wide, and squares of expanse the opposite. Which dimensions of the square that denotes depth and width is determined by the location of the

principal building of the square. If a church is located on one of the two the shortest sides of a rectangular square, then that square is a square of depth. If a principle building is located at one of the longer sides of a rectangular square, then it's square of expanse. This is because the principal building is the focus for visitors of the square, and thus the direction they will be facing towards. Generally, are principal buildings of slender forms better suited for squares of depths, and those with exceptional breadth for squares of expanse (Sitte, 1889).

A general principle for the relationship between the size of a square and its surrounding buildings is, as Sitte explains, difficult to determine. He simply proclaims than a harmonious balance is necessary. A square that's too small provides nothing to the principal buildings surrounding it, whilst a too large square will reduce the impact of the monumental structure and diminish its dimensions. Nonetheless, Sitte (ibid.) provides some guidelines for determining the size of a square. Starting off with a distinction between squares of depth and squares of expanse. Squares of depth ought to have a depth that is in proportion to the height of its principal building whilst squares of expanse ought to have a width that is in proportion to the height of its principal building.

Some rules of thumb are provided next. The minimum proportionate dimension of a square ought to be equal to the height of its principal building whilst its maximum dimension is twice the height of the principal building. To clarify, the depth of a square of depth should be somewhere in between the height of its principal building and two times that height, the width of a square of expanse should be somewhere in between the height of its principal building and two times that height (ibid.).

Size is a difficult aspect as every space has its context that can motivates its magnitude. Two recommendations are presented by Cooper Marcus & Francis (1990). Kevin Lynch's (1971) suggestion is to have the dimensions of a square be between 12 and 24 metres to create an intimate human-scaled space. Gehl (1987) proposes that the maximum dimension of a square be between 70 and 100 metres, and to combine this with the maximum distance to see facial expressions, 20 to 25 metres.

The aspects of spaces that suffices greatest scrutiny is proportions, dimensions and spatial quality. These attributes constitute the overall well-being and comfort associated with good places. The connection between the human body and sensory apparatus, and scale and dimension in space must correspond if such places are to be created. The easy and intuitive rule is that meetings in the form of connections, exchanges and events will occur if inviting and comfortable places to stay. The central argument is that the spatial relationship and size of places will influence how places are experienced and if they incite people to stay, and that through observation of places that do experience great activity, guidelines for human-scaled urban design can be extracted. The size is one of the determining factors for the success of places. For squares, Gehl (2010) look to old cities and present the magical 40 by 80 metres dimensions that produce a place that enable people to identify the faces of other people and enjoy the entirety of the place from anywhere in the square.

Intricacy

Intricacy is directly connected to the diversity of reasons a square can offer to people to spend time in them. The reasons for different people to visit the same square can diverge severely, but the reasons for the same person can also be varied. One might come to a square to sit down and rest, to watch a game, to play, to show off, to keep an appointment, to fall in love and almost always to be enjoy the presence of other people. If a square offers one view, as in, if a square can be completely experienced from one position, there is little reason to visit it as it wouldn't accommodate for the variety of moods and uses of urbanites. The same goes for

squares that only supply spaces that offers the same experience as every other part of the square. Such monotony additionally won't necessitate further exploration. Intricacy is achieved through the provisioning of intricate details at the eye-level. Jacobs (1961) describes these as 'subtle expressions of differences', examples include the grouping of trees, ground-level changes and openings to focal points.

Water Effect

Water is a great option for public spaces and can come in many different forms such as waterwalls, fountains, sluiceways, waterfalls, pools, rapids and meandering brooks. The important aspect for water is not just the existence of it however, access is pivotal. Whyte (1980) expresses his enjoyment by referring to its look and feel. Water should be accessible, touchable and splashable. Water also have a desirable sound. The sound of water functions as white noise and drowns out the unpleasant sounds of the street, it also masks conversation which allows for people to speak loudly to each other without the fear of on-lookers to hear.

Universally, the sound of moving water is appreciated and an attracter of people's interest. The sound generated would technically correct but de facto incorrect be described as noisy and loud. The sound isn't unpleasant and create an ambient soundscape. The sound of moving water also has a stress-relieving effect on people (Cooper Marcus & Francis, 1990).

Desirable Auditory Conditions

The ability to strike up a conversation is greatly dependent on the ability for two or more people to hear each other speaking. A common issue of many cities is the growth of traffic that bring with it an unescapable increase in undesirable noise. Opportunities for conversation needs to be handled with particular care. The upper limit for being able to have a conversation at regular conversation proximity is 60 decibels (Gehl, 2010). Every eight decibel increase over that will be experienced as twice as loud, 68 decibels will be experienced as 120 decibels (Salvato et al, 2003).

Aesthetics

Planting

Smaller areas require a variety of plants to create a diverse and visually interesting scenery to attracts sitters and passers-by. This variety of planting is especially important for plaza users that are alone, without an obvious behavioural prop such as a lunch or book or in a plaza with few people passing through. The colour palette of a plaza naturally effects the users' enjoyment of it. Plants such as trees and shrubbery with varying colours will attain this effect, so will annual and perennials. Along with the colour aspect, fragrance is a pleasant addition from adding plants to a plaza (Cooper Marcus & Francis, 1990).

Side Principle

One artistic fundamental Sitte (1889) presents is that of placing monuments in squares, not simply that monuments should adorn squares but also the importance of proper settings for monuments. Sitte uses Michelangelo's placement of his masterpiece *David* as an example of placing a monument to accentuate the artistic value of it. The giant marble statue was placed to the left of the Palazzo Vecchio main entrance. The Palazzo Vecchio is not an overtly ornate or detailed building with its uniform stone brick façade. The inconspicuous nature of the façade creates an illusion that the statue is experienced as larger than its actual proportions.

This façade serves as a perfect background for *The Statue of David*, making every perfect line of the statue stand out from its backdrop.

With background to this, Sitte (ibid.) proposes that a principle for locating monuments should declare that monuments, such as statues and fountains, ought to be placed to the sides of public squares to lend the works of art a neutral background but also to increase the number of possible monument locations. Instead of systematically placing monuments at the geometrical centre of each place, thereby limiting the number of monuments to one, planners ought to utilise a neutral background much the same as a painter using a neutral background for a portrait.

Visual Complexity

It has been showed in studies from New York, San Francisco and Vancouver (Joardar & Neill, 1978) that a positive reaction from visitors is connected to the perception of the space as contained with a variety of visual element, in terms of textures, colours, landscape element, seating alternatives and so on. A complex and unpredictable environment is appreciated as a much-needed break from the monotonous flow of visual components reoccurring day in and day out at the city centre offices (Cooper Marcus & Francis, 1990).

Human Interaction

Multiplier Effect

The central theme for much of Whyte's (1980) work, as well as for some of his contemporaries such as Jacobs (1961) and Gehl (2010), is that what attracts people to a place is the existence of other people at this place. Which is counter to what some usual platitudes people like to spout when describing an attractive setting, terms such as "oasis", "escape" and "retreat". Because of this, Whyte (1980) puts greater emphasis on what people do than what they say, and people do act as if they are attracted by the presence of other people.

Social activities occur between people in city space and entail all forms of communication. An example of such acts is the most common social activity of people watching. Communication isn't relegated to simply talking; seeing or hearing other people is also a social activity. Other social activities are greeting and talking to acquaintances, spontaneous meetings, small talk at vendors or market booths, talking whilst waiting, asking for directions and so on. This attraction to observe people is a well-known phenomenon that can be verified from studies of cities all around the world (Gehl, 2010).

People are spontaneously attracted to other people, and throughout life, gathering information through social activities in common city spaces becomes a habitual behaviour. The proof for this intrinsic human behaviour can be found in any architectural drawing that, without error, is adorned with happy people enjoying the urban realm. The ever going shifts between purposeful walking, resting, conversing, staying and stopping is a common characteristic for cities. The prevalence of spontaneous, unpredictable and unplanned activities, especially, stimulates an attractive city space (ibid.).

Effective Capacity

Whyte's (1980) team looked at five popular sitting spaces and recorded the average number of sitters at each spot at peak and off-peak hours. The number of people sitting, and the number of available sitting spaces differed from each other greatly. At the most used spaces, between 33 and 38 people sat per 30 metre sitting space. The study was consistent enough to

warrant a rough estimate for the average number of people that will sit at a prime sitting space at peak hours: the amount of sitting space in metres divided by 0,9. This rule of thumb is not the physical capacity of a space, but rather the actual capacity of people that would, by free choice, sit at a space during normal peak-hours, in other words, the effective capacity.

Centering

Most successful small spaces usually have a place within them understood to be the centre, or some form of main crossroad or staying spot. In other words, the space has a climax area. Some small spaces are completely made out of a centre area, in these, intricacy is created through subtle differences at the periphery. Jacobs (1961) gives an example of how these centres attracts activity. The fountain basin at Washington Square in New York is circular with four levels of steps towards the most sunken part of the concrete centrepiece. This, along with the fact that the fountain is dry most of the year, creates an arena or theatre that experience constant activity by actors and audiences. The distinction isn't necessary however, as those being watched are often watching themselves. Jacobs conclude that the centres that provide a stage setting are the greatest.

Male & Female Users

Some of the findings presented by Whyte (1980) in respect to the difference between male and female users are challenged by Cooper Marcus & Francis (1990) along with later studies that demonstrate that, contrary to Whyte's sentiment that female users are more picky, a better analysis of the over-representation of male users at plazas is that a particular sex, age or ethnic group appropriate public space so others are reluctant to intrude.

The difference in preferred seating that Whyte (1980) observed is something that Cooper Marcus & Francis (1990) also observed in studies in San Francisco. Men choose the locations in the front whilst women prefer the secluded areas of the plaza, Cooper Marcus & Francis (1990) refer to this secluded area as the urban oasis. One significant insight that can be concluded is that the variety of users, in terms of sex, is increased with an overall higher usage of the plaza (PPS, 1978).

Cooper Marcus & Francis (1990) refer to a study by Louise Mozingo (1984) that investigated this difference in preferences between the sexes. Mozingo concluded that women, generally, don't want to be put on display in public, and with good reason, women's personal space was intruded twice as often as a man's space was in the study. Men perceive the public realm as a space for human interaction and are thus more tolerant of personal intrusion. Women perceive the public realm as a relief from the office environment and urban stress and thus prefer natural environments that are secure. Mozingo proclaims that these differences shouldn't be a conflict between comfort and involvement, relief and social interaction, rather be posed as the challenge for the designer to integrate the two uses into the same plaza.

Camillo Sitte (1889) The Art of Building Cities

Introduction

Camillo Sitte was a late 19th century Viennese architect that shook European city planning practices in 1889 with the release of his book *Der Städtebau nach seinen künstlerischen Grundsätzen*, which literally translates to *City Planning According to Its Artistic Fundamentals*. The book is an attack of the modern city planning of the time, Sitte believed it

to be an unimaginative, monotonous and dreary practice that have forgotten the most fundamental artistic elements necessary for creating civic designs in cities. Even though the book was written 130 years ago, and technological and societal progress in virtually all areas discussed in the book have developed far beyond what Sitte reasonably could've predicted, his central argument about the loss of artistry in city building is seemingly still relevant today. The book can be described as more than an evaluation of modern city planning, it is prophetic (Sitte, 1889).

The aim of the book is to examine plans of cities to extract the principal elements of old cities that produce harmonious effects and modern plan that result in loose and dull experiences. It is not to merely criticise the modern system of city planning, nor is it to reiterate ancient ideas (ibid.).

In the introduction to the book, Sitte affectionately likens the experience of traveling through a truly great city to the most enjoyable of dreams, the memories of great monuments, landscapes and plazas are displayed onto the canvases of eyelids of travellers long after they leave the city. This, Sitte identifies, is best conceptualisation of beauty and art. Sitte makes the connection between art and civic design by coupling the sensation of experiencing sublime music whilst ascending the monumental terrace of the Forum of Pompeii. This connection is also observable in the similarity between art related spaces such as concert halls and theatres and the public outdoor spaces of ancient plazas. The need for artists, not merely technicians, is thus necessary to achieve similar experiences to the cities from the Middle Ages and the Renaissance (ibid.).

Sitte continues to profess his unbridled admiration for the plazas of ancient Greece which reveal the philosophical basis for the artistic principles outlined later in the book. According to Sitte, public squares of ancient Athens express the feelings of its great people, the piece of open land described as plazas or squares transcends these labels and become over centuries into work of pure art. This is the ideal for city building, and though imitation of such models are difficult to execute it mustn't be overlooked as it is the utmost aim towards which cities ought to strive towards. Sitte attempts to study the principles that constitute such beauty so that it's not lost in the sands of time (ibid.).

> *An artfully effective city plan is truly a work of art, and not a matter of administrative routine. That is the essence of the entire problem* (ibid., p. 82)

This concern for the lost artistic qualities in city planning is how Sitte's work can be described as human-centred. His argumentation is as follows: Beauty and art enlightens the experience of existence; city building should strive towards providing elements that contain beauty and art in civic design. From this, two responses are necessary to present. First, why beauty has that effect, which is as deep of a question one might put. According to Sitte is this effect the experience of transcendence which proclaim a call to a higher being. Second, who decides what is beautiful, who denotes art. This is a worthwhile and important inquiry (Hannay, 1947), Sitte derives the artistic fundamentals that denotes beauty from plans of Medieval and Renaissance era cities and claims that the patterns observable across these plazas reveal the intrinsic will of the people visiting it. The evidence for this, Sitte claims, is in the fact that so many people travel from every corner of the world to experience these great places. This argumentation is also grounded in the economic valuation and profitability of art (Sitte, 1889).

Even still, Sitte's wish for greater artistry in city planning is partly a critique of modern planning that has ignored this aspect of the city. What exact version of art, it could be argued,

city planning would entail doesn't matter, as long as art and beauty is one of the focus areas. Whilst this would be an adequate defence against the subjectivity of art, it isn't a desirable validation for the artistic fundamentals Sitte presents in the book (ibid.).

Art, according to Sitte, is derived from the observed valuation of a collective human society. Places are popular because they contain artistry, if they didn't, they wouldn't be popular. A possible critique to this definition would be that art – according to Sitte's interpretation – would be excluding to forms or expressions of 'art' that isn't conventionally popular. To raise this issue wouldn't deal with the proposition presented by Sitte, it would merely become a discussion of the meaning of the word art. Sittean art means the transcendental effect human being across societies experience when, for example, visiting the *Piazza of the Signoria* in Florence. That definition doesn't necessarily discriminate against unpopular art pieces, similarly it doesn't highlight it as a fundamental artistic principle, the greater number of people demonstrating appreciation merely functions as a vessel for the intrinsic human experience. This dissection of beauty further reveals the human-centred aspects of Sitte's work (ibid.).

The book is divided into 13 chapters. The first six chapters presents artful examples of observed fundamentals about the relationship between buildings, monuments and public squares (I), open centres of public places (II), enclosure of public squares (III), form and expanse of public squares (IV), irregularity of ancient public squares (V) and grouping of public squares (VI). Chapter six is dedicated to the squares of northern Europe, Sitte makes consequent reference to plans for squares in southern Europe, especially Italy, and spends this chapter to describe the difference between northern and southern European squares. Chapters eight to eleven are about modern planning, focusing on the artless and prosaic character of it (VIII), systems it entails (IX), limitations in connection to art (X) as well as improved systems (XI). Sitte ends his book with two chapters summarising how the artistic fundamentals presented in the book can be applicated through illustration (XII) and a conclusion (XIII) (ibid.).

This summary will focus on the first six chapters as they serve the greatest utility towards accomplishing the aims of the study.

The Relationship Between Building, Monuments, and Public Squares

The first chapter of the book goes into how buildings, monuments and public squares are coordinated to achieve maximal artistic impression. Sitte explains that for public life in ancient cities in Italy, the public customs of old remain as well as the relationship between the enclosing buildings of squares and the squares themselves. The natural relationship between a square and its surrounding buildings could for example be observed in ancient cathedral squares or the Signoria, the square of the royal residence. The squares were the places with the most traffic, this is where laws were promulgated, and ceremonies were held. A normal occurrence was to gather the outstanding building around a public place and ornate this square with monuments, statues and fountains which acted as a reminder of history and a declaration of a city's pride and glory, the display of ultimate competence (ibid.).

Sitte provides a pragmatic argument for his seemingly conservative perspective of city planning in this section. Considering the modern complications imposed by problems regarding hygiene for example, it ought to be of interest to planners and civic artists to consider which aspects of ancient city planning that could be adopted to modern planning. Sitte argues, that by doing so is it possible to resolve the aesthetic preservation of city development. By identifying the aspects that constitute the ancient artistic design of public

places and buildings, then those aspect could be replicated onto new development. In so, preserving heritage without having to protect every decrepit, unhygienic old building or square from reconstruction (ibid.).

The artistic fundamental Sitte presents in this chapter is that of placing monuments in squares, not simply that monuments should adorn squares but also the importance of proper settings for monuments. Sitte uses Michelangelo's placement of his masterpiece *David* as an example of placing a monument to accentuate the artistic value of it. The giant marble statue was placed to the left of the Palazzo Vecchio main entrance. The Palazzo Vecchio is not an overtly ornate or detailed building with its uniform stone brick façade. The inconspicuous nature of the façade creates an illusion that the statue is experienced as larger than its actual proportions. This façade serves as a perfect background for *The Statue of David*, making every perfect line of the statue stand out from its backdrop (ibid.).

With background to this, Sitte proposes that a principle for locating monuments should declare that monuments, such as statues and fountains, ought to be placed to the sides of public squares to lend the works of art a neutral background but also to increase the number of possible monument locations. Instead of systematically placing monuments at the geometrical centre of each place, thereby limiting the number of monuments to one, planners ought to utilise a neutral background much the same as a painter using a neutral background for a portrait (ibid.).

Open Centres of Public Places

Sitte opens his second chapter by explaining the difficulty of extracting general principles and patterns from the diverse examples of artistically designed public places but also the importance of this endeavour as it will reveal the instinctual artistry of the old masters that have been lost and replaced by the inflexible geometrical principles of their predecessors (ibid.).

One of these patterns identified by Sitte is what will be referred to as the snowmen principle. The snowmen principle is derived from the placements of snowmen by children in the winter. The instinctual location of snowmen, Sitte argues, serves as a model for proper location of monuments. The model explains that snowmen – and thus monuments – are placed at the islands between the natural thoroughfares of citizens moving through a public square. In Figure 10 the islands are outlined by dashed lines (ibid.).

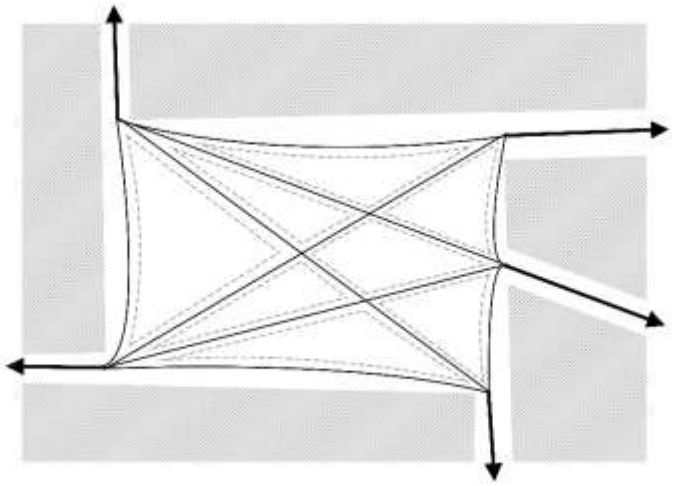


Figure 10 - Traffic islands in squares marked in dotted lines

This is the instinctual location for snowmen as in the winter when the snow covers the streets, paths from human movement will inhibit location for snowmen. The same rule ought to apply to monuments. This principle can be observed in the plans of ancient public squares. This principle neatly ties into the principle of locating monuments at the edges of public places which was presented in the previous chapter. The rule of avoiding thoroughfares also applies to the thoroughfares of sight, as in sightlines. In other words, monuments ought not to obstruct the view of ornate architecture and should therefore be located away from the main sightlines such as at the axes of monumental buildings or portals. This principle is also applicable to vegetation, as in, trees shouldn't be placed to block the view of monumental buildings (ibid.).

The Enclosed Character of the Public Square

Enclosure is, to Sitte, one of if not the defining characteristic of a public square. A simile to a room is brought up to make the argument that what constitute a place is to a great extent the solid masses enclosing it. Sitte described this as the most essential condition for artistry (ibid.).

The principle for achieving desirable enclosure of public squares depends on the distribution of permeable and impermeable elements in connection to the square. In other words, how much of the square is in contact with roads contra buildings. The principle is three-pronged, first, that squares are to have only one street at each corner of the square. The second is to have each connecting street running in different directions. The third prong suggest that the incoming streets ought to enter the square at right angles to the visual lines. Figure 11 demonstrate how if a person enters the square from the street in the bottom right corner, they wouldn't look right into another street opening, rather see a house façade. This is the effect of proper enclosure. As Sitte (p. 21) puts it:

> *From any part of the square there is but one exit on the streets opening into it, and the enclosure of buildings is not broken*

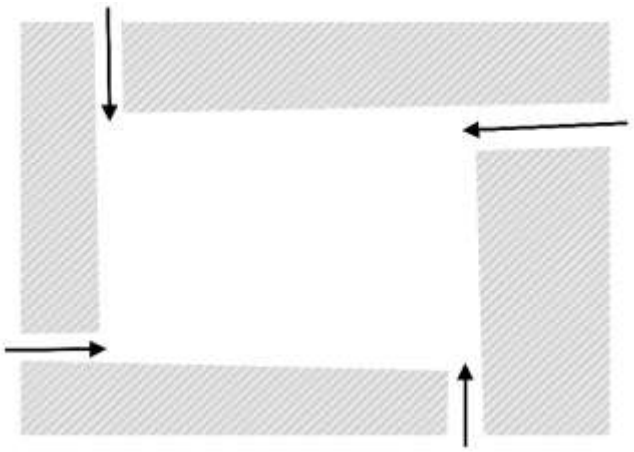


Figure 11 – Sittean enclosure principle

Sitte also highlight some of the methods used to create further enclosure of public squares. Specifically, how the ancient master utilised archways and portals to create segmentation of large areas. This segmentation then creates a 'closing in' feeling in the square. Other enclosure elements include columns with porticos (ibid.).

The Form and Expanse of Public Squares

The fourth chapter of the book starts of by distinguishing between two types of square forms, squares of depth and squares of expanse. Squares of depth are deeper than they are wide, and squares of expanse the opposite. Which dimensions of the square that denotes depth and width is determined by the location of the principal building of the square. If a church is located on one of the two the shortest sides of a rectangular square, then that square is a square of depth. If a principle building is located at one of the longer sides of a rectangular square, then it's square of expanse. This is because the principal building is the focus for visitors of the square, and thus the direction they will be facing towards. Generally, are principal buildings of slender forms better suited for squares of depths, and those with exceptional breadth for squares of expanse (ibid.).

A general principle for the relationship between the size of a square and its surrounding buildings is, as Sitte explains, difficult to determine. He simply proclaims than a harmonious balance is necessary. A square that's too small provides nothing to the principal buildings surrounding it, whilst a too large square will reduce the impact of the monumental structure and diminish its dimensions. Nonetheless, Sitte provides some guidelines for determining the size of a square. Starting off with a distinction between squares of depth and squares of expanse. Squares of depth ought to have a depth that is in proportion to the height of its principal building whilst squares of expanse ought to have a width that is in proportion to the height of its principal building (ibid.).

Some rules of thumb are provided next. The minimum proportionate dimension of a square ought to be equal to the height of its principal building whilst its maximum dimension is twice the height of the principal building. To clarify, the depth of a square of depth should be somewhere in between the height of its principal building and two times that height, the width of a square of expanse should be somewhere in between the height of its principal building and two times that height (ibid.).

Sitte continues by clarifying that elongated squares are preferred over quadratic ones. That squares of depth – that usually have a length that is three times as long as its width – and squares of expanse – that differ more in the relationship between length and width – are more aesthetically pleasing. The average square dimensions of the great square of old cities have a relationship of approximately 2,4 between the large and the small dimension (ibid.).

The Irregularity of Ancient Public Squares

The irregularities observable in old squares are indicators of the historical development that occurred there. They often had practical explanations that necessitated their existence, such as a nearby canal, roadway or building shape. And even though modern planning is insistent on supplying civic constellations that are completely symmetrical and regular, Sitte argues that irregularities and disruptions in symmetry aren't aesthetically displeasing. The contrary is in fact true. Irregular forms and occurrences in public places arouse interest and appear natural, they preserve the picturesque quality of cities. Some irregularities are seldom noticed by visitors of squares, it is only those who analyse plans that can identify when a place is geometrically asymmetrical for example (ibid.).

Sitte is unsatisfied with the unnecessary regularity of modern city building as it render cities uselessly symmetrical and strenuously uniform. As Sitte puts it (p. 32):

> *Why must the straightedge and the compass be the all powerful masters of city building?*

He continuous by providing a practical argument for irregular shaped squares. In modern planning paradigm squares, monuments are deemed suitable and have an obvious location, at the centre. This framing of monuments is – as previously explained in chapter II – counterproductive for artistic and practical utility. Irregular shaped squares on the other doesn't have an explicit location for monuments, or perhaps more important, doesn't have any explicit location where monuments can't be placed. This, Sitte argues, is an advantage rather than a disadvantage of old irregular squares because the possibilities for adornment of public places is increased greatly (ibid.).

Groups of Public Squares

In the old cities of Italy, having clusters of several public squares around the same principal buildings wasn't an unusual occurrence, the opposite, having a singular square grouped by principal was quite unique. This grouping of squares stems from the tradition of setting monumental buildings to the side of squares connected to surrounding buildings rather than isolated from them. By doing so, the principal building presents two to four different facades that are ample subjects that necessitates a square to inhabit the audience brought forth by the monumental structure. This coupled with the principle for squares of depth and expanse along with the principle for square enclosure determines that more than one square is necessary to provide an artistic experience of the place (ibid.).

The grouping of squares is the result of methods that, Sitte argues, are the finest utilisation of monumental buildings. Every façade of the principal building is afforded its own square and every square its own façade. Sitte (p. 38) describes the experience of traversing in a landscape of several enclosed squares:

> *What an impression is made by several groups squares on the person who goes from one to the other! The eye encounters a new scene every instant, and we feel an infinite variety of impressions.*

Jane Jacobs (1961) The Death and Life of Great American Cities

Introduction

Jane Jacobs is one of, if not the most pivotal authors, in the field of people-friendly urbanism if not the urban development field as a whole. The 1961 book *The Death and Life of Great American Cities* is her seminal work, its influence is insurmountable, greatly affecting the fields of urban philosophy, economy, sociology, planning, design, placemaking and how cities are fundamentally viewed as organised complex systems (Hirt & Zahm, 2012).

The book is an attack on the principles that shaped 1950's American orthodox, modern city development and an introduction to alternatives principles. Jacobs (1961) is interested in basic things such as why some streets are safe and other aren't, and the success of some city parks and the failure of other. The fundamental issue with the urban development paradigm of the time was that it was fixated on appearances and behaviours of suburbs, fairs, towns and imaginary cities – everything but cities themselves.

Jacobs (ibid.) argues that cities are the appropriate laboratories for achieving a greater understanding for how cities operate, and consequently, how they should be developed. That through processes of trial and error, practitioners of city building can test their theories on cities. This opportunity has been ignored, unexpected successes haven't been investigated and the knowledge of why spaces fail or succeed hasn't been extracted.

In fact, knowledge itself is a subject for distain in the hearts of modern orthodox planners and city architects. The normative aspect of city building has taken its place in the decision-making mechanism of urban development. What cities *ought* to be, and what the urbanites *ought* to do dictate development rather than what actually goes on in cities. This pseudoscience of city planning developed – over years of nonsensical wishes – a complicated dogma filled to the brim with superstitions, symbols and oversimplifications. Urban planning and design haven't yet embarked on the great expedition of probing cities (ibid.).

The use of neighbourhood space

The sixth chapter covers the use of neighbourhood *parks*, but as Jacobs (ibid.) describes, her writings in this chapter also extend to parklike open spaces. Thus, parks are translated into squares for this section of the book. The first rule for these spaces is that they aren't easily understood, that simply inserting a square into a neighbourhood won't make it a delightful feature. The plea for more open space, Jacobs counters with; more open space for what? Open space to simply have vacuum between buildings or more open space for people to enjoy and use? Furthermore, Jacobs questions if people use space just because it is there, and a designer wish they would.

A square is unlike any other square which makes it hard to produce and work with descriptive generalisations that would preferably explain every intricate detail of any selected square. It is however possible to extract fundamental principles that can provide a better understanding

for why some city spaces work and other don't. Knowledge of these principles, Jacobs (ibid.) argues, will aid the understanding of the influences on city spaces of all kinds.

Cities and squares within them are distinctly physical places. To understand the behaviours of them, information needs to be gathered, not from metaphysical conceptualisations, but from observations of the physical occurrences within them. One such observation is that liveliness attracts further liveliness, and that the absence of life repels life. People want to be where other people are. This is accomplished by offering a diversity of surrounding functions that utilises the services of the square at different times of the day, creating a continuous usage of the open space. This variety of users can be cultivated through certain design qualities (ibid.).

Intricacy

Intricacy is directly connected to the diversity of reasons a square can offer to people to spend time in them. The reasons for different people to visit the same square can diverge severely, but the reasons for the same person can also be varied. One might come to a square to sit down and rest, to watch a game, to play, to show off, to keep an appointment, to fall in love and almost always to enjoy the presence of other people. If a square offers one view, as in, if a square can be completely experienced from one position, there is little reason to visit it as it wouldn't accommodate for the variety of moods and uses of urbanites. The same goes for squares that only supply spaces that offers the same experience as every other part of the square. Such monotony additionally won't necessitate further exploration (ibid.).

Intricacy is achieved through the provisioning of intricate details at the eye-level. Jacobs (ibid.) describes these as 'subtle expressions of differences', examples include the grouping of trees, ground-level changes and openings to focal points. These subtleties of difference then activate different usage which in turn accentuates the subtleties. Perceived intricacy is enhanced with increased usage.

Centering

One element that is vital for intricacy is what Jacobs (ibid.) refers to as 'centering'. Most successful small spaces usually have a place within them understood to be the centre, or some form of main crossroad or staying spot. In other words, the space has a climax area. Some small spaces are completely made out of a centre area, in these, intricacy is created through subtle differences at the periphery.

Jacobs (ibid.) gives an example of how these centres attracts activity. The fountain basin at Washington Square in New York is circular with four levels of steps towards the most sunken part of the concrete centrepiece. This, along with the fact that the fountain is dry most of the year, creates an arena or theatre that experience constant activity by actors and audiences. The distinction isn't necessary however, as those being watched are often watching themselves. Jacobs conclude that the centres that provide a stage setting are the greatest.

Sun

The sun has a vital role to play in order to create a space worth spending time in. But the existence of a sun in itself isn't reason enough to spend time in any square. If a high-rise building is located perfectly to block all sunlight from a space it will be scarcely used. Jacobs (ibid.) points to Rittenhouse Square that has a great big apartment building across from it that creates a great big shadow over a third of the square which results in that third receiving almost no human activity.

Enclosure
Too much of buildings could have a negative effect through the blocking of the sun, but too little of buildings may be even worse. The presence of buildings around squares is necessary to encourage maximum usage. The buildings offer enclosure if they surround the space efficiently. Definite places that are shaped by the surrounding buildings signifies the existence of place rather than the absence of construction. The space becomes an area of great importance, a special feature, not a left-over. Undefined land around buildings are repelling to people. A downtown space with individual buildings located here and there in it experiences little to no activity. Public space users are looking for settings that accommodates their needs, not the needs of people within the buildings. The buildings are the backdrop, the square is the foreground (ibid.).

William H. Whyte (1980) The Social Life of Small Urban Spaces

Introduction
William H. Whyte, an American 20th century urbanist, journalist and avid 'people-watcher' formed in 1970 a small research group called *The Street Life Project* with the seemingly nondescript purpose of looking at city spaces. This practice of direct city observation was at the time a relatively novel method in the U.S., which made Whyte's work quite influential in the field of placemaking. The project entailed studying cross-sections of 16 plazas, three small parks and a small number of odds and ends. The study took six months to execute but communicating the findings required three years of work. In 1980 Whyte published the results gathered from his work with *The Street Life Project* in, what he describes as, a manual for creating spaces that that work for people. The book is called *The Social Life of Small Urban Spaces* and is accompanied by a documentary film with the same name (Whyte, 1980).

The book and the documentary roughly cover the same ideas with the book providing more details in terms of statistics and explanations. The seven basic factors for creating social life in small urban spaces outlined in the documentary can all be attributed to a chapter in the book.

Basic factor	Chapter
Sittable space	**2 Sitting Space**
Sun	**3 Sun, Wind, Trees, Water**
Trees	
Water	
Food	**4 Food**
Street	**5 The street**
Triangulation	**11 Triangulation**

Table 2 - Basic factors and corresponding chapters in The Social Life of Small Urban Spaces

The remaining chapters of the book doesn't have direct correspondence in the documentary but do contain content that is mentioned to a varying degree in the documentary, those are chapters 1 (The Life of Plazas), 6 (The "Undesirables"), 7 (Effective Capacity), 8 (Indoor Spaces), 9 (Concourses and Megastructures) and 10 (Smaller Cities and Places). For this summary, focus will be on chapters 1, 2, 3, 4, 5, 7 and 11 as they serve the greatest utility towards accomplishing the aims of the study.

The Life of Plazas

In the first chapter of the book Whyte provide further information about how the project group gathered data. Time lapse cameras surveying plazas took record of the daily patterns. This together with interviews with people at the plazas constitute the data sources. Although interviews provided important information such as where people worked, how often they visited the plaza, where they were from and what they thought of the square, most of the time was spent watching people. One finding was that the area for which a plaza serves as a 'watering hole' for have a radius of about three blocks (ibid.).

Whyte continues by making a reference to the old economic model of supply and demand but puts the relationship on its head. Instead of supply being necessitated by a demand, demand is created by supply. An assertion in the same vein as "If you build it, they will come". The best places are the most sociable ones, and the indicators for these places is couples, people in groups and women. These groups are the most selective when it comes to deciding where to stay in public. If a plaza is inhabited by a low percentage of women or groups, chances are that the plaza is one of the less popular plazas in town. In New York the five most popular plazas had a percentage of 45% groups while the five least popular had 32% groups (ibid.).

The daily patterns of plazas are quite similar from one plaza to another. The morning activity of people at the plaza is sporadic. Around noon, activity will increase, the main clientele has arrived. Soon after this, the place will reach peak activity and remain around this amount until two. About 80% of the total activity will occur between twelve and two. The distribution of activity was also quite consistent from day to day with activity heavily congregating to certain parts of the plazas whilst ignoring other sections. Amount of activity at the plazas was dependent on local weather conditions and season. The location of off-peak hour activity provided clues for which areas are prioritised (ibid.).

Self-Congestion

The central theme for much of Whyte's work, as well as for some of his contemporaries such as Jane Jacobs and Jan Gehl, is that what attracts people to a place is the existence of other people at this place. Which is counter to what some usual platitudes people like to spout when describing an attractive setting, terms such as "oasis", "escape" and "retreat". Because of this, Whyte puts greater emphasis on what people do than what they say, and people do act as if they are attracted by the presence of other people (ibid.).

Evidence for this can be observed in how people choose to position themselves when engaged in street conversation. Instead of moving out of the main pedestrian flow, people opted to stand smack down in the middle of it, sometimes even moving into it. Whyte utilises the real-estate term, the 100% location, to describe this phenomenon. The same behaviour was observable in plazas as well. At plazas, other magnetic areas are those adorned with objects like a statue or flagpole, well-defined places such as borders of pools and steps are also appreciated. Generally, centres of larger spaces are avoided. These underlying behaviours

observed seems to be consistent across places and cultures as Whyte refers to Gehl's work in Copenhagen and Matthew Ciolek's work with Australian shopping centres (ibid.).

Sitting Space

Why people choose some plazas over other was essentially the main research question for Whyte. Originally, the presence or absence of sunlight were hypothesised as the determining factor between popular and unpopular plazas. In other words, plazas that captured a greater amount of sunlight would be more popular than those that didn't. This turned out to be less important than other attributes for explaining discrepancies in usage between plazas. Some aspects were not possible to test, such as enclosure which was a factor Whyte hypothesised influenced usage. Another factor that was proven to be less important was shape, or at least strip plazas. Strip plazas are public places that are more than three times as long as they are wide. The result show that many strip plazas were unpopular, but also that some of the most popular plazas were strip plazas. Inconclusive results and thus not a critical factor (ibid.).

Another hypothesis was that usage and the amount of open space would have a positive relationship. It makes perfect sense that bigger places could, and therefore would, host a greater number of visitors. There was however no clear correlation, some small spaces had lots of usage just like some larger spaces, and the unpopular plazas were also varied. Space is not a determining factor for usage (ibid.).

The factor that was critical, it seemed, was the amount of sittable space. The relationship between amount of sittable space and average number of people sitting at peak hours was rough but present and positive in nature. The more used plazas have more spaces where people can sit. From this, Whyte draws the conclusion that people sit where most sitting is possible. Whilst this isn't a ground-breaking discovery, it provides essential insights into the basic decision-making mechanism of individuals and groups as well as excellent basis for decision-makers in the political arena. Whyte (p.28) explains why seating is so important:

> *The most attractive fountains, the most striking designs, cannot induce people to come and sit if there is no place to sit*

Integral Sitting

People will sit at places where sitting is possible, but things aren't that black and white. Seating can be sittable to a varying degree. One of the factors for how sittable a space is, is comfortability. Physical comfortability is important, but far more integral is the social comfortability of a seat. Socially comfortability can be translated into variety or diversity. Meaning that there are many types of seating at a space, in the sun, to the side, in the shade, in the back, in groups, up front and off alone (ibid.).

Whyte argues that making a space sittable through social comfortability and choice is easier than not doing it. Most plazas have some sort of elevation in them that require designer to build steps or at least levels of flat surfaces. These inherent features of public spaces are ample subjects for maximisation of sittability. Benches and chairs could be added but if seating could be added without having to resort to such measures, that would surely be ideal. This include making ledges or other flat surfaces physically sittable (ibid.).

Sitting Heights

So, what does make something physically sittable mean? Height is the obvious factor; a too high seat won't be accessible for many and hence not sittable whilst a seat to close to the ground would be physically strenuous. A rule of thumb would be desirable. Whyte and his group couldn't pin-point any exact height that was best suited for sitting, but rather an interval that seemed to be a range for sittability. Between one and three foot, which roughly equals 30 to 91 centimetres, is the recommendations for sitting height (ibid.).

Height, as in turned out, wasn't the most pivotal factor for physically comfortable seating. Most important was depth. Many of the ledges observed in the study couldn't be sat on from both sides, and some wasn't even deep enough to sit on from one side. The recommendation for sitting depth was at least 76 centimetres but preferable 91 centimetres (Whyte uses inches, 76,2 cm and 91,44 cm is the exact conversions). This depth allows ledges to be sittable from both sides comfortably. Whilst this wouldn't double the usage of the space it would offer the privilege of choice, in other words, social comfort (ibid.).

This attribute of variety is why steps are popular, they provide clientele with an abundance of options to arrange themselves at different levels. Corners are also popular, especially those with right angles. They offer people the choice to sit face-to-face and are therefore desirable locations for groups (ibid.).

Benches

Benches, Whyte argues, are atrocious civic elements that only serve as decoration for architectural photographs. They do not accomplish what they are built for, sitting. The problems of benches are many, there are too few of them, they are isolated from other seating or where the action is, they are to small and they are cemented to a permanent location, inhibiting relocation if the wrong location was chosen, which is often is (ibid.).

Chairs

Movable chairs, on the other hand, is a great invention, according to Whyte. A backrest as well as armrest are physically comfortable designs, but the key asset is movability, in other words choice and social comfortability. Chairs provide and almost infinite amount of options, to sit in groups, sit alone, in the sun, in the shade, face the theatre of the sidewalk, to sit in internal contemplation and so on. And perhaps more important than the actual act of making a choice is the existence of the possibility of making a choice. What perception a space make in the minds of its visitor will affect its usage. Is the place filled with different seating, is it a place that allows people to choose how to enjoy it? Deciding induces people with autonomy and self-worth, "I made a decision, I know what I want" (ibid.).

Chairs that aren't movable however, is not to recommend. They make for wonderful decorative objects but horrible seating alternatives. They are set. They can't be manipulated to satisfy the ever-changing character of social comfortability. The distances between fixed chairs are permanent and therefor doomed to provide only one option, and thus rarely right for anyone. Fixed chairs are often located in squares to make them isolated from anything else, the lone chair is awkward because it forces people to be alone. Something that theatregoers knows to be an unnecessary strategy for creating a socially comfortable sitting setting (ibid.).

How Much Sitting Space?
The amount of sitting space is an area that Whyte and his team spent too much time trying to figure out. The simple but correct answer is more. Every plaza they studied, even the most popular ones, had room for about 50% more sitting place. Whyte do offer a final recommendation which is to have approximately 11 centimetres (Whyte uses feet, 10,7639… cm is the exact conversion) of sitting space for every square metre of plaza space. A 30 metre by 10 metre public plaza ought to have 33 metres of sitting space in it ($(30 \times 10) \times 0{,}11 = 33$) (ibid.).

Sun, Wind, Trees, and Water

Sun
Sun, Whyte hypothesised, would have a great impact on the usage of a space, and early observations made sunlight seems like the determining factor for where people choose to sit. The camera footage of Seagrams plaza showed people almost systematically sitting in the part of the plaza that, at the time, was adorned with sunlight. Later, in June, sunlight was proved to be of lesser importance than the early observations indicated. People stopped following the path of sunlight at plazas as the studies ran longer into the summer (ibid.).

Whyte declares that warmth is as important as sunlight for achieving a pleasant public space condition. Sunny days are not the days that plazas are used the most, it is the hot days, overcast or sunny, that draws the most people to the plazas. Important variable is also the relative warmth, as in days that are warmer than the days before it. The first warm day in spring is usually a peak day even though that temperature would be deemed too cold later in the year. Sunlight isn't unimportant. It should be protected. But it is not the be-all and end-all for fostering a pleasant micro-climate (ibid.).

Wind
If warmth is as – if not more – important than sunlight, then how can warmth be properly produced? Whyte proposes the concept of suntraps. Suntraps are spaces that effectively utilises the warmth naturally provided by the sun. To create suntraps, consideration needs to be taken to winds and drafts as much as to the sun. These places are usually smaller public spaces enclosed on three sides. These spaces don't just offer a desirable micro-climate, it is also a space of psychological comfortability (ibid.).

Trees
Trees have plenty of positive impacts on public spaces. In terms of creating spaces that are catered towards humans, trees deserve to be included. The recommendation Whyte offer is to place trees in connection to sitting places. The finest place to sit, according to all observations executed over the project, is overlooking the scene of the public life whilst residing under the comfortable protection of a tree. The tree functions as enclosure in the same way a street cafe's umbrellas does. Trees also provide desirable micro-climate control; their shade cools people down (ibid.).

Water
Water is another great option for public spaces and can come in many different forms such as waterwalls, fountains, sluiceways, waterfalls, pools, rapids and meandering brooks. The important aspect for water is not just the existence of it however, access is pivotal. Whyte

expresses his enjoyment by referring to its look and feel. But many cities make water that shouldn't or can't be touched. This, to Whyte, constitute a moral crime, to show people water but inhibit them from interacting with it. The recommendation for water is that it should be accessible, touchable and splashable. Water also have a desirable sound. When New Yorkers explain why they find Paley Park quiet, the waterwall is always mentioned. The waterwall is very loud, about 75 decibels, which is louder than the noise at the street. The sound of water functions as white noise and drowns out the unpleasant sounds of the street, it also masks conversation which allows for people to speak loudly to each other without the fear of on-lookers to hear (ibid.).

Food

An effective strategy for attracting human activity is to offer food, every plaza or set of steps with flourishing social life have a food vender at the corner of it, Whyte and his team found in their study. Food venders depend on their ability to identify spaces that work, because these spaces will bring customers. The vendors can provide a service that regular permanent commercial establishments can't because they aren't fixed to any on spot and can therefore adapt to locational changes in demand (ibid.).

Food have an attractive effect on humans, humans also have an attractive effect on other humans. In other words, bring food and people will come which in turn will make more people come. Whyte tested this by putting up a food cart in a new plaza. The food cart was an immediate success. An increase of people at the plaza was observed. This justified the existence of another vendor, and so a pushcart vender put up shop on the sidewalks. Another vender put of up shop as well. The customer numbers for all three vendors increased. In time, the restaurant at the plaza opened an outdoor café. The food services snowballed the number of plaza-goers more so than becoming competitors (ibid.).

The Street

The most important aspect of a plaza isn't a part of the plaza, it is how the plaza is connected to the street. The previously mentioned factors; sittable space, sun, trees, water and food, are important but are amenities that can be added at any point. The relationship between the street and the plaza is integral and permanent, it is the critical design factor for usage of any square. One aspect of this can be found in the corners of streets where activity can often be high due to the location of vendors. The pedestrian flow at corners is something that Whyte think should be utilised more, the corner offers a front row seat to the scene of the sidewalk, make it sittable and people will come (ibid.).

Another important aspect of the street is the functions connected to it. The retailing and the stores with their windows that display their services or product, signalling to catch your attention, but also with doors that have a lot of people moving through them. Whyte recommends that 50% of street level frontage ought to be designated for food uses or retailing (ibid.).

Elevation in a plaza is recommended in certain cases. The difference in levels justify the use of steps which, as previously mentioned, is a prime seating alterative. The steps can't create a barrier however, they should be stepped over trippingly and without much struggle. There is no rule of thumb for how great an elevation steps can constitute. The experience of steps is as much a product of physical conditions as psychological. As Whyte (p.58) describes:

> *One plaza that people could be expected to use, but don't, is only a foot or so higher than two comparable ones nearby. It seems much higher. The steps are constricted in width, sharply defined by railings, and their pitch is brisk. No ambiguity here; no dawdling; no drifting up.*

A bad constellation between streets and a plaza is to have a sunken plaza where the plaza is located on a considerately lower level than the conjoining streets. Whyte recommends that these public spaces ought not to be built as they are dead spaces where people feel like they're being watched without watching back. The people at the bottom of a sunken plaza constitute the show and the people above the audience in an amphitheatre. The problem is that the people visiting sunken plazas are not visiting the plaza, they're in the rafters of the plaza. About 80%, Whyte shows, of the people at the plaza is standing above at street level (ibid.).

Effective Capacity

The previous sections of the book have mainly been focused on ways for improving city spaces to make them more attractive to humans. But what if they become too attractive? Could the attractiveness and newly attracted clientele of an area diminish the aspects that made the space enjoyable in the first place? How many people is too many? This, Whyte attempts to tackle through an investigation into what the carrying capacity of a space might be (ibid.).

The team looked at five popular sitting spaces and recorded the average number of sitters at each spot at peak and off-peak hours. The number of people sitting, and the number of available sitting spaces differed from each other greatly. At the most used spaces, between 33 and 38 people sat per 30 metre sitting space. The study was consistent enough to warrant a rough estimate for the average number of people that will sit at a prime sitting space at peak hours: the amount of sitting space in metres divided by 0,9 (Whyte uses feet, 0,9114 is the exact conversion) (ibid.).

This rule of thumb is not the physical capacity of a space, but rather the actual capacity of people that would, by free choice, sit at a space during normal peak-hours, in other words, the effective capacity. The importance is then put upon the supply of sitting space. This effective capacity is also informative of other activity at the plaza, Gehl have shown there to be a correlation between sitters and people standing or walking at the plaza (ibid.).

The distribution of people sitting at these five sitting spaces was not characterised as even, people generally sat close to where other people sat. Clustering was obvious. The amount of activity stayed quite even during peak-hours, however. This was interesting, peak-hours was the time when most people arrived at the sitting space, but also when most people left. Still, the number of people sitting remained between an interval of about three people. And it wasn't as though there was no more space to sit, available seating was always present. It seemed as if there was a self-regulating factor at work. As Whyte (p.69) puts it:

> *It's as if people had some instinctive sense of what is right overall for a place and were cooperating to maintain it that way, obligingly leaving, or sitting down, or not sitting, to keep the density within range [...] Whatever the mechanism, there seems to be a norm that influences people's choices as much as the immediate physical space. Thus is effective capacity determined.*

Triangulation

The final factor for creating sociable urban spaces is what Whyte calls triangulation. Triangulation occurs when an external stimulus arouses common interest by strangers, inciting the possibility of communication between them. It could for example be two people standing at a street corner, a third person appears and starts to preach about a shadow government. This action links the two people together and provides opportunity for them to exchange comments about the human comedy at display for them in a tone usually used between close friends (ibid.).

Examples of elements that elicit a triangulation effect are sculptures, musicians and entertainers. Sculptures have strong social effects, they provoke people to touch them, to walk under them, stand under them, talk about them. Musicians and entertainers become magnets for strangers when they perform. But the important aspect of street performers isn't the quality of the performance itself, the importance is in the ability to gather people. When people stand around a street performer, a considerable amount of people aren't watching the performer, they're watching each other. The bonding of city strangers will occur even if the performance is sub-par, in fact, a really bad act might be more effective for fostering sociability than a good or mediocre one (ibid.).

In Praise of Odds and Ends

Whyte concludes his book by praising the smaller spaces if cities. And provides a practical argument for why smaller spaces needs to be emphasised to larger degree. Small spaces with a high density of human activity and efficient use of space are, according to the findings, the places people appreciate most and find most peaceful and least crowded. The preference for busy spaces is evident by the behaviours of people, as Whyte (p.100) proclaims:

> *I am, in sum, bespeaking busy places. Too busy? Too crowded? I think not. As we have seen, people have a nice sense of the number that is right for a place, and it is they who determine how many is too many. They do not, furthermore seek to get away from it all. If they did, they would go to the lonely empty places where there are few people. But they do not. They go to the lively places where there are many people. And they go there by choice—not to escape the city, but to partake of it.*

Furthermore, some of the most successful places are often created by accident, they are niches, leftovers, odds and ends of space that work for people. Whyte refers to a window ledge that is low enough to sit on and recessed deep enough for wind protection. The location of the ledge makes it so it's in sunlight most of the day. Pedestrian flows in front of the ledge is equivalent to a parade and there is an orange juice vendor at the corner. The place is truly magnificent and it's not the only one of its kind. Most are created by a process of inadvertence, imagine what could be if someone planned them (ibid.).

Clare Cooper Marcus & Carolyn Francis (1990) People Places

Introduction

Clare Cooper Marcus, the former professor at the Department of Architecture and Landscape Architecture, University of California, Berkeley, along with Carolyn Francis, former Ph. D candidate at the Department of Architecture, University of California, Berkeley, edited the 1990 book *People Places – Design Guidelines for Urban Open Space*. Cooper Marcus became interested in the small details of the landscape since a young age, she worked as a city planner in London for many years and describes herself as being drawn to informally observe people in public. Francis was specifically interested in the interface between humans and their environment (Marcus Cooper & Francis, 1990).

The introduction of the book outlines the central issue regarding public places, that the plaza's, the square's, the piazza's necessity has diminished in accordance with cultural and technical development that have privatised many of the functions that the traditional public spaces originally provided. Cooper Marcus & Francis contends with this sentiment, acknowledging that the functions of the old public spaces are replaced by personal solutions but highlights the inherent loss of public life accompanied by such privatisation. Just because most daily necessities, in forms of occupation, socialisation, entertainment, cultural enlightenment and so on can be quenched from the comfort of an apartment, doesn't mean that humans don't desire the experience of public life, and does not make the contemporary plaza unimportant. In fact, such privatisation may magnify the human desire for public interaction and hence also the need for good urban public spaces (ibid.).

Cooper Marcus & Francis continues by noting that the activities that traditionally occurred in the central plaza have been replaces by segregated spaces that cater to a specific clientele and that this function-user specialisation is the fundamental fact of contemporary life in urban North America (but can observed generally in the developed western world). This distinction between function and form is the ignored aspect of public life. And whilst old Italian piazzas can't offer models for functions that would be applicable to a contemporary perspective, the forms, in terms of enclosure, height-to-width ratio and furnishing, of medieval public spaces can be very insightful for enhancing the use of contemporary urban public plazas and squares (ibid.).

The book has seven parts, all dedicated to a certain type of public space. This summary will cover chapter one on urban plazas. Authors of the chapter are the aforementioned editors Clare Cooper Marcus and Carolyn Francis along with Robert Russel, a landscape architect from Quincy California.

Is there a role for the urban plaza?

A common reaction to modern plazas is disappointment, the ideal public plazas in Barcelona and Siena act as an unconscious comparison and renders contemporary attempts of plaza creation as inadequate. The love for the Italian and Spanish versions of public forms is evident in the common use of 'plaza' or 'piazza' instead of the English 'place' when referring to these city elements. But it such a distinction warranted, aren't the modern plaza in many ways the same as the traditional piazza, both are in connection to the buildings of power, in medieval times the cathedral, in modern, the skyscraper (ibid.).

The important difference between the two can be observed in the type of activity occurring at these spaces. Cooper Marcus & Francis refer to observational studies that demonstrate that more than 90% of the activities that occur are some combination of standing, sitting, walking, eating, reading, listening and watching. This is very different that the life of plazas in medieval times as mentioned in the introductory part of this summary. But that does not mean that public life is going out of style (ibid.). In fact, U.S. studies (Whyte, 1974) from the 1970's show

an increase in public activity and a study (Gehl, 1987) from Copenhagen between 1968 and 1986 also observed increase in public activity.

Definition

Cooper Marcus & Francis (1990) refer to two definitions of a plaza before outlining what they intend by plazas. J. B. Jackson (1985) define a plaza as 'an urban form that draws people together for passive enjoyment'. Kevin Lynch's (1981) definition is more detailed and include aspects such as being paved, surrounded by streets and enclosed by buildings. Lynch definition also include function specifications such as being the centre of an intensive urban area, an activity focus, attraction and meeting facilitator.

The definition used in the book have a measurable criterion, which is that more than 50% of the area must be hard surfaced. The space must be outdoor and be a space where cars are excluded. The purpose and function of a plaza is to provide the possibility to stroll, eat, sit and watch the world go by. The plaza distinguishes itself from a sidewalk by being a destination itself rather than a space meant to pass through (Cooper Marcus & Francis, 1990).

A typology of downtown plazas

This section is meant to provide material that can aid in the understanding of the varying spaces that can be described as urban plazas, categorisation of these plazas and development of guidelines for these plaza types. Categorisation of plazas can be performed in different types of categories. Size, relationship to street, predominant function, location, use, style, architectural form and so on and so forth. Cooper Marcus & Francis focus in the book is on the interplay of form and function, resulting in the categorisation being a mixture of forma and use. Five categories, with sub-categories are outlined (ibid.).

The Street Plaza

When a space in direct connection to the street is public open space it is a street plaza, it could sometimes be a simple widening of the street or be under the protection of an arcade. Most of the people at these plazas are sitting, waiting or watching and most of the users are usually men (ibid.).

Six sub-categories of street plazas are identified by Cooper Marcus & Francis. The first is the seating edge which is simply a wall or edge that is at seating height. The second is the widened sidewalk which denotes a widened portion of a sidewalk that have been furnished with steps, blocks or bollards, used by people to view the flow of the sidewalk. Bus-waiting place is the third sub-category and it has a self-explanatory use, these bus-waiting spaces are sometimes furnished with a bench, litter container or kiosk. The fourth is a pedestrian link between two blocks or plazas, usually an outdoor alley or passage, almost exclusively used for walking. The fifth, a corner sun pocket, a corner-part of a block where two streets intersect that offer sun during lunchbreak, used for sitting, eating and viewing. The final sub-category is the arcade plaza which is a street widening that is has an overhang from a building in the form of an arcade or colonnade (ibid.).

The Corporate Foyer

The purpose of the corporate foyer is to present an impressive entry to the corporate building its adorning. The space is publicly available but can be closed off after business hours. It functions in large part as a pleasant image for its corporate sponsor.

There are three sub-categories of the corporate foyer. It can take the shape of a decorative porch, a small entry that can be planted and furnished with some seating or water element, usually to shaded or narrow for heavy usage. Another corporate foyer is the impressive forecourt which is large in size and adorned with fine materials such as marble and travertine, these plazas are often made to discourage sitting and designed for passing through. The third and final type is the stage set, a very large public space with the purpose of providing a frame for the tall building it is connected to, use by 'undesirables' is discouraged (ibid.).

The Urban Oasis

The urban oasis is a heavily planted plaza with garden or park characteristics. Its design and location are meant to provide an alternative to the haste of the city. These plazas are often popular, and it is the one category of public spaces that attract more women than men. A place for quiet reflection (ibid.).

Three types of urban oases exist. The first, an outdoor lunch plaza that is separated from the street, either by a level difference or by a wall, furnished with seating for lunchtime use, attractively planted and often accompanied by a café or restaurant. The garden oasis is a plaza with a variety of plant density that conveys the image of a garden often adorned with a water feature and a diversity of seating alternatives. The final sub-category is the roof garden, appropriately named because they are located on rooftops and are used for viewing the city (ibid.).

The Transit Foyer

This type of plaza has the purpose of providing a space for easy access to dense transit terminals. The design of these spaces is often not encouraging activities often than walking, but they can become gathering places for people-lookers because of their dependable and constant pedestrian flow (ibid.).

There are only two transit foyers described. The subway entry place is a place connected to a subway station that is meant to walk through or for waiting at but can be popular for certain groups such as teens because of their proximity to transit stations. The other type is the bus terminal that are natural places for people entering or leaving the city, mostly used for people walking but can become destinations for venders as it is an obvious location for people to be at (ibid.).

The Grand Public Space

The closest counterpart to the old piazza can be found at the grand public spaces. It's often the watering hole for a greater population with a greater diversity of demographics than other plazas. It can host a plethora of activities such as al-fresco lunches, passers-by's, art shows, political or other rallies, outdoor cafés, concerts and exhibits. Often publicly owned and considered the heart of the city and the location for the annual holiday manifestation such as a Christmas tree (ibid.).

The two grand public spaces presented in the book is the city plaza and the city square. The city plaza is a space mostly constituted of hard surfaces, highly visible and centrally located that are the host for programmed events such as performances, political rallies and concerts. The city square is also centrally located, at the intersection of main thoroughfares, but unlike other plazas, is it not connected to any one principal building, instead often surrounded by one or two complete city blocks bounded by streets on all sides. The hard surfaces and planted elements are usually balanced, meaning that the space could be experienced as a mix between a plaza and a park. The square is often adorned by a monument in terms of a fountain or a statue. A variety of activities occur at this space (ibid.).

Design Recommendations

Location

The best location is in an area with mixed use, as in an area with hotels, offices, luxury and apartments creates demands from families, workers and tourist which in turn creates demand for cafés and vendors. Cooper Marcus & Francis (1990) refer to a study (Chidister, 1986) that showed that the most popular plazas are those located in the areas of greatest land use diversity. A recommendation for regions that have a climate that can't sustain usage of outdoor space for more three months of the year should seriously consider building an indoor space instead.

Size

Size is a difficult aspect as every space has its context that can motivates its magnitude. Two recommendations are presented. Lynch's (1971) suggestion is to have the dimensions of a square be between 12 and 24 metres (Cooper Marcus & Francis uses feet; the exact conversions are 12,192 m and 24,384 m) to create an intimate human-scaled space. Jan Gehl (1987) proposes that the maximum dimension of a square be between 70 and 100 metres, and to combine this with the maximum distance to see facial expressions, 20 to 25 metres.

Visual Complexity

It has been showed in studies from New York, San Francisco and Vancouver (Joardar & Neill, 1978) that a positive reaction from visitors is connected to the perception of the space as contained with a variety of visual element, in terms of textures, colours, landscape element, seating alternatives and so on. A complex and unpredictable environment is appreciated as a much-needed break from the monotonous flow of visual components reoccurring day in and day out at the city centre offices. This complexity needs to be produced in the design process of spaces, for example the set of steps at Crocker Plaza in San Francisco is a success because the continuous pedestrian flow in front of the plaza creates an ever-changing display of passers-by (Cooper Marcus & Francis, 1990).

Passers Through and Lingerers

Cooper Marcus & Francis (1990) refers to the work by Pushkarev & Zupan (1975) which concluded that plazas can't offer space for people passing through it and people staying put in the same part of the plaza. Passers-by don't want to weave their way through a crowded fountain area of the plaza, and lunch eaters and people watchers don't want people walking past them only a few feet in front of them. In order to make people linger in a place it is recommended to provide designs that allow people to attach and anchor themselves to it, both

physically (leaning, sitting) and psychologically (looking at, being in the presence of), a study by Joardar & Neill (1978) showed that less than 1% of people in a plaza will perform activities at the open space away from physical artefacts.

Male and Female Users

Male users are over-represented in most downtown plazas (Dornbusch & Gelb, 1977), female users are more likely to arrive at a plaza in groups, but exception to this occurs when food is served at an urban space. Some of the findings presented by Whyte (1980) in respect to the difference between male and female users are contrasted with later studies that demonstrate that, contrary to Whyte's sentiment that female users are more picky, a better analysis of the over-representation of male users at plazas is that a particular sex, age or ethnic group appropriate public space so others are reluctant to intrude (Cooper Marcus & Francis, 1990).

The difference in preferred seating that Whyte (1980) observed is something that Cooper Marcus & Francis (1990) also observed in studies in San Francisco. Men choose the locations in the front whilst women prefer the secluded areas of the plaza, Cooper Marcus & Francis (1990) refer to this secluded area as the urban oasis. One significant insight that can be concluded is that the variety of users, in terms of sex and age, is increased with an overall higher usage of the plaza (PPS, 1978).

Cooper Marcus & Francis (1990) refer to a study by Louise Mozingo (1984) that investigated this difference in preferences between the sexes. Mozingo concluded that women, generally, don't want to be put on display in public, and with good reason, women's personal space was intruded twice as often as a man's space was in the study. Men perceive the public realm as a space for human interaction and are thus more tolerant of personal intrusion. Women perceive the public realm as a relief from the office environment and urban stress and thus prefer natural environments that are secure. Mozingo proclaims that these differences shouldn't be a conflict between comfort and involvement, relief and social interaction, rather be posed as the challenge for the designer to integrate the two uses into the same plaza.

Vandalism and "Undesirables"

Cooper Marcus & Francis (1990) conclude that the most effective way of combatting vandalism, crime and 'undesirables' (homeless, vinos and old unemployed men) is to make sure a space is frequently used (Whyte, 1980; Department of Landscape Architecture, 1975). The recommendation is thus to have a plaza design that invites heavy usage, this would be most beneficial long-term even though additional maintenance cost from wear and tear and littering would arise (Cooper Marcus & Francis, 1990).

Microclimate

The microclimate in a plaza or urban open space is important to achieve desirable comfort that would justify spending time in them. The pivotal factors that affect outdoor comfort are sun, temperature, wind and humidity. Cooper Marcus & Francis first recommendation is to locate plazas to maximise the amount sunlight permitted by the surrounding buildings. Consideration to the movement of sunlight in the plaza must be taken to optimise the sunlight conditions for summer and winter seasons. If this becomes difficult to accomplish due to existing structures, designers ought to utilise 'borrowed' sunlight from reflection of off nearby marble, steel or glass buildings (ibid.).

Cooper Marcus & Francis (1990) refer to Gehl's (1987) and Pushkarev & Zupan (1975) works to confirm that at a temperature of 13 ºC (Cooper Marcus & Francis uses Fahrenheit; the exact conversion is 12,78), there is a considerable increase in pleasure activity, activity that is made from pleasure rather than obligation. Cooper Marcus & Francis (1990) therefore suggest that predictions of locations for seating during noon-hours ought to be calculated for the months of the year when average noon temperatures are 13 ºC or higher. An additional recommendation is that spaces that will experience temperatures up to 24 ºC (Cooper Marcus & Francis uses Fahrenheit; the exact conversion is 23,89) ought to provide shaded areas and seating.

Wind is another factor that affects comfort, and that is known to many designers. With tall buildings, wind phenomenon such as wakes, cornerflows and downwashes that are created from high-rise buildings deflecting winds downwards making sitting, standing and walking increasingly difficult. The solution for this, Cooper Marcus & Francis (1990) argues, can be found in alternative building envelopes and by coordinating relationships between the sizes and shapes of surrounding buildings to the affected area.

Boundaries and Transitions

A good plaza, Cooper Marcus & Francis argues, ought to strike the balance between being a distinct place and being accessible to passers-by. The adjacent sidewalk is vital to provide activity to the plaza, the recommendation is to have one but preferable two sides connected public streets. The plaza ought to be perceived as an extension of the sidewalk the pedestrian is currently walking on, this increases the possibility for the passer-by to stay. To avoid creating barriers or level changes is important to maximise the number of passers-by that linger in the space (Pushkarev & Zupan, 1975).

In the plaza, the most important part is often the sides and edges. To infuse the street level surfaces of buildings with functions such as retail stores and cafés is important to attract people to the space. Cooper Marcus & Francis (1990) also concludes that the phenomenon that people tend to sit at the edge of spaces is a universal law and that seating ought to, therefore, be located at the sides for viewing and sitting. A further recommendation is to create edges with many 'ins-and-outs' rather than straight edges.

Subspaces

Large plazas that aren't designed to host public gatherings, rallies or markets should be divided into smaller subspaces to encourage greater use. Large open spaces without furniture, planting and other people have an intimidating presence, Cooper Marcus & Francis argues. Most people prefer the enclosed experience over the exposed experience, this will lead to spaces that are left open and un-defined will have people quickly passing through or staying to the edges. Subspaces can be created through planting, seating, level change and construction. These division aren't just visually pleasing aspects of spatial design that allow spaces to be perceived as more densely occupied than if the space was left ambiguously undivided, they also encourage users to locate their own enclosed niches of space and linger (ibid.).

Careful consideration needs to be taken to how an effective subspace that create this effect of division whilst not creating a space that is segregated to other spaces, a clear but subtle distinction of spatial division is necessary. Cooper Marcus & Francis provide an example where a sunken mini plaza combined with a subdivision by an iron railing creates a place that feels like the inside of a prison cell. This level of division is too great and undesirable. The size

of these subspaces is also an important factor, make it too small and it will be perceived as a private room that one shouldn't intrude open, make it too big and people will feel intimidated or alienated if they're sitting there alone (ibid.).

Seating

Generally, Cooper Marcus & Francis abide by Whyte's (1974) fundamental insight; people sit most where there are places to sit. Three further observations are presented regarding sitting behaviour, specifically four phenomenon that gathered sitting activity: 1) artefacts of different sizes and shapes, such as planting edges, steps and benches, that are located close to focal elements gathered sitting activity, 2) fountains and sculptures gathered sitting activity, 3) edges gathered sitting activity and 4) other people gathered sitting activity. The recommendation is to provide ample alternatives for sitting, resting and leaning in plazas if stationary activities is to be increased (Cooper Marcus & Francis, 1990)

Who Are the Sitters?

Cooper Marcus & Francis identifies five types of sitters at plazas. The first is simply people waiting for a bus or taxi. The second is users that position themselves at the side of a plaza to view the passing traffic of the sidewalk, technically they're sitting at the fence of the plaza, but an important focus group, nonetheless. The third groups of sitters are those who sit just inside the plaza viewing the activity occurring in the plaza, these are usually single users, seating ought to be designed so people can sit next to each other at these locations instead of using group arrangements such as right angles and opposite positions. The fourth, and most common users, are those positioned not too close to buildings entries and not too close to the sidewalk. These sitters are both groups and singles. Just like restaurant patrons gravitate to tables along the walls, these sitters sit predominately to the edge of plazas as well as at 'island seating'. The edges of plaza space can be increased by articulating the perimeter of the plaza which also has the possibility of creating subspaces. The fifth and final type is couples and lovers that prefer the secluded parts of plazas (ibid.).

People Watching

A gravitational area for sitting activity is where pedestrians are passing by. This, Cooper Marcus & Francis argues, should be operationalised by identifying the existing or likely pedestrian flows of an urban open space and locate a considerate amount of seating in viewing position of this pedestrian movement (ibid.).

Primary and Secondary Seating

Large open plazas in cities can become desolate, unwelcome, intimidating places if they have hard expansive empty open space or endless rows of benches combined with scarce sitting activity. But if seating is provided for not only from benches, the space seems to be less empty, even if it is. This is accomplished through secondary seating such as retaining walls, mounds of grass, seating walls and steps with a view. These seating alternatives become a part of the sculptural design of the space and thus create a plaza that doesn't seem as lonely as one where those sitting spaces are provided by through benches. The recommendation is to have 50% of total seating be secondary (ibid.).

Styles of Seating

A variety of seating is necessary to satisfy the variety of demands that the clientele of the plaza require. This is both in terms of location, which is evident from the different types of sitters, but also in seating postures. Benches are regular occurrences at plazas, and they can function as more than just benches, make the bench deep enough (91 centimetre) and it could act as a table and seating (ibid.).

Steps are popular options for sitting, they offer an almost infinite variety of constellations for people to sit, with different levels and locations at the steps. The steps are thus, in respects like variety of seating, a more viable option than benches. The steps need to be wide enough to provide physical comfortable seating. Steps might not provide desirable seating for groups of three or more as steps are linear. A better option for those groups is corners of planters, boundary railings, raised pools and other angled postures that allow for easier eye-to-eye seating (Joardar & Neill, 1978). The recommendation is to articulate ledges and edges to encourage use.

A rising trend that Cooper Marcus & Francis (1990) notices is that more people bring their lunch to work rather than eating out, and whilst eating at a bench is possible, eating at a table is preferred. A pleasant addition to public tables in urban open space is umbrellas that provide four functions; 1) a sense of spatial enclosure, 2) shade generator, 3) protection from downdraft of tall buildings and 4) a visual inviting cue for passers-by.

Sitting Alone and in Groups

Seating for users that come to plazas as singles have different demands that those coming in groups. People coming alone doesn't require seating that allow eye-to-eye contact but have not necessarily anything against sitting near other people. Coop Marcus & Francis have two recommendations for such seating. The first is straight sitting alternatives provided through steps, ledges or benches that doesn't force sitters to face each other but instead offer natural space between sitters. The second recommendation is circular benches centred around planters, this allow for an abundance of seating facing all different directions, this is called 'sociofugal' seating. Desirable seating for groups of three or more are benches with corners of right angles, benches curving inwards and wide, backless benches. Other preferable alternatives are movable chairs and tables. These alternatives allow for face-to-face sitting (ibid.).

Orientation of Seating

A variety of seating for different users also includes providing a variety of orientation options. Variety of orientation means a variety of vistas and views over the urban space, some people want to see passers-by, other wants to watch water, other distant views and some want to observe the nearby programming of the space. The orientation diversity also provides a variety of sun-kissed and shaded areas (ibid.).

Planting Variety

Smaller areas require a variety of plants to create a diverse and visually interesting scenery to attracts sitters and passers-by. This variety of planting is especially important for plaza users that are alone, without an obvious behavioural prop such as a lunch or book or in a plaza with few people passing through (ibid.).

Height of Planting
The recommendation Cooper Marcus & Francis offer for planting height and mass to not obstruct the view of a performance or activity area from plaza users. For sunken plazas, planting ought to be tall enough to exceed the street level to contribute to the street experience (ibid.).

Boundary Planting
Plantings may be utilised as boundary articulators if the plaza is surrounded by bounding buildings that are inaccessible by plaza users. The trees will function as screens and if the bounding building have few windows that needs to be considered, denser tree species is recommended (ibid.).

Importance of Colour and Fragrance
The colour palette of a plaza naturally effects the users' enjoyment of it. Plants such as trees and shrubbery with varying colours will attain this effect, so will annual and perennials. Along with the colour aspect, fragrance is a pleasant addition from adding plants to a plaza (ibid.).

Provision of Lawn Areas
The perfect position of a lawn area is flush with the main circulation and seating part of the plaza with a slight slope facing the activity. This position will allow for an aesthetic view that deviates from the office environment, space for people to more casually sit or sunbathe in than at benches as well as it will allow lawn-users to easily observe the action passing them by (ibid.).

Aesthetic and Psychological Effects of Level Changes
Level changes in plazas are visual component that have psychological impact on the plaza users. A plaza that entail some sort of modest but noticeable change is generally preferred to a plaza with no level change at all. There are also practical reasons for utilising level change, it can separate seating and walking circulation, it may function as a temporary platform for performances and speeches and it can become a divider of space that creates smaller human-scale subspaces (ibid.).

The elevation change will automatically provide a vantage point for people watchers, which is a considerate proportion of plaza users, to stand and look down at the people at the lower level. The fascination of people watching is thus enhanced by this element. Copper Marcus & Francis (1990) refer to Gordon Cullen's (1961) ideas about level changes, specifically that height in the townscape equates to privilege, which would explain the prevalence to watch people from a vantage point.

Perils of Sunken Plazas
Sunken plazas, urban open spaces that are dramatically lower than the sidewalk, should be avoided if possible (Fruin, 1971; Pushkarev & Zupan, 1975). The same goes for plazas that are positioned dramatically higher than the sidewalk, as the users of the plaza loses contact with the street. Level changes must be subtle and be designed to allow for visual connection across the level change. A slightly raised space provides and overlook over the plaza but still offer a visual connection between passers-by and users of the raised space. A slightly sunken space

provides enclosure and intimacy for users and the overlook position is held by people passing through at the adjacent sidewalk (Copper Marcus & Francis, 1990)

People Attractors in Sunken Plazas

If a sunken plaza is inevitable, special consideration needs to be made to attract visitors to it. The general rule is: the further down the plaza is, the larger attraction is required. But simply having an attraction to draw people in doesn't ensure that people will stay and experience it. Seating is a must, but so is the attraction. A sunken plaza that only serves as a space that lead to a subway station, and thus contain little reason to stay in, will be scarcely used, even if seating is provided (ibid.).

Raised Plazas

A plaza that is position above street level can be a pleasant experience if the space is visible from the street and doesn't require too many steps to ascend. The physiological and psychological experience of residing above the smell and noise from cars and view of the passing pedestrians is intrinsically pleasurable. If a plaza is too raised or without visual connection to the street, other reasons for visiting it, such as shops or restaurants, are required if it is to be used (ibid.).

Public Art

Cooper Marcus & Francis (1990) refer to Crowhurst-Lennard & Lennard's (1987) *Livable Cities*, and specifically the five criteria for evaluating art in public spaces. The first is that public art ought to create a sense of delight, wonder and joy. The second is that it should draw from mythology, legend, history and metaphor and/or manipulatable design that can be interacted with by sitting, touching or walking under to create elements of creativity, play and imagination. The simple rule is that monuments that intrigue children also intrigue adults. The third criterion is to encourage communication through monuments that are located near main paths and are highly visible, encouraging sitting, talking and staying. The principle has a resemblance to Whyte's (1980) triangulation. The fourth is to provide comfortability close to public art to enable proper enjoyment. This can be done through railings, steps or ledges than people can sit or lean on. Also putting emphasis on the sensory experience of touching a sculpture could be beneficial for activity. The final criterion is that public art ought to encourage interaction between people as actors in the public scene rather than an audience of the arts. A good example of this is Lawrence Halprin's fountains that are designed for children and adults to interact with by jumping in the pool and climbing from one pool to the next. Additionally, public art should also be designed to speak profoundly to the larger population of people that can experience the art piece (Cooper Marcus & Francis, 1990).

Fountains

Universally, the sound of moving water is appreciated and an attracter of people's interest. The sound generated would technically correct but de facto incorrect be described as noisy and loud. The sound isn't unpleasant and function as white noise, drowning out the undesirable noise from traffic and create an ambient soundscape. The sound of moving water also has a stress-relieving effect on people. Therefore, is the recommendation to design urban spaces with fountains so the noise of the fountain can reach as many people as possible (ibid.).

Paving
The basic insight regarding paving is that people in public will take the shortest route from A to B. This means that lawns, and sometimes planting, will be trampled over in the unforgiving nature of human pragmatism. The recommendation is to take this into consideration and utilise unpleasant surfaces that humans avoid, such as cobbles or large-sized gravel to manipulate movement (ibid.).

Jan Gehl (2010) Cities for People

Introduction
Jan Gehl, a Danish architect since 1960 have studied urban development for over 50 years at this point. In Gehl's recollection were cities up until 1960 mainly developed from perspectives derived from centuries old experiences traditions, people-oriented city building was guaranteed as city-life was a critical aspect for the wealth of cities. From the 1960's and onward, ideologies and theories have started to substitute the utility of tradition, the modernist conceptualisation of cities as machines with different parts and functions separated from each other was a dominant idea in city building. The connection between humans and city space was out-ranked in the priority-hierarchy to concerns of traffic planning and so knowledge of how the physical environment affects human behaviour was forgotten. Not lost however, a lot of data have been collected and converted into knowledge within this field since then. This is the orientation towards which Gehl dedicates his 2010 book *Cities for People*, in hopes that it would contribute to the knowledge basis for the connection between urban physical form and human behaviour.

The greatest opposing force for a human dimensioned urban development has been the great growth in car traffic. It is a common denominator for almost all cities of the world that humans that use and is greatly dependent on urban public spaces have been mistreated in the name of effective traffic planning. Other than taking up space, cars are noisy, unsafe and pollute the air of all city dwellers. Gehl refer to Jane Jacobs (1961) as one of the first to recognise and prophesise the demise of human-centred city planning as a result of the increased car traffic. The modernist architectural city concepts of Le Corbusier (1948) with its individual buildings instead of a close-knit city space, Gehl (2010) points out as the most effective way to combat life between buildings.

To Gehl, are the special attractions of the city the versatile supply of activities that occur in them. The ever going shifts between purposeful walking, resting, conversing, staying and stopping is a common characteristic for cities. The prevalence of spontaneous, unpredictable and unplanned activities, especially, stimulates an attractive city space. Gehl puts activities in two categories; necessary and optional. Necessary activities are those people must do: waiting for the bus, going to school or work, bringing goods to customers. Optional activities are things people choose to do: enjoying a view sitting, standing or walking, enjoying the weather, taking a stroll through the city. These are often recreational in nature and they are what define the attraction of a city and to evoke them require proper city quality. Optional activities are dependent on conditions such as weather, whilst necessary occur independent of weather (ibid.).

A third category of activities is called social activities. These are activities that occur between people in city space and entail all forms of communication. An example of such acts is the most common social activity of people watching. Communication isn't relegated to simply talking; seeing or hearing other people is also a social activity. Other social activities are greeting and talking to acquaintances, spontaneous meetings, small talk at vendors or market booths,

talking whilst waiting, asking for directions and so on. This attraction to observe people is a well-known phenomenon that can be verified from studies of cities all around the world. People are spontaneously attracted to other people, and throughout life, gathering information through social activities in common city spaces becomes a habitual behaviour. The proof for this intrinsic human behaviour can be found in any architectural drawing that, without error, is adorned with happy people enjoying the urban realm (ibid.).

The newfound necessity for quality outdoor public city space in the west can be explained by and increased standard of living that brings more free time, longevity and a better economy with it. This along with the fact that more and more people are living alone necessitates the need for a greater toolbox for creating opportunities for human contact, pleasure and recreation outside the home. The common spaces in cities are of greater importance in a society with private offices, private cars, private residences and an overall privatised life (ibid.).

Senses and scale

Homo sapiens is a specie, and as such have evolved for over millions of years, this is an inevitable fact and the impact of this can be observed in biology. It is also in biology where intrinsic human limitations and possibilities can be found. Humans move on foot, slowly and preferable in a forward motion, sideways and backwards walking in considerately harder. This forward motion preference can also be observed in the orientation of ears, eyes and nose that allow for surveillance of dangers ahead whilst permitting friends, or foes, to surprise us from behind. Seeing straight forward is easy, to the sides is not difficult, down is easy to a certain degree but watching up is difficult (Tilley & Dreyfuss Associates, 2002). The human is an upright mammal that is horizontally oriented with a frontal and linear preference. These universal fundamentals of humanity constitute the guidelines for which urban form ought to be scaled and designed after (Gehl, 2010).

Sensory development of humans is equally as important as biology, sensory can be either ‘distance’ (seeing, hearing and smelling), or ‘close’ (tasting and feeling). Distances in the city can be categorised into cut-offs for what can be sensed at different distances. It is possible to distinguish humans from animals at 300 to 500 metres, observe body language at 100 metres, recognise a familiar person at 50 to 70 metres and read facial expressions at 22 to 25 metres. Shouts can be heard at 50 to 70 metres, loud one-way communication can be conducted at 35 metres, short messages can be exchanged at 20 to 25 metres but a proximity of seven metres is required for genuine conversations (ibid.).

The defining sensory experience of squares and plazas is vision, as feet define the scales of the street because the activity of the street is mainly moving, the eyes define the plazas and squares. As Gehl (p.38) puts it:

> *Whereas the street signals movement: “please move on”, psychologically the square signals staying. Whereas movement space says “go, go, go”, the square says: “stop and see what’s happening here”*

The recommendations Gehl proposes are to make the maximum dimension of a square or plaza 100 metres or less as this distance denotes the social field of vision, meaning that at this distance people at one end of a square can generally observe what is going on at the other end of the square. This rule is observable in many old European square. Another important

threshold to have in mind is 25 metres as this is distance at which it is possible to see facial expressions (ibid.).

Gehl refer to Edward T. Hall (1990) to categorise four types of distances for communication that can be observed in public spaces. The first is the *intimate distance* between 0 and 45 centimetres, these conversations are often infused with strong emotions like consolation, love and tenderness but also rage or anger. At his proximity, conversations might be accompanied by physical contact through hugs and pats. *Personal distance* is the conversations that occur between people that are 45 centimetres to 1,2 metres apart, this type is usually reserved for family members and close friends, a good example of personal distance can be found around a dinner table. The *social distance* is within a 1,2 to 3,7 metres range and entail conversations about vacation memories or work, an example of social distance is observable around a living room coffee table. The final distance is the *public distance*, which is all conversations between people 3,7 metres or more apart, usually only formal one-way communication, this distance is the same distance as between a pastor and congregation or teacher and pupil.

Soft edges

The edge – the space where buildings meets the city, the street or the square – is according Gehl (2010) the single most impactful aspect of making cities lively, active and attractive. Gehl refers to his contemporary Christopher Alexander (1977) that similarly proclaims that edges are the crucial element to get right, and if they are failures, the space can't become lively. The reason why the edges are of such great importance is because they create the textures and experiences people can interact with the most. Edges are the limits and defining character of individual space, the differentiator between a space being experienced as a distinct place rather than never-ending space. The edges act as the border for an experience much like the walls of a home denotes feelings of well-being, edges evoke a sense of comfort, security and organisation (Gehl, 2010).

The edge functions as the intermediate between the indoor experience of buildings and the outdoor experience of the city. The presence of life either inside the building or out in the city can support a symbiotic relationship. Everything mentioned above regarding the edge is the result of the inborn human proclivity for edges. Not only is the edge area the space with best climate most of the time, it has the advantageous attribute of catering to the innate human frontal sensory apparatus discussed in the senses and scales section. For example, the human sensory apparatus evolved to detect dangers coming straight ahead with forward facing eyes and nose and from the side with ears on each side of the head. The backside is left vulnerable and naturally requires external protection from a wall or building (ibid.).

Good cities for staying

Human activity can be grouped into two categories; moving and stationary. This section of the book covers what constitutes good city design for the various sub-categories of stationary activity. Gehl's asserts that people sit, stay and stand in the city where the city invites them to do so. That the quality of the city determines its usage, because a large part of activity is naturally optional. In fact, the quality of a city or city space can be measured by the amount of stationary activity that occurs in it. Stationary activity is a preferable measurement over moving activity, heavy pedestrian flow can indicate insufficient transit options or thinly distributed functions in the city. Thus, a city with excessive pedestrian numbers might be the product of poor city quality and, conversely, if staying activity is excessive, good city quality is often observable (ibid.).

> *To invite people to walk and bicycle in the city space is a beginning, but by no means enough. The invitation must also include the option of sitting down and spending time in the city. Staying activities are the key to a lively city, but also the key to a truly delightful city. People stay in a place if it is a beautiful, meaningful and pleasant place to be. The good city has many similarities to a good party: the guests stay on because they are enjoying themselves* (ibid., p.147)

The stationary activity of standing is typically contained in time to a shorter period. People can only stand comfortable for so long and criteria for achieving a space suitable to spend a short time standing in is minimal. Taking a quick look at something going on, looking through a store window, greeting acquaintances, looking at street performers or taking a short break are spontaneous and are performed with lesser consideration for comfort and location. If, however, someone needs to stand for a longer period, a proper good place for standing needs to be identified. When waiting for someone, unaware of how long they need to spend at a place, careful consideration is made as to where the optimal location for waiting is (ibid.).

Edge effect

The phenomenon first mentioned by Gehl is what he refers to as the 'edge effect'; people tend to seek out places at the edges of space when staying for a while. The utility of this position comes from being away from the natural pedestrian flow and thus becoming a discreet addition rather than a noticeable nuisance. Aforementioned benefits such as improved microclimate by protection from wind and rain as well as a protected backside is joined by advantages like being able to watch the maximum amount of activity and the provision of psychological and physical support to create a location truly worthy of spending a longer period of time at (ibid.).

The origin for this preference for edge space can, according to Gehl, be tracked back to the cavemen, sitting with their back up against the wall of the cave. The phenomenon can also be observed at ball rooms where people stand along the walls of the hall as "wall-flowers" between dances. Prime real estate along edges are especially important in public spaces where strangers reside. No one wants to stand alone in a vast expanse of emptiness that naturally accentuates one's isolation. If accompanied by a façade, people can at least look to it for support (ibid.).

Gehl criticises the existence of some city spaces that "sway freely", being surrounded by traffic and without direct connection to any façades and recommends that at least one side of a space ought to be in contact with a façade as it will significantly increase stationary activity through the provision of locals that could infuse activity at the space. This consideration to create active edges is sometimes overlooked at the perils of cities (ibid.).

Piano effect

The second phenomenon is called the 'piano effect' and denotes that humans are drawn to columns, furniture, niches or corners along the aforementioned edge that can support a prolonged stay and aid in distinguishing the place from being merely a place along the wall to one with a well-defined character. The effects name come from the observed prevalence of party guests to position themselves along walls close to a supporting furniture, such as a piano.

The wall provides a safe and unpretentious position whilst the piano offers company and an object for the guest to "be in charge of" (ibid.).

The support points in the edge zone can also take the form of inventories, façade details and equipment, a well-known example are the bollards at Piazza Del Campo in Siena that functions as prime leaning options for the plaza users and are rarely available on days with desirable weather conditions. Even though edges have an innate gravitational effect on people intending to stay for a while, combining the edge zone with good façades will conceive the most attractive staying place possible. Smooth, closed façades without defining details doesn't produce an image inviting passers-by to stop or stay (ibid.).

Niche effect

Which neatly transitions into the next phenomenon: the 'niche effect'. The edge zone must give the potential user the perception that it is a comfortable place suitable for residing in for a longer period. This can be achieved through the use of façade elements like steps, columns, 'caves' and niches, where the two latter are the most attractive alternatives. The niche offers a position of comfortability through physical support, protection against weather, a view of the passing scene and the psychological safety of being able to appear only partially in the public sphere but also the choice to move into the action if an exciting occurrence necessitates it (ibid.).

Attractive seating location

Standing only suffices staying for a limited amount of time, for people that know they are going to stay at a place for an extended period of time, sitting is almost always preferable. The optimal sitting places combine a plethora of advantages. Attractive seating can be broken into four aspects: microclimate, protection, view and placement (Gehl, 1990). Microclimate means enjoying pleasurable temperature and sunlight generally. Protection in the form of noise reduction so conversation is possible and protection from polluting elements of the city. A view is appreciated, can come in the form of good architecture, trees, flowers, water, art or the people at the site. Placement is then the spatial advantages of a location, that aren't connected to the three preceding aspects. This would mean the psychological experience of a location. For example, the sense of belonging and companionship that is connected to sitting with one's back against a wall in contrast to the isolation experienced when being placed in the geometrical centre of a space, being maximally separated from everything else.

Primary and secondary seating

Primary seating is seating with back and arm rests, commonly benches or chairs. The comfort afforded from having something to rest one's back and arms against is usually only appreciated by senior citizens or people sitting for a long time. This type of seating is therefore important to consider when creating spaces for everyone as younger people and kids make do with sub-par levels of comfortable seating. But secondary seating that people can more spontaneously and informally sit on is also important to consider. Secondary seating comes in many forms: steps, bollards, fountains, pedestals, stones, monuments or the city floor itself (Gehl, 2010).

The utility of secondary seating is that it doesn't just function as seating, it is decoration, art, paths to an elevated area and so on. The secondary seating alternatives act in non-seating roles every day of the year but can become options for seating at a moment notice. The cities of old repeatably used the need for civic art to offer sitting opportunities. As far as age goes, primary

seating and physical comfortability become more important with age. Young people and children can sit on almost anything (ibid.).

Benches and chairs

Gehl quickly describes that benches are deployed incorrectly by being placed isolated from enclosing elements, niches and edges. Chairs offer a preferable attribute, but only if they are mobile. Moveable chairs allow people to choose where to sit, in what direction, how close to other seating, in the sun or in the shade. This is a desired flexibility that permanent stationary seating never can offer. The constellation of seating can with moveable chairs be adapted to the size of groups, weather conditions, street performances or any other variables (ibid.).

Cafés

A significant edge zone element in the modern city is the sidewalk café. Cities just to consist of places designed to offer functions necessary for people to live, today these places must offer opportunities for optional activities if anyone is going to visit them. With an increased amount of time for activities that are chosen freely, recreation opportunities are of higher importance than in previous centuries. The attraction to sidewalk cafés isn't primarily accounted for by the delicious coffee it offers as people usually stay longer at these establishments than the time it takes to drink a cup of coffee. The combination of sitting in a comfortable chair and being offered a first-row view of the passing activity at the street is, according to Gehl, the main attraction of sidewalk cafés. The refreshments are merely secondary contributing aspects. The coffee offers an excuse for people to watch other people (ibid.).

Good cities for meeting

Interaction can be divided into three human activities: seeing, hearing and talking, where the first two passive acts are the most common occurrence in almost any city in the world. Talking is performed to a lesser degree but come in many different types. From spontaneous conversations with strangers at bus stops, in proximity to a noteworthy occurrence and conversations about the direction to destination to planned meetings with acquaintances, close friends, family and partners (ibid.).

A prerequisite for enabling spontaneous meetings is to provide opportunities to see something that justifies making a connection. The best attraction available is other people, seating should therefore be placed to enjoy the most of human activity, other great attractors is water, flowers, architecture, trees and fountains. Optimal viewing experience is achieved when scenery in terms of water, trees, architecture etc. is combined with a great act performed by the people of the city traversing in the public realm. Lines of vision is thus an important inquiry for urban designers to consider, the parking spots of cars and buses, location of buildings and landscape design must allow urbanites to view the great play of the street (ibid.).

Hearing and talking

The ability to strike up a conversation is greatly dependent on the ability for two or more people to hear each other speaking. A common issue of many cities is the growth of traffic that bring with it an unescapable increase in undesirable noise. Opportunities for conversation needs to be handled with particular care. The upper limit for being able to have a conversation at regular conversation proximity is 60 decibels (ibid.). Every eight decibel increase over that

will be experienced as twice as loud, 68 decibels will be experienced as 120 decibels (Salvato et al, 2003).

Talkscapes

The furnishing of public space has impact on possibilities for meetings. Benches that offer seats next to each other, facing the same direction, are good for interactions "at arm's length" but quite bad at enabling communication. A turn of the head is needed to strike up a conversation and for big groups are benches abysmal as it becomes impossible for more than three people to participate in any conversation. A superior alternative is to group benches together and create a 'talkscape'. These can be achieved by putting two – or more – benches at angles next to each other and perhaps providing a table between them to put food and drink on. Another way for achieving a talkscape is by utilising the never-ending constellatory formulations afforded to an area through moveable chairs (Gehl, 2010).

Democratic meetings

The city must also host meetings of a more spectacular nature. The opportunity for people to meet with the purpose to gather around or discuss political views is an important prerequisite for any democracy. Open spaces that can become the host of manifestations of happiness, enthusiasm, parades but also anger, sorrow and demonstrations are fundamental requirement for any society built on the free democratic exchange of ideas. History is the greatest proof that meeting places in all forms are important. Gehl refer to the silent protest marches in the streets of Leipzig that played a part in ending the cold war, the weekly student marches in the streets of Belgrade in 1996 and 1997 as an important precursor for a democratic reinstatement in Serbia and the weekly silent protest of mothers in Buenos Aires between 1977 and 2007 at May Square against the military dictatorship (ibid.).

Fixed, flexible and fleeting

It is Gehl's opinion that cities shouldn't be designed with special places for special activities, that a better conceptualisation of space is through the three principles: fixed, flexible and fleeting. Fixed refer to those elements that constitute city space, the permanent fixtures that produces daily framework for city life. Flexible elements are temporary events and facilities that emerges throughout a year. Example range from Christmas markets and ice rinks in winter to swimming and kayaking in summertime as well as festival weeks and carnivals that can be established at different points. Fleeting elements are the minor events in cities. These could be bonfires, fireworks, waterfront festivals and concerts in public squares but also more spontaneous events like street musicians, theatre, poetry and parties. The fundamentals for people-centred cities must be provided for through the fixed elements which in turn can offer opportunities for both flexible and fleeting elements (ibid.).

Good places, fine scale

The aspects of spaces that suffices greatest scrutiny is proportions, dimensions and spatial quality. These attributes constitute the overall well-being and comfort associated with good places. The connection between the human body and sensory apparatus, and scale and dimension in space must correspond if such places are to be created. The easy and intuitive rule is that meetings in the form of connections, exchanges and events will occur if inviting and comfortable places to stay. The central argument is that the spatial relationship and size

of places will influence how places are experienced and if they incite people to stay, and that through observation of places that do experience great activity, guidelines for human-scaled urban design can be extracted (ibid.).

The size is, as previously mentioned, one of the determining factors for the success of places. For squares, Gehl look to old cities and present the magical 40 by 80 metres dimensions that produce a place that enable people to identify the faces of other people and enjoy the entirety of the place from anywhere in the square. This sensitivity is ignored in new city spaces, Gehl proclaims, they are too big and amorphous leading to them becoming too cold and dismissive for human activity (ibid.).

One way for combatting this proclivity towards larger spaces is by dividing large spaces into smaller ones. In this way large amount of land can be combined with a genuine concern for the human scale. These smaller spaces can be produced from utilising colonnades and archways, rows of bollards and rows of trees where pedestrians can feel intimacy whilst still getting a view of the larger city space. The problem isn't that there is too little space, quite the opposite in fact. Urban places are usually too big and too frequently distributed in the city for them to have a warm and inviting relationship to urbanites (ibid.).

Good weather at eye level

A significant determinant for outdoor activity is a permissible climate. When it comes to city spaces the interesting scale is the microclimate that describes the climate around a bench, at a street, in a niche, nook or cranny. Climate can be defined as the culmination of several factors: air temperature, wind chill, humidity and solar heat. Bad weather days are more noticeable than good weather days, but the majority of days in a year have a tolerable climate (ibid.).

If the climate however isn't desirable, are there counter-measures available to employ. Wind speeds can be reduced by making open spaces "bumpy" through the use of low-building clusters or greater amounts of trees. These elements create friction that in turn divert the cold, fast winds above them producing spaces in between them that experience almost no wind. A good example of this effect can be found in any dense forest. Smaller interventions can be made to accommodate the exact area where a microclimate need to be decent. This can be done with hedges, fences, glass walls and marquises but any object can offer wind protection if need be (ibid.).

Beautiful cities, good experiences

A city could in theory entail all practical requirements necessary to produce an experience that would cater to humans but randomly coordinated with incoherent materials, colours and detailing would render the place as completely lacking visual coordination. Subsequently, a space could have a great visual experience with coordinated details and colours but lack all functionality as it pertains to climate, security and staying possibility. The whole experience is greater than any one aspect, functionality and aesthetics must exist in harmony (ibid.).

Attractive qualities ought to be visualised to enhance the visual experience of a site. These qualities can come from water features, plantings, flowers, differences in height, lakes, sea, distant mountains, great landscapes. In order for them to enhance the quality of a space they need to be visible. Hence, lighting is a central consideration to achieve not only security, orientation but also visibility of qualities during dark hours. Gehl refer to examples from

Melbourne city that demonstrate that lighting could be used as an artistic quality in itself (ibid.).

Squares can be specifically designed to produce aesthetically and visually pleasing experiences, the way this is accomplished, Gehl argues, is through utilising designs and details that appeals to other senses than vision. Examples given that might produce such effects are fog, aromatics, trickling water, steam and sounds impressions. The assortment of sensory experiences, the whole, will determine the attraction of a space. Art and beauty have an historically significant relationship to cities through an insurmountable number of fountains, decorations, sculptures, building details and monuments. Art serve a great number of purposes, it protects a remembrance of history, communicates beauty, presents commentary on society, offer surprise, manifest the values of citizens and can be a humorous element in the public realm. City space serves as an important forum between art and people (ibid.).

Other artistic elements available are trees and flowers. Other than the obvious benefits of shade, climate control and air purification, trees also accentuate a place and provides it with place-identity, the place is now not only a place but *the* place where a tree stands. Rows of trees along a boulevard accentuate the linear sequence. Gehl (ibid., p.180) expresses the importance of greenery in cities:

> *In addition to their immediate aesthetic qualities, the green elements in the city have a symbolic value. The presence of green elements passes on a message about recreation, introspection, beauty, sustainability and the diversity of nature*

Jan Gehl & Birgitte Svarre (2013) How to Study Public Life

Introduction

The 2013 book *How to Study Public Life* is a collaboration between the famous Danish architect and people-friendly urban development advocate Jan Gehl and researcher at Gehl Architects Birgitte Svarre is simply put about the interaction between public life and space. The field of public life studies are based on basic observations being systemised and deriving insightful information regarding this interaction between life and space. In simpler terms can it be described as being in public and taking a good look. Public life studies can offer effective tools for achieving more people-friendly city spaces. The results can be utilised as basis for decisions regarding the design for squares, parks and streets (Gehl & Svarre, 2013).

Public Space, Public Life: An Interaction

The central issue is this: public life is impossible to precisely predict, how can any knowledge regarding how a to produce space that caters to the human experience be extracted? This is a valid critique; public life isn't pre-programmed, why investigate this interaction between public life and space if it can be perfectly generalised. The solution to this issue is to investigate incremental differences in targeted studies. What spaces work, and what spaces don't. The basic underlying patterns can thus be derived if enough data is cumulated across spaces (ibid.).

Gehl & Svarre likens this field of study to that of meteorologists. Predicting the weather is hard, yet methods have been created that can reliable predict how the weather is going to be tomorrow and over time they're methods have been refined to achieve greater accuracy. And

similar to the constant flux observable in the field of meteorology, public life can be the subject to forecast. The common denominator between the two is that data is essential to retrieve further reliability (ibid.).

This unpredictability is offered as a possible explanation for why urban planners and architects have been occupied with space and ignoring the life that space ought to conduct. And for good reasons, life is difficult to describe in comparison to deterministic form and space, but if any headway towards a more people-friendly development is to be achieved, careful incorporation of public life insights must be made (ibid.). The basic understandings about this interaction can be found in the books of Jane Jacobs (1961) and William H. Whyte (1980).

Studies are performed through one-way interactions of observations. In other words, the participants aren't questioned, they aren't actively involved in the study and in most cases, participants aren't aware that they are participating in a study. They give their permission to be observed by entering the public sphere. The survey is made from observations of the behaviour of public space users, these behaviours are mapped and used to derive essential needs of public space users. This information will aid in the journey towards understanding why some places work and some don't (Gehl & Svarre, 2013).

Gehl & Svarre use another simile to explain how studies in the public life field is performed; biology, the study of living organisms. In biology, amounts are studied, velocity is measured, and descriptions of patterns, activities and behaviours are noted through the use of systematic observation. Behaviour is documented, analysed and interpreted, in both biology and public life studies. These observations are usually made with the naked eye. A quote from Jane Jacobs' (1961, p.xxiv) seminal book *The Death and Life of Great American Cities* is used to describe the utility of this method:

> *[...] please look closely at real cities. While you are looking, you might as well also listen, linger and think about what you see*

Sight is the central tool in public life studies, but it shouldn't be the singular sense used to perform observation. The other senses must also be used to accurately emulate the real-world condition experienced by urbanites in public life studies. Care and attention are the two recommendations Gehl & Svarre (2013) presents in regard to how to perform observations. An injunction to be systematic is underscored as observations would be quickly rendered ineffectual if they aren't categorised and organised into a system that convert observation into information and evidence.

Data ought to be gathered from a non-participating observer, the benchwarmer of the party and not the life of it. From this position it is possible to see the whole picture and make common sense conclusion about the interaction. The human factor exists for good and bad, with human registration of behaviours, more than just facts will inevitably be included. But that also mean that a greater understanding for why an outlier statistic occurred. Take for example a mapping of stationary activity at a plaza, one day activity spikes dramatically. If an automatic sensor was used to recognise the amount and location of people at the site, no qualitative knowledge into why this occurred will be retrieved. But if the data was gathered manually by a person, this registrar can observe that a class had a visit to the plaza which explains the spike better than any other element. General rules dictate that data ought to be anonyme, and that photography of people in public space is legal. Photography is a good supplement to observation (ibid.).

Who, What, Where?

Public life studies must outline what questions it is supposed to answer. The recommendations for questions provided by Gehl & Svarre are simple but effective: how many, who, what, where, how long? These basic questions ought to be combined in order to provide general knowledge about the interaction between public behaviour and public space. Intertwined inquiries such as *who goes where* can automatically be investigated by answering the basic questions. These findings can then be used to understand patterns in public behaviour and specific knowledge about the use of a defined area (ibid.).

How Many?

By observing a space and counting the amount of people doing something is it possibly to measure the ever-changing city life at display. The resulting data is quantitative in nature, and as such can be readily used as arguments in decision-making processes. These results are especially useful as it is difficult to disagree about quantitative facts. It is possible to count the occurrence of any activity, but the general activities are either *how many* are staying at this place (stationary activity) or *how many* are moving through this place (pedestrian flow). More than one count is necessary to produce statistics that can be used to compare different conditions such as time of the day, weather and season. These conditions must therefore be noted consistently (ibid.).

Who?

The objective for many public life studies is to investigate what spaces people like to be in, it is needless to say that *who* these people that enjoy a specific space is a worthwhile inquiry. Who are the users of space? According to Gehl & Svarre (2013), 'people' denotes a collection of widely different groups of people, worthy of categorisation in order to create a public realm that is inclusive to all these groups. The two general categories most important to investigate is gender and age. The groups, in terms of these categories, that are often overlooked are children, women and the elderly (Cooper Marcus & Francis, 1990). Registration of gender and age is performed through observation, which automatically produces some degree of inaccuracy (Gehl & Svarre, 2013).

Where?

Spaces in cities are often designed with an expected usage in mind, but trampled paths across grass lawns attest to the undeniable fact that people don't always use spaces for their intended purpose. To create places that will be used by people it is first important to discover the basics for where people stay in public space. By studying where people stay it is possible to find barriers but also possibilities for further staying activity. When investigating *where* activity occurs, the recommended factors to observe is distribution – to the edge, in the middle or evenly distributed – and connection to relevant functions or elements such as entrances, furniture, bollards, doors and so on. It is also important to include the surrounding activities or functions around the delimitated area that will affect the magnitude and source of the activity at the site (ibid.).

What?
By registering what happens in a space it becomes possible to better understand how a space is used, is it a staying space, a passing space, a commercial space etc. This information can then be used to discover which requirements the physical environment must have to accommodate this use. The most common activities occurring in the city is standing, sitting, walking and playing but activity can be divided into an endless degree. It is therefore important to find the broadest categories that can register the majority of the activity at the site (ibid.).

Activity can be divided into two types; necessary and optional. Ranging from the completely optional acts of standing and sitting to enjoy life, to the very optional acts of standing to feed birds and sitting to read a book, to the less optional activities of standing to buy something and sitting to supervise children at a playground, to the quite necessary act of standing to greet someone and sitting to rest, to the completely necessary acts of standing and sitting to wait for the bus (Gehl, 1998).

Counting, Mapping, Tracking and other tools

In order to produce answers to the foregoing question, various tools are used to register and systemising direct observations from the site. Some general considerations to have in mind when choosing tools are the purpose of the study, is it supposed to compare a site before and after a renovation, will it gather specific information for a project or more general knowledge about public life across locations or time, and the scale of the study area, will a street be investigated, a neighbourhood or a whole city. No matter what the study is, one single tool is rarely sufficient for gathering relevant data (Gehl & Svarre, 2013).

The choice of date for the study will have a great impact on the results. According to Gehl & Svarre, will weekdays demonstrate markedly different activity compared to weekends. The huge impact weather conditions have on comfort of outdoor public life is referred to by Gehl & Svarre as the argument for executing observations on the days with best weather. This preference for good weather is especially important for registration of staying activity as seating may become wet from rain (ibid.).

The data will always be to some degree a modified version of the truth as cities are wonders of unpredictability. Why else would anyone spend time in them? It is the most attractive possibility produced from sharing spaces with a massive number of people, the possibility that something unforeseen can occur. It is also why it is difficult to depict the daily rhythms of spaces and why manual observation is necessary to experience the actual conditions that inspire public life (ibid.).

The actual tools are basic, most studies only necessitating paper and pen. These studies are used to formally collect and systemise the information gathered through naked eye observations. Other recommendations are to make exact and comparable registrations, by keeping notes of times and date of observations, and weather conditions (ibid.).

Counting
There is virtually nothing that can't be counted, the most common count is how many people are staying (stationary activity) or how many are moving (pedestrian flow). The counting tool is closely connected to the *how many* question. The results are therefore quantitative. The count is performed by a headcount registered through a handheld counter or marks on a paper. A count is performed every hour for ten minutes (more than ten minutes may be necessary if activity is scarce). It is important to not for any reason deviate from the set counting time as

this is a random sampling method and minor inaccuracies can invalidate the overview for a whole day's activity. Unexpected occurrences – such as demonstrations or road work – must be noted as it could influence the magnitude of activity (ibid.).

Mapping

Behavioural mapping is simply the task of mapping the activity occurring at a site on a plan of the area, usually used for stationary activity of standing and sitting. The locations where all occurrences of an activity happen are registered in a similar fashion to the counting method. These maps can then act as a captured map of the activity for a certain time of day or be combined as several layers, resulting in an aggregate that presents general patterns of the investigated stationary behaviour. The mapper can use different symbols – such as circles or crosses – to distinguish between different forms of stationary activity. The qualitative aspects of *where* and *what* become supplements of the quantitative data produced through counting (ibid.).

Tracing

The observation and registration of moving activity can reveal general insights into pedestrian patterns and specific knowledge about the moving activity of a certain area. Using the same plan as for mapping, tracing means drawing a number of lines depicting where the many individual pedestrians are walking at the site, tracing their movement. The same registration time period is recommended. The tool isn't perfect as a completely accurate tracing become difficult to achieve if pedestrian flow is heavy. This tool is useful as it presents the primary and secondary walking paths as well as the areas that experience no traffic (ibid.).

Photographing

A picture is worth a thousand words is an idiom too often mentioned for it not to be a cliché, but the central message is true, nonetheless. In public life studies, photographs of public space – and the life within it – are common reoccurrences. Anyone can look at a photograph, and if the photograph is good enough, almost anyone can understand what the photo is communicating. Photography, according to Gehl & Svarre, ought to be aids in communicating a situation. The photographs can also aid the researcher by providing an opportunity for proper re-evaluation of an event (ibid.).

Keeping a Diary

Previous tools are formidable examples of systemising inputs into data that can generate patterns which in turn may be used to understand general interactions between public life and space. However, they aren't fantastic for noticing the minute details of public behaviours. These details can more readily be registered by keeping a diary. The notes could be about the specific site or more generally about the interaction between activity and space. This highly qualitative information can explain and clarify quantitative data. The method is simply noting detailed observations in real time. Everything can be noted, as long as it of some relevance to the project. The notes can come in forms of explanations to categories of activity – such as sitting or standing – presenting the observed narrative that resulted in the occurrence of a mapped activity, giving nuance as to why something occurred, why it occurred in the location it did and how that activity played out (ibid.).

Results & Analysis

The resulting data from the stationary activity mapping is utilised to address the factors of the seven themes from the literature study.

Sitting

Kungsträdgården attracts considerately higher numbers of sitters than Sergels Torg (see Figure 12). For being two public spaces that are equal in size and share many similar surrounding land uses, densities and demographics they experience huge disparity in sitting activity. Why do Kungsträdgården host, on average, ten times as many sitters as Sergels Torg?

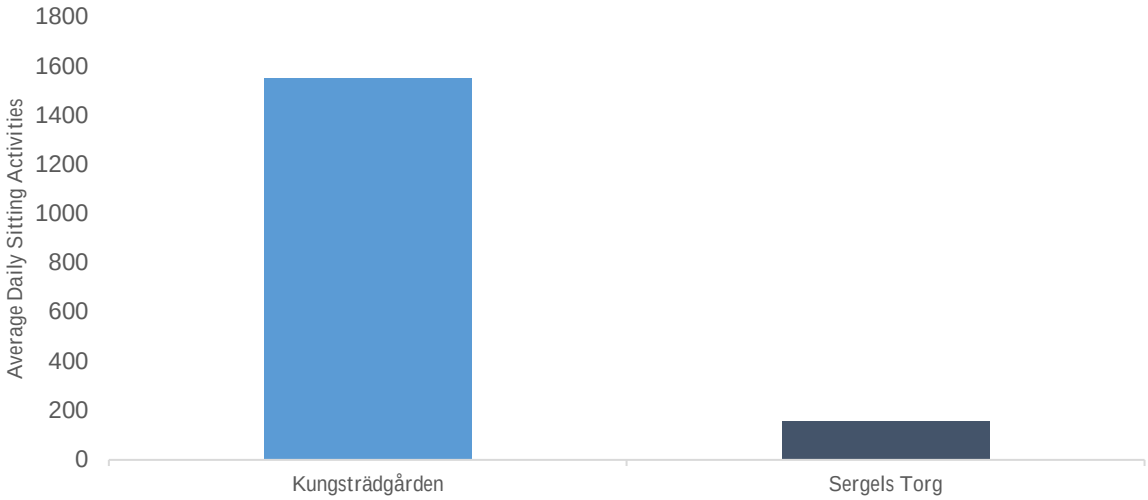


Figure 12 - Average daily sitting activities for Kungsträdgården and Sergels Torg

The reasons sitters are attracted to Kungsträdgården but not to Sergels Torg are many. A place in the sun, protection from unpleasant sounds, interesting views through vegetation, careful placement of seating, provisioning of physically and socially comfortable primary and secondary seating and the usage of the 'tree effect' are some of the most impactful factors and aspects every designer interested in making good spaces for sitting activity should take into special consideration.

A main concern is simply the amount of seating, more people sit at Kungsträdgården then at Sergels Torg for the simple reason that there is more seating. A greater opportunity to sit is provided for by a greater supply of total seats.

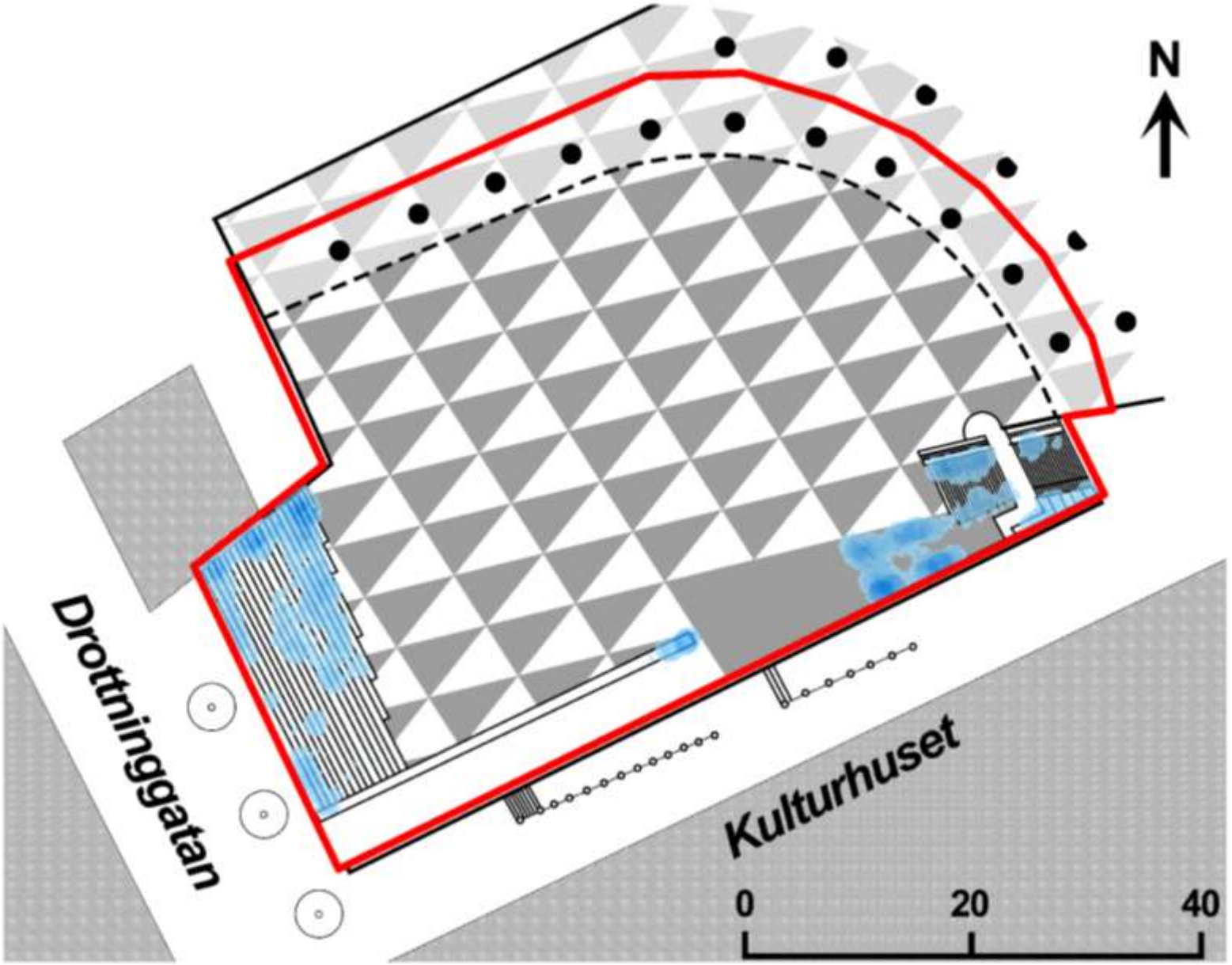


Figure 13 - Density map for total sitting activity at Sergels Torg

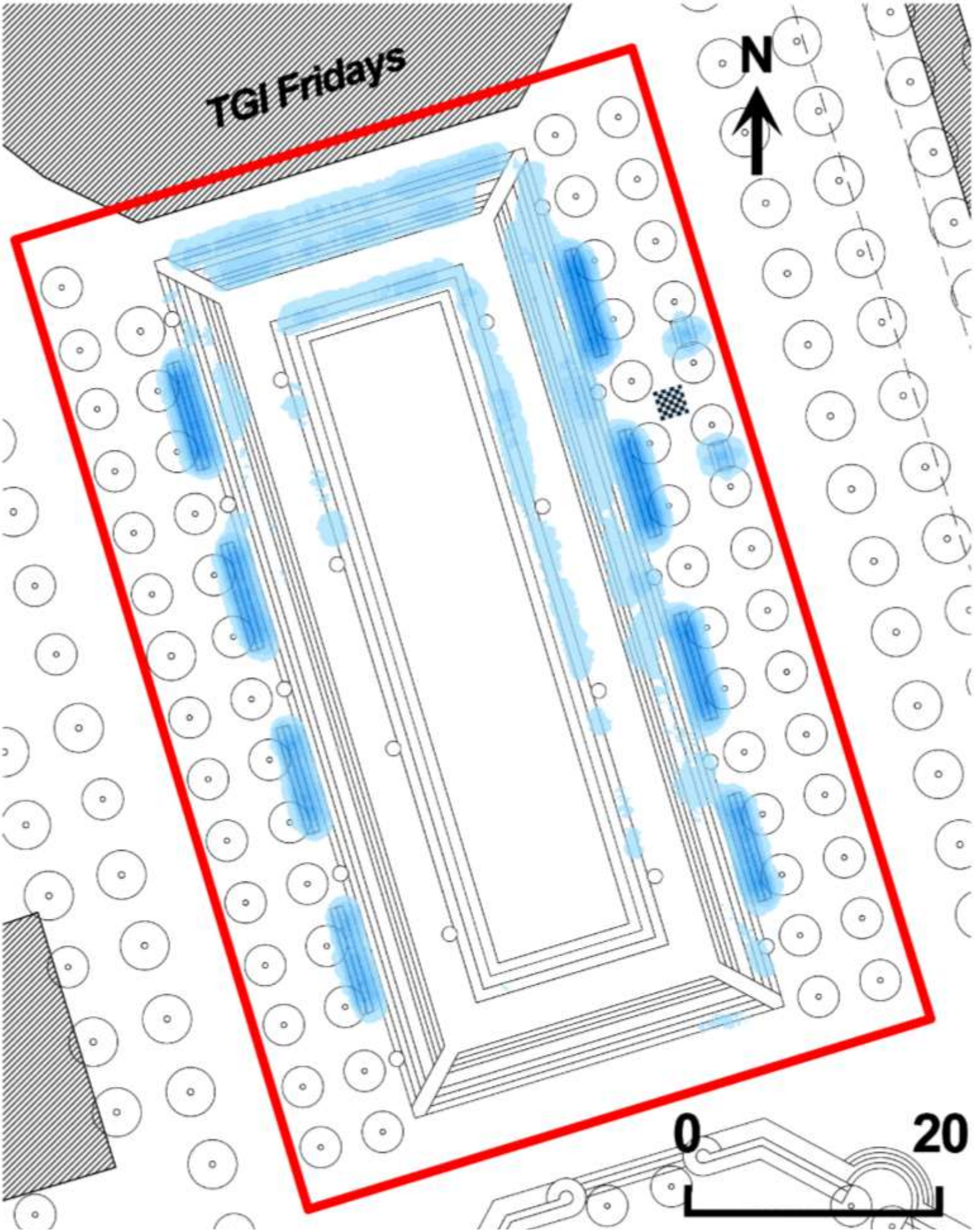


Figure 14 - Density map for total sitting activity at Kungsträdgården

Optimal Seating Location

Microclimate

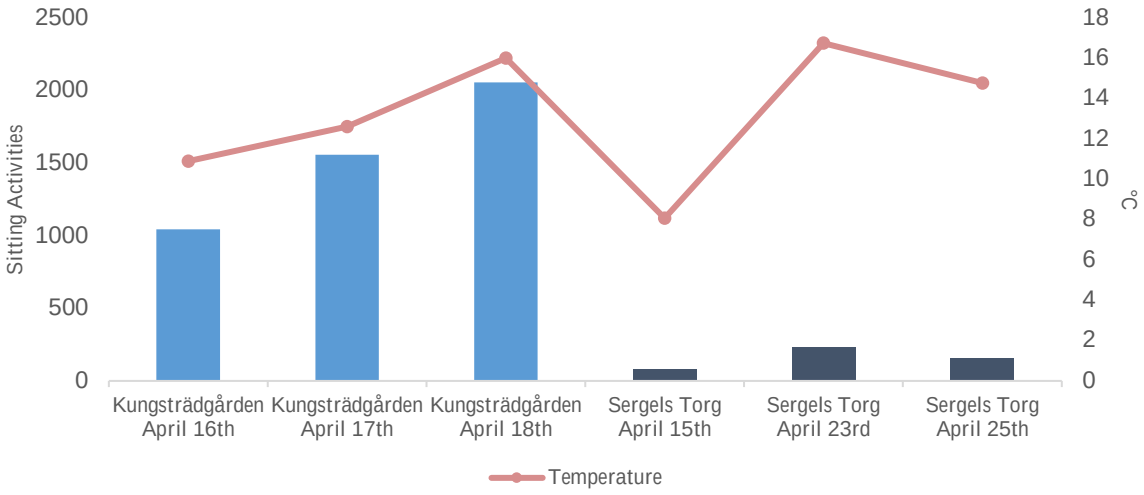


Figure 15 - Sitting activities and respective average temperatures for each study day

A frequently cited requirement for a pleasurable outdoor climate that would incite sitting activity is comfortable temperatures (Whyte, 1980; Cooper Marcus & Francis, 1990; Gehl, 2010; Gehl & Svarre, 2013). The sitting activity count for the two squares indicate that warmer temperatures bring with them additional sitters. This is especially easy to observe for Kungsträdgården, quite a bit harder but still present is this temperature relationship for the life at Sergels Torg (see Figure 15). One thing that is more obvious than the impact of temperature on sitting activity is the discrepancy in sitting activity between the two squares. Temperature alone won't suffice as an explanation for why sitting activity occurs.

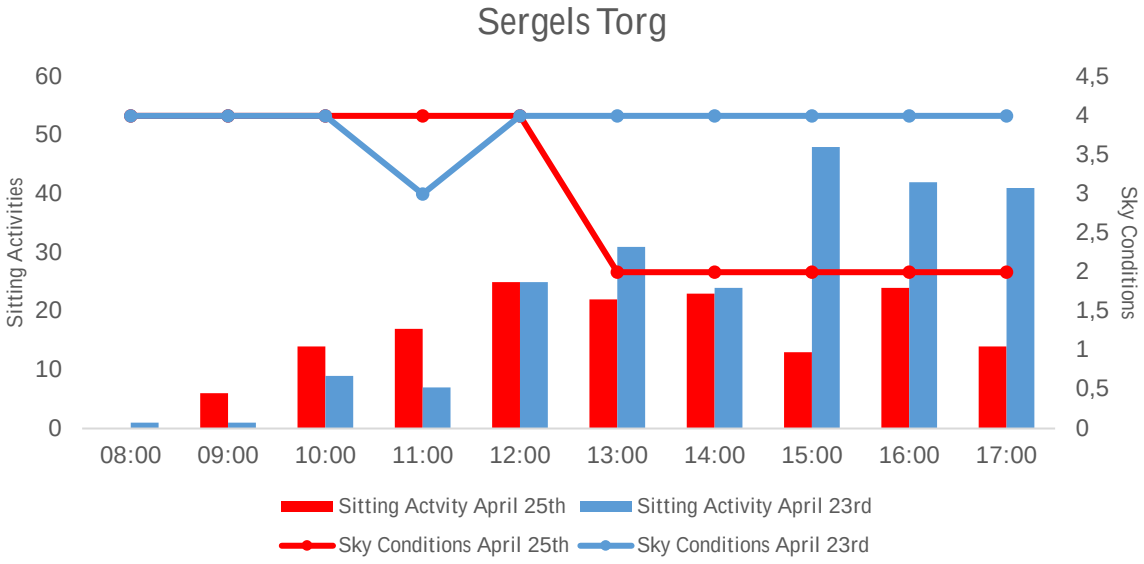


Figure 16 - Sitting activities and respective sky conditions for April 23rd and April 25th at Sergels Torg

Including the existing sky conditions provides a greater understanding for the reasons people choose to sit at a location. Sky conditions were graded on a scale from one to four where one denoted rain, two; overcast, three; partly cloudy and four; sunny A comparison of two days at Sergels Torg with diverging sky conditions but otherwise comparable conditions reveal that a

day with almost completely unobstructed sunlight retrieves considerately greater sitting activity than that of a day that is overcast in the afternoon. The impact is accentuated by the fact that the days received similar activity before noon, when sky conditions were the same, but diverge in the afternoon (see Figure 16).

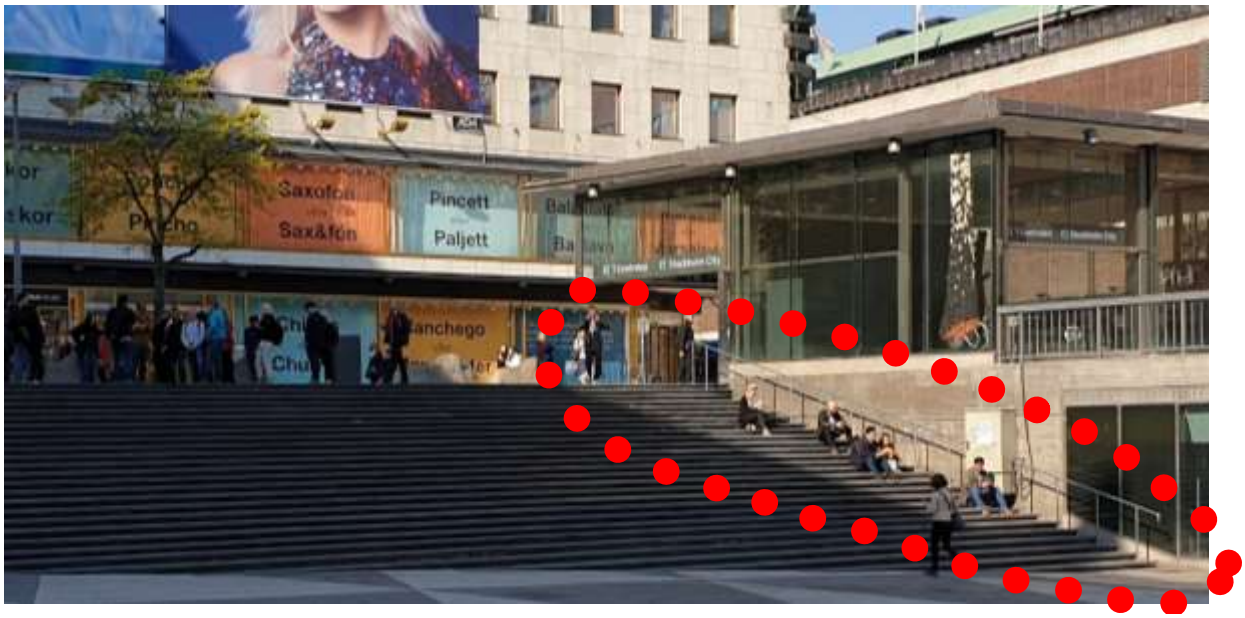


Image 6 - People sitting in the sun, Sergels Torg, April 23rd, 10:00, 15,5°C, Sunny

Sunlight is impactful in other manners as well. Having an unobstructed sun is necessary to experience its light and warmth, this goes for clouds as well as for buildings and location of seating. Faced with the option to enjoy the sun or not, most sitters at the time of the study choose to bask in the sunlight, perhaps to sun-bathe, perhaps to warm up, it is however undeniable that a place in the sun is preferred over the alternative at this time of the year, in this part of the world (see Image 6 & 7). The observed attraction towards sunny spots may be explained by the long cold winter Stockholmers just experienced over the last couple of months. Whyte (1980) found that the correlation between stationary activity and unobstructed sunlight fades of later into the summer. The same could be true for the life at Sergels Torg and Kungsträdgården.

Image 7 - People sitting in the sun, Kungsträdgården, Mars 23rd, 15:19

Stockholmers want to enjoy the sun, and the preferred way to enjoy it is straight-ahead, onto the face. The sun is the literal life force of human beings, and as such have been worshipped across cultures and time. Swedes are uniquely secular and self-expressive beings (Inglehart et al, 2014), the strongest form of worship present in Swedish culture isn't a sermon or congregation, but rather to rush into the streets at first sight of sunny weather after the long winter. Sunlight provides people with an accessible, reliable and cheap supply of vitamin D – a vital sustenance for many bodily functions – but offer other benefits as well (Lucas & Ponsonby, 2006). To meet the sun with a smiling face is a natural evolutionary behavioural

pattern, an interaction that affirms the life-sustaining benefits of the sun's existence. This proclivity towards sunlight is observable in the temporal maps of the sitting activity of both squares. The sitters flock to the opposite direction to where the sun is in relation to the space (see Figure 17 & 18).

In the morning hours at Kungsträdgården – between eight and ten – the western row of benches is systematically chosen over the eastern row, or any other seating alternative (see Figure 18). The sun rises over the buildings in the east before the clock strikes eight, and the warmth-inducing light from the sun offers a most welcome paus from the otherwise wearisome conditions off going to work. As the sun rises higher later in the day, a clear congregation appears at the northern short side of the pond from noon until four in the afternoon. This continues the sun-dance from the morning session. When the sun is positioned east of the square, people position themselves on the west side of the square, when the sun is slightly south of the square, people place themselves at the north end. The same occurs at the end of the day, as the sun starts to go down behind the buildings in the west, people sit at the eastern bleachers and, to an excessive extent, at the eastern row of benches.

The same pattern is observable for the sitting activity at Sergels Torg (see Figure 17). In the morning, only a single sitter can be spotted at the top of the flight of stairs connecting the square to Drottninggatan. Unsurprisingly the western most, and eastern-facing seating alternative is chosen over anything else. The popularity of the western steps increase over the day as the sun rises above Kulturhuset and bask the stairs in greater daylight. The sun endows the eastern stairs with light later on in the day which can be observable at the sitting activity at four and five in the afternoon. There is a large portion of the square that isn't adorned with seating, and as such can't be seated in during most of the day. Namely the transition area from the open-air part and the underground tunnels as well as the open centre. This discrepancy in seating between the two spaces is most likely one of the factors explaining the discrepancy in sitting activity.

Sitting

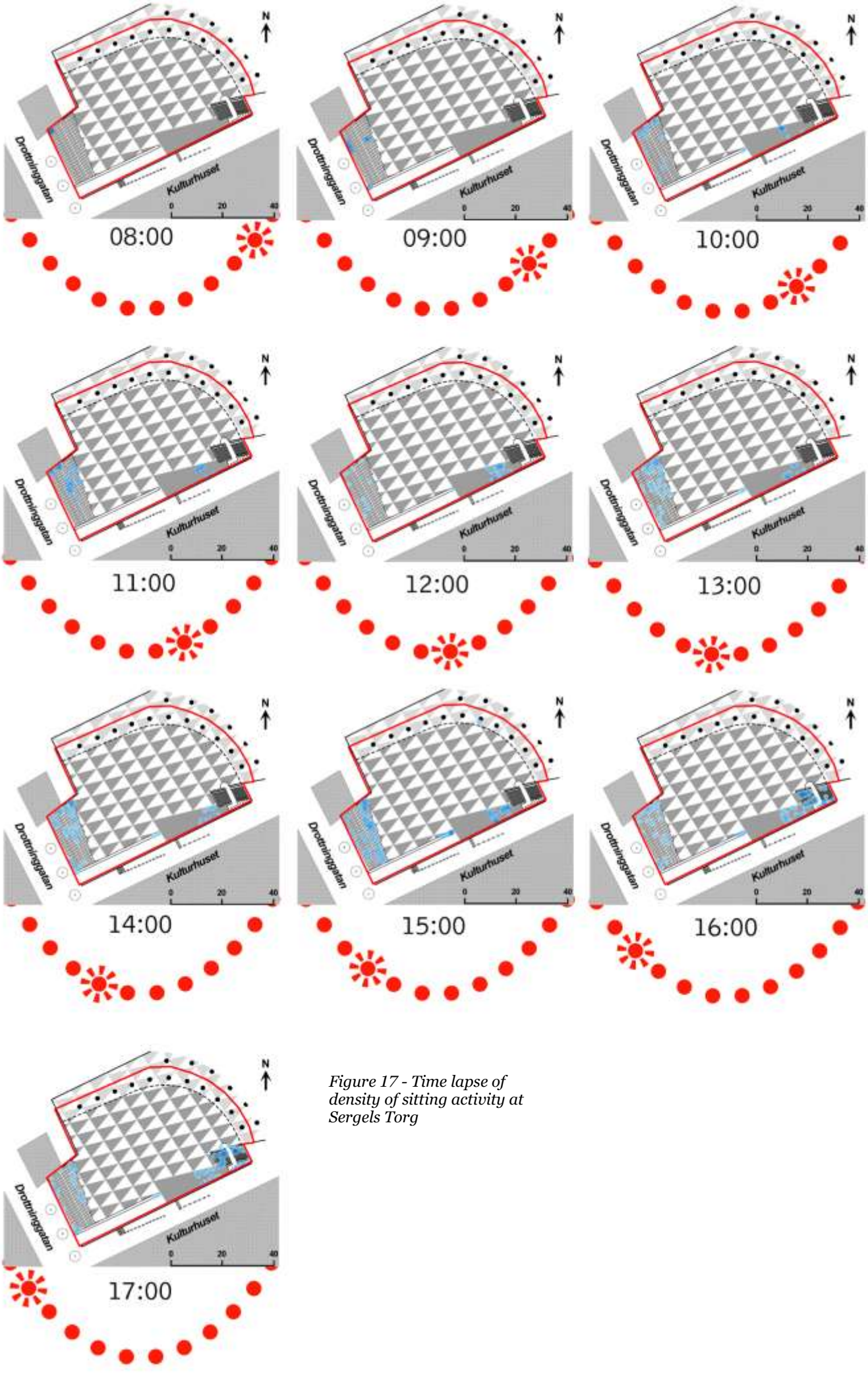


Figure 17 - Time lapse of density of sitting activity at Sergels Torg

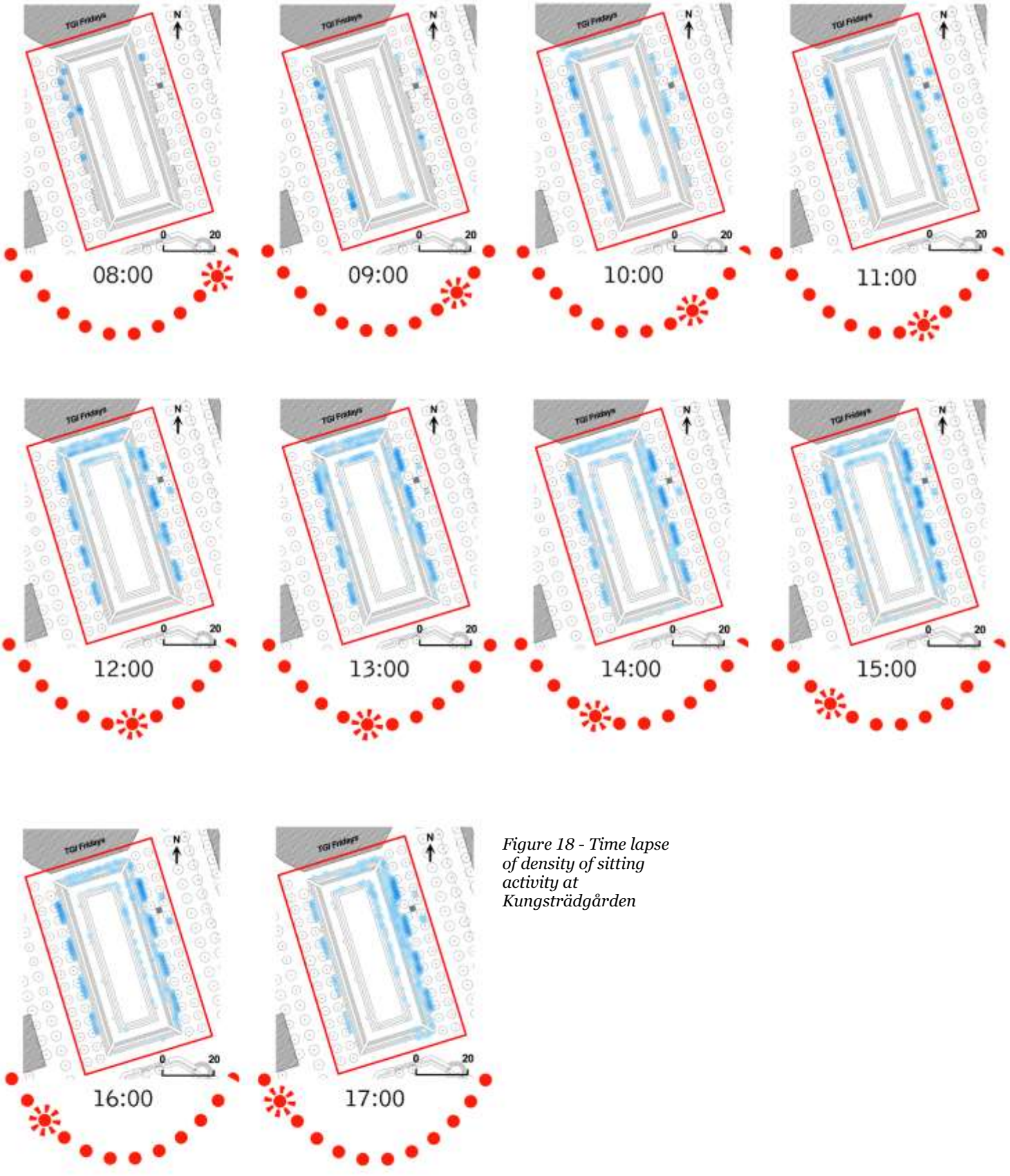


Figure 18 - Time lapse of density of sitting activity at Kungsträdgården

Protection

Microclimate alone does not produce the different sitting activity rates of the two spaces. One vital factor seems to be protection from high auditory levels. Sergels Torg experience consistently lower sitting activity and consistently higher auditory levels than Kungsträdgården (see Figure 19).

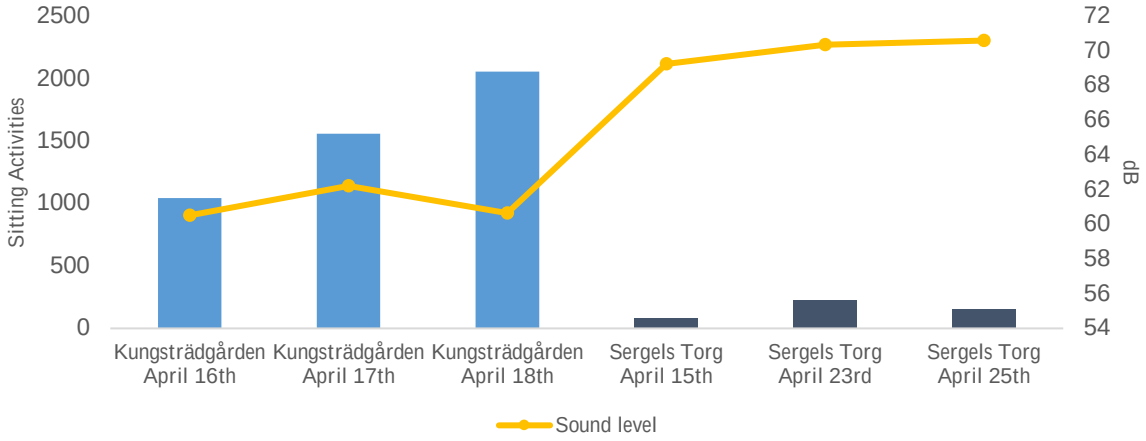


Figure 19 - Sitting activities and respective average sound levels for each study day

Whilst the inverse correlation between auditory levels in decibel and sitting activity is undeniable cross-site, daily fluctuations in auditory levels for the same square does not seem to impact the number of sitters tremendously. Not that the volume of the natural soundscape for each space changes drastically from one day to the other. A standard sound level is clearly visible for both places. The uptick for April 17th is mostly due to an outlier measurement recorded whilst a noisy cleaning vehicle visited the site. The standard sound level for Kungsträdgården is approximately 60 dB and 70 dB for Sergels Torg.

The higher sound levels at Sergels Torg could to some extent be attributed to a ventilation shaft located at the bottom of the western steps (see Image 8). This placement is especially unfortunate as it dilutes the main seating spot of the square. The sound itself is one of the least pleasurable white noises any urbanite might stumble upon, a constant reminder that the space they're visiting first and foremost is designed to achieve some infrastructure's or building's efficiency, not a space made for humans to be in. The sound of constant air flow also makes one wonder where the air is coming from, and consequently what fragrance might travel with that flow. The sound becomes associated with the expectation of undesirable smell.

Image 8 – Loud ventilation shaft at Sergels Torg, April 15th, 08:13, 3,6°C, Sunny

The existence and respective non-existence of vegetation at Kungsträdgården and Sergels Torg contribute to the discrepancy in protection from noise which in turn affect the number of sitters. Noise reduction from trees is an essential ecosystem service in urban areas (Gómez-Baggethun & Barton, 2013).

View

The two squares offer some of the same views, specifically the view of people going about their business. Seeing people and being seen by people is a vital human communication, every spot that experience any form of human activity will naturally attract people watchers. But the supply of viewing experiences ends there. The viewing experiences deviate greatly in terms of trees, water, flowers, space and art works. Sergels Torg have a black and white triangular pattern all over the floor of the square, which provides it with a specific place-identity. A small image of the pattern would indicate to any Stockholmer that they're viewing Sergels Torg. The colours of the pattern are however not an outstanding element, the black and white melts into the surrounding rather than contrasting to it.

Image 9 - Sergels Torg, April 22nd, 15:09

Kungsträdgården offers several interesting views. The greatest attracter of many is surely the pink flowers of Japanese cherry trees that blossom for about a week in April. The act of watching these cherry trees blossomed flowers has its own holiday in Japan, *Hanami*, that literarily translates into "flower viewing". The pink flowers are a romantic break from the daily rhythms of urbanites. Further viewing objects are the subtle level differences, creating a space that feels more intricate (Jacobs, 1961), the artistic urns and the flowers in those urns. The linear flights of bleachers along with the row of trees creates framing for the place as well as focal points, either towards the rest of the park or towards the restaurant. Just in time for the cherry flowers to fall, the pond adds water as a new attractive view.

The location of seating is the fundamental aspect required to consider in order to achieve favourable views for sitters to enjoy. At Sergels Torg the main seating alternative, the westerns flight of stairs, is faced toward the square. Seems like a reasonable direction. Not if it's acknowledged that an even greater pedestrian flow occurs at Drottninggatan, behind the backs of the sitters.

Image 10 - Kungsträdgården, April 17th, 14:23, 14,1°C, Sunny

Kungsträdgården directs its seating towards the middle of the square as well. But it also directs it out from it. Allowing people to choose what to view. Either to view the passing people of the two alleyways or to view the staying people at the pond. The cherry trees are observable from any seating alternative which is a great aspect that surely factors into the diverging overall sitting activities of the two squares.

Image 12 - People looking at passers-by, Kungsträdgården, Mars 2nd, 12:24

Image 11 - Person observing the scene at Kungsträdgården, April 25th, 12:19

Placement

The placement of sitting activity is the spatial advantages of seating that can't be attributed to microclimate, protection and view. The edge is commonly refered to as a place to sit. At Kungsträdgården, the row of double-sided benches constitute edge-zone seating because the row of cherry trees behind the benches create a boundary for the space. Further placement advantages at those edge-zones can be attributed to the upward enclosing effects of the cherry trees and the support pillars created from the urns (see Figure 14).

The edge effect of sitting activity is also observable at Sergels Torg. The part of the main flight of stairs that recieves heaviest usage is along the wall (see Figure 13). The opposite wall is severely suffering from the unfortuntate placement of the ventilation shaft an as such does not become a viable seating alternative. Thus making the place along the northern wall even more popular.

At Kungsträdgården, it is visible that sitting activity "fills in" from the edge inwards. The part of the lowest bleachers that experience activity also experience activity at the bleachers above it and the benches above them. The south-east part of the pond is receiving sitting activity throughout whilst the north-east part only experience usage at the benches and around the urns (see Figure 14).

Image 13 - People sitting under and with their backs towards threes, or looking into the groove of threes, Kungsträdgården, April 15th, 15:19

Image 14 - Kungsträdgården, April 17th, 12:06, 14,4°C, Sunny

Optimal Seating Attributes

Height

Seating height seems to matter to Stockholmers. What's referred to as 'primary seating' in the literature (Cooper Marcus & Francis, 1990; Gehl, 2010) – chairs and benches – usually offer superior physical comfort to 'secondary seating' – ledges and steps – and physical comfortability, at least through seating height, seems to factor into the selection of seating. The seating steps at the two squares naturally doesn't allow for the optimal seating height of at least 30 cm, to achieve such height the sitter must extend his or her feet two or three steps down, enforcing a certain position. If sitters want to sit with their feet on the step below them, they have to squat, which is uncomfortable for many and impossible for the old. A clear congregation is observable for the primary seating alternatives that offer desirable seating height, the benches at Kungsträdgården and the café chairs at Sergels Torg (see Figure 13 & 14). Although it needs to be mentioned that these alternatives offer other positive attributes such as a place under a tree for the benches and the ability to buy a cappuccino at the café.

Depth

Height is important, but so is depth. At least if the sitting activity numbers of the two squares are to be believed. 86% of the seating at Kungsträdgården have acceptable seating depth – the steps around the pond – and an additional 13% have borderline acceptable depth (Whyte's (1980) seating depth of at least 38 cm is used as the acceptable seating depth here). 72% of the seating at Sergels Torg have acceptable seating depth. This discrepancy is neither dramatic nor solely explanatory for the overall difference in total sitting activity, but rather another in a long list of contributing factors between making a prime seating space and an underutilised public place.

Mobility

Image 15 - Outdoor café serving area, Sergels Torg, April 23rd, 12:55, 18,3°C, Sunny

There is really only one seating option that is mobile, and even that mobile seating option is restricted to some degree. The outdoor café chairs at Sergels Torg are moveable and allow café patrons to direct their chairs in any direction to face each other, the sun or any interesting occurrence at the square. But the full movement of the chairs is restricted by some barrier

posts and ropes. The accessibility of the moveable chairs is also restricted by the fee one has to pay in order to use them. They are the property of the café and it is required to buy something from the café in order to use the seating alternative (although some use the chairs without buying anything). The restricted mobility of the seating alternative is two-fold. It is mobile, if you can afford to pay the price of admission, and it is mobile, if you only want to sit within the allowed seating area. Nonetheless, the seating is attractive, especially in the afternoon when patrons can combine *fika* (Swedish small meal, usually with coffee and something sweet) with sun-bathing (see Figure 17).

Grouping

In terms of enforced loneliness through isolated seating, neither of the squares engage in this poor practice of seating distribution. The majority of the seating at both squares are flights of steps. Steps offer a wide variety of possible groupings with different levels, allowing groups of people position themselves in three dimensions. Steps accomplishes this without impeding the option for single urbanites to choose a spot away from other people. It is neither enforced isolation, nor enforced socialisation.

The picnic tables at Kungsträdgården demonstrates another type of grouping, eye-to-eye group seating. Of course, sitters can always choose to sit with their backs towards the table – and they sometimes do – but the intended, and most common, sitting activity of these tables are groups sitting around the table to enjoy a meal or combatants playing a game of chess, undisputed eye-to-eye activities. This type of seating more clearly invites a certain type of activity compared to the steps, but it also offers the superior service of a table to rest food or elbows on. The café chairs and accompanying tables at Sergels Torg offer virtually the same seating option with the added possibility to change composition through moveable seating.

Image 16 - Isolated bench close to the pond at Kungsträdgården, April 23rd, 15:21

Social Comfortability

The diagrams used compares the total sitting activity and not the percentage of the effective capacity that is used. An argument could be made that Kungsträdgården experience greater total sitting activity just because there is more seating available, and that the important number should be how much of the available seating that is used. The percentage of the effective capacity is an interesting inquiry as it reveals how much of the accessible seating is used. But the argument that Sergels Torg's seating is used to a similar degree to

Kungsträdgården quickly falls apart when the two actual percentages are revealed; Sergels Torg ≈ 3%, Kungsträdgården ≈ 15% of the effective capacity on average every hour. But this isn't the only reason why total sitting activity is utilised. The two squares are equal in area, ergo, they can – in theory – provide equal seating capacity. The amount of seating is a worthwhile area of critique.

Social comfortability, to some extent, includes the provisioning of a socially comfortable total number of available seating. Variety and diversity are the usual synonyms for social comfortability (Whyte, 1980). But in the case for Kungsträdgården, a square that provides a great number of similar types of seating at the steps around the pond, variety and diversity of seating options is created by having a large number of overall seating. The different locations at the steps around the pond are identical in physical comfort, mobility and possible grouping but because there is so much of that seating, different locations will offer differing levels of sunshine or shade, different proximity from the open pond area and differing levels of surrounding activity. The ability to choose is increased by the sheer number of available seats to choose from in this case.

Image 17 - Different types of sitting activity at Kungsträdgården, April 15th, 13:18

Image 18 - Pre-schoolers sitting next to the open pond area, Kungsträdgården, April 16th, 10:13, 8,6°C, Partly cloudy

The steps of both squares are 'straight sitting' options, meaning that people are able to sit next to each other, all facing the same direction (Cooper Marcus & Francis, 1990). This allows for many people to sit close to each other whilst not having to look them in the eyes. But it also allows for people to sit in couple and groups and angle themselves towards each other. Thus, offer the steps, themselves, a somewhat socially comfortable supply of seating. The study did not register age of plaza users, but it seems as if the sitting activity at the pond bleachers along with the rows of benches would result in a positive correlation between altitude and age. The top position with physically comfortable benches and a good oversight of the space are preferred seating for elder, the steps closest to the open pond area is a must for young children and their entourage as it provides prime access to the playground stage in the middle, the bleachers between these two

require some physical ability to get up from but also enable out-stretched half-sitting-half-lying postures, they become the designated spot for young-adults and the middle-aged.

The linear rows of benches at Kungsträdgården are great for single users – allowing people to be close to other people without enforcing eye-contact – very good for couples – providing many of the same possibilities for cuddling as sofas – mediocre for groups of threes – forcing the middle member to follow the conversation as a tennis match or to choose to exclude one of the wing-members – and bad for larger groups – inhibiting the possibility for four or more people to engage in the same conversation at the same time. Many of the same attributes can be said about the different linear flights of steps at the two squares, although steps have the mitigating option to sit at different levels.

Image 19 - Two people looking at a phone together, Sergels Torg, April 12th, 16:09

An alternative for larger groups is thus necessary to ensure desirable social comfortability for both squares. And it is provided, in different ways. At Sergels Torg, groups can choose to sit at the larger steps next to the upper part of the eastern flight of steps or at the café. The café requires groups to be hungry and ready to pay, which puts a caveat on the social comfortability of the alternative as the selection to sit at the café comes with a couple of prerequisites. The other group-option is simply a right-angled corner ledge that is great for face-to-face sitting of smaller and bigger groups of Stockholmers (see Image 19).

Image 20 - Corner ramp at Kungsträdgården, inhibiting group sitting in otherwise natural corner steps, February 24th, 13:56

Kungsträdgården provides the possibility to sit around a table at the two picnic tables, a cheaper option to the café area at Sergels Torg. The picnic tables are a textbook example of talkscapes (Gehl, 2010). The right-angle corner seating at Sergels Torg is also observable at Kungsträdgården, only at Kungsträdgården, there is four times as much. The lower bleachers of steps have, unlike the upper bleachers of steps, natural corners of lines of steps that provide the same possibilities for group sitting as the seating at Sergels Torg. The upper fights of steps have their corners adorned with ramps to provide easier access the plateau between the two flights (see Image 20). To place those ramps at the middle of the steps instead of the corners might've been a better decision as it would create further talkscapes

Tree Effect

The impact of trees for the choice of sitting activity can be seen by the concentration of people choosing to sit under the cherry trees in Kungsträdgården (see Figure 14). The rows of benches atop the pond at Kungsträdgården offer the unique pleasure of moderate upwards enclosure. These benches offer other desirable attributes such as edge location and comfortable backrests, but its distinctive quality is the possibility to sit under branches and possibly flowers. The café chairs offer upwards enclosure through umbrellas and whilst this is an enhancing feature of the seating alternative it fails in comparison to the natural enclosure provided through the cherry trees. The branches of the trees offer a more visually diverse experience than the umbrellas (Cooper Marcus & Francis, 1990).

Image 21 - Kungsträdgården, Mars 22nd, 15:21

How design affects the sitting activity at the squares

- If Stockholmers can sit with their faces towards the sun in April, they will
- More seating means disproportionally more sitting
- Stockholmers prefer a soundscape around 60 dB over 70 dB
- Social comfort through diversity of seating may be achieved through an abundance of similar seats, if the seats can offer different experiences
- Seats under Japanese cherry trees are popular

Standing

If Kungsträdgården is a testbed for sitting activity, Sergels Torg is a testbed for standing activity. On average, Kungsträdgården receives a little more than half of Sergels Torg's standing activity (see Figure 20). Is Sergels Torg a superior place to stand? What evokes standing activity? Standing, compared to sitting, requires less of an effort. Going from walking to standing and back to walking is a minor action compared to walking—sitting—walking. Sitting usually constitutes a longer stay (Gehl, 2010), hence a 'sit' indicates an, on average, greater impact on public life than a 'stand' as it marks a typically longer staying activity.

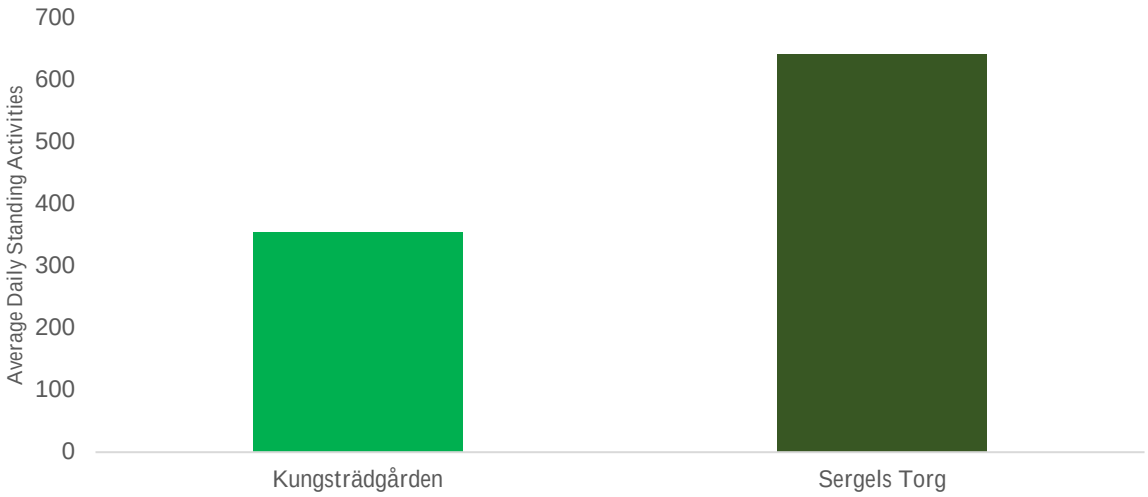


Figure 20 - Average daily standing activities for Kungsträdgården and Sergels Torg

Nevertheless, investigations into why people choose to stop a while and stand at any location is of immense importance as it represent a more tentative stationary activity than sitting. Standing, with its more fleeting nature than sitting, demonstrates the possibility to perform a humbler staying activity. Sitting demonstrates a more active decision of seating, placement and direction. Standing activity can entail a sequence of standing activities. The stander will often choose a placement and direction, realise that another location might offer a better situation, and change place. This behaviour is not as common for sitters, because the effort to get up and change seats is greater than to simply go from a stationary upright activity walk over and resume the stationary upright activity at another place. The stander shows us that being unsure about one's position is okay, and that contemplation is acceptable.

Image 22 - Various standing activities occurring in sunlight, Sergels Torg, Mars 22nd, 15:21

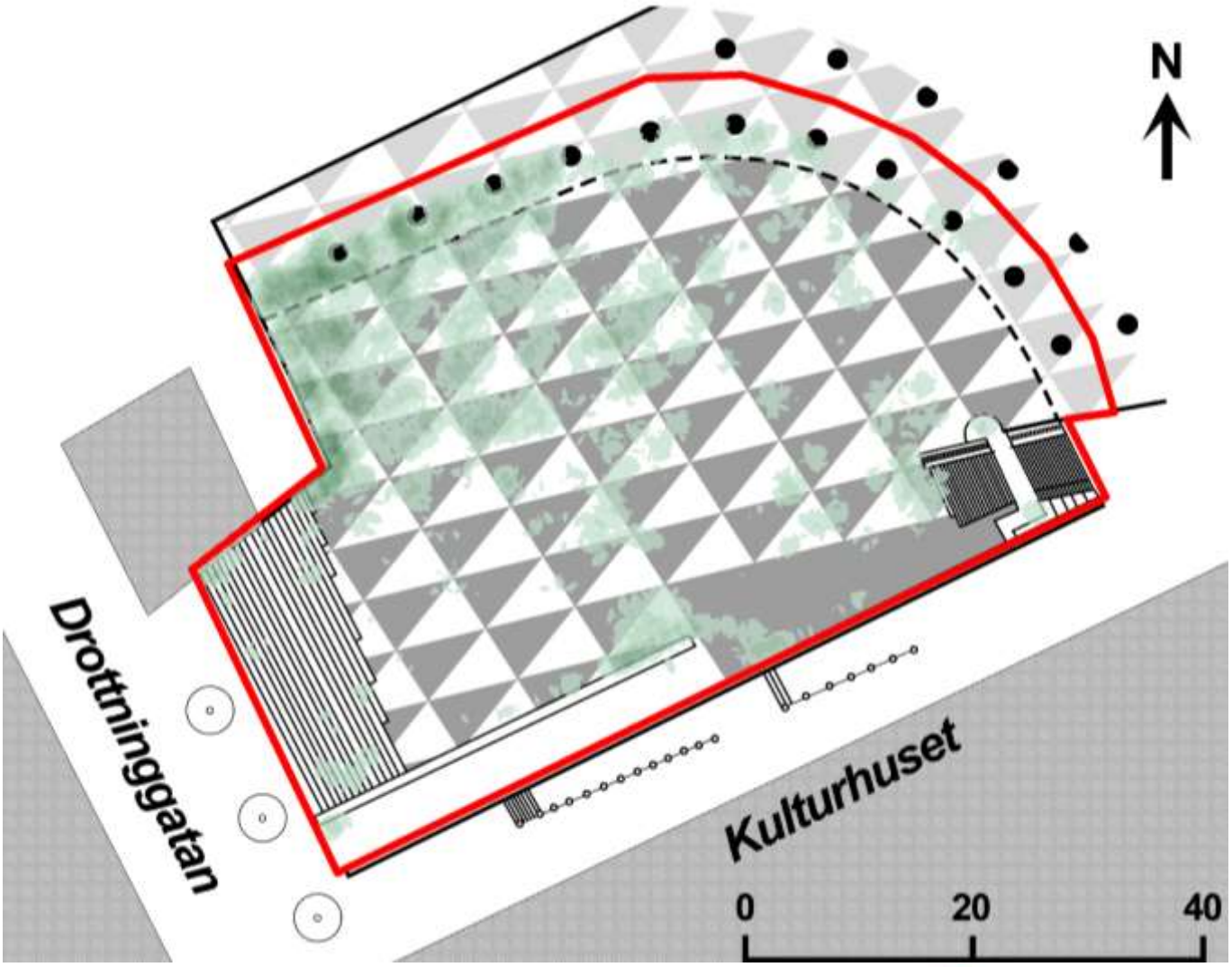
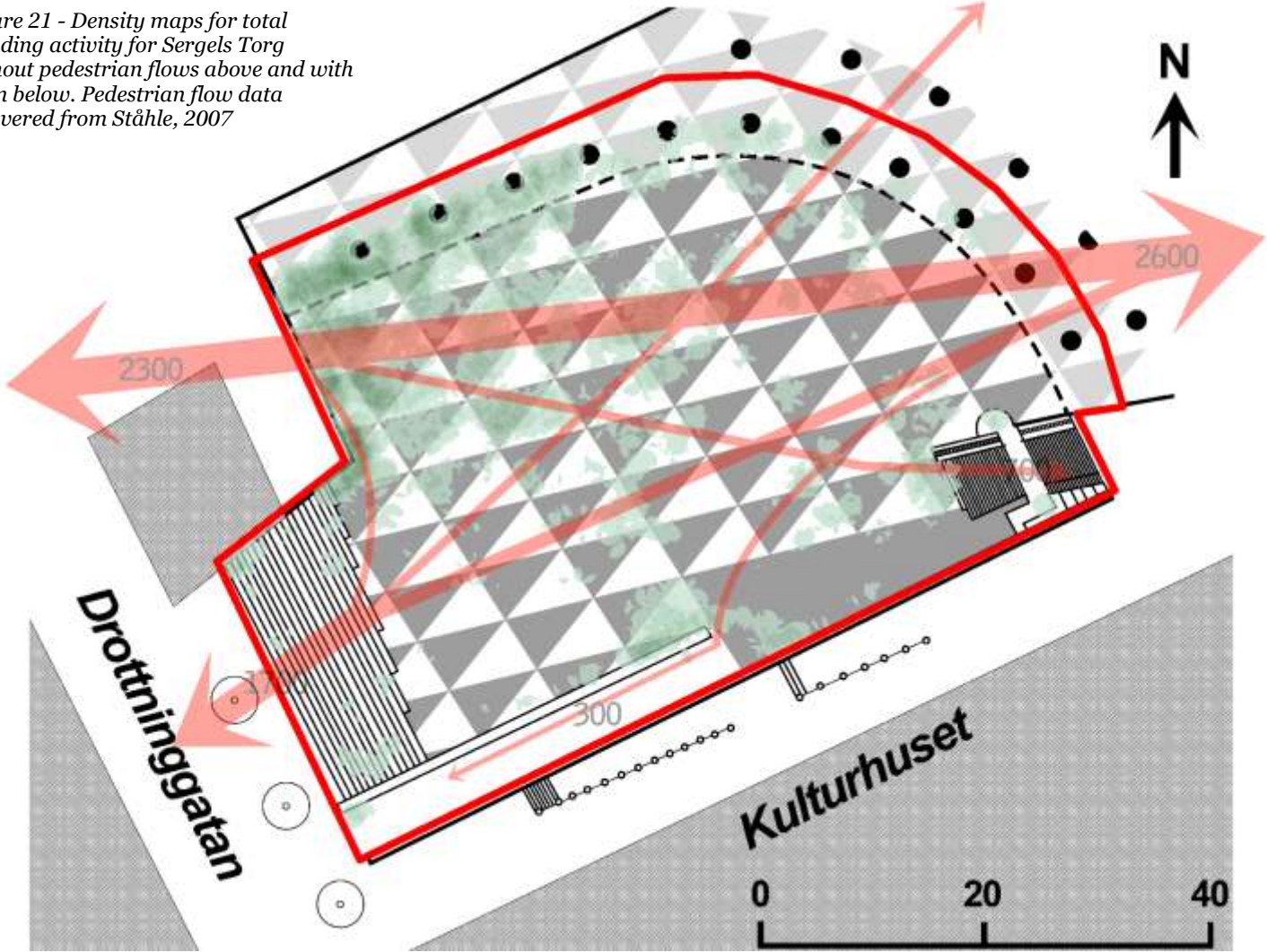


Figure 21 - Density maps for total standing activity for Sergels Torg without pedestrian flows above and with them below. Pedestrian flow data recovered from Ståhle, 2007



Standing

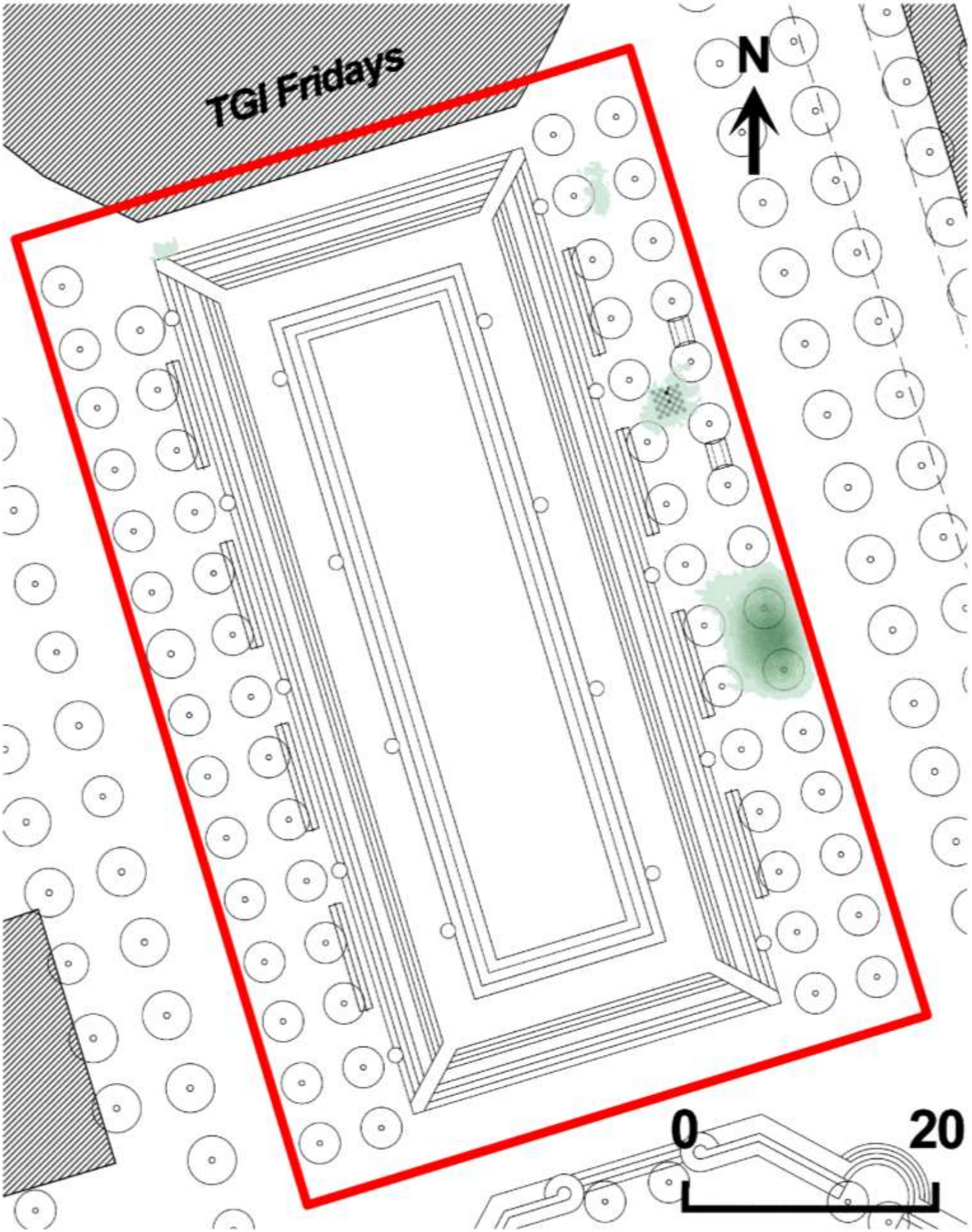


Figure 22 - Density maps for total standing activity for Kungsträdgården

100 Percent Spot

In addition to be the study area that receives greatest standing activity, Sergels Torg also experience greatest pedestrian activity of any public space in the study but also in the city (Gehl, 1990; Franzén, 2002). In a public life study from 2007 by *Spacescape* (Ståhle, 2007), movement magnitudes and paths across Sergels Torg was registered. Combining the pedestrian flows of that study with the recorded standing activity of this study reveals that, whilst standing activity isn't attracted solely to the path of the main pedestrian flows, it doesn't seem to actively avoid it either (see Figure 21). The main flow from the transit station is wider than the movement lines make it out to be. With this in mind, some sort of congregation outwards from the transit station entry along with the movement path is observable. Hardly a clear indicator for the existence of the proposed 100 percent spot, but neither a decisive proof for the inexistence of it.

The 100 percent spot is the most convenient spot for conversations to occur, a group on foot might stop in their tracks and start a stationary conversation, hence standing in the 100 percent spot. But the theory behind the 100 percent isn't merely that many conversations occur in the middle of heavy pedestrian flows, but that people actively chooses to move into the middle of the flow when engaging in conversations (Whyte, 1980). This tendency isn't completely observable at Sergels Torg. Some people seemed to have nothing against being in the middle of the flow, and some did choose that position over other possible locations away from the flow. However, many did not choose to group up in conversation in the 100 percent spot, many choose a placement away from heavy pedestrian activity. A simple rule such as the 100 percent spot doesn't seem to offer adequate detail as to why people choose to stand where they do, even though it explains some of the observed activity.

Triangulation Effect

External stimulus that provides opportunity for strangers to stop and meet to take part in a common experience are wonderful elements, full of spontaneity and surprise. It is truly what makes cities so attractive. The possibility to experience something unpredictable and to do so in the company of people that have seemingly no connection to you other than that the both of you consider this special occurrence to be interesting enough for you to pause your packed schedule and simply enjoy the existence of present life is a unique quality of city spaces.

Image 23 - People photographing and looking at the cherry blossom, Kungsträdgården, April 16th, 11:21, 11,7°C, Partly cloudy

A textbook example of triangulation is visible in the standing activity at Kungsträdgården. The square was studied over three days of the third week of April. At this time, only one portion of the cherry trees had started to blossom. The timing of the study couldn't have been better. By the fourth week of April, every flower at the pond had blossomed and standing, and sitting, activity was too immense to be recorded. The partial blossoming of the cherry trees allowed for convincing evidence of the effects of pink flowers on standing activity (see Figure 22). The pink flowers of the trees aren't simply pink flowers though, they indicate the coming of warmer weather and is *the* sign of spring for any Stockholmer.

Photographing the flowers wasn't an activity systematically registered but was a common activity at the blossomed cherry flowers. Meeting fellow photographers is unavoidable and unplanned conversations aren't unusual. Because only a limited section of the trees had blossomed, this area become the hotspot for this specific activity. The swedes are also an inherently polite breed, resulting in the occurrence of improvised queues. And in order for these queues to function, interaction is required, necessitating additional communication between strangers.

Sergels Torg demonstrated also great examples of triangulation. The people-gathering elements at Sergels Torg was, unlike the cherry trees at Kungsträdgården, constituted from human activity. On the last day of mapping, a day that experienced overcast weather and hence lower temperatures, a memorial was held for the victims of the Sri Lanka Islamic terrorist suicide bombings on Easter Sunday. Even though this was an event of more sombre character, it still managed to gather the interest of passers-by. The effect is that even though April 25th experienced poorer weather conditions, it hosted a greater number of standing activities (see Figure 23). About 50 people were directly involved in the memorial, arriving to the square to either make a speech, take photos or listen to speakers, one of which were Swedish Minister for Culture and Democracy Amanda Lind (see Image 25). Another group of people visited the square for reasons unrelated to the memorial, but still stopped to look or listen at it. The impact of this event is observable in the total aggregate of standing activity at the square as well with its cluster of activity around the bottom of the ramp connecting the square to Drottninggatan.

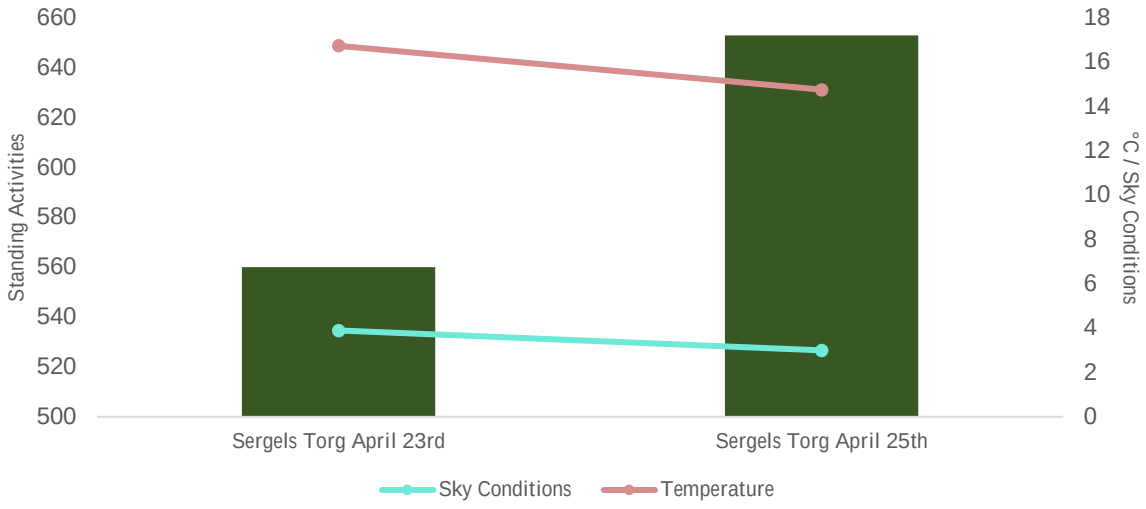


Figure 23 - Total standing activities and respective average sky conditions and temperatures for April 23rd and 25th at Sergels Torg

Other triangulation occurrences include the daily 2 o'clock trailer cart filled with free bibles and coffee, usually accompanied by a trumpeter and a demonstration for the environment (see Image 24). Just like the memorial did these activities require people directly engaged in the triangulation element, but the memorial and these activities do attract many people that merely stumble upon them.

Image 25 - Memorial for the victims of the Sri Lanka terrorist bombing with Swedish Minister for Culture and Democracy Amanda Lind circled in red, Sergels Torg, April 25th, 16:13, 15,1°C, Overcast

This human-produced triangulation was also observable at Kungsträdgården. A dancer was practicing at the open pond area one afternoon, first by himself but later joined by young children whose dance was less choreographed but all the more playful. The caretakers and parents of the kids gather around the dancer, making polite excuses to the dancer who of course don't mind the company.

Image 24 - Trumpeter at Sergels Torg, April 15th, 13:56, 9,6°C, Sunny

Image 26 - Protesters at Sergels Torg, April 15th, 17:14, 9,2°C, Sunny

How design affects the standing activity at the squares

- Pink flowers create reasons for standing to occur
- The activity of other people creates reasons for standing to occur, attract people and they will attract standers

Thermal Comfort

The importance of experiencing comfortable conditions have been proven to impact human activity previously in relation to sitting activity. The feeling of warmth from sun or otherwise high temperatures are usually recognised as desirable, especially for Scandinavians (Gehl, 2013).

Sun

As previously discussed, sunlight is a pivotal factor for plaza-sitters. The same pattern is observable for the overall stationary activity but seems to be of higher importance to sitters than standers. Standing in the sun, whilst it is a pleasurable act and if temperatures are low almost necessary, are less impactful looking at the overall public life compared to other factors. Incidents of stationary upright sun-bathing aren't uncommon, especially in the morning when thermal conditions are sub-optimal. But other motives for standing activity seem to out-rank being sun kissed in the minds of standers. At least when other desirable motives are present. At Kungsträdgården, a cluster of sun-bathing sitting activity gathers at the western rows of benches, but there is also a cluster of activity between the two eastern row of cherry trees, especially at the one part of the trees that had blossomed (see Figure 24). Keep in mind that this part of the square is shaded, yet people endure such conditions in order to experience and document the blossomed flowers of the Japanese cherry trees.

Image 27 - Women enjoying the sun, Kungsträdgården, Mars 12th, 12:54

The spatial distribution of public life at Sergels Torg is most clearly connected to sunlight in the morning hours, when temperatures are naturally lower, and the sun offers greatest comfort. The sun peeks above Kulturhuset at eight in the morning, shining a thin sliver of sunlight over the entrance to the transit hub (see Image 28). A small area just in front of the entrance becomes the designated smoking area for commuting Stockholmers on their way to work.

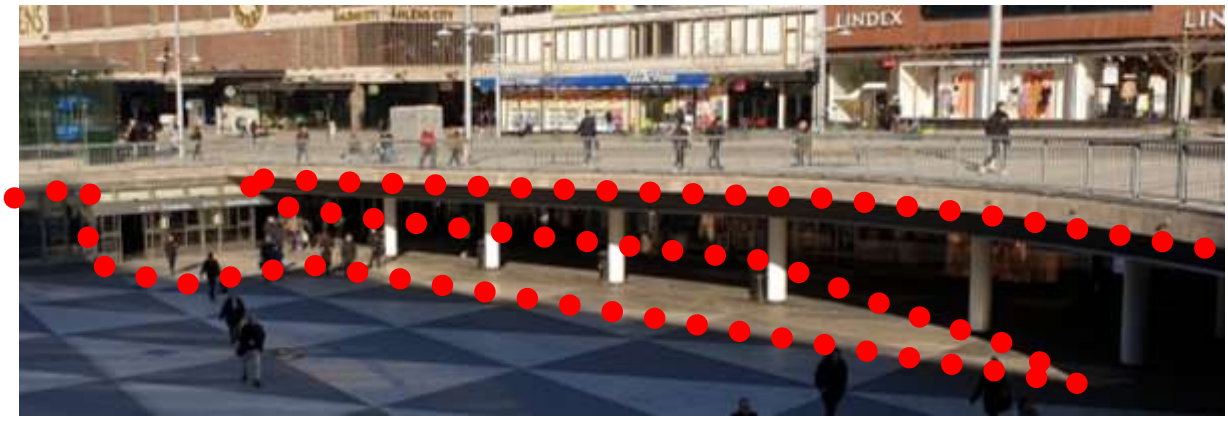


Image 28 - Strip of sunlight at Sergels Torg, April 15th, 08:53, 3,6°C, Sunny

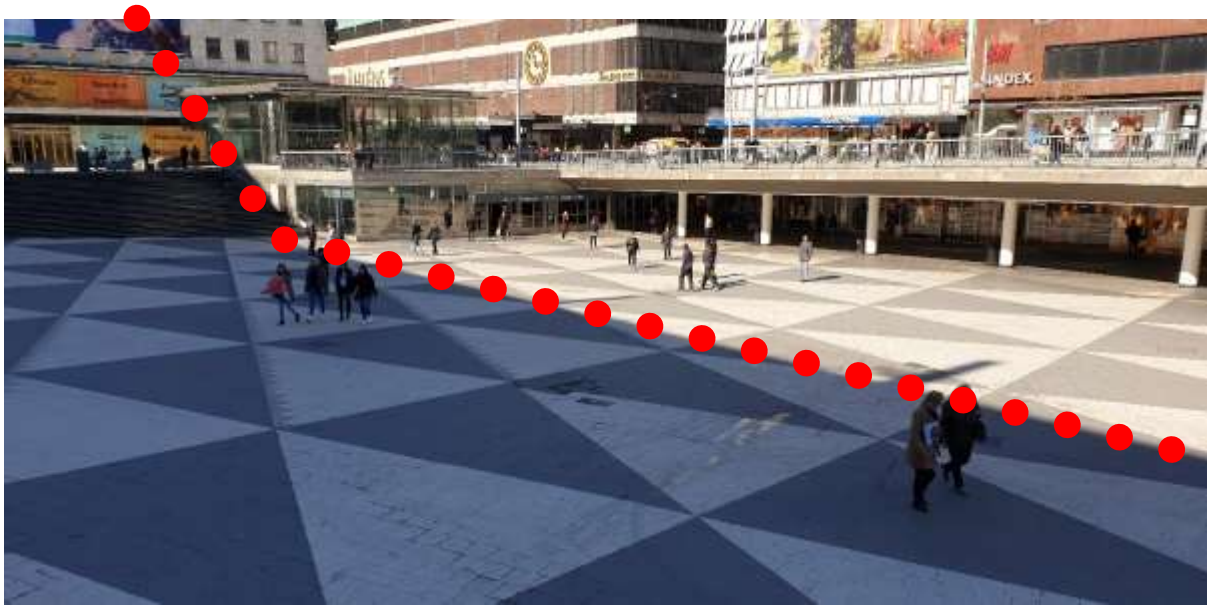


Image 29 - Sun availability at Sergels Torg, April 15th, 11:15, 7,6°C, Sunny

As the day goes on and the sun ears itself above Kulturhuset the sliver widens, and a larger portion of the square becomes sun coated (see Image 29). Another sun effect is present at nine o'clock, borrowed sun from the closest of the five 'trumpets-blasts' – five office skyscrapers – in the form of a glare provides some sunlight to the square (see Image 30). With a larger area of sunlight, stationary activity spreads out over the square, and public life turns more sporadic and less focused to any one area of the square.

The unfocused distribution of stationationary activity continues as the sunlight brightens greater sections of the space, one indicator for the movement of sunlight is observable in the gradual evolution of activity along the support pillars going from occurring exclusively at the western-most pillars to being outspread to almost all pillars. Yet, activity is still occurring to a large degree at the entrance to the transit hub even towards the end of the day when the sun is no longer shining upon it (see Figure 25). This is partly because the temperature in the afternoon is comfortable, even in the shade, but it is also the result of mitigating factors present at this entrance area. Reaffirming the partial disconnect between standing activity and sunlight.

Image 30 - Sun flare at Sergels Torg, April 15th, 09:11, 5,8°C, Sunny

Image 31 - Sergels Torg, Mars 12th, 12:42

Sergels Torg is a sunken plaza, it is located under street level. One of several perils of sunken plazas are their innate ability to obstruct sunlight. The effect is obvious. Imagine the different amounts of sunlight a ten by ten metre area and a ten by ten hole, sunken two metres down from surface level, will receive. Or why not the different levels of sunlight between a square surrounded by two-story buildings and one surrounded by four-story buildings. Every surrounding structure becomes taller if a square is sunken, everything becomes a greater sun obstruction. In this case is Sergels Torg a sunken square whilst Kungsträdgården is not, this does not single-handily explain why Sergels Torg only receives 42% of the stationary activity Kungsträdgården do, but it is an important factor, especially for the sitting activity. And as there is little seating options offered at Sergels Torg, stationary and sitting activity is naturally lower compared to Kungsträdgården.

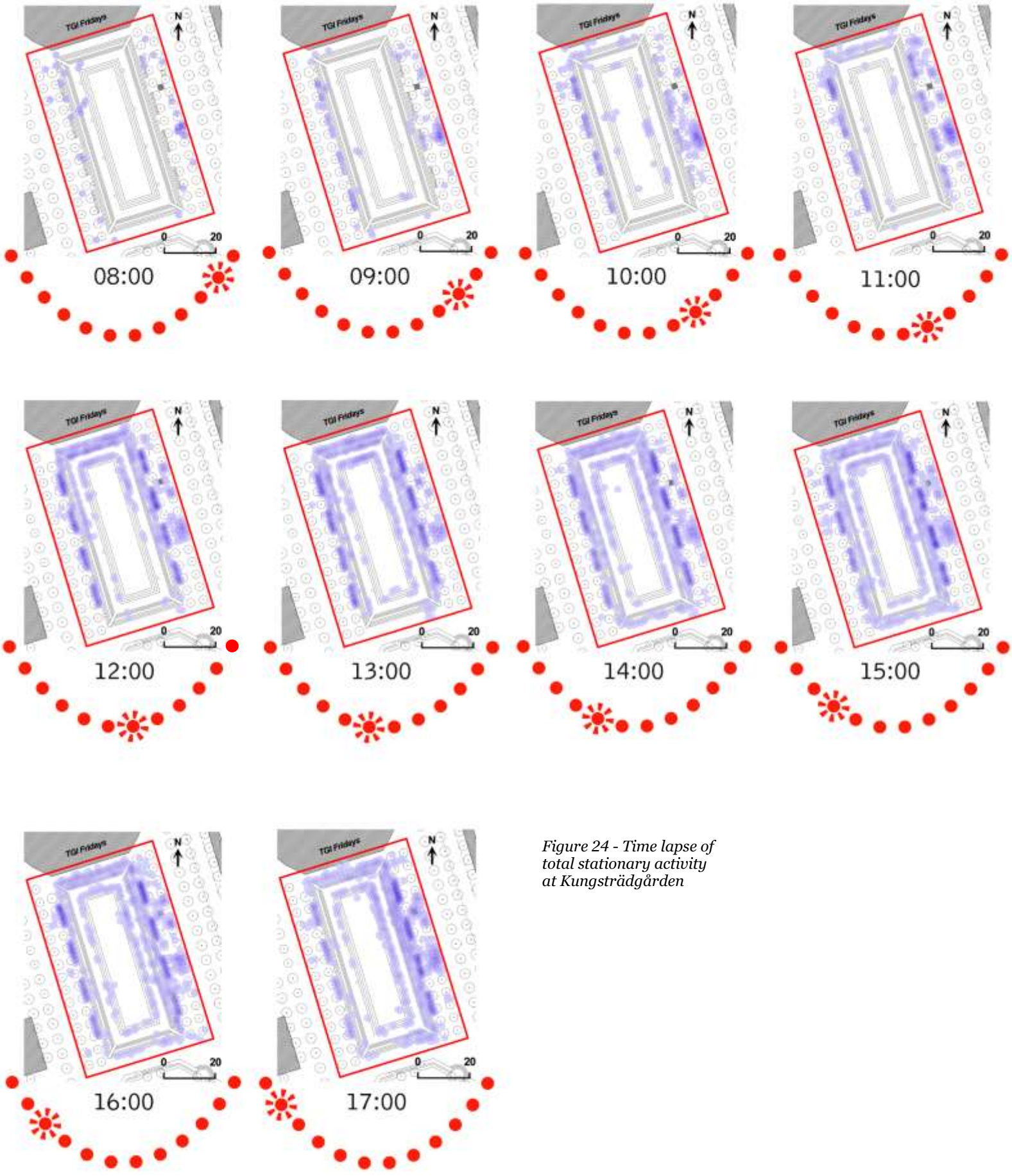


Figure 24 - Time lapse of total stationary activity at Kungsträdgården

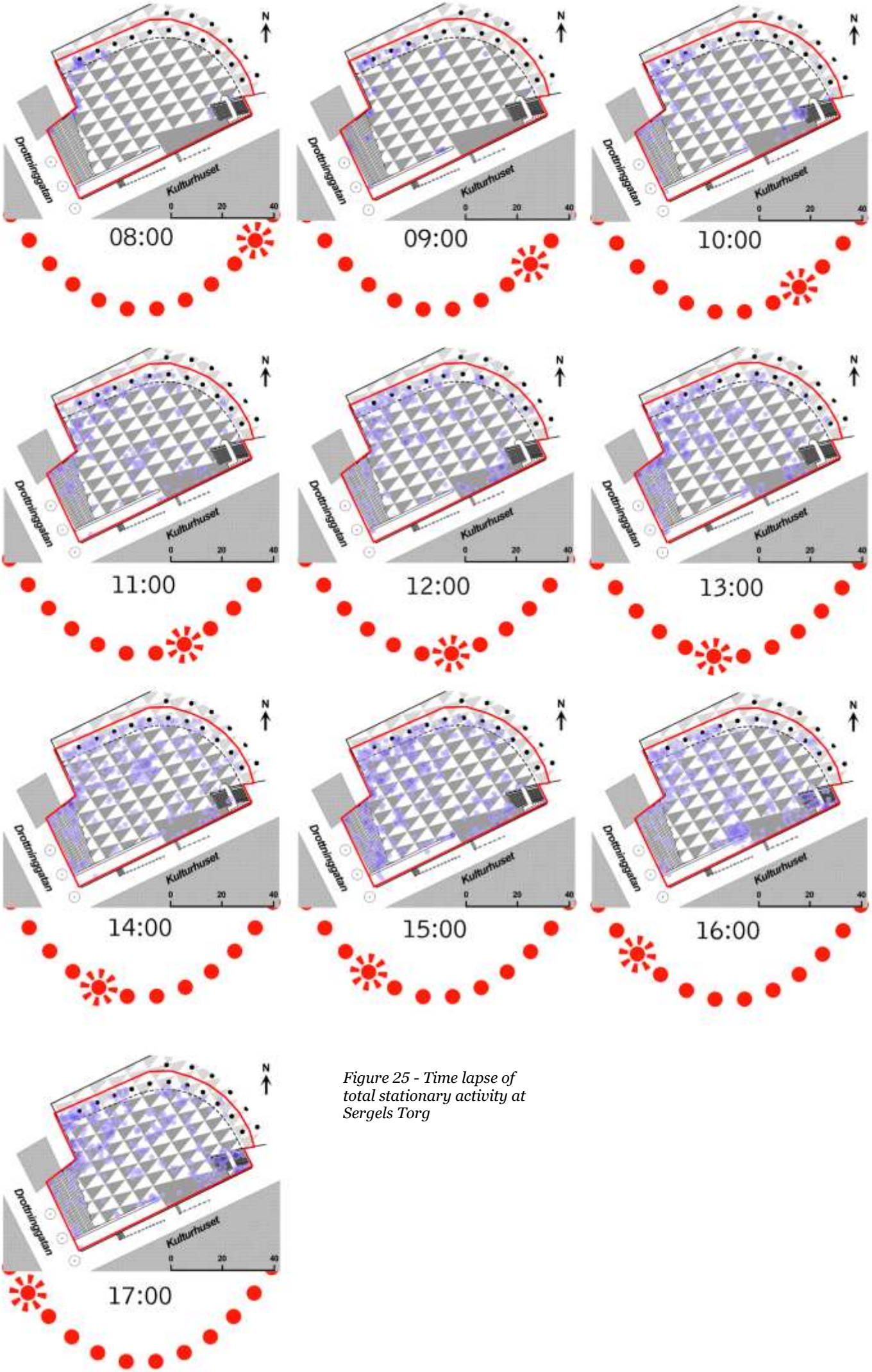


Figure 25 - Time lapse of total stationary activity at Sergels Torg

Suntraps

Is warmth more important than sunlight? Possibly. Looking at the activity at Kungsträdgården will have anyone believe wholeheartedly that temperature and total stationary activity have a deterministic, almost linear, and positive relationship (see Figure 26). Sunlight for these days were pretty similar, so that's a non-factor. No improvised or programmed event occurred for any of the study days. It is as close to a laboratory project on the impact on temperature on public life one can achieve. With constant factors in terms of sky conditions, auditory levels but also programming and physical design. The three study days experience different levels of stationary activity that correlate with the average temperatures. Thus, temperature seems to be an explanatory variable for total stationary activity.

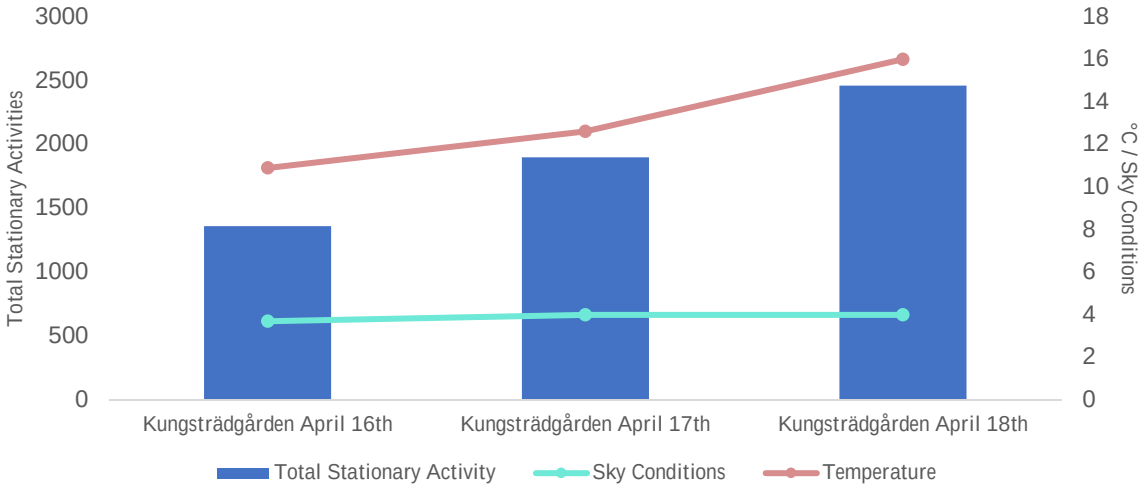


Figure 26 - Total stationary activity and respective average sky conditions and temperatures for each study day at Kungsträdgården

However, this worldview shatters at first glance of the relationship between the staying activity and temperature at Sergels Torg. April 15th, the first study day experienced considerately lower temperatures than the two latter ones, yet it hosts about as much stationary activity (see Figure 27). For one, April 25th saw the memorial of the victims of the Easter Day Sri Lanka Islamic terrorist attack, which explains the uptick in stationary activity. Why April 23rd receives less stationary activity than April 15th can't be explained by such fleeting elements. April 15th didn't host any special event that properly results in an inflated magnitude of activity. The most probable explanation is 'relative warmth', that April 15th receives greater activity than it should've – given its temperature – because the days leading up to it was considerately colder. This coincides with April 17th being the national start of the meteorological summer in Sweden 2019 (SMHI, 2019a), and that Stockholm experienced an average temperature of 2,6˚C the week before (SMHI, 2019b).

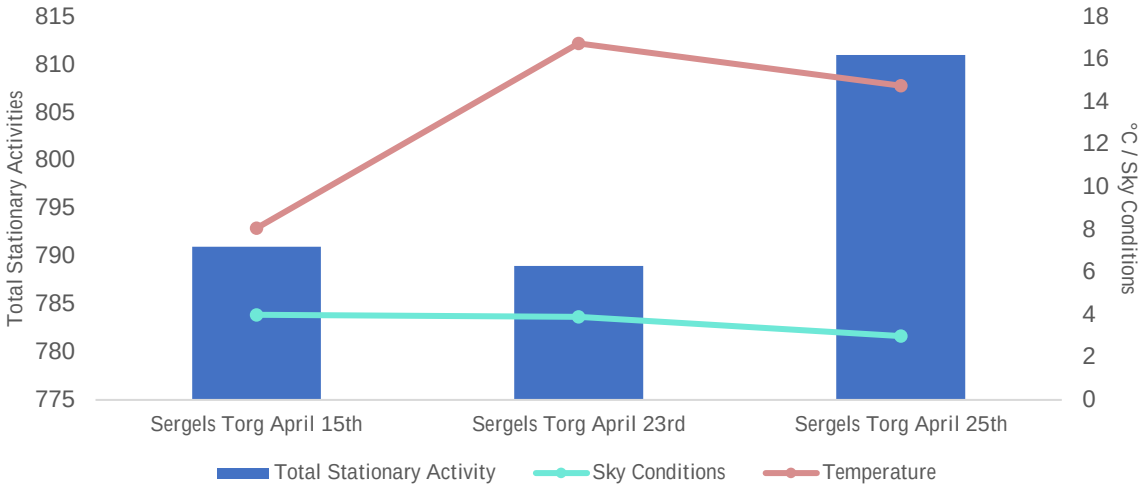


Figure 27 - Total stationary activity and respective average sky conditions and temperatures for each study day at Sergels Torg

The idea that acceptable temperatures are more important than acceptable access to sunlight is hard to confirm. Inspection of the activity at Kungsträdgården does not lend a greater understanding for the intersectional impacts of temperature and sky conditions because the sky conditions of the three days were very similar. One of the study days at Sergels Torg did however experience markedly different sky conditions than the other two. April 25th had an overcast afternoon, yet relatively high temperatures throughout, it was also the most popular day. This is in line with Whyte's (1980) idea that warmth is more important than sunny weather. But as previously mentioned, Sergels Torg hosted a memorial on April 25th, which attracted at least 50 people that came to the square for the single purpose of the memorial. Subtracting 50 stationary activities from the total number would render the 25th the least popular day instead.

What is to be made about this confusion? One possible explanation is that, in unity with Whyte's (1980) findings, sunlight is an important factor in the beginning of the summer but that its effect on activity fades away as the year goes on and temperatures naturally rises, no longer necessitating for people to reside in sunlight to experience comfortable temperatures. The Kungsträdgården measurements can't offer any insights on impact of sky conditions but do demonstrate the impact of increasingly pleasurable temperatures.

Desirable Microclimate

Out of the six study days, three experienced average temperatures above 13°C and consequently three experienced average temperatures below 13°C. Whilst the correlation between temperature and total stationary activity at Kungsträdgården seems to follow a linear and positive relationship with a very good fit, the same cannot be said for Sergels Torg (see Figure 28). Additionally, there is little indication that the suggested threshold of 13°C would result in considerately higher number of pleasure activities as the increase in activities per increase degree of Celsius between two sub-13°C days is greater than that between a day under 13°C and a day above 13°C (see Figure 29). The data sample gathered is however far too small to be able to show any correlation at all. It could also be that the bar for greater pleasure activities is lower in a country like Sweden where temperatures are naturally lower than the global average.

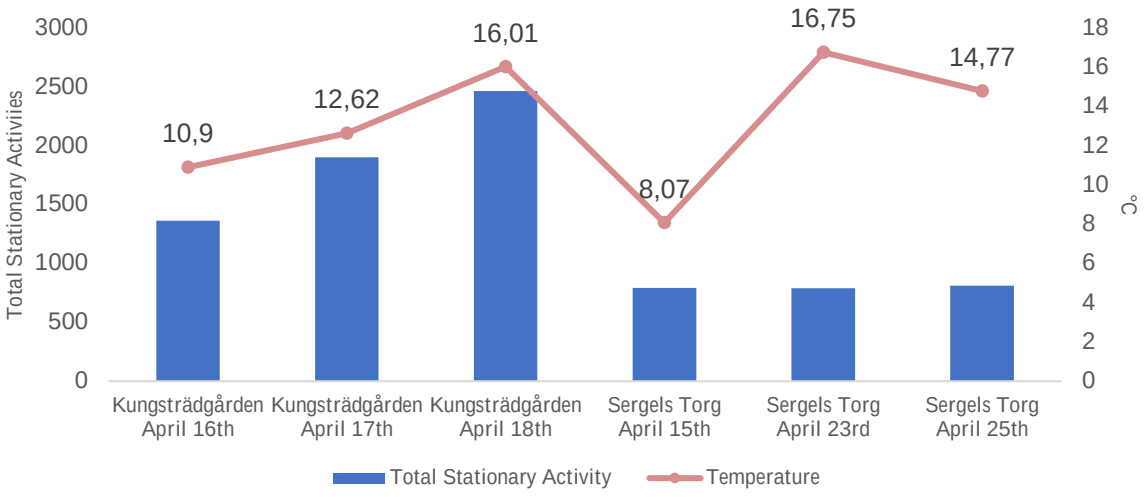
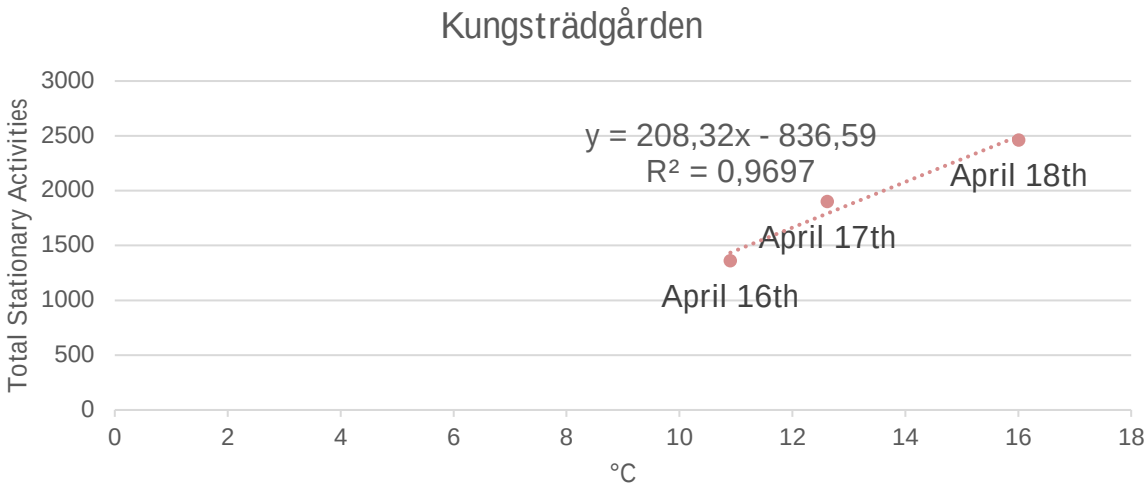
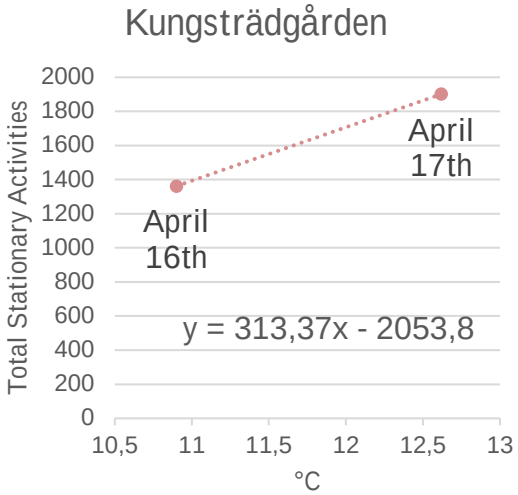
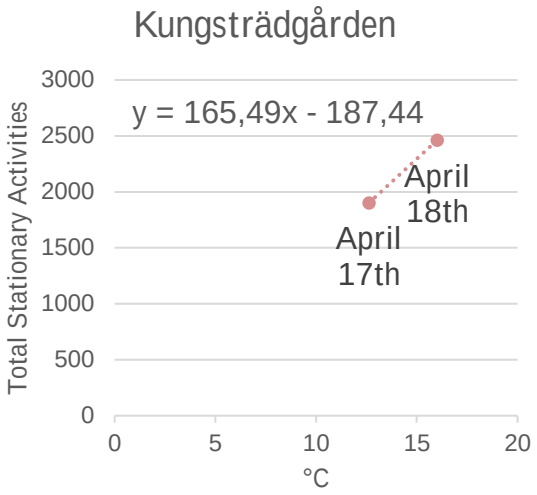


Figure 28 - Total stationary activities and respective average temperatures for each study day







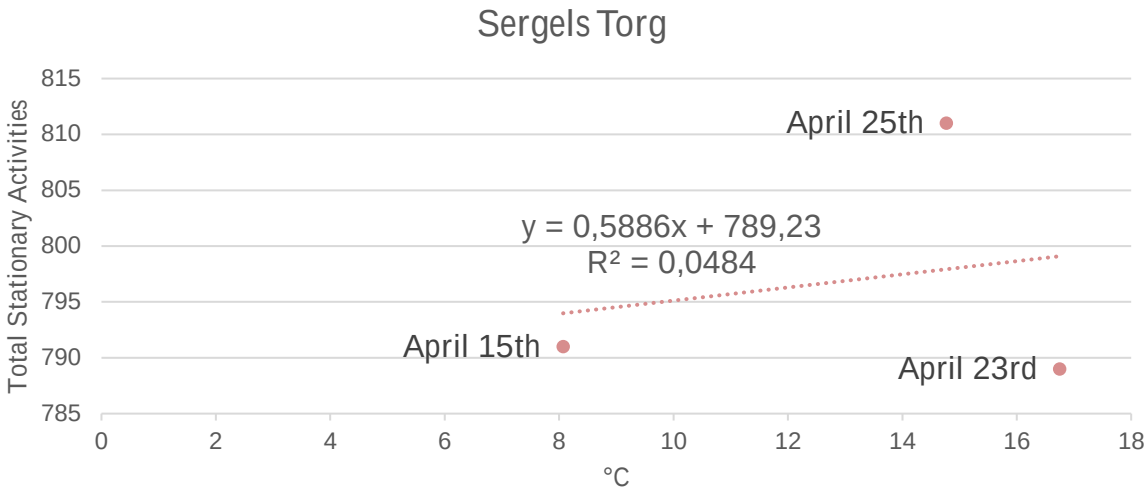


Figure 29 - Linear regression between total stationary activity and average temperatures

How thermal comfort affects the staying activity at the squares

- Sunken plazas, such as Sergels Torg, will create spaces with less sunlight than regular squares if all other factors are the same
- Comfortable microclimate matters more to sitters than standers
- Relative warmth, as in how warm a day is compared to previous days, are of importance
- The 13°C threshold for considerately higher pleasure activity may occur at a lower temperature in Sweden

Psychological Comfort

The discrepancy in physical, social and thermal comfortable seating, triangulation elements and levels of sunlight between the two squares are insightful factor that partly explain the difference in stationary activity between the two. The staying coefficient, the average hourly number of people performing stationary activities per 100 square metres, for Kungsträdgården is 4,8 and 2 for Sergels Torg. This is a vast discrepancy, for every person staying at Sergels Torg, almost two and a half persons stays at Kungsträdgården.

The factors that evoke outdoor activities aren't simply how comfortable one's body feel, sunlight and temperature matters, but as briefly discussed in relation to social comfortability, so does the internal effect of the physical environment. How the human brain reacts to physical elements in their environment dictate to what degree a space is used. The proof of this can be found in the correlation between perceived safety and human activity (Weinstein et al, 1999; Loukaitou-Sideris, 2006).

The physical designs of the two spaces differ distinctly. One has dramatic level changes whilst the other have subtle ones, one is described by its openness whilst the other can be divided into several smaller spaces, one is designed as a mass hall whilst the other is furnished as a living-room. What follows is a more in-depth analysis of how the physical form affects the internal processes of human beings and thus result in proclivity towards certain elements in the public realm. To identify the pertinence of the psychological impacts of physical design, attention is put upon previous studies, personal observation and empirical data from each square but also the relative magnitudes between them. Correspondence throughout the different sources indicate a greater relevance of the form-behaviour interaction.

Amphitheatre Effect

As previously mentioned, sunken plazas are spaces of inherent defects, such as their innate sun obstruction attributes. One issue is the stark distinction between the two levels of the squares. Take Sergels Torg with its upper street level space that is connected to Hamngatan, Sergelcity and the main shopping street Drottninggatan and its lower level connected to the underground tunnels and the T-Centralen transit hub. There is no smooth transition between the two and people will always be able to recollect which floor of the square they visited. They either looked down at the people in the square or looked up at the people above. The visual communication between them embodies the relationship between a parent and child rather than that of two equals.

This experience has been described as a discrepancy in perceived privilege between the two positions (Cullen, 1961). And the height difference between upper and lower Sergels Torg denotes a difference in privilege that inevitably instils a separation between plaza-users and street-users. Audience and actors, with no overlap. Why audiences are located above actors in theatres is connected to the innate human functioning limitation of viewing, that looking upwards is difficult and watching something with a slight downward angle is preferable (Tilley & Dreyfuss Associates, 2002; Gehl, 2010).

Another problem is that sunken plazas makes everything larger than it actually is. This is, as previously mentioned, an issue because of sunlight obstruction but it is also a deficit for how the place is perceived. Kulturhuset is perceived as three metres taller than it actually is because standing in the square, which roughly equates to standing in a hole in the ground, the house becomes larger than its height above street level, because from the perspective of the square it is. An obvious point, but worth consideration, nonetheless. The scales of buildings are important for public life as they can accommodate for or distract from the horizontal sensory apparatus (Gehl, 2010), either allowing people to enjoy the entirety of architectural works or

interesting scenes without moving one's head up and down, or enforcing such movements with excessively tall buildings.

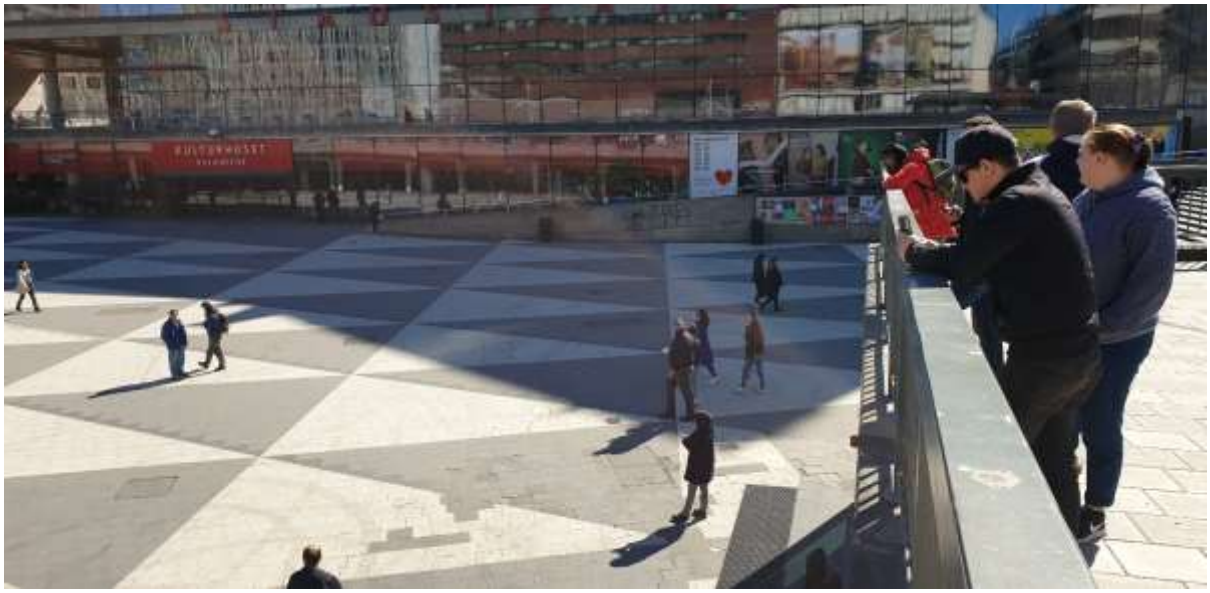


Image 32 - People watchers at Sergels Torg, April 15th, 12:58, 10,1°C, Sunny

The interaction between the two levels at Sergels Torg, enforced dominance and subordinance, can thus also be applied to the surrounding buildings and the sunken-plaza-users. The sizes of the buildings are enlarged whilst the human experience at the square consequently is belittled. The impact is distinct. Compared to the experience at street level, the buildings have a much more overbearing characteristic. The altitude difference is about three metres, still an immense impact is perceived. The position above is also superior for the simple reason that it allows for a greater overlook over the space, thus instilling a privilege through natural information-gathering utility. Everything that might occur in the lower level can easily be observed from the upper position whilst almost nothing of the street life can be seen by square-users (see Image 32).

These are some of the reasons why so many people choose to stay at Kungsträdgården compared to Sergels Torg. It isn't simply that Kungsträdgården offers superior qualities, even though it does, it also because there aren't sufficient reasons for potential stayer to stay at Sergels Torg. Staying isn't preferable over passing if staying means enduring a psychologically unpleasant environment. The discrepancy in usage between the squares is partly the result of the deficiencies of sunken plazas and the amphitheatre effect.

Optimal Elevation

The two squares studied are both designed with elevation changes. It is however at this point the similarities end. The flight of stairs from Drottninggatan down to Sergels Torg is constituted with about 28 steps that go down ten and a half cm for every 39 cm of flat surface of each step. The result is a staircase about ten metres in length and three metres in height, that's a 29° incline. Kungsträdgården has a more detailed flight of steps with one five metre plateau and another one metre plateau, but the incline for the flight of steps from the open pond area up to the cherry trees is roughly 12°. This difference in incline angle is a simple indicator for the difference between a dramatic elevation and a subtle one (see Figure 30).

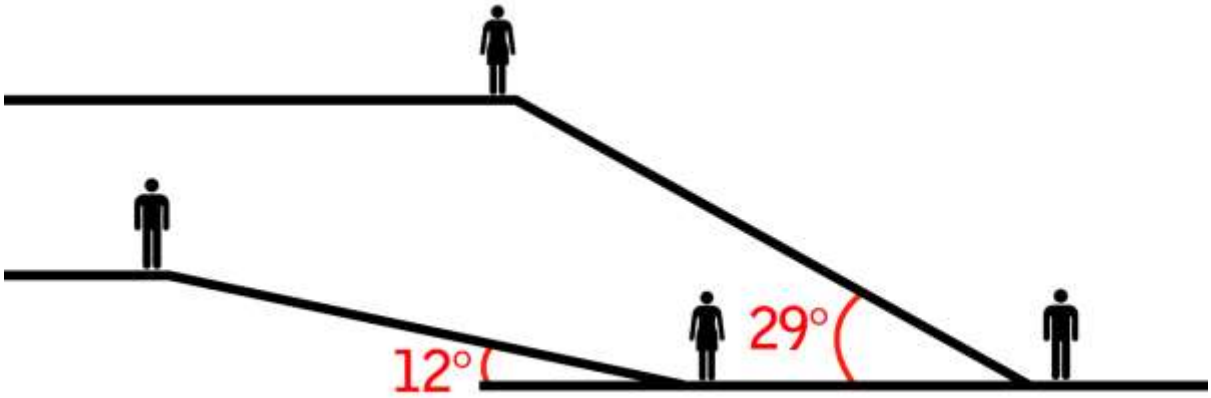


Figure 30 - Difference in incline between Kungsträdgården (12°) and Sergels Torg (29°)

Elevation changes in urban spaces provides ample opportunities for the common breed of public space users known as people watchers. Photographers interested in a good picture over Kungsträdgården position themselves in the highest corner position to get a good perspective, providing the greatest possible overview of the life of the square. The row of benches atop the pond steps are prime seating alternatives for many reasons, one of which is its altitude that endows it with the greatest view of all other elements at the square, human or otherwise. The devil is in the detail when it comes to elevation, however.

Image 33 - Kungsträdgården, April 23rd, 12:23

The flight of steps at the two squares are roughly equal in length, in other words, if they were to be equal in width, they would use the equal amount of space. Yet they have decidedly different impacts on the interplay between the people at the higher and lower level. Having to angle one's head up or down 12° is within a comfortable range and wouldn't require a distinct head-and-neck tilt. This is in line with the recommended flexion threshold for eye-to-monitor angles of under 20° (Chaffin, 1973; Kilbom & Persson, 1987) or preferred workstation angle ranges between +10° and -25° in relation to the horizontal line (Menozzi et al, 1994). Whilst the additional 17° required to perform the 29° tilt may seem small it is worth mentioning that for every degree increase in tilt, further strain is put upon various muscles in the head and neck region (Sommerich et al, 2001). The angle increase in the elevation at Sergels Torg, compared to Kungsträdgården, is in itself a more physically straining environment, but more importantly is the connotations that our brains develop due to the strain our naturally limited

anatomy inflicts in interactions with forms that enforces movements than cause such discomfort.

The elevation at Kungsträdgården and Sergels Torg allows people to position themselves in autonomously chosen altitude, latitude and longitude coordinates, making a decision that demonstrates which level you prefer. This is an inherent positive attribute of all seating flights of steps. The difference between the different elevation changes of the two squares is that the different levels at Kungsträdgården are sequenced more gradual as to allow for a more humble and discrete decision. This smooth transition between levels is directly affected by the lower angle. The elevation at Sergels Torg is more dramatic and distinct in comparison, separating the two levels more clearly with a larger angle that enforces a seemingly shorter but all the more strenuous transition.

Enclosure

Defined spaces invite greater activity because the process of defining them induces the spaces with a sense of purpose, marking them as areas worthy of attention because of its distinction from surrounding spaces and allows people to connect to the forms that define them. A fundamental definition of space is enclosure, the boundary of space. Enclosure can be achieved by different means and through various degrees of boundaries. Boundaries can be solid and completely impermeable, but there are also visual boundaries that, whilst permeable, still instils an enclosing character of space.

Image 35 - Claustrophobic underground section of Sergels Torg, April 15th, 16:19

Sergels Torg has the opportunity to create complete enclosure, given its separation from the street, and to some degree it does. The square can be divided into two parts with one under a ceiling and one open, this study focusing on the latter. The underground section is rarely used and would by many not be considered a square, but rather an underground passageway. The boundary between the two parts is vague, with no actual indication that one has passed on to the next space other than the end of the ceiling. The ceiling is low and a rare example of over-enclosure that, rather than providing a sense of belonging – that enclosure usually does – it constitutes a claustrophobic experience that additionally separates people from the natural light of the sun completely (see Image 35).

Image 34 - Row of support pillars at Sergels Torg, February 21st, 14:48

The line of pillars going along the bend of the street above – and hence the ceiling – is most likely the result of prioritising the most effective supportive construction rather than any artistic consideration of enclosure, given the space's modernistic background. The pillars do however create some enclosing archway-like characteristics which is instantly reduced by the fact that the space behind the first row of pillars leads into what looks like an endless abyss of darkness, support pillars and underground pathways (see Image 34). The opposite side of the

square is enclosed properly with the façade of Kulturhuset that offer both interesting elements such as the library, allowing people to view it through big the glass windows but also walls that are necessary to sustain prolonged standing activity.

Image 36 – Above: Arcade of cherry trees at Kungsträdgården, April 25th, 12:19. Below: A set of archways at the building "Cases d'en Xifré" near the marina in Barcelona, Spain (Obal, 2008).

The pond area at Kungsträdgården is enclosed by the two sets of double rows of Japanese cherry trees at each long side of the pond that helps marking the spot, providing visual boundary but also noise and wind protection (Gómez-Baggethun & Barton, 2013). The rows of trees are located in parallel linear lines with some space between the rows, enabling strolling between the trunks and below the branches of the trees. The rows of trees along with its branching form a common enclosure tool the ancient renaissance masters used called archways or *arcades* (Sitte, 1889) (see Image 36). This element allows for people to waiver between completely diving into the deep in the pond or reserving in the gallery of the arcades, overviewing the scene. The branches of the trees – that provides upwards enclosure – is in comparison to the ceiling at Sergels Torg a lighter boundary between open-air and full enclosure, a perfect middle-ground.

Subspaces

The two squares are approximately equal in overall size but represent two different strategies for division of space. Sergels Torg leaves the task of creating intimacy to the people using the square whilst Kungsträdgården offers design element that form divisions within the space. The subspaces are created through the elevation changes and plateaus that allow for people to reside within them. The majority of the space is constituted by the eleven different levels within the flights of steps around the pond, hence eleven subspaces around the pond. The linear steps are however quite long, this is remedied in the lower flights of steps where the urns interrupt the lengthy supply of 'straight sitting' with a well-needed support furniture that also offers backrest or shade if need be. The urns at the top of the upper flights of steps offer the same interruption and space-division but do so also for the row of benches. Clearly marking one bench from the other.

The upper urns, benches, trees and branches of said trees also create division in three directions. The divisions are however of varying forms, the urns create solid divisions that obstruct any peripherally located eavesdroppers to spy on you and gives sitters something to look at if they run out of conversations subject. The same visual focal point is provided through the branches above though they do not offer the solid attributes of the urns, the branches do however offer shade from the sun on hot summer days. The trunks are an example of division achieved merely through the perception of boundary. The rows of cherry trees don't obstruct access to the benches, but because of their long linear sequencing they infer the presence of a division in space. As previously mentioned, they are framing devices for enclosing space, and therefor also for dividing space.

Image 37 - Kungsträdgården in heavy usage, April 25th, 12:20

The arcades of cherry trees are in themselves subspaces. The elongated shape of the archways provides zero confusion for what the intended way to experience the subspace is. Walking down the length of the arcade accentuates the enclosing character of the tree-rows. Pattern recognition is vital for the mere survival of any animal, but humans distinguish themselves from other mammals through our superior pattern processing ability that allows for the uniquely human development of language, intelligence, imagination, beliefs in ghosts and gods, art and social organisation (Mattson, 2014; Logan & Tandoc, 2018). Stockholmers pilgrimage to the elongated arcades of linear patterns created by the rows of trees is the effect of a brain evolved with the fundamental function to recognise such patterns.

Edge Effect

The activity at both squares have hotspots at the edges of them (see Figure 33 & 34). At Kungsträdgården, this means the row of benches that are provided with edge-zone qualities from the rows of trees behind them and the downward elevation from the pond in front of them. Sergels Torg sees edge activity mainly at the walls beside the transit hub entrance. The psychological impact of residing in a position along an edge is the historical remanence of a long line of humans vital need to attain a safe position. Humans have a frontal sensory apparatus – with forward facing eyes and nose, and sideways facing ears – edge placement provide safety from unnoticed perpetrators by protecting the direction humans are less able to investigate through sight, touch, smell and hearing, their backs.

But the impact is psychological rather than actual. This can be seen at Kungsträdgården where the edge isn't constituted by an impermeable wall but rather a very permeable row of trees. The edge pattern constructed through the linear distribution of trees is connotated in the minds of people with the service of backwards protection and safety. The behavioural pattern described by the edge effect is a representation for the human need for security, not safety. The edge is favourable position for reasons related to microclimate as well. But there are other psychological impacts vital for the importance of edges.

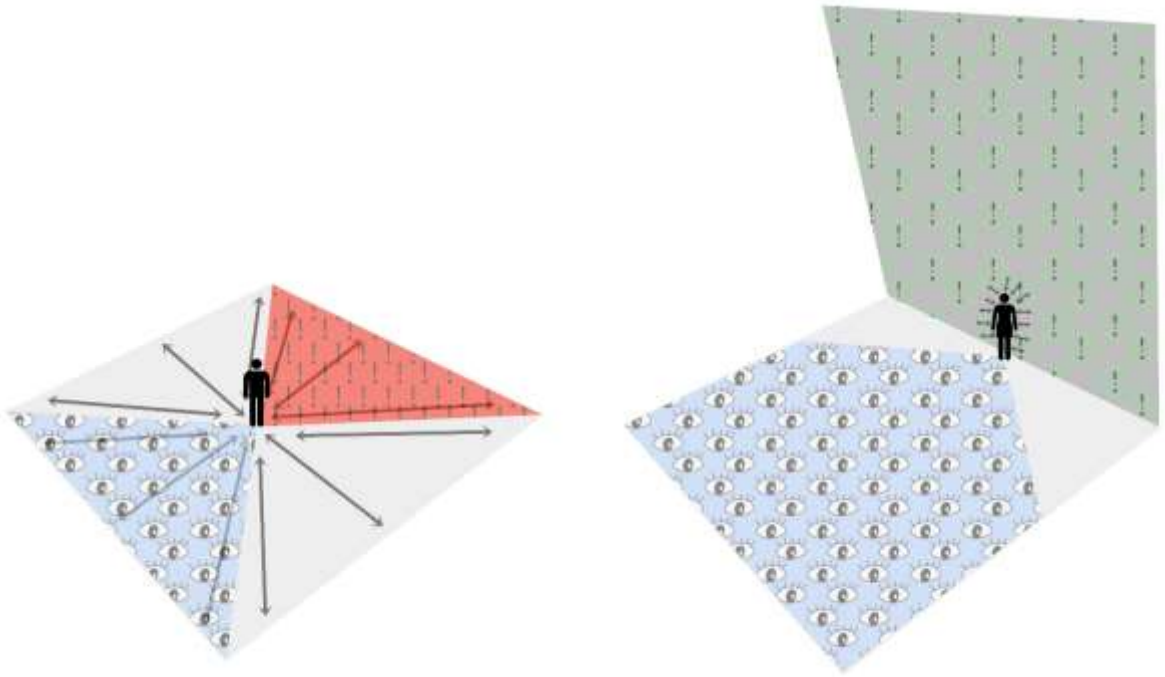


Figure 31 - The psychological benefits of edge placement

Why edges are good psychological positions can best be understood by contrasting it with the alternative, non-edge positions. The edge position offers the greatest overview of any space unless something obstructs that view, for every step inwards from the edge, less and less of the place is visible. This is advantageous for information gathering both in terms of safety and to observe the scene, either by looking for something special, as a late-running friend, or simply to experience the unpredictable drama of public life. As previously mentioned, do edges negate the possibility to get attacked from behind, which connotates the edge with the intrinsic positive attribute of safety, thus, have our brains evolved to like edges. But being close to, or leaning on, edges also instil a sense of belonging (see Figure 31).

Physical contact or the ability to engage in physical contact with the defining enclosing elements of space connects humans to their environment. Compared to the isolation

experienced by separating oneself from edges, maximising the distances to defining forms, edge-zones offer company in the forms of buildings, constructions, walls of vegetation. Elements that will remain after the edge-resident leaves, elements that existed before she got there, elements that define the space. By attaching to *the* defining quality of squares, people connect their existence to that of the square, and in turn, the city as a whole.

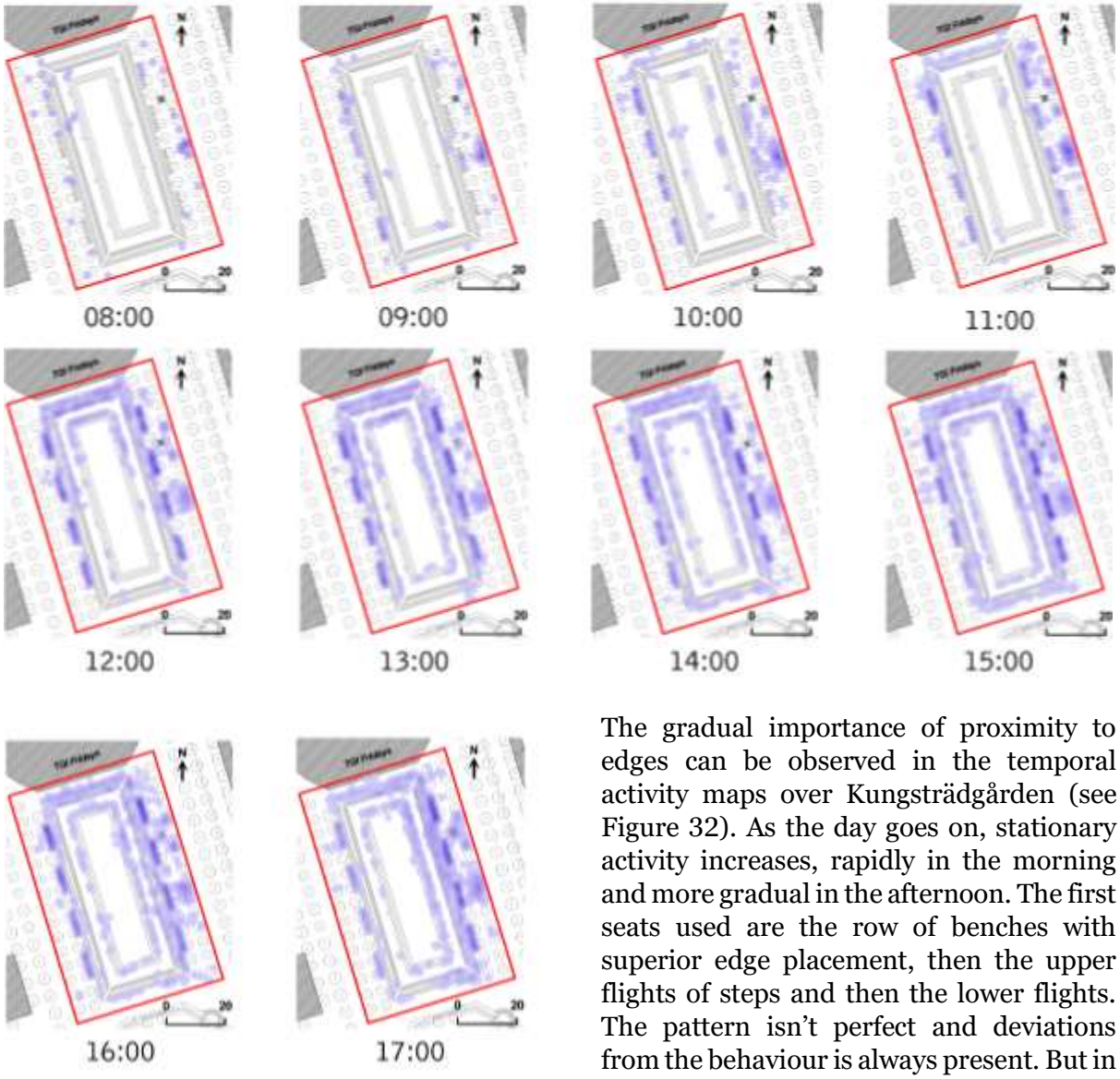


Figure 32 - Time lapse of the density of total stationary activity at Kungsträdgården

The gradual importance of proximity to edges can be observed in the temporal activity maps over Kungsträdgården (see Figure 32). As the day goes on, stationary activity increases, rapidly in the morning and more gradual in the afternoon. The first seats used are the row of benches with superior edge placement, then the upper flights of steps and then the lower flights. The pattern isn't perfect and deviations from the behaviour is always present. But in general, people first choose the prime edge positions and then fill in inwards towards the centre. This can be seen especially in the maps between noon and four where more and more of the pond seating is used. The upper seats are filled up before the lower seats are, and the parts of the lower flights that receive activity usually have activity at the upper flights above them.

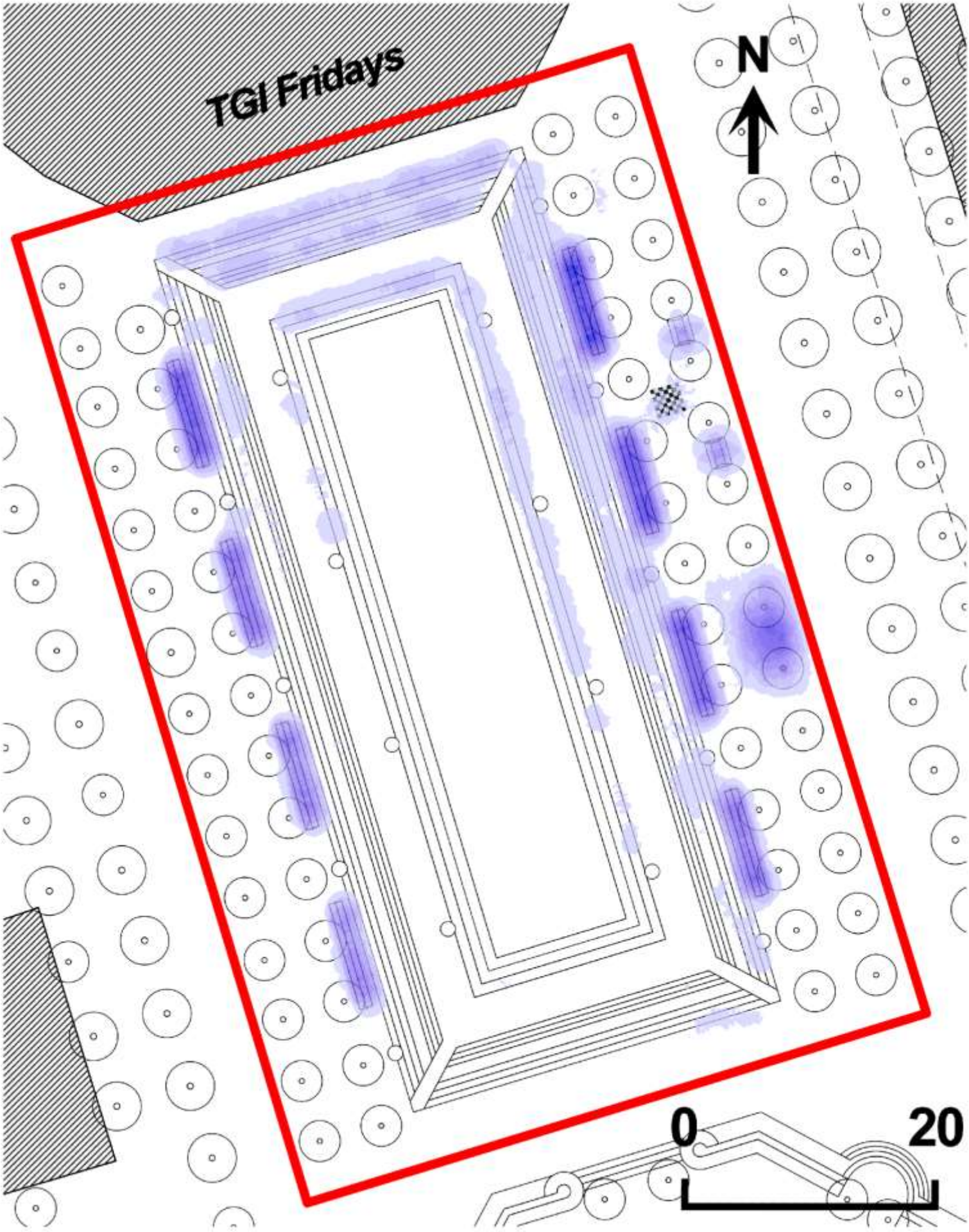


Figure 33 - Density map for total stationary activity at Kungsträdgården

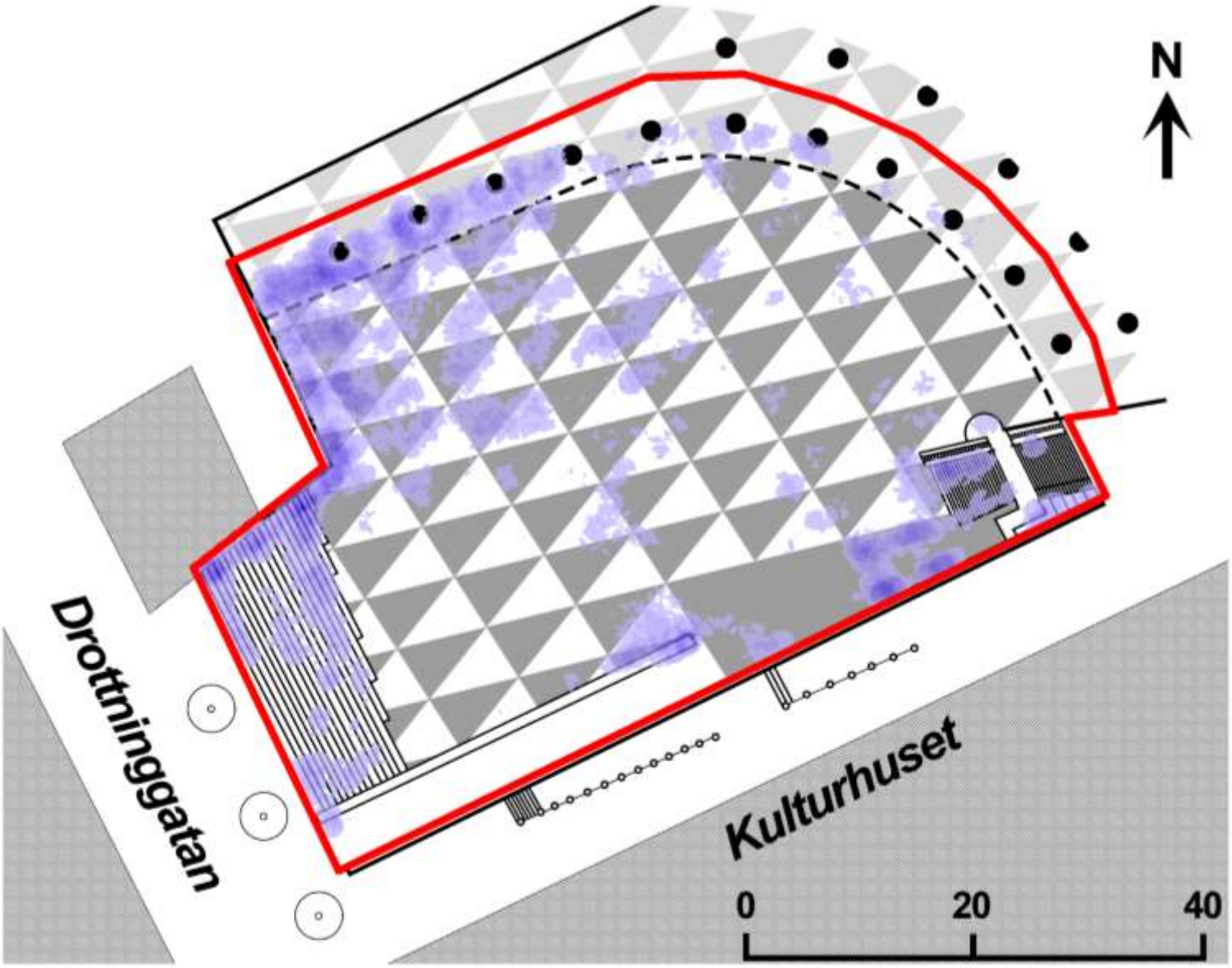


Figure 34 - Density map for total stationary activity at Sergels Torg

Piano Effect

The impact supportive public furniture has on stationary activity is visible at both squares. The support pillars along the bend at Sergels Torg attract activity because they offer the ability to perform a more comfortable upright stationary activity (see Figure 34). Prolonged standing activity can lead to muscle fatigue, cardiovascular problems, negative pregnancy outcomes and back pain and it is recommended that office workers mix-up their postures by occasionally leaning as to combat these effects (Garcia et al, 2015; Waters & Dick, 2015).

Similar connotations between edges and safety can also be observed between supportive physical elements and physical comfort. The public furnishing that allow for people to lean against them offer something more than just the act of leaning, they offer the choice to lean or not. In comparison to a situation without these elements – that offer only one possible posture – a 'piano' enables people to make a choice between two possible activities, standing or leaning. People get to actively form how they want to experience the public realm instead of passively residing in the enforced vastness of undefined space. And with a support element nearby, the alternative to change posture is always available. As Whyte (1980, p.34) puts it:

> *The possibility of choice is as important as the exercise of it. If you know you can move if you want to, you feel more comfortable staying put.*

The piano is however also a companion and not just something to lean against. This can be seen in the fact that most of the people at the support pillars at Sergels Torg aren't actually in physical contact with them. Rather they stand in close vicinity to them. The mere visual presence of any physical element provides focal points for people to ground their stationary activity in. Make the furniture interesting and the company it offers will attract more people.

Similar physical comfort advantages the pillars have at Sergels Torg is offered by the urns at Kungsträdgården (see Figure 33 & Image 38). Only the urns can be leaned against by standers and sitters. Having a backrest helps to decrease lumbar pain (Vergara & Page, 2002), but just like the case for the pillars, are the elements valuable through the possibility to choose they provide.

Image 38 - Girl using an urn as backrest at Kungsträdgården, Mars 2nd, 12:51

Niche Effect

There aren't really any forms that conjure any so-called niches in the two squares. The underground section of Sergels Torg is a literal cave, a form usually provoking the niche effect, but the space under the street is too big and undefined to produce any of the comfortable conditions advertised by the promise of the niche. Niches ought to provide protection in three direction, left, right and above. As previously discussed, do the benches at Kungsträdgården have enclosing elements in these directions, but the row of trees and branches of those trees allow for too much flow of sun or visual intrusion to form a real niche.

The picture to the right (see Image 39) is from a small adjoining street running perpendicular to the length of Kungsträdgården. In it is a prime example of the construction and usage of a niche. The arch window is sunken into the façade creating solid enclosure in the three directions. The windowsill with its perfect height and depth produces a comfortable bench for one, two or three people. The window with its frame acts as backrests, allowing for different constellations, directions and postures of sitting activity.

The inwards extruded niche makes it so people can stay at this spot without making too much of an impression, or inconvenience on the passing flow of pedestrians.

Image 39 - Two women using the cave created by an inwards extruded window frame, close to Kungsträdgården, April 25th, 12:21

How psychological impacts of design affects the staying activity at the squares

- Sunken plazas, such as Sergels Torg, will enforce public roles
- Subtle level change is preferred over abrupt
- Enclosure is important, but don't overdo it
- Utilising human pattern processing to create space boundary is a useful tool for creating well-defined spaces
- Edges are preferred staying spots
- Defining elements allow for decision-making
- The possibility to choose is important for people to stay

Sensory Comfort

Sensory comfort is achieved through the provisioning of forms, scales, sizes and element that satisfy the human sensory apparatus. The most common senses are hearing, touch, vision, smell and taste. Intuitive and self-explanatory observations regarding sensory comfort would suggest, for example, that planners ought not to combine a landfill and a public playground to avoid creating an unpleasant smell that would repel people from going to the playground. A further analysis into why that is reveals that people avoid smelly places because the human sense of smell experience some smells to be discomforting, and other not (Khan et al, 2007). In other words, the sense of smell has limitations. The same could be said about thresholds for vision (Gehl, 2010), hearing (Pye & Langbauer, 1998), taste (Mojet et al, 2001) and touch (Stroud & Unger, 2010).

Senses are universal (Strang, 2005). Some people do however have functional impairments such as blindness and deafness. Such variations in sensory apparatuses are accommodated for through visual and auditory information messages or guiding surface details in subway stations. Accommodation for the basic senses is achieved though universal designs that provide experiential richness in terms of appropriate sounds, sights, smells, touch and taste (Preiser, 2008). Inclusionary measures aren't analysed in this section, rather the comfort experienced by undeviating functioning sensory apparatuses.

Optimal Square Dimensions

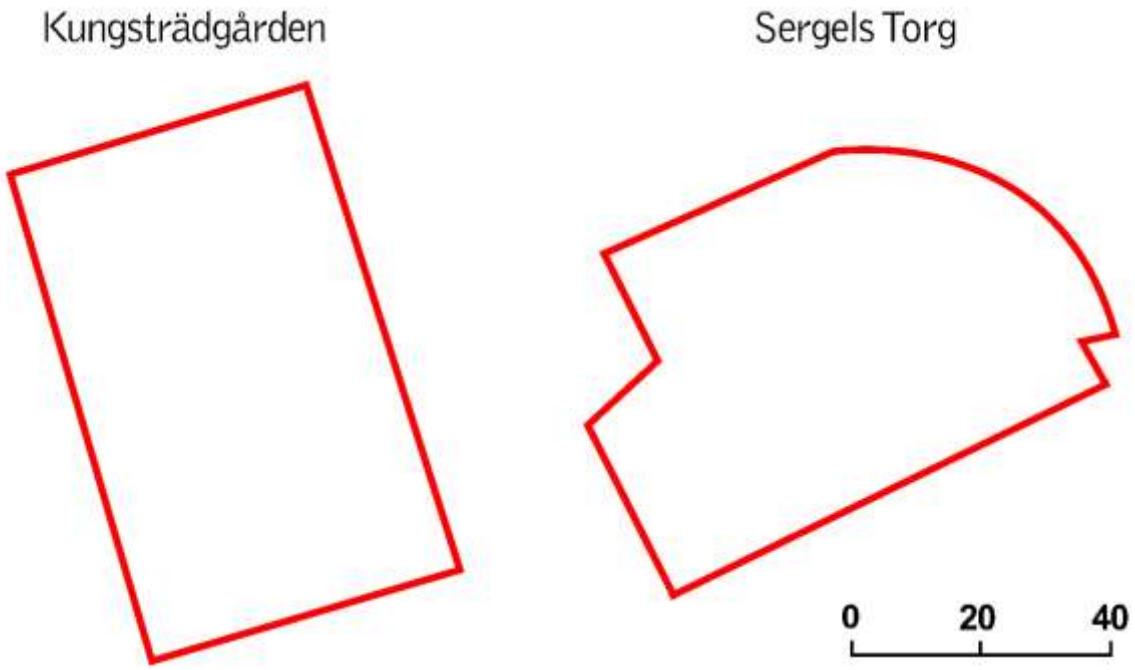


Figure 35 - Shapes of Kungsträdgården and Sergels Torg

The two squares are about equal in total area, at least the parts studied. They are also similar in total dimensions with the pond at Kungsträdgården constituting a perfect quadrangular shape 80 metres long and 50 metres wide. The study area at Sergels Torg has more corners and sides, not to mention a bend, but approximately constitute a 70 by 55 metre area (see Figure 35). Application of Sitte's (1889) principles for square form and their principal buildings would dictate that the pond at Kungsträdgården is a square of depth, having TGI Fridays as its principal building and having that establishment be located at one of the two

short sides of the square. Sergels Torg is therefore a square of expanse with Kulturhuset located at the longer dimension of the square.

The recommendation from Sitte is that the squares ought to have their shorter dimension be of the same length as the height of the principal building and the longer dimension be maximum twice the height of the principal building. Kulturhuset is approximately the same height as a nearby eight storey building, if every story is approximately 3 metres high, and adding three metre for the sunken nature of Sergels Torg, the height of the principal building is 27 metres. The restaurant at Kungsträdgården is one floored and can't be much taller than three metres.

Kulturhuset is a wide principal building, which follows Sitte's recommendations. The height of it is considerately closer to the Sittean ideal than the restaurant at Kungsträdgården. The framing device of square dimension in relation to building height has some weight to it. The restaurant is hardly noticeable, and almost any photo of the space is taken away from it, in direction of the rest of the square. Kulturhuset is noticeable, and the main foci the square opens up to. The impact of this is unclear, however. If it does impact activity, it isn't visible in the numbers recorded at the squares, or if it does it is merely in a mitigating manner. Kungsträdgården is able to attract considerably more activity, even though it fails to utilise the possibility of proper height-to-size ratio.

The dimensions might lend more insight into human preference. People are able to recognise human activity and expressions at closer dimensions. The two squares are almost identical in both size and dimensions but the pond at Kungsträdgården is able for effectively to divide its area into smaller spaces. The most prevalent being the two cherry tree arcades to the sides and the sitting pond in the middle. Through this division can three more elongated spaces be conceived. The pond and its flight of bleacher around it constitute an area of about 35 metres in width and 80 metres in length, leaving 7,5 by 80 metres for the tree-arcades. The middle section is early close to the magical 40 by 80 metres ideal suggested by Gehl (2010), and the two arcades approaches the 12 to 24 metre recommendation by Lynch's (1971).

To contrast this with Sergels Torg that is left ambiguously open and undividable. The total dimensions of the space are also closer to rectangular than Kungsträdgården and therefor lacks a clear direction. By not having subspaces with smaller dimensions the square never allows people to stay close enough to each other for any prolonged length of time. The smaller pond area is 35 metre in width and filled to the brim with seating. The possibility that two people will sit within 25 metres of each other is extremely high. This is not unimportant! At 25 metres, people are able to read expressions on other peoples' faces, a vital human interaction (Gehl, 2010). The two main seating alternatives at Sergels Torg are located approximately 60 metres apart, at this range, one might not even recognise a friend.

Intricacy

A revelation regarding the varying degrees of intricacy between the two squares is embedded into the on-the-ground methods employed to register the activity at the squares. All stationary activities at Sergels Torg was mapped from the same position, the middle of the ramp connecting the square to Drottninggatan. This position allowed surveillance of the entire square, from the steps in the west to the transit hub entrance and all the way to the outdoor café. The morning hour mappings at Kungsträdgården was also performed from a singular position, usually one of the east-row benches. Every stationary activity was able to be mapped because activity is naturally sparse in the morning, allowing for the registrar to turn his head frequently to survey the entire space. As the day went on however, registration from a singular position became increasingly difficult, and in order to capture the entirety of the activity, the

registrar had to take a standardised route through the square. With a rapidly increasing activity is the intricacy of the space revealed, in line with Jacobs (1961) observations. The different sections of the square evoke different clusters of usage, such as the photographers of cherry trees, the senior sitters or the chess players.

Intricacy has to do with the sense of vision, and the supply of visual stimuli that a space can offer. Funny enough, limiting what's observable increases intricacy. Limitations to observation could perhaps better be described as enclosing, bounding or defining elements of sight. One such obstructing element is the urns at Kungsträdgården. These urns block different parts of the pond depending on the perspective at which they are looked upon, creating a supply of different views over the square (see Image 40). In contrast to the absence of defining elements at the empty middle of Sergels Torg that results in 360 identical perspectives of the space.

Image 40 - Excessive sitting activity at Kungsträdgården, April 18th, 14:46, 18,8°C, Sunny

Too much visual obstruction isn't good either. The abrupt level change at Sergels Torg create a square that can't visually connect with the street or only do so from a position of a subordinate. A person placed in Sergels Torg can't see the street above, apart from a smaller section of Drottninggatan. The two aren't connected, potential intricacy through having an upper and lower level of the square is avoided by making the difference in height harsh and hence unavailable from each other rather than discrete and allowing for people to venture between them.

The more subtle level change at Kungsträdgården enable for people to more easily float into the space without making a great effort. Just descend smoothly down the deep steps or why not take the pedestrian friendly ramp. The level change is obvious and noticeable, framing the space and creating a variety of staying alternatives in terms of location and perspectives. But the differences in the space are closely connected and accessible to each other by the delicacy of how they are distinguished. The arcades are different from the pond, with a make-shift roof of branches and enclosing pillars made out of tree trunks, but access to the pond is ever present with little effort needed to sit down because of the low incline of the pond steps.

The underground section at Sergels Torg seemingly offer a similar difference to the open-air part. The difference here is however more distinct than that at Kungsträdgården. The roof here is solid, allowing no sunlight permission into the space, whilst the branches at Kungsträdgården provide some shade and some sunlight at the same time. The person

deciding to go from the underground section into the open area must therefore change her mind decisively about whether or not she would want to experience sun or shade, nothing in between, no subtlety.

The pleasure of intricacy is the possibility for people to be privy to a specific experience. The individual human experience connects to a perspective of space, but so also is the space connected to this specific human. Devotion to similar behaviour can be found in every public space where two people express their monogamous affection for one another. Maybe that's why they go so well together, an intricate, intimate space for intimate people.

Water Effect

The pond at Kungsträdgården is adorned with water for a section of the year. At the time of this study however it was not. But about two weeks after, it was. Whilst any statistical claims can be made about the impact of water can't be made. Unofficial observation does however coincide with those of Whyte (1980), specifically that if water is present, people will interact with it. The first observation of the square with added water say three young kids dipping their hands into it (see Image 41). Water is pleasant to touch, and its accessibility at Kungsträdgården is one of the great attributes. But water is great for other reasons as well.

Image 41 - Three kids touching the water at Kungsträdgården, May 11th, 14:44

Specifically, its sound. A square just south of Sergels Torg called Brunkebergstorg has recently been redesigned and supplied two pools with several water sprouts (see Image 42). The sound of the moving water is quite loud, reaching auditory levels of 71,4 dB when recorded at approximately one metres distance. But the volume isn't the only thing that matter. The sound of water is appreciated by the vast majority of people (Yang & Kang, 2005; Guastavino, 2006; Yu & Kang, 2008), hence is masking unwanted sounds by the sound of water a recommended solution (Brown & Rutherford, 1994).

Image 42 - People sitting around the water feature at Brunkebergstorg, April 25th, 12:15

The planners and designers of the square know this, which is why they located the seating around the pools as to overpower the unwanted sound of traffic that would otherwise harm the sensory comfort of the space. The sound of water is universally experienced as mesmerising, relaxing, invigorating and meditative. Explanations why includes that humans

need water to survive and can't go for too long without it, that water reminds people of their mothers' wombs, that water reflects light which is another life-giving source and the availability to achieve thermal equilibrium though showering (Strang, 2005). Whilst the origin for the human attraction to water and the sound of it is unclear, its universality is not.

Desirable Auditory Conditions

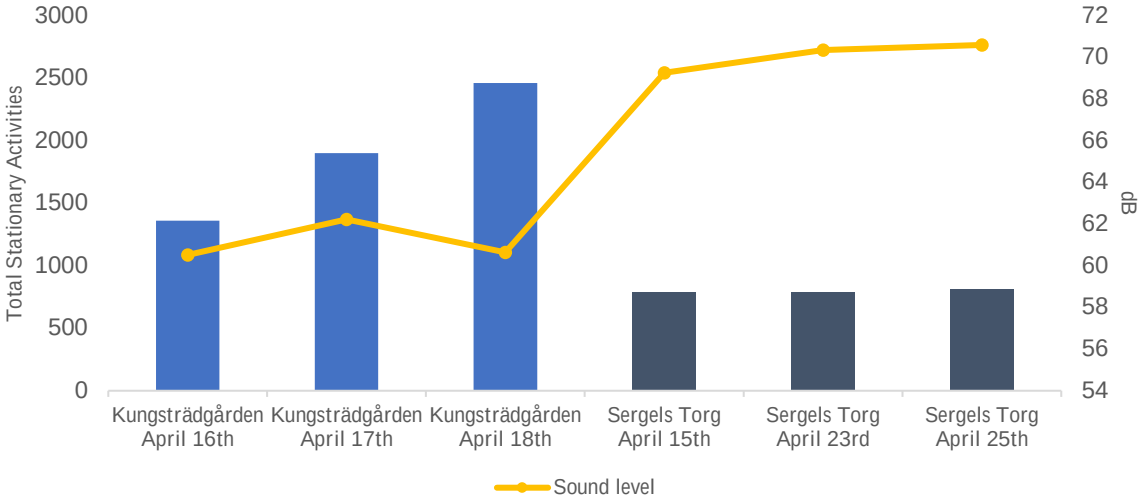


Figure 36 - Total stationary activities and respective average sound levels for each study day

A better argument for planners to consider auditory levels than this graph is hard to find (see Figure 36). Other variables affect the discrepancy in total stationary activity between the two squares. But not to this extent, and never with such convincing epistemic evidence. The sound levels at Kungsträdgården hover around 60 dB, April 17th recorded an average of 62 dB largely because a maintenance car was making noise at the time of one measurement. The sound levels at Sergels Torg are all around 70 dB, this is a 10-decibel discrepancy and whilst that might not seem as that big of a difference it should be recognised that the perceived auditory experience between 60 dB and 68 dB equates to an 100% increase in volume. In other words, 70 dB is experienced as at least 120 dB. Sergels Torg's levels exceeds the critical 60 dB threshold (Gehl, 2010) whilst Kungsträdgården falls exactly on it, making regular conversations between people effortless at Kungsträdgården but trying at Sergels Torg.

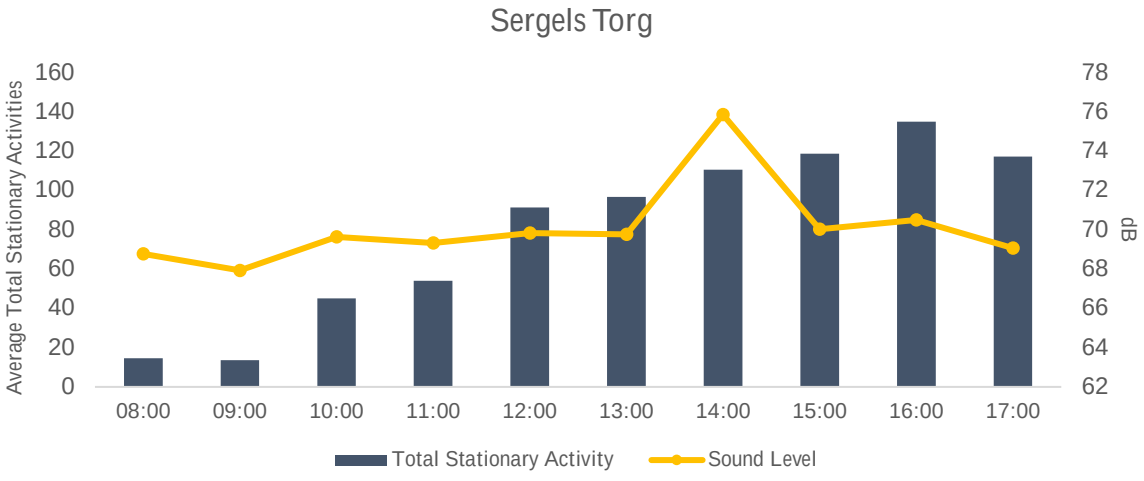


Figure 37 - Average hourly total stationary activities and respective hourly average sound levels at Sergels Torg

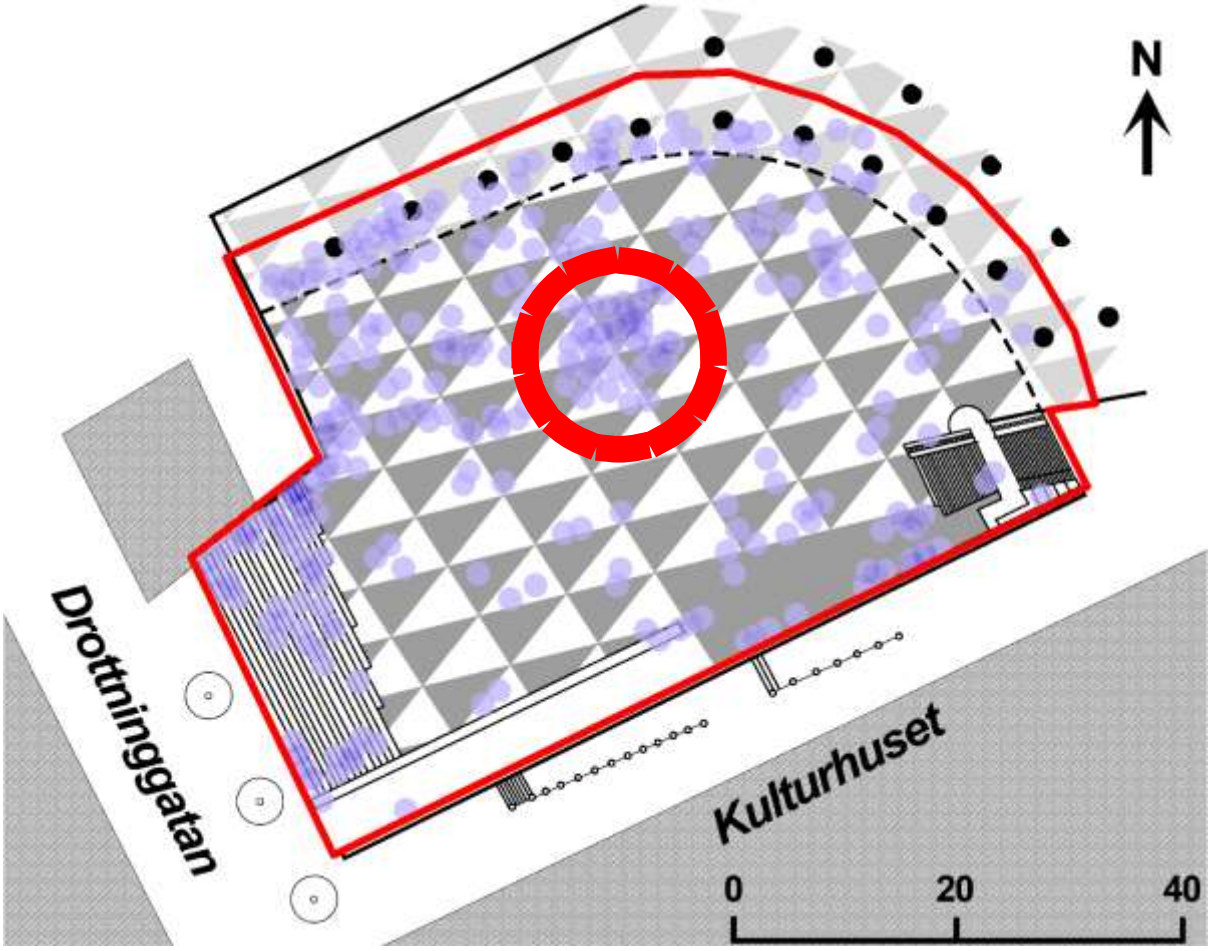


Figure 38 - Density map for total stationary activities at 14:00 at Sergels Torg, location of trumpeter circled in red

But not all sounds are the same. As previously discussed, is water a loud but pleasant auditory experience. Another occurrence of such phenomenon is the pushcart with free bibles and coffee accompanied by a trumpeter, a guitarist and often singing that makes an appearance at Sergels Torg every day around two o'clock. The result of the live performances can be observed in the auditory levels throughout the day (see Figure 37). People don't seem to mind it though. Activity doesn't dip, even though sound is increased. In fact, at the two o'clock activity map, congregation is visible around the location of the musician (see Figure 38). The vital aspect of sound isn't just the volume of it, but also what type of sound. There are wanted and unwanted sounds in public space, wanted include water (as previously mentioned), music, church bells, footsteps and general sounds of nature. Unwanted sounds include road traffic and machinery noises (Brown & Muhar, 2004). Therefore, should consideration not only be taken to the volume of soundscape but also the type of sound producing such volumes.

How sensory experiences of design affects the staying activity at the squares

- Smaller dimensions of space are desirable to accommodate for limitations of sight
- Moderate visual obstruction is preferable over strict or non-existent visual obstruction
- Water has desirable attributes in terms of touch and sound
- Sound levels matter, but so does the type of sound, create wanted sound if possible

Aesthetics

What constitute an aesthetically pleasing environment for one person might not be perceived as such by another person. Yet are some paintings sold at the price range of hundreds of millions of dollars. Strange isn't it, a piece of art will gain a higher annual return than its weight in gold (Renneboog & Spaenjers, 2013). Very strange indeed, making the gamble that something of beauty will remain beautiful in the eyes of other people is a better gamble, at least in term of annual return rate, than to gamble on the literal gold-standard.

Why something can be so universally aesthetically pleasing is a true mystery. It is however exactly because there exist such popular aesthetics that it ought to be investigated. What elements are people attracted to because of their aesthetics? How can similar aesthetic effects be achieved?

Planting

The cherry trees at Kungsträdgården are people attractors. The reason why people are attracted to them is entirely because of their aesthetic beauty. The proof of this can be seen in the activity map, with a clear cluster around the blossomed part of the trees (see Figure 39). Further evidence for it is gained by the knowledge that a majority of the people that create this cluster have either their mobile phones or cameras pointed in the direction of the blossomed flowers. And it should be mentioned that a blossomed flower at Kungsträdgården is the foremost sign of spring in all of Stockholm. But many flowers blossom in spring, what's so special about this one? Blossomed cherry trees are cherished elements, not only for Stockholmers, but for all Swedes and humans from all corners of the planet. The aforementioned Japanese holiday *Hanami*, that not only the Japanese celebrate but that tourist from any origin travel to Japan to experience, further cements the effect of these trees. What makes them universally appreciated?

Image 43 - Pink blossomed cherry trees flowers at Kungsträdgården, April 23rd, 12:24

The aesthetic quality of the trees is contrast, in double meanings. First in its pink colour, which contrasts the otherwise toned-down colour palette of the surrounding buildings and square floor. The reason why contrast is pleasing has to do with cells in the brain and eye that can only respond to changes in luminance, as to say edges. These cells are used to gain information, to allocate

attention. Edges declare regions of change, hence information. Edges are thus more attention grabbing, more interesting, than areas that have homogenous colours and hence no change, no information, no reason to focus one's attention towards it. The attraction of contrast is its object-discovering function, that contrast – edges or change in luminance – define the boundaries between objects (Ramachandran & Hirstein, 1999).

The flowers other contrasting effect are their temporality. The pink flowers are only present for a week or two every year. The contrasting pinkness of the flowers are aesthetically interesting because of the contrast to surrounding colours. But the occurrence of this contrasting element, is in itself a contrast to the regular experience of the square and the city as a whole. Temporary elements create something that are both new and will soon be gone, something other than was but also something other than will be. An inherent contrast to the status quo, a contrast to homogeny. These temporary elements are known to be popular occurrences in various cities (Oswalt et al, 2013).

Kungsträdgården have scheduled events that create specific purposes for people to visit the huge public garden, but the majority of visitors come to the pond area for unprogrammed reasons, they come to enjoy the fixed elements of the space. There are some fixed elements that invites certain activity, such as the chess board and the restaurant, but most seating has seemingly no intended purpose. People have to create their own purposes to be seated at the pond, either to spend time with family or friends, eat lunch, watch people or watch the flowers. Contrasting elements are thus necessary to invite activities, otherwise won't the space be interesting enough to visit.

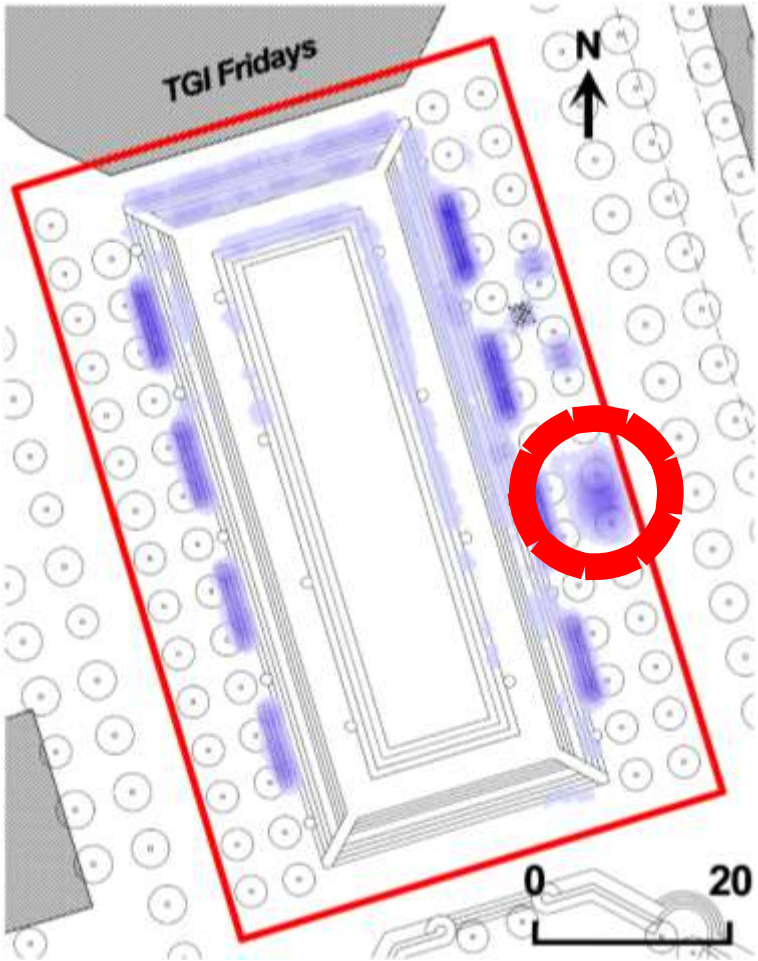


Figure 39 - Density map for total stationary activities at Kungsträdgården, blossomed section of the cherry trees circled in red

Image 48 - Kungsträdgården, April 23rd, 12:37

Image 47 - Flower photography, Kungsträdgården, April 12th, 16:26

Image 46 - Cherry blossoms at Kungsträdgården, April 23rd, 12:36

Image 45 - Flowers in urns at Kungsträdgården, April 25th, 12:20

Image 44 - Urns with flowers in them at Kungsträdgården, April 16th, 08:18, 5,5°C, Sunny

Side Principle

The power of contrast is also the argument for Sitte's (1889) proposition to place monuments along the side of places, with neutral building façades as backgrounds. The region of change created by the difference between a homogenous surface in the backdrop and a detailed art piece in the foreground has a similar effect as that of the contrasting pink colours of the cherry trees on the enclosing buildings behind them. There is no perfect testbed for analysing the pertinence of this principle in this study. Such would require one monument located in the middle of a square and one monument to the side and observe how people reacted to them both.

Extensive decoration of public spaces with civic artworks have gone out of fashion in general since before a century ago (Sitte, 1889), which have resulted in spaces such as Sergels Torg being left without any elements of only artistic purposes. The urns at Kungsträdgården are sculptures and they are designed to be beautiful, but they also function as flowerpots. The purpose of such vegetation is to offer a more visually interesting experience, hence could the urns be seen as works of art. The urns provide almost no functional purpose to the pond, the same amount of seating would exist without the urns, the water of the pond would exist without them, the trees would exist without them, the restaurant would exist without them.

The urns can't strictly be described as holding a side-placement, but they are located at the side of the open pond area and at the side of the extended pond area and flights of steps. These aren't solid edges but are boundaries between subspaces created through subtle level changes and rows of trees. The contrast effect isn't created with the upper urns but is somewhat noticeable with the lower urns, with the steps and open pond area creating a somewhat homogenous background. This effect is however diminished when people start to populate the seating behind the urns, blurring the lines between the sculptures and its background. This is why placement closer to façades are preferable, preventing the possibility to diffuse intended aesthetic contrast through embroilment of the neutral background.

Visual Complexity

One of the pillars at Sergels Torg is coloured in *Heart Wood* – colour of the year 2018 – a muted version of pink (see Image 49). This and the red colour of the entrance and the blinds at Kulturhuset are the only breaks in the grey-white-black colour palette of the square. The *Heart Wood* coloured pillar is an attempt of inserting a visually interesting element and colour into the space, but the colour doesn't stick out from the rest of the space. The other pillars are white, which is distinctly different that the muted pink, and the "pink" pillar is more interesting than the rest of them. It is an element that creates some variety in terms of visual. The colour is however discrete and looking at the square whilst entering the square from Drottninggatan makes the pillar almost unnoticeable as it fades into the shaded background in the underground section of the square.

Image 49 - Heart Wood coloured support pillar at Sergels Torg, April 23rd, 11:15, 17,4°C, Partly cloudy

The grey-white-black colour palette is a deficit of the space as well. It doesn't provide colours than are distinguished from one another. Grey, white and black are monochromatic versions of each other, such a colour palette does not create a great variety of aesthetics, hence no visual complexity (Joardar & Neill, 1978; Heylighen, 1999). The triangles at the square floor create a pattern that distinguishes it from any other square and can thus be said to have some aesthetic value.

Image 50 - Sergels Torg, February 21st, 14:48

But that value is not in terms of visual complexity. It is rather in visual simplicity as it utilises a repetitive pattern to create a scene that appears symmetric and uniform, not complex or filled with variety (Olivia et al, 2004).

Image 51 - Kungsträdgården, April 23rd, 12:23

The palette at Kungsträdgården is somewhat more varied with a grey square floor, green sculptures, pink, white and green vegetation and an overall more varied colour scheme of background buildings such as the big red church. Whilst Kungsträdgården isn't an outstandingly varied visual experience, its main colours of the grey shades on the square floor, green urn sculptures and pink or green cherry trees are distinctly different colours. The water does also add visual complexity through its unique texture and reflective ability.

Image 52 - Kungsträdgården, May 11th, 14:45

How aesthetics of design affects the staying activity at the squares

- Vegetation is a useful element to create visually contrasting and interesting spaces but also create a space that shifts in appearance throughout the year
- Contrast is important to allocate attention which is translated into interesting and pleasing views
- Spaces with monochromatic colour palettes aren't visually engaging

Human Interaction

Sergels Torg and Kungsträdgården are in many ways two sides of the same coin. Kungsträdgården is a much beloved, appreciated (Nolin, 2019) and used public space (Gehl, 1990) in the absolute centre of Stockholm city. Sergels Torg is notorious for its connotation to criminal and police activity and is a common example of central station public spaces that attracts such activity (Franzén, 2002). Kungsträdgården is a central public space for staying (Gehl, 1990) whilst Sergels Torg centrality is found in its attribute as a crossroads for enormous flows of passing activity (Franzén, 2002).

This is also observable in the gender and activity proportions at the squares. The two are almost perfect split image mirrors of each other, with deviations of only singular percentages (see Figure 40). In fact, the sitting female and male activity at Sergels Torg and the standing male and female activity at Kungsträdgården are perfect matches respectively. With sitting female activities at Sergels Torg and standing male activity at Kungsträdgården both accounting for seven percent of the total activity at each square. The same goes for the sitting male activity at Sergels Torg and standing female activity at Kungsträdgården that both constitute twelve percent of the total activity at each square.

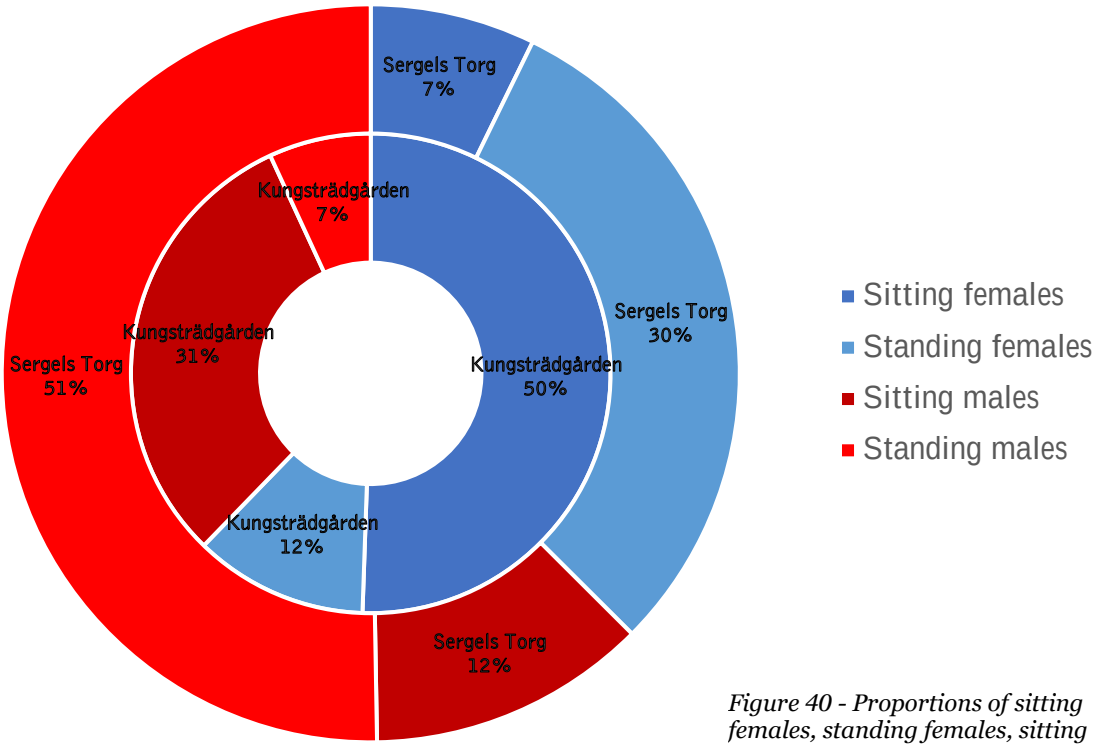


Figure 40 - Proportions of sitting females, standing females, sitting males, standing males at Kungsträdgården and Sergels Torg

The male activity at Sergels Torg account for 63% of its total activity, the activity at Kungsträdgården is female by 62%. The sitting activity at Kungsträdgården constitute 81% of its activity whilst standing activity makes up 81% of the total activity at Sergels Torg. If Sergels Torg is a standing space Kungsträdgården is a sitting space, if Kungsträdgården is a female space Sergels Torg is a male space.

One additional type of activity that would've been interesting to record is police activity. A portion of the stationary activity for almost every hour measurement at Sergels Torg was constituted by police officers. The police are of course there when a protest or event occurs, but officers are also at the square at regular occasions, for seemingly no specific reason other than to deter possible criminal activity. It could be argued that the presence of police may lead to less activity and that they cement the reputation of the square as a criminal – and hence dangerous – space. Such argumentation is valid, but the police officers aren't scary or off-putting, they are perhaps the most popular plaza-users of them all.

Image 56 - Police officers at Sergels Torg, Mars 22nd, 15:11

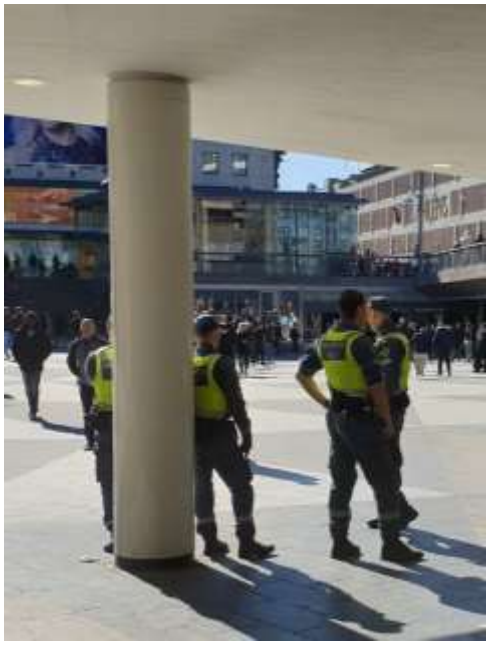


Image 55 - Police officers at Sergels Torg, April 15th, 15:28, 10,3°C, Sunny

Image 54 - Police cars at Sergels Torg, April 15th, 10,3°C, Sunny

Image 53 - Police car at Sergels Torg, April 25th, 11:54, 16,1°C, Sunny

The police officers are constantly approached by and engaged in conversation with civilians. Occasionally they have to go up to suspicious-looking individuals to ask them to empty their pockets but most interactions between police and civilians occur at the pleasure of both parties. The police presence is not the problem, it is the symptom of the problem. The criminal activity at the square is undesirable and regular patrols is the tool used to combat it. However, the root of the criminal activity is the utter unattractiveness – and thus inactivity – of the square's design, which allows for shady activity to occur. If more people used the square for any extended length of time, fewer criminals would feel comfortable doing business there (Jacobs, 1961; Whyte, 1980).

Multiplier Effect

The temporal snapshots of Sergels Torg provide a unique opportunity to observe how the distribution of stationary activity is affected by the presence of other stationary activity. There aren't many clear benefits to position oneself at any one location in the square as most of it is left open and without seating, vegetation, sculptures or other anchoring elements. The entrance area does offer edges and are thus a prioritised location, but the benefits of that placement will mostly affect the people who are in direct contact with or in extreme proximity to the wall. The point is that decision-making for where to stand at the square aren't affected to a massive degree by the physical environment, because the physical environment is so similar across the square. The impact of other factors, such as the hypothesised *multiplier effect*, is accentuated by this.

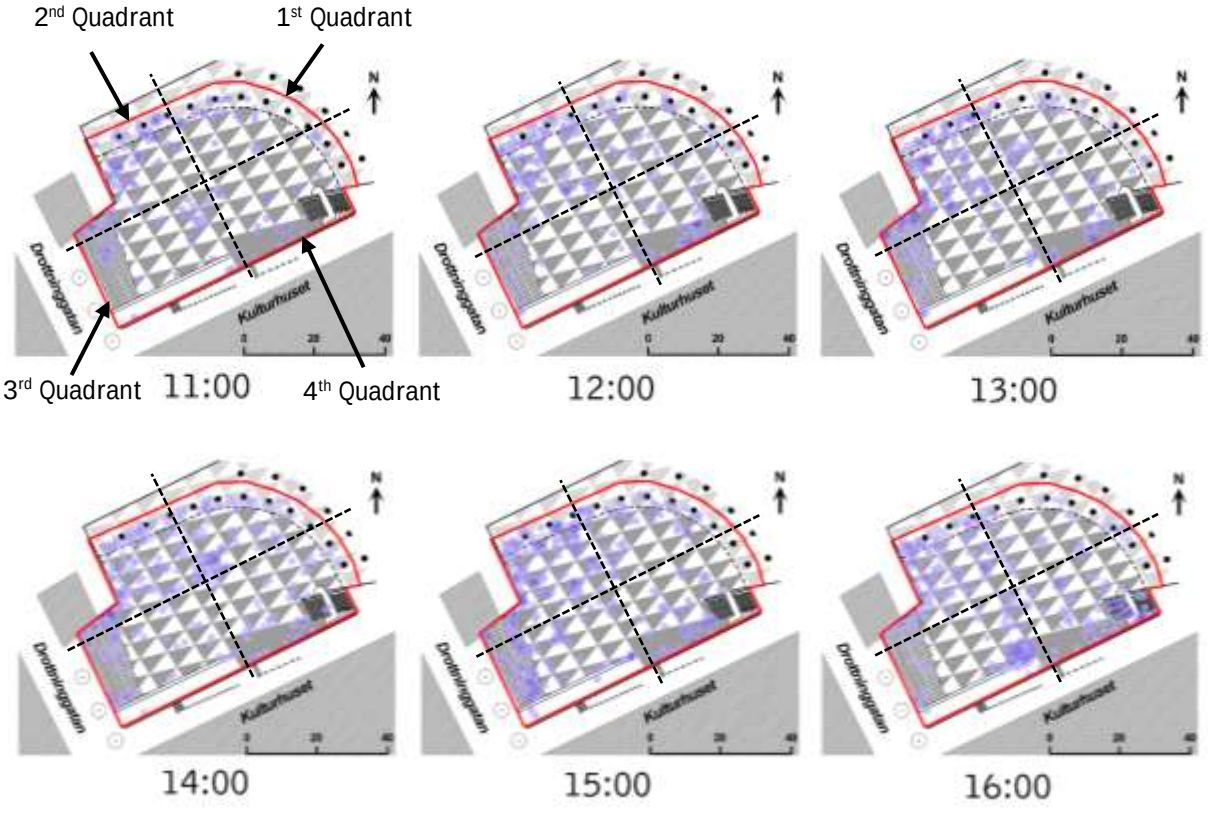


Figure 41 - Temporal density maps from 11:00 to 16:00 for total stationary activities, divided into four quadrants

Dividing the space into four quadrant aids investigations into how activity distribution occurred (see Figure 41). As observable was the 2nd quadrant the most used, and an even distribution of staying activity throughout the space was nowhere to be seen. The 2nd quadrant is the quadrant with the preferable edge-zone which constitute some of the activity, but there is also a considerate potion of activity not in the immediate edge-zone. This seems to be the product of the multiplier effect. The edge invites some of the activity and the people residing at the edge invites other people to come look at them.

The aggregated map for all hours would also show a congregation in the 2nd quadrant. The issue with that map is that there is no evidence for the clustered activity to be affected by one another. The activity at each hourly measurement demonstrate activities that occurred at roughly the same time, ergo, affected each other.

The multiplier effect may also be what makes some squares greatly used and other barely used at all. If a public space has the ability to attract any human activity, it also has the ability to attract additional activity in terms of social activity – activity that's created from people looking at, talking to and listening to other people. The evidence for this can be seen in the

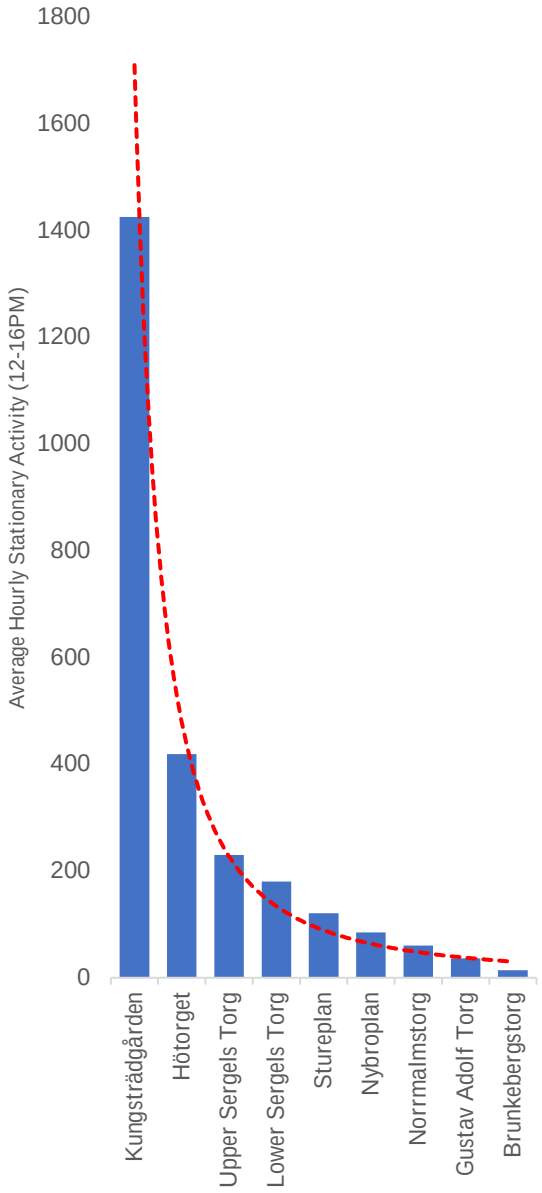


Figure 42 - Average hourly stationary activities between noon and four in the afternoon for Stockholm city public spaces (Gehl, 1991)

distribution of stationary activity throughout the different squares in Stockholm city, as recorded by Gehl in 1990 (Gehl, 1990) (see Figure 42). The distribution of activity resembles that of the pareto distribution, or the "80—20 rule". Instead of seeing a linear and gradual decrease in activity is the vast majority (about 80%) located in the most used squares (the top 20% of squares), hence 80—20.

The squares that have great physical designs that naturally invites and attracts great numbers of stationary activity who go to the square for non-social reasons experiences exponentially more activity than squares that are poorly designed. For every person that visits a square for the qualities its superior design provide will themselves provide qualities to the social aspect of said square. An example: square 1 have a physical design that evokes 200 stationary activities, square 2 have a physical design that evokes 100 stationary activities. Say that every person in the squares attracts one other person to it through the multiplier effect. The total – for design and social reasons – activity of the two squares would then be 400 for square 1 and 200 for square 2, a discrepancy greater than simply the discrepancy in design qualities. This could potentially explain the excessive disparity in activity between the two squares in this study, with total stationary activity numbers accentuating the difference in design quality.

There is however also human activity that have a negative impact on the social quality of squares. An example of this is the peacocking of bare-chested men sometimes present at Kungsträdgården. A bare-chested man was seated at one of the benches during a peak activity hour one day. Even though activity was high, and thus demand for seating high as well, non-one chose the seating next to him. Bare-chested men are however a milder occurrence of undesirable activity and increase in overall stationary activity combats the more undesirable activities. Such as the multiple occurrences of public urination registered at Sergels Torg, which happened in the morning when activity is scarcer.

Effective Capacity

The foremost prime seating alternative across both squares are the row of benches at Kungsträdgården. The suggested effective capacity of these is 136, meaning that at peak-hours, 136 people will be using them if Whyte's (1980) observations from New York are to be consistent with the findings of these studies. The activity at Kungsträdgården consistently peaks at three in the afternoon, and April 18th had warmest temperature and received the

greatest activity, leading to three o'clock, April 18th being peak-hour activity. This measurement saw 130 people using the benches. This is fairly close to the hypothesised 136 number. Whyte found that 33 to 38 people per 30 metre of sitting space will sit at a prime sitting space at peak hours. The number of people sitting at the benches at Kungsträdgården per 30 metre of sitting space is 32 at peak hours. Whyte's effective capacity seems to correspond to the public life at Kungsträdgården.

Further evidence of a potential effective capacity can be found in the fact that April 17th, even though that measurement experienced 100 less sitting activities in total, received the exact same amount of activity at the benches as April 18th. The benches are the seating alternative that always receives greatest usage, it is the desired option for many sitters. In other words, the seating at the benches fills up before any other. Yet, even though 100 more people are sitting at the square the 18th, the same amount is sitting at the benches as the 17th. The benches are never at their physical capacity, more people can sit at the benches on the 18th than at the 17th, but they don't. They actively choose other seating. The effective capacity, the socially appropriate capacity of seating is reached, further sitters would breach the collectively determined acceptable sitting density. This is also observable in how constant the sitting numbers are, when one sitter gets up, someone fills in the spot, never letting the sitting number falling to low, but never overdoing it either as evidenced in the April 18th activity.

Centering

The cherry pond at Kungsträdgården is almost completely constituted of centering designs. The open pond area is the climax of the subtle level change into the ground and the geometrical centre of the place (see Image 57). The seating is created to direct the eyes of all sitters towards the centre stage. And that's what the open pond area in the middle, that is filled with water come summertime, becomes, a stage for the performance art that is public life. People of the square get to vicariously experience the pure joy and wonder of child's play. Common plays include but are not limited to kicking-a-ball-around, chase-the-birds and tag. The power of proper centering is unavoidable for anyone paying attention and is a vital ingredient for the success of Kungsträdgården.

Image 57 - Kids playing in the open pond area at Kungsträdgården, April 16th, 11:47, 12,3°C, Sunny

Whilst Sergels Torg also could be described as only centre, there exist no centering. There are no invitations for the people in the square to all focus their attention towards any designed middle. The centering comes instead from the upper level that are provided with a railing to lean against whilst observing the life of the square. But the subtlety recommended from Jacobs

(1961), and present at Kungsträdgården, is nowhere to be found, there is no confusion as to who is spectator and who is the show.

Male & Female Users

As much as Sergels Torg can be described as a place dominated by male activity, Kungsträdgården can be characterised as a female dominated space. The Sergels Torg public life is 63% male and the Kungsträdgården public life is 62% female. Why the two spaces host such different demographics is interesting and provides insight into why men and women are attracted to certain spaces in public.

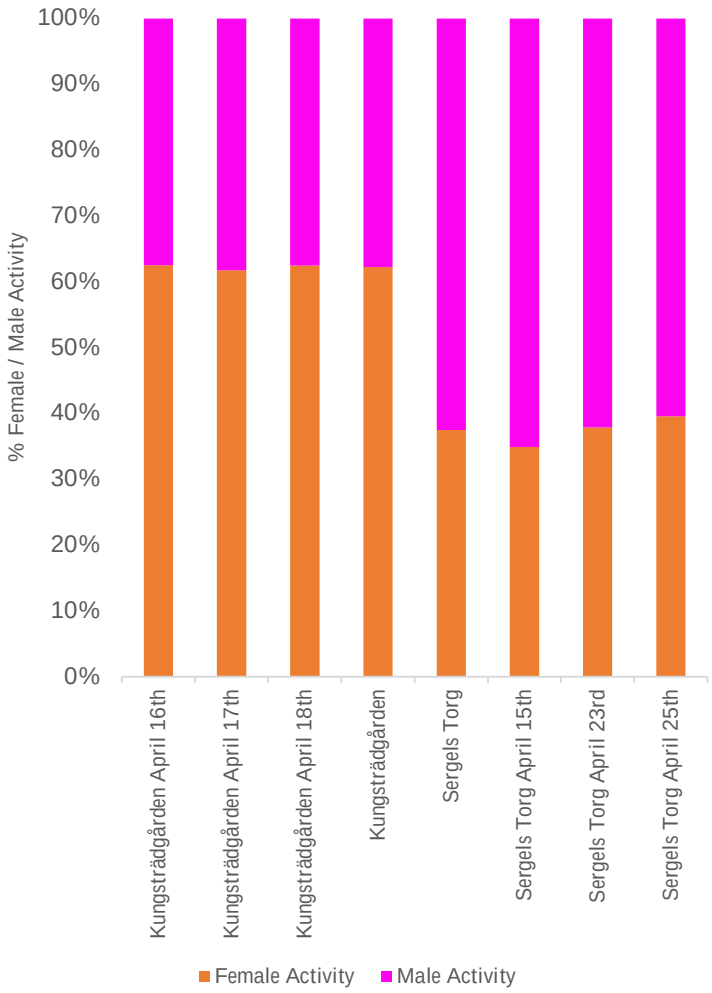


Figure 43 - Proportions of female and male users in total for each study day

The total percentages of gender division are consistent throughout all study days (see Figure 43). Demonstrating that the public life of the squares is quite predictable in this way, one day very much resembles the other. People know that Sergels Torg will have mostly male activity, and the opposite for Kungsträdgården. There is a disparity in reputation between the two squares (Nolin, 2019; Franzén, 2002), and if the proportions of female—male at the two squares, as recorded in this study, are to be believed, female dominated spaces are perceived as more attractive public spaces than male dominated spaces. Or perhaps the relationship is inverse, that perceived, or actual, attractive spaces attracts more females, proportionally, than males, that women are pickier. This is for example what Whyte (1980, p.18) believed:

> *Women are more discriminating than men as to where they will sit, more sensitive to annoyances, and women spend more time casting the various possibilities. If a plaza has markedly lower than average proportion of women, something is wrong.*

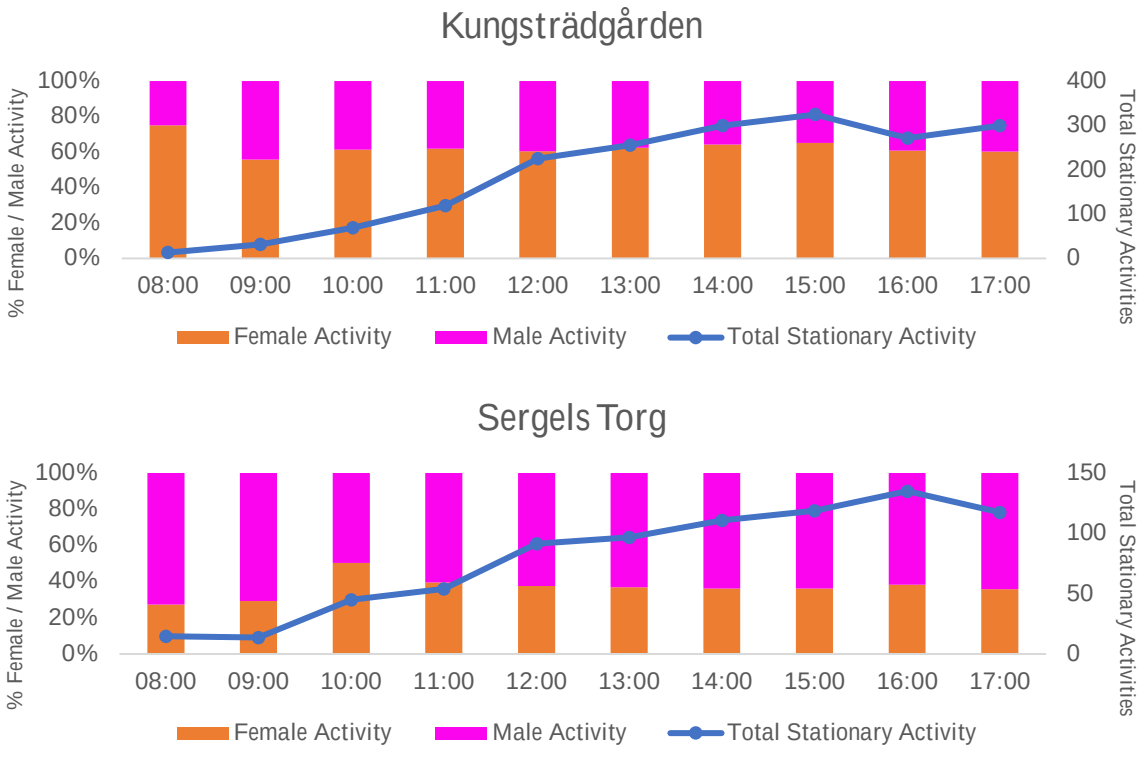


Figure 44 - Hourly proportions of female and male users and respective hourly total stationary activities at Kungsträdgården (above) and Sergels Torg (below)

Cooper Marcus & Francis (1990) observed that as a square gets increased usage, the variety of users, in term of sex, will even out. This is not in line with the activities across Sergels Torg and Kungsträdgården, with the two being equally varied. Looking into how the proportions change throughout the day didn't conclude convincingly that with greater activity comes greater diversity (see Figure 44).

One thing that seem to be explain why the proportions between the two squares differ so clearly and consistently. Sergels Torg experiences a 10-dB higher sound level than Kungsträdgården. It has been reported previously (Whyte, 1980; Cooper Marcus & Francis, 1990) that women are more sensitive to external negatives such as undesirable noise. This is in line with findings form this study. The disparity between male activity across the squares is smaller than the disparity in female activity (see Figure 45). This suggests that it matters more to females that auditory levels are desirable than it matters to males.

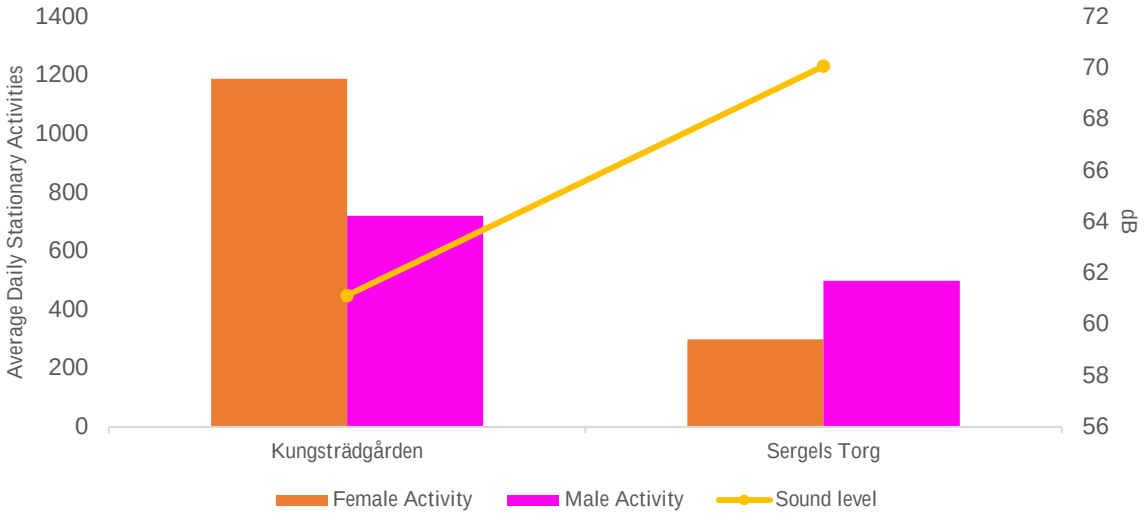


Figure 45 - Average gendered daily stationary activities and respective average sound levels for Kungsträdgården and Sergels Torg

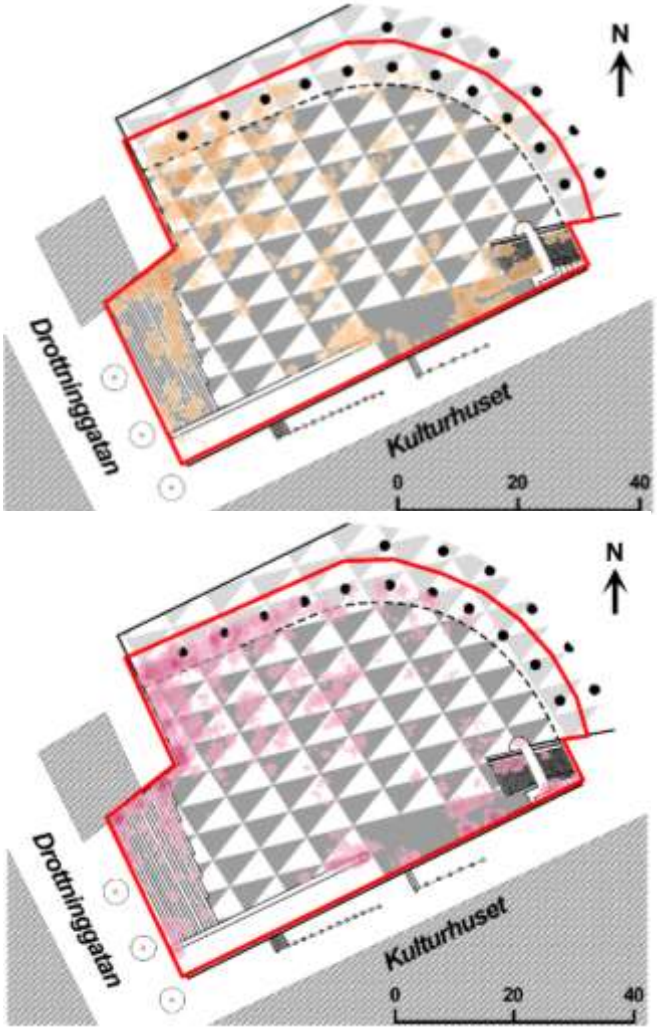


Figure 46 - Above: Density map for total female stationary activities at Sergels Torg. Below: Density map for total male stationary activities at Sergels Torg

The distribution of male and female activity also reveals how the two sex groups behave in public. Looking at the activity at both squares what's most obvious is the overall similarities between the two types of users (see Figure 46 & 47). A good place for women to be in is often also a good place for men to be in, and vice versa. Men and women are more the same than different in this regard and spaces can be made satisfying for both, evidenced at Kungsträdgården, that receives more female and male activity than Sergels Torg. There is one observable difference in relational preferences between the sexes. The male activity at Kungsträdgården has cluster at the chess board that isn't present for the female activity. Additionally, is the congregation of activity around the blossomed cherry trees more intense for female activity than for male activity (see Figure 47). This can be explained by Mozingo (1984) findings that females look for relief in public space whilst men look for human interaction. Women gravitate to the transcendental beauty of nature whilst the men face off in a friendly game of chess

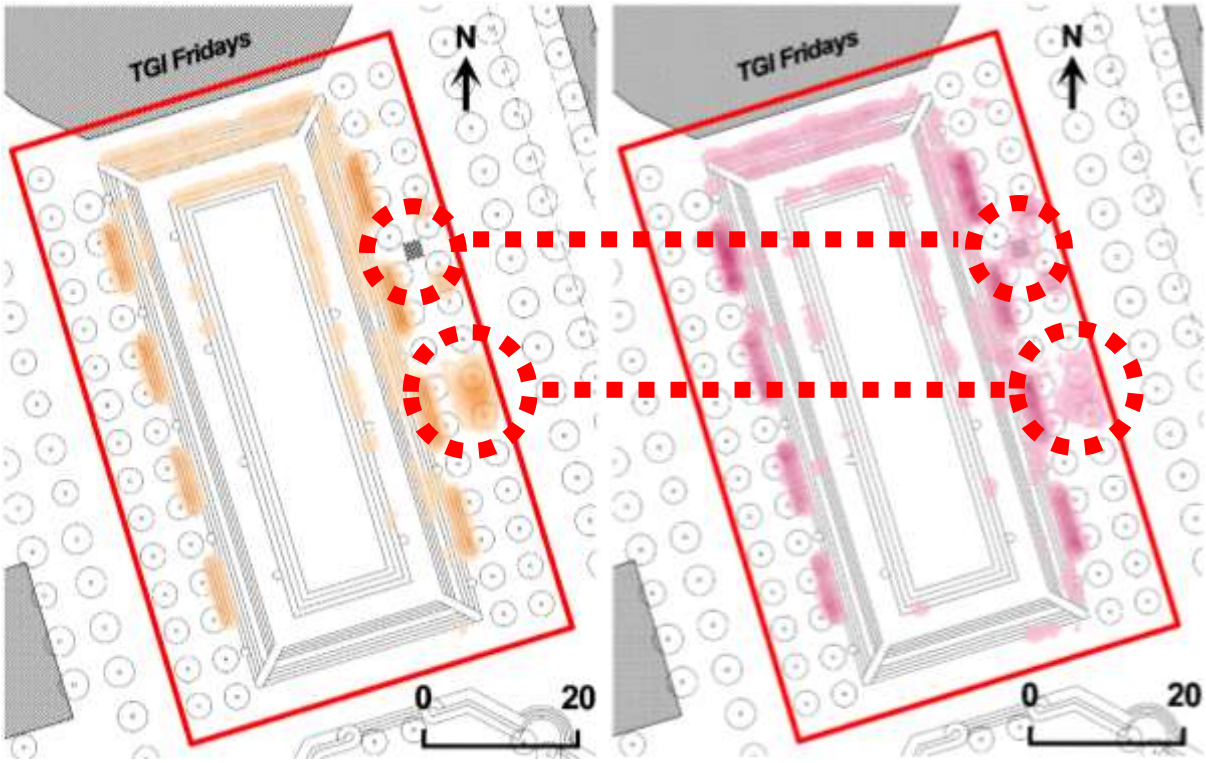


Figure 47 - Left: Density map for total female stationary activities at Kungsträdgården. Right: Density map for total male stationary activities at Kungsträdgården

Image 59 - People interacting with the cherry blossoms at Kungsträdgården, April 16th, 11:20, 11,7°C, Partly cloudy

These differing levels of clustering at different elements along with opposite gender proportions between the two squares indicate the existence of Mozingo's (1984) ideas regarding the differences in what men and women look for in public but it may also indicate the existence of Cooper Marcus & Francis (1990) previous observations that groups appropriate space and that such high proportions of one group might make the out-group aversive to stay in the space. Unclear if this appropriation hypothesis is more applicable than Whyte's (1980) observation that women make more considerate choices, and which is why well-used spaces have high proportions on women in them. The high percentage of women at Kungsträdgården doesn't seem to have scared away many others, looking at the activity numbers, whilst it could be argued that the high percentage of men at Sergels Torg could be a contributing factor for its relative inactivity.

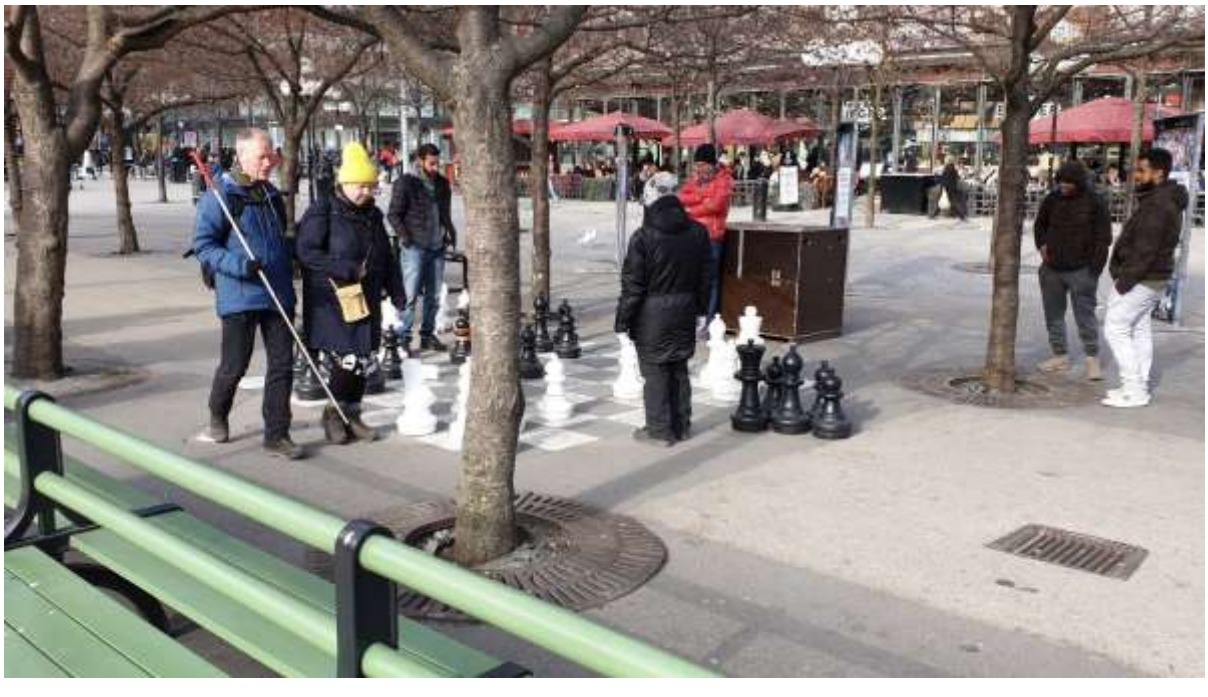


Image 58 - People playing chess at Kungsträdgården, April 12th, 16:26

How human interaction through design affects the staying activity at the squares

- Well-designed spaces are disproportionally lively because they naturally host public life which in turn host additional social life
- There seems to be a human mechanism for determining the sitting capacity for a seating alternative
- The centre of spaces can be endowed with great activity if the framing makes it, not simply the geometrical centre, but more importantly the intersection of human sight and activity
- Sergels Torg attracts men to the same degree Kungsträdgården attracts women, percentage wise
- Men and women are attracted to the same elements within the two squares, generally. Men stay at virtually the same parts of Kungsträdgården or Sergels Torg as women do, and vice versa
- There is some female proclivity towards cherry blossoms and chess-playing for men

Discussion

Academic framework

This study has three research questions. The first is: *What are the design qualities of outdoor public urban squares that promote a human-centred experience of outdoor public urban squares, according to the selected academic literature of public life studies?* The physical elements direct impact on human behaviour and subsequently how that behaviour impacts the overall social life of public spaces, according to the selected literature, is extensively outlined in the literature study and distilled into manageable and applicable themes of previous observation in the thematic literature summary.

The selected literature can't be described as a complete or comprehensive review of the entire academic field, but rather a collection of some of the most influential works within it. A suitable sub-title for the question could be: *What we thought we knew about public space and public life*. With the non-descriptive "we" acting as a representation for a knowledge basis of the field that only entail the most common ideas.

Correspondence between literature and data

The second question – *Which of these hypotheses can be observed in the two Stockholm outdoor public urban squares studied?* – is answered in detail in the seven sections of the results and analysis chapter of the study. Answers in terms of binaries 'yes' or 'no' does not provide adequate explanations for the pertinence of each previously observed interaction. What follows is however a shorter version that more clearly distinguish the observable hypotheses from the non-observable.

For sitting activity was three hypotheses tested, but two of them had sub-hypotheses so in total were nine hypotheses tested. Of the more pertinent were protection from noise, microclimate, placement, seating height, social comfortability and the tree effect. Standing activity was better described by the triangulation effect than the 100 percent spot. Thermal comfort matters more for sitters than standers, and the movement of the sun seems to be of great importance for Stockholmers, at least at this time of the year. The psychological perils of sunken plazas are evident in the stationary activity, so are also the benefits of proper elevation changes and subspaces, however such evaluation depend greatly on subjective assessment rather than empirical data. The edge effect, especially, can be observed in the distribution of public life at the squares. The sense of hearing seems to matter greatly for the life of the plazas, with water being an effective way to combat unwanted sounds. Contrast is identified as a vital aesthetic quality and planting is observed to matter greatly in the distribution of stationary activity. And finally, can the multiplier effect and effective capacity be found to be applicable in the section on human interaction. The correlation between attractive spaces and higher proportions of women can be identified, so also a slight deviation between men and women, but fundamentally are the attractive elements of public spaces for women also the attractive elements for men, and vice versa.

Relationship between staying activity and the design of urban squares

The third and final question is this: *What relationship between stationary human activity and design is observable in the two outdoor public urban squares investigated in this study?* The first step required to answer this question is to establish if a relationship between human stationary activity and design exists. The two squares received different magnitudes of stationary activity (Kungsträdgården = 1908, and Sergels Torg = 797, on average daily), the

measurements also occurred at days that had very similar temperatures (Kungsträdgården = 13,18 °C, and Sergels Torg = 13,20 °C, on average), and similar weather conditions (Kungsträdgården = 3,9/4, and Sergels Torg = 3,6/4, on average), the surrounding land use of the two square are similar in density and use, and the squares didn't host any special events at these days. In summary, the similar conditions of the study days, the similarity in external conditions, and the similar programming of the squares create foundations to produce comparable statistics of the human stationary activity of the two squares. The discrepancy in human stationary activity should therefore be an indication for the existence of a discrepancy in design quality between the popular and the inactive square.

This is to say if design matters for human stationary activity, which is also the over-arching theme of the study. Do people stay at public squares because they offer some sort of desirable service through their design, either through sitting opportunity, standing opportunity microclimate, psychological comfort, sensory comfort, aesthetical pleasure or is it all determined by the human interactions that occur within them? At some point of that analysis, the distinction becomes unnecessary. The social aspects of squares, their reputation, how they are perceived to be, what type of human activity than occur in them, all stem from the physical designs that evoke such activity, which in turn defines its essence, creating its perception.

Sergels Torg is seen as a criminal space, uninviting for women, usually patrolled by police officers because the majority of activity is male and because police are on patrol there because criminal activity does occur there. But the reason criminal activity occurs there isn't noumenal, it's not there for no reason at all. Sergels Torg is a central space with good connections to all corners of the city which is good for drug business and it receives heavy pedestrian flows constantly, creating great complications for anyone trying to survey the scene (Franzén, 2002). But such conditions also create a phenomenal opportunity for a public space with enormous staying activity. Yet it is sparsely used, inhibiting natural surveillance from people just sitting or standing in the square, which in turn enables criminal activity that necessitates the presence of police. Its conditions do not define its usage, hence doesn't its conditions determine its perception.

If Sergels Torg has a bad reputation, Kungsträdgården has a brilliant one. It's a space synonymous with imagery that come to represent a certain time of the year but also the city as a whole. As iconic and recognisable as the triangle pattern at Sergels Torg is for Stockholm as a city, so is the pink blossomed cherry flowers at Kungsträdgården. An argument can be made that walking under the blossomed flower and taking a photo of them is a social activity that allows people to connect to each other by participating in this activity that many other people also engage in, thus sharing the experience. That the vital aspect is how people interact with each other, and not how the public square is designed. This argument is quickly demolished when one indulges in the thought experiment of a Kungsträdgården without the cherry trees. Would the social interaction still occur? Of course not. Aleksander Wolodarski – the designer of the square – could've made the decision to not include such trees, and there wouldn't have been any social media posts of pink cherry blossoms at Kungsträdgården come April, because there wouldn't have been any flowers to photograph in the first place.

The same could be said about every other well used detail at Kungsträdgården and underused square metre at Sergels Torg. That their usage, or lack thereof, is a product of the social knowledge of this space. The aspect such arguments are missing is the chronology of the physical and social attributes of the space. Zero drug-related activities occurred at Sergels Torg in its inaugural minute, but the design that today is connotated with such activity was firmly present. Confusion regarding the chicken or the egg is not applicable in this case. Activity is born out of the environments that invites it. Sergels Torg invites almost no one, so the people who strive in such conditions are drawn to it naturally. Complaints to police about the criminal

activity at the square should be redirected to the planning office, they might actually have the ability to change it.

The specific relationship between stationary human activity and design, with background to the activity at both squares, entail several insightful findings. A primary principle can be derived from the human survival need to identify objects (Ramachandran & Hirstein, 1999). This affects the human interaction with design through the proclivity for defined spaces over undefined spaces.

Two physical elements of space that allow for proper space definition are boundaries and contrasts. Boundaries can be created in terms of impermeable, solid dividers of space such as buildings that strictly defines the region of change between two areas by inhibiting the visual or actual continuity between the two. But it can also be achieved by created a perception of boundary by utilising humans superior pattern processing ability (Mattson, 2014) to create spaces within spaces through organisation of repeating elements – such as the rows of cherry trees – or noticeable, but permeable, changes in space that don't interrupt the continuity – such as the level change at the pond.

Contrast is directly connected to the need to identify objects. The human vision has evolved to differentiate between elements – as this was necessary to identify potentially dangerous threats – and differentiation between objects is accomplished through contrast. As such is attention allocation naturally drawn to contrasting element, because from an evolutionary standpoint, are they of greater interest. Their interesting nature, stemming from the survival purposes they provided, is translated into pleasure (Ramachandran & Hirstein, 1999) in the privileged eyes of modern urbanites. Whilst contrast's evolutionary service has fizzled out in the process of human progress, its importance has not.

Another fundamental in connection to this proclivity for definition is the distinction between freedom and free space. As the introduction of the study presents, is the fulfilment of autonomy a central need. From the total stationary activity numbers of the two squares it would be suggested that Kungsträdgården is autonomously chosen over Sergels Torg. There is no convincing reason to believe that the people visiting the two squares are there for non-optional purposes. And the rise in optional activities across history is evident (Gehl, 2010). How then is autonomy better achieved in Kungsträdgården than at Sergels Torg?

Sergels Torg is a space that seemingly allows for people to completely freely choose themselves how to use the square, with no restricting elements that define the space as an area for a certain use. This is achieved by abstaining from implementing defining design elements and leaving much of the square up to interpretation. The square is a space endowed with freeness, but hardly anyone uses their free will to be there. Instead they go to a garden square filled with subtle level changes, secondary seating, rows of trees, flowers, urn sculptures, water, benches and chess boards. Because those elements justify selection. They are in line with the needs of humans, they accommodate for the limited human sensory apparatus, they offer the possibility to perform a variety of certain activities.

Stationary activity is an umbrella term for different sub-categories of activities, two of which are sitting and standing. The requirement to sit is different from the requirement to stand. This is obvious from the different activity maps for sitting and standing activity. Both of these activities can't be accommodated for in the same square metre. In order to sit one must be provided with comfortable seating. Spaces such as Sergels Torg, with no specific invitation to perform any great variety of certain activities, won't hosts a great number of, let's say, sitting activity because it simply isn't possible to sit there to a greater extent. The same critique can be extended in terms of any other possible stationary activity that require something from the physical design. No one can play chess at the square because there is no chess board, no one

can look at flowers because there are no flowers, no one can touch water because there is no water, no one can share a photo of a popular spring sign and no one can stand in a gallery of cherry trees because there are no trees.

The two squares, and the activities they host respectively, demonstrate the importance of formulating space with nuance rather than robustness. The level change present at both squares is a prime example, with the dramatically sunken Sergels Torg and the subtlety descending pond at Kungsträdgården. The separation between different levels at Sergels Torg create an interaction with clear roles that aren't interchangeable, whilst the pond becomes an auditorium and a stage, with no real clue as to who's in the audience and who's the performer, because everyone might be either one.

This extreme nature of Sergels Torg can also be felt in the claustrophobic underground section and over-exposed open-air section of the square. The square also creates a flux of staying activity that is either extremely high when a remarkable event occurs – such as the memorial for the victims of the 2017 terrorist attack at Drottninggatan or celebration for a national team – or extremely low – most other times of the year. The space can most accurately be likened to an exhibition hall, a large space reserved empty, waiting for someone to book an event.

The pond at Kungsträdgården has instead be described as the city's living room (Nolin, 2019). A space used daily for ordinary activities such as engaging in conversation with family and friends, eating, watching something interesting, relaxing or reading a book. This is a natural outcome of creating a physical environment that invites people to perform these everyday activities. Eating lunch is something people do every day, and when presented with the option to do so sitting down, with a view, with water as a background noise under the protection of a tree, most people choose that option over the alternative.

Conclusion

The previous hypotheses, observations and principles from the selected literature corresponded with the observations from Sergels Torg and Kungsträdgården to a varying degree. The edge effect (Gehl, 2010), for example, is clearly visible in the stationary activity maps of both squares, whilst the proposed considerable increase in stationary activity at 13°C (Cooper Marcus & Francis, 1990) was not convincingly present. The selected literature is insightful and generally presents relevant interactions between public space and human behaviour. Public life is however incompatible with generic all-encompassing deterministic predictors, so whilst the majority of ideas from the literature would most likely be observable at any square, it is difficult to say exactly which ones that would be. That is why iterations of similar studies render the findings in this study more relevant for the knowledge basis on public space as a whole.

By identifying the tribulations and prosperities of otherwise comparable public spaces can an ideal be more precisely produced. The differences between spaces that work and those that don't provide a catalogue of more or less successful design qualities. Only by a greater understanding of why some spaces fail and other succeed, why some spaces justify autonomous selection whilst other see almost no activity at all can future spaces be designed to achieve a livelier public life with a greater magnitude of stationary activities.

The ideal can't always be achieved, however. Sergels Torg should preferable be lifted out of its sunken-ness to combat sun-obstruction and negative psychological effects. Such a change is however economically, culturally and politically hard to accomplish. Yet, can the square be improved towards a more human-centred space by introducing water features to mask the unwanted sound of the city but also attract people to interact with it, put seating around said water feature so people can stay comfortably in the square, putting out moveable chairs so people can autonomously create their staying experience and rest their legs, inserting some vegetation and some civic art to create a more visually interesting space, all in all producing a space with sub-spaces within it, increasing the intimacy and intricacy of the space.

What would be the alternative anyway, no ideal, pure pragmatism? How would that function operationally? If no ideal exists, then no measurements indicate betterment or impairment. No argument about public space could be made without the existence of an ideal, what else would the argument be based on? The more important aspect then may be the ability to communicate the impacts of implementing the recommended actions required to improve towards said ideal. According to this study would the sitting activity at Sergels Torg be increased if it was redesigned with a higher number of seating alternatives, if the relationship between sitting activity and available seats at Kungsträdgården is to be believed. This is one example of one measurement of one factor of how the ideal of public life studies can be communicated, how this information then is used isn't the focus of this study.

And perhaps the ideal behind Sergels Torg is incompatible with the ideal of public life studies. Perhaps it's not, or not supposed to be, a public square in the same way Kungsträdgården is a public square. Sergels Torg is a space with a similar function as the original Roman *Forum* or Greek *Agora*, a space for circulation of ideas, manifestation of debate (Minea, 2012), public festivals and official ceremonies (Sitte, 1889). These public spaces were immensely popular in the middle ages and the renaissance era as they provided the only forum for such necessary interactions (Sitte, 1889), but in 2019, and a long time before this, are forums in abundance. The result is a mostly useless space, criminally inactive.

Inactive – in terms of staying activity – but not objectively bad. If Sergels Torg never was supposed to host constant public life the same way Kungsträdgården does, it doesn't matter

how many people that use it daily. Other measurements, other justifications, may render Sergels Torg a success story. Sergels Torg is a space characterised by its moving activity, with its large pedestrian flows and intimate connection to the, by-far, greatest node of public transport across the city, T-Centralen (Franzén, 2002). This is a more favourable model of public squares for Sergels Torg. Public squares as spaces to pass through, not to stay in. If this is the ideal behind Sergels Torg, and the design achieves it, the necessity for studies such as this to not only investigate how an ideal can be further accomplished but also present why the ideal matter in the first place is only heightened.

Justification of the ideal ultimately matters more than the ideal itself. The impacts of poor invitation for staying activities observable through the pattern, distribution and magnitude of staying activity expose the justifiable aspects of the ideal behind public life studies and human-centred urban design. The impacts of staying activity itself, and why it is justifiable to produce it, can be found in the seven themes of the study. The themes are demonstrating what staying activity are indicators of – such as secure spaces (edge effect) – and how it impacts other public life – through human interaction (multiplier effect). Greater justification is achieved through greater information and greater information is gained through the deciphering of data. In the case of public life studies and human-centred urban design this data is the infinitesimally ephemeral public life of city spaces, and two main principles permeates all city life. That the nature of public life is both universal but also universally varied.

To work with human-centred urban design is to 1) Identify the invariable needs of human beings and 2) Acknowledge the intrinsic autonomous variability of all humans. To both identify the human needs that are derived from the invariant limitations of human functioning – such as the frontal sensory apparatus – and to acknowledge the diversity of needs groups of autonomous individuals demand from public space – such as different seating alternatives for different ages, activities, temperatures, interests and group-sizes. Space must accommodate for invariant human limitation and intrinsic human variability.

The results of the study – as presented through the seven themes – demonstrate systematically how individuals select where to perform staying activities across and within Kungsträdgården and Sergels Torg. These staying activities are, for the most part, products of autonomous processes. It could be argued that the patrolling police officers at Sergels Torg and various recruiting volunteers at both squares are there out of necessity rather than their own admission. This is however a minority of the total staying activity. The vast majority of the activity is made up out of people watching flowers, photographing, talking, listening, eating food alone, eating food with other people, watching public life, playing chess, waiting for someone, waiting for something and sunbathing, as well as other inherent optional activities.

The distribution of these autonomous acts is – as analysed through the seven themes – representative of intrinsic human needs. Whether it be physical needs of comfort for sitting activity, externally stimulating needs for standing activity, needs for thermal comfort through the intersection between sunlight and temperature, psychological needs to feel safe in public space, sensory needs through a comfortable soundscape, needs for visual stimulus or social needs of human interaction. Autonomy is not a sense of independence, but rather a genuine consent to existing conditions (Ryan & Deci, 2004). When people choose the benches at Kungsträdgården it is indicative of the needs the benches accommodate for. In order to create spaces that justify autonomous selection, considerations must be made to these needs, rather than ignoring the requirements they entail.

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Appendix A – Stationary Activity Mapping data from Kungsträdgården

Kungsträdgården

16-apr

	Sitting females	Standing females	Sitting males	Standing males	Females	Males	Sitting	Standing	Total stationary activity	Weather	Temperature	Sound level
08:00	2	8	2	2	10	4	4	10	14	4	5,5	57,9
09:00	5	4	3	7	9	10	8	11	19	4	6,6	55,4
10:00	20	17	9	4	37	13	29	21	50	3	8,6	59,5
11:00	20	29	18	8	49	26	38	37	75	3	11,7	59,2
12:00	85	10	60	3	95	63	145	13	158	4	12,3	62,4
13:00	98	20	68	10	118	78	166	30	196	4	14,5	63,5
14:00	111	24	83	15	135	98	194	39	233	4	13,8	61,8
15:00	131	30	54	16	161	70	185	46	231	4	12,4	61,5
16:00	80	33	60	18	113	78	140	51	191	3	12	60,3
17:00	83	42	53	17	125	70	136	59	195	4	11,6	63,7
Whole day	635	217	410	100	852	510	1045	317	1362	3,7	10,9	60,52

17-apr

	Sitting females	Standing females	Sitting males	Standing males	Females	Males	Sitting	Standing	Total stationary activity	Weather	Temperature	Sound level
08:00	1	6	0	5	7	5	1	11	12	4	6,3	56,8
09:00	9	11	8	10	20	18	17	21	38	4	9,3	53,9
10:00	21	21	17	11	42	28	38	32	70	4	11,4	56
11:00	43	39	39	16	82	55	82	55	137	4	13,9	68,7
12:00	121	14	82	6	135	88	203	20	223	4	14,4	62,5
13:00	146	10	89	8	156	97	235	18	253	4	14,6	63,7
14:00	169	20	86	9	189	95	255	29	284	4	14,1	62,5
15:00	170	28	101	11	198	112	271	39	310	4	14,1	65,5
16:00	134	27	74	29	161	103	208	56	264	4	14	65,8
17:00	154	30	95	31	184	126	249	61	310	4	14,1	66,8
Whole day	968	206	591	136	1174	727	1559	342	1901	4	12,62	62,22

18-apr

	Sitting females	Standing females	Sitting males	Standing males	Females	Males	Sitting	Standing	Total stationary activity	Weather	Temperature	Sound level
08:00	3	10	0	1	13	1	3	11	14	4	9,5	55,9
09:00	10	14	9	5	24	14	19	19	38	4	10,6	55,6
10:00	26	22	23	16	48	39	49	38	87	4	14	55,8
11:00	57	32	41	14	89	55	98	46	144	4	16	58
12:00	141	37	100	17	178	117	241	54	295	4	18,7	62,7
13:00	187	18	97	16	205	113	284	34	318	4	17,9	62,2
14:00	234	20	112	16	254	128	346	36	382	4	18,5	64
15:00	236	38	137	21	274	158	373	59	432	4	18,8	63,5
16:00	200	21	117	21	221	138	317	42	359	4	18,7	64
17:00	197	35	130	31	232	161	327	66	393	4	17,4	64,8
Whole day	1291	247	766	158	1538	924	2057	405	2462	4	16,01	60,65

Average

	Sitting females	Standing females	Sitting males	Standing males	Females	Males	Sitting	Standing	Total stationary activity	Weather	Temperature	Sound level
08:00	2,0	8,0	0,7	2,7	10,0	3,3	2,7	10,7	13,3	4,0	7,1	56,9
09:00	8,0	9,7	6,7	7,3	17,7	14,0	14,7	17,0	31,7	4,0	8,8	55,0
10:00	22,3	20,0	16,3	10,3	42,3	26,7	38,7	30,3	69,0	3,7	11,3	57,1
11:00	40,0	33,3	32,7	12,7	73,3	45,3	72,7	46,0	118,7	3,7	13,9	62,0
12:00	115,7	20,3	80,7	8,7	136,0	89,3	196,3	29,0	225,3	4,0	15,1	62,5
13:00	143,7	16,0	84,7	11,3	159,7	96,0	228,3	27,3	255,7	4,0	15,7	63,1
14:00	171,3	21,3	93,7	13,3	192,7	107,0	265,0	34,7	299,7	4,0	15,5	62,8
15:00	179,0	32,0	97,3	16,0	211,0	113,3	276,3	48,0	324,3	4,0	15,1	63,5
16:00	138,0	27,0	83,7	22,7	165,0	106,3	221,7	49,7	271,3	3,7	14,9	63,4
17:00	144,7	35,7	92,7	26,3	180,3	119,0	237,3	62,0	299,3	4,0	14,4	65,1

	Sitting females	Standing females	Sitting males	Standing males	Females	Males	Sitting	Standing	Total stationary activity	Weather	Temperature	Sound level
Total	2894,0	670,0	1767,0	394,0	3564,0	2161,0	4661,0	1064,0	5725,0	-	-	-
Daily Average	964,7	223,3	589,0	131,3	1188,0	720,3	1553,7	354,7	1908,3	3,9	13,2	61,1
Hourly Average	96,5	22,3	58,9	13,1	118,8	72,0	155,4	35,5	190,8	3,9	13,2	61,1

Appendix B – Stationary Activity Mapping data from Sergels Torg

Sergels Torg

15-apr

	Sitting females	Standing females	Sitting males	Standing males	Females	Males	Sitting	Standing	Total stationary activity	Weather	Temperature	Sound level
08:00	0	3	0	14	3	14	0	17	17	4	3,6	67
09:00	0	1	0	14	1	14	0	15	15	4	5,8	66
10:00	0	13	0	15	13	15	0	28	28	4	5,7	69
11:00	0	23	0	34	23	34	0	57	57	4	7,6	68
12:00	0	26	0	65	26	65	0	91	91	4	8,6	68
13:00	3	35	10	52	38	62	13	87	100	4	10,1	69
14:00	3	36	17	74	39	91	20	110	130	4	9,6	80
15:00	2	40	5	66	42	71	7	106	113	4	10,3	70
16:00	17	37	9	65	54	74	26	102	128	4	10,2	69
17:00	7	30	6	69	37	75	13	99	112	4	9,2	68
Whole day	32	244	47	468	276	515	79	712	791	4	8,07	69

23-apr

	Sitting females	Standing females	Sitting males	Standing males	Females	Males	Sitting	Standing	Total stationary activity	Weather	Temperature	Sound level
08:00	0	1	1	7	1	8	1	8	9	4	10,6	68
09:00	0	4	1	7	4	8	1	11	12	4	13	68
10:00	2	31	7	16	33	23	9	47	56	4	15,5	70
11:00	1	11	6	20	12	26	7	31	38	3	17,4	69
12:00	11	34	14	41	45	55	25	75	100	4	18,2	71
13:00	15	15	16	44	30	60	31	59	90	4	18,3	71
14:00	13	27	11	42	40	53	24	69	93	4	18,4	76
15:00	22	24	26	65	46	91	48	89	137	4	18,8	69
16:00	13	34	29	58	47	87	42	92	134	4	18,9	71
17:00	12	29	29	50	41	79	41	79	120	4	18,4	70
Whole day	89	210	140	350	299	490	229	560	789	3,9	16,8	70

25-apr

	Sitting females	Standing females	Sitting males	Standing males	Females	Males	Sitting	Standing	Total stationary activity	Weather	Temperature	Sound level
08:00	0	8	0	10	8	10	0	18	18	4	11,3	71
09:00	2	5	4	3	7	7	6	8	14	4	14,8	70
10:00	3	19	11	18	22	29	14	37	51	4	15,2	71
11:00	6	23	11	27	29	38	17	50	67	4	16,5	71
12:00	6	26	19	32	32	51	25	58	83	4	16,1	71
13:00	10	29	12	49	39	61	22	78	100	2	16,1	70
14:00	10	31	13	55	41	68	23	86	109	2	14,3	72
15:00	6	35	7	58	41	65	13	93	106	2	14,2	71
16:00	6	48	18	71	54	89	24	119	143	2	15,1	71
17:00	3	45	11	61	48	72	14	106	120	2	14,1	70
Whole day	52	269	106	384	321	490	158	653	811	3	14,8	71

Average

	Sitting females	Standing females	Sitting males	Standing males	Females	Males	Sitting	Standing	Total stationary activity	Weather	Temperature	Sound level
08:00	0,0	4,0	0,3	10,3	4,0	10,7	0,3	14,3	14,7	4,0	8,5	68,8
09:00	0,7	3,3	1,7	8,0	4,0	9,7	2,3	11,3	13,7	4,0	11,2	67,9
10:00	1,7	21,0	6,0	16,3	22,7	22,3	7,7	37,3	45,0	4,0	12,1	69,6
11:00	2,3	19,0	5,7	27,0	21,3	32,7	8,0	46,0	54,0	3,7	13,8	69,3
12:00	5,7	28,7	11,0	46,0	34,3	57,0	16,7	74,7	91,3	4,0	14,3	69,8
13:00	9,3	26,3	12,7	48,3	35,7	61,0	22,0	74,7	96,7	3,3	14,8	69,8
14:00	8,7	31,3	13,7	57,0	40,0	70,7	22,3	88,3	110,7	3,3	14,1	75,9
15:00	10,0	33,0	12,7	63,0	43,0	75,7	22,7	96,0	118,7	3,3	14,4	70,0
16:00	12,0	39,7	18,7	64,7	51,7	83,3	30,7	104,3	135,0	3,3	14,7	70,5
17:00	7,3	34,7	15,3	60,0	42,0	75,3	22,7	94,7	117,3	3,3	13,9	69,1

	Sitting females	Standing females	Sitting males	Standing males	Females	Males	Sitting	Standing	Total stationary activity	Weather	Temperature	Sound level
Total	173,0	723,0	293,0	1202,0	896,0	1495,0	466,0	1925,0	2391,0	-	-	-
Daily Average	57,7	241,0	97,7	400,7	298,7	498,3	155,3	641,7	797,0	3,6	13,2	70,1
Hourly Average	5,8	24,1	9,8	40,1	29,9	49,8	15,5	64,2	79,7	3,6	13,2	70,1

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