# Feeling Comfortable Outdoors

## A Phenomenological Understanding of Microclimate Perception in the Egyptian Context

A Thesis submitted to Newcastle University for the Degree of
Doctor of Philosophy

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### Abstract

The purely physical approach used to characterize thermal comfort is not informative for many urban designers and landscape architects. Significantly, this theoretical approach has been criticized due to the lack of consideration of human sensations and perceptions. Recent research has shown an increased consideration for the psychological and behavioural aspects of outdoor thermal comfort. However, the theoretical and methodological bases employed to consider the human aspect raise questions which may argue the quality of the produced knowledge. On the other hand, the perceptual links between microclimate and spatial configurations studied in a few studies is an interesting subject for landscape architects; nevertheless, it remains poorly researched.

Therefore, this study takes an atypical approach to understanding outdoor comfort in the Egyptian summer climate, aiming to inform the design of open spaces which people would perceive as comfortable. The study offers a possible phenomenological understanding of the inherent sense of microclimate (dis)comfort in view of phenomenological notions of embodiment and multi-sensory perception. The phenomenology of atmosphere and weather offered a theoretical perspective to approach and understand human relations to the microclimates. The methodological approach taken to understand the microclimate perception was inspired by Heidegger's philosophy, with its emphasis on the occurrence of understanding while being in the world, and valuing subjectivity and historicity in understanding. The researcher's prolonged touring and immersion in the microclimates was followed by investigation of 17 participants' intentional walking experiences within the microclimates.

The findings went beyond the intuitive knowledge held in mind about shade and water preferences as related to comfort in the Egyptian climate context. The study disclosed new insights into understanding outdoor comfort, originally within sunny microclimates. It was found that the microclimate perception is a perception of an atmospheric configuration, which is affected by the deep interplay of humans, place, and time. The perceived spatial physiognomies intruded with variant levels upon human perception of (dis)comfort. Interestingly, the concluded design implications do not often support the conclusions of previous experimental studies in hot, arid regions. This emphasizes the differences between subjective and objective examinations of microclimate and comfort. The study concludes that the issue of evoking and promoting comfortable feelings outdoors should be given more focal consideration in open space design than the expected impacts recommended by experimental investigations.

**Dedication**

*This dissertation is dedicated to my beloved father, May his soul rest in peace. I know what this achievement meant for you and I hope it would complete the dream that you had for me.*

*I wish you were here to draw a smile on your face, but I'm sure you are in a better place now and you know what I want to say…*

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# Chapter One
# Introduction

# Chapter 1. Introduction

Cairo, Al Azhar Park, July 2009, at about 2:00pm

It was a typical hot summer day and I was walking with my friend in the park, capturing some pictures of the park environment which she needed for her MSc research. We reached the lake area, a completely open sunny space. We kept walking along the pathway encircling the lake, and then I sat on a bench in mid-pathway which looks over the lake for a rest while my friend remained taking more pictures of the space.

> Me: *The weather is really nice here, isn't it?*
> My friend: (thinking for a while) *Not sure of that, may be you feel better because of water here*.

During my PhD journey, I was often reminded of this incidence. On that day, we passed by different forms of fountains in the park, and I knew scientifically about the positive impact of water in the microclimate, but I could not recall any moment where the impact of water was manifested in the microclimate other than this moment. The weather experienced at this moment influenced my preference for the space although it was completely sunny. However, my friend did not feel this delight in the microclimate although she reflected her belief in the expected impact of water. She seemed uncomfortable with the weather, but trying to justify that there is a positive impact of water in the microclimate. This made me wonder about how the same microclimate condition is perceived differently. Is there a real impact of water in the microclimate, and how did I feel comfortable at this critical hot time and in this sunny space, while my friend did not feel comfortable? This personal experience got me thinking about how we make sense of the microclimate (dis)comfort outdoors. It sparked my interest to research the issue of human (dis)comfort from a subjective perspective and, as an architect, it evoked an inspiration to study the spatial microclimate perception and examine how perceived design qualities may impact our perception of the microclimate (dis)comfort.

## 1.1 Knowledge and Gaps in Approaches to Human Thermal Comfort Outdoors

### *1.1.1 Position and assessment of human parameter*

Thermal comfort was described by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)[1] as "*the condition of mind which expresses satisfaction of mind with the surrounding thermal environment"* (Rohles, 2007). This definition implies that not only physical and physiological factors e.g. the 'state of body,' are involved, but also it takes psychological influences into account 'state of mind'. Nevertheless, much attention has been paid in early research to purely physiological aspects of human thermal comfort, and the psychological issues were long ignored. This appeared in the broad range of sophisticated

[1] An organization devoted to the advancement of indoor-environment-control technology in the heating, ventilation, and air conditioning (HVAC) industry (https://www.ashrae.org/home)

physical models and indices for thermal comfort that has been developed,[2] where many of these indices were initially developed for the indoor environment and then modified for outdoor environments (Chen and Ng, 2012). These indices provide a score that is scaled on thermal sensational scales that represent the average thermal sensation felt by a large group of people in a space (Charles, 2003). Despite this physical/physiological approach to assessing thermal comfort being widely used, it has limitations. The adequacy of scaling to these thermal sensational scales was criticised, as these scales are based on indicators such as the measurements of physiological changes, for example sweating, or skin temperature, which would normally be carried out in controlled environment rooms but which is hardly practical in outdoor spaces (Auliciems and Szokolay, 1997; Chen and Ng, 2012). Moreover, the dominant aim of the research studies appears to have been to determine thermal comfort quantitatively. These indices are sophisticated for an urban designer or a landscaper to be familiar with, where they require domain knowledge in bio-meteorology and physiology, and the results are not directly informative to outline useful guiding implications for design of comfortable outdoor space (Chen and Ng, 2012).

One significant concern which has been raised relates to how human parameter in the assessment of thermal comfort is limited to the measurements of physiological changes such as the consideration of the two personal related factors: clothing degree and activity level in PMV index (Chen and Ng, 2012). A few early studies have argued that using the purely physiological approach to assess thermal comfort is inadequate and that understanding the human parameter is necessary in designing microclimates; this is the reason why some studies have started to examine the psychological factors that influence the human sensation of microclimate (Auliciems, 1981; Baker and Standeven, 1997; Brager and De Dear 1998). Auliciems (1981) first criticized the pure physiological approach and formulated thermal preference as the result of both physiological responses to immediate parameters, measured by the indices, and expectations based on past experiences.

The consideration of the psychological and behavioural perspectives in human thermal comfort is relatively an unexplored domain of research (Klemm et al., 2015). Only within the last decade has greater attention been given to these perspectives in the examination of outdoor thermal comfort, where thermal perception is discussed as a complex of interaction

[2] Examples of these thermal comfort indices are: Predicted Mean Vote (PMV), Physiological Equivalent Temperature (PET), Comfort Formula (COMFA).

of physical, physiological, psychological, and behavioural factors (Nikolopoulou, 2004; Andrade and Oliveira, 2007; Knez *et al.*, 2009; Chen and Ng, 2012). Of particular interest, Nikolopoulou *et al.* (2001) is one of the first outdoor thermal comfort studies which interviewed people on their subjective evaluations of their thermal sensations, and the results showed that thermal comfort indices might be too 'strict' in their evaluation and that people in the outdoors show a greater tolerance and flexibility to different microclimate conditions than these indices derived from measurements series would suggest. This consideration of users' sensational votes explored how different people perceive the environment in different ways and that the human response to a physical stimulus is not necessarily in a direct relationship to its magnitude, but depends on a complex interaction of different aspect, such as the 'information' that people have for a particular situation (Nikolopoulou, 2001). This significant conclusion emphasizes the inadequacy of employing a purely physiological approach in characterising outdoor thermal comfort conditions.

The methodological approach and conclusion of Nikolopoulou *et al.* (2001) greatly influenced subsequent studies in this area. Nikolopoulou and Steemers (2003) further emphasised the concept of psychological adaptation and attributed several psychological factors that influence human evaluation of thermal comfort: *naturalness, perceived control, environmental stimulation, time of exposure , past experiences, and expectations*. Several studies have shown the relation between human comfort and the use of outdoor space, attendance, and behavioural pattern (Eliasson et al., 2007; Thorsson et al., 2007; Lin, 2009). Others have explored the relation between thermal comfort and origins and cultural background (Knez, 2005; Knez and Thorsson, 2006), and these showed that people in different countries show a great variation in what they consider to be a comfortable temperature.

This development in the theoretical approach to thermal comfort give emphasis to human parameter in the study of thermal comfort and led to the consideration of variant perspectives that influence the subjective thermal satisfaction. However, findings brought by these studies are not often immediately useful for urban and landscape designers, for example, emergent findings, including length of outdoor stay, origins, past experience, or expectations (Nikolopoulou, 2004), are not directly influenced by design interventions. Even aspects which may have an implication for outdoor space design such as naturalness, environmental stimulation, and perceived control discussed in Nikolopoulou and Steemers (2003) framework was determined without any depth.

Nevertheless, this theoretical approach identified the psychological factors of comfort experience to be of equal importance as the technically measurable comfort indices. Despite this positive step, so far research examining and characterizing outdoor thermal comfort has aimed to quantify comfort conditions outdoors. The results from physical measurements and scaled indices are often compared with users' momentary thermal assessments, which are taken simultaneously with the measurement of conditions in field studies. No attempts have been made to focus on human experience, knowledge, and perception as it is, as the principal source of knowledge to approach and understand human thermal comfort. This raises the question of whether reliability in the design of comfortable spaces should be given to physical measurements or subjective feelings and perceptions of comfort.

Significantly, there are limitations on both theoretical and methodological levels in the assessment of human sensation votes which raise arguments. Lenzholzer (2010a) criticized the reliability of seeking momentary thermal sensation of people in outdoor places. She argued that space design could not be based on a momentary sensation as this might not represent the actual experience. Inspired by psychological concepts, Lenzholzer argued that it is often people's long term experience which influences their use or avoidance of a place. This led her work to focus on long term perceptions instead of momentary sensations. Lenzholzer based a significant part of her study on gathering knowledge about the perceptual microclimate character that people develop thorough their everyday encounter with microclimate conditions of public spaces, investigating how this relates to the actual microclimate circumstances. The significance of this work lies in the acknowledgment of users' ingrained perception of the microclimate in the provision of applicable guidelines for the design of spaces. Furthermore, users' thermal votes are taken by questionnaires where they are asked to rate their thermal feelings on a given scale. This method of assessment does not only provide a quantitative standardization of human thermal comfort, but also points out human sensation by imposing an abstracted external framework that ignores the subjective meaning held in mind behind the verbal sensation. These given scales are based on particular goals which is not necessary to correlate with people ideas about their state of thermal comfort. Moreover, users are asked to rate their sensation on a scale of given points, such as in Nikolopoulou et al. (2001), varying from too cold to too hot. This given scale of assessment supports that humans are highly conscious of thermal changes, and sensitive enough to differentiate between feelings such as "warm/ too warm" or "warm/ slightly warm." Kibert

(2012) discussed that the majority of individuals would be satisfied by a set of values, and as the range of values deviate progressively from the ideal, fewer and fewer people become satisfied. I agree with this viewpoint, where the slight difference between points on sensational scales may be widely overlooked from a subjective perspective. These issues raise arguments about the effectiveness of knowledge gained from the evaluation of users' thermal sensation.

### *1.1.2 Microclimate, thermal comfort and the spatial environment*

Microclimate is defined; in Oxford English dictionary online (2015) as the long-term climate of a small or specific area. It depends on aspects such as the amount sunlight, shade, or exposure to the wind. A relevant body of knowledge focuses on the urban microclimate in relation to outdoor thermal comfort. These studies, such as that illustrated by Brown and Gillespie (1995) aim to regulate the relation between aspects of microclimate and aspects of the spatial environment, including landscape elements for the goal of outdoor human comfort. Many research studies can be found providing design guidelines on the physical parameters that can be changed through design interventions, such as space forms, spatial orientations, and paving materials. Others focus on the thermal performance of vegetation, trees qualities and the impact of water in the microclimate.

These studies conclude specific guidelines for application, which benefit urban designers and landscape architects. Nevertheless, microclimate and human comfort are often approached from a physical standpoint, based on actual measurements and the development of models or simulation to test the design interventions. In addition, these studies build their ideal intervention on pre-determined constructs that determine conditions of human thermal comfort theoretically based on parameters of the climate region. For example, in hot arid regions, the general aim of studies is built on the realization of the design attributes which maximize shade coverage and minimize sun coverage.

Moreover, despite the fact that these studies provide detailed design guidelines for the creation of a presumably 'comfortable open space or thermal environment', they underrepresented the perceptual perspective of physical environment in relation to microclimate and comfort. These studies predominantly identify objective characteristics based on the inter-relations of landscape elements and the built environment, which characterise the microclimate comfort conditions; however, they have ignored how this

spatial microclimate is subjectively perceived in terms of comfort. Kravanjai (2006) presented the thoughts of some authors who distinguished between studying any vegetation objectively as physical characteristics, and studying the subjective relation to plants as comprised of one's interpretation of their physical characteristics. Indeed, Robinson (2004) elaborates that every human being responds in a personal way to plants. This raises the question in the design of comfortable human spaces of whether the recommended spatial qualities and relationships are perceived in a way that achieves its objective aim, and whether the design of comfortable space should focus on the real environment or a perceived one.

Moreover, the review of the existing literature showed that little research has been done on the spatial microclimate perception, especially that which provides beneficial guidelines for space design. Some studies have concluded that the perception of comfort is related to level of naturalness and positive experience of the environment (Nikolopoulou and Steemers, 2003; Nikolopoulou, 2004; Reiter, 2004; Knez and Thorsson, 2006; Eliasson et al., 2007). Although these studies provide evidence that the microclimate is integral in place experience, they did not go further to provide applicable implications for design. The work of Igor Knez is one which views the climate or weather as a generator in place perception (Knez, 2003b; Knez, 2003a; Knez et al., 2003). It addresses how climate can act as prior knowledge of a place that influences perception, and where people can have memories and emotions regarding a place for its climate, which awakens certain moods. Recently, the work of Lenzholzer (Lenzholzer, 2010a; Lenzholzer, 2010b; Lenzholzer and Koh, 2010; Lenzholzer and Van Der Wulp, 2010) heavily emphasized on the issue of users' microclimate perception and the relation between microclimate perception and spatial perception. She pointed out how people describe certain places using terms for climate like windy and sunny (Lenzholzer, 2010a). The work of both Knez and Lenzholzer provide reference thoughts for my study, as they suggested that people develop an understanding of how climate and physical surroundings are apparently related and certain spatial configurations can develop certain microclimate experiences.

## 1.2 Questions, Aims and Objectives

Knowledge in the previous section highlights several gaps and raises certain issues. It indicates the inadequacy of a pure physiological approach to thermal comfort and at the same time the uncommunicatively and ineffective of the produced knowledge for designers. It also sheds light on the limitations of gathering momentary sensations and the way in which subjective thermal sensational are assessed. Finally, it indicates the overlooked position of the spatial

microclimate perception and the experiential and perceptual knowledge of microclimate and comfort in general as principal source knowledge.

These issues set the primary concern of this study as being to inform the design of comfortable open spaces in the Egyptian climate context, relying principally on human experiential and perceptual knowledge. In this respect, the study aimed in the first position to examine the issue of spatial microclimate perception, through examining the spatial dimension in human perception of the microclimate and comfort. However, a set of subsequent questions were raised from the philosophical discussion in Chapter Two. Within these questions, one significant question is raised, which at this time evoked primary concerns about shifting the knowledge that the study was expected to produce to be far from a spatial dimension. This question directs the study to examine the subjective sensation and perception of microclimate, whatever this may be. The significance and consequence of this question is sounded and emphasised in the findings, which in turn, give this question primary emphasis in understanding the microclimate from a subjective perspective over the examination of the spatial dimension. Accordingly, the first objective established for this study is to understand how people make sense of the microclimate and comfort in outdoor space in the Egyptian context (Cairo). The second objective aims to read the contribution of the spatial environment in shaping human perception of microclimate and comfort. Moreover, as this study aims to approach the microclimate and human comfort from an atypical perspective that emphasises human perceptual and experiential knowledge, the question of 'how' to carry out this investigation was important. The research questions are expressed as follows in Table 1.1.

| Question | chapter |
|---|---|
| What are we sensing as being a microclimate and how do we make sense of the microclimate (dis)comfort? | Four |
| | Five |
| | Six |
| What is the spatial interpretation of human perception of microclimate (dis)comfort? | Seven |
| | eight |
| How could the microclimate examined from a subjective perspective? | Three |

Table 1.1: Research questions and their corresponding chapters

## 1.3 Research Setting

This section sheds light on the nature and problems of open spaces in the Egyptian context and public parks in Cairo in particular. It indicates the relation of the user to public parks and

highlights the studies done on the aspects of preference in the outdoor spaces in the Egyptian context, in relation to the issue of outdoor comfort.

Public parks in Cairo are mostly owned and managed by the government (Figures 1.1). These spaces face managerial problems due to limited governmental financial resources, which affects their quality and appearance to a great extent (Abou El-Ela *et al.*, 2010), and has resulted in such parks mainly targeted at the lower class nowadays (El Messiri, 2004; Abou El-Ela *et al.*, 2010), who cannot afford other pricey recreational varieties. Moreover, due to the limited mobility and income of this group of the society, families preferred to use any nearby, easily accessible open spaces for recreation than to pay a family fee to enter a public park. On the other hand, inhabitants, primarily middle and upper class families, avoid the public parks (Stino and El-Masry, 2011) and prefer to join private clubs or drive to nearby beaches along the Red Sea and the Mediterranean.

The study of Abou El-Ela and others (2010) examined how most of the public parks are characterized by natural greenery elements and the lack of a water feature. Nevertheless, the survey done by the government (Government, 2010) presented evidence for public dissatisfaction with the quality of its urban parks. Of particular relevance to my study, the survey shows low occupancy rates during the day time period. Further problems that were highlighted in the survey report the absence of shaded paths, insufficient shaded areas for resting, and the presence of some shaded areas which are unsuitable for seating. These problems may justify the reason for low occupancy as it reflects users' thermal dissatisfaction due to the absence of comfortable microclimate conditions, and that the users were left with no choice between microclimate variations. These problems, in turn, suggest that the natural greenery element in most of the parks does not suit users' needs and preference for comfort in an open space (Abou El-Ela *et al.*, 2010). This also may explain the low occupation level of some parks which have a rich vegetation and maintained design, such as Horeyya and Al Andalus Parks in Cairo, which have survived for long periods but did not continue to be socially viable because they were overprotected and treated as museums. The combination of vegetation in both parks aims to create a visual scene rather than comfortable spaces (Figure 1.2).

Figure 1.1: Examples of public parks' designs in the Egyptian context
(Researcher 2004, and Cairo cleaning and beautification agency: http://www.ccba.gov.eg/)

Figure 1.2: Horeyya and Al Andalus parks
Examples of over-protected parks which put restrictions that prevent users' adaptation
(Cairo cleaning and beautification agency: http://www.ccba.gov.eg/)

According to El Messiri (2004), who interviewed directors of different parks, ordinary days of the week account for the lowest number of visitors. This number is doubled or tripled during weekends and quadrupled on feast days. On 'Sham el Nasim', the spring festival, numbers go

up exponentially. The images in Figure 1.3 were captured by the researcher in 2012 during her observation of frequency level in ordinary days and at Easter, which supports the previous observation of the visitors' numbers. On Easter day, there were no empty spaces, so users come prepared to adapt to the expected lack of shaded areas by bringing a fabric shed to create their own shade and shelter from the sun anywhere in the park.

During spring and summer, parks are nearly empty in the morning and early afternoon and usually visited in evening –if it is open – and small percent of visits occurs in afternoon weekends or weekday (El Messiri, 2004). However, most of the public parks close at early evening times, so users, especially the lower class who are the main occupants of public parks, try to find other accessible open space for recreation in the hot summer such as green traffic islands and roundabouts in the major streets and squares and open areas of the more affluent adjacent districts, which can be used till late into the night to enjoy the nice summer breeze.

Figure 1.3: Low occupation level in normal weekdays, and extremely high occupation level at Easter (Japanese Park, April 2012, the researcher)

This observation of visitor numbers and patterns reveals that comfort conditions influence the use of the space. However, it also gives insights into understanding the users' relation to the park in the Egyptian context. From my experience of belonging to the Egyptian context and living in Cairo, visiting a park is considered a secondary activity of recreation. It is often considered to be an outing; a full day activity, mostly at the weekends, vacations, or for special events. Public parks are not visited on a regular or a routinely basis, unlike visiting social private clubs at weekends, for example. This might be due to the fact that people who can afford to go regularly to parks are more attracted to other recreational activities and, thus, they visit parks on a longer exceptional period to change their recreational pattern. This is in

addition to the fact that public parks are few, and many of them are unsuccessfully managed and thus become unattractive. Being an optional activity makes it sometimes dependent on having favourable exterior conditions when weather and place invite them, as discussed by Gehl (2006). Also, the location of the parks at a distance from work or residency, being fenced and having to pay a fee for entrance, have all distanced the relation of the user to the park and did not make it based on a frequent basis either for resting or strolling.

Little research has investigated the aspects of preference in an outdoor space in the Egyptian context. For example, Salama (2008) showed that the users prefer spaces that provided shaded gardens and water bodies together as these natural elements give the feeling that the weather is cooler and temperature is lower during the summer. Salama (2008) found that these aspects influence users' perceptions of comfort, as they were perceived as excellent treatment for Cairo's climate, offering a more refreshing atmosphere and making users feel comfortable. Another study by Gabr (2004) observed how during midday, a water feature may substitute for the absence of shaded areas. This supports my own observations from seeing how users were gathered around the main water space in the Japanese park at Easter day, despite the hot and sunny conditions (Figure 1.4). Also PhD study of Stino (1983) examined the visual preference of outdoor spaces in Egypt. The study concluded how the role of shade trees is highly appreciated, where participants classified the outdoor spaces to spaces without vegetation and spaces with shade trees.

Figure 1.4: The attraction to water spaces at Easter, in spite of the hot and sunny conditions
(Japanese Park, April 2012, the researcher)

This overview sheds light on the difficulty of using parks –as open spaces – during the summer daytime period in the Egyptian climate context, due to lack of comfort conditions; rather only those with a strong motivations to spend some time in a park during this critical period go there. The importance of shade in the Egyptian climate is shown as a crucial condition to encourage intensive use in summer and make outdoor spaces more attractive (Figure 1.5). This appreciation for shade is due to the nature of the Egyptian climate, which according to Koppen's classification, is a dry climate, and lies almost entirely in the sub group of an arid,

hot climate (Peel et al., 2007). Cairo's climate zone is known as hot and humid in summer and mild and humid in winter (Mahmoud, 2011a). Studies considering Cairo's climate such as MENGİ (2009), Mahmoud (2011a) and Mahmoud (2011b) often emphasize the aspect of sun shading in the warmer half of the year. However, the impact of water in Cairo's climate is overlooked, such as in Mahmoud (2011a), although the importance of water in users' thermal preference has been found in other research. This contradiction between subjective preference and, recommendations based on physical investigations provides a reference for the importance of studying the subjective perspective of microclimate (dis)comfort.

Figure 1.5: Sunny resting spaces are left unoccupied at Easter
(Japanese Park, April 2012, the researcher)

## 1.4 The Potential Interest in Phenomenology

Phenomenological approach is very inspiring for the study of the microclimate experience from a subjective perspective. Literally, phenomenology is the study of phenomena; the appearance of things or things as they appear in our experience (Sokolowski, 2000). The key issue in any phenomenological approach is the manner in which people experience and understand the world. Phenomenology involves an understanding and description of things as they are experienced by the subject (Tilley, 1994; Tilley and Bennett, 2004). It addresses the role of human senses in place perception, where one basic notion in phenomenology is that concepts formed in a person's mind about what is perceived in the environment are strongly related to sensory perception (Woodruff-Smith, 2011).

Knowledge in Chapter Two shows that phenomenology has recently gained increasing attention in spatial disciplines, mostly because the idea of human experience in place is central in phenomenology. Phenomenology deals with the experience of physical environments, the sensory properties, and the mental concepts gained about these environments. Phenomenological approaches aim to reveal how human senses and the environment are together made and communicated, in and through lived experience (Wylie, 2007). This notion

is of particular importance to this study as it captures the relation of the environment and the human being, which is greatly shaped by design aspects.

The literature review in Chapter Two reveals that the study of thermal perception is underrepresented in spatial design discipline. Nevertheless, the concepts of multi-sensory experience and embodiment which are integral in phenomenological investigation provide theoretical inspirations to answer the research questions related to the interaction of the thermal perception and other human senses and the engagement of the corporeal being in the microclimate experience. Moreover, *Gernot Bohme* is a significant philosopher in this study, where his phenomenological notions of atmosphere and weather, are discussed in depth in Chapter Two, and provide inspiring as well as influential theoretical perspectives to understand human relation to the microclimate (Bohme, 2005; Bohme, 2008).

On the methodological level, phenomenological methodologies of understanding the human relation to the world are very inspiring and relevant to research the microclimate from a subjective perspective. Phenomenological examination enables a new and deeper understanding of the phenomenon. In addition, some inspiring phenomenological methodologies admit the researcher's impact and engagement in the process of understanding, which is a critical issue in this study (see section 1.5).

## 1.5 Methodological Approach

The methodological approach is influenced and adapted from philosophies underpinning Heideggerian interpretive phenomenology, which signifies the occurrence of understanding while being engaged in the world. The phenomenon under investigation –the microclimate – is researched in my home context, where I was raised and have lived my whole life, immersed, surrounded and touched everyday by the local climate conditions. In this respect, inspired by Heidegger's ontological perspective of being (Heidegger, 1927/1962), this deep rooted relationship raises the importance of employing the appropriate phenomenological attitude that admits the impact of the researcher's historicity and engages her, in the virtue of belonging to the same climate context, in the construction of knowledge through interpretation. However, phenomenology admits to an awareness of entering the phenomenon with a sense of openness and fresh eyes to enable a new understanding of the phenomenon. In this respect, Finlay's perspective (Finlay, 2005; Finlay, 2008; Finlay, 2009) gives insights to understanding as co-created; and from this understanding arises from that

inter-subjective space between the researcher and the participant. In engaging these attitudes, the researcher's subjectivity is valued and evolving understandings are managed in a relational context.

Inspired by Heidegger's notion of being in the world, understanding of the microclimate is established, based on the idea that description and interpretation can be seen as a continuum, in which description is mediated by nonverbal expressions and behaviours, which in turn involve a stronger element of interpretation. Moreover, the study seeks an intersubjective understanding of the microclimate, while also acknowledging the individual interpretation and expression of meaning.

Two processes of learning were employed in the research. The learning process started by identifying my own knowledge regarding the perception of comfort in summer time in an outdoor place. This was done to contain its influence on new understanding. Moreover, in response to the essential role of the researcher in interpretation, I facilitated an intimacy with the phenomenon before encountering it with the participants. I conducted several reconnoitring visits to the case study over a month period. Through a sense of immediacy, I walked in the microclimate and recorded everything that appeared to me regarding my experience and perception of the microclimate. The second process of learning aimed for engagement with others' perceptions of the microclimate to uncover a variant, deeper, and richer perspective of microclimate and human comfort. Prolonged touring with an intentional immersion –of the participant and I together in the microclimate – was employed as a method where the participant expressed their sensations and impressions regarding the phenomenon. In addition, different types of reflective field notes and photos were supplementary tools to the recording of the participants that enhanced the interpretation. The analytical process employed reflected the notion of the hermeneutic circle, which represents the dynamic circular movement that occurs in the process of understanding. The development of the methodological approach was not straight forward, yet the learning process moved forward and backward (Table 1.2) in a way that could be described more as a long phase of reflection on action.

| Phase | Duration |
|---|---|
| Literature review | Jan 2011- onwards |
| Preliminary methodological design | January 2012–March 2012 |
| Researcher reconnoitring visits and immersion in the experience<br>Evaluation of the method used with the participants | April 2012 |
| Noting personal reflections from reconnoitring visits<br>Evaluating and developing the method<br>Preparation for fieldwork | May 2012-July 2012 |
| The main field work | August 2012-Sept. 2012 |
| Reviewing the methodology<br>– reviewing philosophies of understanding<br>– Defining the phenomenological attitude and outline the position of the researcher subjectivity in the research | Oct.2012-Dec. 2012 |
| Data analysis | Jan 2012- August 2013 |
| Findings and the way forward | September 2013- Onwards |

Table 1.2: The research process

## 1.6 Significance of the Study

This study focuses on the issue of human thermal comfort in open spaces. However, the approach to human comfort is different from the dominant approaches used to study outdoor thermal comfort. This study aims to understand the human perception of the microclimate (dis)comfort, rather than a scientific determination. It emphasizes the human aspect, and relies on a subjective perception to understand how people make sense of the microclimate in their own terms. In this respect, the study employs a phenomenological methodological route to reveal a deeper perspective of the subject relation to the microclimate rather than quantitative assessment of scaled momentary sensations. This study focuses on the microclimate and human comfort from a behavioural and psychological perspective. It deals with thermal comfort as more than just a question of temperature and with microclimate as a phenomenon that is sensed by the body, mind, and senses. It suggests that humans comfort outdoors, and their relation to microclimate are integral aspects of the spatial experience. Moreover, it addresses thermal sensation as more than just a measured index, and the human perception of microclimate (dis)comfort is being beyond physiological thermal sensation.

This study attempts to understand the human perception of microclimate (dis)comfort in the summer period in the Egyptian context, when there is a difficulty to enjoy staying outdoors. It is hoped that this research can establish guidelines for the design of spaces that would be perceived as comfortable outdoor spaces. The examination of the microclimate perception in relation to the spatial configuration and aspects of design in outdoor spaces makes the research beneficial for landscape architects and urban designers. Moreover, the study examines the significance of studying the perceptual and experiential perspective of

microclimate and comfort through comparing emergent findings with corresponding previous results of other relevant experimental investigations in hot arid climates. Importantly, the study is conducted in the Egyptian context, where very few studies exist of the issue of human thermal comfort and where there is an inattention to the human parameter in researching thermal comfort. Finally, in a broader context, the knowledge expected from this study could in turn lead to the development and application of sustainable, liveable, and useable open spaces for this critical period of the year.

## 1.7 Research Structure

The study is structured around nine chapters. Following this introductory chapter, Chapter Two: **The Approach to the Microclimate: Phenomenological thoughts and questions: A literature review,** discusses the inspirations gained from phenomenological thoughts and concepts, which provided theoretical references to research the microclimate from a subjective perspective. It then moves on to highlight inspiring notions from the existing phenomenology of atmospheres, weather and climate which capture the human relation to the "atmosphere", whether natural weather or created ambiances and feelings. Finally, the discussion of literature in this chapter suggested further questions through which to approach and understand human perception of the microclimate.

Chapter Three, **Research Design and Methodology,** elaborates the criteria by which the study is designed and justifies the manner by which the study is approached. First, the researcher raises the issue of her position in the study. In this respect, relevant philosophical and epistemological bases in phenomenological research are reviewed to establish the process of understanding the microclimate, and this, in turn, led to identifying the phenomenological attitude employed in the study. In this chapter, the researcher attempts to justify the relevancy of the thoughts of interpretative phenomenology, and moves on to justify the selection of the case study. Then, the chapter provides a detailed elaboration of the learning journey, showing the way in which the data were collected, analysed, and discussed in respect of the aims and objectives of the study.

The analytical chapters from four to six aim to answer the research primary question –what is sensed as being a microclimate. The organization and structure of the analytical chapters show the progression of data gathering to analysis and findings. Chapter Four, **Journey within the microclimates: giving voice for making sense**, is an introductory analytical chapter which aims

to facilitate and clarify how that understanding occurs. This chapter presents the themes elicited from participants during the walking tours in the microclimate on four pathways, showing commonalties but also reading individual occurrences which added and clarified the understanding of the microclimate perception. The knowledge of this chapter lays the foundation for an understanding of the inherent qualities of the microclimate comfort from a subjective perspective.

The subsequent two chapters sharpen the meanings and relationships drawn from the analysis of participants' perceptions and experiences in Chapter Four, providing a deep understanding of the subjective perspective of microclimate and (dis)comfort in the Egyptian context. Chapter Five, **Historicity: Cultural constructs of climate and comfort,** discusses the everyday conceptions of climate in the Egyptian context, which impact the immediate perception of (dis)comfort. This chapter provides a deeper insight into the common sense of (dis)comfort in the Egyptian context. Moreover, the knowledge discussed offers a platform for understanding participants' immediate perceptions of the microclimate through legitimatizing and containing their influence on new understanding. Knowledge in this chapter shows that the intuitive constructs established about microclimate (dis)comfort in a hot arid region are acknowledged. However, hidden and deeper perspectives are revealed in these shared taken-for-granted constructs about outdoor thermal comfort and local climate. In particular, this chapter explores the temporal dimension in human perception of the microclimate. It reads the climatic significance connoted for the investigated time period –the summer daytime period.

Chapter Six, **Conscious being-in the microclimate,** focuses on the knowledge gained through participants' immediate conscious experiences of the microclimate. Knowledge in this chapter examines the comfortable and uncomfortable experiences of the microclimates. This examination uncovers deeper insights into the conceptions held in mind about climate and comfort in the Egyptian context. The chapter highlights significant reflections from participants' experiences, which collectively brought the phenomenological understanding of the microclimate (dis)comfort perception. The chapter further provides an in-depth reading of the subjective perception of discomfort, which alternatively elaborates the inherent constituent for feeling comfortable, and reveals the impact of the time period of the year in which the study was conducted. The last section examines the influence of consciousness by time in shaping the human feelings of dis(comfort).

Chapters Seven and Eight combine analysis and discussion of findings. These chapters address the second research question through outlining the contribution brought by understanding human perception of the microclimate, in the design of comfortable open spaces. These two chapters focus on aspects of the spatial environment which emerged in the perception of the microclimate and comfort. Chapter Seven, **The spatial creation of the microclimate perception,** considers the contribution of the spatial differences on the microclimate perception through analysing and comparing the perceived spatial qualities in each of the four pathways in relation to perceived microclimate and level of comfort. The second section of the chapter places the findings in critical discussion with relevant experimental literature on outdoor thermal comfort and microclimate. The chapter focuses on the aspect of spatial orientation due to the emergent significance of it in influencing human perception of (dis)comfort. Further, knowledge in this chapter discusses how, in subjective terms, vegetation qualities were perceived in terms of comfort, providing a deeper phenomenological perspective for the human perception of tree canopies. Next, Chapter Eight, **Ecstasies of the water in the microclimate: The Meaning of Water in the Egyptian Mentality,** sheds light on the aspect of water with the aim of understanding how it possibly ameliorates the human perception of microclimate (dis)comfort. The chapter starts with a set of experiential reflections which audit how water was perceived in different experiences of (dis)comfort. Then, it moves to discuss the findings with relevant physical investigations regarding the impact of water in the microclimate.

The final chapter, **Concluding discussion and implication for design,** draws together all the issues raised in the study. The chapter returns to the main research questions, highlighting what was expected and what was produced by the study. It provides a collective understanding of the microclimate and comfort from a subjective perspective. It then moves to sharply formulate the contribution of knowledge in terms of design, and provides conceptual guidelines for the design of comfortable outdoors. Moreover, issues of transferability and limitations of the findings are also discussed. The last section provides an evaluation of the methodological process employed in the study, highlighting the debate around valuing subjectivity in view of the reliability and trustworthiness of knowledge in phenomenological research.

# Chapter Two

# The Approach to the Microclimate

## Phenomenological Thoughts and Questions

### A Literature Review

# Chapter 2. The Approach to the Microclimate

## Phenomenological Thoughts and Questions: A Literature Review

### 2.1 Introduction

This chapter aims to contextualize the research and establish a reference point from which to understand the human perception of the microclimate and comfort. By choosing phenomenology as the inspiring foundation of this research into the microclimate, the first part of this chapter reviews major theoretical concepts in phenomenology, reflecting on how these concepts might influence the research approach and examination of the microclimate. It discusses the notions of embodiment and sensory perception in spatial disciplines concerned with the human subjects. The second part highlights inspiring notions from the phenomenology of atmospheres, weather, and climate which capture the human relation to both spatially created and natural atmospheres. As illustrated in section 1.2, the literature review in this chapter suggested further research questions which held implications for the knowledge expected from the study of the microclimate from a subjective perspective.

### 2.2 The Multi-Sensory Perception

The historical movement of phenomenology was launched in the first half of the 20$^{th}$ century by Husserl, the founding father of phenomenology, who dedicated a large part of his work to the development of phenomenology (Sokolowski, 2000; Woodruff-Smith, 2011). Husserl criticised the Cartesian body/mind split, which limits the human senses and discards perception as an unreliable system of knowledge. Instead, he argued that human beings spontaneously perceive the environment and generate their mental worlds based on their perceptions (Lenzholzer, 2010a). Husserl's original work was supplemented by other thinkers. Most influential are Heidegger and Merleau-Ponty. Heidegger argued that life is unconsciously experienced through being in it with the bodies, mind and senses (Heidegger, 1927/1962; Woodruff-Smith, 2011). Merleau-Ponty in *The Phenomenology of Perception* elaborated on the notion of a human as a multi- sensory bodily being whose conceptions of the world is based on sensory experiences (Merleau-Ponty, 1945/2002). Following these influential theorists, sensory perception became the focus for many phenomenologists who elaborated on the subject of human multi-sensory perception.

The sensuous experience as discussed by many thinkers is, in any case, often a complex of senses working together offering a range of clues about the environment through which the body is passing (Rodaway, 2002). Some argue that it might not be easy to define how many senses we have or even to define what a sense is. Some claim there are five senses, while others say twelve (Ayres, 1983; Soesman, 1998), and still others suggest even more (Grahn and Stigsdotter, 2010). Some studies have tried to address the role played by every sense in human perception (Perkins, 1983; Soesman, 1998). However, senses are rarely used in isolation; they most often work in concert (Bundy *et al.*, 2002; Tilley and Bennett, 2008; Grahn and Stigsdotter, 2010) to mediate human experiences (Rodaway, 2002).

In spatial disciplines, Rodaway (2002) and Tilley and Bennett (2004) discussed that in environmental perception, there is a fundamental ambiguity in any study of the role of the senses. Roadway argued that the more one explores the nature of the sensuous experience, the more one becomes aware of the complex associations, substitutions, and transformations operating between the different sense organs, the human body itself, and the complex mental processes (Rodaway, 2002). Environmental perception involves the simultaneous use of the senses, and our participation in the world is in such a manner that we fail to distinguish between, the visual, audible, and olfactory etc. They impinge on us and contribute to our experience all at once (Tilley and Bennett, 2004). Tilley and Bennett (2004) argued that in landscape, sensory experience is a totality and if we describe the operations of the senses one after another, we can only convey a very impoverished account of reality. However, to truly know is to feel and perceive through all the senses (Tilley and Bennett, 2004).

### *2.2.1 The epistemological privileging of vision*

Despite advocating human sensory perception of the environment, there was an overemphasis on the sense of vision over the other senses. Descartes equated the vision with touch; however, he regarded vision as the most universal and noble of the senses and his philosophy was consequently grounded in the privileging of vision (Jay, 1993; Pallasmaa, 2005). The philosophical work of Merleau-Ponty criticized the Cartesian eye of the outside spectator, and emphasized the greater interaction of all human senses in perception (Merleau-Ponty, 1945/2002). Nevertheless, Jay (1993) claimed the presence of a visual focus in Merleau-Ponty's work. Indeed, he discussed the role of the tactile sense in place

experience, but he also thought the visual experience to be truer than the tactile one (Merleau-Ponty, 1945/2002).

In spatial disciplines, further studies on human sensory perception were developed. However, the dominance of vision and the consequent bias in cognition has been observed and criticized. In architecture, the focus on vision, as argued by Pallasmaa (2005) was problematic. It has resulted in looking at the world from an ocular-centric perception. The consequence of the negligence of the other senses has led to the creation of inhumane places. The hegemony of the eye in architecture may be a fairly recent phenomenon. Although historically philosophies have focused on the sense of sight as the noblest sense, in architecture the focus on vision did not reject the engagement of other senses. Lucien Febvre pointed out that 'the sixteenth century did not see first: it heard and smelled, it sniffed the air and caught sounds' (Pallasmaa, 2005, p. 25). However, in the modern era, visual senses were overemphasized in architectural theory and practice (Lenzholzer, 2010a). Architecture became dominated by vision only and users became mere spectators without being engaged in the environment (Pallasmaa, 2005). Many thinkers have attributed this to the technological advances, where the use of visual simulation technologies as design tools in architecture and urban design have led to the sensual detachment of the designers, and the designs became in the aim of creating memorable and attractive visual images (Pallasmaa, 2005; Sennett, 2008; Lenzholzer, 2010a). Even in social life, technological culture also separated the senses even more distinctly (Rodaway, 2002; Pallasmaa, 2005). As Pallasmaa (2005) argued, in many societies vision and hearing are now the privileged sociable senses, whereas the other senses are considered archaic sensory remnants.

Criticism on the dominance of vision appeared in the geographical and landscape disciplines as well. Several contemporary writers have criticized the interpretation that treats landscape as a primarily visual contrast (Cosgrove, 2002; Rodaway, 2002; Olwig, 2004; Macpherson, 2006; Thwaites and Simkins, 2007; Wylie, 2007; Taylor, 2008; Roe and Taylor, 2014) and that theories of landscape perception basically depend on vision (Macpherson, 2006), where the term landscape came to refer to the representation of scenery. It has been used to refer to a measurable range of material forms, to the representation of those forms in painting, texts and photos, and to seeing of a view (Rodaway, 2002). A persistent feature within the modern usage of the landscape concept is a connection with seeing and the sense of sight (Cosgrove, 2002; Rodaway, 2002; Macpherson, 2006) where the external landscape is

treated as rendered inert matter, whose sole quality is extension in three dimensions. This in turn establishes a certain distance between the –gazing –subject and the landscape (Wylie, 2007). New technologies of observation and representation, such as remote sensing and geographical information systems, have further extended the reach of the eyes and serve to reinforce a visual conception of landscape. Virtual Reality used by architects and planners allows the eye alone to traverse a landscape within a virtual space (Macpherson, 2006). The scenic concept of landscape also continues to be used in many studies of environmental perception, which focus on the scenic object to be the ultimate determinant of perception, and tend to ignore the non-visual qualities of perception (Macpherson, 2006). Cosgrove (2002) pointed out that the dominance of vision as the principle means of knowing the world devalues alternative modes of experience and cognition.

### *2.2.2 Attention to proximal senses and the position of the thermal sense*

Criticism of the hegemony of vision has advocated the introduction of other proximal senses in knowing the world. Rodaway (2002) gave equal attention to other senses rather than the focus on the visual sense as a mediator of the human experience in the environment. He refused to perceive senses as merely passive receptors and, instead, sees each as being actively engaged in the environment, pointing out that what might first appear to be a visual perception may be seen to include important auditory, olfactory and tactile components (Rodaway, 2002). In architecture, the hegemony of vision has been criticized and this has led to advocating the role of other proximal senses in perception. Nevertheless, much attention has been given to the tactile and auditory senses, in particular those other than vision. For example, Pallasmaa (2005) expressed the significance of the tactile sense for our experience and understanding of the world. He discussed how all the senses, including vision, are extensions of the tactile sense, where all the sensory experiences are modes of touching and related to tactility, '...*the very essence of the lived experience is moulded by hapticity*' (Pallasmaa, 2005, p. 10). Rasmussen organized the contents of his book *Experiencing Architecture* in relation to human senses (Rasmussen, 1964). However, using well-known buildings to exemplify, he emphasised the visual, tactile, and auditory senses more than other proximal senses. Also, Tilley and Bennett (2008) emphasized that the experience of landscape is always multisensory. Nevertheless, recent attention remained given to tactile perception in theories and research on landscape perception (Tilley, 1994; Macpherson, 2007; Wylie, 2007; Tilley and Bennett, 2008).

This raises the question of the position of the thermal sense and thermal perception. Very few studies have addressed the thermal sense as a separate sensory organ in details. *Our twelve senses* appreciates the rich tapestry of the twelve senses, rather than the usual five (Soesman, 1998), where the temperature sense was classified as one of the senses that relate the human being to the world. Perkins, in his book Sensing the World, discussed the topic of immediate thermal perception (Perkins, 1983). However, knowledge in these studies is based on complicated philosophical and scientific discussions that may not be informative or beneficial for architects and landscape designers.

The contribution of the thermal sense to multisensory experiences and the relation between senses has been studied more broadly in other fields than spatial disciplines. In products' designs, some studies have been done on the links between the thermal sense and other human senses (Fenko *et al.*, 2010; Wastiels *et al.*, 2012). These studies have examined how several aspects such as colour and surface gloss had an influence on the thermal perception of the subjects. However, in architectural studies, little attention has been paid to the position of thermal sense as one of the primal senses. It has been recognised as a sense that extends the main five senses or it has been regarded as a kind of touch. This might be due to the fact that we feel it through our skin, although scientifically several studies have shown that thermal receptors in the skin are different from receptors that react to kinetic stimuli (Parsons, 2002). A few studies in spatial discipline have discussed thermal perception in the realm of multi-sensory experience, making links between thermal sensation and other senses, principally vision. For example, in interior space design, the appearance of the environment has shown an effect on the thermal perception of people (Rohles, 2007). Also, Rasummen discussed the thermal sensation as warm or hot sensations resulting from using certain colours and materials together in indoor spaces (Rasmussen, 1964).

In an outdoor environment, Knez *et al.* (2003) presented the thought of the thermal sensation as derived from clues of other senses discussing how it can be seen, heard, or sensed. However, a few studies such as Centnerová and Boerstra (2010), and the work of Lenzholzer (Lenzholzer, 2010b; Lenzholzer and Koh, 2010), have focused on the examination of the human perception of thermal comfort in the realm of a multi-sensory experience. Also, in philosophical discussions of the sensory experiences, so far few studies have focused on human thermal perception, such as Lisa Heschong in *Thermal Delight in Architecture* in which she elaborated on the issue of thermal experience in indoor and outdoor spaces,

emphasizing multi-sensory perception and making connections with phenomenological thoughts (Heschong, 1979). Moreover, in addressing sensory experience of landscape, Tilley and Bennett (2008) pointed to the influence of the sound of weather in the experience and perception of space.

These studies have elaborated on the significance of thermal perception as integral to the human perception of space, and raise the significant questions of how the microclimate perception can be influenced by cues from other senses, and how certain scenes, sounds, or smells might be related to our perception of microclimate (dis)comfort?

### 2.3 The Concept of Embodiment

The concept of embodiment is another central concept in the phenomenological realm which provides inspiring thought in researching human perception of the microclimate. The embodiment refers to the body and its surrounding world as one entity, where the body is the main agent for perceiving and conceiving the world (Rodaway, 2002; Lenzholzer, 2010a). The body is viewed as an essential part of the sensuous experience: as a sense organ in itself including the skin, as the site of all the other sense organs and the brain, and as being our primary tool for movement and exploration of the environment (Rodaway, 2002).

In philosophical discussions, Heidegger implicitly discussed the notion of the embodied experience, emphasizing the role of the human body as the focus of the perception of a humanized world (Heidegger, 1927/1962). He elaborated how the kinetic activities of human beings create landscapes as humane space (Tilley, 1994). This basic insight of Heidegger is finding meaning in human behaviour (Molden, 2009). Merleau-Ponty (1945/2002) observed the body as a whole as a subject. He discussed how the embodied experience is an interchange of information derived from different senses, which enhance each other to form a conception of the human world (Lenzholzer, 2010a). He explicitly emphasized the role of body in human experiences, focusing on body image; our experience of our own body and its significance in our activities, which is neither in the mental realm nor mechanical physical realm. Rather, my body is in my engaged action with the things I perceive (Woodruff-Smith, 2011), which is in agreement with Heidegger's insight. Merleau-Ponty developed the concept of body-subject as an alternative to Cartesian body/mind split (Woodruff-Smith, 2011). Merleau-Ponty argues that the human body constitutes a way of relating to, perceiving, and understanding the world. It is the manner in which a subjective attitude

comes to know and express itself (Tilley, 1994). Lefebvre also elaborated on the role of the body in perceiving the world. He discussed the interaction of body and environment through the different senses of the lived body and how it produces its own space (Lefebvre, 1974). Pallasmaa (2005, p. 41) emphasized the role of body in the architectural experience in his famous quotation: 'Every touching experience of architecture is multi-sensory; qualities of space, matter and scale are measured equally by the eye, ear, nose, skin, tongue, skeleton and muscle.' Bloomer and Moore (1977) argued for the role of the body and the senses in the architectural experience, believing that the corporeal experience constitutes the basis for understanding spatial feelings in space. Gibson (1966) emphasized the role of body in place perception, where instead of the five detached senses, Gibson categorised the senses in five perceptual sensory systems that are functional and cooperative in an interaction with the environment. Each system is inclusive of both specific sense organs, the associated muscles of the body, and mental processes (Rodaway, 2002).

In landscape perception, different approaches have introduced human practices in landscapes, such as Ingold (2000), a cultural anthropologist and a key advocate of phenomenological approaches to landscape. Ingold developed an approach to landscape perception as a whole-body activity which introduces our practices in landscapes and the corporeal importance in structuring perception (Ingold, 2000; Macpherson, 2006; Wylie, 2007). Ingold's approach to perception emphasized that the human experience of the concrete land is not just composed of external information, such as those gained through sight and sound, but also of internal information such as information derived from human motion in space (Macpherson, 2006). Moreover, Tilley (1994) pointed out how different sensory impressions are gained through our motion in landscape and how these impressions influence our spatial narrative of landscape. Tilley and Bennett (2004) consider that the most important aspect in examining sensory perception is not to be simply exposed to a sensory data, but rather the embodied interaction with the world. Macpherson examined how perceptions of places and landscape exist to some extent relative to our changing bodies (Macpherson, 2006; Macpherson, 2007). Furthermore, the discussion of landscape perception in Non Representational Theory, as informed by Nigel Thrift makes a clear move from images of landscape to landscaping, working towards the ongoing shaping of self, body and landscape via practice and performance (Wylie, 2007). This theory considers that familiar and recognisable actions such as walking, looking, and cycling might be understood

as embodied acts of landscaping (Wylie, 2007). This builds up an idea of embodiment not as a constant process but as a practical and expressive involvement with other objects and people in the world (Macpherson, 2006).

These insights about the embodied multi-sensory perception have made a shift in landscape perception and developed approaches to landscape to focus away from vision. Nevertheless, the increased attention in landscape works remains limited to tactile experiences and our practices in landscape as important sensory organs and actions in place experience (Tilley, 1994; Macpherson, 2007; Wylie, 2007; Tilley and Bennett, 2008). Wylie argued that the focus given to tactile engagement was the reason behind drawing attention to issue of perception in motion (Wylie, 2007).

So far, the brief review of the literature on outdoor thermal comfort in Chapter One has shown that the examination of human behaviours in microclimate conditions focused on the amounts of people walking, activity, and adaptation relative to the microclimate conditions. However, the concept of embodiment provides a deeper phenomenological viewing of bodily behaviour, and raises the question of the examination of the corporeal engagement in perceiving the microclimate: How would our bodily behaviours be engaged in the microclimate, and how would it reflect our state of microclimate (dis)comfort?

### *2.3.1 Embodied vision: A different way of looking*

Some studies were found to have made links between thermal sensation and visual perception. For example, Klatzky et al. (1985) and Wastiels et al. (2012) explored temperature through visual contact, where the hand or other part of the skin touches or feels the surface. In researching human experience in the outdoor spaces, there is no doubt that vision is a sense of the utmost importance when visiting urban green spaces, a fact which may raise expectations of finding a visual impact in the human perception of microclimate.

Several thinkers have advocated a new way of looking in place perception. In landscape perception, Merleau-Ponty (1945/2002) elaborated on the visual qualities of objects as an important part of the experience; however, he observed vision as intertwining between the self and the landscape (Wylie, 2007). The term intertwining was used to capture the way in which self and landscape relate to each other: I see with landscape (Wylie, 2007). Merleau-Ponty's work was significant as it transforms the notion of landscape, vision, and subjectivity

and enabled a new definition of landscape. It is not anymore a scene to view, but a world to live in. In this respect, Merleau-Ponty's sense of sight is an embodied vision (Pallasmaa, 2005).

Ingold (2000) indicated that sight can be intimate and engaging. He suggested that it is not the emphasis on vision that is always at fault in landscape interpretation but rather using it as a particular way of seeing. Pallasmaa advocated that the sense of sight may incorporate and even reinforce other senses modalities (Pallasmaa, 2005). He argued how vision reveals what the touch already knows, and how the sense of touch could be thought of as the unconscious of vision 'our eyes stroke distant surfaces and edges, and the unconscious tactile sensation determines the agreeableness or unpleasantness of the experience...' (Pallasmaa, 2005, p. 42). Further, Macpherson (2006) suggested how the primacy of vision in landscape perception can be understood in historical and cultural terms. This was based on her findings that showed how the relationship between perception, the senses, and landscape is changeable and influenced by geographical, historical, and cultural aspects. These thoughts provide a deeper insight to understand the expected visual impacts in perception rather than grounding it in purely physiological terms.

### 2.4 Bohme Phenomenology of Atmosphere

Moving further in searching the human relation to the microclimate, relevant phenomenological theories which capture human relation to atmospheric feelings were found to provide inspiring perspectives. From a phenomenological perspective, in the discussion of the spatial perception, climate has never been included directly as a generator in the embodied experience of place. Since the end of the 1960s, phenomenology of atmospheres has been developed in Germany; however, it did not approach the natural climate as an atmospheric phenomenon but rather concentrated on ambiances and feelings (Knebusch, 2008). Of particular interest to this study is, Gernot Bohme, who came up with an approach of embodied experience and described it with the term atmosphere; which is the fundamental concept of his theory. Bohme's concept of atmospheres was introduced in 1995 as a basic concept of new aesthetics (Bohme, 2005; Bohme, 2008; Dalsgaard and Kortbek, 2009), and tackles atmosphere as a subject-space encounter, as a phenomenon that emerges as a relation between the embodied subject and the perceptible surrounding space (Dalsgaard and Kortbek, 2009). Bohme discussed the notion of creating an indoor atmosphere such as creating atmospheres on stage (Bohme, 2008; Dalsgaard and Kortbek,

2009). His thoughts emphasised the influence of the works of designers, architects and others on the creation of such atmospheres (Lenzholzer, 2010a). Other thinkers such as Wigley (1998) and others cited in Knebusch (2008), also contribute to discussing the notion of atmospheres. Also, Zumthor (2006) approached the atmosphere of the space as more than just thermal sensations, emphasizing the role of the subject in sensing the atmosphere of a place. Zumthor defines atmospheres as the thing that adds quality to architecture, and addresses the temperature of a space as not only a physical sensation, but also psychological *'...it is in what I see, what I feel, what I touch, even with my feet*' (Zumthor, 2006, p. 35).

Indeed, it might seem irrelevant to study the human experience and perception of the natural climate phenomenon from a perspective of an artificial generated atmosphere which focuses on the indoor atmosphere. However, knowledge in this section suggest the discussion of the human relation to the microclimate as an atmosphere. On one hand, Bohme notices the way in which we speak of atmospheres in every day speech, for example, as tense, light-hearted or serious, oppressive or uplifting, cold or warm. Zumthor identifies the temperature of space creates the atmosphere in the space (Zumthor, 2006). On the other hand, many studies found have mentioned how climate feeling or sensation corresponds to an emotional state of the subject (Heschong, 1979; Knez, 2003a; Knez, 2003b; Knez and Thorsson, 2006; Knebusch, 2008). Therefore, this suggests that the discussion of the feeling of microclimate as a feeling of an atmosphere. The following sub-sections highlight related inspiring concepts in Bohme's perspective of atmosphere.

### *2.4.1 Definition, location and subjectivity of the "Atmosphere"*

Bohme defines atmosphere as "spheres of presence." It is the manner in which we experience a place (Dalsgaard and Kortbek, 2009). He distinguishes three components in perception: the thing, the medium, and the subject. For Bohme, a key part of perception is the medium in which it occurs and he refers to this medium as *atmosphere,* sensing the presence or feeling of a certain atmosphere. He argued how the experience of an atmosphere is an embodied experience that is formed by the environment and the embodied subject with all senses, body, and mind as a continuum (Dalsgaard and Kortbek, 2009; Lenzholzer, 2010a). Atmospheres emerge from the "and" that relates environmental qualities and the subject's state and feelings (Chandler, 2011). They are created by things, people and their surroundings and they constitute the sensation of entering the space and enable a very specific experience of spatiality (Dalsgaard and Kortbek, 2009).

In continuation of Bohme's phenomenological insights of the atmosphere, the sociologist Niels Albertsen[1] further signifies the influence of the corporeal act in experiencing an atmosphere. He stresses that atmosphere is not just about the sensual experience of a space, but rather that atmospheres are constituted of a relation between the moving subject and its environmental space. This perspective reveals that mobility is crucial aspect in the experience of atmosphere (Dalsgaard and Kortbek, 2009), and gives the potential to be discussed on the outdoor environment where corporeal subjects walk within a natural atmosphere.

Seel (2004) recognized the atmosphere as something given even if no one is paying attention to it. We are surrounded by the atmosphere and sense it even if we do not know anything about it (Seel, 2004; Dalsgaard and Kortbek, 2009). Moreover, atmosphere is always perceived in subjective experience (Bohme, 2008). Nevertheless, Bohme neither locates atmospheres in the objects that exude them, nor in the subjects who sense them. However, atmospheres present as an intermediate phenomenon in-between the subject and object, and in both of them at the same time (Bohme, 2008; Dalsgaard and Kortbek, 2009; Chandler, 2011). Bohme signifies the subjective access to the atmospheric perception: '*Without the sentient subject, they are nothing'* (Bohme, 2008, p.2), emphasizing atmosphere is something entirely felt by the subject. This viewpoint reveals that in order to say what they are or to define their character, one must expose oneself to experience them.

### *2.4.2 Quasi-objectivity and inter-subjectivity of the atmosphere*

In Bohme's view, the nature of the atmospheres make them intangible, which means that they may have no secure ontological status; nevertheless, it has a character that can be recognized in the way in which it communicates a feeling to the subjects (Bohme, 2008). They do not exist as entities which remain identical over time, but can remain after a temporal interruption recognised similarly, through their character. Accordingly, Bohme argued that atmospheres are not objective, and yet they are not tangible nor something purely subjective (Bohme, 2008; Chandler, 2011).

This viewpoint gives Bohme the opportunity to argue that atmosphere is a quasi-objective phenomenon (Bohme, 2008; Chandler, 2011), although they are only accessed in subjective

[1] Reference as cited in Dalsgaared and Kortbek (2009): Albersten, N., 1999, Urbane Atmosfaerer, In Sociologi I dag nr. 4, pp.5-29

experience. He argued that atmosphere has a character that can be recognized, and thus it is possible to communicate about them inter-subjectively in our language. This notion challenges positivist thinking, as it opposes the predominant mode of scientific thinking that assumes that inter-subjectivity is grounded in objectivity and that the detection of the presence and determinateness of something is independent of subjective perception (Bohme, 2008).

Bohme supported that the quasi-objective character is emphasized in subjects' experiences of surprising or salient atmospheres (Bohme, 2008). This viewpoint elaborates that the intersubjective communication would transcend cultural differences. However, Bohme supported that the intersubjective communication is strongly attributed to the role culture plays. He argued that subjects who share similar mode of perception through similar cultural socialisation would experience and communicate about the atmosphere in the similar way.

### *2.4.3 Creating the atmosphere*

Bohme's perspective of the quasi-objective character of atmosphere argues the potentiality to approach atmosphere not only from the side of subjects, but also from the side of objects (Bohme, 2008). The atmosphere for the subject is comprehended as something intangible, felt consciously or unconsciously (Chandler, 2011), and has the tendency to induce a characteristic sensation in the subject. In addition to the significance of culture, which impacts upon the mode of perception as addressed by Bohme, the role of the senses and the whole body in the atmospheric perception is emphasized, where the combination of all of our senses is utilised when sensing atmospheres (Bohme, 2008; Chandler, 2011) .

However, Bohme's principal argument was the possibility of creating atmosphere. He argued that atmospheres could be created, as they are not purely subjective. He demonstrated that by looking to atmospheres from the side of the objects, it would be possible to gain rational access to their intangible entity (Bohme, 2008). In this notion, Bohme is most clear about the influence of space and the qualities of the environment on the multi-sensory perception (Lenzholzer, 2010a). He emphasizes how atmospheres can be designed by considering the sensory properties of the space elements of design. Atmosphere was described as a kind of sensuous emission of sound, light, heat, smell, moisture (Wigley, 1998; Wagenfeld, 2009). The work of Wigley (1998) agrees with Bohme notion as it describes atmosphere as swirling, and having intangible effects, yet it is generated by a stationary objects.

Bohme refers to the components of perception as: physiognomy, atmosphere, and feelings. These refer respectively to characteristics of spatial objects, medium and the subject. He defines physiognomy as the characteristics by which a thing reveals itself relative to sensory organs. The most important feature of physiognomy consists in its capacity to induce atmospheres in the medium of perception, and knowledge of physiognomy is established through cultural impacts which provide the ingredients for atmospheric perception.

For Bohme, the true character of creating atmosphere is making possible the appearance of a phenomenon by establishing conditions (Bohme, 2008; Dalsgaard and Kortbek, 2009). This viewpoint emphasizes the importance of creating conditions of perception under which the idea of the object appears for the subject. For Bohme, identification of objects that create atmosphere occurs not only by shaping and establishing of the geometrical space and its contents in terms of the physical determination of things, but also by the way they radiate outwards into space (Bohme, 2008; Chandler, 2011). Bohme defines this by the term 'ecstasies,' ways of stepping outside oneself, and argues that in the design of making an atmosphere, more emphasis should be drawn toward the expressive forms of things in space (Bohme, 2008). Bohme exemplifies how the pure appearance of building materials such as wood, glass, steel and marble as elements of architecture and design no longer designate materials in themselves, but expressive essence (Chandler, 2011). Chandler (2011) noted that straddling an object's concrete properties and ecstasies of sensuous presence is its physiognomy. Thus, the physiognomy and cultural signification of the object together induces atmospheres which are experienced sensuously.[2]

So far in the research examined, no relevant studies have been found which focus on the examination of the expressive essence of design elements in space and its influence on human perception of the microclimate. Nevertheless, the emergence of aspect such as level of naturalness of the space (Nikolopoulou *et al.*, 2001) as addressed in research in European counties, has shown a psychological influence on users' assessment of the microclimate comfort. Studies done in the Egyptian context have found that the existence of aspects such as shade trees and water in general, are visually appealing, adding to the quality of space and increasing the human perception of comfort (Stino, 1983; Salama, 2008; Salama, 2010). However, the idea of the physiognomy and ecstasies of objects evoked a deeper look at objects in space rather than examining only their concrete existence in space. These

[2] The terms ecstasies and physiognomies will be taken up later in the study.

concepts suggest an understanding of the expressive essences which have the potential to generate certain microclimate feelings. This raises the question of the qualities which people perceive, and which are influential for architects and landscape designers: What are the sensory properties perceived and how would the human perception of the microclimate be influenced by particular features or design qualities? And are there any thermal concepts held in users' minds about spatial relationships and qualities in the Egyptian context?

## 2.5 Phenomenology of Natural Atmosphere

Discussion of the natural atmospheric phenomena in phenomenological research has been recognized recently, and has focused on climate and weather. From a scientific standpoint, climate; in Oxford English dictionary online (2015) is defined as "The weather conditions prevailing in a given area or country over a long period." It is usually represented by the statistical summary of the meteorological conditions during a period long enough, generally 30 years, to ensure that representative values are obtained (Howard, 2013). These meteorological conditions, including temperature, precipitation, and wind, characteristically prevail in a particular region. However, weather is used to define the short term state of the atmosphere at a specific time and place with respect to variables such as temperature, moisture and wind velocity.

The phenomenology of weather was originally informed by Bohme, and was greatly influenced by his insights into atmospheres. It concentrates on natural atmospheric phenomena, trying to characterize the human sensation of climate (Knebusch, 2008), rather than scientific determination. Further, inspired by Bohme's phenomenology of weather, other researchers have tried to outline a phenomenology of larger meteorological time – climate (Knebusch, 2008; Howard, 2013), which focused on climate perception. The following sub-sections highlight inspiring philosophical thoughts from the phenomenology of weather and climate which deeply approach human relation to the natural atmospheric phenomena.

### *2.5.1 Weather as landscape: subjective relation to weather*

Knebusch (2008) discussed the human relation to the natural atmospheric sensations, reflecting on the German word "wetter," which gave rise to several interesting words that captured the subjects' relationship to weather, such as "*wetterfuhlig,*" which expresses sensitivity to weather, the verb "*witten,*" which refers to a sense or sensing of the

atmosphere, and the word "*sich witten,*" which captures the perception of something revealing itself atmospherically. These subjective expressions of human relations to weather reveal that the sensation of weather is a sensation of an atmosphere that is approached in subjective terms. Bohme describes the experience of weather as the experiencing of an atmosphere (Howard, 2013). He signifies the subjectivity of weather, pointing out that it seems impossible to conceive weather as a totality except in subjective terms. It is only as an embodied, corporeal being can we be affected by the elemental qualities of climate (Howard, 2013). This contradicts the definition of weather from a scientific point of view, which is identified by various series of meteorological parameters.

Subjectivity of weather perception is also drawn in Bohme's resemblance of weather as landscape. In his phenomenology of weather, he elaborated that landscape does not exist in nature without the subject's eye, which grasps an expanse of an arrangement or a configuration. Bohme resembled weather perception in a similar way as a perception of a certain presentation of an ensemble of natural atmospheric facts embraced and expressed by a sensitive being (Knebusch, 2008). In a similar way, Howard (2013) reflected on Bohme's description of the human perception of weather as a perception of a configuration of atmospheric vibrancies experienced by a subject. Indeed, this analogy does not only signify the subjectivity of the weather perception, but also the thought of weather perception from a subjective perspective, as a presentation of configuration of an atmospheric facts may reflect the notion of the multi-sensory perception of the weather, evoking links between thermal and visual senses.

### *2.5.2 Weather as an atmospheric medium*

In his phenomenology of weather, Bohme's insights into the location of the weather perception is as similar as his insight of atmospheric perception. The location of weather sensation is indefinite; it is in and out of the subject at the same time (Knebusch, 2008). Bohme defines our experience of weather as something from which it is impossible to extract oneself (Knebusch, 2008). He describes the weather experience as a sensation of a modification of space with blurred borders (Knebusch, 2008). On the other hand, the impact of the person's familiarity with the local climate characteristics was emphasized, where the perception of weather is noted as deeply woven by our everyday immersion in the different patterns of weather.

However, Knebusch (2008) argues that our feeling of weather is the feeling of a larger reality. He views it as a horizon, an atmospheric openness, where the experienced weather opens an atmospheric relation to the world (Knebusch, 2008). The sensation of weather colours and shapes one's perception of the world (Knebusch, 2008). This perspective of weather as a horizon acknowledges the potential influence of the human sensation of the natural atmosphere on his relationship to environment, which goes in agreement with what Heschong disclosed as '*Thermal qualities –warm, cool, humid, airy, radiant, cozy – are an important part of our experience of a space; they not only influence what we choose to do there but also how we feel about the space'* (Heschong, 1979, p. vii).

### *2.5.3 The subjective relation to climate*

Seasons as discussed in Knebusch (2008) and Howard (2013) refer to the human scale of climate perception where for people climate is usually associated with seasonal changes which occur in specific geographical place (Howard, 2013). Knebusch (2008) illuminated how climate, from a phenomenological perspective, is always sensed as weather, and that by experiencing weather through a season, there is a complex interplay of time, body and place. Human perception of weather indicates a cultural climatic relationship established progressively between the weather of a place and people who have familiarity and experience of through memory over periods of time. Experiences of weather patterns over longer periods establish a sense of orderliness character that may be implicitly seen as regular, consistent, and stable. Howard (2013) describes how the immersion in a multiplicity of specific season generates a representation of experiences of patterns, and signs which lift out affective memories. By means of seasons, a human being grasps broader articulation and a balance of metrological time. People live in the stability of knowing this experience is expected based on previous experiences and memories. They are immersed in their atmospheric weather where subtle signs and changes that occur around and might be consciously perceived are overlooked and often ignored in changing seasonal perceptions. This subjective stability of weather perception is unquestionably opposed from the scientific view of climate changeable nature. From a scientific perspective, the weather of any season often shifts and varies over a short period of time. However, from a subjective perceptive, Howard (2013) suggests it can be described as a feeling based on a gestalt that have nothing to do with time as measured on the calendar.

This thought about climate perception may relate to Bohme's insight into the quasi-objective character of the atmosphere that can be recognized and inter-subjectively communicated, with consideration for impact of culture and having a similar mode of perception in order to share similar atmospheric perceptions. Here, climate perception, built on Bohme's description of atmospheres, does not remain identical over time; nevertheless, even after a temporal interruption they can be recognised similarly, through their character. This discussion raises questions: What are the inherent constituents of this ingrained culture of local climate, which is, in the case of my study the summer season, in the Egyptian climate context? And how far does the culture about summer climate relate to humans' conscious and immediate feelings of the microclimate on a summer day*?*

## 2.6 Concluding Discussion: Developing our Thought of the Microclimate Examination

The concept of embodied multi-sensory perception provided inspiring thoughts for understanding the microclimate from a subjective perspective. On one hand, it provides a reference for the research argument to examine the microclimate perception in the realm of multi-sensory perception which might be derived from clues of other sensory organs. This fits the approach to microclimate as something beyond mere thermal sensation, which is not a question of temperature, but can be seen, heard or sensed. The discussion of phenomenology of atmosphere further deepened the thought of the microclimate perception as an embodied multi-sensory perception. This notion inspires the thought of the thermal sense in relation to other senses as the unconscious of the other sense, rather than a physical hot or cold sensation.

Furthermore, discussions of the phenomenology of atmosphere, weather, and climate provided fruitful elaboration of the human relation to atmosphere, and brought to the fore inspiring reflections as well as questions related to understanding human perception of the microclimate. Both phenomenologies shared common notions such as the location of the atmosphere as mediating human relation to space. Both emphasized the subjective access to the atmospheric phenomenon, pointing out how atmosphere is only perceived in subjective terms. Moreover, subjectivity was emphasised in defining the location of atmospheric perception, which is not only gained from the environment but created by the subject and the environment together. It is floating in-between things and the perceiving subjects, and in both of them at the same time. This emphasis on the role of the subject supports the shift that happened in researching human outdoor thermal comfort towards understanding the

human aspect in approaching the microclimate (see section 1.1.1), leading to the recognition of several psychological factors that influence the human sensation and perception of microclimate, which in turn shows that microclimate perception is far beyond sensation of a real magnitude.

A significant insight exists in Bohme's identification of atmosphere as something that does not remain identical over time, but rather is subject to temporal interruption. This identification is relevant to describe the character the natural atmosphere which also changes with time. Nevertheless, from a subjective perspective, Bohme discussed how the atmosphere has a character that is recognized and inter-subjectively communicated. This notion of inter-subjectivity sounded in the discussion of human perception of climate as a seasonal weather perception that could be inter-subjectively communicated due to the immersion in the same local climate. Of particular interest, the impact of culture was signified in the human perception of the atmosphere, being natural or artificial, which structures the mode of perception in this intersubjective communication. This shows further evidence of how feeling the atmosphere is something that is not only generated from space, but how the cultural aspects of the subject may provide the ingredients that influence this perception. This deep thought reflects ASHARE's definition of thermal comfort as 'condition of mind' (section 1.1.1). This knowledge supports the standpoint of thermal comfort perception as a perception that goes beyond physical measurement, and gives rise to a deeper examination of the larger reality which constitutes microclimate feelings.

Moreover, a principal aim of this study is to understand the spatial interpretation of the microclimate perception. This sheds light on the potential of Bohme's concept of creating atmospheres. In urban microclimate research, microclimate is conventionally discussed as a phenomenon that is featured by the given spatial qualities and relationships, which are configured by urban designers and landscape architects. This gives Bohme's notion of creating atmospheres the potential interest and relevancy to approach the microclimate feeling as a created atmospheric feeling, which can be perceived through the design of given spatial qualities and relationships. Significantly, Bohme's notion grounds atmospheres materially by identifying atmospheres as the physiognomic products of proximal things and by demonstrating atmosphere as something quasi-objective created by setting objects and conditions to create a certain atmospheric phenomenon. The notions of both physiognomy and the ecstasies of the objects in space, elaborates on making the conditions that generate

a certain atmosphere, taking into account the viewpoint of the subject, and seeks to make manifest what it represents in such a way that the observer perceives it correctly. These insights of physiognomy and ecstasies of objects direct the attention to another way of looking to the spatial relations of objects –elements of design – in space.

Interestingly, my research was primarily focused on understanding the spatial interpretation of the human perception of the microclimate, in order to explore design practices for comfortable outdoor spaces. However, discussions of the phenomenology of the natural atmosphere evoked a significant question, which is: *What are we sensing as being a microclimate? How do people really make sense of the microclimate (dis)comfort?* The answer to this question evokes concerns which would possibly shift the knowledge expected to be produced from this research to be far from or unlimited by the spatial dimension.

## 2.7 Summary

The concepts discussed in this chapter clarify the form of knowledge the study seeks to produce to understand the topic of the human perception of the microclimate. These concepts provoke a phenomenological way of thinking about natural atmospheric phenomena and the human relation to the microclimate. Moreover, knowledge in this chapter contributes to developing my thoughts as well as questioning the subjective relation to the microclimate. This raised a number of questions; nevertheless, the reliability of these subjective perspectives remains grounded in the consequences gained from the achievement of this study.

## Chapter Three

# Research Design and Methodology

# Chapter 3. Research Design and Methodology

## 3.1 Introduction

> "Being phenomenological" involves taking a quality which occurs in everyday life, honing it, stretching it, and employing it with a particular degree of determination and rigor".
>
> (Smith *et al.*, 2009, p. 189)

As discussed in Chapters One and Two, the phenomenological approach is appropriate for researching the microclimate from a subjective perspective. There are different approaches to phenomenological research, which underpin the examination of a phenomenon, and which have an impact on the methodological procedures. The approach to a phenomenological method design should be flexible and adapted to suit the phenomena under investigation (Holroyd, 2001). This chapter discusses and justifies the manner in which the research was approached and carried out. It elaborates the criteria by which the research was designed and describes the methodological tools used to collect and analyze the data.

## 3.2 Identifying the Phenomenological Attitude

### *3.2.1 The relation between the researcher and the phenomenon*

Description, reduction, essences, and intentionality are described as common characteristics of different types of phenomenological methodology (Merleau-Ponty, 1945/2002). However, Finlay (2008a), in questioning what counts as phenomenological research, signified the importance of employing a clear phenomenological attitude or a stance that is respected throughout the research. The choice of an appropriate phenomenological attitude is shaped by the nature of the phenomenon being studied and the relation between me –the researcher – and the phenomenon in order to ensure better understanding and exploration of the phenomenon (Finlay, 2008a).

In this respect, the microclimate experience is a lifeworld experience from which it is impossible to extract ourselves (Seel, 2004; Bohme, 2008). The microclimate is a given phenomenon and we are surrounded by it, sensing it even if we are not attentive to it (Seel, 2004; Dalsgaard and Kortbek, 2009). I am one such human being who is immersed, surrounded and touched everyday by the microclimate. Researching the microclimate in my home context, where I was raised and have lived my whole life, might bring forth my own

subjectivity in the research. This strongly indicates the importance of employing a phenomenological attitude that identifies my position in the whole process of understanding.

The phenomenological attitude has to be appropriately linked to the phenomenological theories and philosophies underpinning the examination of the phenomenon (Finlay, 2009). This raises the importance of establishing the epistemological bases for approaching the microclimate, in order to engage the appropriate phenomenological approach and identify the researcher's position in the research in view of her belonging to the same climate context.

#### *3.2.1.1 Reviewing epistemological philosophies in phenomenological research*

Diverse types of phenomenological methodologies are underpinned by Husserlian and Heidggerian epistemological perspectives. Husserl (1938/1980) sought to uncover the human experience as it is lived, criticizing psychology as a science that had gone wrong by attempting to apply methods of natural sciences to human issues (Laverty, 2003). Husserl's philosophy of knowing pointed to conscious awareness and intentionality through our direct grasping of the phenomenon, as the starting base in building one's knowledge of reality (Valle *et al.*, 1989; Laverty, 2003). In Husserl's view, intentionality should be accompanied by a special attitude of "reduction" which involves different levels (Finlay, 2008b), such as individual "bracketing" and suspending the natural attitude, in order to reach the phenomenon in a new and unconventional way, and to illuminate the details and seemingly inconsiderable aspects within experiences that may be taken for granted in our lives (Laverty, 2003).

Philosophers following Husserl shared common beginnings and common interests in lived experience from a perspective that grounds knowing and understanding in the lived experiences. However, disagreement appears in the way the exploration of the lived experience proceeds. Heidegger (1927/1962), for instance, emphasizes that we need to move away from looking at consciousness as a 'thing' and shift our focus onto exploring our 'Being'. From the Heideggerian standpoint, humans relate to the world in integral ways, not as subjects intended to grasp objects, but as being inseparable from a world of being (Rapport, 2007); in other words, there is an "undissolvable unity" between people and the world (Seamon, 2000). Heidegger's view described the people and the world as indissolubly

related in cultural, social and historical contexts (Laverty, 2003). This perspective views that understanding is not in the way we know the world, but rather the way we are in the world.

Heidegger's perspective claims that the human experience might be beyond conscious knowing (Rapport, 2007) and consciousness is not separate from the world but a formation of the historically lived experiences (Laverty, 2003). This perspective has impacted the way the phenomenon is approached. Heidegger, and his follower Gadamer, who extended Heidegger's philosophy to practical application, rejected Husserl's reduction of one's historicity (Finlay, 2008a). They argued that we cannot escape our historicity but rather they advocated the possibility of exploring its meaning, content and impact on understanding. Understanding, they say, depends on recognizing our pre-understanding and historicity (Finlay, 2008a). Historicity, a person's history or background, includes what a culture gives a person from birth and is handed down, presenting ways of understanding the world, and through this understanding, one determines what is 'real' from one's own view (Laverty, 2003). Our historicity implicates and penetrates any perception of the world we may have (Finlay, 2008a), as they are already with us in the world (Laverty, 2003). Gadamer defended prejudice as not only giving real thrust to our inquiry but also it is the means by which truth is established (Rapport, 2007); this is the standpoint that is seen as a critical issue that threatens the trustworthiness of phenomenological research.

Heidegger (1927/1962) saw interpretation as critical to this process of understanding meanings (Laverty, 2003; Holroyd, 2007; Rapport, 2007), where every encounter involves an interpretation influenced by an individual's background or historicity (Laverty, 2003). Interpretation for Heidegger is not an additional procedure, but instead constitutes an inevitable and basic structure of our "being-in-the world", where we experience a thing as something that has already been interpreted (Finlay, 2009). Gadamer believes that understanding occurs in interpreting (Laverty, 2003). He distinguishes between interpretation as pointing to something that suits a phenomenological description, and interpretation as pointing out the meaning by imposing an external framework (Holroyd, 2007; Finlay, 2009). Gadamer described horizon as a range of vision that includes everything seen from a particular vantage point. He discussed interpretation as a fusion of horizons where a dialectical interaction occurs between the expectation of the interpreter and the meaning of the text (Laverty, 2003; Holroyd, 2007; Rapport, 2007), and as a movement between the interpreter's past and present (Finlay, 2008a). Thus, a person with no horizon,

in Gadamer's view, does not see far enough and overvalues what is nearest at hand, whereas to have a horizon means being able to see beyond what is close at hand (Laverty, 2003; Holroyd, 2007).

Despite the ontological differences between Husserl and Heidegger, both perspectives agree that striving for rich descriptions of lived experiences is the core of a phenomenological research. They also affirm the value of practising a reduction to control the influence of our pre-understandings in order to see the phenomenon in fresh and new ways (Finlay, 2008a). Nevertheless, the Heideggerian perspective supports that the researcher should be aware of the implications of their horizon on the construction of meaning to allow the dialectical interaction with the phenomena to surprise him. This is not a formal process of bracketing as advocated by Husserl, but rather a process of surrendering through a stance of openness to what we know (Holroyd, 2007; Finlay, 2009). It is in this surrender that the individual has the potential to be transformed and see the phenomenon in new and unconventional ways (Holroyd, 2007).

## 3.3 Establishing the Understanding of the Microclimate

### *3.3.1 Placing reduction and subjectivity together*

Accepting Heidegger's perspective, I should admit that there could be a subjective influence on the interpretation of this phenomenon. As a person who is raised in the Egyptian context, my own subjectivity which involve my pre-understandings established through my every day immersion in the Egyptian climate context may have an impact on data collection and interpretation, and thus may influence the construction of the understanding the phenomenon. However, at the same time, I should be aware of researching the phenomenon with fresh eyes to enable a new and deeper understanding of the phenomenon.

When conducting research, the researcher engages other people and attempts to reflect on their lived experiences, and this adds various layers of complexity. Finlay (2009) and Finlay (2008a) discussed what should be bracketed and how reduction and subjectivity could be placed together in practice, while attaining a stance of being open to other's experiences at the same time. She questioned how much attention researchers should pay to bring their

own experience to the foreground. Some researchers recognize the concept of *reflexivity*[1]*,* where researchers need to bring a critical self-awareness of how their own subjectivity might impact on the research process and findings (Finlay, 2008a; Finlay, 2009), arguing the need to come to an awareness of the pre-existing beliefs, which then makes it possible to examine and interrogate them in the light of new evidence. Finlay (2008) and Finlay (2009) analyzed the work of several psychological writers such Dahlberg *et al.* (2008), who elaborated the nature of this process of reflexivity, showing how reduction can be intertwined with reflexivity. In this process, the researcher moves between bracketing pre-understandings and exploiting them as a source of insight. In operationalizing this attitude of understanding, the researcher strives "to simultaneously embody contradictory attitudes of being 'scientifically removed from', 'open to' and 'aware of' while also interacting with research participants during their own experiencing" (Finlay, 2008a; Finlay, 2009).

I agree with this attitude which views the permeation nature of subjectivity and reduction. This process embraces an awareness of personal assumptions and then returns to looking at participants' experiences in a fresh way. Nevertheless, in the context of engaging researcher reflexivity, the researcher faces the challenge of avoiding preoccupation with their own emotions and experience, to keep the focus on the research participant and the phenomenon in its appearance. Here, embracing the inter-subjective empathetic relationship between the researcher and the participant experiencing the researched phenomenon is suggested (Finlay, 2005; Finlay, 2008a). In this sense, such a perspective establishes the nature of understanding in this study as co-created in the embodied dialogical encounter, where what we can know arises from the inter-subjective space. Understanding is grounded by the inter-subjective relationship between the researcher and others. The phenomenological attitude does not simply entail suspending my pre-understanding, but is rather a process in which the researcher opens herself to being moved by another; she interrogates her pre-understanding and evolving understandings are managed in a relational context. This might link to Gadamer's view of the fusion of horizon. In engaging this attitude, researcher's subjectivity is valued and the focus is kept on the other's experiences through openness and inter-subjectivity as stances of reflexively sharing something with the other.

[1] Finlay (2008a): Reflection involves 'thinking about' something after the event, while the concept of reflexivity aims to capture a more immediate, dynamic self-awareness.

### *3.3.2 Description and interpretation as a continuum*

Understanding in this study is established through viewing description and interpretation as a continuum. This opposes Husserl's descriptive phenomenology which stays close to what is given to them in all its richness and complexity, claiming that interpretation is a situation of doubt, ignorance or lack of clarity (Rapport, 2007). However, interpretive phenomenology inspired by Heidegger, argues that the meaning of phenomenological description lies in interpretation (Holroyd, 2007; Finlay, 2009; Smith *et al.*, 2009). The Heideggerian perspective of interpretation values the influence of our pre-understanding in the understanding of the phenomenon. Moreover, van Manen (1990) suggests that when description is mediated by expression, including nonverbal aspects, it involves a stronger element of interpretation. This aspect is of particular interest as it establishes the nature of understanding as emerging from the description and interpretation of human bodily behaviours within the microclimate as a continuum of each other, linked to the concept of embodiment.

### *3.3.3 Seeking an inter-subjective understanding through an individual exploration*

Dahlberg *et al.* (2008) state that it should be possible to generalize research findings to be validate them to other than those involved in the concrete study. However, phenomenological research is always contextual and the results, consequently, can never be considered universal. On the other hand, Seamon (2000) and Bohme (2008) state that people in a shared cultural and linguistic community identify their experience in a consistent and shared manner, and inter-subjectively communicate. From this standpoint, and in respect of the study's design aim of concluding beneficial knowledge that would help urban designers and landscape architects in the design of comfortable open spaces, this study seeks to establish the understanding from the inter-subjective character of the microclimate perception. At the same time, the study respects the personal exploration, expression, and interpretation. This goes in line with Halling (2007) and Finlay (2009) who accepts both the particular and general by arguing that idiographic research can be general in that it may well identify general structures of experience.

## 3.4 Case Study Selection

Research into understanding microclimate perception could theoretically be carried out in a

number of parks in Egypt. In selecting the case study, criteria were set to enhance the examination of the microclimate experience. The important criterion was set to be the richness and distinctiveness of the spatial design, both of the natural and built environment, to enhance differentiation in human responses. Faced with equally, yet few, suitable alternatives, the choice of a park that is relatively popular and frequently visited by all types of people, was seen as another important aspect in order to include different perspectives in the study. These criteria led to the exclusion of many possible cases, particularly parks executed and managed by the government due to their empty and poor character (Abou El-Ela et al., 2010), and lack of services, which have led them to lose their social viability. In addition, their poor character limited their occupation to a specific sector of the population (see section 1.3).

For these reasons, Al Azhar Park was selected for the study (figure 3.1). This park is one of the largest parks in Cairo and was opened in 2004. The park was designed to act as a green lung within the old city, and was funded and constructed by the Aga Khan Trust for culture through its historic cities support programme (Stino and El-Masry, 2011). The location of the park on a higher ground level looking over the old historic city gives it a unique character. The most rewarding aspect of Al Azhar Park is that it is used and appreciated by all age groups and by families and those from all economic levels. It has succeeded in bridging the gap, by creating an outdoor space that gathers different sectors of the population (Nassar, 2011).

In terms of design, the park's vision was to develop a paradigm shift in public spaces design in Egypt (Stino and El-Masry, 2011). The design theme was derived from the contextual historical Islamic heritage of old Cairo. It offers a balance between contemporary style and an interpretation of the principles of Islamic gardens such as the prevalence of symmetrical forms, the use of water features and the commonness of shade areas. The park includes elements that are missing from most public spaces in Cairo (Salama, 2008), such as a lookout plaza, water cascade and stream, a lake, formal gardens and an amphitheatre. It is characterized by a rich concentration of variant forms of vegetation including formal palms, different forms of canopy trees, shrubs, and bushes. In addition, water plays a key role in the design (Salama, 2010), where the overall design of the park is enlivened by the succession of varied water features, including fountains bowls, ground level fountains, rills and canals. In every scene in the park, there is a liveable water feature. This richness of the environment

enhances the examination of the impact of the design features on the microclimate perception. In addition, there is a recent experimental study of Mahmoud (2011b), which investigated users' thermal comfort in Al Azhar Park. This study gives the opportunity of comparing between emergent findings of experiential and experimental approach to microclimate and comfort.


Figure 3.1: Al Azhar Park: A green lung in the historic old city
Source: Google Earth accessed in 16.01.2015

Figure 3.2: Arial view of Al Azhar Park

## 3.5 The Learning Journey

Gadamer describes our understanding of the world as more than a simple accumulation of experiences; it is a learning process, where individuals through this process undergo a radical shift in their consciousness (Holroyd, 2007). This study aims through a phenomenological exploration, to understand how people make sense of microclimate (dis)comfort in summer

in an outdoor space in the Egyptian context. This section justifies and describes in details the scenario of the two processes of learning which were employed to understand human perception of the microclimate.

### *3.5.1 Researcher surrendering in the microclimate*

The learning process started by identifying my own understanding to determine its legitimacy and to contain its influence on my new understanding. Finlay (2008a) and Laverty (2003) emphasized that researchers' subjectivity should be placed in the foreground through a process of self-reflection at the beginning of the research to give considerable thought to their own experience and to explicitly claim the ways in which their position or experience relates to the issues being researched. In this respect, I started with a reflective statement of my knowledge regarding comfort in summer time in an outdoor place.

> **Researcher's reflective statement (outlined in early 2012):** I did not conceptualize my own conception of the microclimate in the Egyptian outdoor space until I conducted this research with this methodological approach. The knowledge discussed in the introduction and literature chapters raised plenty of questions about how humans make sense of the microclimate (dis)comfort. While reading in the literature at the beginning of the research to formulate research questions and aims, the only aspect floating in my mind that I used often to exemplify certain links in approaching the experience was the importance of shade. Shade was the major concern for me for resting comfortably in an outdoor place at peak time in summer. I was aware of its significance in the Egyptian climate context as a comfortable microclimate that is sought by all. My knowledge about the importance of shade was supported scientifically by the review of research in this climate context and about the problems of Egyptian parks, where the absence or lack of shaded paths or spaces were significantly addressed. As an architect, shade was often stressed in designing responsive climate buildings where shutters and sun breakers are often sought in the design for the prevention of sun exposure. On the other hand, although I knew scientifically about the positive impact of water in the microclimate, I could not recall any ingrained moment where the impact of water manifested in the microclimate on a hot sunny day in summer, apart from the incidence which I narrated at the beginning of the introduction chapter. I knew also about the commonness of both shade and water in Islamic garden design, where these aspects are viewed as essential for creating a comfortable microclimate. These were the two main aspects I was aware of and reminded to set aside and not impose during the learning journey.

As acknowledged by Heidegger, understanding deeper perspectives of a phenomenon involves a way of being and behaving. In response to the essential role of the researcher in interpretation, the researcher needs to facilitate an intimacy with the phenomenon under investigation in all possible ways before encountering it with others (Seamon, 2000). Seamon emphasized this is an important starting point in understanding a lifeworld phenomenon. The researcher, through being at the site and having direct experience of the phenomenon, becomes immersed in the phenomenon studied through prolonged, first-hand involvement, so that they become as familiar as possible with it, assuming that they do not know the phenomenon beforehand. Several researchers started with their direct encounter with the phenomena being studied (Violich, 1985; Seamon, 1992; Clark, 2011). This first-

hand immersion enables a reliable, better interpretation and understanding of the others' experiences (Seamon, 2000).

In this respect, I conducted several repetitive visits to the case study in April 2012. During these visits, I became immersed in and surrendered myself to the experience, spending as much time as possible walking, looking, writing, sketching and recording what appeared to me regarding the experience (figure 3.3). Exploration during an immediate being-in the phenomenon was the method chosen for data gathering. This method is consistent with the essential features of phenomenological research as it allows the collection of good data while being in it rather than using a distanced description. According to van Manen (1990), it is only through a sense of immediacy that we really get to know our lifeworld, by capturing verbal and non-verbal actions. The phenomenological examination asks us to be open to the phenomenon in its stark immediacy, in an effort to see what emerges to us beyond the objective characteristics (Holroyd, 2007).

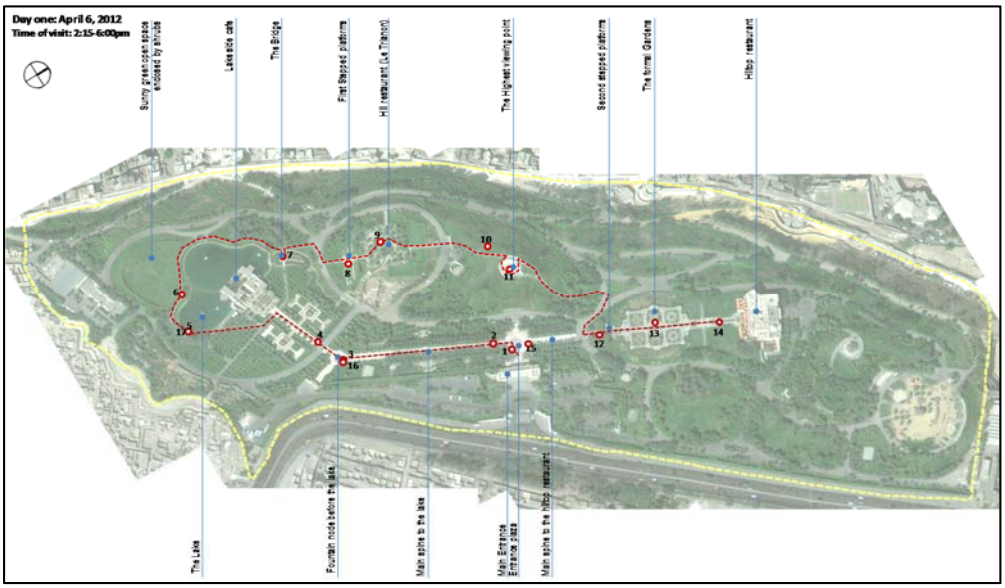



Figure 3.3: Mapping of one of the researcher's tours in the case study
The path of her tour and areas where she stopped to record her perceptions

I started a process of sensual interaction with the microclimate. In this learning process, I tried to be open to the phenomenon as much as possible, and to experience different spatial microclimates throughout different time periods. I focused on the active reflection on the experience as immediately experienced. Throughout the solo journey examination, I recorded immediate notes, and wrote notes on a map supported by photos and videos, about any gained sensation or impression, accepting anything that appeared regarding the

experience. These feelings were recorded in relation to time and space. I started to develop some ideas in my mind, which were interrogated through my continuous comparisons between feelings and impressions in relation to variation in space design and the perceived associated microclimates.

*Al Azhar Park, 21-4-2012 (1:40pm):* After walking a distance exposed to direct sun, I rested by a shade tree before the entrance of the lake side café building. I sensed a significant difference in the microclimate. I was feeling the heat of the sun during walking a distance exposed to sun, but now at this point, I feel the gentle wind breeze nicely cooling and refreshing me. …… I sat beneath the shade tree, the weather was wonderful, and the leaves blew in the passing breeze. The shape of the canopy is very natural. It was sheltering me from the sun but I can see the sky from in-between the leaves. The tree bestows a lovely area of shade, I sit comfy on the ground freely laying my legs. I sense the breeze passing. The grass is very fresh and green, the ground is moisturized, and I can feel the coolness of the ground, although it is not wet. I am interested by the shadows moving on the grass providing slots of shade and light.

*Al Azhar Park, 6-4-2012: 3:00pm:* At the fountain node: I sat on a bench in the node looking at the fountain. The sun was almost facing my right side. I found myself looking continuously to the fountain as if it is the only feature that exists in the place. I was pleased by the splashing of water on the ground and the plentifuly water flowing energetically, giving the sound of a waterfall. For me, I felt really refreshed by seeing water on the marble ground.

During this process, the appropriateness of the phenomenological attitude employed in the research was justified[2]. My historicity has been a source of some prejudice, but it also offered a platform from which to view, interact with, and feel users' experiences. These moments of embodied inter-subjectivity as described by Finlay (2002) helped me to understand more empathically their sensations and experiences. Nevertheless, I was reminded to set aside this meaning and try to look at shade from a new perspective, to allow for new understanding to emerge. It happened as Finlay (2008) described it as there was 'reduction and reflexivity as intertwining, permeating each other'.

[2] I was aware of my historicity, interrogating my pre-understanding of comfort through a kind of empathic feelings for people around. I tried to bracket my preference and knowledge about the "*importance of shade*" in summer time in the Egyptian climate context. However, I found myself in an empathetic embodied communication with the people surrounding me in the shade, appreciating their need to be in shade not only because I know it is 35°C, but also because of my contextual knowledge about Cairo summer climate and what it means to be in an outdoor space in this time period. I found myself many times reflecting on how people seem to share similar feelings as mine, through observing their behaviours and pattern of resting, listening to their chats concerning their feelings about the microclimate. My knowledge about the 'importance of shade' was interrogated in observing people trying to occupy "*any available spot of shade",* as I described it. I was also aware that I did not want to be exposed to the sun in the peak period in summer time and my feelings were justified by observing how the sunny spaces were often found unoccupied.

Figure 3.4: The researcher's historicity was reflected in her empathy with users' need for every available slot of shade

When I returned to Newcastle, I outlined a brief reflection of the experienced phenomenon, reflecting on the ideas floating in my mind. This was done to be aware of the gained knowledge and to set it aside as well as to interrogate it later during the second process of learning.

### *3.5.2 Preparing for the second process of learning*

The second process of learning included the engagement with participants, seeking to understand the others' horizons of experience to uncover deeper and richer understanding of the microclimate. My preliminary visits to the park acted as reconnoitring – or pilot visits, which were useful in the preparation for the second process of learning.

#### *3.5.2.1 Developing the method of data collection*

In the phenomenological realm, the interview as a method of data gathering is described as a vehicle for gathering rich and in-depth data (Smith *et al.*, 2009). Interviews encourage the development of a conversational relationship between the participant and researcher about exploring the meaning of the experience through in-depth discovery and intimacy, and tends to build trust with the participants by offering them a space to express their experiences in their own words (van Manen, 1990; Holroyd, 2007; Rapport, 2007).

In this respect, the initial method selected for exploring participants' experiences was based on accessing the participants on-site and conducting an interview with them. It was expected that through this interview the researcher would collect rich data experiences from participants about the microclimate. Nevertheless, I realized during my reconnoitring visits, and through having a few chats with some users, the limitation of conducting random interviews on-site for many reasons. The cultural and current political situation in Egypt has generated a sense of unwillingness and mistrust for participants to communicate freely with a 'stranger' especially when they know the desire to record the conversation. Moreover, the data which emerged from a few persons who were interviewed on-site during the pilot study

did not move beyond objective descriptions and opinions. It was a simple description of the conventional conceptions of shade and sun exposure, which was not rich enough to give fresh and new perspectives. Gathering objective descriptions contradicts the aim of the phenomenological inquiry, which needs to move to what is experienced. Accordingly, this led me to develop the method in such a way that the understanding of the phenomenon was better.

Rapport (2007) indicated how a good phenomenological research focuses on the development of method instead of limiting it to a specific method. Here, my reconnoitring visits to the case study were useful in evaluating the method and researching the development to enable a better exploration of the experience. Researching for other alternatives, I tried interviewing two persons who agreed to walk in the park with me. The prolonged intentional and immediate experiences of these persons in the variant microclimates during walking in different spaces in the park was useful, as this gave them more opportunity to be immersed in the microclimate and to compare feelings in different spaces and microclimates.

Accordingly, the interview technique was developed to be a more exploratory tour within the microclimate. This method of prolonged touring –by the participant and researcher together, as the participants expressed their sensations and impressions regarding the phenomenon, enabled good intentional engagement and immersion of the participant in the experience; consequently, there was good data collection where new and deeper understanding was disclosed. In addition, this development in the method assured the immediacy of the experience and limited the momentary sensational responses. This method has been used in a similar way in some phenomenological and ethnographic studies (Bendiner-Viani, 2005; Macpherson, 2007; Pink, 2008; Fink, 2012).

#### *3.5.2.2 Selection and access to participants*

In phenomenological research, participants are selected on the basis that they can grant access to a particular perspective on the phenomena under study. They aim to represent a perspective rather than a population (Smith *et al.*, 2009). Believing in the impact of one's historicity in understanding the microclimate perception, research into understanding local microclimate perception could be carried out with persons-in-context (Larkin *et al.*, 2006). This could be any participant who lives in the Egyptian –Cairo – climate context, as these are

the persons for whom the research question will be meaningful. The development that occurred in the method of data collection prompted the importance of pre-arrangement[3] with participants, who also had to be willing to share their experiences while touring the park for more than two hours. Participants were selected through purposive sampling. The case study is characterized by being a recreational target for a broad range of people from different economic levels and social backgrounds. The most appropriate sampling techniques to access these different sectors were found to be snowballing,[4] convenience, [5] and referral from gate keepers.[6] Despite the fact that the study is field oriented in nature and not concerned with statistical rigour, the selection of participants was focused to cover different genders and ages. Moreover, there is no right answer for the question of sample size (Todres, 2007; Smith *et al.*, 2009). Todres (2007) advised that having a large number of participants is helpful to better intuit and see essential features of the phenomena. In addition to this, it helps to collect rich material with which to communicate the sense and logic of the phenomena to others. At the same time, a small sample, allows commitment to a detailed interpretative account (Smith and Osborn, 2008). In my study, the number of potential participants was not set until fieldwork began[7]. It was established inductively, as I continued inviting more participants until I intuited the occurrence of similar experiences over and over again.

#### *3.5.2.3 The time of the study*

As this study aims to understand the microclimate perception in outdoor spaces during the summer period, it was designed to conduct the study over three months in June, July and August, as these months are meteorologically shown to be the hottest summer months (WMO, Updated on 31 Jul 2014). However to do a fieldwork in Egypt, a permit was required and this was applied for through the sponsor in Cairo, who in turn passed the application to both the National Security Agency and the Centre for Public Mobilisation and Statistics. This process consumed great deal of time and resulted in delaying the fieldwork start to late

[3] Due to cultural considerations in the Egyptian context, it is not easy to ask someone to go for a walk without being familiar, even if having the documentations to show that it is for research purposes. The participants were contacted personally to inform them about the nature of the research and the activity and then, after getting their approval, a date was set for the visit.
[4] Contacting participants who were referred by other participants.
[5] Participants were drawn from the researcher's contacts who were willing to participate.
[6] The researcher tried to access the residents of the historic city "Al Darb Al Ahmar" who are major visitors of the park, through a gate keeper from the Aga Khan Foundation.
[7] The researcher put together a preliminary list of potential contacts before going to the fieldwork. The majority were contacted during the researcher's stay in Egypt for fieldwork, and she continued to contact more potential participants when she faced refusals.

August 2012. Accordingly, the investigation was conducted over the period of late August until the end of September. However, this unexpected delay supported the subjective perspective of the study and enriched the understanding of how people make sense of the microclimate and comfort. This is explored in-depth in section (5.4.1).

The reconnoitring visits revealed that the most convenient time for conducting the study was between 12-6pm as sunset is around 6pm and direct observations showed that the park is almost unoccupied before 12 pm. The time between 12-6pm covers the period of sunshine and my own immersion in the microclimate reflected how the presence of the sun enriches the understanding of microclimate and comfort in summer. Participants visit times to the park were decided within this time interval based on their availability.

#### *3.5.2.4 Re-focusing: walking within the microclimate*

Walking, resting and lying down were the common activities observed in the park during my preliminary visits. Discussions with users and direct observations showed that shade is an inevitable need for longer and comfortable resting. However, due to the fact that the case study targets different social backgrounds (Nassar, 2011), conversations with some users during the reconnoitring visits discerned the influence of social and economic background[8] on the perception of the available shaded 'resting' spaces. For example:

> A conversation with a teenager who was walking with her friends: *the problem of Al Azhar Park is the difficulty of resting in a shaded space* (I was astonished to hear that until she added) *without paying money* (she stressed this point while saying it)… what about the shade trees in the park? *I don't like to sit beneath a shade tree on grass unless we have no other option. I prefer sitting on a shaded bench, but also the problem of sitting on a bench is the limited space, it is only enough for 3 persons. If we are a big group, it will be different. A pergola might be appropriate, but not for small groups, and we don't like to share the place with someone else.*
>
> Another conversation with a woman in her 50's walking in the park: The woman seemed to be from an upper class group and had come with her husband for relaxation. Where do you enjoy the weather in the park? *I used to visit the park, especially during Ramadan. I like sitting in the lake side café; the atmosphere is wonderful at any time. Previously, I rested at the hill restaurant.* In weather condition like now, where would you like to stay in the park? (She looked around): *if I didn't find a place in the lakeside café, I would not stay.*

[8] The definition of the social background is based on the researcher familiarity and belonging to the Egyptian context. Social background in Egyptian context is reflected on aspects such as appearance, education and residence and style of life. An important aspect that might reflect the social background is our behaviours and pattern of using the outdoor spaces.

Figure 3.5: Perception of shade availability is subject to social background

This knowledge had a significant implication on developing the research focus, as it decided to focus on examining the microclimate in the pathways during walking in the case study. Pathways are spaces for walking as well as taking short breaks. These spaces are inevitably experienced by all kinds of people who are unavoidably faced with the associated microclimate conditions, and shaded occurrences are certainly encountered. This decision of narrowing the focus was taken in respect of the design aim of the research, regardless of the user typology and in view of the time framework and the length of the study.

### *3.5.3 In field*

Seventeen participants were involved in the research. Most of the tours were conducted with one participant at a time, while a few tours were conducted with more than one participant who knew each other beforehand (Appendix 1). As advised by Smith et al. (2009), a guiding schedule was set to enable us to think about what the exploratory tour was expected to cover. To begin the process of engagement, before starting the tour I simply described the research interest and focused on the activity to be done while touring the park. The same speech regarding information about the study was provided for each participant to ensure they all received the same details. Following this, a set of questions was asked to help me to understand each participant' relationship with the park. These questions included information about previous visits, activities done in the park, time of visit, and the places preferred by the participant. Also, according to Smith et al. (2009), who recommend starting with a question which allows the participant to recount a fairly descriptive experience, the participants were asked to describe what a (un)comfortable microclimate means to them.

Such questions warmed up the participants to the conversation and increased their sense of confidence to engage successfully in the conversation. Staring the tour, the main question that was addressed to the participants was to describe in detail their experience of the microclimate during walking and resting, and this was followed up with questions depending on the conversation. I tried to raise the participants' confidence and trust by asking them to freely express their experienced microclimate and what constituted it in the way they really experienced it. I insisted on telling them that I was not looking for a correct answer but rather my interest is on their own experience as they really experience it. This issue encouraged many of them to be inattentive to what they said and to describe their experience in their own words and their own way. Particularly, these words were helpful for the participants who were less educated and of low social background to feel confident in talking to an academic person. The tour was led by the participants who were asked to decide their path (Appendix 2). During the tour, active and empathetic listening to the participant, as referred to by Rapport (2007), helped to develop the sense of trust and sustained the interaction and motivation of the participant. I was keen that the participant did not get the feeling of being the focus because they were talking all the time, and I was only listening. At the same time, I was aware of the need to remain well oriented to the topic of discussion and to avoid idle chatter.

Smith et al. (2009) elaborated that participants became more analytical when they began to feel at ease with the interview. In the research situation, participants' exploratory tours took 2.5 to 4 hours. This period of intentional immersion in the microclimate successfully enabled the gradual enrichment of participants' expressions of the phenomena, which started more with conscious awareness and objective investigation, but later on the participants became immersed in the mood of the experience and felt free to express themselves verbally and nonverbally. Participants started to compare between their feelings and impressions of the microclimate in different spaces in the park. Sometimes after the participants became immersed in different microclimate experiences, the conversation moved to generalization. At that time, I asked the participants to clarify this general assumption by examples they had experienced in the park, such as at specific place or specific instance while having the tour.

At the end of the tour, summarizing questions were helpful to strengthen the qualities of the experience for every participant. These questions included mentioning places –during the tour – where participants felt (un)comfortable by identifying the main aspects behind their

sensation. This scenario of the touring experience was a useful part of the process of understanding the participants' experiences, as it provided greater breadth or richness in the data compared with structured interviews. It allowed participants the freedom to express their experiences without being tied down to specific answers.

Different types of notes were recorded during the tour. Each participant's own words of the experience were recorded as they experienced by them. The recorder used in the study gives the option to record and save separate notes, where each note is identified by the location and time of the recording. Also, I was highly attentive to my participants while being within the microclimate, not only through active listening, but also through noticing and reflecting on their bodily interaction with the microclimate, and recording their non-verbal expressions. I recorded clarifications for specific instances during the conversation/ tour or after it, such as chosen routes, the participant's orientation and postures, unintentional actions and movements, and other non -verbal signals. These notes captured immediate insights related to the phenomenon that helped me further in the data analysis. I also used to take photographs of the participants during their experiences and noted down specific remarks on the map of the park.

Moreover, in coping with the reflexive demand of the research, I also sometimes recorded my personal and shared reflexive notes respecting the phenomenological attitude employed in the research. I attentively recorded these without disrupting the conversational dialogue, and also without the participant's attention being drawn to the recording, in order not to influence their subjectivity in all ways. Following the tour with every participant, I took general reflective notes regarding the whole participant experience and the nature of the tour. In addition, a brief sketch was drawn after every tour, illustrating the path of the participant from beginning to end, to help in orienting me later in the process of transcribing and analysing. The recorded conversation, tour sketch and all field notes of different types were compiled in a folder for every participant.

The phenomenological attitude was employed in this data gathering phase. While the participants were expressing their experiences, my contextual background enriched by my intentional pre-immersion in experience was a source of some prejudice. Being an Egyptian doing research in the Egyptian context with Egyptian participants obviously facilitated communication, empathy, and understanding by virtue of belonging to the same climate context. I was able to feel and reflect on what was beyond the participants' literal word of

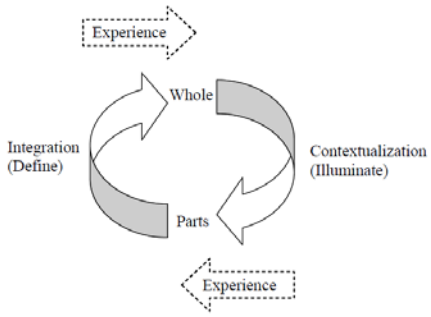
expression, where the literal description has a shared contextual meaning. Also, as discussed by Molden (2009), I used my experience and background to reflectively clarify the unintentional non- verbal behavioural actions of participants regarding the experience. These aspects offered a platform from which to view, interact, and feel the participants' feelings. It helped to understand more empathically the participants' sensation and experiences. Sometimes I used to imagine myself in the situation of the participant to interpret and reflect on his/her words.

The exploratory tour was more a conversational dialogue between the participant and I to encourage the engagement of the participant. Nevertheless, I was aware of staying neutral and unbiased in my talking so as not to influence the participants. While carefully and actively listening to the participants, I found myself many times thinking and questioning my feelings. During these moments of personal reflexivity, I was engaged in moments of inter-subjective empathetic relationship with my participant, as described by Finlay (2002), as these moments occurred more when the participants expressed the same sensations as mine. Sometimes, I recalled my sensations at specific places and interrogated them. This process of reflexive sensational empathy might reveal limits of pre-understanding that should be bracketed, but I tried to be aware of retaining these stances to limit the participants' possibility of gaining any empathetic impression or understanding that might influence them.

### 3.6 The Process of Analysis

The structure of the analytical process of every participant employed emerged inductively from the immersion in the first participant's experience with the research questions floating in mind, and this structure was developed throughout the immersion in the analysis of more participants. The analytical process reflected the notion of the Hermeneutic circle, which represents the dynamic circular movement that occurs in the process of understanding (figure 3.6). The circular process of understanding involves a movement between the parts and whole (Smith *et al.*, 2009), where the whole illuminates certain parts and integration of parts uncovers and defines the whole (Ajjawi and Higgs, 2007), as the researcher seeks to turn them into explanations of each other (Rapport, 2007). In this process, there is also a movement between interpretive projection from researcher prejudice, which makes understanding possible, and uncovering and disclosing, which provides the space for evaluation of an interpretive account (Ajjawi and Higgs, 2007).

Questioning is an essential aspect in this process, as it helps make new horizons and understandings possible (Finlay, 2008a). Rapport (2007) and Laverty (2003) emphasized the importance of a reciprocal question-answer relationship between the researcher and the text. Through this dynamic movement, the process of interpretation and understanding involves the co-construction of the data between researcher pre-understanding and the text (Laverty, 2003). Spiralling through this dynamic process continues until a moment in time where one has reached sensible meanings, free from inner contradictionsp (Laverty, 2003).




| The part | The whole |
|---|---|
| The single word | The sentence in which the word is embedded |
| The single extract | The complete text |
| The interview | The research project (questions) |
| The single episode | The complete life |

Figure 3.6: Notion of the hermeneutic circle
As described by Ajjawi and Higgs (2007) on the left, and Smith *et al.* (2009) on the right

Along with the transcription and translation of the text of every participant, and the different types of notes taken during and after the tour, the photos of the tour were all put together in their respected sequence showing the narrative of the tour. The dynamic, non-linear, style of thinking in the concept of the hermeneutic circle describes effectively how the analytical process occurred. I moved from parts to whole through re-listening to the original recording and reviewing the transcription. This process aimed to check that the translation of the text revealed the meanings the participant wanted to reveal and to get more immersed in the participant text - his own words. This deep engagement with the text led to an initial impression and unstructured ideas about the participant's sense of comfort and microclimate.

I then moved from the whole to parts, through organization of data and breaking down the original transcript. Hence, the circular process of interpretation meant any separation in the process of interpretation is artificial and only for the purpose of making the process by which data is transformed transparent to the reader. The breakdown of the data emerged from the immersion in the text, as a reflection of the research main questions which were the focus of

interest within the text[9]. This organization of data helped me to become deeply immersed in every particular situation, every sentence, trying not to interpret each situated description in insolation, but in relation to the whole text – the whole experiences lived by the particular participant. Interpretation was done in view of the participant's direct description and my projection (appendix 3). I remained open to the questions that emerge from the text and tried to find the answer in the text. Moreover, my reflective notes of the participants during the tour were beneficial in interpretation, as I was engaged in the reading of participants' notes related to postures, unintentional behaviours…etc. and interrogating these notes with participant's experiential feeling. Here, my familiarity with the text, gained from re-listening to it, helped in the interpretation not to be from my own standpoint, but also knowing more about the participant text helped the interpretation to be done from his perspective, illuminating what was not expressed directly. Understanding was developed in this stage through the identification of themes and relationships.

The analytical process then moved again from parts to the whole through mapping of the subjective interpretation of the experiences (appendix 4). In this mapping, the sequence of every participant's experiences was respected. This mapping acted as a summary of the participant's lived experiences, making it helpful to retrieve all data and keep it floating in mind. In this mapping, the experience is not structured or standardized across participants. However, the subjective personal meaning was respected by quoting "how the participant revealed or expressed it". This way of subjective mapping was helpful to move from parts to the whole, questioning the emergent understanding across the whole tour (text), tracking the relevance and occurrence of an interpretation, and making the comparison between relative experiences and perceptions emphasised through adding colours and marks to the map. Interpretation moved in a circular movement between detailed interpretation and mapping the experience until reaching a sensible understanding.

The mapping was also useful to look across all of the participants, reading inter-subjectivity of the experience and questioning personal and shared ways of expression across participants. In this way, the analytical process included a dialogue between the text and

[9]The text was preliminary broken down relative to variation in the spatial environment, as a direct response to the study's design aim. Nevertheless, this classification was not successful to understand, where in some spaces different perceptions of (dis)comfort were revealed. To better understand the experience, the text was re-broken down according to the variation in the participant's feelings of (dis)comfort where the change in feelings marked a break down – a new experience regardless of the change in space. This mode of splitting was questioned across all of the participants in order to justify its relevance to answer the research questions.

myself – the researcher. This analytical process was achieved through moving from the parts of experience, to the whole experience and back and forth, again and again, to increase the depth of engagement with and the understanding of the text.

### 3.7 Discussion of Findings

The emergent findings related to the first research question that investigate the phenomenological perspective of human perception of microclimate and comfort is analysed and discussed in chapter nine in view of the phenomenological concepts introduced in Chapter Two. However, the findings related to the spatial dimension of the microclimate perception raised specific aspects for comparison and discussion with the findings of conventional objective examination of urban microclimate and outdoor thermal comfort. This led to employing a comparative discussion, where appropriate in Chapters Seven and Eight, of the emergent findings with further relevant experimental studies on these specific aspects, which were not referred to in the introductory chapter. This comparison between the subjective and experimental approach to microclimate and comfort allowed the examination of the significance of studying the experiential and perceptual perspective of the microclimate comfort outdoors.

### 3.8 Summary

The methodology was developed through the researcher's gained experiences from fieldwork, and relevant literature on the phenomenological methodology. In this chapter, the methodological design of the research was discussed and justified according to the nature of the phenomenon under investigation. This was done by reviewing salient philosophies of knowing and understanding lifeworld experiences informed by important philosophers of phenomenology. The methodological attitude employed is inspired by Heidegger's philosophies of understanding, which signify the occurrence of understanding while being in the world, and value subjectivity and historicity in understanding. I found a voice for myself in the process of understanding by virtue of belonging to the same Egyptian climate context. The phenomenological attitude places reduction and subjectivity together, where I embodied contradictory attitudes of being 'scientifically removed from,' 'open to' and 'aware of' while also interacting with research participants in their own experience.

Al Azhar Park was chosen to be the case study, where researching the microclimate in this rich and distinct spatial environment would provide implications that would hopefully benefit the design decisions in governmental park.

Two processes of learning were employed in this study. Prolonged touring in the microclimate was chosen as the method for data gathering. My personal immersion in the experience was followed by participants' intentional immersion. Throughout the whole learning journey, the phenomenological attitude taken by the researcher and the theories underpinning it were considered.

Finally, this chapter attempts to address transparency by carefully representing the gradual convergence of insight on the part of the researcher, reviewing salient theories, describing and justifying the different phases that occurred in the design of the method, and the shifts that occurred and the detailed description of sequence of the learning process employed in the research. The sequence of work presented in this chapter was not straight forward; rather, it was a long phase of reflection on action, a phase of stepping backward for reflection, development and clarification.

## Chapter Four

# Journey within the Microclimates

Giving Voice for Making Sense

# Chapter 4. Journey within the Microclimates
# Giving Voice for Making Sense

## 4.1 Introduction

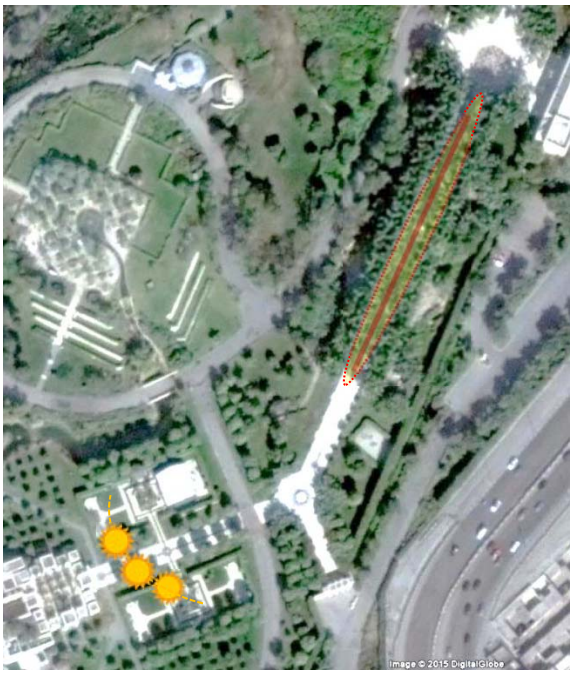
This chapter is an introductory analytical chapter that links participants' experiences of the microclimate and perceptions of comfort to the temporal and contextual circumstances. The knowledge in this chapter builds the understanding of the microclimate perception, and also seeks to familiarize and immerse the reader in the spatial context of the case study. This chapter reports the knowledge gained from the individual analysis done for every participant, where the individual notes and ideas are transformed into concise themes that capture what was found in the participants' perceptions of the microclimate.

Participants' walking tours within the microclimate of four different pathways were analysed. The behavioural and bodily acts revealed during their experiences of particular microclimate conditions are highlighted. The chapter also explores participants' preconceptions, as well as their descriptions of the experienced moment. These were read with consideration of variant indicators and circumstances, such as the surrounding spatial character, time, and the participant's position. Moreover, in order to engage the reader in participants' experiences, a reference for the microclimate condition is described by the researcher, which generally provide a description of the amount of shadow in the investigated time periods, giving insights to the reader into anticipating the microclimate conditions experienced by the participants.

## 4.2 Perception of Continuous (dis)comfort in the Microclimate

### *4.2.1 The case of the palm promenade*

The palm promenade is flanked on both sides by double rows of royal palms. It provides a distinct axial southward view of the citadel. Shade created by the palms' fronds was found along the promenade in varying amounts throughout participants' visiting hours (figures 4.1). The microclimate experienced in the palm promenade was examined through three different microclimate references, which represented three different time periods.




(1) (2) (3) (4) (5)

Figure 4.1: Looking southward: Successive microclimate references of the promenade over daytime (at participants' experienced times)

1 noon representation experienced by one participant 2 late noon representation experienced by one participant 3/4/5 Afternoon, the most commonly experienced representation, the intensity of sunny spots differs from time to time; however, shade was often significantly present along the promenade.

## A. Microclimate reference (1): The promenade is almost sunny

Direction: walking northward

Around mid-day, one participant experienced the microclimate in the palm promenade when small areas of shade were barely showing along the western edge.

Participant F5 (1:07pm)

***Participant's orientation eases feelings of discomfort:*** At the start of the tour, the participant showed her attachment and preference for the lake area, which means a walk along the opposite direction of the promenade; however she exchanged her willingness to go to the lake for another nearer destination. The scene of a consistent long sunny pathway has evoked a fear of a long period of discomfort. By choosing this side of the promenade, she was aware of being in a sunny space at a critical time period; however, her familiarity with the promenade's length was soothing because she knew it would shortly come to an end. However, the lake area was perceived as a distant destination that would require lengthy immersion in the sun during a particularly harsh daytime period. However the alternative destination, the cascade; was within a shorter walking distance. The direct exposure to sun may have been a hidden aspect, creating a perceived repulsion to the opposite promenade. Walking along the promenade towards the north, she was walking her back to the direct sun exposure: *How do you experience the microclimate now? Do you feel a difference from being at the entrance plaza? "It is sunny, but I'm not feeling too hot, I will after walking for a short time in this sunny microclimate. It will be a good place for walking after the heat recedes. Now it is too sunny to stay here,*

*and also uncomfortable for resting."* She was conscious of the harshness of the time period, and was looking for a shorter stay in the sunny microclimate. Being familiar with the park, walking was an escape to end her stay in sunny microclimate and to reach a comfortable destination. However, the indirect sunny exposure soothed the feeling of discomfort for some time, which was illuminated clearly when she changed her posture.

***Showing discomfort by changing her posture***: Walking northward, I was curious about how she anticipates walking along the opposite extension now. When she turned around, she unconsciously wore her sunglasses. "*How do you perceive it? I will walk faster to reach a destination, it is now an unavoidable passage linking areas together, but I couldn't rest on any of these benches now."* Being in this time period, the promenade was free of any sense of enjoyment. Her main focus was to walk until reaching the nearest comfortable destination, showing no consideration for resting during that time period on the promenade. Later, when the promenade was taken over by shade, she showed how she carries an immense emotion about it. The promenade for her is not just a passage, but rather an impressive atmospheric experience which conveys the spirit of the Islamic garden, the impressive axial view of the citadel, and immersion in naturalness. She revealed these aspects while walking along it and staying for some time. The immediate experienced sunny microclimate did not allow her to immerse herself fully in enjoying the atmospheric qualities of her walk.

Walking towards the northern end

Turning around and looking southward

## B. Microclimate reference (2): shade crawled to the middle of the promenade

Direction: walking southward towards the lake

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The shade traversed the promenade, moving from west to east over the course of the noontime. One participant experienced the time period, when the shadows of the palms fronds extended on the ground, permeated by small sunny spots covering the western half of the promenade, whereas direct sun could be seen along the promenade's eastern half.

Participant M9 (2:10pm)

***Inhabiting shaded ground and splitting the microclimate of the promenade***: Once we started walking along the promenade towards the lake, the participant asked to move to the shaded half to avoid the sun: "*It is more comfortable for me to avoid exposure to the sun. I feel better walking in the shaded part and avoiding the sun"*. He consciously broke down the promenade's microclimate into two microclimates where he had chosen the comfortable microclimate. He tracked the shade on the ground, and walked bounded by it, not daring to step into the sunny half.

***A shared temporal desire:*** *the* participant observed people walking along the promenade: *Look around and you will see most of the people who are walking towards the lake are walking in that shaded part to avoid direct eye contact with sun, while the others – those who had their backs to the sun – are moving more freely because they are not facing the sun. People facing the sun walk on the right side, while others in the opposite direction walk freely on the left side of the promenade. It is like traffic rules, the right is for going and left is for returning but here it is the microclimate rules that organize the movement.* He was highly interactive with the space's microclimate, and thoughtful about his act of adaptation alongside others sharing the microclimate with him. He justified his act

by emphasizing an ultimate need, a shared act for being in an Egyptian microclimate context at this significant hot time period. He has chosen the comfortable shade to avoid the discomfort of harsh sun on his eyes.

### C. Microclimate reference (3): The Domination of shade

Direction: walking southward towards the lake

Most of the participants' experiences took place when the promenade was shaded (figure 4.2). Although with varying amounts due to changing time, the shade was an obvious dominant cue in shaping the promenade's microclimate character. Palms do not completely block the sun, but rather the sun intensity permeated the shaded pathway, creating a gradient like effect from direct sun exposure to indirect sun light.

Figure 4.2: Reference of the microclimate experienced by the majority of the participants

*Enjoyment stimulated by the consistent perception of a pool of shade:* The ample shade of the promenade was appreciated by all participants in their descriptions of their experiences, directly and indirectly. The comfort bestowed by the shade was expressed as a sense of enjoyment. Showing contentment usually overshadowed and preceded the appreciation and recognition of being in shade. Participants were more engaged and interactive in the shade microclimate. Interaction with the environment and freer exploration of the spatial context reflected a comfortable being. This was observed during walking along the promenade, where the axial formal design of the promenade caught the attention of many of the participants, bringing it forward to constitute a part of their enjoyable lived moments.

M5 (4:09pm): How do you experience walking now in the promenade? *I'm really enjoying it, and interested by this axial view of the citadel.* Are you enjoying the domination of shade? *Yes, I feel comfortable in walking in sufficient and extended shade.*

F1 (3:09pm)*:* While walking the participant expressed her admiration of the axial design of the promenade with its double rows of palms and lamp post on both sides: *The impressive thing in this path is how it strengthens the view of the citadel southward by these formal rows of palms on both sides and lighting post which gives it a distinct character…* So are you enjoying your walk now? *It is a nice passage, especially being shaded by these planting arrangements.*

F4 (3:53pm): Walking along the promenade: *It is an enjoyable passage….*what about its microclimate character? *It is wonderful for being shaded. Palms play a major role as they provide shade as well as add a distinguishable visual image for the passage.*

The expression of contentment was a cue revealing their sense of comfort. The ample continuity of shaded area along the whole promenade is reflected in the free movement on the promenade without feeling restricted to inhabiting a certain area. Although the shade was intermittently permeated by gentle sunny slots, the domination of shade induced a sense of experienced cosiness by securing comfort for a considerable amount of time. The continuation of shade was not only a relief during a meaningful hot time period of harsh and pitiless sun, it also stimulated an atmospheric pleasure. The microclimate experiences of many participants are expressed in emotional responses. In this emotional relationship, walking along in consistent shade for a considerable distance and time and during a meaningful time period created a consistent mood of comfort. This consistent mood has evoked pleasure awareness of the surrounding context. Feeling comfortable has developed and stimulated a dialogue between oneself and the context, disclosing a sense of enjoyment.

M9 (3:50pm) in his second walk along the promenade in a later time period, the promenade became almost covered by shade, he was conscious of the difference in the microclimate. He noticed how the extension of shade gave the users more freedom in walking: *Well, the first gained notice was people's pattern of movements in the space. Now, I feel that people going towards the lake – walking southward – are walking more freely on the left, while people directed to the entrance walk on the right side. Now we are walking on the left side, which was unbearable earlier.*

M1 (3:45pm): the participant clearly emphasized that being shaded was the condition that allowed enjoyment of the surrounding: *Being in this shaded place encourages me to look around and spot the scenic view of the citadel. If it were sunny, I would not have stayed; and I would only need to leave.* (Adding) *We can rest here on that bench to enjoy the scene of the citadel.*

F5 (3:21pm): she had an earlier experience of the promenade when it was completely sunny*: The weather improves. It is now better than earlier, with an ample area of shade, and it is more comfortable and enjoyable to walk in now after the sun has disappeared. It is also good to rest in and enjoy the view of the citadel. I didn't dare to do so before, it was completely sunny.* Adding: *Look how it is more liveable now in the promenade… It has a distinguished character, I like the palms along both sides…it makes an impressive sound at night with the breeze. Also, the transitional points of water along the promenade create a nice background and resting areas for a break near to water, hearing and seeing water from time to time..* The promenade provides a window to enjoy the surroundings, and feeling comfortable enliven her emotions to the promenade.

*A significant essence of feeling sheltered:* Continuing to walk southward, I questioned participants' comfortable feelings, and this revealed a rooted meaning that is captured in their depictions of the perceived microclimate. For the majority of the participants, the slight interference of the sun was not perceived. However, a few went deeper, breaking down different perceptions while walking along the promenade. In particular, they referred to the sunny spots which were quietly disrupting the shade's consistency (figures 4.3). Few participants exhibited, directly or indirectly, a momentary discomfort change in their thermal sensation in these spots, which were quietly disrupting the shade's consistency, due

to sun access. Direct sun access induced conscious momentary discomfort, breaking down the shaded experience by moments of discomfort intruding upon shade comfort. Nevertheless, it was obvious that the walking along these disconnected sunny spots did not lessen the wholly shaded comfort of the promenade, where discomforting moments were shortly soothed by comforting longer intervals of feeling sheltered. This strongly supports why these spots did not appear to have much effect on the experience of the majority of the participants.

> M4 (4:07pm): *I enjoy the place here better, I feel sheltered in walking, the sun is not dominant on me, and it is slightly penetrating the promenade, but not annoying me while walking. However, if I stopped in any of these sunny slots, I would not be comfortable.*
>
> F6 (4:13pm): It was a peculiar act to find a participant has silently put on sunglasses while walking along the shaded part. At that time, the participant was walking near to the left edge, experiencing significant intervals of sunny spots permeating the shade. Feeling annoyed by the access to the sun was emphasized in her action of wearing her sunglasses; however, she did not express any upset verbally.

Figure 4.3: Representation of the sunny spots on the ground revealed different microclimate experiences

Interestingly, some described these spots on the ground as "sunlight spots" without any expression of discomfort or a thermal change in the shaded being. Rather, the visual composition of shade permeated by sunlight along the promenade was described as nicely adding to the microclimatic experience and stimulated a delightful daylight feeling. This is presumably due to the experience of filtered sun exposure or dappled sun, where descriptions of sunlight referred to ground coverage without any mention of exposure to the sun.

> M6 (3:05pm): *I'm really interested in walking along the promenade.* Are you enjoying being shaded? *Definitely, it is even better by being extensively shaded. There're a few sunny slots but the shade is dominant……. These are spots of sunlight; it is an access to the sunlight but not the sun's heat.*
>
> M2 (2:59pm): a participant who moved from the left edge to the right edge of the promenade: *here the palms are high, covering wide areas of shade, but on the opposite edge there are greater spaces of direct sun .This might be the reason for the heat there, but the domination of shade with fewer slots of light in the passage induces a sense of being in nice weather.*

Moreover, the experience of one participant (M1) who walked in the opposite direction, i.e. northward, revealed no recognition of the sun's presence in his perception of the microclimate. This shows that the perception of slight changes in shade microclimate was dictated by the orientation. Breaking down the essence of shade was only revealed when

walking southward by the possibility of direct visual contact with the sun. In changing the orientation, feeling sheltered was a consistent experience due to stimulating predominant sheltering from the sun, and preventing instants of sun confrontation.

M1 (3:45pm): walking northward, this was the only participant who experienced the shaded microclimate of the promenade during walking northward. His acts and descriptions emphasized how he experienced a pleasant shade that allowed him to spend some time enjoying the sight of the citadel. He showed no attention to the sunny intervals in his descriptions of the experience: *I like the view of the citadel from this point and how it is centred with the promenade. The palms portray the scene; they covered the unpleasant views and strengthen the positives of the place. I like being sheltered whilst freely exploring the surroundings.*

*Ample shade pattern is visually a relief:* Participants' descriptions revealed that the feeling of being comfortable went beyond a mere physiological thermal sensation. The visual perception of the shade coverage extending along the whole promenade delivered a visual message of securing a comfort mood for a considerable amount of time. Perception of comfort was strengthened by seeing a sufficient and ample area of shade during the experienced hot time period.

> M1 (3:45pm): when sitting on a bench in the promenade: What does being shaded mean for you? *Comfortable weather for resting and a visual relief in that time of the day.*
>
> M8 (3:55pm): Do you feel a difference in this shaded microclimate? *The weather is mild, I'm still feeling hot from our way to the park, but psychologically speaking, it could not be compared by feelings immersed in a sunny space. Here, I felt the promenade is cool just by seeing an ample area of shade; it induces an impression of being in comfortable weather, especially in this time period.*
>
> M9 (3:50pm): *The shade has increased more than earlier. I feel better now seeing the shade is almost covering the promenade*.

*Shade is a microclimate embracing the sensation of a gentle breeze:* The sensation of a breeze was expressed by a considerable number of participants alongside their experience of shade. In fact, the significant breezy sensation was peculiar in the promenade, as it was highly dependent on the weather conditions of the day. Throughout participants' experiences, some were lucky to experience an impressive breeze expressing a delightful addition to shade. The sensation of breeze increased, for some participants, their relish of shade. The sensation of breeze triggered a positive sensuous expression of the surrounding context, adding to the perceived shade's comfort.

> F2 (3:53pm): Enjoying a pleasant microclimate: *Look how the palms respond softly to the breeze, like a gentle tune, I feel pleased in walking in shade and sensing gentle breeze. It is a nice weather.*
>
> F4 (3:53pm): *I'm excited by hearing the sound of fronds swaying by the breeze.*
>
> M1 (3:45pm): the participant spent a long time sitting on a bench on the promenade; he was greatly engaged in the surroundings. A strongly sensed wind breeze passed by that moment: *the wind breeze now is refreshing. I feel it on my body, and can see and hear it in the palm fronds swaying by the wind. Its sound is refreshing my*

> *being.* It was really too strong, to the extent that the breeze sound was higher than the sounds existing in the space.

Nevertheless, the promenade's comfort bestowed by ample shade was capable of overshadowing the absent or insignificant breeze sensation. It was observed how many participants expressed their comfort of being shaded while paying no attention to breeze sensation. Even those few who had expected a breezy experience but did not feel it significantly were nonetheless very comforted by the shaded experience. This prevented the interpretation of the absence of a significant breeze sensation from devaluing the shaded experience at hot time periods of the day.

> F5 (3:21pm): experiencing a pleasant shade walking along the promenade: *although there is no breeze as at the lake area, the shade here is enough, I'm not feeling hot.*

A significant understanding of the perception of breeze sensation emerged from some participants who re-visited the promenade at the end of their tours, after their long immersion in different microclimates during the tour. This understanding was echoed strongly during the microclimate tour in the further questioning of the microclimates, and disclosed a breeze connotation for the shaded experiences. It uncovered the breeze as a cue of a shaded being, a cue constituted by feeling sheltered, where being shaded is a relieving status embracing the presence of a gentle breezy essence. This interpretation might enlighten the absent expression of breeze in many participants' experiences whilst expressing their comfort of shade. The breeze was an aspect gently presented in the shaded experience. It is not always captured; however, it is evoked by the sheltered relationship.

> M6: the participant did not express any sensation of breeze when he was walking in the shade of the promenade. However, at the end of his tour, he disclosed a significant description of the shaded microclimate: *It is shaded, and generally as long as we are in shade, we intuitively feel gentle breezes passing by, unlike sunny spaces, where you need an impressive breeze to neutralize your being.*

> M1 (4:11pm): It was nearer to end of the tour when the participant re-passed by the promenade. Due to getting immersed in different microclimates, the participant thought about his experience of the promenade's shade microclimate and compared it with other experienced sunny microclimates, coming up with his own interpretation: *Shade has a big influence on sensing the wind on my body. The sensation of the breeze is only captured in the shade.*

*Appreciating shade during a meaningful hot time period:* The promenade's shade was described as a welcome escape from the sun, which was a main upsetting experiential aspect. Participants spent some time immersed in the shade, and this was favoured as an optimal desired microclimate during a hot time period.

> M7 (3:07pm): emphasized how the promenade provided a different microclimate: *Although the sun is too hot now, we are walking in shade.*

> M8 (3:55pm): How do experience the microclimate? *It is shaded, and I'm extremely happy to being in it now.*

F4 (3:50pm): What about the microclimate? *It is good to be in a shaded promenade in this time period… that's the optimum need for now.*

F2 (3:53pm): Are you enjoying the promenade now? *Of course, generally, the sun is my enemy now.*

Moreover, the significance of the experienced time appeared in the perception of the direct exposure to sun, accessing from in-between the palms' fronds. This appeared in participants' descriptions, whose experiences were formed in the late afternoon, and those who experienced the ample shade of the promenade twice, yet at different time periods.

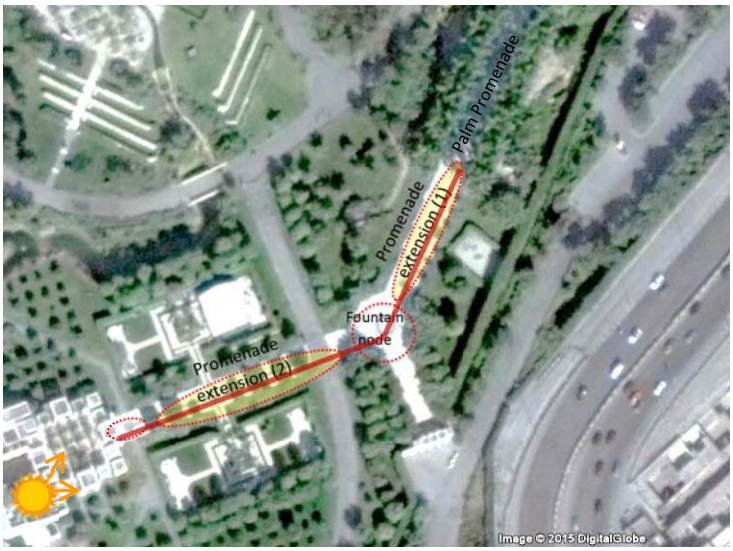
M2 (3:48pm) the participant experienced the promenade twice, when it was covered by shade, yet in two different time periods. In his second visit, he gave a different interpretation which revealed being more comfortable from earlier: *There is an enormous difference between now and earlier at 2pm. Now, I feel that, being in sunset time, the sun is almost non-existent, and I see the sun from in-between the branches but I do not feel its heat anymore, so I can rest till evening here…there aren't any sun rays in the promenade.*

F1 (5:05pm), the participant expressed a different perception from earlier, although both experiences were when the promenade was mostly covered by shade, with few sunny spots permeating it: Have you experienced a difference from our earlier visit? *Of course there is a difference now. I enjoy walking in intervals of light and shade. The sunny spots are not annoying any more when followed by shade.*

The pleasure and appreciation of being in the shade of the promenade was shown due to the significance of the experienced hot time. This shows that the perception of time was integral in seeking the shade.

### *4.2.2 The case of the promenade extensions*

The formal promenade continues beyond the palms rows, before it turns in a south-westerly direction toward the lake (figure 4.4). The first promenade extension is a linear continuation of the palm promenade. It extends towards the south beyond the palm rows. In this extension, lamp posts and marble seats are evenly spaced and uniformly arranged along its expanse. There are flat well-groomed grassy areas on both sides planted with scattered trees and small bushes. A narrow rill runs along the centre of the extension, descending gently towards the joining nodal point - the fountain. This node is circular and surrounded by a few, uniformly arranged canopied trees, and there is a scalloped bowl fountain at its centre. The second extension runs westward from the node. Here, trees are evenly spaced and uniformly planted along each side. A narrow water rill runs along the centre, tying together three water fountains. The lake café building is located at the end of extension two. A featured geometric pavilion serves as the building's entrance. The pavilion is roofed by a wooden lattice shed and has water fountains which create a discernible and distinctive approach to the building.




Extension One | The fountain node | Extension two | Lake Café Entrance

Figure 4.4: The two extensions of the promenade, the fountain node, and the lake café building

Despite the differences in the spatial design of the two extensions, the microclimates perceived in both extensions shared significant similarities. This perception of commonality and continuality in the microclimates propels closer study of the microclimate in both extensions together. Here is an extract from a participant (M9), who described the two extensions as one due to the perceived similar microclimate:

> M9 (2:39pm) described his perception of the two extensions: *I remain shaded for a distance, in a space with many sheltering palms, and suddenly the sun dominates, where few trees are planted. I feel how I'm unsheltered and lost in a deserted sunny microclimate, losing my comfortable thermal status until I reach the lake side café.*

**A. Microclimate reference (1): The promenade extensions are almost sunny**

Direction: walking southwards towards the lake

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The first extension was characterised by direct sun comprehensively and fully covering the ground. The only minor break in the sun's coverage came from the insignificant shadows cast by the lampposts. The second extension was highly similar to extension one, where the ground was also well-lit, except for barely perceptible shadows that creep slowly at the edges created by the even row of trees planted along the walkway (figure 4.5).


Extension (1) Extension (2)

Figure 4.5: Reference of the microclimate experienced by most of the participants

*Immediate reflection on a thermal shift:* Leaving the shade of the palm promenade and heading southward towards the lake area (figure 4.6), participants suddenly found themselves directly exposed to the sun. It was a shift that was consciously reflected upon by almost all of them once they were exposed to the sun. The change in the microclimate immediately induced a troublesome and unpleasant thermal feeling caused by sudden exposure to the sun. Participants clearly emphasized the significant constituent which formed that thermal shift: the sun's heat, which has a meaningful perception connoted for the hot time period.

M9 (2:36pm): *ohh!! What a heat, the shelter is removed*

M7 (3:07pm): *here the weather is too hot*

M8 (3:58pm): *now the most obvious sensation for me is the shift from shade to sunny*

F3 (4:14pm): reaching the transition, the participant suddenly wore her sun glasses and said: *The sun comes on us suddenly….*

M4 (4:09pm): *ohh!! We are leaving the shaded area behind and going to immerse in the sun.*


Figure 4.6: The shift in the microclimate experience: from shade to direct sun exposure

*Expression of harsh discomfort:* The hot feeling gained once entering extension one remained along the whole length in all the participants' experiences of the microclimate. Immersion in a sunny space during the hottest time period emphasised the sun as the overwhelmingly dominant constituent of the microclimate. The sun took on an immense emphasis in the descriptions of the microclimate experiences. It was depicted as a medium which suddenly had taken the comfort and pleasure of the palm promenade, causing a hot microclimate.

F5 (3:21pm): *The sun appeared again, all the gained good impression gained in the shade of the promenade vanishes now* (adding) *the sun is not only a source of thermal annoyance, but also it obstructs my view, I couldn't see anything in a sunny space*

F4 (3:53pm): *Off, the sun disturbs my mood, I want to walk faster to catch any shade, shade makes refreshment and enhance mood of being, it prevents feeling bore or annoyed.*

M3 (4:36pm): during walking I noticed how his facial signals have changed, seeming distressed. How do you experience this part of the promenade? *Too bad, too bad, too sunny, and no palms providing shade as previously, the sun in this part has turned me down*

The heat experienced was clear in the way that participants' actions adapted to the microclimate as they looked down towards the ground occasionally, in an attempt to reduce the exposure to the sun. Of particular note was an attitude taken by all of the participants in that there was no stopping and the walking pace quickened. Walking "*faster*" was expressed as a need to escape from the microclimate. Walking faster than normal appeared as an instinctual bodily reaction to quickly put an end to their discomfort.

F5 (3:21pm): *I only want to walk faster and look down* …(she wore her sun glasses).

M4 (4:09pm): *I need to walk faster.*

M5 (4:12pm): *I feel a difference here. In the shaded part, I could walk slowly, feeling comfy, but now I need to walk faster.*

*Contextual isolation and the hope for change:* The reaction to sun exposure generated behaviour of contextual isolation. Sun was not only a microclimatic annoyance but also a barrier to considering the surrounding context. Reflecting on the surroundings was seemingly difficult, and this was observed in the citadel's unique scene, which was totally absent and unconsidered although the extension provides a distinct and close view of it. The sun interfered with participants' abilities to enjoy themselves and their surrounds, causing a sense of place repulsion and contextual segregation.

M3 (4:36pm): *….it* - the sun - *disrupted my interaction and relationship with the space.*

M4 (4:18pm): I asked the participant how he perceives the microclimate and the space? *I couldn't focus on its details now because of the sun intensity on my face and eyes, disturbing any kind of contemplation or exploration....it is really not a good time for contemplation.*

M5 (4:14pm): How do you experience this segment, do you feel any change induced by these smaller water fountains or the water canal? *I don't know, but the problem is now I'm directly facing the sun. I'm now walking looking down, sometimes closing my eyes to avoid the sun's exposure. I don't care for the details in the surrounding, and I'm not attentive to the presence of water and can't feel any essence.* At that moment, I felt the participant expressed my feelings exactly.

The inescapability of the full and direct exposure to the sun due to the formal axial, and extensively open design, obliterated any hope of closer relief, giving no alternative to the participants except to continue walking in discomfort in order to end it. In extension two, the desire for microclimate change was emphasised in participants' actions, thoughts, and

decisions due to their perception of alternatives. The wide curved pathway just before extension two was thought of as an attractive escape by some participants in an attempt to change or reduce the direct full exposure to sun.

> M4 (4:17pm): While sitting in the fountain node, the participant thought about where to go next: *It is not good to continue walking in the promenade now...*looking and pointing to the paved path, which was also penetrated by the sun: *This paved path may be better now, as we would be walking away from the sun's radiation, but in the promenade, the sun is directly facing us.*
>
> M5 (4:12pm): Passed by the fountain node without stopping. He was hurrying to reach the lake area; suddenly, he stopped for a moment looking to both the paved path and promenade: *My only intention now is to change this direction of walking, but I think this path – the paved path - is not safe to walk along, let's continue in this way.* He was obliged to continue walking along the promenade for safety precautions.

Also, unlike in extension one, the realisation of a side pathway in at the middle of extension two leading to an apparently enclosed space - inexperienced before by many of them - attracted four participants to turn to the left to explore this enclosed space and thus escape the direct sun exposure, hoping to find a comfortable microclimate. Despite that this act was not emphasised directly as an attempt to change their microclimate experience, the common agreement on orientation to that space specifically was questionable. Participants were exploring the presence of shade at the sunken garden, emphasizing the unsuitability of the space at this hot time (figure 4.7).

Figure 4.7: Turing left to escape from the direct sun exposure

*Appreciating shade and evoking the harshness of the time period:* In extension one, the significant change in the microclimate drew participants' attention to the lack of shelter previously supplied by the palm trees, and drew out expressions of appreciation for the microclimatic role played by them in the palm promenade. This functional appreciation was evoked after its sheltering qualities had been lost. The corporeal discomfort formed by participants' orientation evoked the harshness of the sun, and the inhospitable experience of being outside exposed to sun at this particular hot time period. The perception of the sun's unforgiving and relentless heat was strongly realised, strengthening the feelings of discomfort with the microclimate and evoking the need for the comfort of shade. Comparisons between the pleasant comfort of being in the shade of the palms and the full

and direct sun exposure in extension one during the experienced hot time period were drawn. The full and direct exposure to sun immediately after a lengthy time in full shelter was depicted as two diametrically opposed microclimates. The stark psychological thermal change evoked the harshness of the hot summer season after it was forgotten in the shelter of the palm promenade. The comparisons emphasised how the sunny promenade caused the loss of the pleasure and positive spirits held within the shade.

> F1 (3:14pm): *I felt hot immediately after the palms ended. I felt how nice the weather at the palm promenade was, and now I'm experiencing a totally different one, as if we suddenly went out at the wrong time.*
>
> F6 (4:14pm): recalling a previously experienced uncomfortable microclimate: *My office was nearer to the lake area, and I used to walk along the whole length of the promenade till my working point, which was in the business lounge in the hilltop building. The problem was mainly in the hot period, I remember the peak time, when I used to walk in around 700m between two points. I really feel now the same annoying heat of the sun.*
>
> F4 (3:53pm): the experienced discomfort evoked a perception of the Egyptian sun in summer time: *Our sun is really harsh and cruel in summer time.*

The experience of extension two was quite similar to extension one. The harsh microclimate of full direct sun exposure evoked the desire for shade by retrieving a sudden value of and desire for the shaded experience of the palm promenade. Shade microclimate was described as the only condition capable of changing the feelings of discomfort in that extension of the promenade.

> M5 (4:12pm): *I would prefer now to be in shade similar to the previous experienced in palm promenade. Walking in shade enables me to reflect on the surrounding context and express my enjoyment and contemplation.*
>
> F6 (4:25pm): *I would prefer to walk along a shaded promenade as earlier; it is necessary for comfort due to the sun.*

*Emergence of a significant constituent of discomfort:* The deeper questioning of the discomfort feelings reflected a harsh bodily confrontation. Facing the sun has greatly increased the heat of the sun in the microclimate, strengthening the perception of its uncomfortable impact during the hot time period. Few gave a specific indication of the harshness gained by the direct facial exposure to the sun. This unavoidable posture of direct facial exposure to the sun is expressed as a constituent of discomfort.

> F1 (5:08pm): *I can't face the sun…*
>
> M4 (4:09pm): *The main problem in this area is the direct facial exposure of the sun on my right cheek. It is really annoying to be forced to walk in that position for some time.*

It was observed how, unlike the palm promenade, the direct facial exposure to the sun influenced the consideration that the walkway was unsuited to resting. A participant (M6)

explained clearly the harshness of the position by showing a preference to rest on a bench, for the condition that he could change his orientation to the sun.

> M6 (3:07pm): this participant was the only participant who showed tolerance to experience the sun, and I was curious to ask him if he would consider resting now: *Yeah, the most important thing is not to be directly facing it, I could adjust my posture so that the sun would face my side or back.*

Walking along the second extension, the microclimate experience similarly held the discomfort due to sun exposure. Discomfort was shown in their mood for they felt annoyed. The westward change in orientation on the promenade's axis even hardened participants' orientation to sun exposure. The sun directly facing the participants was revealed as the main source of bother.

> M9 (2:48pm): *The place here is strongly exposed to the sun…I want to leave it.* I noticed the participant's face at that moment. He was narrowing his eyes showing facial signals of distress. I asked him about the reason, he said *"I feel my face is burning, I could not bear the exposure to sun anymore".*
>
> M8 (4:01pm): *Here the most influential thing is the direct sun exposure*
>
> F2 (4:03pm) after the fountain node, I found the participant turning to walk along the paved path; however, I asked her if we could continue walking along the promenade: *Okay….you intend to let me walk in sun to interrogate my feelings and sensations.* Aren't you happy? *It is a good passage but the sun is strongly hitting my eyes….*

*Harshness of sun microclimate is dictated by a particular orientation:* It was observed how the immediate thermal shift was only sensed and reflected upon while walking in the direction leaving the palm promenade and walking southward towards the lake area. However, when walking northward in the opposite direction, no shift was recognized as there were no signs of appreciation in moving or escaping from the sun into the shade of the palm promenade.

This observation was also remarked when walking along the length of the promenade's two extensions, yet walking northward. Walking in the opposite direction and experiencing the microclimate occurred with one participant. Questioning the difference in his experience, the participant did not show any emphasis on the sun as an overwhelmingly dominant constituent of the microclimate during his experience of the sunny microclimate, rather the emphasis on the sun was absent from the description of his experience. These observations strengthen the significance of the facial exposure to the sun. This reveals walking away from the sun's radiation relieved the harsh sun impact. The change in orientation to the sun generated a walking experience in a sunny place without negative feelings and revealed an interaction with the surrounds.

*Claustrophobic feelings in the microclimate:* On both extensions the sensation of a breeze was commonly missing in all of participants' experiences. One participant (M1) was thoughtful about the breeze sensation in the shade microclimate of the palm promenade and the harsh microclimate of the promenade's extension. This comparison was brought forward due to the perception of comfort in the shade of palm promenade followed by perception of vivid discomfort of being directly facing the sun. These two extreme perceptions provoked an interpretation of breeze absence on the promenade extension.

> M1 (4:11pm): *I feel an opposite sensational relationship between feeling the heat of the sun and sensing the wind breeze. The sensation of the breeze is more captured in the shade.*

The participant interpreted that the breeze sensation was not felt due to the experience of direct sun exposure. This interpretation echoed strongly and was developed during the microclimate tour in the further examination of the microclimates.

**B. Microclimate reference (2): slight shadows breaking the sun's dominance**

Direction: walking southward towards the lake

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In a later time period, a slight shift towards the west in the sun's position caused the extension of some shadows across promenade extension one. These shadows slightly cut through the sun coverage on the ground. However, in extension two, the trees' shadows extended considerably across the ground (figure 4.8).

Extension *One*

Extension *Two*

Figure 4.8: Microclimate reference experienced by the participants of both extensions during later afternoon period

*Recollecting discomfort with a sense of ease:* In extension one, participants who experienced that part of the promenade at two different time periods, tried in their latter perception of the microclimate to respond to the perception of being in a different time period and to experience the impact of time. However, the feeling of the full open and direct sun exposure was still disturbing their thermal comfort significantly as they recalled the discomfort of the earlier microclimate.

> M2 (3:48pm): Later, while walking along the palm promenade and approaching the sunny extension: *This pleasure of shade is going to change now as we are going out to the sunny area again, but of course it won't be as harsh as our earlier experience.* Few moments later: *now we are actually in it, sure I still prefer to be in shade now, but moving from shade to sun now is not an extreme contrasting shift as earlier, the impact of sun now is not as in noon time, we are near to sunset.*
>
> M9 (3:53pm): *Now we reached the deserted zone in the path, and I still don't like this extension, it might be more tolerable than before, but still I can't stay or rest in any bench in this space.*

Similarly, in extension two the changing time period did not produce a significant change in the microclimate experience. Although the sun had slightly changed the direct facial exposure, the microclimate was still characterised largely by the description of a harsh exposure. The unkindness of the sun exposure was expressed as a source of annoyance, and screening of the sun's exposure was only achieved by walking closer to the right edge of the extension in order to feel sheltered by trees.

> M3 (4:40pm): *Now we are walking facing the sun, I think this sensation might change if we walked in the opposite direction as the sun would radiate from behind. But also time is a criterion in this sensation: it might be difficult if we were walked earlier than now.*
>
> M4 (5:27pm): Walking near the edge in the shadows of the trees: do you feel a diffrence now? *Of course, the path now is almost shaded, the sun does not exist now, I can walk comfortably now without suffering.*

Participants' perceptions revealed the aspect of time was consciously considered in the experience, as participants were aware of the declining harshness of the sun as the day went on. On both extensions, it transpired through time that the harshness and power of the sun which affected microclimate perception at the earlier hot time period was reduced in the latter experience of microclimate. The conception of time was supported by impressions gained from the visible creep of shadows covering a larger area of the ground and the reduction in the strength of reflected sunlight boosted the realisation of time. However, some participants' perceptions of the microclimate revealed conflicts between the conceived and immediately perceived sensation of heat, where the conception held about the declining harshness of the sun due to the day going on, and the actual bodily sensation of direct full sun exposure, were at odds with one another. It was observed that changing the orientation gave strength to the experience of time over that of the sensation of heat. This was revealed in the absence of harsh sun exposure in the microclimate depictions. The experiences of both participants (M4, F1) were at similar times, near to sunset. However, their different orientations impacted their perception of sun and the microclimate:

> M4 (5:20pm) walking northward: Are you still looking for special conditions for resting? *I can stay now anywhere in the park without being concerned by shade.* Thinking and adding: *the issue of looking for shade and avoiding the sun is important during the peak hot time period, but now, it is nearer to sunset time; the need now is to find spaces that are breezy such as the higher areas.* The participant's orientation strengthened his realization of time impact in the microclimate

F1 (5:10pm) walking southward: *I still feel uncovered in this space, and I can't face the sun. It seems the weather in this extension won't change till sunset time*

## C. The presence of perpetual pools of shade cut off the duration of discomfort

Tracking participants' movements along the whole length of the two extensions of the promenade, the majority of them rested a few moments at two spaces: the joining nodal point - the fountain, and at the approach to the lake cafe building. Throughout the participant's experiences of different time periods, shade was always present in these two spots. This perpetual shade coverage brought forward a change in the microclimate, which set them apart from the immersion in the harsh experienced microclimate caused by the unkindness of the sun's exposure.

The promenade's length is interrupted by a change in direction at the fountain node, a small, circular node. The first pool of shade was in the western half of the fountain node, created by the canopied trees (figure 4.9). The area of shade lengthens to cover larger areas with the changes in the sun's position. During the participants' visits, moving to the western half of the node was a common action taken by all of the participants. Some participants had more clearly pointed to the characteristics of that side, elaborating on what made the microclimate different from the rest of the node. Many of them specifically chose to rest on "any bench on the right side", describing the microclimate offered by it as being shaded. The perception of shade in this spot cut off the continuation of the discomfort experienced in the two extensions, where sheltering from the sun was an attractive microclimate in which to spend a few moments.

*3:10pm* *4:00pm* *4:10pm* *4:17pm*

Figure 4.9: An attractive shaded break: the majority of the participants inhabited the shade at the right side of the fountain node.

F3 (4:20pm): If you think of resting here, where would you stay here? *I will choose this side* (pointing to a shaded bench on the right side. adding: *The other side of the node isn't comfortable at all.*

M2 (3:07pm): If you thought of resting at the node, where would you choose to stay during that time period? *Well, I would try to find a shaded space.* Like where? *This bench on the right side, the sun will be in the rear.* Have you considered the sun when you make your choice? *Yeah, this side is shaded by the tree, effectively screening the sun's radiation. I will be really shaded by the tree. On the other side, although there is a shade tree, its shade will not cover me when I sit on the bench. This justifies being unoccupied.*

M3 (4:38pm): Where would you stay? Looking around… *I think I could rest for some time on that bench to be in shade, opposite to the sun's direction, and not facing it……* So you consider your posture to sun when looking to rest? *Yeah for sure I need to stay away from the sun's direction now….*

The second pool of shade was in front of the Lake café building (figure 4.10), at the end of extension two. During the participants' microclimatic visits, the approach to the building often provided an attractive microclimate throughout the hot time period. Shade coverage in this area changes from time to time, yet it is always apparent. This space was brought to attention due the observation of an attitude taken by the majority of the participants who had either stopped at or were slowed down by this space. Feeling sheltered by the pavilion created favour for the space as a short resting space for some of them. This spot was a break from the direct and full exposure of the sun not just once, but as a stopping point for participants on multiple occasions for those who passed by more than once during the visit. It was a decision to spend a few moments there before continuing to walk or to think about where to go afterward, however, for some it was an unconscious revealing stopping or slowing down action in shade.

Figure 4.10: The approach to the lake café building: a permanent pool of shade.

It was obvious that shade, in those two spots, was the main comfort offered, giving it the potential to be thought of for a short break. When participants inhabited the shade, they expressed the perception of a noticeable shift in the microclimate. The experienced microclimate's comfort evoked a comparison with the uncomfortable microclimate experienced on the promenade's extensions. Experiencing a comfortable microclimate was also emphasized in participants' contextual interaction and enjoyment. These two pools of shade served as windows to the space, reinstating the exploration of the environmental qualities that were inconspicuous or invisible due to direct sun exposure, which limited the interaction because of looking down towards the ground occasionally in an attempt to reduce the direct exposure to the sun (figure 4.11).

Figure 4.11: Looking northward, staying in the pool of shade and reinstating the lost perception of the environmental qualities

M9 (2:50pm) showed his interest to stay in the shade, describing the area in front of the lake café as "*a semi-shaded area with a gentle sound of ground water fountains".* His description reflected the feelings of shade comfort.

M1 (3:12pm): In front of the entrance of the lake side café, the participant stopped walking and asked me to have a break here, describing it as "*The only slot of shade in this area".*

F5 (2:17pm): walked with a quick pace, without stopping until she stopped by the entrance: *I like this space the squared shape with its shade and light character*, *the combination of materials such as wood, and brick, using natural colours, and palms, the presence of water with the blue colour, it simply reflects the Andalusian style. I enjoy the sound of water.* The presence of shade has encouraged her to stay, and release her emotions.

F3 (4:25pm): *If someone is unfamiliar with the park, this area is good for a break, a gathering point. It offers a nice microclimate that allows the person to wait someone before entering the cafe. It is also good to have a sign of the park's map here.*

M5 (4:15pm): after the lake; staying at the shaded area in front of the lake building for the second time: How do you experience this small fountain? *It has a gentle sound; however, I would prefer it bigger to be more impressive.* Looking around and adding: *I didn't notice there is a fountain placed in the middle of the promenade; I was looking downwards, only attentive to hide from the sun.*

*Clear perception of breeze sensation in shade:* The comfort of shade was associated with an emphasis on breeze sensation which was clearly revealed as part of the microclimate's comfort. The heat and claustrophobic feelings which were sensed in the promenade's extensions allowed the obvious reception of a gentle breeze once entering the pools of shade. Breeze sensations were described by some participants as an atmospheric generator that added a layer of happiness and relaxation to the shade. Moreover, depictions of the trees around the fountain, responding softly to the breeze's passage, strengthened the corporeal sensation of the breeze and evoked a sensuous contemplation in its soft leafy character.

M8 (3:59pm): how do you experience the microclimate here? *Well I appreciate being in shade and feeling breeze better and the water is supporting all these nice sensations.*

M7 (3:12pm): How could you describe your lived experience now? *It is nicely breezy, although we are still in the hot period, but here in shade it is really different, there is a breeze.*

In front of the lake building, one participant (F1) revealed a deeply rooted meaning of breeze sensation captured in her description of shade comfort. She expressed an implicit connotation for breeze when moving into the shaded spot and immediately reflecting on her perception of the microclimate as "*entering an air conditioned space*". In this depiction, the

breeze sensation is embedded in the shaded microclimate. Alternatively, this meaning strongly reflects how the direct sun experienced on the promenade aroused claustrophobic feelings and absence of breeze sensation.

*Intuition of a relationship between comfort perception and facial sheltering:* comfort with the microclimate was commonly revealed in participants' depictions and behavioural interaction. However, the perception of a sensational shift in entering the shade of the lake café building provoked one participant to precisely express it:

> M5 (4:15pm): once stopped by this area in front of the lake building: *Now, here once the sun is not direct on my face, I start to look around more freely, and be more attentive to the context.*

The participant's description disclosed a definite change gained through facial sheltering after direct and full facial exposure to sun for a considerable time where the direct confrontation with the sun experienced at the promenade ended by sheltering in this slot. The feeling of facial sheltering induced a sensational change in the microclimate experience.

## 4.3 Perception of (dis)comfort Microclimate Intervals and Intermittent Changes

### *4.3.1 The case of the pathway encircling the lake*

The southern lake is the park's main water feature. The large man-made lake has water sprays and fountains dispersed through the lake in different formations. The lake café building extends over the lake appearing to float and provides semi-outdoor resting spaces (figure 4.12). The lake area looks south and south-west towards distinctive views of the old Islamic city with its historical minarets.

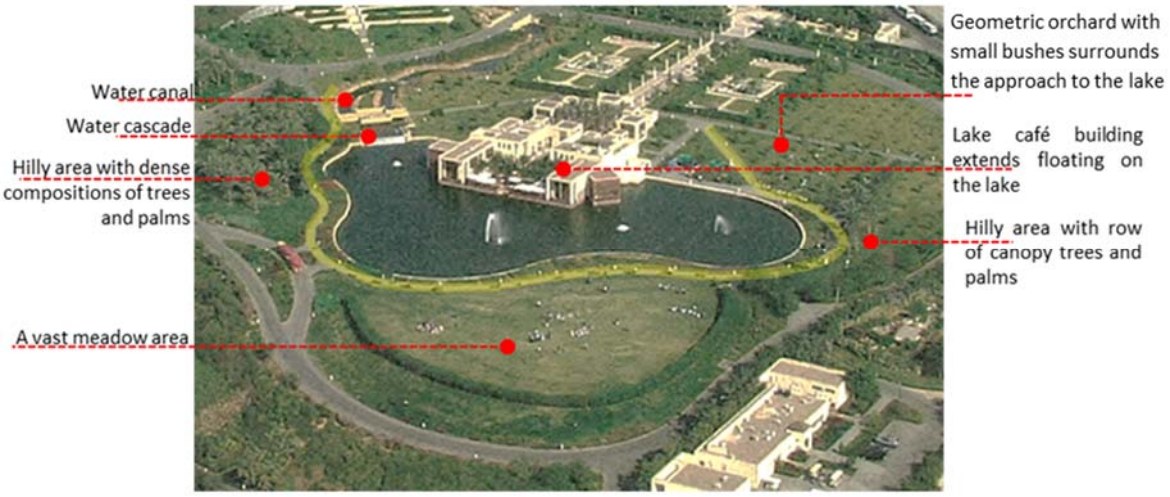


Figure 4.12: The southern lake area and the pathway encircling the lake

There is a main pathway encircling the lake, which provides two main entrances to the lake area and where seats are arranged along its length. The lake is surrounded by a variety of different planted areas. A geometric orchard with small bushes surrounds the approach to the lake. On the eastern flank of the lake, the pathway looks over a hilly, grassy area with a few palms planted along the pathway's edge (figure 4.13). The pathway's middle segment looks southward over a large open meadow (figure 4.14).

A view of the eastern approach of the lake's pathway flanked by orchard with small bushes

A View of the hilly area on the eastern edge of the lake

Figure 4.13: Eastern area of the lake

Views of the mid-pathway looking over a large meadow and in the background are the citadel and two of the famous mosques in old Islamic city of Cairo

Figure 4.14: The mid-pathway

On the opposite flank of the lake, the pathway looks over another hilly area, planted with compositions of canopy trees and palms. The arrangement of vegetation canopies this segment of the pathway. The pathway then continues with heavily canopied dense trees on its flanks and looks over a water cascade flowing into the lake. The pathway then opens up and extends out of the lake area, with recessed bushes westward and looks over a water canal running along its side. The environment at this point appears extremely naturalistic due to the dense plantings and water feature (figure 4.15).

View of water canal, water cascade and hilly area looking over the lake

Western approach of the pathway

Figure 4.15: Western area of the lake

A. **Microclimate reference (1): direct sun fully covering the ground**

Direction: walking southward and approaching the lake area from the eastern entrance

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The majority of participants visited the lake area at noon and during the early afternoon periods. The pathway during this period was characterized by direct sun fully covering the ground. The only break in the sun's coverage over the pathway came from the shadows cast by the palms and canopy trees in the western flank of the lake. Participants perceived the microclimate when walking along the pathway. The majority approached the pathway from the eastern entrance and walking along the whole expanse around the lake, towards the opposite end. On many occasions, participants stopped momentarily or rested for short period of time. Walking along the pathway during the hot time period, different changes in the microclimate perception were revealed. The analysis of the experiential changes in the microclimate perceptions uncovered the perception of different microclimates, which were revealed successively in the eastern flank of the pathway, the mid-pathway and the western flank (figure 4.16).

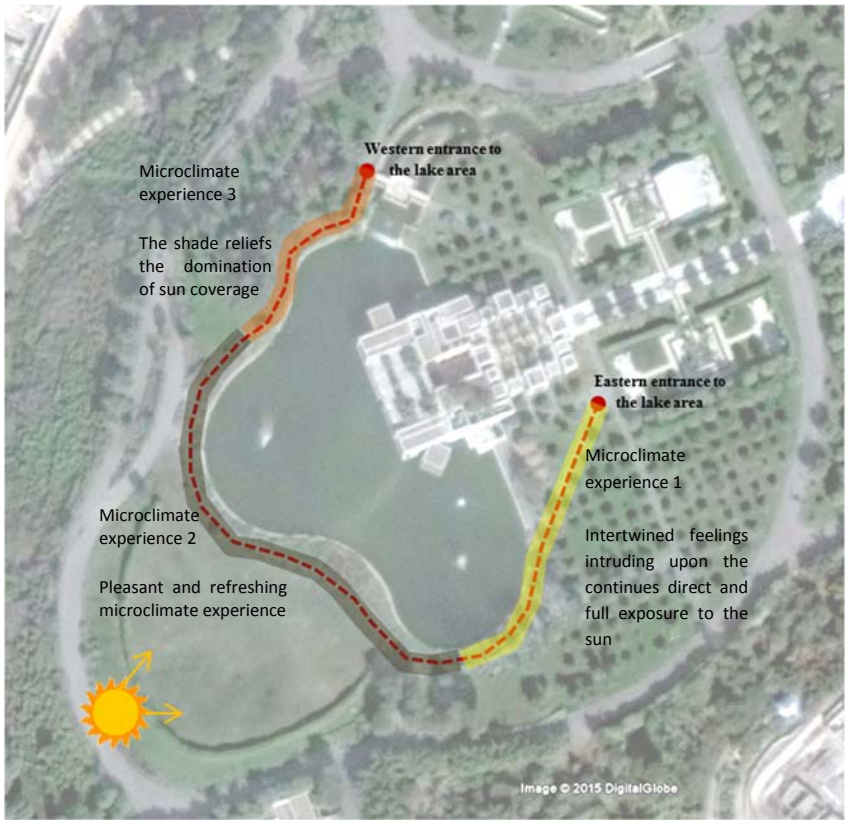


Figure 4.16: The experiential changes in the microclimate perception.

***Experience (1)***
*Intertwined emotions intruding upon the continuous direct and full exposure to the sun*

Approaching the lake area from the eastern entrance, participants experienced intertwined feelings floating between immediate corporeal sensations on one hand, and their emotions to the area, preconceptions and expectations of a cooler water space on the other hand. Participants found themselves in full direct exposure to the sun. The openness of the context and fears of discomfort rose. Participants who expected to find the cool and moist impact of water, were disappointed and revealed uncertainty in the ability to find thermal comfort when they were faced with the immediacy of spatial microclimate. At that stage, a few displayed no enjoyment about continuing to walk, preferring to delay the visit to the lake area to a later period. However, many others confronted their fears of discomfort as they were emotionally excited to walk by the lake whatever the time period.

> F2 (5:08pm): We sat on a sunny bench in the first part of the path: *the sound of the water jets is refreshing but not enough to sit comfortably now, the sun is itching my skin.*

*Expression of discomfort:* The experience of an uncomfortable microclimate was revealed and disclosed by many of the participants. Feelings of discomfort were constituted by the full and direct exposure to the sun, where the sun's harshness was emphasized in the

participants' depictions of their lived moments. The direct facial exposure to the sun in a hot time period had a strong impact on the perception of the place. For some participants, the feelings of discomfort created a negative microclimate anticipation of the whole lake area, perceiving it as an unacceptable resting place at that day time period.

> F4 (5:04pm): Did you expect to find a different microclimate in the lake area? *It should be due to being proximate to water, but obviously it still isn't a preferred place to stay in now. It is too sunny, the sun is tough and the space is totally uncovered.* (Adding) *It is too difficult now.*

Participants' feelings of discomfort were strengthened by their perception of full sun coverage. Three participants (M4, M5, M9) decided to change their direction to escape from the sunny pathway. Nevertheless, their sense of the area's distinctiveness from the other areas in the park made the majority of the participants continue to walk. It was observed that the emphasis on the feelings of discomfort was weaker when few participants observed nearby comfortable space. Spotting an escape from the microclimate prompted them to walk tolerably within uncomfortable conditions. Although they expressed immediate discomfort, it was without revealing negative perceptions about the area; rather, there was an appreciation of the area's distinctiveness. The following describes occasions which prompted to bear the feelings of discomfort:

> *Having a specific orientation to a previously experienced destination and getting nearer to it:* Two participants (F3, F6) at the beginning of their tours, described the distinctive microclimate feelings at the lake area when sitting on the grassy hills, in the shade, and enjoying the atmosphere. Coming closer to the grassy hills which look over the pathway, they walked oriented to it. During walking, discomfort was revealed in their continuous walking to the place and absence of both interaction and enjoyment. However, they didn't express the harshness of the microclimate in walking, but tolerated the uncomfortable conditions until reaching their favoured microclimate experience.
>
> *Having a strong preconception about the presence of an optimum microclimate for any time period at the lake area:* it was the case of one participant (M2) who held pleasant microclimate memories of the lake area, but from evening visits. His previous experiences of the microclimate constructed a preconception of the area as "the most comfortable zone in the park" with an impressive moist sensation of breeze. During his visit in the hot period, he was shocked by the heat and absence of breeze sensation. Nevertheless, his emotions towards the lake area and the preconception of its microclimate, led him to bear the discomfort while consciously looking for an escape. He was keen to re-live the pleasant microclimatic construct ingrained in his memory, believing in the presence of a better experience than the one immediately lived. He was only relieved when spotting a semi-shaded space at an intersection at the lake area and he walked faster to reach it.

*Contextual isolation:* Participants did not reveal any feelings of enjoyment during walking, especially those who were visiting the lake area for the first time. These participants were continuously aware of the thermal exposure despite the area's potential. Looking down was a reaction seeking to escape from the sun's direct facial exposure. This corporeal adaptation caused partial isolation of the participants from the spatial context. This was obvious as the distinct image of the citadel, visible from that location on the visual axis, was hardly noticeable to them. Contextual isolation caused many participants, who at the beginning of

the tour related feeling comfortable at the lake area by presence of shade, to fail to recognise the nearby hilly shaded areas to their left as a possible resting place. On the other hand, many of the participants, who visited the area already, behaved more interactively through their descriptions of area. They were led by their emotions and attachments to the place, recalling their spatial familiarity such as of previous memories at the lake café building. This gave the impression that the experienced microclimate challenged the immediate exploration; instead, communication relied on their spatial memory describing the places around.

*Sound of the water splashing positively intrudes at uncomfortable moments:* attention was given to water during the moments of discomfort. The strong feelings of discomfort were concurrent with being affected and charged by the arrival at a great deal of actively splashing water. The harsh exposure to the sun challenged the variant water formations to change the heat sensations. It was evident in participants' emphasis on heat that water did not physiologically reveal significant change in the microclimate sensations, as was expected by some of them. However, its presence intervened in the participants' moments of discomfort to emotionally make a positive soothing difference. Some participants within the microclimate conditions, tried to endure the discomfort, as they described the thermal recharge when reaching the water space especially after the discomfort experienced in the promenade's extension. However, the psychological recharge was short lived, as it was suppressed by the continuality of the unavoidable full and direct exposure to the sun. A desire to touch the water to relieve the heat was expressed by two participants (M8, F1). These reflections revealed that the impact of water was intuitively felt, but suppressed by the immense heat experienced. The lake was not enjoyable at those moments, as the corporeal discomfort hindered the potential delight of the water space. Two participants clearly pointed to delaying the lakeside enjoyment until after that harsh distance had passed.

> M9 (4:00pm): *Here, I am more interested by the water jets and not the lake itself. If the water surface was stagnant, I would not be happy in this hot weather. The presence of splashing, strong water and hearing the refreshing sound is increasing my feelings of comfort in this space, although I could not dare to stay for long in that place* (recognizing his direct and full exposure to the sun), *but of course it is better than walking in the earlier deserted area* (he meant the promenade's extension).
>
> M7 (3:17pm): Approaching the lake area: *I'm interested by the impressive sound of water jets and feeling relieved by coming near.* Adding *when we walk nearer to it, it really soothes the heat, especially now in this extensive sunny space, as there is no shade now.*

Deeper questioning of water qualities, which intruded on the sun's harsh exposure, revealed that in the participants' depictions the sound of water splashes was grasped and favoured. It

was audible and character defining for the space. Participants' momentary glimpses of the lake inevitably happened during the exposure to sun. However, hearing the fountains and water sprays actively splashing strengthened the impression of being in an energetic water space.

The attention of many participants to the active sound of fountains and sprays dispersed through the lake indicated that their active running was soothingly perceived within the uncomfortable microclimate more than the lake itself. Their qualities psychologically softened participants' stay in the sun during the hot time. As the splashing was audible from a distance, the impressive sound of water was an attractive quality that encouraged two participants (M1,M4) who had not visited the area before, to visit the lake area during the hot time period.

*Failure of anticipated breeze sensation:* The sensation of the breeze was a common expectation of many participants. The expectation arose either as a construction from previous visits to the area or a pre-understanding associated with water and open spaces. Nevertheless, when getting there, the sensation of breeze was not revealed in the microclimate descriptions for any of the participants. The great heat sensations caused a participant (M2), who carried a moist breezy preconception of the lake area acquired from his frequent evening visits, to question the claustrophobic sensations during the hot time period, pointing to the breeze manifestation in the swaying of the trees in front of him. He believed that there must be a breeze. However, the sensation of heat and the failure to sense the breeze impressively on his body as usual increased the extreme sensation, causing him to feel claustrophobic "*we are nearer to the lake, but it is sunny and there is almost no breeze sensed*".

*Movements ease microclimate's claustrophobia:* Continuous and non-stop walking was a common action taken by the majority of the participants. Participants' passage by the water feature, without stopping, was unexpected, as the lake was a target destination for many of them. There were no occurrences of stopping momentarily to view the lake, even for those who held strong emotional attachments to the place. The sound of water splashing held the participants' impression of water, without them stopping to gaze at it.

One participant (M2) emphasized a deeper interpretation of his corporeal movements. He questioned the activity by staying and walking within the harsh microclimate. The participant

compared between staying in rest and walking within the microclimate, describing walking as a great relieving act and depicting it as a corporeal activity, which psychologically attempted to change claustrophobic feelings in the microclimate:

> M2 (3:33pm): *Walking is greatly different from sitting in a sunny space. He was in a direct exposure to the sun at this moment*. Adding: *In walking; I slightly feel the breeze unlike when I sit still, I don't sense any breeze at all when I sit.*

Incidences of three other participants who chose to sit on a sunny bench in that segment strongly signified the impact of the corporeal movements:

> Three participants (F4, F2, and M8) thought of resting on a seat in an attempt to change the direct facial exposure to the sun, and to experience the aura of the water space better. Although it was on different days, the three participants' choice of seating was on the same seat. They were possibly affected by the presence of a broad canopy tree close to the seat or by the presence of some shadows covering it. They sat oriented towards the lakeside. Being seated in that posture, shadows covered some of them; however, their bodies and faces were still largely exposed to sun laterally. Discomfort was reflected in their emphasis on the harsh "over heat", that suppressed the reception of any of the water qualities. Two of them (F4, F2) could not bear to sit for more than a few moments. The third participant (M8) shifted his posture, so as to be opposite to the sun's radiation. Although the posture lost him his orientation to the place, he was more comfortable while also being consciously aware of the fact that he was is exposed to the sun. He remarked on the breeze sensation and showed an immense appreciation for the active presence of water sprays in the sunny microclimate.

The corporeal movement during the harsh exposure to the sun was an unconscious reaction in response to the microclimate experienced, in an attempt to escape from the harsh microclimate. The continuous walking of the participants was an attempt not only to address the immediate heat, but also their claustrophobic feelings. This interpretation showed that walking had an impact as important as the sound of water in psychologically easing the moments of full and direct exposure to the sun at a hot time period.

*Changing the orientation created a better perception of the microclimate:* The experience of one participant (M1), who approached the lake area from the western entrance, reflected a better microclimate when approaching the eastern segment walking opposite to the sun's radiation. His behaviour reflected how he was able to explore the surroundings freely, describing the potential of the hilly shaded spaces looking over the lake. He walked forgetting his sun exposure and the difficulty of the time period, until he turned toward the lake to gaze over the area. He was confronted by the sun's harsh exposure and preferred to continue walking.

***Experience (2)***
*Pleasant and Refreshing Microclimate Experience*

*Perception of the mist created a thermal shift* Nearer to the mid-pathway, a significant change occurred in the microclimate perception. Walking along the pathway, feeling hot and uncomfortable in the direct sunny exposure, participants suddenly felt the mist on their faces. It was from the water sprays dispersed through the lake. The moment of feeling the water mist reflected an unexpected pleasure. It was a conscious moment which reflected an impressive change in the microclimate as it brought pleasure and refreshment in relieving the thermal discomfort.

> M9 (3:59pm): Walking around the lake, the participant was so pleased when he felt the water drizzles splashing on his face and immediately commented on this moment: *I am impressed by the water drizzles on my face. It really makes me feel refreshed.* He chose to sit on a bench in this zone, where he could feel more water drizzles on his face.
>
> F5 (2:32pm): Suddenly, while sitting, we felt the water drizzles on our face. The participant immediately commented: *Wow, it is fantastic. This is the best place to rest in in this time of the day. The drizzles with the breeze and landscape, it is really an interesting natural combination. The moments of sensing the water drizzles are extremely interesting and make me feel cooler.*
>
> M6 (3:20pm): *Here it is breezy, and the breeze passes by the water inducing a nice smell and drizzles. Adding I enjoy these drizzles so much.*
>
> F2 (4:09pm): While walking near the middle of the path: Suddenly: *Look how the water drizzles have changed my mood, it is highly refreshing…this weather lifts up my mood.* We spent some time sitting on a bench: Is there a difference now in your experience of microclimate at that place? *Yeah, there is a difference sensed, better from earlier moments. I'm more comfortable with the drizzles' refreshment. It pleases and awakens me.*
>
> F4 (4:12pm): Sensing the drizzles on her face during her full exposure to the sun*: this splash of water soothed the heat somehow….*
>
> M7 (3:20pm): *The drizzles are very refreshing in this area. I feel myself at the coast feeling the drizzles of sea waves.*
>
> F7 (4:50pm): *When the drizzles touch me, I feel cooler and refreshed*

*Pleasure of the microclimate:* Feeling the mist on their faces initiated the conditions for perceiving a different microclimate. The mist prompted the participants to stop walking and adjust their posture to face the water fountains, in order to receive the mist better. Impacted by these refreshing sensations, many participants showed interest in spending additional time on the nearest seat. By sitting on the pathway seat, participants were now oriented away from the sun's radiation. During the time spent in the mid-pathway, all the participants revealed pleasant microclimate perceptions. The microclimate was described by the vital refreshing presence of different water formations and the strong continuous breeze sensation. The sensation of the vibrant microclimate reinforced their preconception for water spaces.

M9 (4:14pm): What are the aspects which influence your microclimate experience now? *Being in a large water space gives a good impression, especially the water jets with its sound and droplets from time to time touching my face, I sat on this bench to feel it again on my face. Also seeing the active flow of water running in the cascade is impressive, in addition to the non-stop breeze sensation.*

F5 (2:30pm): We sat on a bench in the mid-pathway near to one of the water jets *This place is distinct for the presence of different forms of water, which persuasively constitute the spirit of the space; the lake, the cascade and fountains with different forms of flows. It is very interesting.* Do you need to see the water when sitting? *Well, sometimes I'm a bit upset by these high dense shrubs, as they isolate me from seeing the water when I sit, especially if the water jets are not working. Seeing the water splashing everywhere is the main privilege of being in this place. The presence of water makes a difference to everything. It adds liveability to anything, as God says: "We made from water every living thing*. What is the most influential aspect in your microclimate experience of the lake area? *I love the lake, especially the sound of the water and the natural spirit of the place. Both staying here and in the shade over there are good for resting during this time period; however, I would prefer to sit here in the sunny microclimate to feel the drizzles than to sit beneath a shade tree there. Water drizzles are very impressive and sought after in this hot time.*

M4 (4:42pm): *Here the water with different flows is highly refreshing in the atmosphere; water disturbs the attention to anything else in the space other than it.*

M7 (3:25pm): Would you enjoy the lake if there weren't any water jets splashing? *It would be a dead water, and would not attract me at all. I enjoy the sound of water, it enriches the natural spirit of the space and improves the microclimate rather than stagnant water.*

The pleasure and refreshment of the microclimate were reflected in participants' perception of the surroundings. Fears from the pervasive open character of the area were forgotten. The microclimate enlivened the participants' relation to the space. Reaching and inhabiting the mid-pathway was "a window" for comfort exploration and enjoyment during a hot time period. Participants recognized the space's distinctive features that differentiated the area from other Egyptian parks' water spaces. The whole view of the lake area became visible and noticed. For example, the potential of the hilly shaded area on the eastern side was noticed and described by some as a comfortable alternative for long resting periods during the hot time. Some participants recalled pleasant memories of similar configurations or similar microclimate conditions. Others' thermal pleasure was emphasised by the observation of a similar pleasure and comfort seen in people who shared the microclimate around them. Contentment was touched in the trace of mist sprayed by the wind and plants dazzlingly swaying all around them. A participant described his pleasure saying:

M5 (4:47PM) *I enjoy seeing the swaying of the trees and water, they enlarge the sensation of breeze. I feel the whole space is responding to the breeze. It is like watching a comedy movie, I enjoy watching with people, laughing together, and it won't be the same if I'm watching alone, I feel the context is sensing the breeze as me, responding and reflecting the same pleasure".*

I was surprised when a participant described the lake café as a *"cave"* (figure 4.17), where the sensation of breeze and enjoyment of the surrounding breeze were expected to be

limited when sitting inside the lake café as it is exceedingly enclosed and barely offered views of the area.

Figure 4.17: The lake-café building as a cave: Changing the perception of the lake café after the experience of pleasant microclimate in the mid-pathway

The same microclimatic pleasure was revealed in the experiences of the three participants who approached the lake area from the western pathway entrance and reached the mid-pathway. It was not surprising at the end of the microclimatic tours that some participants described the microclimate of the mid-pathway as the most impressive microclimate experience lived throughout the whole tour.

*Continuous stimulations of water*: The vital character of water psychologically contributed to the feelings of refreshment in the air, and the significant physiological contribution was revealed by the mist. Participants felt the mist from time to time on their faces and immediately reflected on its reception every time they felt it. Participant's emphasis on the pleasure and refreshment created by the mist made it a strong generator to bear the presence in an open sunny microclimate at the hottest period of the day. In addition, participants were engaged in the different water formations defining the space, seeing active water flow, and hearing impressive streaming. The continuous stimulation of water during the hot time period strengthened the feelings of engagement and immersion in water space and successfully eased participants' perceptions of sun's exposure. This showed that the soothing impressions gained from the fountains and sprays contributed more than the lake itself. The significant contribution of the water jets to the perceived microclimate was emphasized in the occurrences when a few participants found them inoperative:

> M1 (3:01pm): the jets were inoperative on this day. We sat on a bench in the middle of the path in front of the lake café. *The bad thing in sitting here is that the shrubs have hidden the water. I could not see the lake while sitting. I want to see the water; I don't feel the refreshing impact of the water space.*
>
> M2 (3:39pm): Continuing walking and reaching the mid-pathway: *Here in this segment, I could rest on any of those benches, looking towards the lake, and opposite to the sun's direction, which would soothe the weather. However, this is only if I am compelled to rest here; otherwise, I could find somewhere else that is more comfortable. Adding: The weather here used to be more moisturized from the rest of the park due to the presence of water and landscape, but the fountains today are not splashing. These fountains make a great*

> *change in the microclimate. They blow the water higher, along with the breeze, and I really feel the air is too moisturized.* The absence of water sprays and fountains disappointed him. Nevertheless, he stayed refreshed by the breeze.

*Developing a relationship between breeze sensation and corporeal posture to sun radiation:*

In the mid-pathway, when participants adjusted their posture towards the lake to receive the mist better, they then faced northward. The open character of the lake area allowed the sensation of a moisturized breeze coming from the north and passing by the water. Sensations of a strong and consistent passage of breeze was another significant cue in the microclimatic pleasure experienced. Breeze sensation was described as a reliever, which succeeded in effectively dispersing the heat of the sun and relieving any claustrophobic feelings.

However, what was remarkable was that the sensation of breeze was revealed only after the participants changed their posture away from the sun's radiation. This adaptation relieved their faces from the heat caused by the sun's direct exposure, and gave a boost to sense the breeze better on their face and whole body. The sensation of breeze after the corporal adaptation to the sun's radiation was revealed in the depictions of the majority of the participants; however, this experiential relation was also felt and disclosed by some of them.

*Corporeal orientation is the origin of microclimate perception:* The experiential relation established between the breeze sensation and corporeal adaptation illustrated the interpretation of the corporeal posture - staying away from the sun's radiations - as the principal origin of the microclimate experienced. Keeping participants' primary orientation away from the sun created a comfortable thermal medium in the hot time period as it relieved the perception of heat. It evoked the breeze sensation, as well as the pleasure and enjoyment of the place's distinct qualities.

The significance of comfort when staying opposite to the sun's radiation was emphasized clearly by some participants and was indicated in pleasing descriptions of the microclimate experienced. Moreover, it was expected by a participant (M9) at the beginning of the lake pathway. When he was in full and direct exposure to the sun, he anticipated a better change in the microclimate to occur on reaching the mid-pathway when the sun would then be at his back. Another incident which illustrates the impact of this corporeal orientation experientially is the study of two participants' depictions of the microclimate (F1, M1). When they were staying in the mid-pathway, they atypically tried to glimpse the

view of the citadel in the background to the south. They turned around to become directly facing the sun's radiation and immediately regained the harsh feelings of heat. They found themselves unable to view the citadel and the microclimate pleasure was taken over by re-feeling of heat and claustrophobia. They had uncomfortable moments that was reflected in their relation with their surroundings, as some of them described the feelings of "dryness" induced from the view of the large sunny meadow (figure 4.18).

Left: when looking away from the sun's direction, right: when looking to the direction of radiation
Figure 4.18: Two extremely different microclimate perceptions were revealed in the mid-pathway

Nevertheless, the interpretation of the corporeal posture as the origin of the experienced microclimate pleasure does not devalue the continuous stimulation of either the breezy quality of the place, or the vitality of the water formations in the perception of the microclimate. The distinct qualities perceived in the mid-pathway, especially the refreshing sensation of breeze and the mist, brought pleasure and refreshment in their thermal comfort, compelling participants to stop walking and to stay for some time in the sunny area during the critical time period. This understanding is clearly supported in the experience of two participants (M1, M2), who experienced the lake area while the water sprays and fountains were inoperative, emphasizing the significant change occurred in the microclimate due to ending the direct exposure to the sun.

***Experience (3)***
*The shade relieves the domination of sun coverage*

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*Expression of comfort:* Leaving the mid-pathway, the sun faced the participants' left side, and gradually moved across their faces to their back. Participants walked in the sun, but their awareness of the sun's harshness faded. They were refreshed by the breeze sensation and the continuous stimulations of water. Feelings of comfort were revealed in participants' behaviour during their walk, as they stopped momentarily to gaze at the lakeside and those beyond, particularly the water cascade flowing into the lake (figure 4.19).

Figure 4.19: Participants enjoyed the water cascade and forgot walking in sun

Continuing to walk, participants reached the shaded segment of the pathway. The area was occupied by users sitting on the seats along the pathway or lying on the hilly area looking over the pathway. It was often the busiest in the whole lake area due to the shade coverage; nevertheless, many participants appreciated the shade after the long sunny length. The shade provided a vantage point from which to gaze at the cascade.

*Breeze is a cue of the shade microclimate:* Before reaching the shade microclimate, a participant (M8) expected to find it cooler describing it as a *"cool hub"* due to the shade provided (figure 4.20). When participants inhabited the shade, few disclosed the sensation of light breeze. In fact, the breeze sensation was not as strong and significant as at the mid-pathway. However, it was experientially felt due to participants' feelings of being sheltered after sun exposure and described as a sensation associated with the shaded microclimate.

Figure 4.20: Expecting coolness and a breeze sensation in the shade

*The perception of an enclosed shaded space:* Questioning participants' views about a longer stay within this microclimate illuminated a deeper reading of the character of the shaded space. The inhabitability of the space reflects the potential for comfort of the shade microclimate during a hot time period as described by some participants. These participants enjoyed the atmosphere of the place and expressed a desire to stay longer. However, for

some participants, the crowdedness[1] - as described by them - lessened the shade's enjoyment. These participants revealed that they were less likely to stay longer in this area. A participant (F5) described her preference for staying longer in the sunny microclimate in the mid-pathway, even during the hot time period, over resting in the shaded microclimate. Different feelings and perceptions were evoked by the crowdedness. Some participants mentioned feelings of enclosure and another participant mentioned claustrophobic feelings.

Being in the Egyptian microclimatic context, lack of appreciation for staying in shade microclimate in a water space during the hot summer period raised wonder and questions, especially when compared with the other shaded experiences of a few of the participants in the lake area that revealed discernible feelings of comfort and pleasure:

> **Reflections from shaded experiences in the lake area:** five of the participants (M2, M5, F3, F6, F7) chose to rest in shade. Participants rested in the shade of high canopy trees and palms in the eastern area of the lake. They were either directed to this specific location due to their previous experiences or they were keen to find a shaded space during their walk. During their stay, participants' feelings of refreshment were voiced in their description. They revealed the thermal pleasure caused by their immersion in shade. Staying in shade created pleasant emotions towards the area. Participants freely explored the potential of water, stayed well refreshed by the strong and consistent sensation of breeze, and sensually engaged in the context. They enjoyed viewing the lake and beyond through being sheltered. The vital water formations were described as adding visual and audible harmony alongside to the comfort of shade; however, the emphasis on the mist's feelings on their faces was not as meaningful as in the mid-pathway. It was remarkable how through staying in shade, the emotions towards the sun coverage and the openness of the context changed. The shade microclimate was described as a favourable window to enjoy the area's sun coverage without an obligation to experience the harsh sun during the hottest time period. The sun was described as a source of light that enriched their daytime pleasure (figure 4.21).

Figure 4.21: Participants' shaded experiences in the lake area

The reading of the spatial impressions felt in the participants' descriptions, in that segment of the pathway, indicated that feelings of enclosure were felt by some participants. This might be a synonym for the claustrophobic feelings which were also expressed. One participant (M1) described that he "*felt stuck in the place*". Here in inhabiting this situation, the enclosure of the shaded microclimate resembled claustrophobic feelings –in the atmosphere – evoked by staying in a crowded indoor space, where the feelings of enclosure were evoked by the crowd of people in the space.

[1] Some participants' microclimatic tours were at weekends or during the festive period *(Eid El Fitr),* where the park was too crowded with users, especially in the shaded areas.

Enclosure of the space was experienced, but participants did not interpret its spatial causes. However, one participant was thoughtful about his feelings of displeasure of shade microclimate, drawing a comparison between the shaded characters of this segment and the palm promenade. In the palm promenade, the comfort bestowed by the openness of the shaded space was expressed as a sense of enjoyment. Participants in the palm promenade didn't reveal any claustrophobic feelings even in times when the promenade was crowded. This comparison suggested spatial clues behind the feelings of enclosure in the lake's pathway. In this segment, despite being the same width as the rest of the pathway, spatial enclosure was possibly induced from the close proximity of the lake café building to that segment on one side, and feeling closely canopied with dense trees planted over the side of the pathway. However, the feeling of crowdedness in a closely canopied space was integral to evoke the feelings of enclosure. This interpretation may be justified by the pleasant microclimate perceptions of other participants who enjoyed the shade microclimate and liveability, with no feelings of crowdedness. Continuing to walk and leaving the lake area, feelings of enclosure were reinforced when walking through low compositions of dense spreading plantings canopy (figure 4.22), but then it was no longer mentioned afterwards by coming out of the canopy. Participants' microclimate perceptions were then relieved when reaching a segment with spots of shadow covering the ground, cast by compositions of high canopy trees and palms planted in the hilly area on the west. Participants revealed indicators of shade enjoyment. They were pleasantly immersed in the naturalistic context, especially the gently running water canal.

This difference in perceptions suggests that the desire for longer pleasure and comfort in the shaded space with enclosed characters was negatively impacted by the occupation levels. In closely canopied spaces the crowdedness which can be found in shade spaces devalues the esteem for shade at the height of the day, as well as the sensation of breeze; instead, it evokes feelings of claustrophobia. This reading of the shaded space discloses that the shade microclimate is not the ultimate desire during the hottest time period and illustrates how spatial qualities may relate to the creation of prolonged comfort and pleasure of shade.

Figure 4.22: Perception of enclosure due to walking in a closely canopied segment

**B. Perception of time in a fully sunny space**

The perception of time was an aspect increasing harsh corporeal sensations during participants 'moments of discomfort. The majority of participants experienced the lake area at noon and during early afternoon. The interval of direct exposure to the sun focused attention on the insensitivity of the hot time period and the meaning of sun exposure. The perception of time supported the early construction of the negative thermal perception of the whole area and conditioned microclimate comfort upon finding shaded microclimate. However, as the height of the day passed by, the change in the time period partially intruded upon changing the perception of the sun's heat. Two participants (M1, F1) who passed by the lake area twice recollected the harshness of the hot time period, preferring to continue their walk rather than to stay. However, they were aware of the fact that "*heat is supposed to be lesser*" -as expressed by participant (M1) than the hottest period as the day went on.

When some shadows began to cover areas in the eastern flank of the lake due to the slight movements of the sun, one of the seats along the eastern flank of the lake became shaded. It was the same seat occupied by three participants earlier, when there was no shade. However, feeling sheltered in the shaded microclimate revealed a pleasantly different microclimate perception. Spotting the shaded seat motivated two participants to walk to it to escape from the direct and full sun and enjoy the lake. Despite the fact that the height of day had passed, as we were at mid-afternoon period, the shaded microclimate was sought as the most comfortable microclimate to enjoy the lake from within it. With the approach of sunset, the perception of time strongly changed the perceived heat. It was noticed that with the approach of the sunset, the cafe building folded its sun shades as the exposure to the sun was no longer annoying. One participant (M3) visited the lake area nearer to sunset time. Once he reached the lake, he expressed his enjoyment of it during day time, revealing his

willingness to spend a few moments gazing at the lake in the full direct exposure to the sun, a decision which was difficult to take earlier.

At the mid-pathway, the refreshing microclimate was a distinct experience during the height of the day, which took the participants away from harshness of time period. The pleasant microclimate digressed into the temporal perception of the hottest period and the meaning of the sun's heat during this time period. It was clear that the experienced microclimate succeeded in making participants forget their fears of staying in a sunny space at height of the day for considerable lengths of time. Thus, the microclimate created a nice and refreshing break. However, questioning the extent to which the microclimate would stimulate desires for longer stays revealed underlying fears of discomfort that challenged ideas of longer stays in sun exposure. Those fears were voiced by some, who felt altered by the heat of the sun "*on their head, on their backs*", after spending a period of enjoyable time. It seemed that the difficulty of prolonged stay in a fully sunny space remained floating in the mind, restricting the continuation of pleasure. This conception altered the participants' length of comfort and pleasure, and brought strong beliefs that comfort would be lost after some time.

In the late afternoon period, the mid-pathway was covered by sun. Participants, who visited the lake twice during the microclimate tour were keen to reach the mid-pathway in order to re-live the earlier pleasure. They distinguished the microclimate experienced in the mid-pathway from the rest of the area, even after the passage of the hot time. Interestingly, three participants (M3, M4, M5) who visited the lake area in the late afternoon period noted their strong desire to rest for a longer time. They emphasized the late afternoon time period as the optimum time to enjoy the lake area freely, and they expected uncomfortable microclimate conditions and difficulty of enjoyment during the earlier daytimes. Their desire for long engagement and immersion in the microclimate was disclosed, without any fear of discomfort or a limit to the length of comfort. It was observed that participants' perception of the sun, as a source of heat, changed by changing time. The temporal impact strongly stimulated desires of prolonged stays during a later time period when the day had progressed.

### *4.3.2 The case of the curvilinear pathways*

The formal park core is encompassed by a network of curvilinear pathways following the hilly topography of the site (figure 4.23). The park's western hillside consists predominantly of slopes, which are cloaked with flowering and succulent plants. Pathways have been carved into the hillside at different levels and extend along the length of the park. These pathways run between the lower walkway along the historic wall and the hill summits and provide lateral access points to the park formal core. They are open to sweeping views of Cairo's historic centre, providing many vantage points along the west. On the eastern half of the park, pathways are also carved into the hillside and spread through the grassy lawns. They have a more enclosed character than the open pathways on the western hillside, except for a peculiar pathway near the lake area. The curvilinear pathways provide comfortable circulation, allowing visitors to move through the entire park with ease.

Figure 4.23: Pathways are carved into the western hillside

Curvilinear pathways in Al Azhar Park share similar spatial features. Apart from being curvilinear, they are similar in width and have the same ground material, asphalt. Canopied trees with various heights and sizes are scattered along at intermittent intervals, and shrubs are planted to frame the pathways. The intermittent scattering of canopy trees is a common characteristic of most of the curvilinear pathways; however, some peculiar segments are differently characterized especially on the eastern hillside.

The microclimate of the curvilinear pathways was only encountered and thought about by a number of participants, mostly due to the location of the curvilinear pathways on the peripheries, out of the formal park core (figure 4.24). Despite this limitation, its spatial differentiation from the formal promenade strongly elaborated and strengthened further perspectives of the microclimate through participants' direct experiences.

Figure 4.24: Network of curvilinear pathways and highlights of segments experienced by the participants

### A. Microclimate reference (1): Sunny with intermittent shadows

Direction: walking southward

Throughout the daytime, the open pathways are characterized by the presence of shaded areas scattered along the length (figure 4.25). The plantings along the pathways were the only source of shade. Shade coverage varies based on the planting characteristics and changes with movement in sun position. Nevertheless, during participants' visit times, the sun always dominates over shade. This character of shade percentage accounts for a general description of the ground representation throughout daytime as sunny with intermittent shadows.

Figure 4.25: A sunny pathway with intermittent spots of shade during the time of visits

*Expression of discomfort:* The uncomfortable experiences took place in full and direct facial exposure to the sun. The perception of discomfort was revealed as similar to discomfort on the formal promenade's extension. Corporeal movements implicitly reflected the uncomfortable experience of full and direct sun exposure. The non-stop walking - somehow faster than normal - was a noticeable reaction to the discomfort experienced. Discomfort evoked the harsh perception of the sun and the difficulty of staying outdoors at the hot time of the day.

> M4 (4:00pm): walking with no intention to stop to viewing the historic surroundings: *I hate going out at peak time period, I only go out for a necessity; the sun is my main problem in summer. For me, in summer I usually prefer to go out at sunset time.*

*Isolation, needing to escape or looking for a change:* Walking along the open pathways was not an enjoyable experience despite the distinctiveness of the place. The distinct view of the historic district was not present in participants' perceptions. The uncomfortable microclimate experienced prevented participants' enjoyment and moved their attention away from the context. They were isolated from the spatial context, staying within their immediate corporeal sensation of heat.

> F5 (1:35pm) are you enjoying the path right now? Confused*….it is better in a different time period, it is good and quiet path for walking and provides different views of Cairo and the historic area…*the participant at the beginning of her tour reflected on the distinct view of the historic district provided from this particular path. However, the experienced microclimate was reflected in the absence of interest to stop for the view. I got the feeling the participant was uncomfortable while walking, trying to walk faster without stopping.

Besides the continuous walking, looking for an escape from the sun was observed in participants' discussion in those harsh moments. Experiencing the uncomfortable intervals of sun exposure was differently approached. A participant (F5) who knew the park expressed her desire to walk faster to reach her well-known escape, as she was sure of having a better microclimate there. Knowledge of the place was a strong motivating factor, causing the participant to walk faster in order to end the harsh circumstances. This might have prevented the reception of, or the interaction with, any slight change in the microclimate.

> F5 (1:47pm) While walking in the sunny microclimate, the participant expressed her desire to go to the hilltop restaurant. At that moment I got the feeling how she sought for a reliable shaded place in order to escape from the continuous walking in the sun. After spending some time in the hill top building, we walked again in the uncomfortable microclimate at that moment she said: *Let's go this way to the highest point; it is my second thermal transition to break down walking in this harsh path. Of course, the weather there is better than here.*

On the contrary, another participant visiting the park for the first time were consciously sensitive to any change in the microclimate, as he reflected immediately on instances when he felt sheltered from the sun, revealing a comfortable change occurred in the microclimate.

> M1 (2:47pm): We walked through the path overlooking Al Darb al Ahmar, towards the lake area. Although it is not a long distance to walk in sun, we felt how long it is. The sun was directly facing us all the time without any shelter nearby. The participant did not say anything, he was only attentive to quickly quit this path and reach a more comfortable area. Suddenly, he stopped by a palm tree providing ample shade, saying: *let's have a break from the sun.*

*Absence of the anticipated breeze:* at the beginning of the participants' microclimatic tours, the anticipation of a breeze sensation was brought forward by several participants, as an understanding related to open and high spaces. Nevertheless, it was obvious when walking

southward along the pathways; the breeze sensation was not revealed directly nor indirectly by any participant during those experienced intervals of discomfort. None of the participants stated whether the anticipated breeze failed to materialize or the effect of breeze turned out to be less significant than expected; however, it was strongly observed how participants were occupied by the experienced heat and the sun's direct exposure at those moments.

*Stepping on shadow spots has a soothing effect:* this was *a*n action taken by one participant (F5) who was observed in her continuous walking to step on the spots of shadows on the ground (figure 4.26). Walking over these shadows on the ground, it appeared that stepping over these spots did not produce a significant change in the microclimate experienced, which was clear in her persistent intention to pursue a different microclimate. This strongly revealed that the participant did not feel sheltered from the direct sun radiation during the moments of stepping on these shadows. Stepping over the shadows appeared to be an attempt in itself to escape from or soothe the full and direct sun exposure. The behaviour of stepping over shadows gave insights into the reading of corporeal attraction to scattered shadows coverages, as two dimensional representations are pattern of a meaningful microclimatic quality.

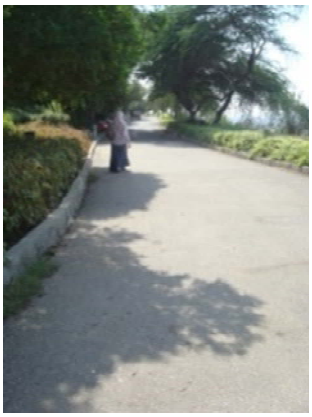

Figure 4.26: Observation of a participant stepping on the shadows patterns

*Intermittent shaded pools interrupted continuous discomfort:* perception of some areas of shadows induced a different microclimate. This reading was revealed through the behavioural action of a participant, who stepped on the shadow of a broad canopy tree and reflected on a change in the microclimate. The perception of feeling sheltered from the direct sun exposure prompted the participant to stop walking, showing his attraction to taking a break. Inhabiting the shade was highly appreciated and reflected the perception of comfortable microclimate. It was a break from the sun and an opportunity for discussion and

reflection. It was also a vantage point that allowed the exploration of the context through inhabiting it.

M4 (3:57pm): We walked along the paved path. The participant expressed his feelings of comfort by the weather of the path than at the promenade extension although he kept walking until suddenly he inhabited a shaded area: *it is a nice slot for a break.* Can you describe your experience? *It is a high space with a highly sensed breeze and we are staying in shade. I am pleased in this slot. It is better for me to spend some time in this shaded place, having good access to breeze than to rest on a bench in a space dominated by the sun.*

Feeling sheltered from the direct sun access was an escape from sun heat at the hottest period of the day. It created a microclimate experience which made the exploration of the context possible, and brought recognition to the distinct character of the open pathways due to freeing to the participant (M4) to comfortably explore the historic context. Of particular interest, the participant described the shaded space created by the canopied tree as an identifiable microclimatic space within the uncomfortable sunny microclimate of the pathway by saying, *"I am pleased in this slot".* Here, this description goes beyond shadows as two dimensional patterns on the ground, but rather, a three dimensional one, a volume or a slot, which the participant inhabited and felt immersed in.

*Changing direction discloses a different microclimate perception:* As the pathway was mostly covered by sun during the height of the day; by changing the orientation, discomfort was not expressed or behaviourally revealed. Walking northwards, participants' behaviours reflected no indication of the sun's severity. This suggests that the participants' orientation to the sun detracted the corporeal sensation away from its harsh and full radiance during a hot time period, as the sun was shining on their rear side as opposed to their front. This particular orientation to the sun's radiation hindered the harshness and unkindness of full and direct facial exposure to the sun, and thus relieved the face from direct exposure. In addition, it allowed for recognition of the potential of the space. Acceptance of the experienced microclimate was shown in the participants' interactive behaviours, as they revealed enjoyment of the historic view, had a pleasant stroll, and stopped from time to time to view their surroundings.

> F1 (3:45pm): walking northward: *I enjoy the path; I'm not bothered by the heat. I would like to ride a bike now in this path. I'm not annoyed by staying now although it is sunny; but, it is open and extended, with a good view, seeing landscape everywhere.*
>
> M9 (3:00pm) walking northward: *I like this path, I remember from a previous visit how it had shade coverage. It is nice now and I feel the breeze because it is open and higher than the surrounding historic area, without any obstruction for breeze...*

Moreover, shadows, intermittently and inconsistently dispersed along the pathway, were comfortable meaningful representations. Stepping on shadows over the ground stimulated a comfortable walk within the hot time period. It was noted that the presence of shadows on the left edge of the pathway propelled a participant to walk along the left edge of the pathway, and looking westwards at the historic district. Stepping on shadow coverage had a soothing effect. Shadows visually interrupted the sun's coverage over the ground, and cut its dominancy. This visual quality prevented the total immersion in discomfort as they induced an impression of partially feeling sheltered during a hot time period. This eased participants' perceptions of the sunny microclimate during the hot time period and improved their engagement with the context. Particularly illustrative of this impression was the perception of the microclimate by two participants (M9) and (M4), who described the pathway as being "*a more shaded path*" and "*better than the promenade extension"*. This perception elaborates how the scattering of canopy plantings casting shadow patterns were favoured, in the absence of a direct experience of sun radiation, as these stimulated a comfortable feeling on the walk within the microclimate.

> M9 (3:03pm): I observed the participant while walking and I got the feeling that his movements were bounded by the shade patterns over the ground. He walked on the left shaded edge. He was sheltered from time to time by a tree. I captured a photo of him. Suddenly, he stopped in the shade of a tree to look at the historic district, while avoiding the direct contact with the sun, as it was filtered by the canopy. The path was then divided into two narrower passages. I followed the participant in the one he chose to walk in. He chose the path which was aligned by shade trees on both sides. It was partially shaded and partially sunny. However, I felt the vegetation was effectively sheltering the path.

Furthermore, it was observed that the desire for a sheltered vantage point was delayed. While walking, the participants explored the surroundings in a comfortable atmosphere and the desire for shade was not expressed or revealed. However, it was observed that the two participants (M9, M1)who experienced the pathway during the hot time period, after walking almost the whole length, ended up inhabiting ample shaded areas, adjusting their postures to the west and exploring the scenic view of the historic context (figure 4.27). This reveals that the absence of a full and direct facial exposure to the sun delayed the need for a break in total shade for a considerable time.

Figure 4.27: Delayed desire for a sheltered vantage point

Walking northward, participants described their sensation of a gentle breeze while walking, explaining that this sensation was due to their presence in a high and open space. However, the anticipation of breeze and then the failure to receive it, when the participants were walking southward, does not support that the sensation of breeze was caused by the spatial character of the pathway. Instead, the physical orientation of the participants northward explains the corporeal reception of breeze.

> M1 (4:27pm): After a long walk along the entire length of one of the paved pathways, the participant stopped in the shade of a broad canopy tree. I asked him about the reason for stopping here: *I feel the wind is strong in this place and it is shaded. It is a good place to rest for a break and have an open view of the sky and Cairo skyline. It is good to enjoy a scene while being comfortable. I could spot the same scene from this sunny slot* (he pointed to a sunny point in the path), *but it is more comfortable to stay in shade if it is nearby.*

**B. Microclimate reference (2): Sunny with intermittent shadows**

Direction: walking southward

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Later on, when the sun was lower, the changes in the amount of shadow coverage on the ground were indiscernible, where the ground was still dominated by sun coverage with intermittent shade.

*Perception of time creates the perception of a bearable microclimate to walk in:* the perception of time change brought forward different perceptions of the experienced microclimate. Most influentially, time affected the perception of the sun whereas changing the time period changed the microclimate experience from an interrupted experience of discomfort to a fully tolerable microclimate, where obvious feelings of discomfort become eased and bearable; however, descriptions revealed that the sensation of breeze was still absent.

> M2 (5:00pm): Are you still experiencing the sun's heat? *Absolutely not, the intensity of the sun is totally different now at 5 from earlier at after 2, now I can walk facing it, and I can spend some time in this position,*

> *not too long, but longer than earlier without feeling annoyed. Earlier, it was too harsh to walk even a few minutes in this direction.*
>
> M4 (5:22pm): We walked facing the sun for some time: *I don't feel any bother from the sun now, I could even look at it, and rest anywhere in the park …it is fine now to walk in this path because it is past 5:00pm.*

The microclimate perception, at a later time period, was still impacted by the presence of a direct sun exposure. However, participants' perception of time partially gave a different meaning for this exposure. The harshness of the sun's exposure was slightly broken down by time, and the direct exposure appeared tolerable without a focused expression on discomfort and without a behavioural desire for either sun screening, or an escape or a change. Nevertheless, emphasis on walking within the microclimate, and absence of interest to stay in it for some moments, revealed that walking is a stimulant that relieved participants' perceptions of the sunny microclimate, where their immediate corporeal sensation of sun still imposed itself when making the decision to stop when there was nothing obstructing the sun.

*Soothing effect of lower sun radiating through canopied formations:* Further questioning of the tolerable feelings of the microclimate revealed the significant visual impacts of canopied trees scattered along the pathway. A participant (M2) who experienced the curvilinear pathway twice at different time periods expressed how the visual perception of the planting formations, in the later afternoon period, reduced the feelings of discomfort which strongly dominated during the earlier hot period.

> M2 (3:07pm): *For example now we are walking in sun, but earlier, I don't dare to stay in this orientation. Now seeing the trees scattered along the length induce an impression of a comfort in this sunny experience, but earlier, I urgently seek to stay beneath them, in their shade to feel comfortable.*

The emergence of this description in this particular time period was significantly created by the perception of the westward and lower position of the sun. The description supported that spotting both the sun and canopy formations scattered along the length, on the visual horizon, psychologically took participants' attention away from the sun's heat, and dissipated the feelings of direct and full sun exposure. The perception of canopy trees changed from being an important refuge during hot time period to features that were favoured to 'see' along the pathway, and thus their visual perception enhanced participants' walk in the sun. This perception improved the realization of time change and the associated temporal meaning of the sun's heat at that time.

*Transcending expression of thermal comfort when changing orientation:* The expression of the microclimate's comfort transcended the thermal comfort through the conscious recognition of the passage of the hot time period. Changing the time period, the microclimate experienced changed the perception of the space as participants began to view the space not merely as a pathway but as a resting place. The potential of the open pathways overlooking the historic context became delightful and favoured. The interactive immersion in the historic surroundings was clearly shown in participants' depictions and desire for longer rests. The high connection with and engagement in the context reflected the experience of a vibrant atmosphere.

F1 (5:22pm): Do you feel a difference in the microclimate from the moments in the lake area when the sun was facing you? *The microclimate here is much better now. I forget the sun, although we are still exposed to it. I feel the breeze better in this path, although generally it isn't a bit sensed today, but maybe here because the path is open and higher than the surrounding.* Are not you botherd by the sun coverage? *The sun may bother me if I stayed longer, but I enjoy walking now.* (Adding) *I really enjoy this path. I feel isolated, I feel myself more engaged with Cairo, with its sounds. Next time when I visit the park I would prefer to spend a longer time here in this path, even if it is earlier than now, I like the relaxation mood of this place.*

M4 (4:57pm): Why did you choose this path? *It fulfils all that I need. It is a relaxing atmosphere that allows me to engage and contemplate the sounds of the historical context. I feel the breeze is nicely penetrating through the path. The path is open and higher than the surroundings and extended along the length of the park overlooking a lower context, and in this configuration sensing a significant breeze is expected.* Would you experience it the same if it was completely sunny? *I don't think so, of course the presence of some shade over the ground, encourages me to continue walking.* He was not attentive to the shade until I grabbed his attention, he walked freely showing no necessity to stay in shade. After walking along the path for some time, he added: *I think even if I walked in this path in the hottest period, I would still enjoy its weather.*

The consciousness of the declining harshness of the sun as the day went on changed the perceived ecstasies of shadows and sun coverage over the ground (figure 4.28). Descriptions of several participants revealed how the coverage of sun and shadow became representations stimulating the day time pleasure. Participants revealed their enjoyment to visit the park at this daytime period, which is neither hot nor an evening period. The perception of shadow, as two dimensional patterns connoting thermal relief, eased off and there was no attraction to walk over them as earlier. The sun's perception became daylight stimulant rather than a heat supplier, and its coverage became a pleasant indicator of a day time continuation. This elaborates the perception of the passage of the hot time period

when staying away from the direct sun radiation, changed the way the ground's representation radiated outward to the participants, where thermal indicators of comfort and discomfort dissipated, and indicators of daylight and shade perceived.

Figure 4.28: The change of the perception of shade and sun coverage due to hot time passage

The sensation of refreshing breeze was strongly expressed. It was more readily felt at that time period which revealed it more strongly and clearly than at the height of day. Although it was not an impressive sensation, the sensation of breeze created harmony, refreshment and even pleasure.

## 4.4 Summary

In this chapter, an in-depth examination of the participants' walking tours within the microclimate of four different spatial microclimates is described. Different time periods are analysed through the consideration of the variant microclimate references experienced. Each of the four spatial microclimate cases has its exclusivity. Along the length of the formal promenade, two extremely different successive microclimates were perceived. The palm promenade offered an extensive understanding of a shaded microclimate. However, both two segments of the promenade's extension demonstrated that the microclimate experience was dominated by consistent full and direct exposure to the sun. The curvilinear pathways including the lake pathway deepened and strengthened the understanding of the relationships which emerged from the analysis of the formal promenade. They also offered understanding of the changing microclimate experiences, as well as the spatial contribution in the formulation and changing of the microclimate perceptions. Despite the obvious spatial differences between the four cases, the study of the microclimate experiences and perceptions showed consensus and each one complemented the other in order to reach a holistic understanding of the experience. The structure of the knowledge exhibits how the understanding of the microclimate was a process of learning for both the researcher and the participants.

This chapter reported the themes elicited from participants during the walking tours in the microclimate, and highlighted commonalties, echoes, and amplifications while also reading individual occurrences which added and clarified understanding. The subsequent two chapters sharpen the meanings and relationships embedded in participants' experiences.

# Chapter Five

# Historicity

Cultural Constructs of climate and Comfort

# Chapter 5. Historicity

## Cultural Constructs of Climate and Comfort

### 5.1 Introduction

The reading of participants' microclimate perceptions disclosed the interplay between body, time, and place. Their perception of the microclimate was neither an abstracted immediate physical sensation, nor was it disconnected from the context. Instead, there was an interaction of the corporeal being in experiencing a climate context with familiar characteristics. The participants' conscious experiences of the microclimate revealed the presence of intersubjective climate constructs which affected their immediate microclimate experience. The familiarity of the participants with the climate context revealed that their constructs of the microclimate (dis)comfort guided their immediate experiences. The deep-seated climate culture reflected the constructs which were both understood and inter-subjectively shared and communicated about the nature and characteristics of the Egyptian climate context. It was a culture gained progressively from the experiential familiarity with the context and through everyday encounters over periods of time. Participants' conscious examinations of the microclimate showed their questioning and communication between their held climate constructs and their actual immediate experiences of the microclimate. This chapter focuses on the examination of the cultural constructs held about climate and comfort in order to understand their influences on our immediate perception of the microclimate.

### 5.2 Conceptions of Comfort

Participants at the beginning of the microclimatic tours were asked about their conception of a comfortable microclimate. The shaded microclimate was, unsurprisingly, pervasively emphasized and a taken-for- granted conception of the means of staying comfortable. This was to the extent that some participants replied sarcastically to the question. Shade was conceived as the ultimate relief from heat. However, it was agreed that a sunny microclimate accounts for staying uncomfortable.

> F7: What are the conditions that you need to rest comfortably during this time period*? Sure it has to be shaded.*

M3: What about the uncomfortable places? *For me, all uncovered places now are uncomfortable. The sun now is my main problem; however, shaded places are nice now.*

F5: What about the uncomfortable places at the time of the day? *The play area will absolutely be uncomfortable now in this hot weather. … You would not find anybody now playing in the play area. I believe the presence of shade makes a difference.*

M2: Where would you expect to have a comfortable experience now? *Any shaded place is comfortable now; otherwise, it is hot. ……Now the sun is too hot, so now shade is the only condition to stay comfortable.*

F3: Before starting the tour, where do you think will be comfortable for the time period? *Now* (laughing) *any place with shade and breeze* (thinking) *it might be convenient now at the lake area, but I'm not sure.*

M5: Describing the area around the lake: *I don't remember specific shaded spaces there, but I know I will be comfortable when staying in shade.*

### *5.2.1 Perception of general atmospheric forms*

Participants' responses to the question about the comfortable microclimate disclosed the presence of both shared and taken-for-granted conceptions about thermal comfort and discomfort. Responses emphasized the subjective perception of two elemental and discernible forms of microclimates: shaded and sunny. One of the thoughts raised at the beginning of researching the microclimate perception was to understand how different forms of sunshade, such as a pergola, and trees, can affect the perception of the microclimatic comfort (sections 1.1.2 and 2.3.3). However, the reading of the verbal description of "shaded" and "sunny" referred to abstracted forms of microclimates, which overlooked the spatial configuration that provide this form of microclimate. This was observed in the general descriptions of "any" or "all" shaded/ sunny areas. This revealed the examination of comfort focused on an atmospheric form or pattern, while detaching the spatial qualities that provides shade or sun coverage. Even participants who had frequently visited the park several times before gave further examples as they expected both reliable comfortable and uncomfortable spaces in the park based on their spatial familiarity, such as the preference for the lake café building due to being a reliable semi-outdoor space with sunshade coverings. However, it was noticeable that none recalled the character of the feature - the sunshades - that provided the shade there. The determination of comfort and discomfort by the abstracted description of shaded and sunny microclimates raises the question of what caused these two forms to be shared and inter-subjectively understood.

This obvious and inter-subjective homogeny suggested an understanding of the knowledge constructed about thermal comfort as knowledge constructed from the familiarity with the wider context. Conceptions of shaded and sunny microclimates were constructed from the

experiential everyday encounters in the Egyptian climate, which gave the participants a similar mode of perception and understanding.

> F3: Is it still not acceptable to stay in a sunny space now? *After living in Europe for some time, I'm not astonished any more by seeing people sitting in the sun. For me, here, it is not acceptable; I still can't bear sitting in a sunny space for more than 5 minutes.*

As I was raised in the same climate context, during my reconnoitring visits to the park, my familiarity with the Egyptian climate gave me a platform from which to interpret and empathize with the users when observing them inhabiting the shaded microclimates. This shows the knowledge understood about the indication of shade and sunny microclimates is expected from a person who lives in a hot arid climate region. It emphasizes the presence of shaded or sunny microclimates - wherever they are and whatever provides them - as meaningful indicators of (dis)comfort in the Egyptian climate context. Therefore, sun and shade are two atmospheric forms of comfort and discomfort grounded in the immersion within the Egyptian climate context due to its hot arid character.

### *5.2.2 The visual examination of (dis)comfort*

Another perspective that was revealed by the participants' abstracted conceptions about thermal comfort was how sun and shade microclimates were examined and indicated. Participants' descriptions revealed how the aspect of sun coverage is the determinant of comfort perception.

> M8: Do you feel a difference in this shaded microclimate? *The weather is mild, I'm still feeling hot from our way to the park, so physiologically speaking. I felt the promenade is cool just by seeing ample shade. It induces an impression of being in comfortable weather for this time period.*
>
> F2: Walking at the end of the shaded promenade: Are you enjoying the promenade? *Of course, but I won't be happy after a while.* The participant expected discomfort when she spotted the sunny promenade ahead covered with sun.
>
> M4: At the end of the shaded promenade, the participant spotted the sunny part: *We are leaving the shaded area behind and going to be immersed in the sun.*
>
> M4: Walking along the paved pathway: Would you have the same enjoyment if the pathway were completely sunny? *I don't think so but of course the scene of some shade on the ground encourages me to continue walking.*
>
> M9: Near to the fountain node: Are you upset by the place or its microclimate? *The microclimate, I am sitting in a slot of shade within a jungle of sun. I could not stay here for long. I am afraid I will be exposed to the sun sooner or later and there are no alternatives around. I need to rest comfortably in an ample shaded area.*
>
> M5: *Now when we approached the lake area, I spotted some shade there and I felt myself walking faster to catch it.*
>
> F1: Staying in the shade of the lake café and looking to the promenade extension: *I feel the presence of shade in the promenade might have increased or shifted from earlier, but it was present all the time, its presence is soothing this sunny part. It is unlike the other completely sunny part which is without any slot of shade nearby. There, I felt there is no hope for a change to happen throughout the daytime.*

M2: The participant was more interested in walking along the paved path towards the lake area. The path was almost sunny except an area of shade created by a huge shade tree. He asked me to stay in its shade for a while for a chat to describe his experience. *This path at evening is too breezy, the breeze direction passing by the lake in advance. At evening it is too crowded, I can sit anywhere and now also, as you spot, there are many people hiding in the shade of small trees scattered around.* Are you expecting to find nice weather when walking along the path now? *Yeah,* looking around and feeling uncertain *but the trees are not waving and no shade on the ground except this area!!* Continuing walking along the path: *Now we left the shaded area, but the weather is still nice……*

M2: Sitting beneath a small shade tree near the lake: Could you describe your experience? *I am really pleased here, although the area of shade is limited, but the weather here is very nice. …….* What, create a good shade for long resting? *The area of shade coverage, when the shade dominates the space, I feel more secured in staying comfortable.*

F3: The lake area: *The best place for me is that empty space with no trees* (pointing to it) *it is impossible to rest in it now; it is pervasively sunny and unsuitable…*

M8: Pointing to a place in front to him: *I see many trees and palms providing ample shaded areas on the ground… and the path we are going to walk along is shaded and there are many people occupying the place, which shows there is something comfortable in that place.*

Participants' descriptions showed that the microclimate as an atmospheric form was examined as scenery, a pattern, or representation. Comfort was indicated by the ground representation or the ground scenery created by sun coverage or protection. It repeatedly occurred that during the microclimate tours, many of the participants expected and investigated the microclimate comfort of spaces around them by examining the sun coverage on the ground, and sometimes participants described their immediate lived experience by referring to the state of the ground coverage. "*The scene of shade/sun*…." was an expression used by many participants. This way of investigation and understanding suggested that comfort is examined as a two-dimensional scenery or representation. Shade comfort was understood as the "area" or "spots of areas" on the ground which determined staying comfortable. However, the discomfort was expected in a pervasive and extensive area of sun coverage.

In semi-shaded pattern where the sun rays intertwined with shade on the ground, microclimate comfort was assessed by seeing the percentage or dominance of shade over sunny spots on the ground.

F4: Participant's expectation of semi-shade with domination of shade: Would you prefer to sit somewhere else in that node? *Our place here is nice, but if I thought of resting longer, I would prefer the other side…* Why? *In that place, I feel immersed in the landscape, I know it is partially sunny, but the sun is softened when it penetrates the shade.*

M6: In a shaded promenade*: It is even better by being almost shaded, and of course there're a few sunny slots on the ground but the shade is dominant….*

M4: Entrance plaza: Why did you choose this place? *It is shaded; I feel it is more comfortably secured from other surrounding areas, as I see the sun is accessing the surrounding shaded places.*

M9 lake café*: For me, this is zone two in temperature. It is a much intimate space for resting – but still not the optimum microclimate experience. It provides a composition of sunny and shaded areas in a small area. Palms*

*and wooden pergolas provide larger areas of shades, and I would feel comfortable here because the shade is dominating the sunny slots.*

M2: We walked to the secondary passage on the left side of the palm promenade: *Here it is nicely breezier than the right passage; although both have the same configuration and landscape* ….wondering and interrogating the difference: *here the palms are high, covering wide areas of shade unlike the first passage where trees are not high enough, shading limited areas and leaving the others directly sunny, that might be the reason for the heat there*, adding: *Look how there are more people sitting here than the first passage, which indicates the weather is really nice in that place. The domination of shade with a few slots of sunlight in the passage induces a sense of being in nice weather.*

Turning back to my reconnoitring visits, the indication of comfort through the ground representation was also emphasised. I was, as an observer, observing users' inhabiting the microclimates. Verbal descriptions such as "*every spot of shade on the ground*", "*every bit and piece of shade*" as well as "*spot*" were commonly used in my microclimate diary, which represented the areas suitable for inhabitation. I found myself questioning any vacant shaded spot. The descriptive expression of shade embodiment arose and was developed by me on-site, during my observations, to describe my feelings towards the users' inhabitation of the areas and spots of shade scattered in the space. The following is a part of my own recorded reflective during one of the reconnoitring visits:

Al Azhar Park, *April* 6, 2012 (3:18pm):

"The park was crowded on that day. It was a good day for investigating obviously the patterns of resting and the microclimate associated with it. In this day, I observed how people were "embodying" the shade pattern on the ground; I got the feeling that the suitability of places for resting is determined by tracing the shaded borders on the ground… When I approached the lake, I got the feeling that people are using every bit of shade found. All the shaded spaces beneath the trees were occupied by people. Although the shade of the tree was not enough for resting comfortable, especially for big families, people were trying to adapt their seating arrangement according to the available area of shade, sometimes I got the feeling that they squeeze themselves or lay freely depending on the area of shade (figure 5.1).

Figure 5.1: Inhabitation of any shaded spot on the ground

Here, interpretation of the microclimate through the examination of two dimensional patterns reveals an apparent emphasis of vision in determining thermal comfort. This perception brought focus to understand microclimate comfort through visual examination of sun coverage in space. However, this perception is grounded by the climate context, where shaded and sunny microclimates represented meaningful atmospheric patterns, which gained their climatic comfort indication from long immersion in the hot dry climatic context.

## 5.3 The Significance of the Sun in the Egyptian Climate Culture

Sunshine is guaranteed in Egypt almost all year. The sun is known as a natural cosmic object which provides light and warmth. However, the participants revealed, in terms of thermal comfort, an elemental emphasis on the sun as the supplier of harsh heat. All the participants emphasized the exposure to sun as an intrinsic parameter that disturbs a comfortable outdoor stay in the Egyptian microclimate context. Participants' ingrained perceptions of the Egyptian sun indicated insensitivity and cruelty that might reveal a sense of hatred. Here, a selective resemblance was strongly captured in the sense of hatred for the sun: "*The sun is like a detestable object. It may be good in winter but in summer it is abominable and certainly awful*"[1].

It was noticeable that despite the differences in temperatures and variation of heat across Egypt and the fact that there are different bioclimatic zones in Egypt (Mahmoud, 2011a), the participants' descriptions of the character of the sun were not confined to Cairo, instead they spoke of the sun as an elemental supplier of discomfort in the whole of Egypt. This revealed that the Egyptian climate is perceived, in subjective terms, in totality with homogenous hot characteristics, in which the harshness of the sun prevails over all other climatic parameters.

> M1: Asking about his attention to the sun*: …….it is really an annoying thing (the sun). I think you will find this common aspect for all your participants in our Egyptian climate context.*

### *5.3.1 Ambiguity in relation to the sunshine: Taking refuge from the Sun's 'heat' to enjoy its 'sunshine'*

The perception of the harshness of the Egyptian sun was dominant. Nevertheless, participants everyday experience of the Egyptian climate context had given them tolerance and adaptation to the sun's heat. This aspect has also been shown in studies conducted in hot climates, such as in Malaysia (Nasir *et al.*, 2012), and Colombo, Sri Lanka (Rajapaksha and Rathnayaka, 2014), as well as in Cairo (Mahmoud, 2011b), where users showed tolerance and expectations of high temperatures in the hot months.

Interestingly, some participants disclosed a dichotomy in the perception of the sun linked to a deeper description of Egyptians in relation to the sun, and which revealed how the sun radiates outwards into the subjects in different ways. This dichotomy appeared in the

[1] A chat with a participant (F, 30s) during my early reconnoitring visits in April 2012.

description of the sun as a supplier of harsh heat, while also being a supplier of pleasant daylight. Sunshine was described as a likeable aspect to enjoy a daytime stay in an outdoor space and a pleasant indicator of a daytime outing. The following extracts describe this ambiguous relation to sun in the Egyptian climate context:

> M6: *Generally, Egyptians don't like heat, as they really have a contradictory act; they think of going to outdoor spaces early to enjoy the daytime, but the first thing they ask for when deciding to rest is an umbrella. In summer or winter, the umbrella is important to hide from the sun, their concept of enjoying the sun is feeling the sunlight. This is how they enjoy their daytime.*
>
> M9: *I like to stay in a semi-shaded space. For example, I like the lake side café, a semi- outdoor place where the wind can penetrate it; I can see the sun, I'm not in a dull place, but not exposed to it. This is much better than sitting in an air conditioned space or being totally exposed to sun…*
>
> M5: At the lake: sitting in shade: How would you describe your lived experience of the microclimate: *An optimum lived time.* Could you give more details? *A gentle breezy weather that is very refreshing, I'm staying in a shaded space that is not dim, so I can see the sun in the space,* Adding: *I would not have enjoyed the place if it was wholly shaded. I enjoy seeing the graduation in light from sunny to shade, the colour of grass in shade and in shiny sun* at the end of the visit reflecting on his experience at the lake: *I enjoyed the sunny microclimate from a sheltered place.*
>
> F1: The lake mid-pathway: *I love to see this green area space; it is lovely to sit here on the grass, seeing this beautiful historical skyline. It is also a very relaxing and quiet space unlike the rest of the park, but the problem now is the sun which is destroying this enjoyment, it makes it difficult to do this now as it lacks any kind of shelter and that is the reason for its emptiness now. It is really a contradictory feeling, the lack of trees makes it an open vast space perfect to play or rest in during a different time period of the day, but I also need the trees for shade at that time period.*

Descriptions show that the daytime experience is sought despite the harsh perception of the sunshine. The perceptual dichotomy of the Egyptian sun provided the understanding of the comfortable and enjoyable relation between the Egyptian human and the sun in the Egyptian context. Participants' extracts revealed that the key aspect of remaining comfortable and enjoying the feeling of sunshine during a harsh sunny period was to be sheltered from it. In alternative terms, it is the description of the shaded microclimate. This dichotomy in the perception of sun coverage offered a different level of understanding of sun coverage, rather than being an ultimate indicator of discomfort. It provides insights into the possible understanding of the visual perception of sun coverage as a part of the human enjoyment of the weather.

## 5.4 The Temporal Dimension of the Climate: *The sun of when?*

One aspect that is quite obvious in the conceptions constructed about the sun is its temporal connotation, in which the description of the sun as a supplier of thermal discomfort was often time-based.

> F2: *It is unbearable to stay in the sun now; I hate the sun, generally the sun is my enemy now.*

M4: *I hate going out at peak time period, I only go out if necessary; the sun is my main problem in summer. For me, in summer I usually prefer to go out, whenever possible, at sunset.*

F6: At the beginning of the tour with a participant who worked in the park for a period of time: At what time did you work in the park? *It was often at peak time. I was known by my hat which I used to put on my head because of the harshness of the sun….The problem was mainly at the peak time when I felt the heat of the sun. I used to walk along the length of the park in both directions, around 700m. It was harsh and insensitive.*

M2: Are you still experiencing the sun as a source of heat? *Absolutely not, experiencing the sun is totally different now at 5pm than earlier at just after two.*

The harshness of the sun reflected an ingrained perception about a particular time. Participants' verbal descriptions such as "peak time", "hottest time" and "summer time" were communicated to clarify the insensitive feelings of the sun. This suggested that the feeling of the microclimate is a felt-time experience, where time is thermally felt. The significance of time assigned to the sun prompted the reading of the temporal dimension of the climate perception that is ingrained in Egyptian climatic culture. In particular, it prompted understanding of how the 'summer daytime period', which was the time of the study, was thermally understood, and how perception of time was linked to the human relationship to the sun.

In their walking tours in the park, participants started the examination of the microclimate with an expectation of harsh sun. When they spoke of shade as an immediate reliable relief, it was with knowledge of the significance of the immediate meaningful time period.

M6: What microclimate experience are you looking for to stay comfy during that time period? *In a time period like now, I would like to stay in a green space, with some shade…*

Temporal connotations were obvious and extensive in participants' perceptions of the microclimate. During the participants' tours, their usage of time was meaningful and, reasonably communicated, and put forth reasons for the determination or expectation of the conditions of comfort.

M1: *It is now quarter to five and the heat of the sun should be more tolerable.*

F7: In the formal garden: How would you expect it to have been earlier? At 2pm for example? *It is gonna' be too hot, I won't walk this long distance to stay in an uncomfortable place at the end.*

F3: At the bridge: How would you expect the weather here at noon time, will you be able to keep exploring the park? *I expect it is gonna be gruesome at noon time, I wouldn't be able to bear to stay for long…*later in the formal garden: How would you have expected it to be earlier? At 2pm for example? She laughed when she heard 2pm: *sure it won't be comfortable at all.*

F4: *I expect that this plaza at noon time without water will be unbearable, especially Egyptian weather, it is very hard at noon time.*

M4: *It is good to be in a shaded promenade in that time period.*

The repetitive and habitual conjunction with time as an indicator of the microclimate perception revealed the presence of a temporal culture in which time communicates thermal meaning. The participants' perceptions of the microclimate revealed that the everyday encounters in the local climate context progressively gave time a climatic significance and led to the establishment of an inter-subjective knowledge that related time, climate/weather, and comfort perception.

An illustrative moment which strongly reflects the presence of an inter-subjective knowledge that related time and comfort perception took part in the analytical interpretive process. For me, being an Egyptian citizen who shared similar temporal constructs related to climate, the identification of the time gave me insights into understanding the meaning inherent in the microclimate perception of the participants. The fact that the recorder used in the field work recorded the time of each note made by every participant was found very useful in the recap. Time was an indicator, a clue, which helped in interpreting and uncovering participants' descriptions and perceptions. Awareness of time was part of the dialogue between myself and the participants' texts in the analysis.

The reading of the participants' perceptions of time and climate/weather revealed that the experiential familiarity with the local climate context constructed meaningful felt-time periods, where each period of time connoted an associated climate/weather perception and which, consequently, determined the conditions of human (dis)comfort. This may provide an explanation of Fraser's (2003) discussion of the human experience of the passage of time, which described how humans seem to experience climate as a nested and collective hierarchy of qualitatively different temporalities. This appeared when participants in their discussions of the microclimate differentiated between summer and winter, or morning daytime and afternoon daytime. Climate perception represented the hierarchy of different temporalities that came together to refer to an embedded form of the climate and comfort conditions associated with this time period. Accordingly, expressions such as "In this time period" and "now" which were pervasively and frequently used by the participants to describe the immediate microclimate experienced, referred to particular temporal period within the nested and collective the hierarchal temporalities. They communicated a (dis)comfort significance through the participants' awareness of being in particular time.

> M5: Formal garden: How would you experience that place at peak time, for example at 3pm? *In summer or winter?* Summer time, like this time period. *I expect I could not bear to stay in it for*

> *long, I would need to leave after a short time because of direct sun exposure, but if in winter, I could enjoy it for some time. However, in summer time nearer to sunset like now, after the absence of the shiny sun, it would be nicer to spend some time in that place for the gentle breeze passing by. Once the heat dies down, it would be a good resting place.* So you are interested in staying in that place at that time of the day, aren't you? *Yes, at any time after the absence of sun brightness (sunshine). If at peak time, and there is any kind of shelter in that place, I would enjoy staying it its shade.*
>
> F5: Where would you stay to enjoy the water scene? *Of course, I will look for a shaded place in that time period* (laughing because she thought of it as a taken for granted need). *For me, if I'm going to stay in the plaza for some time, I will rest in a comfortable microclimate to better enjoy the water. If there is no shade, I might return to it by sunset, as it will be a fantastic place.*

In this study, the reading of the investigated time period - summer daytime period - is grounded in the two hierarchal felt-time periods: the "day period perception," in "a seasonal period perception. The following two sub-sections examine in-depth the climatic meaning of time during those meaningful felt-time periods.

### *5.4.1 A subjective seasonal stability: A perceptual gestalt*

Participants' perceptions of the experienced microclimates were grounded in the fact of being in the summer period of the year. Their expectations of harsh heat were gained from the climate conception gained about the character of the Egyptian summer time. Cairo and Egypt as a whole like most regions of the Tropic of Cancer, has two distinct seasons: a long hot summer and a mild winter. The hot months last from May to October, and June, July and August are bracketed as the hottest months with the highest temperatures, while the cold months are from November to April. From a subjective perspective, participants described the Egyptian summer as a very hot season emphasizing the sun's heat as the salient quality, which characterizes the climate of this time period in Cairo and Egypt as a whole. From this standpoint, sunny and shaded microclimates gained their dis(comfort)indications in view of the participants' experiential knowledge of summer climate characteristics.

> M2: So is the sun still a source of heat? Do you still need to hide from it? *The sun generally in summer is a source of bothering heat.*

It was noticeable how the meteorological variation in the temperature was ignored and unrecognized in subjective terms. The perception of the sun as a supplier of harsh heat was discussed as consistent over the whole summer period, and the perception of heat did not emphasize the meteorological climate characteristics of each of the summer months. The fact that the reconnoitring visits were conducted in April (2012) and the fieldwork that included the participants' microclimatic tours were conducted over a period of more than one month from late August to late September (2012), means that from a meteorological

perspective, they were not conducted in the hottest months. However, subjectively the perception of heat did not emphasize the meteorological climate characteristics of the investigated months. The sun was described as a 'cruel creature' by one participant (F, 30's) in April, although this month is considered late spring. Similarly, the sun's heat was conceived as unkind in late September, and was not distinguished from the meteorological hottest months. Participants' awareness was often grounded in a homogenised perception of summer heat that characterized the period in totality, rather than the metrological variation and the heat intensity of the month they were experiencing. Moreover, there were subtle signs and changes in temperature in the days of the participants' tours, and these were consciously perceived many times; however, they were overlooked and ignored in changing the stable harsh perception constructed about the summer time. The following is an extract from my conversation with one of the park's users (M, 30-35), which took place during the reconnoitring visit in April (2012):

> How do you perceive the weather today: *it is not too hot today, it is moderate with a slight sense of heat.* Did you think about what you were going to wear before coming to the park today? *No, it does not matter to me. We are now in the hot summer and so I wear anything light and half sleeved.* Were you happy to visit at park at 2pm? *Well, I was worried about the heat, I felt hot on our way to the park, but I find it much better than what I expected.*

This subjective stability of the perception of summer climate contradicts the meteorological timeline, which indicates increases in the temperature to their peak of heat during the hottest months and then subsequently decreases. However, participants' immediate perceptions of the microclimate reflected the perceptual gestalt of summer. This subjective stability strongly reflects Howard's (2013) views of the human perception of climate as a feeling based on gestalt (section 2.5.3). The climate over the summer period was perceived as a homogeneous felt-time period during which the subjective perception of heat was understood as regular, consistent and stable. This might be gained from the slight differences between the months' average temperatures, as illustrated in table 5.1, showing Cairo's monthly average temperature for the period 1971-2000 from the WMO station (WMO, Updated on 31 Jul 2014). The data shows that June and July are the hottest months. However, it also emphasises that homogeneity of the climate condition over the summer period. Moreover, according to the updated Köppen-Geiger climate classification, Egypt's climatic zone has been steady since 1901, and the study suggests this will remain so until 2100 (Rubel and Kottek, 2010).

| Month | Mean Temperature °C | | Mean Total Rainfall (mm) | Mean Number of Rain Days |
|---|---|---|---|---|
| | Daily Minimum | Daily Maximum | | |
| Jan | 9.0 | 18.9 | 5.0 | 3.5 |
| Feb | 9.7 | 20.4 | 3.8 | 2.7 |
| Mar | 11.6 | 23.5 | 3.8 | 1.9 |
| Apr | 14.6 | 28.3 | 1.1 | 0.9 |
| May | 17.7 | 32.0 | 0.5 | 0.5 |
| Jun | 20.1 | 33.9 | 0.1 | 0.1 |
| Jul | 22.0 | 34.7 | 0.0 | 0.0 |
| Aug | 22.1 | 34.2 | TR | 0.0 |
| Sep | 20.5 | 32.6 | TR | 0.0 |
| Oct | 17.4 | 29.2 | 0.7 | 0.5 |
| Nov | 14.1 | 24.8 | 3.8 | 1.3 |
| Dec | 10.4 | 20.3 | 5.9 | 2.8 |

Table 5.1: Climatological information of Cairo based on monthly averages for the 30-year period 1971-2000 (The World Meteorological Organization: http://worldweather.wmo.int/059/c00248f.htm)

### *5.4.2 Understanding day time as a set of felt-time periods*

The investigated time period of the day was also associated with an ingrained construct of climate and comfort. The significance of the period of the day was evoked in the very early phase of the fieldwork. Getting participants' agreements to visit the park during the noon period was not straight forward. This is illustrated in my following reflective note on the fieldwork journey:

> The microclimate tour was decided for the early noontime period. I faced many refusals when contacting the participants and asking them to participate in the research project. They were not excited about visiting the park during noon time, and emphasized the harsh heat of the time period that threatens enjoyment. Those who had visited the park before, mentioned that they often visit the park during the evening or at sunset. All of the participants felt more comfortable to postpone the visit to a later time in the day to avoid the heat of noon. Many of them preferred to defer the visit to half past four or five o'clock. This "late afternoon period" was declared by some to be enjoyable and comfortable. In fact, this time period was nearer to sunset. Here, I found a need to re-clarify the focus of the research and the significance of the time of the study. Participants found difficulty with the noon-time visit, i.e. 12 o'clock, and after negotiation participants' visits to the park were conducted in a time period after 2 o'clock, which was still troublesome for almost all of them. Only one participant, who expressed her emotions about the park and showed willingness to participate in the research, accepted a visit to the park during an early noon period; however that was due to her commitment to pick up her child from nursery.

These early discussions showed the significance of time in the organization of the outdoor stays in the Egyptian context. It determined time periods when enjoyment was expected and sought for in an outdoor stay, which sheds light on the strong relation between enjoyment and comfort and time.

> M9: Do you usually think about the weather when you decide to go to an outdoor space in the daytime? Would you change your outing because of the microclimate or try to adapt to it? *Yes, if it is too hot, I would not dare to stay in an outdoor space from noon to al Asur time (afternoon). Of course if I am going to a park for recreation, I will choose a time that pleases me.*
>
> F5: *Usually I visit the park after the hot period, to enjoy my stay and to be pleased by the views; after heat has dissipated, I can walk more comfortably and enjoy the place.*
>
> M6: *Usually I visit the park after-noon time to enjoy my stay. I remember on one of my visits, I stayed with my friends at the lake café during hot time, it was quiet and shaded, and then at sunset, we moved*

*to the highest point, it was breezy and the sun had become weak, and we enjoyed the view of the surrounding.*

Of particular interest these discussions of time provided insights into reading the thermal indications during the length of a summer daytime. It exhibited how the perception of heat in subjective terms was not understood as stable over the period of sunshine. Despite the fact that the weather is changing every moment, from the subjective perspective weather over the daytime changes over a larger intervals. There was a stable weather character that describes each interval of the day and determines the conditions of (dis)comfort during this period. This shows that the weather perception over the daytime period was conceived as sets of successive homogenous felt-time intervals.

Participants' discussions of time and weather showed that felt-time periods had subjective borders which indicated a change in the perception of the sun and heat. Felt-time periods were elaborated through different approaches. For example, some of the participants described them in terms of clock time, a period of hours from (…) to (…), while others described them as noon, afternoon, or before sunset.[2] Other participants used the term the "peak" or "hottest" time period, to describe the period when heat and protection from the sun exposure are inevitably significant, and "out of peak" or "safe" time period when the sun is perceived as heat meaningless. Despite the variation in the expressions of the felt time periods, they were inter-subjectively communicated. This acknowledges the presence of the local climate culture and that the immersion in the climate context establishes a similar mode of perception that communicates meaningfully. The following extracts show how felt-time periods were subjectively expressed:

M1: *From 12pm to 4pm is the most critical time here in Cairo in summer to stay in an outdoor space. It is the hottest time. It is the peak of the sun's heat.*

F3: At the beginning of the tour: *Most of my visits were during late afternoon period, or sunset till evening. What are your favourite places? I love the lake area; I so much enjoy sitting there on the grass. Also, I like the highest point; it is too sunny and hot during the daytime, so I enjoy it during the late afternoon and sunset.*

F6: What are your favourite places? *Lake area is lovely, and also the highest point, but only after 5pm.*

F4: Before starting the tour could you describe the microclimate experience needed in that time period? *A place with trees, greenery…*Is it important to stay in shade? *Sure, in a peak time period like now, it is an ordinary preference to stay in a breezy place, a normal need for all people regardless of ages or gender…in this harsh time, there is a need for shade, a nice mild weather*

[2] In the Egyptian social culture, Aza'an (prayer) time organizes the way people perceive the period of the day. Noon time is known to be the period after Azaan Al Zohor (noon prayer), which starts from around 12-1pm over summer season, the afternoon period is known as the period after Azaan Al Asur (after noon prayer), which starts from 3-4 pm over the summer season). Sunset is perceived as the period after Azan Al Maghreb (sunset prayer) which is around (6-7 pm).

> *…it is too hard now at 3pm, the sun is too tough.* Later on, she expressed her conception of time: *From 3pm the sun's heat starts to dissipate, the real harshness of the sun starts from noon (12pm), and from 12-3 is the hardest time.*
>
> M6: Walking to the hill area: *The sun at 9 or 10pm is not as tiring as now, not as hot as now,…. however, from 12-4 is a disaster, its full power, a period of highly induced heat, I wouldn't dare to stay or walk facing it.*
>
> M4: While walking in the formal garden: *It is now harmful to stay exposed to the sun's rays until 5 pm or 4.30…*later on, when do you consider yourself out of the peak time? *As I said before 4.30 or 5pm is a good time to think of going out …it is not a clear shift, sometimes at 5pm you feel it is still hot especially when the humidity is high.*
>
> M4: When is the period when you think of going out is only if it is a necessity? *The hardest period is from 12-3pm, but I felt it started to be bothersome from 10am.*
>
> M3: *I expect the best for the noon time 12 or 2pm is to stay in the promenade, for the shade of its palms. In that period, I think I wouldn't dare walk in sun; I would hide in the shade during peak time. However, out of the peak period, like now, I will stay in the lake area, in the green open space enjoying the wonderful atmosphere.*

Noon time is a term intuitively used to refer to midday, twelve o'clock or the time which breaks daytime into morning and afternoon periods. However, this term also communicated a climate significance. It was conceived as the time period when the sun is perpendicular and its radiation is at its peak, and thus bare shade exists and the sun's coverage is dominant.

> M5: At the entrance plaza: *Well at noon time, I do expect it this place will be completely sunny.*
>
> F6: At the bridge: Have you visited it earlier? *Actually, I used to pass by it only for a reason, at noon it is completely sunny, I don't prefer passing by it.*
>
> F2: How would you expect the microclimate at noon time? *I understand that now areas of shade have increased. It will be too hard earlier; the sun will be persuasive in the node.*
>
> M2: *For example, in this promenade, why couldn't it be shaded by a pergola? Now it is shaded but at noontime - 12pm - the sun is perpendicular and the promenade is sunny. It is a hard time to enjoy walking along the promenade or even visiting at that time. So if there is a permanent sunshade, it will assure the promenade's comfort in all time periods.*

The constructed climate knowledge about the midday or noontime reflected some climatic facts, yet with a blurred identification. The Tropic of Cancer passes through the southern part of Egypt, and thus meteorologically speaking June 21st (summer solstice) is the day with the highest sun in the sky, at around 12 o'clock, and the sun is almost perpendicular, with sun altitude at about 86° above horizon (Figure 5.2). However, participants' discussions of the noontime significance revealed a general conception of this to be consistent over the whole summer period, where it is not only understood as a time with bare shade and extreme sun coverage, but also when the sun is perpendicular. The fact that the sun's angle during the reconnoitring visits (April) and fieldwork visits (over August and September) was far from being perpendicular was overlooked.

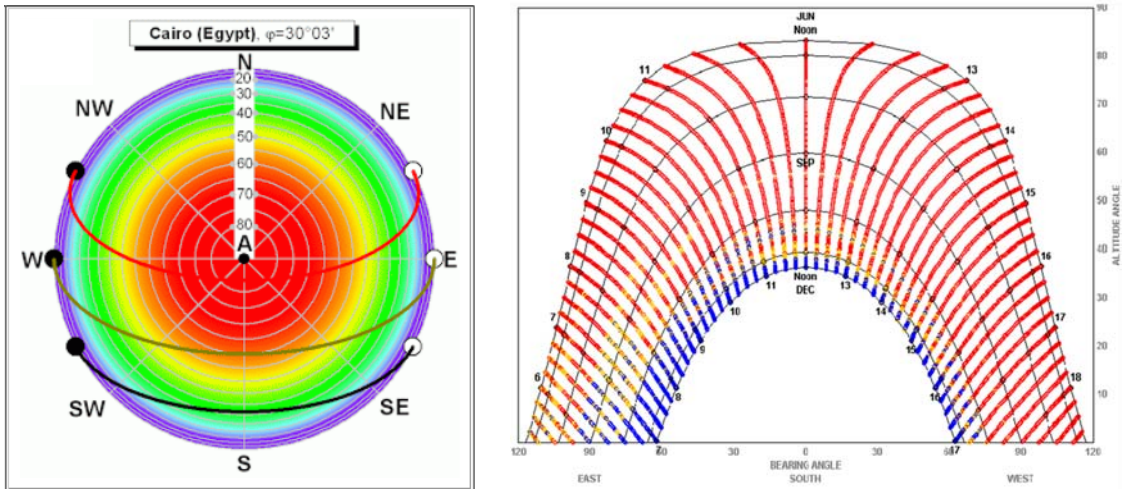


Figure 5.2: The sun altitude in Cairo throughout the year.
Left (Khavrus and Shelevytsky, 2010) right (Rashid and Khater, 2009)

Moreover, participants' discussions of time revealed that, in terms of heat perception, mid-day or 12 o'clock, is not understood as the climax of heat, but rather the beginning of an extended period of harsh heat. This was reflected in participants' communication of the noon time as synonym for an interval of peak time period or hottest time period. Their discussions and the harsh over-heat of noontime revealed it is an extended felt-time period that dominated most of the daytime and subsumed a considerable length of the period culturally known as afternoon. In arranging for the park's visit with the participants, they emphasized their comfort at visiting the park in a period near to sunset (a sunset visit) to ensure reliably escaping the harshness of noon-time. Discussions of the afternoon- the period after afternoon prayer- revealed a perceptual continuation of noon time discomfort. This shows that the subjective borders of the felt-time periods neither have equal length nor coincide with the meteorological classification of hottest period of the day.

> M4: Hill area: *The time period before sunset is the highest relaxation period in the daytime*. Later on before the sunset: *the time period from now, the start of sunset time to sunset, almost from 5 to 7pm is perfect for enjoying the daytime in an outdoor space*
>
> M5: *Nearer to sunset, I will be more thermally comfy when the sun has become a source of light.*

## 5.5 Summary

This chapter discussed the everyday conceptions of climate in the Egyptian context. Participants' immediate perceptions of the microclimate were impacted by the cultural and contextual constructs of climate and time. This emphasized the previously discussed views of Heidegger and Gadamer (section 3.2.1.1), about the impossibility of escaping our historicity, and advocating the possibility of exploring their meaning, content, and impact on

understanding. The everyday immersion and encounter in the climate context establishes a similar mode of perception that communicates meaningfully. In this respect, this chapter provides a deeper insight into the common conceptions of (dis)comfort in the Egyptian context, to offer a platform for understanding participants' immediate perceptions of the microclimate through reading and containing their influence on the new understanding.

The findings in this chapter were unsurprising and expected, as they acknowledge the intuitive constructs about microclimate comfort and discomfort in a hot arid region. However, the phenomenological reading revealed the hidden perspectives in the taken-for-granted constructs of thermal comfort. Moreover, in this chapter the inter-subjective understanding of climate/weather and time is discussed, reading the significance connoted for the investigated time period –the summer daytime period.

The discussion shows that the perception of stability of the climate and the construction of the felt-time period was gained from the steady and consistent character of the Egyptian climate. This elaborates what was discussed by Stehr (1997), where the stability and normality of the climate developed a sense of trust towards the environment, as the sun, for example, is understood as source of harsh heat in summer. This stable character made the establishment of cultural constructs of the climate stronger, in which time, climate, and comfort are related and inter-subjectively communicated. The temporal impact revealed in this chapter discloses further considerations in assessing the findings based on human momentary sensational votes and long term perceptions in conventional approaches to outdoor thermal comfort research discussed in section 1.1.1.

## Chapter Six

# Conscious Being-in the Microclimate

# Chapter 6. Conscious Being-in the Microclimate

## 6.1 Introduction

This chapter outlines clearly the meanings and relationships gained through participants' experiential examination of the microclimate reported in Chapter Four. It brings to the fore significant experiential reflections about the participants' conscious experiences within the microclimate. These provide further understanding of the inherent sense of microclimate perception. The findings gained through analysis of participants' conscious experiences uncover deeper insights into the conceptions about comfort that is taken for granted in the Egyptian context.

## 6.2 The Significance of the Corporeal Orientation to the Sun Radiation

### *6.2.1 Consciousness to the position of the sun*

During the microclimate tours, participants were aware of the experience of a harsh hot period of the day. Many of the participants were consciously aware of avoiding sunny spaces due to fears and anticipation of discomfort. Nevertheless, due to reliable sunshine in summer days in Cairo and Egypt, where there were mostly sunny skies, it was difficult to avoid sun exposure. Such unavoidable occasions, in completely sunny covered spaces, revealed that participants were attentive to the position of the sun as the focal point for causing discomfort. It was observed that participants tracked the position of the sun in their depictions and behaviours. Hiding, escaping, consciousness of its presence, adaptation of posture, walking faster, wearing sunglasses, changing directions, and delaying or minimizing the stays in sunny areas were all examples of the behavioural actions observed among many participants during the walk in the sun. These behaviours suggested that fear of the sun's heat materialized as a tangible direction that dictated the participants' willingness to be in certain places as well as their preference for walking directions. Statements such as, "*The sun comes on us suddenly" and "It is –the sun– not at my back, it is on the left side*" illustrate the participants' consciousness to the sun's radiation. Most of the time, it was unconsciously communicated in their perceptions without direct reference to its position:

> M4: Approaching the lake area: Spending some moments thinking of the direction to walk: *I would prefer not to walk along the lake's pathway now. Is there any other option? I would be pleased if there is.* I pointed to the opposite direction as an alternative to enter the lake: *Yeah; i think this way is much better.*

The participant choose between the two sunny directions, yet, his relation to the sun's radiation was intuited and influenced his decision.

M1: At the highest point: Would you like to rest? (Thinking for a while) Yes, but not anywhere (Hesitated): *In the daytime, I would adjust my sitting posture towards the entrance plaza. At night, I might enjoy the scene of the citadel.* Why did you set that difference, could not you enjoy the citadel scene at day time? *No* (Quick response), *I don't know why.* (Thinking) *Let's try it* (he decided to have the experience).

### *6.2.2 Sunny atmosphere is inconsistently uncomfortable*

In continuation of the analysis in the previous sub-section, during participants' experiences of sunny spaces, materialization of the direction of the sun's heat led to the realization that there are changing perceptions of microclimate (dis)comfort. It was unsurprising that feelings of discomfort were revealed in sunny spaces at that harsh period of the day. However, feelings of comfort that were perceived during experiences in sunny spaces, and in the Egyptian climate context, and which sometimes reached states of pleasure and enjoyment, such as in the lake mid-pathway, were obviously surprising.

F3: After the shaded area of the lake café building, she turned left toward lake: *I feel the direction of the sun matters too. Here walking along this segment now is more comfortable from walking along the sunny promenade* (when the sun was facing us).

M9: At the lake: I noticed that the participant was walking faster than the normal. I asked him to rest somewhere, but he said: *We can rest somewhere when the sun is in our backs.* Later, when we sat on the mid-pathway: *Although we are in a completely sunny space now, we have been sitting here for around twenty minutes now and I could not see any shade around, but I do not feel any thermal discomfort……* Later: I expressed my willingness to continue walking; however he was not excited: *I am having a pleasant experience, although I have started to feel the heat on the back of my head.*

F5: This was the only participant who visited the park in the time period when the palm promenade was almost sunny. It was unusual for the participants to avoid walking to the lake area (southward). However, this participant chose to walk towards the formal garden (northward) in order to walk in the opposite direction of the sun. During walking: *It is sunny here, but I'm not feeling hot, however. I will feel hot after a short time if we walk longer in this sunny weather.*

The perceptions of variant levels of comfort within the same sunny microclimate were repeatedly experienced by all of the participants. Readings of these occurrences were pivotal in outlining the subjective sense of the microclimate. Originally and interestingly, these occurrences revealed a new understanding of the sunny microclimate, which did not support the general conception about the taken-for-granted uncomfortableness of the sunny microclimates.

The occurrences of changing perceptions of comfort within the sunny spaces prompted a deep reading of a relation between one's orientation, direction of the sun's radiation, and perception of (dis)comfort. The analysis of this relation revealed obvious differences between

the perceptions of the microclimate when staying in direct and full exposure to the sun's radiation and when standing opposite to the sun's radiation. Themes reported in Chapter Four showed that participants' physical orientations to the sun's radiation were clear in shaping their perceptions of microclimate and comfort. Participants' experienced relationship to the sun affected their perceptions of heat, and consequently, created their perception of (dis)comfort. A significant occurrence was the experience at the promenade's extension, where participants emphasized the harsh and uncomfortable microclimate immediately when they walked facing the full and direct sun for an uninterrupted and extended period of time. However, after changing orientations and walking away from the sun's radiation in the same sunny atmosphere, the harsh perception of heat was dissipated and somehow seemed forgotten. Another significant moment was noted at the lake when a few participants stayed at the mid-pathway and turned their posture to take a glimpse of the citadel beyond. This adaptation led to staying in a direct relationship to the sun's radiation. Immediately, an extreme change in the microclimate perception was intuited and disclosed, shifting from highly pleasant and refreshing to harsh and uncomfortable.

> M2: In the lake's mid-pathway: *Here, in that place, I could rest on any of those benches in this area, opposite to the sun's direction and enjoy looking at the lake.* What about your experience of that green space behind you? *It is too difficult to stay in it now. The sun is highly dominant in the space and hitting the ground, with no shade at all, I would pass in it but I could not dare to sit. Staying opposite to the sun soothes the weather. It is better for resting in order to interact, (*turning around) *if I stayed in sun's direction, I would need to close my eyes.*
>
> F5: At the bridge looking southward: *Although the view of the citadel is stunning, I don't know why the other side of the bridge is more thermally comfortable. Isn't it? It is not as hot as this side.* (Thinking), I was waiting for her justification. Adding: *I think it is related to our posture to the sun...*

The following extract shows how the shifting of postures in an open sunny space clearly affected and changed the perception of the microclimate:

> M1: Approaching the lake mid-pathway, the participant was conscious that we changed our orientation to the sun on this part of the path: *Now there is a sensed wind breeze that passes by the water in advance, and the place is opened. We can rest here for some time.* At that moment we were on the mid-pathway: *The sun is at our back. I can feel the breeze better and it is soothing me in the sun.* Adding: *It is really a nice area here. The sun is no longer on my right cheek. We have been staying here for more than two minutes; nevertheless, I am not annoyed by the sun and I don't walk to leave the place.* It was the first time for him to visit the lake area; he was interested to turn around to see the citadel beyond. Turing around, he directly faced the sun. He noticed the sunny pervasive green area: *Look at this area. People are sitting along the edge in the shade of the shrubs. Nobody is resting in the centre. I would not dare to stay in this sunny area at that daytime. Also, there is something dry in the place. There is something missing and dry in this view of greenery area. Although the citadel is in the background and it is a wonderful scene that should grabbed my attention, as I usually looks for scenic views, I cannot enjoy it or even see it. I feel the sun is too hot. There is a sense of drought in this scene in front of me, isn't there?*

*I don't know exactly why, but I feel it that way.* The feelings of dryness reflected the feelings of discomfort and the harshness of the heat felt.

### *6.2.3 Understanding of the perception of shade's comfort*

Understanding the comfort experienced at shaded times was a primary concern in understanding the perception of comfort. The shaded microclimate was always sought and appreciated from the standpoint that it prevented the exposure to the sun. The verbal expression of semi-shade revealed anxiety and discomfort when a few participants were asked about their conception of the comforts of a semi-shaded microclimate. In fact, almost all of the participants' shaded microclimate experiences were in reality semi-shaded, where sunlight permeated the shade to varying degrees. The comfort of shade was perceived due to the feeling that shade dominates over their bodies. This observation originally deepened the understanding of the perception of shade's comfort as feeling filtered from the sun rather than an absolute screening of the body from the sun.

However, comfort was not always experienced in the shaded and semi-shaded patterns. Some participants had experienced instances of discomfort during their inhabitation of shade and semi-shaded areas. "Fake" was a description used by a participant capturing his feelings as uncomfortable, but inhabiting a shaded area. The reading of the experiences of "fake" shade significantly developed the understanding of comfort in the shade. The discomfort in shade was perceived when the participant's orientation within the shade area allowed direct facial exposure to the sun. This exposure disturbed the comfort and ability to relish the shade. The experience of the palm promenade emphasizes how the comfort of shade was sometimes provoked by slots providing direct exposure to the sun.

M4: In the palm promenade: How do you experience the promenade right now? *I enjoy the place here more, I feel sheltered when walking, the sun is not dominant on me, it is slightly penetrating the promenade, but not annoying. However, if I stopped or stayed in any of these sunny spots, I wouldn't be comfortable.*

Progressively and due to the longer conscious experiences in different microclimates, participants' awareness of their physical relationship to the direction of the sun changed their preconceptions about the reliability of finding relief and comfort in any shaded ground coverage. Instead, they became more aware of, and selective in, the description of a comfortable shaded microclimate.

F1: During her stay in the formal garden, she commented on the outdoor terrrace of the hilltop building that was sheltered with umberellas: *It is a good place to rest in, however, at that time period and all daytime, it won't be good to rest in the outdoor area because it is still facing the sun. The shades do nothing as it will be uncomfortably sunny due to its southern orientation.*

F1: While continuing going on up towards the highest viewpoint, she expressed her attraction to two trees: *Something is attractive to me, I would like to sit beneath the trees;* (Laughing) *Actually, we should be resting in their shade, although now there is no real shade, but they gave a fake impression of shelter.*

M2: Fountain node: If you thought of resting at the node, where would you choose to stay at that time? *I would try to find a place beneath a shade tree;* Such as? *This bench to the right side, the sun will be at the rear.* Did you consider the sun when you make your choice? *Yeah, this side is shaded by the tree, and if I sat on it looking to the fountain, I would not be in the sun's path. I will be really shaded by the tree. While the other side, although there is a shade tree, its shade isn't covering the bench as much. So I won't be sufficiently covered by shade when resting there,* adding: *and that's justified by the empty benches on that side.*

The analysis of participants' experiences in shade revealed that any direct relationship with direct sun prevented the perceptual receptiveness to shade comfort, even when shade was relatively present over the rest of the body. This condition for the perception of shade emphasizes the significance of the physical orientation to the sun in understanding the microclimate, from a subjective perspective.

### *6.2.4 Inter-subjective communication of the new knowledge*

Though the significance of participants' physical relationship to the sun was clearly implicit in their perceptions, the outlining of this relationship was developed and disclosed after participants' extended immersion in the microclimate and conscious examination of different positions relative to the sun. Many participants developed their intuitive understanding of their microclimate and understood the significance of their physical relationship to the sun as a key component of their microclimate. The developed understanding of what constitutes a microclimate was not only recognized by many of the participants, but was also consciously investigated. A few participants examined the soundness of their interpretations by intentionally altering their positions in order to experience different relationships to the sun. It was also noteworthy that some participants, at the end of their tours, referred to particular experiences of sunny places as the best microclimate experiences. The preferences for these sunny spaces, as stated by them, was conditional on staying away from the sun. This inter-

subjective communication justifies the new knowledge established about the significance of the physical relationship to the direction of the sun's radiation and becomes strongly reliable.

> M8: While walking, the participant put forward an interpretation of his microclimate experience: *It is a matter of walking facing the sun's direction or opposite to it. This surely has a clear emphasis of shaping a microclimate experience and enjoying a place.*
>
> M6: Sunny promenade: Could you rest for some time in a space like that now? Or only when walking? *Yeah, the most important is not to be directly facing it - the sun, I could adjust my orientation to make the sun facing my side or back…* Later near to stepped platforms area: Would about considering a resting place? *It is a nice place for resting. Actually, there are many nice places in the park that are lovely resting spots, but the only determinant is our orientation to the sun, I can sit anywhere, only adjusting my position to opposing the sun to be more comfy and to look around me more freely. Now I am comfortable in this position although we are staying in a sunny place* (we were opposite to the sun).
>
> M3: At the fountain node: Where would you stay? Looking around*… I think I could sit on that bench so that I would be opposite to the sun and not facing it.* So you consider your orientation to sun when looking to rest? *Yeah for sure I need to be opposite to the sun now to feel comfortable….*Continuing onto the sunny promenade (facing the sun): How are you experiencing the sun now? Is it still harsh? *Yeah it is still annoying, but now we are walking with our faces towards it. I think this sensation might differ if we were to walk in the opposite direction when the sun would be behind us.*

## 6.3 Relation to the Environment as an Indication of (Dis)comfort

Knowledge established about the subjective perception of the microclimate and comfort embraces a deeper phenomenological account of the relation of the subject, as a corporeal being and the environment. The reading of participants' descriptions and reactions showed how participants' physical relationship to the sun radiated outwards. The perceived microclimate (dis)comfort was captured in participants' relation to the surrounding context. On the palm promenade, when participants had a lengthy time in full shelter, high levels of interactive exploration and engagement occurred, where the comfort of the shade provided a sense of enjoyment. However, when the shade was followed by full and direct sun exposure, facing the sun generated a significant and noticeable behaviour change, toward isolation from the spatial context, as participants' principal aim was to escape from the sun. This revealed that the experience of an uncomfortable relationship to the sun inhibited the realization of another quality besides heat. This understanding was developed in the curvilinear pathway with intermittent spots of shade, which showed how participants' interaction levels changed from shade to sun exposure during their walk. This revealed that contextual interaction, enjoyment, and communication are indicators of shade comfort. However, isolation and displeasure were indicators of discomfort, where reflection on the surroundings was seemingly difficult during full and direct exposure to the sun.

F5: Promenade extension: *The sun appeared again, the good imperssion gained has vanished. The sun is not only a source of thermal annoynace, but it also obstructs my view. I couldn't see anything in a sunny space. I only wanted to walk faster and look down or…(*at that moment she wore her sun glasses).

F1: Promenade extension*: I got hot suddenly after the palms ended. The weather was completely different in the promenade and now here it is a totally uncomfortable one, as if we were in an air conditioned space and suddenly we went out at the wrong time.*

M3: Promenade extension*: The sun in this part has put me in a bad mood, and it disrupted my interaction and relationship with the space.*

M5: At the bridge*: The direct exposure to sun couldn't stimulate any kind of comfort or enjoyment even in winter time.*

Interestingly, signs of interaction as well as enjoyment, similar to those that were revealed in the shaded microclimate, were also revealed in completely sunny spaces, yet this occurred when participants' were oriented away from the sun. Staying away from direct sun radiation enlivened the participants' relations to the space. Participants engaged comfortably in the context and the spaces around became visible and perceptible. The relation between contextual interaction and physical orientations to the sun was intuited by some participants. The following is an illustrative extract of a participant realizing a "gathering node" when he felt comfortable:


M5: Gathering point: Walking back from the lake towards the lake café entrance, the participant stopped by a node: *In this gathering point, I feel the breeze better in that posture and this node encourages me to slow down and take a break to enjoy the breeze and have a chat.* Looking around and facing the sun then adjusting his posture again: *When we were walking to the lake, my eyes were facing the sun and I didn't notice the presence of this gathering point. I only wanted to hide from the sun. I was bothered by my eyes' exposure to the sun, looking down most of the time. Facing the sun constituted my experience of the surrounding. However, now in this mode, I started to enjoy and observe unnoticed details.* Looking around: *For example, I didn't notice those people resting over there on grass the first time. Now, I start to notice and perceive the surroundings. When I was facing the sun, I wasn't attentive to the sensation of breeze. Actually, I didn't have time to feel anything; I only walked faster. Now, I started to enjoy, contemplate and feel the breeze better. It is the first time I notice this gathering point. It attracts me to stop and enjoy the breeze.*

Moreover, during sunny experiences, when participants were aware of the experience of the hottest daytime period, it was observed that the sun coverage sensuously related to the participants in variant expressive forms. During moments of direct and full sun exposure, participants' focal emphasis was on the sun as the source of harsh heat. Their perceptions of

the sun's ground coverage symbolized their perceived harshness which intensified feelings of discomfort. However, occasions when participants stayed with their backs to the sun, the harshness of the sun was seemingly forgotten, and the description of the sun's ground coverage was neutral and without any negative feelings. Sometimes, the sun's ground coverage was reflected upon as a pleasant daylight as shown in the curvilinear pathway, which indicated, to some extent, the comfortableness of the microclimate. This revealed that the physical relationship to the sun impacted the way the sun sensuously radiates outwards onto to the subjects, and was reflected in their visual perception of sun coverage.

> M5: At the bridge: *I enjoy the sun so much, but only when it is indirect, like now. It is still daytime but I'm not exposed to the sun.*
>
> F2: The participant turned eastward to walk along a secondary path but I asked her to continue walking along the promenade if possible: *Okay….you intend to keep me walking in the sun to interrogate my feelings and sensations*. The two paths were in full sun; however, her description gives the impression that if she changed the orientation, she would not feel the sun exposure.

Not only does microclimatic comfort establish the structure of a contextual relationship, it also enhances the perceptual receptiveness to finer atmospheric qualities. This was particularly illustrated by reading the moments of awareness of the breeze sensation. The reliable and consistent sensation of wind –strong breeze is not sensed in Cairo's spaces, unless there is a peculiar spatial characteristic, such as being considerably high or pervasively open. Thus, the term breeze better describes the gentle character of wind that is felt inconsistently. The reading of participants' occurrences of breeze sensation suggested that the breeze sensation was a cue dictated by one's physical relationship to the sun. During the harsh and direct exposure to the sun, a breeze sensation was commonly missing in all participants' experiences. Staying in full and direct exposure to the sun prevented the awareness of breeze sensations, and evoked claustrophobic feelings of the atmosphere. On the other hand, the awareness of the breeze was greatly stimulated by a sheltering perception. It was usually expressed in participants' depictions along with the shade. Participants' shaded experiences communicated shade as a cool microclimate due to their conceptual association of shade along with the sensation of a gentle breeze. The breeze sensation increased the relish of the shaded microclimate, as described by some participants.

> M1: While walking after passing by the palm promenade and fountain node: *Shade has a big influence on being able to sense the wind on my body. There is an inverse relation between feeling the heat of the sun and sensing the wind breeze. I can't feel the breeze in a sunny area the same as I can in a shaded one.* We were facing the sun at those moments. *Now, while passing through sunny and shaded intervals, I feel the breeze from time to time when I am in the shade.*

M6: Staying on the stepped platforms and expecting the microclimate of the palm promenade: *It is shaded, and generally as long as we are in shade, we intuitively feel gentle breezes passing by, unlike sunny spaces, where you need a strong breeze to neutralize uncomfortable feelings...*

F5: In a shaded slot at the top of a small hill overlooking the formal garden: *With the presence of shade here, it changes my mood* (after exhausting direct sun exposure) *I enjoy staying here…Once we moved to shade, I felt the breeze better than when being-in the sunny place, don't you feel the same? There is a real sensed shift in the weather. The breeze in the shade is better sensed than in the sunny microclimate, especially in the transition from sun to shade. I think it may be a psychological impression gained from entering a shaded place after being in a sunny place.*

However, it was noticeable that during the stay in completely sunny spaces, the perception of the breeze was obviously evoked when participants remained facing away from the sun. Participants described the gentle breeze sensation as softening their sunny microclimate experiences. This interpretation of a breeze's perceptibility suggest that the avoidance of a direct relationship to the sun's radiation allowed the sensation of breeze to preside over feelings of heat. The prolonged and conscious examination of the microclimate uncovered a relationship between the breeze sensation and one's physical orientation to the sun. During the microclimate tour, this relationship was intuited and implicitly disclosed by many of the participants.

Figure 6.1: The emphasis on the relation between breeze sensation and one's physical relationship to sun radiation revealed at the highest viewpoint[1]

F5: Highest point: How do you experience the place? *I'm pleased by the continuous breeze in the place. Breeze creates comfort because it relieves the heat of the sun. Of course I will not face the sun, but when staying with my back to it, the breeze overshadows the heat.* Leaving the highest point and walking southward facing the sun: *As long as my back was facing the sun, I felt the breeze better and had a wonderful weather experience. I did not feel bothered by being in a sunny place at that hot time; however, once I faced the sun, I felt the heat, and needed to leave the place, as I couldn't feel the breeze any more, as if it had stopped.*

M1: At the highest point: We stayed in a position looking at the citadel: *I don't know, but the weather is blocked in that place and there is no sensed breeze, it stopped.* Adding: *The breeze is the main thing that reduces my heat. I feel hot now. It might be because by looking at the citadel, we are*

[1] The analysis of the highest viewpoint was not included in Chapter Four; however, here, I employed it due to its significance in the understanding of the relation between breeze sensation and physical relation to the sun. This is due to the reliable breezy character of this space, for its considerable height and openness, which made understanding of the sensation of the breeze in relation to the sun obvious.

> *directly facing the sun and that increases my temperature and draws my attention back to the hot sun…I think, here, in this space if I planned to rest, I would try to choose a position opposite to the sun to better feel the breeze…*Leaving the highest point and walking facing the sun, I asked him to take a photo of the space. He adjusted his posture to take the photo, suddenly he commented: *I feel the breeze better in this posture, don't you feel the same? When I walked in a direction away from the sun, I felt the breeze better than when it was directly on my face. Sensing the breeze directly on my face is really making a difference. When I walk feeling the breeze on our face it soothes me at this hot time of the day.*
>
> M8: The participant started to intuit the impact of his relationship to the sun on his microclimate experience; however, he was curious to investigate and emphasize his reading of this relationship. He decided to go back up to the highest point and then go down using the opposite staircase to experience different relationships to the sun: *When I was going down on my way to you, opposing the sun's direction, I really sensed the breeze better, the breeze was cool. I felt the powerfulness of breeze on my body in this orientation, I think my sensation of the breeze is related to staying away from the sun.*

This knowledge establishes how the perceived microclimatic (dis)comfort is beyond a simple inhabitation of sun or shade as atmospheric patterns on the ground. Instead, it is an atmospheric medium, where our physical relationship to the sun radiation establishes different perceptual mediums, which shape the relationship to the surroundings. The findings emphasized how the perceived microclimate inhabits one's perception of the surrounding context. The physical relationship to the sun creates a perceptual medium that enables a very specific experience of spatiality. This relationship impacted the levels of communication, pleasure, and interaction between the person and the context. Thus, users' relationship to the sun's radiation determines levels of enjoyment and contextual engagement.

### 6.4 Bodily Behaviours within the Microclimate

Immediate corporeal experience constituted an important platform for understanding participants' feelings of the microclimate. The findings revealed that the body is key in microclimatic microclimate perception. Bodily behaviour was engaged in the indication of (dis)comfort. Participants' movements unconsciously intuited and reflected the state of (dis)comfort perceived. All four cases clearly revealed how feelings of comfort were embodied in freer and slower movements, giving time for exploration and enjoyment. However, discomfort was revealed through faster movement and quicker walking pace, avoiding any distraction or interruption in an attempt to minimize exposure to the harsh microclimate. Walking faster than normal was an instinctual bodily reaction to quickly put an end to their discomfort. It became clearer at the lake area when the physical movements were discussed as greatly relieving action, which psychologically attempted to ease the feelings of heat and

claustrophobia. These bodily observations showed that the human body constitutes a way of perceiving and understanding the world.

> M5: *I really felt a difference now* (entering the promenade extension)*. In the shaded part* (palm promenade)*, I could walk slowly, feeling comfy, but now I only need to walk faster.*

The implication of this knowledge raises the question of whether we create our microclimate and comfort. Actually, the findings strongly suggest that there is the potential for human being to create their own microclimate comfort, where the body adapts to conditions of the microclimate. This understanding embraces the implication of the self in creating and initiating the conditions of a microclimate. Moreover, participants' conception of sun sheltering was understood as a need to stay in the shade of a sheltering object. However, their experientially based examination and perception sharpens the notion of feeling shelter. Feelings of shelter from the sun's heat during sunny atmospheric experiences were realized through the bodies' adaptations (figure 6.2). When the body was oriented far away from the sun rays, this corporeal orientation psychologically served as a barrier or shelter that inhibited feelings of harsh sun exposure. This postural orientation created the conditions that make it possible to stay in the sunny space during a hot period of a summer day.

> M7: The highest point: *The weather here is good at any time, even when it is hot. There is a fantastic fresh breeze, and I could stay here for some time even in the hottest period of the day. I won't look for shade and I won't be bothered. I only need to shift my orientation and enjoy the view, the breeze will soothe the heat.*

Figure 6.2: Participants reached an awareness of the impacts of their orientations relative to the sun rays.

This way of understanding the perception of sheltering did not support the separation between the sheltering object and the sheltered subject. The implication of the corporeal orientation showed that the perception of comfort is not necessarily acquired through the experience of a shaded microclimate or spatial shelter but rather, comfort is realized from one's feeling sheltered without the necessity of an external sheltering feature. It is the self's corporeal orientation that shelters oneself, where humans, through their bodies, appear to create their own microclimatic comfort.

## 6.5 Understanding the Subjective Perception of Discomfort

This section provides in-depth extrapolation of the generators evoking bodily discomfort during physical orientation to full and direct sun and leading bodies to adapt and take action to achieve comfort. This deep reading of discomfort caused by direct sun exposure alternatively elaborates the essence of feeling comfortable.

### *6.5.1 The significance of facial exposure to the sun*

> M9*: Off!! What a terrible heat. The space here is strongly exposed to the sun. I'm not pleased by this direct exposure to the sun…* I noticed the participant's face at that moment. He showed signs of distress. I asked him about the reason, he said *"I feel my face is burning, I could not bear that sun exposure anymore".*
>
> M8: *The sun is hitting my face*
>
> M4: Walking along the curved paved pathway heading to the lake area, the path turns its orientation to be directly facing the sun; the space was quiet as few people existed nearby. How do you experience the space now? Do you like it? *No, I like its quietness but i feel the sun is similar to a powerful lamp that is too close to my face, hitting my face.*

Examining participants' experiences of full and direct sun, discomfort was commonly and frequently described as harsh and insensitive facial exposure to full and direct sun, as opposed to other parts of the body. The transition from facial shelter to facial exposure to the sun usually revealed perceptions of change in the configuration of the atmospheric medium. An illustrative moment here is when participants reached the promenade extension after a lengthy full shelter in the palm promenade, as heat was consciously perceived once the face become directly exposed to direct sun. Moreover, the perception of discomfort was reflected in facial expressions showing signs of distress. "*My face is burning*" is a distinctive description of a participant (M9) describing his feelings during full and direct sun exposure as if he was in pain. Looking down, when walking in full and direct sun, was a common behaviour observed amongst participants. This indicates that comfort in the sunny microclimate is perceived in a corporeal mode, which prevented facial exposure to the sun. Feelings of facial shelter delayed and dissipated perceptions of heat caused by sun exposure for considerable amounts of time, and evoked breeze sensations on the face.

Moreover, the presence of direct facial contact with sunshine created significantly uncomfortable microclimate feelings, even when the rest of the body was covered in shade, as illustrated in the shade of the palm promenade. The bodily comfort was gained from extended facial sheltering from the sunlight provided by vegetation. While walking,

participants experienced insignificant moments of direct exposure to sunlight, caused by light emerging from in-between the tree foliage. Once staying in an area with direct facial exposure, whole bodily discomfort was evoked; however, it was immediately relieved by longer moments of shade. The experiences of "fake" shade were clearly constituted by the presence of facial sun exposure, which disturbed the shade comfort. On the other hand, moments in which the face was sheltered from direct sun by an object yielded experiences of comfort even when the rest of the body was to some extent exposed to the sun.

> M4: At the lake we sat on a shaded wooden bench at the beginning of the lake pathway. After harsh exposure to the sun, the participant chose to sit on that bench expecting the microclimate to be breezy: *Once we sat in shade, we felt the refreshing breeze...* Looking at the surrounding context: *Look, when the breeze moves the palm's fronds, the sun faces us...It is good to feel the breeze, but i wish the fronds do not move so they would keep sheltering me*. The participant was conscious of his relationship to sun as he felt bound by the shade cast on his face created by the palm fronds. He added: *I am not comfortable now because if I rest my back, my face would be exposed to the sun. I must avoid moving into the sun, especially my face.*

The descriptions showed that facial exposure to the sun positively affected the whole bodily perception of the microclimate. This disclosure of facial significance exhibited the face as a thermal perceptual organ through which (dis)comfort perceptions were gained.

### *6.5.2 A physiological investigation of the facial receptiveness to heat*

The emphasis on the face raises the question as to why discomfort of the whole body was described in particular by the relationship of the face to the sun. Some other body parts were also exposed to direct sun, such as the arms and feet, as many of the female participants wore sandals in summer. However, the face was revealed as the most exposed region. From a physiological perspective, some studies have found that skin temperature, independent of core body temperature, has a significant effect on the thermal perception of the environment (Mundel *et al.*, 2006). From a scientific standpoint, the head region carries the highest concentration of thermal receptors (Tamura and Lee, 1995a; Tamura and Lee, 1995b; Nakamura *et al.*, 2008). Many studies focusing on the thermal sensitivity of human skin in indoor thermal environments found that the face/head has a relatively greater thermal sensitivity than other areas of the skin (Arens *et al.*, 2006b; Arens *et al.*, 2006a; Mundel *et al.*, 2006; Nakamura *et al.*, 2008). This relates to findings from Nadel *et al.* (1973) that the facial region has a greater proportion of warmth receptors per unit than any other skin area. Other recent studies have gone further, as they studied the thermal sensitivity of human body parts and the relation to overall perception of bodily (dis)comfort. A study by Mundel *et al.* (2006)

found that in warm environments, when the whole body was uncomfortable, cooling of the face was associated with improved perception of thermal comfort, concluding that cooling the face can positively affect subjects' discomfort. Another study by Arens *et al.* (2006a) found the same result, adding that in warm environments, when a subject's whole body was uncomfortable, facial warming was the most uncomfortable and that when the whole body was perceived as slightly warm or hot, the head region was perceived as the hottest and the least comfortable. The authors concluded that the overall body (dis)comfort closely follows the warm head sensation.

Interestingly, these results support what was experientially observed in participants' perceptions. Taking the face as indicator of overall bodily comfort may explain that this part of the body is most responsive to hot and cold sensations. In addition, the analysis of participants' descriptions found in their expressions of the harshness of the sun's heat on their "face" was in sometimes called out by referring to the "cheeks". The analysis of participants' verbal description of "cheeks" supports the physiological account about the particular thermal sensitivity of the facial skin to warmth.

> M1**:** *We have walked a long distance facing the sun; I really felt the heat on my right cheek.*
>
> M4: The promenade extension: *The main problem in this area is the direct facial exposure of the sun on my right cheek. I wish there would be any other option than walking in this direction.*

So far, no studies have been found on the thermal sensitivity of bodily parts and physiological comfort in outdoor environments, with regard to sun exposure. Despite the previously discussed studies are concerned with indoor conditions, these studies give insights into interpreting the particular significance of facial exposure to the sun. Knowledge gained from these studies made it possible to interpret the discomfort perceived when participants experienced direct facial exposure to the sun, as resulting from physiological sensations of heat on the face, and the concentration of the thermal receptors is strongly invoked to explain the strong thermal discomfort produced by facial exposure to heat.

### *6.5.3 Questioning the immediacy of discomfort feelings*

Drawing back to results of these physiological studies, it was observed that it takes time for the facial skin temperature to rise. A quick reading of thermal tests on the face elaborates that it often takes a couple of minutes for the facial temperature to increase or decrease. A study proved a sudden exposure to intense heat caused an immediate increase in the temperature

on the facial skin (Nadel *et al.*, 1973). However, reading thermal patterns shows that the immediate increase was found as taking one minute for the temperature to rise and feel uncomfortable. The fact that it takes time to start to feel uncomfortable acts as a question and challenge to the common perceptions of the participants, who often expressed immediate and sudden feelings of discomfort once facing the sun.

Arens *et al.* (2006b) gave a more plausible explanation of the phenomenon that is relevant to my findings. When they discovered the perception of 'very comfortable' was only expressed in the transient between extreme environmental conditions, particularly when the face was cooled after being in a warm environment, it was explained that the perception of comfort was anticipated and overshot the coincident skin temperature. This occasion invokes what ASHARE[2] has stated about thermal comfort as a psychological state of mind, which is not necessarily to be in a direct relationship with the magnitude of a physical stimulus, but rather the perception of comfort depends on other psychological factors such as expectation (Nikolopoulou *et al.*, 2001).

This theoretical discussion seemingly interprets the phenomenon of the immediate expression of perceptual change from facial exposure to sheltering and vice versa. The perception of discomfort caused by full and direct sun was not necessarily relevant to a corresponding shift in physiological skin sensation, as the temperature of the facial skin takes minutes to rise. Instead, reading of this phenomenon reveals a psychological impact, as this interpretation evokes the significance of the participants' familiarity with the Egyptian climate context that impacts their expectations and perceptions, causing them to anticipate in advance the discomfort feelings associated with a sunny atmospheric configuration. Discomfort is evoked by the perception of facial exposure to Egyptian summer sun. The immediate perception of discomfort allowed possibilities for the interpretation of facial exposure to the sun as a meaningful exposure, grounded by familiarity with the climate context and reflected in the whole bodily perception of the microclimate.

### *6.5.4 Seeing the heat "it is –the sun – hot in my eyes"*

It was noticed in physiological studies of thermal sensitivity and comfort that the head and face were not differentiated. However, participants' relationships to the sun pointed out a

[2] See sub-section 1.1.1

clear difference. Participants revealed that direct facial sun exposure created immediate discomfort and feelings of heat, unlike the exposure of the back of head to the sun, which dissipated and overlooked the feelings of heat, preventing the perception of immediate discomfort. This prompts understanding of which discriminating factors are initiated by the direct facial exposure to the sun to instigate immediate discomfort.

The over-emphasis and repetition of specific parts of the face, "the eyes", was observed in the majority of the participants. Participants' perceptions of immediate discomfort revealed a strong significance of "eyes' contact" with the sun's radiations. The emphasis on contact by the eyes with the sun further challenged the interpretation of the discomfort perception as an ultimate physiological sensation of heat. Instead, it positively allowed for the interpretation of a discomfort perception as acquired by the visual perception of the sun's radiation. The immediate visual and direct contact with full and direct sunlight induced immediate perceptions of heat and discomfort, not only of the face but of the whole body.

> F2: Walking along the promenade extension: *It is a good passage, but frankly the sun is too strong and it is in my eyes.*
>
> M6: Sitting on the bench at the lake mid-pathway: *Now, the sun is facing my back, I feel comfortable, my eyes are opened, and I'm enjoying the surroundings, I feel a breeze… I am really enjoying the weather now.*
>
> M4: promenade extension: *I find a difficulty now to focus on the spatial details because of the sun's powerfulness on my face and eyes, disrupting any kind of comfort or contemplation.*
>
> M5: We were in the lake and then we walked back towards the lake café in an orientation opposite to the sun: *Now, we are walking in a sunny microclimate, but our eyes are not facing the sun anymore. I feel more comfortable than in earlier moments when we were walking in that path facing the sun.*
>
> M9: At the formal garden: I found him tracking the position of the sun to decide where to sit: H*ere we will have a direct eye contact with sun,* looking to the benches on the opposite side and choosing a seat that allows him to enjoy the place and prevented the direct facial exposure to the sun.

This understanding suggests that discomfort was visually perceived. The human eye can only see visible light wavelengths. The analysis in Chapter Five about cultural constructs of local climate and (dis)comfort referred to the perception of a meaningful sun, which is not only perceived as an incandescent source of light, but as an insensitive heat source with harsh thermal qualities. This means the visual perception of the radiation includes thermal components. The perception of this meaningful sun was evoked once experienced in full and direct contact. The participants not only stated their discomfort, but also many of their behavioural actions signified the perception of seeing heat. Reactions such as narrowing eyes showing facial signals of distress and disgust, causing participants to look down towards the

ground occasionally, were facial adaptations in an attempt to reduce the facial exposure to the sun and minimize the eyes' direct contact with the sun. Figure (6.3, left) captured one of the participants during her experience of full and direct sun. She unconsciously placed her hand on her forehead to create a sunshade in an attempt to block the sun from her eyes. It was an instinctual reaction to reduce her feelings of heat. The interpretation of whole bodily discomfort caused by seeing sun rays on the eyes also accounts for the reason why the few participants who put on sunglasses did not emphasize the harshness caused by direct exposure as much as participants who did not wear sunglasses.

Figure 6.3: The significance of eye contact with sun radiation
Left: The participant placed her hand on her forehead to create sunshade on her eyes. Right: The participant stayed with many parts of her face exposed to sun, but her eye region is sheltered. She was feeling herself in shade.

On the other hand, experiences, such as those on the lake's mid-pathway showed that participants were aware of the sun, seen through its ground coverage; however, staying in an orientation opposite to the sun prevented direct visual eye contact, allowing improved comfort perceptions. The significance of eye contact with the sun sheds light on facial protection, and particularly eye protection from the sun, as a key constituent for the realization of a shaded microclimate perception (Fig 6.3, right).

This interpretation provides an understanding of how the discomfort felt was not brought only due to physiological sensations, but multi-sensory interactions grounded psychologically by ingrained familiarity with the climate context. This knowledge suggested that the microclimate perception is dictated by the visual perception of direct sunlight, where the cultural construct about the summer sun in the Egyptian context was perceived once in direct visual contact with the sun. The perception of the sun was grounded contextually by the participants' habitual experience in the Egyptian climate and the ingrained meanings the Egyptian summer sun holds within this climate context. The harsh thermal feelings experienced through facial exposure, and reflected in the whole bodily perception of the microclimate once in full and direct sun exposure, were evoked by the direct eye contact with sun rays.

## 6.6 Temporal Awareness: Time felt and time understood

Time conjunctions were present implicitly and explicitly in participants' microclimate perceptions. Temporal expressions such as "*now", or "at that time of the day", or "at …o'clock"* were repeatedly in conjunction to the description of the microclimate experience. For example, this was shown during the tour when asking such questions as "*Would you like to rest in that place*?" when some replied "*Do you mean resting now or generally speaking?"* In many repeated instances, during the microclimate investigation, participants were seen looking at the time on their watch to justify their comfort evaluations of the sun and shade ground representations seen around, which shows that time grounded the investigations of the atmospheric patterns. *"Are you still experiencing the sun as source of heat? It is all a matter of when we experience the sun",* this is an extract showing one of the participants (M2) remarks. It clearly incorporated the temporal aspect into the perception of the microclimate. The impact of the cultural knowledge constructed about climate and time, discussed in Chapter Five, was apparent. However, participants' physical presence within the microclimate at the particular time experienced led to conscious questioning of this knowledge by the participants themselves. This is discussed in the following two sub-sections.

### *6.6.1 Reliability of time understood*

Awareness of time was communicated as a reference aspect where participants' immediate feelings of (dis)comfort at the particular time experienced were positively rationalized by their conception and anticipation of climate and comfort for this time period and served as a reliable indicator. Consistency of feelings with the temporal climate constructs, was revealed when participants were aware of it being the peak hot period of the day. During this period, participants' microclimate feelings and knowledge constructed regarding thermal comfort significance of the time experienced, were strongly related. The sun exposure was perceived as harsh and uncomfortable and the shaded experiences were undoubtedly sought due to the temporal thermal significance. This was revealed at the beginning of the participants' microclimate tours. It was the first time for the majority of participants to visit the park during this hot period of the day. They were aware of the harshness of the time period experienced, and started the microclimate investigation knowing over-heat is expected because of the significance of the time. Their experience of time justified their desire for shade as the ultimate comfortable relief to protect themselves from the sunny microclimates and harsh heat. As

shown in the palm promenade, staying in its shade was described as an appreciative experience due to harsh thermal meanings of the sun associated to the particular time experienced. Participants were temporally aware and the extended stays in the shade of the promenade fulfilled their need to avoid the sun.

The experiences of direct and full sun exposure, such as at the promenade extensions and at the lake, were obvious reminders of the harsh time experienced, and the difficulty of staying outdoors in such meaningful hot period of the day and the importance of shade. The harshness evoked by direct facial sun exposure evoked an awareness of the particular time experienced, boosting the insensitivity of sun exposure and enlarging participants' immediate harsh feelings of heat. Even when participants emphasized feelings of comfort in staying opposite to the sun's radiation in a sunny atmosphere, awareness of the temporal thermal significance was admitted. Indeed, awareness of the temporal thermal significance was incorporated in shaping participants' perception of the position of staying opposite to the sun as a possible orientation, relieving feelings of harsh heat. Interestingly, feeling comfortable in sun was communicated as unexpected condition due to the consciousness of time. This was revealed in the lake mid-pathway, as when participants stayed with their back to the sun, they consciously perceived their orientation to the sun as the most comfortable condition for staying in a sunny atmosphere in the hot period of the day.

In Chapter Five, discussions of participants' conceptions constructed about noon time revealed that it is a term used as a synonym for peak time, characterized by insensitivity and harshness. Discussions also showed that noon time is a period of the day which extends beyond the middle of the day, i.e. 12 o'clock". These conceptions about noon time were strongly emphasised during participants' experientially based examination of the microclimate. Participants' microclimatic tours in the park took place from 2-6pm. During the microclimate tours, participants were aware of the passage of midday. However, their awareness of the hottest period remained experienced for considerable amounts of time during the tour, as they emphasized no change from the heat of mid-day, and the consciousness of the particular time experienced remained a reference point, reasonably justifying their perception of heat.

Towards the tours' ends marked another time period, when participants' awareness of time revealed relief and comfort due to approaching sunsets. The relief perceived from reading

time was reflected in the ways the sun and shade patterns radiated outwards to the participants. As was revealed in the case of the curvilinear pathway, there was no attraction to inhibit, or appreciation of, shadows on the ground, and the sun coverage was seen as indicative, boosting daytime pleasure.

> F6: During late afternoon in the formal garden: How do you experience the sun now? *It has almost gone, it is not hot anymore, and it is now a nice source of light.*
>
> F4: How do you experience the microclimate of this garden now? *The area here is wonderful, now I accept sitting in that sunny space, as it is not hot anymore. The sun is leaving. It is gentle on my body, and there is no need for shade.*
>
> M4: Promenade extension: Are you still looking for special resting conditions? Looking around while walking**:** *There is no problem now staying at any place. I can stay now anywhere in the park without concern for shade or attention to the position of the sun.*
>
> M5: After hill area: How do you perceive the park now? *Now I feel safe staying in any place, and there are no resting constraints. Earlier, I was conscious of choosing where to go, avoiding the sun as much as I can and looking for shade. However, now I don't mind going to any place. The thing I was hiding from is not here anymore.*

During this late afternoon period, participants' direct facial sun exposure was perceived and explicitly stated as being heat meaningless and far from discomfort, indicating the approach of sunset and providing the absolute certainty needed for passing the peak time period. Participants' perceptions of the sun as a source of daylight boosted the thermal significance constructed about the time experienced. This revealed that, as the day went on, awareness of time improved perceptions of the sun's declining harshness, and boosted feelings of comfort when in direct facial sun exposure.

> M3: At the lake: *I know we are facing the sun, but now the heat has greatly receded. This is the best place for resting now.* He expressed his desire to rest in the open green space, reflecting no concerns for heat or discomfort.
>
> M2: Near the platform area, we inhabited the shadows of a tree; however, it was a fake shade, as the sun was facing us directly: Are you still experiencing the sun as source of heat? *Absolutely not, experiencing the sun is totally different now at 5PM than earlier at 2PM. Now I can even stay facing it, without annoying my eyes, I can spend a longer time than earlier without any annoyance. Earlier, I wouldn't dare spend a few minutes in this orientation.*

### *6.6.2 Blurred transition: Perplexity of time felt and time understood*

> M2: At the highest point: If there is no strong breeze would you stay to enjoy the view? *No, and I think earlier, two or three hours earlier, there would have been the same breeze but the sun is an aspect for consideration. I will have to think of my position relative to the sun but now the breeze creates the microclimate experience, and the sun is not an issue.* Where and how would you choose to stay now? *I would sit on the edge. Now, I would not consider my position in relation to the sun. Actually, I am facing the sun now; however, I'm not bothered by this direct exposure level.*

It appeared at a certain period of time that the knowledge constructed regarding temporal thermal significance caused perplexity in the participants' immediate experiences of the microclimate, especially with regards to the perception of heat. This period of time marked the unclear perceptual shift from experiences at peak time to off peak time. The transition was blurred as many participants travelled from space to space experiencing the fluctuation in heat. Participants experienced conflict between their immediate feelings of microclimate and the temporal thermal significance of the particular time experienced. The conflict arose during participants' experiences of the period culturally known as afternoon time, approximately during the period from 4:30-5:30pm. They were conceptually aware of the passage of the peak time period of the day; however, their microclimate perceptions did not consistently reflect heat passage.

Participants' microclimatic depictions showed occasions of feeling comfortable from sun exposure, whether it was in shade or in an orientation away from direct sun, which gave strength to the realization of time impact, and effected their perception of comfort. This was illuminated in the curvilinear pathways, where the physical orientation away from the sun boosted the thermal significance of time experienced. Participants' appreciation of shade was relieved and the sun's perception was related to as a source of daylight rather than an unquestionable source of heat. These feelings of comfort associated with the realisation of the temporal impact changed the ecstasies of the atmospheric patterns of shade and sun on the ground to patterns, boosting daytime pleasure.

However, the conflict between the perception and conception of time appeared obvious once re-entering full and direct exposure to the sun. During these moments, and despite participants' conceptual awareness of the passage of the peak time period, the perceptions of harsh discomfort and appreciation of sun protection, similar to what was experienced during the peak time, were re-enlivened, which revealed that perception of change in the microclimate was not sensed. The full, open, and direct facial sun exposure was still disturbing their thermal comfort, and prevented the perception of the impact of time. The following are extracts from some participants, showing their experiences of successive different relationships to the sun's radiation. They exhibit how, during a particular time period, the perception of the sun and heat change, based on the physical bodily relationship with it.

> M3 (5:33pm): After some time at the entrance plaza staying in the "fake" shade of a tree facing the sun, the participant was wearing his sunglasses*: I feel the sun now has slightly receded; its heat is*

*weaker now, isn't it?* He was affected conceptually by the passage of the hot period of the day; however, the partial direct facial exposure to the sun revealed hesitant feelings.
Walking in the shade of the palm promenade: What about the weather, did you find any difference from the plaza? *Yeah of course, here it is shaded and much nicer than the plaza*
Entering the promenade extension, and became facing the full and direct sun: How do you experience this part of the promenade? *It is too bad, too hot, and too sunny. No palms providing shade as was the case earlier.*

F1 (4:15pm): Walking up to the highest viewpoint: *The microclimate now is nicer, the sun does not sting, I would enjoy resting anywhere in the park uncovered with shade*
A few moments later at the formal garden: *The place is still sunny and uncomfortable. The sun is not irritating as in noon time but still it is annoying and in my eyes.* We rested for a break, on a bench opposite to the sun exospore (after some time): *My first impression when we came to the place, and seeing the place uncovered, I felt how it is sunny and hot but after staying in it some time, I feel it not as hot as earlier*. Feeling comfortable boosted her realization of the time and the thermal significance of the particular time experienced.

M2 (5:05pm): At the highest point: We stayed at the side overlooking the entrance plaza. How would you stay at that time period? *I feel no difference now in facing sun or opposing the sun.* Aren't you feeling hot now in this sunny space? *Well, it is not hot as before, as the sun has receded now. I would stay here for one or two hours without any bother. I expect, if earlier at 12pm for example, it would be hard to stay. It is now past 4pm, and the sun is mild. However, at noon, the problem is the extremely hot sun, but now there is only one hour left before sunset.*
A few moments later at the entrance plaza: Staying in a sunny place at the entrance plaza, it was 4:30pm, the participant revealed his perception of the microclimate: *Actually I feel it is too hot. The sun is strongly hitting the space and my eyes.*

When participants experienced direct facial exposure to the sun, their feelings of discomfort were at odds with their expectations of relief in the microclimate due to the knowledge constructed related to the hot time passage. Participants questioned their experience of the sun as a source of heat when it was supposed to be less intense. The reading of participants' perceptions showed that the heat experienced created vexation, leading participants to perceive their microclimatic comfort was similar to their experiences in the peak time.

F3: At the hill area: Are you still experiencing the sun as a source of heat? *I should not be any more, but I still don't feel comfortable staying directly facing it.*

M5: Are you still experiencing the sun as a source of heat? *Well, I'm not feeling hot now, but still would be uncomfortable by its bright intensity in my eyes.* So, would you enjoy resting here in this time of the day? *Yes, I will be pleased to rest, but I would need to stay in a position far away from the direct sun exposure and look to the water. Now in this position, I don't feel any heat. The atmosphere now is wonderful.*

M4: *Well, we are now just before sunset, and this is the most comfortable and relaxing period of day time. There is no need for shade; the sun's harshness won't re-enliven. It is good to stay in an open space, but of course I wouldn't be comfortable in directly facing the sun.*

M1: During late afternoon in the formal garden, the participant was walking facing the sun: How do you experience the weather in this garden? (He looked upset)*: I am not interested in this garden. The sun dominates the garden, I could not stay or rest here for a long time. It is now 4:45pm, and the heat of the sun should be more tolerable but here I could not feel that.* He kept walking, he seemed uninterested to rest. While walking, he added: *The sun here is still disturbing my comfort.* (Looking around) *Look how people resting on the benches are adjusting their position relative to the sun.*

M8: *I don't think there is a big difference between staying in sun or shade now. Generally, the sun is not as hot as it was earlier, when we started the tour*, (thinking) *but I feel staying direct to sun is harsher than staying opposite to it, or when in shade.*

M2: At the formal garden**:** *If I am obliged to spend some time in this place now, I could rest anywhere oriented away from the sun.* So is the sun still a significant source of heat? Do you still need to avoid it? *Generally, the summer sun is bothersome and very hot. Now it is about past 5pm, the sun exposure should be bearable; however, I still couldn't stay in a place like that unless there is shade. If I am obliged to stay now for a certain reason, I would need to sit opposite the sun rays. Now we are facing the sun, it is of course more bearable than earlier, but not for a long time in this position.*

F7: At the highest point: *It is a good place but not for long rests, it is uncomfortable for resting now. It is only for exploration, staying for some time interval. I feel too exposed to the sun, and it annoys my eyes. It might be residing, but still its presence is still strong.*

M5: At the lake: Are you still experiencing the sun as a source of heat (we were sitting in a bench in shade, looking at the lake)? *Well, I feel its ground reflection has decreased. It should not be as hot as before. It became more a source of light rather than heat.* Thinking & adding: *But I still do prefer to walk in a direction opposite to the sun. It will be better if not walking with our eyes facing it.*

The previous extracts showed that in some occurrences the sun's harshness emphasized by the participants' during their experiences of peak hot time period, was reduced relative to their latter experiences. Despite their feelings of discomfort, participants tried to intuit the impact of time on the microclimate. During this conflict and disorientation of feelings, it was observed in participants' descriptions that the spatial environments gave positive impressions that improved their reading of the impact of time in the perception of the microclimate. In the promenade extension participants intuited the thermal significance of the particular time experienced in the creep of shadows covering larger ground areas, reducing the strength of sunlight reflection seen on the marble ground. Also, in the curvilinear pathways, greater intuition of the impact of time was evoked by the perception of the characteristics of the canopied plantation scattered on the pathway, which reduced the concern for direct facial exposure. The visual perception of these environmental qualities helped to lessen the gap between the expected temporal meaning of the sun and the immediate perception of it. Nevertheless, the direct experience to full sun -at rest- continued to be perceived as uncomfortable, to an extent that some of the participants reconsidered their understanding of time, particularly the peak time length, to include the particular time experienced.

This discussion shows that time was a psychological aspect incorporated in the perception of the microclimate. Conceptions held in mind about summer time rationalized the perception of the sun and intensity of heat. Nevertheless, the experientially based examination of the microclimate showed a blurred difference between how time is actually felt and how it is thermally understood, and emphasizes that the immediate physical relationship to the sun's

radiation has the most reliable impact on the microclimate perception from a subjective perspective.

## 6.7 Summary

This chapter captured the essential qualities constituting the perception of microclimate comfort. Participants' immediate perceptions of a microclimate were impacted by the constructs of contextual climate culture. However, the conscious examination of the microclimate revealed that constructs of the contextual climate culture are blurred, and this experiential examination allowed participants to reveal and recognize a deeper inherent sense of what constituted their microclimate comfort.

The findings in this chapter showed that the perception of microclimate comfort is significantly constructed by our physical relation to the sun's radiation. This raises the notion of the human potential to create their own microclimate comfort. The deep analysis of the perceptions of discomfort signified the meaning of facial and eye exposure to full and direct sun. The emerging relation between eye contact with the sun and the immediate perception of discomfort directed understanding of the responses to direct sun exposure beyond the physics of the body. Rather, it positively suggested impacts of the knowledge gained from the everyday immersion in the Egyptian climate context. Analysis, in this respect, revealed links between both thermal and sight senses.

The reading of time in the perception of the microclimate strongly supported that the microclimate is understood as a felt-time experience. Despite that time was a strong reference for microclimate and comfort justification, the (dis)comfort perception caused by the state of the physical orientation to the sun remained the principal constituent that shaped the perception of the microclimate from a subjective perspective.

Findings in this chapter complete the findings in the previous chapter by developing the understanding of what is perceived as an (un)comfortable microclimate from a subjective perspective and had a strong implication of space design. In this respect, the next two chapters focus on the physiognomies of the spatial context in an attempt to draw the contribution of the spatial context in configuring the human relationship to sun's radiation.

## Chapter Seven

# Spatial Creation of the Microclimate Perception

# Chapter 7. Spatial Creation of the Microclimate Perception

## 7.1. Introduction

This chapter aims to understand how to evoke users' perception of (dis)comfort through the space design. Chapter Six established an understanding of the microclimate (dis)comfort perception as constituted by the corporeal orientation to the sun's radiation. This significant finding shows an implicit impact of the position of the sun in the sky relative to the subject during the period when the space is used. Chapter Four reported participants' experiences of the microclimates in four different pathways with variant spatial configurations (Figure 7.1). Over the course of participants' visits to the park during time periods ranging from late noon and early afternoon, until the late afternoon period, the sun's movement was in the south and south western sky.


Figure 7.1: An illustration of the position and movement of the sun in relation to the four investigated pathways during participants' visit time periods.

Participants' perceptions revealed the particular spatial physiognomies [1] which were perceived and/or intuited as intruding to varying degrees upon their corporeal relation to the sun and impacting their perception of (dis)comfort (table 7.1). The analytical reading of these spatial physiognomies is the objective of section 7.2, which outlines, analyses and compares the design aspects in the four investigated pathways, and their impacts on the

[1] See sub-section 2.4.3 for definition of physiognomies.

subjective perception of (dis)comfort. The subsequent sections discuss these findings in relation to the relevant experimental literature on microclimate and outdoor thermal comfort.

| | |
|---|---|
| The palm promenade | Limitation of the combination of spatial depth and a NE-SW orientation<br>The shade character of the palms and a sensuous perception of sheltering<br>Preference for openness and a sky viewing shelter |
| Promenade extensions | Extensive and prolonged spatial openness to the southern sun<br>Trees on the flanks as fake shelter provider<br>Glare intensifies the feelings of discomfort<br>Preference for perpetual comfort spots |
| Curvilinear pathways | The perceptual impact of wider spreading canopies with irregular forms<br>Visible shadows invoke microclimate perception<br>The potential of extended curvilinearity |
| Lake Pathway | The physiognomy of the curvature in full sun<br>The lake as a center of orientation |

Table 7.1: Spatial physiognomies revealed from participants' experiences in each of the four spatial cases

## 7.2. Reading of the Spatial Physiognomies

### *7.2.1. Limitation of the combination of spatial depth and a NE-SW orientation*

The palm promenade was characterized by the formal double rows of palms arranged uniformly along the length. The three time periods presented in Chapter Four indicated that over the period of the participants' visits periods, the most extensive sun penetration occurs around mid-day, when the sun was almost in line with the promenade's axis (figures 7.2). As the time increased and the sun moved westward, the uniform spatial characteristics of the configuration allowed one's relationship with the sun to change from direct facial exposure to the sun around midday to efficient facial sheltering from it. By the earlier afternoon period until sunset, the promenade became dominated by ample shade permeated by gentle sunny spots.

Figure 7.2: Looking southward: Shade traversed the promenade moving from west to east over the course of the noontime.

The promenade is characterized by its relative spatial depth, predominately established by its extended length and the immense height and formal arrangement of the palms on either flank relative to its width. From a subjective standpoint of comfort, this spatial depth failed

to evoke any sheltering perception when the sun was axial to the promenade during the hot period. During this period, the continuous and extensive direct exposure to the sun made it an unavoidable pathway, understating the promenade's spatial depth characteristic. However, the appreciation of this spatial depth was strengthened later by feelings of deep sheltering experienced as the sun moved westward and impinged upon the promenade laterally from in-between the palm fronds. The experience of sheltering evoked the aesthetic as well as a functional appreciation of the consistent arrangement of palms flanked on both sides.

The promenade is oriented NE-SW. The reading of the promenade's microclimate conditions over the course of the day indicates that this orientation allowed facial exposure to the sun to occur as it moved in the southern sky during a portion of the hot period of the summer day. The experienced period of direct exposure lessened the effectiveness of the sheltering function of the deep form. However, this function was revealed as the time increased, as the spatial depth maximized the duration of shade and minimized the direct sun exposure. From a subjective perspective, the consistent arrangement of tall vegetation limited the direct facial exposure to the southern sun to occur around midday, during which the frequency of visiting the park is relatively low. This indicated the significant sheltering role of the palms arranged on the western flank of the promenade in particular, as they were significantly responsible for screening the sun in the south and south west in the hottest period of the day, at a time when the park started to be visited and when comfort was sought.

### *7.2.2. The shade character of the palms and a sensuous perception of sheltering*

During the period of shade domination in the palm promenade, a sense of experienced comfort was induced from the sensual perception of securing shelter from the harsh sun for a considerable amount of time. The perception of comfortable sheltering indicated the efficiency of the quality of shade provided by the palms. The presence of a double row of palms on either flank effectively lessened the amount and intensity of the sun as it moved westward, providing effective sheltering and pleasant continuous filtration. Despite the presence of sunlight emerging from in-between the palms' fronds, moments of shade gave immediate relief from the exposure to the sun. The rapid intertwining of sunscreen and sunlight gave no time or space to reveal discomfort; instead, from a subjective perspective, this characteristic enchanted the perception of the microclimate. This revealed that the

close and uniform arrangement of the rows of palms along the length created a consistent experience of sheltering, giving no time to reveal discomfort feelings from the tiny sunny spots. In addition, the extended domination of shade evoked the sensation of a breeze and coolness alongside the shade microclimate, with some describing the promenade as "*a cool space"*. Moreover, a particular expressive essence was revealed by the visible perception of shade domination over the whole length ahead. The continuity of shade was an attractive meaningful representation of comfort during the hot period and the sunny spots were described as a representation adding to the quality of the outdoor experience.

This comfort perceived in walking within this space exhibits particular qualities in the case of the close presence of sheltering trees, which improved participants' perception of the microclimate. Shade trees need not be too dense in order to perceive their sheltering effect; however, domination of shade is required as well as allowing spots or gradients of sunlight to ameliorate the outdoor experience.

### *7.2.3. Preference for openness and a sky viewing shelter*

A deeper perception of the expressive essence of the palm promenade's configuration was developed by some participants when attempting to question the differences in the shaded experiences they passed through during their microclimate tour. Different positive and negative perceptions were revealed in some shaded spaces. Shaded spaces characterized by variant levels of enclosure, such as the segment in the lake area, evoked feelings of enclosure and claustrophobia caused by dense canopied trees. Participants' perceptions revealed that the feelings of over-crowding of people in the closely canopied space promoted feelings of enclosure. This showed that the shade microclimate is a significant need during the hottest time period; however, the shaded space is subject to desire and preference. The desire for longer pleasure and comfort in the shaded space with an enclosed character is likely to be negatively impacted by the occupation levels. However, in respect to design, the feelings of spatial enclosure also gave insights into the reading of planting qualities as generators of shade enclosure or openness, capable of impacting on the stimulation of shade pleasure. Tree formations with smaller heights and denser spreading canopies, as in the lake area, evoked feelings of enclosure and decreased the enjoyment of shade (figure 7.3). Despite the good interception of sun radiation, these qualities obstructed

the interaction with the environment and the sky, and the spatial enclosure of the canopy evoked feelings of trapped heat under the canopy boosted by over crowdedness.

Figure 7.3: Feelings of enclosure decreased the enjoyment of shade

Psychologically, feelings of being enclosed and claustrophobia in some shaded spaces brought forward a comparison with the configuration of the palm promenade, which was recognized as a distinct shaded space.

> M2: In a secondary shaded passage: *I was expecting this passage to have nice weather, it is almost shaded, trees and flowers on both sides, but what I felt is that the promenade was breezier than here. Here, I feel claustrophobia,* Adding: *the place here is a bit enclosed.*
>
> M8: *I enjoyed the promenade for being shaded and open at the same time. I didn't feel trapped in it.*
>
> M1: He was enjoying the shade and was keen to find a shaded bench that enabled him to spend some time enjoying the scene of the citadel: *The palms are sheltering the promenade without feeling sheltered and making a strong character. I like being sheltered whilst exploring the surrounding.*
>
> M6: The promenade was too busy with people at this time: *The promenade is fantastic, with rows of palms on both sides. I like how the promenade is not enclosed; it is still open, although being sharply bounded by rows of high palms on both sides.*

The perception of the promenade as an open space with enclosing shelters casting shadows indicates the preference for the perception of both the openness and shelter together. The promenade is the main pathway in the park and its shaded character made it an attractive destination during the hot time period. Different levels of occupation were experienced, ranging from low occupation, crowdedness, and over-crowdedness during holidays and at weekends. Nevertheless, it was noticeable that feelings of claustrophobia and enclosure were not felt in the palm promenade during the high levels of occupation. This reflects the particular subjective perception induced from the planting's qualities. Despite the strict arrangement and immense height of the palms, their canopies are small in size and not spread, keeping a pleasant interaction with the sky view and the surrounding context. The space provided shelter from the sun without feeling a canopy overhead. Preference for spatial openness shed light on the preference for degrees of sky view and contextual

interaction. It strengthens the reading of the shaded space as a shelter providing interaction with the environment, but without feeling enclosed by a canopy overhead.

This subjective preference may signify the positive impact of tall vegetation formations with small and narrow spreading canopies. Nevertheless, the period when the shade was minimal in the palm promenade revealed the deficiency of these qualities. The small canopy of the palm increased the time period until shade become significant in the pathway and sufficient to inhabit. This reflects the advantage of trees with wider spreading canopy as they would allow the significant extension of shade to appear as the sun moves westward. In addition, the immense height of the canopy did not intrude upon the visual sight of the direct sun radiation. Therefore, the intermittent arrangement of canopies with lower heights, would better dissipates the direct visual exposure to the sun's radiation in the southern sky, creating instances of facial sheltering.

### *7.2.4. Extensive and prolonged spatial openness to the southern sun*

In the promenade's extension, the obvious characteristic was the direct sun fully covering the ground during most of the daytime period (figure 7.4). Feelings of discomfort were evoked by the unavoidable direct exposure to the sun for a longer period of the day time, during which the park is frequently visited by users. As the time increased, the experience of the harsh exposure to the sun suppressed the realization of the impact of time in the microclimate. The span of the promenade's extension was described as "*the deserted zone*" and "*always uncomfortable zone"* in the park, due to the feelings of discomfort that were consistently experienced for long periods of the day time. Within these depictions, heat and dryness are embedded. In addition, feeling no significant change in the microclimate made it a repulsive space, preventing its occupation over the long length of the daytime period as long as the sun was perceived as a troublesome aspect.

M9: *Now we reached the deserted zone. I feel thrown in this sunny microclimate.*

M2: *This area is extremely uncomfortable, no trees, no shade at all. We left the rows of palms which were sheltering us to a space with no shelter at all, I feel the temperature is higher…there is a remarkable shift in the weather from shade to sun. I will keep walking till I reach a comfortable place.*

Figure 7.4: Looking southwards: promenade extension one

This reveals the ineffectiveness of the configuration in terms of comfort. The perception of spatial openness was a provocative characteristic during the hot period of the day as revealed in participants' perceptions. Unlike the experience of the palm promenade, perception of unpleasant spatial openness was evoked by the perceived lack of sheltering features on either flank. It appears that the sensuous perception of no real shelters strengthened the feelings of discomfort and evoked the perception of feeling closer to the sun's radiation during the time period when shelter was sought.

A principal deficiency of the two segments originates from the impact of orientation. Promenade segment one is a linear extension of the palm promenade with the same NE-SW orientation. Promenade segment two continues axially, yet it runs westward from the formal promenade. As the sun moves in the southern sky, the orientations of both segments prompted the users' experiences of unavoidable direct facial exposure to the sun to occur during the hot time period. The shallow form of the two segments and the ineffective qualities of the vegetation opened the users' field of vision to the south and south western horizon due to their orientation. This visual openness maximized the period of facial exposure to full and direct sun movement in the south and south west for long courses of the daytime period.

The qualities of this configuration limited the feelings of comfort in summer, relative to the sun's position, to be perceived in early morning and nearer to sunset time periods, as these are the two time periods when the sun is not seen in the users' field of vision, however, time would give a positive meaning to the perceived sun.

In the promenade's extension, the spatial openness also allowed great amounts of sky view. However, this characteristic was negatively assessed as it strengthened the harsh exposure to the sun's radiation. The comparison between the perception of spatial openness, and sky view in the palm promenade and the extensions, establishes the interpretation of spatial openness and sky view as preferred aspects only during the users' experience of a comfortable microclimate.

### *7.2.5. Trees on the flanks as fake shelter providers*

In segment one, participants' descriptions showed that the vegetation around was understated, as they did not feel its presence as a part of the pathway configuration, due to

the complete absence of its functional sheltering role. The low vegetation features scattered on the side green lawns provided shade only around its canopies. The planting of trees away from the promenade's flanks prevented their sheltering function and the creep of shadows over the promenade span, keeping it extensively exposed to the sun's path and without any percentage of shade.

In segment two, the deviation towards the west rather emphasized the harsh direct and full facial relation with the sun's radiation as it moves in the south western sky during the visit time period. The uncomfortable direct exposure to sun provoked some participants to look for the shade provided by the trees, which were planted regularly along the two flanks (figure 7.5), questioning their shadows and discerning the spatial difference with the palm promenade. The trees were perceived as "fake shelters". They were reflected upon as non-existent shelter providers, which were insignificant in changing the uncomfortable microclimate as they did not act as real barriers to the visible obstruction of the sun's radiation. As the time increased and the sun moved westward, the trees' sheltering effect was limited to walking closer to the right edge in order to capitalize on the moments of sun screen in walking along the walkway. Thus, their physiognomies in the perception of the microclimate did not change as the shelters remained fake.

Figure 7.5: Trees were perceived as fake shelters

> M9: *The space here is strongly exposed to the sun, although there are some trees on both sides, but it is not high enough to shade the promenade. They barely create an area of shade beneath. I am not pleased by this direct exposure to the sun*
>
> F3: *The reason for this experienced discomfort is not absence of vegetation, as there are many trees on both sides. The problem is they are not shading the promenade as the palms in the first part. It is not necessary to have similar palms to provide shade, but this space may need broader and higher trees to provide ample shade. The existing ones hardly provide any small slots beneath.*
>
> M6: Emphasizing his desire for shade: *It is enough to have rows of trees on both sides of the passage,* giving no notice to the present trees, as if they don't exist.

The regular arrangement of trees impeded the perception of spatial openness. Nevertheless, in terms of comfort, the segment remained penetrated by the sun

exposure for most of the day time. The insignificant sheltering role of the trees reflected the deficiencies of their characteristics in intruding upon the direct exposure to the sun. They were small in terms of height and canopy size, on a path that axially faces the sun's movement during the hot period of the day. The selection of trees with a small and roughly roundhead canopy might aim to enhance the visual perception and increase the perception of green landscape, for aesthetic consideration. This aesthetic side was captured but only by a few participants due to the harsh microclimate conditions. They were favoured for improving the green quality of the space. However, in respect to human comfort, they were 'shadeless' and this reduced their appreciation.

The placement of the trees, relative to the users' orientation and the sun movement during the time period when the park is most likely visited strengthened their fake role throughout most of the day time period. Tree density created good interception of heat and light; however, they cast shadows in the wrong place. The roundhead small canopy concentrated the shade around the small canopy. The shade hardly creeps over the ground in the hottest period of the day and its enjoyment was limited to staying beneath the canopy. This finding gives preference for placing trees with wider canopies, in order to significantly alter or even reduce the intensity of the full direct exposure to sun.

### *7.2.6. Glare intensifies the feelings of discomfort*

The promenade is paved with large surfaces of marble stone. The reflectivity from the pavement material intensified participants' perception of discomfort. The pavement material induced extensive glare when the sunlight directly fell on it. The domination of bright pavement furthered the feeling of discomfort and dryness especially during the experience of the peak period of the day. During moments of direct exposure, the visible perception of the continuous bright and shiny pavement strongly penetrated by the sun evoked fears of expecting prolonged uncomfortable microclimate conditions. On the other hand, during the experience of the opposite orientation to the sun's radiation, the domination of the bright pavement alerted the users to the harshness of the time period. Participants' descriptions of the "shininess of the ground" capture the feelings of discomfort, and show the negative impact of the glare and shiny materials on the microclimate perception. When the time

increased, the perception of decreased glare, in addition to the slight creep of shadows, was stated as a pattern that partially improved the realization of time.

> F1: In her second passage at a later time period : *the shade coverge now is limited, but it relieves me, it is completely different from the earlier period when the ground was extensively shiny, with no apparent shade.*
>
> M4: Spent a few minutes in the shade of the lake building to gaze at his surroundings: *I'm pleased in this shaded spot, but I'm not sure I would remain happy if I walked now along this shiny promenade.*
>
> M5: Shaded promenade: Why did you choose walking in this direction? *I walked, without thinking, towards the shaded side. I felt the other direction is shinier as I see the glare of the sun on the ground, it is more exposed to the sun, and I feel comfortable in walking in extended and ample shade.*

### *7.2.7. Attraction to perpetual comfort spots*

Along the entire sunny length of the promenade's extensions, two spots were brought forward as revealing a change in the microclimate experience, due to shade coverage which was always present over the course of the hot time period and attracted the majority of the participants to stop hiding from the sun. Descriptions such as "shade spots are always present" or "the only spots of shade" after a long immersion in a harsh microclimate set them apart from the surrounding spatial microclimate as long as the unkindness of the sun's exposure was sensed.

The first shaded pool was found at the fountain node (figures 7.6). This jointly nodal area was extensively exposed to the sun. However, the circular plaza was surrounded uniformly with broad canopy trees, which created spots of shade in the western area of the node due to the position of the sun during participants' visits. The trees' wide spreading canopies created an efficient sheltering zone, cutting off the direct relationship to the sun. The location of the trees and its qualities effectively intruded upon the exposure to the sun's radiation and allowed the sun to be screened for a longer period of time, unlike the trees in segment two.

Nevertheless, the canopied trees planted around the node were deciduous seasonal trees. It was observed how the absence of these shaded spots at the fountain node changed the experiential dimension of the node from a gathering space to an unavoidable pathway:

> **Seasonal differentiation discloses different actions and perceptions:** I remembered my own experiences at the fountain node in April 2012, where I used to stay on a bench on the left side of the node in a very harsh direct relationship to the sun, and it became a habit to sit there every time in the proceeding visits to experience the microclimate. In September 2012, in interrogating the participants' experiences of the microclimate, I was asking myself how I had not spotted the shaded area to rest in or how I had left the opportunity of staying in the shade and instead I remained in the sun on each visit. Was it occupied and that's why I used to move to the other side? Reviewing the notes taken in my visits, I noticed that the shade coverage was absent from my descriptions of the microclimate. Moreover, the behaviour of the only participant who had interrogated his experience in April was also

in question with similar behaviour by the majority of the participants. He perceived the node as an unacceptable place for resting. When he reached the fountain node, he refused to stay in it and he chose a shaded bench, a bit further away from the node, where he expressed how it would be comfortable to sit there.

These wonders became unclouded, when it came to bringing together the photos documenting the microclimate experiences of every participant at the fountain node for questions and wider understanding. It was clear at that moment how it was a matter of seasonal timing (figure 7.6), which clearly affects the microclimate perception of the node. The deciduous trees planted around the node were leafless in April, and completely changed the microclimate perception of the node from April to September when they were fully blossomed. In September, the pools of shade provided by the trees created a centre of attraction that is inhabited and cut off the discomfort of the promenade; however, in April, it was a repulsive place at hot times.

April: 2012 Leafless trees around the node September 2012: fully blossomed (in leaf)

Figure 7.6: Seasonal timing affects the microclimate perception and the experiential dimension of the node

The other pool of shade was created by the lake café building, which is located at the end of segment 2, perpendicular to its axis and facing the north-eastern horizon (figure 7.7). The building effectively blocked the facial exposure to the sun. The orientation of the building relative to the sun's movements in the southern sky during the visit time period allowed the perpetual experience of shade to varying degrees over the course of the hot period. The building's sheltering effect was limited to approaching closer to it in order to capture moments of sun screen due to the relatively small height of the building.

Figure 7.7: The presence of a permanent pool of shade at the approach to the lake café building

The appreciation of these spots was due to their prolonged potential to prevent the exposure to the sun's radiation, during its path in the southern and south western sky, thus allowing comfortable conditions for a longer period of the day time. They acted as effective galleries in a pathway extensively penetrated by the sun over the course of the day. The perpetual effective sheltering function soothed the discomfort caused by the spatial orientation and openness of the extensions to the southern sky during the hottest period of the day.

### *7.2.8. Walking through shadows: The perceptual impact of wider spreading canopies with irregular forms*

Figure 7.8: A sunny pathway with intermittent spots of shade during the visit times

In the curvilinear pathway, the general description of the ground representation over the course of the day is sunny with intermittent shadows scattered along the length. Despite the relatively high amounts of sun coverage, participants perceived spatial physiognomies which improved the perception of comfort, creating an experience different from the discomfort experienced in the promenade's two extensions. This contradicts Mahmoud's (2011b) study of the same pathway, which suggested that the high percentage of user dissatisfaction is due to ample sun coverage. Nevertheless, subjectively, the curvilinear pathway was perceived as a "more shaded path" in comparison with the promenade extensions in my study.

The investigated curvilinear pathway extends along the length of the park. It is roughly NE/SW and NW/SE with a gentle curvature deviating from the north-south. Participants' perceptions showed that the deviations were not enough to significantly change the direct facial exposure to the sun during its path in the southern horizon. However, the perceived physiognomy of the vegetation was reflected in participants' behavioural actions and changing perceptions of the microclimate. Participants' movements during the hot time revealed the experience of a harsh microclimate that was intermittently interrupted by pools of shade or by instances of facial screening from time to time by the canopied trees formations, which cut the direct and full sun exposure. In addition, participants' descriptions showed that the inhabitation of the tree shade evoked the sensation of breeze, which increased the enjoyment of the shaded moments.

The perception of intermittent sheltering enhanced participants' perceptions positively. This brought the tree characteristics to the fore. The trees planted in the pathway had a relatively similar height to the trees planted in the promenade extension. Moreover, the size of their canopies was not considerably large, but had a wide spreading form. It was obvious that the sense of enclosure was not felt under the canopy, despite its small height compared to the

palms, due to the sparse character of the branches and the low density of foliage. This sparse character promoted interaction with the context and the sensation of breeze, and prevented claustrophobia and contextual isolation while staying under the canopy. Moreover, the tree characteristics allowed for sky viewing. Despite the lower degree of interception relative to a dense tree, the degree of interception of sunlight was experientially revealed as sufficient to induce comfortable sheltering. The canopies' density allowed the domination of the percentage of shade over the percentage of sun on the human body during the inhabitation of the shaded ground. In addition, the placement of the tree with spreading canopies on the flanks allowed the maximum percentage of shade to be cast and to creep over the ground, improving the user perceptions of the trees' sheltering function.

Further to the sheltering role of the canopied trees', a peculiar physiognomy was induced from the visible perception of scattered trees with spreading canopies along the length in the field of vision. During the moments of walking opposite to the sun's radiation in the hot period of the day, the visual perception of the spreading canopies in the foreground improved the impression of partially "feeling sheltered" and enhanced the perception of enclosure, unlike in the promenade extension. Moreover, the impression gained from the visible perception of the tree canopies in the field of vision was strengthened as the time increased. When the sun became lower in the visual horizon, due to time increase, the spreading canopied tree formation was perceived in the foreground to the direct sun's radiation, intruding upon the direct eye exposure to the sun exposure. The intrusion dissipated fears of discomfort and generated a degree of ease. In addition, this indirect relationship with the sun improved the perception of a change in time period and the associated perception of the sun. As for the irregular arrangement, the openness of the pathway to the south west was essential to stimulate the distinct panoramic view of the historic city. Although the pathway is characterized by its spatial openness to the historic context, the singular and irregular placement of the canopied trees on the flanks evoked the impression of sheltering from time to time, and allowed great levels of engagement with the environment.

Similar to the formal promenade, the impact of the curvilinear pathway's orientation allowed the axial sun penetration to occur during the critical hot time period. Nevertheless, the characteristics of the planting formation in the curvilinear pathway acted more

successfully in improving the perception of comfort than the palm arrangement during the period of axial sun exposure. The spreading canopies offered better intrusion upon the consistency of direct visual exposure to the sun and this enhanced the perception of comfort during the hot period of the day. This distinct positive impact caused by the trees in the curvilinear pathway did not support Mahmoud's (2011b) findings, which tackled the same pathway's microclimate condition as a whole consistent uncomfortable microclimate. However, subjectively, microclimate perception kept changing due to the perceived change in the eye contact with the sun caused by the impact of the trees.

### *7.2.9. Walking over shadows: Visible shadows invoke microclimate perception*

The scattering of a variety of vegetation formations along the curvilinear pathway, including irregular shaped bushes and shrubs, contributed to the microclimate perception throughout the daytime period. Participants' movements showed bodily instinctual inhabitation of the ground's shaded spots. In occurrences of walking in a direction facing the sun's radiation, shadows were a meaningful representation on the ground where walking over them was partially relieving, although they might not cast shadows on the participants' face. The impact of shadow representations appeared strongly during walking in a direction opposite to the sun's rays. Seeing shadows scattered intermittently along the pathway and walking over them provided a psychological ease, which delayed the desire for a real shaded microclimate and dissipated the attention to the sunny microclimate experience during the hot time period. This reveals an understanding of the visual presence of shadows intruding upon the sun's dominance on the ground, giving an impression of a better microclimate by walking over them during a hot time period. This interpretation might reveal how the presence of shaded patterns cutting off the sun coverage helped to establish the perception of the pathway as a *"more shaded pathway*".

The perception of perpetual representation of shadow coverage improved the realization of the time period. Throughout the time, the participants' perceptions of shadows and sun coverage together over the ground created a meaningful formation, whereas the perception of shadows changed with time from being a thermal indicator to a visual artistic composition that intertwined shade and sunlight over the ground. The appreciation of sun and shadow patterns over both the ground and time reveals a different function offered by the vegetation shadow which is apart from its real sheltering.

### *7.2.10. The potential of extended curvilinearity*

The slight gentle curvatures in the pathway were insufficient enough to change corporeal direct exposure to the sun's radiation, and thus vegetation was needed to cut the direct exposure to the sun. However, the extended curvilinear character strengthened the perceived physiognomies induced from the planting formations. The slight deviations harmonized the perception of the vegetation features, through enabling the successful intrusion of the canopied tree formations in the direct facial relationship to the sun's radiation, inciting an impression of dispersion of the sun's direct access, especially during the period when the sun moved lower in south western sky. On the other hand, this form of extension allowed shadows to scatter over the ground during most of the day time period and to change with the sun's movements. This highlights the positive impact of a curvilinear extension on the subjective perception of comfort.

### *7.2.11. The physiognomy of the curvature in full sun*

The design of the lake pathway strongly emphasized the impact of a curved pathway. The location of the lake area at the southern end of the park is completely open to the south east, south, and south west. The pathway runs in a curvilinear pattern following the lake's form, which curves outwards towards the south with the middle segment of it running roughly E-W. On participants' visits at different time periods, the sun's position and movements were across the southern sky, extensively and directly penetrating the area (figure 7.9). Despite the pervasive openness of the lake area and unavoidable sun coverage, the orientation of the path relative to the sun's position, allowed participants' perceptions of various levels of microclimate (dis)comfort through their movements during the hot period.

> M1: The participant was inspired by the curved character of the lake pathway: *I think designers should try, in their designs of paths, to make sure the sun does not directly face the users, so that the designs would not let the users stay in consistent harsh exposure to the sun for a long time. The sun would shift its position on me while walking.*

Figure 7.9: Illustration of the sun's path during the visit time

The previous description illustrates the perceived physiognomy of the curvature, as it captures a particular advantage offered by the design of the lake area. The analysis of participants' perceptions of comfort at the lake showed how they walked in the sun, but their awareness of the sun's heat changed during the walk. The curvature of the pathway allowed participants to experience periods of homogeneous microclimate feelings, induced by the sun gradually moving across the participants' faces to their sides and backs. This change in the facial exposure to the sun prevented the perception of consistent direct exposure to full and direct sun. The curvature's impact on the microclimate perception was preconceived by some participants during the moments of direct exposure to the sun, disclosed clearly by their desire to delay space enjoyment until reaching the mid-pathway when the sun would rest on their sides and backs. Thus, the form of curvature enabled the participant to enjoy their stay in the sun within the hot time period and without the need for vegetation sheltering.

#### *7.2.12. The lake is a centre of orientation*

The pleasant relief sensed in the lake's mid-pathway prompts a reading of the function played by the water feature as significant. The realization of different corporeal modes of sun exposure was made successfully stronger by the attraction force of the water space. The lake oriented corporeal posture and encouraged the experience of a pleasant microclimate during complete sun exposure, through prompting the corporeal adaptation towards the northern sky, opposite to the sun's radiation in the south horizon (see figure 7.9). Without the attraction of the water scene, participants would have passed by the mid-pathway segment, feeling relieved from the direct exposure as the sun would be facing their sides. However, the attraction force of the lake prompted users to keep their primary corporeal orientation effectively opposite to the sun's radiation and reveal their enjoyment of the microclimate. The view of the lake acted as an orientating aspect that adapted the users' orientations to comfortable positions. This shows the successfulness of the space's design in imparting microclimate comfort in a space strongly exposed to the sun and without the need for shade.

### 7.3. The Potential of the Spatial Orientation to Create Subjective Microclimate Comfort

A broad range of studies have discussed how outdoor thermal comfort is based on orientation and space geometry in terms of its design details, such as its vegetation, green

cover area and trees spacing and arrangements (Fahmy and Sharples, 2009). These aspects together determine the space's climatic features due to their impact on the amount and duration of shade and sun exposure (Shashua-Bar and Hoffman, 2003; Ali-Toudert and Mayer, 2006; Ali-Toudert and Mayer, 2007a; Ali-Toudert and Mayer, 2007b; Shishegar, 2013). Shashua-Bar and Hoffman (2003) reported that the effect of orientation on shading is insignificant in the case of an urban canyon with trees, elaborating that tree shade coverage largely offsets the impact of orientation. The finding that orientation alone hardly influences the amount of solar radiation (Shishegar, 2013) puts greater emphasis on the effectiveness of the qualities of the planting formations in a given pathway, as they are the principal generator of human comfort, and this alternatively places orientation as a subsidiary aspect.

Moreover, in the context of orientation, the range of experimental studies on thermal comfort aimed to create levels of comfort through determining the angle of deviation that produces maximum shadow coverage with a good combination of other design aspects. This understanding of comfort contradicts the subjective perception of comfort, as it limits discomfort perception to sunny microclimate. In my study, the established understanding of the microclimate (dis)comfort as a constituent of one's corporeal relationship to full sun radiation emphasised that the perception of discomfort is not an abstract perception of an experienced sunny microclimate; rather, it is realized due to particular solar penetration of the space that causes occupants to experience direct facial exposure to the sun. The pleasant microclimate perceived in the lake mid-pathway revealed how comfort was perceived during the experience of full sun in the critical hot period of the day. This places an emphasis on the potential of the spatial orientation as a significant aspect impacting on the users' relationship to the sun's radiation, independently capable of evoking a perception of (dis)comfort. This emphasis on orientation allows a discussion of it as a spatial aspect on its own, setting aside the impacts of other design aspects.

Space orientation is a solar orientation, which is determined by the area's latitude. Cairo's latitude is 30°6'N and lies in the hot dry region (Peel *et al.*, 2007). In this climatic region, studying the optimum orientation focuses on minimizing the duration and amount of solar penetration. Several studies conducted in a hot dry region concluded that N-S orientation is the best for least solar penetration (Ali-Toudert and Mayer, 2006; Mahmoud, 2011b; Shishegar, 2013). However, others have concluded the preference for intermediate orientations deviated from N-S for better comfort conditions, not only for summer, but also

with consideration to winter sun (Ali-Toudert and Mayer, 2004; Shishegar, 2013). Further studies have focused on the optimum degree of deviation from the N-S (Waziry, 2002; Muhaisen, 2006; Fahmy and Sharples, 2009). The study by Ali-Toudert and Mayer (2006) reported that the duration of solar exposure is longer in these intermediate orientations than in the N-S orientation. However, deviation from the N-S axis allows variant percentages of shade coverage during a period of sun exposure, which consequently gives options for adaptation. For this reason the authors recommended intermediate orientations were recommended, although not optimal as N-S, but they seem to be more advantageous when outdoor comfort is considered (Ali-Toudert and Mayer, 2006). Despite the differences between the findings of these previous studies, however, all of them suggest that the range of orientations deviating from N-S and NE-SW axes are more effective for hot arid regions.

This shows that the spatial orientations of the investigated formal and curvilinear pathways, as deviated from N-S, are in agreement with the previous results (see figure 7.1). They run roughly southward and south-westward, and are open with variant levels to the south and south western horizon. Nevertheless, my findings revealed the significance of the time period when direct facial exposure to the sun occurs, as one's thermal perception of direct sun exposure is impacted by the temporal meaning of the sun. For example, the spatial depth of the palm promenade did not prevent users from experiencing a period of direct sun exposure when the sun axially penetrates the path during the hottest period of the summer day.

Orientation significantly influences the diurnal and seasonal pattern of irradiation of the street surfaces (Shishegar, 2013). This brings the significant consideration of solar azimuth in the discussion of the orientation context. Solar azimuth is the position of the sun in its daily movement. Ali-Toudert and Mayer (2006) emphasized the significance of the solar azimuth, illustrating that solar exposure occurs at different times of the day for different orientations. The aspect of solar azimuth strongly impacts the subjective perception of the microclimate (dis)comfort, due to being an aspect that captures the time period of the relationship between the corporeal being and the sun's position.

The consideration of the impact of the solar azimuth on subjective microclimate perception weakens the advantageousness of N-S orientation or deviations from it. This range of orientations prompts the user to experience unavoidable direct sun exposure when the sun

moves on the south and south western horizon and axially penetrates the pathway. The difficulty of this relationship is strengthened by occurring during the hot period of the summer day. The time of axial penetration differs according to the degree of inclination from the N-S axis; however, it remains within the time period when avoiding the sun's radiation is necessary. This emphasizes the inevitable need for effective vegetation qualities and geometry in order to control the period of direct facial exposure or through the creation of perpetual shaded slots such as galleries (Ali-Toudert and Mayer, 2006) to intrude upon the sun's movements in the southern horizon during the hot time period. This was the significant difference between the configuration of both the palm promenade and the two extensions. In the palm promenade, the spatial depth created by the vegetation controlled the period of direct exposure to the sun. However, in the promenade's extensions, the ineffectiveness of the planting formations maximised the period of direct exposure to the sun as it moves on the south and south western horizon.

Moreover, from a comfort standpoint, N-S orientation or the range of orientations deviating from it are subjectively experienced the same, as these orientations similarly opened the field of vision towards the sun's path as it radiated in the south and south west. This highlights the limitations in the suggestion given in Mahmoud (2011b) of changing the orientation of the palm promenade from NE-SW to N-S for better comfort condition, as this would be is subjectively insignificant. According to Ali-Toudert and Mayer (2006), this change would slightly shift and decrease the period of sun exposure; however, the direct facial relationship to the sun will remain experienced. Although in different time periods, it remains within the critical hot period when thermal comfort is mostly required outdoors. The significant advantage of the intermediate orientation is that the period of sun exposure is cut off by partial shade coverage, and thus it promotes adaptation. However, N-S would prevent the partial shade in the period of solar penetration (Ali-Toudert and Mayer, 2006).

Interestingly, the impact of the solar azimuth exhibits the potential for improving the perception of comfort on an E-W orientation. Although the lake mid-pathway is wide open to the sun in the southern sky over the course of the day, from a subjective perspective and based on experiential perceptions, its roughly E-W orientation prompted the users' walking orientation to experience side exposure to the sun's radiation over the course of the hot time period. The fact that the sun rays impinge the human body laterally, from the southwest, south, and south east directions during the hot period improved the perception

of the microclimate due to avoiding direct eye contact with it during the time period when the space is most likely to be used (Figures 7.1 and 7.9).

In spite of the perception of the microclimate comfort in an E-W orientation, this finding is clearly inconsistent with the results of several experimental studies. E-W is often reported as a stressful and uncomfortable orientation in a hot arid climate region (Ali-Toudert and Mayer, 2006; Ali-Toudert and Mayer, 2007a), due to long periods of sun exposure and limited shade coverage around noon time even in case of deep spatial forms (Ali-Toudert and Mayer, 2006; Shishegar, 2013). However, my findings advocate the potential of improving human comfort in an E-W orientation for longer periods over the course of the hot time period. Moreover, the findings exhibited further design cues for improvements to the comfort perception. This includes the role played by the large amount of water in the lake that acted as a centre of orientation, effectively prompting the users' wish to stay opposite the sun, allowing superior levels of comfort during extensive sun exposure.

### 7.4. Subjective Perception of Trees as Sheltering Providers

Trees are planted to increase the quality of the natural experience, and in hot arid regions, they are principally considered for their effects on the microclimate (Kotzen, 2003). Several experimental studies on the thermal performances of vegetation offer a significant contribution to the effects of trees. In particular, their ability to create shade ameliorates the microclimate conditions by reducing the intense solar radiation in the summer (Shashua-Bar and Hoffman, 2000; Lin *et al.*, 2010; Mahmoud, 2011b).

Further studies have focused on characteristics of tree that affect the level of heat and light interception. Physical aspects of the canopy such as form, height, density and branching structure, as well as leaf distribution, are stated as components impacting the quality of heat and light interceptions (Shashua-Bar and Hoffman, 2000; Fahmy et al., 2010; Shahidan et al., 2010). A broad range of experimental studies have agreed on the significance of the physical characteristics of tree canopies. Shashua-Bar and Hoffman (2000) and Shahidan *et al.* (2007) signified the role of trees canopies as the predominant producer of shade, in addition to reducing wind velocity and glare and blocking the diffuse light from the sky and surrounding surfaces (Shahidan et al., 2007; Shahidan et al., 2010). Moreover, the cooling effect of a tree is influenced by foliage density, tree height and size, and canopy size (Potchter et al., 2006). Ali-Toudert and Mayer (2007a) and Fahmy et al. (2010) reported that the extent to which a

tree is recognized as an efficient shading feature depends on the canopy's density and geometry.

In my study, participants' perceptions of the sheltering function of trees showed that not all trees cast shade that evokes a sheltering perception. From a subjective perspective, the perception of the tree's shelter was realized and intuited significantly through its ability to intrude upon the facial interaction with direct sun beam. In addition, this perception was strengthened through the perception of having ample shade coverage to inhabit, and feelings of bodily immersion in shade. The difference in the perception of the sheltering function of the trees disclosed the significant impact of the canopy's qualities on the perceived quality of comfort. This brings to the fore the analysis of the canopies' qualities and their impact on the subjective microclimate perception.

### *7.4.1. The physiognomy of canopies' sizes and forms*

The size and form of the canopy was subjectively intuited through the area of shade coverage and by the level of intruding upon the direct exposure to the sun. The comparison between the trees planted in the promenade's extension two and the curvilinear pathway demonstrated the perceived impact of the canopies' sizes and forms. In both configurations, the trees were planted on flanks of pathways that are axially penetrated by the sun during the hot period of the day. However, in the extension segment, the trees' sheltering function was insignificant as their qualities kept the users directly exposed to full sun while walking in the hot period of the day. The small and roughly round shape of the tree canopies limited the perception of its sheltering function to staying beneath its canopy. The small size of the canopy limited the shade and concentrated its coverage around the canopy.

However, in the case of the curvilinear pathway, the canopies' sizes and forms boosted the perception of comfort. The microclimate perception was positively improved by the perception of an ample area of shade bestowed by the small, but broad and spreading, canopy form. On one hand, in respect of its sheltering function, the broadness of the canopy increased the opportunity to experience intermittent shelter from the sun while walking along the pathway. Although long intervals of direct sun exposure were experienced, the quality of the trees improved the microclimate perception of the pathway as the intermittent shade prevented the continuity of harsh facial exposure to the sun. On the

other hand, the broader and spreading character of the canopy allowed an increase in the shaded area, which allowed the shade to cover significant parts of the ground.

The case of the curvilinear pathway elaborated the preference for planting trees with spreading and broader canopy character to create greater possibilities of comfortable feelings during the hot time period of the day. These qualities are consistent with the functional role expected from a tree in a hot arid region. As Fahmy *et al.* (2010) demonstrated, the ground level shape of tree shadow poses the purpose of the planting. The objective of a tree in a hot climate like Cairo should focus on the production of maximum ground shadows, especially in the hot time period. Also, Kotzen (2003) and Shahidan *et al.* (2010) demonstrated the benefits of a broad horizontal canopy as opposed to an elongated one. When the sun is high in the sky the shade is concentrated directly around the canopy and thus not only does the broad shaped canopy provide significantly more shade over the whole day, it does so during the hottest parts of the day when comfort is most needed. This gives insight into reading the aim of the roundhead trees in the extension as being ornamental rather than functional. Moreover, it may explain the deficiency of the palm's qualities during the period when the sun is high or axially penetrating the promenade. The promenade receives extensive solar radiation while the palm cannot provide sufficient shade coverage during this period. This is due to having immense height, but a small canopy size which provides only a small area of shade.

### *7.4.2. The perception of sheltering, contextual interaction and breeze sensation*

Participants' perceptions of sheltering reflected the impact of the canopy's density. Canopy density is determined by branching, twigs, and leaf cover character (Shahidan et al., 2007). Subjectively, besides the significance of facial sheltering on comfort perception, effective sheltering was perceived by the feelings of the percentage of shade dominating over percentage of penetrated sunlight on the body. The pleasant impact of experiencing a fine gradient of sunlight penetrating through shade was emphasized in all the investigated shaded experiences. Nevertheless, allowing a great percentage of sunlight to penetrate the shade and reach the subject's face and body negatively impacted the perception of sheltering, disturbing the comfort of shade.

Figure 7.10: Gradient of sunlight penetrating through shade

The trees in the curvilinear pathway have a sparser and wider canopied character, allowing a gradient of sunlight to pass. Nevertheless, the density of the canopies was sufficient for shelter. It filtered the intensity of direct sun beams and allowed the enjoyment of the historic context beyond. Pleasure was evoked through enabling communication of the subject with the environment from in between the branches. This shows that the canopy is not only a means of sheltering, but is also a natural filter through which to enjoy the context from beneath and in-between its branching, twigs and leaf cover. This finding suggest that the density of the canopy, in terms of branching, twigs and leaves, is an aspect impacting quality and enjoyment in sheltering. The perception of both comfort and enjoyment reveals how the perception of sheltering is not necessarily induced from complete sun screening; rather, it would be realized from a plausibly sparser wide branching canopied tree.

Figure 7.11: The density of the canopy as an aspect impacting quality and enjoyment in sheltering

This finding is inconsistent with the results of studies on the effect of plantation attributes on the quality of shade, which stressed the importance of having trees with dense layers of leaves, in order to have good interception of heat and light in the hot arid climate and effective reduction in temperature (Kotzen, 2003; Potchter *et al.*, 2006; Shahidan *et al.*, 2007; Fahmy *et al.*, 2010; Shahidan *et al.*, 2010). On the other hand, the disadvantages of dense canopies have also been reported by experimental studies, which found that the density of the tree might affect the wind velocity, especially if planted in groups, due to the friction of the plant canopies (Mahmoud, 2011b). In this respect, some studies have established a relation between the density of the canopy and height of the tree, indicating the more height the tree has, the greater the need for a denser canopy (Fahmy et al., 2010). Reflecting on the palms' promenade, this may help to understand the effective combination between the height of the palms and an increase in their densities. A palm allows wider slots of sunlight to pass relative to a tree. However, the density of the fronds was improved by having a continuous arrangement of double rows of palms on either flank. This, in turn, reduced the level of interception of sunlight and minimized the occurrence of prolonged direct facial exposure to the sun. At the same time, the continuous arrangement did not prevent the sensation of breeze in the promenade, despite deep forms being proven to allow slower airflow in comparison to a shallower one (Shishegar, 2013). Shashua-Bar and Hoffman (2000) reported through field observations how the relatively higher canopies of trees promoted better ventilation. Potchter et al. (2006) added to this conclusion, showing that the higher and sparser canopied trees have a positive effect on human thermal comfort. This shows the positive impact of qualities of the palms in the promenade, which experientially promoted the sensation of breeze alongside effective sheltering. This positive perception of the palms suggest the possible consideration of selecting trees with higher canopies, yet with a relatively sparser character, in the creation of an extended deep pathway.

In this study, the relation between the canopy's density and breeze sensation was emphasized more in instances of shade created by trees with smaller heights. Trees with smaller heights and denser canopies negatively affected human comfort due to the decrease in the wind velocity (Potchter *et al.*, 2006). The study of Fahmy *et al.* (2010) conducted in the Egyptian climate context reached the same conclusion, especially when gathered in groups. Indeed, this may explain the feelings of claustrophobia that were evoked while experiencing

a dense branching canopy overhead. Claustrophobia in shade was emphasized as an aspect that decreased the pleasure and comfort of the shaded experience. In the curvilinear pathway, the reading of the microclimate perceptions supported how small tree height with broader and sparser canopy character positively improved the sensation of breeze alongside its shade. The characteristics of the canopy prevented feelings of claustrophobia and the impression of enclosure that might be evoked from the experience of a canopy overhead. This suggests that invoking impression of breeze sensation alongside the shaded microclimate is more likely to affect the enjoyment in shade than the actual cooling impact of shade caused by the reduction in temperature. Dense tree formation allows a greater decrease in temperature due to the effective interception of heat and light. However, they would negatively affect the sensation of breeze, especially when the canopy is overhead. Alternatively, a small tree with sparser foliage would normally provide less shading, but it allows the passage of more breeze (Ali-Toudert and Mayer, 2007a), which strengthens human enjoyment of the quality of shade.

These findings strongly reflect the inter-relationship between the height and density of the canopies, as stated in several experimental studies. However, the reading of the experiential perceptions of sheltering discussed in this section elaborates further and deeper aspects invoked by the density of the tree canopy, rather than the sheltering function. The perceptual impact of the filtration of direct light while allowing a gradient of sunlight encourages contextual interaction, and improves the sensation of breeze under the canopy. These are disclosed as aspects that evoke pleasure and enjoyment alongside shade comfort.

## 7.5. Evoking Atmospheric Impressions of (dis)comfort

The creation of an atmosphere through spatial effects has been discussed by Bohme (2008) and Zumthor (2006). Focusing on the thermal impression, some studies have discussed the thermal impact of colours as hot and cold colours (Fenko et al., 2010). In landscape, studies such as Serpa and Muhar (1996) and Kravanja (2006) stated that specific plant properties affect the spatial perception of green spaces through creating perspective illusions that invoke certain feelings. In my study, experiential examinations of the microclimate disclosed the impacts gained from the visual perception of the surrounding environment, which strengthened human perceptions of (dis)comfort.

### *7.5.1. Extended spatial depth without spatial enclosure*

The case of the palm promenade showed the privilege of having a deep form in open spaces in the Egyptian climate context. The spatial depth of the palm promenade maximized the period of shade coverage. The consistent arrangement of palms on either flank succeeded in the provision of consistent shade coverage along the whole length that extends across the width throughout time as the sun moves westward. This agrees with a broad range of experimental studies which reported the recommendation for deep forms in the hot arid climate (Ali-Toudert and Mayer, 2006; Muhaisen, 2006; Shishegar, 2013).

Significantly, my findings revealed how part of the pleasure taken in the shade of the palm promenade was evoked by the perception of spatial openness whilst sheltering. Despite the promenade's spatial depth, it was perceived as a shaded open space. This shed light on the qualities of the sheltering palms which, although continually and tightly arranged, allowed a pleasant amount of visible sky. This observation reveals the significance of the sky view factor, which indicates the amount of visible sky at a given point. Lin *et al.* (2010) found that the sky view factor created by buildings or vegetation had a significant impact on users' perception of thermal comfort. Our study showed that the visibility of sky was preferred as long as the sky view was free of the sun's shininess. This finding shows a preference for avoiding the perception of spatial enclosure in cases of creating extended spatial depth using trees planted on groves.

### *7.5.2. Reflectivity of the paving material*

Pavement materials are important components of landscape design. However, they have a climatic impact (Akbari *et al.*, 2001; Mahmoud, 2011b). The study tackled two paving materials that showed an impact on the perception of (dis)comfort. The formal promenade is paved with light marble stone. From a climatic perspective, marble stone is classified as a cold material that has a high albedo. The usage of cool material is discussed as promising in hot climates, as it enhances the thermal comfort conditions during the summer period through reflecting the light falling on it and preventing the increase of ground temperature.

However, subjectively the impact of marble did not reflect the assumptions of cool materials with high albedo. During the period of solar penetration, the visible perception of the sunny marble pavement evoked the impression of glare that showed a negative impact on the

microclimate perception. The perception of the extensive glare was a significant sensuous ecstasy induced by the visual perception of a large area of marble stone pavement exposed to full sun and reflecting the sunlight. The impact of glare was enlarged in moments of direct exposure to the sun. The negative impacts of glare on human comfort are reported by Shahidan et al. (2010). Moreover, the experimental study of Mahmoud (2011b) conducted in the palm promenade reported an increase in the measured temperature, showing the insignificant effect of the ground pavement. The study also reported the negative impact induced from the visible perception of extensive bright ground, during the hot period of the day, increasing users' level of dissatisfaction with the microclimate. This showed that subjectively the effect of glare was more powerful than the expected effect of a material with high surface albedo in the perception of (dis)comfort.

On the other hand, in the curvilinear pathway the pavement is dark asphalt. From a climatic standpoint, usage of asphalt and dark finishing materials is not favoured in hot arid regions due to having low albedo (Akbari et al., 2001). It absorbs solar radiation quickly and leads to a higher surface temperature that re-radiates the heat again to the surrounding bodies (Mahmoud, 2011b). Mahmoud (2011b) suggested that in the curvilinear pathway, the increase in measured temperature and users' high thermal dissatisfaction were predominantly caused by the impact of the extensive surfaces of hardscape materials with a low albedo, concluding the negative effect of low albedo on the thermal sensations. However, from a subjective standpoint, participants' perceptions of the microclimate revealed the insignificant impact of the dark asphalt in their feelings of (dis)comfort.

The comparison between the impact of the solar penetration on the marble in the formal promenade and asphalt pavement in the curvilinear pathways strongly suggests that the insignificant perception of any thermal stress from the asphalt was due to the absence of the glare effect. Asphalt was more comfortable to the eye than the marble because the dark colour of the asphalt does not reflect sunlight in the same way as the marble ground. Thus, the impact of glare and shininess induced from a cool material with high albedo was more influential than the impact of a dark material with less albedo.

### *7.5.3. The experiential dimension of the sun and shade patterns*

Sunlight and shadow are non-permanent environmental features. The impact of these features has been discussed many times in architecture (Rasmussen, 1964; Tanizaki, 2001;

Malnar and Vodvarka, 2004). Pallasmaa (2005) discussed the significance of shadows in spatial context, describing how they give shape and life to the object in light. Compositions of shadows and light were discussed in a more artistic realm, emphasizing the beauty gained from the variation of shadows such as, heavy shadow against light shadows in the spatial context, and showing their potential to induce atmospheres and impressions through creating different spatial effects (Rasmussen, 1964; Tanizaki, 2001; Zumthor, 2006; Bohme, 2008).

In my study, the positive appreciation of intertwining shade and spots of sunlight over the ground with varying levels of interception was emphasized in the investigated shaded experiences (figure 7.12). Moreover, an observed soothing quality was gained through the visual perception of the patterns of sun and shadow scattered over the ground in the case of the curvilinear pathway. The varying planting formations, regardless of their sheltering efficiency, created different shadow coverage, in terms of size and form, scattered along the length. Shadows scattered along the ground were an attractive meaningful pattern in the hot time period that promoted forbearance and ease during the experience of the sunny microclimate, and especially when staying in an orientation opposite to the sun's radiation. This was revealed in the unconscious walking over or stepping on the shaded spots.

Figure 7.12: Shadow patterns improve perception of comfort

The scattering of shadow patterns boosted the perception of a "more shaded path". It cut off the domination and continuity of sun penetration to the ground, compared to the extensions, which were characterized by the complete sunlit and shiny marble ground without any noticeable spots of shade. As the time increased, the relation to sunlight and shade patterns changed from a thermal meaning to an aesthetic meaning that enhanced the quality of the outdoor experience. The sun covering the ground became a pleasant indicator of day time continuation. These perceptions show how the shade spots over the course of

the day, and especially in the hot period of the day, create perspective physiognomies which invoked certain feelings or moods of eased comfort. This experiential dimension of sun and shade might reflect Thwaites and Simkins' (2007) description of their ability to generate strong transitional sensations. This gives insight into the consideration of placing various planting formations on the flanks to cast areas of shade on the ground over the course of the day.

## 7.6. Summary

This chapter considers the contribution of the space design of the case study areas on the microclimate perception of the participants. It analyzed and discussed the physiognomies that were revealed from the spatial configurations of each of the four investigated pathways during the hot period of the day, focusing on the paths' orientations and vegetation aspects.

The findings emphasized the important consideration of the sun's movement during the period when the space is likely to be occupied. In this respect, discussions in this chapter re-visited the context of spatial orientation in hot arid climates and my experiential findings did not support the results of the experimental studies on optimum orientations in hot arid regions. However, they offered different considerations in the context of orientation.

Findings in this chapter showed how people in subjective terms experience and perceive trees in terms of comfort, reading the impact of vegetation qualities, on the perception of (dis)comfort. The findings explored how tree qualities, particularly canopy quality, impacted the amount and duration of exposure to the sun offering degrees of intrusion upon the subject's relationship to the direct sun exposure. Interestingly, this experiential study moved a step forward, showing that shade is a need that is subject to desire and preference. The reading of the experiential perceptions of sheltering goes beyond the sheltering function, showing how canopy quality allowed pleasant sheltering that evoked enjoyment and pleasure in the shade's comfort.

Moreover, understanding of the microclimate perception as being more than thermal sensation was also strengthened in this chapter, shedding light on several visual impacts gained from the environment by revealing the strong perceptual links between the visual and thermal senses.

## Chapter Eight

# Ecstasies of Water in the Microclimate

The Meaning of Water in the Egyptian Mentality

# Chapter 8. Ecstasies of Water in the Microclimate

## The Meaning of Water in the Egyptian Mentality

### 8.1 Introduction

This chapter aims to understand how water can ameliorate the subjective perception of the microclimate in the Egyptian microclimate context. As Islamic architecture was a key source of inspiration for the creation of Al Azhar Park, water played a key role in landscape design. The park is characterised by extensive and distinctive water formations. Water bodies come in different forms in the park including fountains, cascades, water channels and ponds. From a climatic standpoint, participants' pre-understandings of a comfortable microclimate revealed that water was believed to be an intrinsic aspect associated with the experience of a comfortable microclimate. They were affected by the concept of expecting a better "cooler" microclimate near water bodies, believing in the capacity of water features –as coolant –to ameliorate the microclimate. The predominant choice of the lake area by the majority of participants, as a desired destination supported their belief in the impact of water. One participant (M2) used the description of "*the lake comfort zone*", showing his belief in finding a cooler microclimate in the area proximate to the lake.

However, participants' conception of the impact of water was discussed in a way that revealed that the idea gained about the cool impact of water in the microclimate seemed to be shared and culture driven by a popular science conception rather than experiential knowledge. On one hand, there are various water formations in the lake area; however, participants expressed water as an abstracted aspect, without any experiential recognition or remembrance of particular qualities or forms that improved the microclimate. On the other hand, discussions with some participants showed that the expectation of a cooler microclimate, at this hot period of the day, was conditional upon finding a shaded place near the lake. Moreover, recalling memories of previous visits to the lake area illustrated that the past experiences of enjoying a cooler microclimate were linked to the stay in the shade of the lake café building, or to evening times.

> M5: *The lake area is one of my favourite comfortable relaxing places because of the large water space, which gives me an impression of being in better weather especially if staying in the shade.*

However, the conception held in mind about the impact of water in the microclimate inspired the reading of the contribution of water aspect during a real immersion in the

microclimate, especially in the critical hot period of the day. In this respect, this chapter reads the perceived water 'ecstasies,'[1] which radiated outwards to the participants.

## 8.2 Experiential Reflections

Different water formations were examined during participants' experiences of the microclimates in the palm promenade, the promenade's two extensions and the lake (figure 8.1). Participants' perceptions of water in each of these setting are reported in the following experiential reflections.


Figure 8.1: The different water formations examined during immediate microclimate experienced

[1] See sub-section 2.4.3 for the definition of ecstasies.

### *8.2.1 The atmospheric potential of the water through the comfort of shade*

In the microclimate tours, variant formations of water were perceived during the participants' experiences of the shaded microclimate. Comfort was perceived due to the feelings of facial sheltering from the sun's radiation. Closer to the end of the palm promenade, the first water feature was experienced and investigated by the majority of the participants. A rill of water runs towards the south, descending gently along the path of the rest of the palm promenade and continuing along the promenade extension (figure 8.2). The rill starts with a small hexagonal ground fountain. Nevertheless, it was noticed how the presence of the fountain caught participants' attention, disclosing a positive change in the shade comfort. Despite the fact that the fountain is small in size, most of the participants' revealed their pleasure in seeing the water running in the fountain. One participant (F8) revealed her pleasure by describing the palm promenade as "…*offering shade but it is a boring atmosphere, the water here adds a livable pleasure to it*". On the other hand, for others, finding the fountain inoperative or dry spoiled the comfort of shade as it affected their enjoyment and perception of the quality of the outdoor experience.

Figure 8.2: The rill of water

F1: The fountain was not splashing: *It is a nice shaded passage, but here the scene of stagnant water is really awful…this canal should be running water, but now seeing this stability induces a highly negative impression. I don't feel any pleasure here by my proximity to water; on the contrary, I want to walk far to avoid seeing it. I would have a pleasant shaded atmosphere now if I am close to a water canal and hearing a soft water sound in the background, but actually this water scene disrupts my experience.*

M7: The fountain splash: The *water here is nice and quiet.*

M9: *Ohh!!! Why is it not splashing?!!!* The participant was walking enjoying the shaded atmosphere of the promenade; however, when he spotted the dry fountain, his immediate reflection revealed how it disturbed his mood of comfort.

Another similar ground water fountain was experienced in front of the lake café, during the participants' stay in the shade (figure 8.3). Feeling sheltered in such a shaded space from direct sun, especially after a considerable amount of time in direct and full exposure, improved the perception of the surrounding environment, including the water fountain. It was appreciated and described as an atmospheric generator with a lovely sound in the air;

however, occurrences when the fountain was inoperative reflected a decrease in pleasure.

Figure 8.3: The ground water fountain in front of the lake café

F3: *It expresses itself in the microclimate. It is not pleasant but clearly felt in the space, as it has a nice sound and flow but not a lovely shape.*

M8: *The water here is felt, it runs actively*. He was comparing with other water fountains experienced in the promenade extension.

F8: *Well, I don't know, it is good to have a water feature but I would prefer it to be calmer; it induces refreshment now but I would enjoy a quieter one to harmonize the calm character of the space.*

M1: The fountain was inoperative: *This is the only slot of shade in this area, but seeing the fountain not working decreases my pleasure.*

### *8.2.2 High subjectivity in the expression and preference for the pleasure of water alongside a shaded experience*

Occurrences of water alongside the shaded microclimate described above showed that the water feature was a favoured visible feature in the outdoor experience. However, there was also high subjectivity shown in the perception of water ecstasies in the shade. Water radiated outwards to the participants in various ways. This subjectivity was deeply exhibited in the perception of the qualities of water in the fountain node.

Figure 8.4: The fountain node

The circular shape of the node is surrounded uniformly by relatively broad canopied trees (figure 8.4). The node is obviously characterized by the extensive exposure to the sun. However, participants consciously chose to stay in the shade of the canopied trees. Despite the fountain at the centre of the node being a focal object in the space, shade intertwined with the sensation of a gentle breeze was emphasized as the main constituents of comfort, creating suitable conditions in which to rest at the node.

M8: And how do you experience the microclimate here? *Well I appreciate being in shade and feeling the breeze better. The fountain is a good feature, which improves these nice sensations*

M7: How could you describe your lived experience now? *Staying in shade, enjoying the view of a gentle flow of water that is not annoying,* (adding) *also it is breezy, although we are still in the hot period, but here in shade it is really different, there is a breeze.*

The comfort of shade permitted the conditions for comfortable visual perception of the details of the surrounding features. Perceptions revealed an obvious inter-subjective acceptance and preference for the presence of a water feature in the node's center, creating a focal point of attraction. Expressions such as "the scene of water, seeing the water flow, the style of the fountain, etc." revealed a positive improvement in the atmosphere gained from having a view of water. Nevertheless, few participants advocated their preference for having a more exciting element instead.

M6: Reaching the fountain node: *The place here is good, it is good to have a water feature in this space, however it is not distinguishable, having a prototypical water fountain flowing water from its edges*...(Adding) *the aim of a fountain is not providing a water source as much as providing a certain visual scene, this is not enjoyable. It is better to be replaced by something unique, for example a composition of landscape, an attractive tree, to attract people's attention to stay at the space, something capable of grabbing people's attention as at the lake area, which is a huge water space surrounded by green spaces. This composition gives the perfect mood for relaxation.* Aren't you enjoying the water here? *It is good but not as impressive as the lake.*

High subjectivity in the expression of water's audible pleasure, from weak to favoured, was also revealed. For some participants, the fountain was expressed as an atmospheric generator, where the sound of the water flow was revealed as a background aspect that improved the restorative and calm character of the space. For some others, water qualities did not meet their expectations, but this obviously did not prevent the appreciation of having a water feature to enhance the quality of the space. Nevertheless, it was inevitable that this subjectivity does not impact the perception of the microclimate comfort. The emphasis on the pleasure of shade and breeze sensation exhibited that the ecstasies of water is less effective to disturb the comfort of feeling sheltered from the sun.

F5*: Water could be soothing the heat, but its beauty is in enjoying its scene rather than its sound. It is a psychological soother but actually does nothing to the microclimate. Its visual essence is higher than its microclimate essence. I only feel its presence when I come nearer to it and it is not sounding in the place so much* (adding) *however, it is aesthetically better than not having it in the place. It has a character as the mosques' fountains, running naturally and calmly adding a gentle sound to the place. It is better than not having it in the place, as it gives an atmosphere to the node, and creates a gathering point.*

M7: How do you experience the microclimate? *Well, for me, it is a nice place to rest, I enjoy the gentle sound of water, especially enjoying it from the shade like now. I am not concerned by its shape, whatever it looks like; I'm looking for its impact, and here it provides a gentle background to shade. Its sound is quite relaxing me. I would enjoy the flow to be even slower to be quieter in the space.*

F8: *I feel more soothed by seeing the water splashing effectively at ground levels of the fountain unlike the water at the top level, it is weaker. Seeing the water strongly splashing is very refreshing. That's why I enjoy the character of the fountain at the plaza.*

F1: After spending some time here in the shade: how do you experience the water here? *It is nice* (seemed not so excited), *but not as impressive as the one in the plaza, I liked the feeling of water on a ground level, here it is slow.*

M9: *This fountain is only for visual appearance, to look at, but I could not feel any coolness from it. Nevertheless, it is better for me than not seeing water or seeing the fountain inoperative as in the sunny promenade.*

M5: How do you experience the fountain? *I could not feel its presence in the microclimate.*

F4: How do you experience the microclimate here? *The water makes a difference, it is capable of letting me stop for a break, spending some moments to contemplate.* What about the water flow? Does it refresh you? *It is weak, but for me it is enough to see a different form of water that differs from the one at the plaza. If it were the same as the plaza, we would not stop by it again.*

M3: Staying in shade and looking at the fountain: *I'm really disappointed for seeing the fountain inoperative*. Adding*: really water induces an impression of being in softened weather, strengthening the shift from one zone to another, hearing water from time to time, walking beside it.*

### *8.2.3 Significance of the perceived shaded experience*

In the lake area, the proximity to distinctive water formations effectively sounding in the space was often appreciated. However, during some experiences of shaded microclimates in spots looking over the lake, a negative perception of water was reported. The microclimate comfort was created by the immersion in shade, but dissatisfaction with the shaded space was expressed, due to claustrophobic feelings induced by the enclosure felt under the dense canopied trees' and the crowds of people. This state of displeasure was reflected in the perception of the surrounding context. For most of the participants, the reflection on water formations was disregarded, as they kept the focus on displeasure. For others, the reception of the sound of water was unexpectedly related to noise and loudness, as a negative communication in the comfort of shade and the recreational experience. On the other hand, occurrences where participants felt comfortable as well as pleased by the shaded space included the water formations in the lake area, which were depicted as increasing the enjoyment of the microclimate. This revealed that finding pleasure in the shaded atmosphere was effective in the stimulation of its comfort more than water.

F3: How would you expect the lake to be if the jets weren't splashing? *The most important aspect is staying in this shaded area. If it were not for the jets, I would still feel the presence of water, but the jets are really adding nicely to the natural view of the place.*

M4: Are you pleased by water here alongside the shade? *I couldn't bear the intrusion of water as now, actually I feel annoyed by its loud splashing.*

### *8.2.4 The intertwining of dissatisfaction and esteem during direct facial exposure to the sun*

The case of the promenade's two extensions provided deep insights into understanding the perceived effect of calm water in a sunny microclimate as these two settings were extensively exposed to sun throughout the daytime period. As previously described in section 4.2.2, the extensions were characterized by a water rill running along the length (figure 8.5),

and in segment two the rill ties three fountains (figure 8.6). The articulation of the water formation in the promenade is inspired by the design of water channels and fountains in the Islamic garden. The extensive solar penetration and lack of shade in both segments prompted the unavoidable investigation of water while walking in a harsh uncomfortable microclimate caused by the direct facial exposure to the sun.

In the promenade extension, water was experienced by the majority of the participants during their experience of a full and direct exposure to the sun. Walking along segment one, the participants' focus was on the harsh heat of the sun; however, purposeful questioning by the researcher was given to the contribution of the water rill running along the centre of the segment. The ecstasies of water in the microclimate was highly provocative to many of the participants. A common sense of dissatisfaction and displeasure was revealed by the narrowness of the rill and by the scene of almost still or slowly running water. There was hardly any change in the discomfort felt in the microclimate.

Figure 8.5: The southern end of the water rill

F1: While walking: how do you experience the water here? *Here water is really provocative, water in the canal is stagnant; it is not completely felt in this sunny microclimate.*

F3: Feeling annoyed: *I think the water flow is too weak, isn't it*? Here, I found myself (the researcher) replying, yeah, it is hardly running.

M8: *I didn't feel any impact of water in this sunny space. It is supposed to enjoy having water, but it needs to be stronger. Probably, it is meant to create a calm atmosphere, but the sun here makes it difficult* (adding). *It is good to walk by water, but actually this one doesn't relieve the uncomfortable feelings of the microclimate.*

In segment two, the presence of different water formations triggered the question of its contribution to the microclimate experience. The aesthetic preference for the promenade's design was admitted. However, enjoyment was suppressed by the harsh exposure to the sun.

M7: The participant showed his appreciation to the calm water sound echoing uneventfully in the background. He was greatly influenced by the noisy water at the entrance plaza. How do you experience the water here in this part of the promenade? *Here I hear a gentle sound while walking, that is good for me. Even if it is an aesthetic feature, it is good to have it in the sunny passage, and linking different water sources, the canal and the fountains, all together…*adding*:* but the heat is stronger. We need to walk faster.

F2: Isn't the water changing anything? Looking at the water fountain in the middle*: the water is too weak… it is a good idea to tie the fountains with a ground water channel, but the water flow is not felt at all.*

F4: Continuing walking along the promenade: *I like the idea of linking the water fountain through a canal as a scene, but it should have a perceptible motion to attract me, it is stagnant, not grabbing my attention, and humans are attracted to running water.*

Despite the presence of different water formations along segment two, perceptions of the water qualities revealed that water was similarly perceived to its perception in segment one. Almost all of the participants expressed dissatisfaction with the water ecstasies offered in the microclimate. It was noticeable in this perception that discomfort caused by the full and direct exposure to the sun shortened the singular question of each water fountain; instead, a wholly indiscernible impression was induced from the unimpressive presence of water along the whole segment (figure 8.6). This indiscernible character of water within the microclimate experience was described by a number of participants:

M9: Commenting while walking: *I could not feel the water influencing the microclimate in this place even psychologically. It is splashing too calmly. Its sound is low and I could not feel any influence even psychologically. The place here is strongly exposed to the sun, although there are some trees on both sides, but it is not high enough to shade the promenade, only creating an area of shade beneath. I am not pleased by this direct exposure to the sun.*

M5: How do you experience this part, do you feel any essence induced by these smaller water fountains or the water canal? *I don't know, but the problem is now I'm directly facing the sun; my only intention now is to change this direction of walking. I don't care for the details in the surrounding; I'm not attentive to the presence of water and couldn't feel any essence.* At that moment, I felt the participant expressed exactly my feelings.

M6: *Here I am not interested by the water at all, it has no meaning to put a narrow water canal, it is really not felt in the space, I'm only attentive to it to avoid falling in it, it is not visually appreciated and does not make any difference to the weather. It is enough to have rows of shady trees on both sides of the passage, rather than this unenjoyably narrow water rill. I feel its sound is not able to show itself.*

M8: What about the water in the part? *Here I feel the water needs to be more actively running, to feel it in this weather, it is almost stagnant, being active would have make some soothing difference but still the urgent need is providing some areas of shade, this will create the main difference.*

F2: *The flow and amount of water in the middle fountain is too weak. Is that normal or is it not working properly and needs maintenance?* Laughing and adding *its flow is provocative in this hot weather.*

F1: In a later time epriod, when a few shadows covered the ground: How do you experience the water here? Is there any difference from before? *It is too weak, it is rather provocative to me. I couldn't feel its presence in the place, and no impact in the microclimate, even its sound is too low.* Looking at the water canal: *even the water in the rill is not felt, its flow is too slow, and it is almost stagnant. Look at the end of the rill, it is almost dry here….water does not run anymore.* Passing by the the marble founation in the middle of the segment: *Look at this fountain, I feel water is going to cut off* (describing it sarcastically).

Figure 8.6: A weak expressive essence of water was not capable of overshadowing discomfort

Descriptions revealed the flow in the water fountains was weak enough to create a perceptible motion in the water rill. Water formations along the segment were perceived as ineffective in presence and volume. It was too weak in flow and consequently was hardly

felt, and thus its expressive essence changed nothing in the uncomfortable microclimate.

The uncomfortable microclimate experienced by the participants was reflected in the physiognomies of water. Nevertheless, despite the poor qualities of water formations in the sunny microclimate, dissatisfaction did not conceal the positive reception to the absolute presence of a water feature in the spatial microclimate –whatever its characteristics. This was shown by those participants who experienced no water in the rill on their visit but had anticipated the presence of water –whatever its flow – to make a positive difference emotionally.

### *8.2.5 The perceptible sound of water barely stimulated the soothing walking in direct full sun exposure*

Despite the perception of the water as indiscernible in the microclimate, the presence of different water formations provoked some participants to question the singular character of each of the fountains in the microclimate. This was elaborated in segment two by a few participants. Hearing a considerably active splash of water from the star-shaped fountain at the beginning of segment two generated a psychologically better perception. However, the too weak or almost stagnant flow in the water rill and the obvious upsetting water flow in the marble fountain in the middle of the pathway were perceived as greatly disappointing. Walking close to the water fountain was remarked on by two participants who described the privilege of walking closer to capture the water sound better in the microclimate as it was inaudible just a few steps away from it, and was lost by walking a few steps away.

> M9: Walking closer to the fountain*: Only when I became too close to the fountain, I could hear its sound, and this gives a better microclimate impression.*
>
> M8: *When I walked close to this fountain it somewhat grabbed my attention. The water in the rill is not noticeable at all.*

This shows that the perception of the fine water quality in the uncomfortable microclimate was underpinned by the user's proximity to it. Nevertheless, in both segments, continuous walking was common. None of the participants –whatever their perception of water – thought of stopping to question the contribution of water, not even those who showed partial satisfaction in the presence of a water feature by proximity. Water was often questioned while continuing to walk alongside it. The discomfort of the direct and full exposure to the sun overrode the question and reception of physiognomies in the space at rest.

### 8.2.6 The prevention of direct sun exposure promoted appreciation over dissatisfaction

The perception of the water features during the walk in the direction opposite to the sun's radiation was experienced by few participants. Staying far away from the direct sun beam prevented the feelings of the sun's harshness, and this allowed for a better reception of the aesthetic qualities of the space's design. The participants revealed the acceptance of the quality of water through their appreciation of the Islamic spirit evoked in the design of the rill and fountains, as adding to the aesthetic quality of the space and improving their outdoor experience. The insignificant sound of water was also stated; however, the description was free of the sun's harshness and feelings of discomfort.

> F8: *Although it is sunny, water gives me a different impression. It is a good atmosphere that changes my mood in this sunny promenade.*

### 8.2.7 The perception of a great deal of water formations during extensive sun exposure

The lake area was the main water space in the park. It was characterized by the large water body, the lake, with fountains, jets, and a cascade dispersed through it (figure 8.7). Each water feature portrayed a different mood or character, and the formation all together gently radiates expansive energy outward into the context. The area is characterized by extensive exposure to the sun path in the southern sky. However, the curved character of the pathway allowed the experience of different orientations to the sun in the southern sky, and thus the perception of varying degrees of microclimate dis(comfort).[2]

During moments of full and direct exposure to the sun, the contribution of the water to the microclimate perception in the lake area was relatively distinctive, unlike the insignificant contribution of the water in the promenade extension. Although participants' perceptions of the microclimate were highly affected by the immense heat experienced, they intuited and grasped their proximity to actively splashing water space. Water was invisible to the participants; as they looked down to avoid the direct eyes exposure to the sun's radiation. However, they were psychologically charged by their proximity to the varying and continuous lively play of water. In particular, the sound of the actively splashing water was favoured, as it was magnificently audible in the space. This psychological impression

[2]As exhibited in sub-section 4.3.1, water was integral to the microclimate perception in the lake area. Participants were constantly faced with different sensory incentives of a great deal of actively splashing water, which intruded to varying degrees upon their perception of the microclimate dis(comfort). In this chapter, reading of these sensory incentives is sharpened. Participants' supporting quotations are provided in the detailed description of the microclimate perception in sub-section 4.3.1.

positively attempted to dissipate their static immersion in heat and direct exposure to sun. Nevertheless, the harshness of the sun's full and direct facial exposure dominated and prevented them from stopping and gazing at the water.

The feelings of discomfort completely disappeared when the participants at the mid-pathway adjusted their posture to face the live play of water. Staying away from direct sun improved the microclimate conditions and allowed for visible engagement with the characteristics of water. The provision of better conditions for engagement with context and its rich dynamic characteristics strengthened and stimulated the perception of freshness in the microclimate. Water showed itself as an extensive and continuous stimulation of variant water formations. The lake, water jets, fountains and the cascade, contributed to the perception of great freshness in a sunny open space and during the peak of the day. The impressive motion of water splashing in the fountains and the cascade, and the water jets splashing the water high in the air, became seen.

Figure 8.7: The Lake

Descriptions reveal that the proximity to a visibly significant number of water formations and hearing active splashing dissipated the fears of discomfort from being in a sunny microclimate during the hottest period of the day and allowed conditions for longer resting. Thus, the perceived water ecstasies were intrinsic to the perception of comfort, along with remaining opposite to the direct sun beam. The significant contribution of the visual and audible perception of water jets to the microclimate, in particular, was emphasized in the occurrences when few participants experienced them inoperative.

### *8.2.8 The touching of water on face*

Near the mid path-way, the distinct contribution to the perception of microclimatic pleasure was caused by the feeling of the mist on the face. It was the first time that participants

expressed tangible sensations of coolness in the microclimate. The experience of the water droplets was depicted as a principal constituent of the microclimate, which relieved the perception of heat at the height of the day and dislocated participants' perceptions of the hottest time period. "*Feeling cooler*" was a common expressed sensation evoked by the mist. The feeling of mist on the face, improved the experience of a sunny microclimate at the critical hot period of the day. Particularly, it relieved, to some extent, the experience of direct facial exposure to the sun as described by one participant (M8)*: "Being touched by water is more powerful than heat."* The microclimatic improvement brought by the feelings of the mist acted as a distinct cool incentive during the height of the day, prompting the participants to stop walking and adjust their posture to face the water fountains, in order to receive the mist better.

## 8.3 Discussing Subjective Intuition and Objective Investigation of the Impact of Water in the Microclimate

### *8.3.1 Emotional esteem and preference for water in the Egyptian context*

From a subjective perspective, participants' experiential examinations of the water during immediate microclimate experiences and perceptions supported the researcher's earlier observations. They disclosed that the ingrained conception of the cool impact of water in the microclimate was communicated as knowledge based on popular science rather than an actual physical encounter, and that the expectation of the cool impact of water was affected by the preconceptions. However, the microclimate immediacy uncovered deeper understanding of this meaning.

The findings of this study disclosed that the physical presence of the water aspect was favoured during comfortable and uncomfortable microclimates. Participants revealed an emotional preference and esteem for the water aspect. This appreciation inspired the reading this emotional meaning of water in the Egyptian context. Water historically has proved to be a key feature in the design of successful spaces, as it is a major meaning-giving element in any landscape (Burmil et al., 1999; Salama, 2010). Of particular significance, water has a distinct meaning in arid landscapes; where heat, drought and dust prevail water provides a means to wash dust off, saturate thirst, cool off and refresh the body (Burmil et al., 1999). Human images of arid landscapes, as documented in the historical literature, depict how the desert is mostly perceived as inhospitable for humans, and, in contrast, the appearance of water often

assumes a miraculous status in the desert (Burmil et al., 1999). Water in an arid landscape is conceived as an aspect that is able to transform the harsh desert landscape into a liveable and even idyllic place, into an oasis (Burmil et al., 1999). The widespread Arabic proverb (*Al ma', Wa Al Khodra, wa Al Wajh Al Hasan*) expressing the mood of pleasure, cites water –Al ma'– as one of the three most enjoyable things in life, and greenery and a beautiful face follows, respectively (Salama, 2010). Different cultures and religions have used water in their architectural manifestations for different purposes. In Islam, water conveys a symbolic meaning, as it is a representation of life, a "life-giving" element. The idea of the paradise-garden is imprinted in all Muslims' mental conceptions, and running water is a principal aspect in its design (Ruggles, 2008; Salama, 2010). In Islamic architecture, water bodies are predominant features in gardens and courtyards (Ruggles, 2008). For example, the importance of water as an integral element has been recognized in Egyptian gardens (Burmil et al., 1999).

Many studies have reported a subjective preference for water spaces such as (Ulrich, 1981; Herzog, 1985; Kaplan, 1985; Ulrich, 1986; Kaplan and Kaplan, 1989; Nasar and Li, 2004; Karmanov and Hamel, 2008). Water is considered one of the most important aesthetic landscape elements and plays an important role in landscape perception, preference, and design, as a part of the natural landscape impact of water. Water features have consistently been found to be important to human perceptual evaluation of landscape scenic quality and to the quality of many outdoor recreational experiences (Burmil et al., 1999). Viewing and hearing water in the landscape has potentially been found to serve important health restorative needs (Smith et al., 1995; Burmil et al., 1999; Velarde et al., 2007; Korpela et al., 2010; White et al., 2010; Völker and Kistemann, 2011). Research reviewed in Nasar and Li (2004) and Völker and Kistemann (2011) shows that people establish categories of landscapes with and without water and rate them significantly differently.

Indeed, a research conducted in the Egyptian context has shown that differentiation of and preference for outdoor spaces was principally determined by the presence of shade trees (Stino, 1983). However, favouring water in outdoor spaces has also been found in some studies which focused on the visual preference of outdoor spaces in the Egyptian context (Stino, 1983; Gabr, 2004), and the findings revealed that the Egyptian mentality is more attracted to outdoor spaces that combine greenery and water. Of particular interest here is the research by Salama (2008) which addressed the users' reactions in Al Azhar Park. His findings revealed that the lake area was highly appreciated and favoured.

In my study, the preference for water spaces was emphasized from the very beginning in the observations of users' experiences during my reconnoitering visits to the park. The water space was often valued and perceived as the centre of gathering, resting, and main activities in the park. During the microclimate tours, participants' descriptions revealed frequent emotional appreciation of water features as adding to the quality of the space. The meaning of water in the Egyptian mentality is captured in the words of a participant (F5) "*Water creates a gathering space, a point of stability. It adds liveability to anything as God says: We made from water every living thing"*. Moreover, when the participants saw inoperative water features, during their microclimate tours, this had an obvious negative impact on their enjoyment. This illustrates the deep-seated significance of this feature in the preference for an outdoor space, revealing the emotional relationship to the water aspect in the Egyptian mentality.

### *8.3.2 The cooling capacity of water in the microclimate*

From a physical thermal comfort standpoint, the role of water has been extensively investigated and acknowledged in the microclimate. Many studies have been dedicated to the role of water on the microclimate (Givoni *et al.*, 2003; Robitu *et al.*, 2006; Robert, 2010; Olah, 2012; Coutts *et al.*, 2013). Experimental data have often demonstrated the potential of water bodies in reducing the temperature during daytime, through evaporative cooling in the surrounding area to the water body, on hot summer days (Xu et al., 2010; Steeneveld et al., 2014). Others have demonstrated the effective combination of shade and evaporative cooling together in ameliorating human thermal comfort conditions (Robitu et al., 2006; Krüger and Pearlmutter, 2008; Coutts et al., 2013).

In ancient architecture, water was one passive feature which helped in creating comfortable thermal environment in the buildings (Nahar et al., 2003), and in Islamic architecture, water bodies were used to create a comfortable thermal environment in hot arid climates. An experimental study of Egyptian housing courtyards demonstrated how water contributed to the creation of better microclimate conditions in the Islamic gardens and courtyards, when shade is insufficient (Attia, 2006). In the Egyptian climatic context, the evaporative cooling of water is generally discussed as one of the design tools capable of enhancing human thermal comfort (Attia and Duchhart, 2011). However, Mahmoud (2011a) detailed analysis of the bioclimatic zones in Egypt emphasized the significant contribution of the provision of sun shading and natural ventilation in the warmer part of the year in Cairo's bioclimatic zone, as a

means of enhancing the passive design. It devalued the contribution of evaporative cooling in the Cairo zone, relative to other Egyptian bioclimatic zones. This result is in accordance with the results of an experimental study in Al Azhar park, in which the measured temperatures demonstrated that the impact of the evaporative cooling in the lake area and fountain node, as two significant settings exposed to extensive solar radiation, was generally insignificant in decreasing the temperature of the area (Mahmoud, 2011b).

This raises the idea of our corporeal response to the physical impact of water in the air: do our bodies sense the amount of decrease in temperature likely to happen in a water space? As discussed in section 5.4.1, from a subjective perspective, the Egyptian summer was described as a very hot season where the sun's heat was the salient quality which characterizes the climate of this time period in Cairo and Egypt as a whole. Participants' experiential immersion in the microclimate showed that subtle, physical signs and change in temperatures were not perceived. The results of Mahmoud (2011b) showed that the benefit of water in the microclimate caused a reduction in temperature $2^{o}c$ lower than the highest temperature measured. From a subjective perspective, this seemed to be insignificant enough to be physically perceived or sensed. This discrepancy between the subjective and real impact of water challenges and questions the conditions for physically perceiving the cool impact of water in the microclimate, especially when a space has extensive sun exposure and insufficient shade.

### *8.3.3 Physical cooling or psychological refreshment?*

Apart from the experience of the mist, the absence of a perceptual physical impact in the microclimate generated from water was noticeable. The fact that the participants' perceptions of water reflected a sense of relief caused by the physical presence of water features, impacting on the overall comfort to varying degrees, showed a particular significance that prompted the studying of the relation between the emotional preference to water and the microclimate perception. The experimental study which was conducted recently in the lake area in Al Azhar Park during the hottest month emphasized the positive impact of the water space on users' subjective thermal evaluation of the microclimate (Mahmoud, 2011b). The study reported a noticeable satisfaction of the users in the hottest month in the lake area relative to other zones in the park, and the author suggested that the improvement happened due to the benefit of the lake area from the effect of evaporation. Nevertheless, the reading of

the measured temperatures in the different zones in the park indicates the presence of a very slight decrease in the temperature of the lake area relative to other zones, which would hardly cause a sensible physiological change in users' perceptions. This may indicate that the users' satisfaction and acceptability might be closely linked to appreciation of water, where the positive improvement recorded in users' perceptions of the microclimate at the lake may have been psychologically gained from the impression of proximity to water space, rather than an actual physical sensation of coolness. Indeed, another study which focused on the thermal acceptability of users in two parks including huge water bodies (Rajapaksha and Rathnayaka, 2014) supports the improvement of the microclimate perceptions of the users due to their impression of proximity to water space.

Moreover, the 'naturalness' of a place is exhibited as a significant aspect improving the perception of the microclimate (Nikolopoulou et al., 2001; Thorsson et al., 2007). In this respect, water is viewed as a design element that strongly imparts the mobility on nature and invokes a natural image in the environment. Indeed, the fact that Egyptian parks are few and often characterized by the rare presence of water features increased the appreciation of the existence of any design combining greenery and water features, even when these had an unsatisfying quality. Participants were charged by the naturalness of the park, and invigorated by the concentrated presence of water and greenery together, which are aspects they strongly lacked in the everyday life. The participants in my study discussed water as a vital aspect of the park experience, showing obvious emotional preference for the water aspect in space design.

This discussion uncovers how the cooling capacity of water in subjective terms is recognized as psychological feelings of refreshment. The presence of water is an aspect considered to add a natural spirit and improve human thermal acceptability and preference for the place.

### 8.4 Ecstasies of Water Signal the Perceived Microclimate (Dis)comfort

Previous studies reviewed in Völker and Kistemann (2011) elaborated that the perception of aesthetic quality and pleasure from water were strongly influenced by subjective aspects such as mood, meteorological factors in terms of temperature, wind, etc., choices of activities, age group or expertise in water issues, naturalness versus artificial waterscapes (reviewed in (Nasar and Li, 2004), or water with reflective views (Nasar and Li, 2004), and sensual aspects like sound, colour, clarity, motion and context (Smith et al., 1995; Völker and Kistemann, 2011).

However, the findings of my study identified a condition proven to have a significant impact on the subjective perception of the refreshment and pleasure from water. The way that water was perceived during participants' different orientations to the sun radiation revealed that the user's particular corporeal relationship to it was a principal aspect that impacts on how water sensually radiates outwards to the user. This aspect illuminates how the perceived ecstasies of water signalled the experienced (dis)comfort. This interpretation was inherent in the descriptions and perceptions of all participants' experiences. A particular relevance clearly emphasizing this interpretation is in the promenade's extension two, where participants examined water in two similar star- shaped ground fountains, at the beginning and end of a rill tying them, but the conditions of perception was different. The first fountain was examined during a full and direct facial exposure to the sun (figure 8.8, left), while the latter was perceived alongside the comfort of shade (figure 8.8, right). Participants' perceptions of the impact of water from the two fountains in the microclimate were different.

F1: How do you experience the water fountain here? *Well, although it is the same as the first one we passed by, I feel this is more powerful than the other; its sound is revealed in the space. I hear its sound, a sound that could impress my being, breaking down any still essence.*

Figure 8.8: The two star-shaped fountains located at the beginning and the end of segment two

The expressive essence of water changes due to the different conditions of perceptions shaped by changing orientation to the sun. Feeling comfortable in shaded spot was revealed in the perception of a positive expressive essence of water in a shaded microclimate, which was different to a similar water fountain examined a few moments before but perceived in an uncomfortable microclimate. Moreover, the comparative analysis of my findings and the experimental study conducted in the same park (Mahmoud, 2011b) on subjective evaluation and measured temperatures in the fountain node, provides evidence to support how users' feelings of (dis)comfort are reflected in their perception of water. At the fountain node, my participants stayed purposively in the shaded spots, showing esteem and favour for the atmosphere enhanced by the presence of water fountain. However, according to Mahmoud (2011b), users' microclimate perceptions at the fountain node reported a high percentage of

dissatisfaction, suggesting that this dissatisfaction was due to the extensive exposure to the sun overcoming the cooling effect of the fountain. This subjective differentiation shows the impact of the condition of perception shaped by the corporeal orientation to the sun, and affecting the receptiveness of water ecstasies.

## 8.5 Improving Atmospheres through Water

The previous finding presents certain implications for the design of water in the outdoor spaces as it indicates the consideration of the users' orientation to the sun's radiation, in the design of water features. In continuation to this finding, this section reads the sensual qualities of the water perceived in different modes of corporeal orientations to the sun's radiation. This analysis aims to provide clues for the water qualities needed to ameliorate the microclimate perception in the Egyptian climate context, especially during the hot period of the summer day.

### *8.5.1 Water alongside a shaded experience*

Burmil *et al.* (1999) described how a place, with shade and water in an arid landscape is perceived as a shelter, an oasis. From a subjective climatic perspective, the perception of water through shaded experiences did not show any thermal conjunction. This perceptual insignificant climatic impact of water alongside a shaded experience, from a subjective perspective, is consistent with the results of Rajapaksha and Rathnayaka (2014) which reported that the influence of water in the microclimate modification is negligible relative to the decrease in temperature occurring due to the shade. This supports the notion that landscaping elements providing shade are prime factors in ameliorating outdoor microclimates. Another study emphasized that small water bodies create relative limited improvement, arguing that vegetation alone can create a comfortable outdoor microclimate for people (Xu et al., 2010).

The shaded microclimate constituted by facial sheltering from direct sun radiation was perceived as the prime condition of feeling comfortable. It was noticeable that the comfortable experience of shade allowed the basic conditions needed for human comfort in the hot time period, for staying outdoors. Interestingly, as read in participants' shaded microclimate experiences near the lake, it is the level of satisfaction and pleasure with the "configuration – or the medium of shade" that influence one's perception of water qualities. Water in the lake area was most often valued in the perception of the microclimate in the

moments when participants were in complete sun but feeling comfortable, rather than in those moments when participants were in shade but feeling claustrophobic and displeased due to the enclosure of the shaded space.

On the other hand, being able to shelter from the direct sun radiation coupled with the sensation of the breeze created corporeal comfort and distinct pleasure that allowed for a positive receptiveness to water. The feelings of both enjoyment and comfort in the shaded space allowed the search for beyond comfort, as it provoked and triggered the search for excitement and a superior quality in the outdoor experience. Thus, water was assessed and considered from a different perspective. It was also observed that the shaded microclimate, as an atmospheric medium, promoted a strong visual relationship between the person and the water feature. The visible perception of water features improved the perceived "natural" quality of the outdoor space. Descriptions revealed how water qualities were many times perceived from an aesthetic viewpoint. The physical presence of a water aspect in the palm promenade and the fountain node ameliorated and enriched the 'atmospheric shaded natural experience.' Interestingly, in the shaded microclimate, the flow of water was more seen than heard. For example, in the lake area, the water jets spraying water droplets in the air were favoured as a sculptural pattern of flow, (F3) "*seeing the water droplets in the air*" that created a certain sculptural value. This consequently puts an emphasis on the visual appearance of the water feature in case the space design allows the user to perceive it alongside a shaded microclimate.

Moreover, the restorative potential of water, discussed in many studies, was raised during the shade comfort. Water was discussed as an atmospheric generator, and was assessed from the standpoint of its restorative capacity to induce a relaxing mood or a natural and/or livable tone in the shaded experience. The need to relax in a comfortable natural atmosphere during the rest phase in shade evoked the sound of water as a design quality affecting the mood of shade. The findings exhibit the idiosyncratic differences in the expression and preference for pleasure from water audibility. The energetic sounds of the water formations in the lake were favoured by some; however, it was perceived as loud and noisy for others who preferred a quieter water feature to sound in shaded atmosphere. Of particular significance indicating comfort in the shade relative to the sunny microclimate, was how the calm flow of water was pleasing and acceptable alongside the comfort of shade, for some participants. It was communicated as an uplifting characteristic helping to create a restorative experience. This is

in accordance with White *et al.* (2010), who considered the calm sounds of water to be restorative.

This variation in perception shows that the comfort of shade allowed conditions for revealing subjectivity in the expression and preference for the pleasure of water, and this high subjectivity made it difficult to figure out an inter-subjective character of water that would inevitably lift the shaded experience. However, water –whatever its characteristics – did not negatively impact the comfort gained by being sheltered from the sun. Rather, designers should focus on the creation of pleasant shaded configurations which would positively improve the receptiveness to water.

### *8.5.2 Water alongside an uncomfortable sunny experience*

The perception of water in a sunny microclimate discernibly showed the impact of our physical orientation to the sun's radiation. The direct facial exposure to the sun during the hot time in the Egyptian microclimate context evoked the thermal conception of water as a coolant, bringing to the fore the desire for the sensation of water coolness, and questioning the impact of water. This orientation to the sun not only created harsh feelings of discomfort, but also this orientation created an intense condition of perception that obscured the visual perception of water. This explains why the sound of water was much intuited in the sunny microclimate, where the flow of water radiated outwards through its audibility.

The sound of water is an important aspect in its sensual perception, and several studies have shown that people appreciate the sounds of water (Völker and Kistemann, 2011). Water sounds range from calm, laminar flows to energetic and roaring sounds (Burmil et al., 1999; White et al., 2010). In my study, there was an obvious sense of dissatisfaction with the water in the experience of the promenade's two extensions, which disclosed how the harsh condition of perception prevented the reception of its fine or bare perceptible sound. The calm flow of the water during the full and direct exposure to the sun was imperceptible. It revealed how stagnant or weak the water is, and this insignificant audible pattern of water prevented the expectation of feeling any fresh 'cool' microclimate near water features, during the full and direct exposure to sun.

Moreover, findings revealed that calm water was provocative in the experienced discomfort and caused a sense of dissatisfaction that prevailed over the appreciation of water. Participants' descriptions of water exhibited that the water aspect was favoured more when

capturing its sound in the microclimate. This was emphasized in the promenade's extension two when the perceptible expression of the soft echoing of the water of the star-shaped fountain was appraised, during moments of full and direct exposure to the sun on approaching close to the fountains. It was clearer at the lake area, where the perception of the energetic audible effect of the lively play of different water formations proved to intrude partially upon the moments of discomfort to make a positive, emotionally soothing, difference. Hearing the lively play of water splashing offered a psychological impression of a fresh microclimate, and created a relative relief in human discomfort feelings of direct sun exposure. This suggest that the relative improvement in the microclimate was realized due to the impact of the fountains and jets, dispersed through the lake and actively running. They induced a sound character defining the space that exceeds the impact of the lake, as a huge water space, yet it is calm.

Experiences of water during full direct facial exposure to the sun showed how water was assessed by its capability of inducing a change in the immediate microclimate experience. The findings elaborated the significance of the perceptible sound of audibly running water splash, which somehow psychologically superseded the discomfort of the sun for moments. Nevertheless, these perceived audible qualities were insufficient to encourage participants to stop walking. The discomfort of the direct and full exposure to the sun prevented the examination and reception of water ecstasies at rest. Even in the lake area, the harsh facial exposure to the sun challenged the water formations to change the heat sensations, and this was reflected in how the feelings of discomfort hindered the potential delight of enjoying the water space when at rest.

### *8.5.3 Water alongside a comfortable sunny experience*

The experience of water in the sunny microclimate, but with an orientation away from the sun radiation, uncovered greater positive soothing impacts in the microclimate perceived. The comfortable relationship to the sun's radiation strengthened the visible perception of the water aspect. This evoked the deep-seated appreciation for water in the Egyptian mind, intervening emotionally and making a positive difference. As in the case of water fountains in promenade extension two, the aesthetic appreciation of having an energetic water aspect prevailed over its expected refreshing role in the microclimate, showing that comfort was psychologically improved by the presence of water, despite the barely perceptible sound of water. Psychologically, the impression of having small water features emotionally relieves the

existence within the microclimate and softens the visual hegemony of sun over the ground. Additionally, extreme delight with water formations in the lake area was only perceived during the stay in an opposite relationship to the sun's radiation. The perceived ecstasies of water contributed to forgetting the heat and sun exposure for a considerable time. Visible and audible engagement with active running water dissipated the feelings of discomfort in an extensive sunny microclimate, and delayed the fears of expected discomfort due to the solar penetration. Instead, the pleasure from water stimulated comfortable and even pleasant, resting conditions in an extensive sunny microclimate during a critical daytime period.

Therefore, the study show that the presence of a water feature was valued and favoured alongside a comfortable sunny microclimate experience. Nevertheless, the findings highlights the important consideration of the audible character of water when it is intended to be experienced in sun, in order to increase its capability of inducing a change in users' perceptions of the sunny microclimate.

### *8.5.4 The physical sensation of the mist*

Misting cooling systems have been used in architecture and landscape architecture for aesthetic purposes. In the beginning it was incorporated as an aesthetic element in landscape architecture, in practice with no specific concern for its impact on thermal comfort. Recently, due to great concern for comfort in outdoor spaces, misting systems have taken on new meaning (Nunes et al., 2011). Throughout participants' examination of various water formations, the perception of the cool impact of water in the microclimate was often psychologically driven by the refreshing impressions evoked, with varying degrees, by the proximity to water features and the qualities of the water received. However, in the case of mist, its impact was different as it was a physical impact. The experience of the mist on faces created a significant change in the microclimate perception as it created the perception of a conscious fresh and cool sensation in microclimate. This sensation brought pleasure and physical refreshment to relieve the discomfort caused by the direct facial exposure to the sun. Moreover, experiencing the water droplets during the opposite orientation to sun radiation strengthened its impact in the perception of microclimate.

There are some successful examples of using misting systems in hot arid and humid climates (Farnham et al., 2011), reporting the cooling effect of using misting systems in the reduction of air temperatures and proving the capability of misting in improving microclimate conditions on

hot days (Belarbi et al., 2006; Yamada et al., 2008). It is discussed as an effective system that uses small amounts of water and energy (Yamada et al., 2008) which makes it suitable for areas with scarce rainfall. On the other hand, a study in Japan conducted a survey of people experiencing an overhead fine mist spray cooling system in a rail platform, and the results showed that subjective perception of thermal comfort perception relative to the actual decrease in the temperature indicates that the psychological impact of the water droplets on subjective thermal comfort, as they touch the body, exceed the magnitude of decrease in the temperature (Farnham et al., 2011). This is consistent with the impressive pleasure and coolness expressed by the participants in my study once they sensed the water droplets on their face during the exposure to the sun, which does not necessarily correspond to an actual sensation of a decrease in temperature.

Indeed, experiencing the mist during the extensive and unavoidable exposure to the sun in the hot period of the day is what enriched the appreciation of the physical sensation of the water droplets. The mist proved to be an effective intervention in the experiences of sunny microclimates, not only when participants' stayed far away from direct facial exposure to the sun, but, most importantly, during the moments of direct and full solar radiation. Unlike in the shade, where the view of misting water was esteemed as a form of natural sculpture. The participants showed no concerns in the shaded microclimate if the water droplets were unobtainable. Despite the achievement of a maximum temperature reduction when a misting system operates in shaded conditions (Yoon et al., 2008), from a subjective perspective my findings showed that the cooling effect of mist was devalued compared to the comfort created by shade and feeling sheltered from the sun.

> F6: Sitting in shade of a tree looking at water: *the jets are not nice; I don't want to be touched by water, may be it is not clean water…* (Devaluing the touching impact of water drizzles).

Studies on misting systems discussed aspects such as the droplets' size, frequency, and pattern of flow for the design of an indoor or an outdoor effective misting system, in order to keep a balance between optimizing the cooling effect and minimizing the wetting of people and surfaces exposed to water droplets. Details of these aspects showed its crucial considerations, but these are outside the scope of this study. However, the particular focus related to outdoor space design is demonstrated by (Nunes *et al.*, 2011), whose study asserted that the site's orientation, and climate condition aspects are among the aspects most essential in the design of an outdoor misting system. The fact that the lake area is open to the south, with an exposure to the sun's path in the southern sky, and the breeze coming from the opposite

northern direction, strengthens the impact of the mist in the lake mid-pathway region. This openness of the water space allowed the reliable presence of the air current, and that consequently promoted the wider spreading of the droplets in the space. Thus, the reading of the impressive impact of the mist in the lake area shows that the successful consideration of the misting system with the orientation of the space relative to the sun's path and the direction of breeze, and the pattern of the user's experience and movements along a curved pathway that allowed changing the corporeal relationship with the sun radiation.

## 8.6 Summary

The importance of water in hot climates is often stressed. However, this chapter took a step forward in understanding the perception of the cool meaning of water in the Egyptian a context. Apart from the distinct physical experience of misting, the findings showed the absence of any perceived sensations of water coolness in the microclimate, whatever its qualities. The reading of participants' perceptions of water showed that the psychological impact invoked by the natural and refreshing meaning of water on the microclimate perception.

Moreover, the findings revealed the significant impact of our physical orientation to the sun's radiation, which creates a medium of perception, impacting on our sensual perception of water. This significant finding raises a key question concerning the design of water aspect is*: how do we encounter water in the space?* In an attempt to answer this significant question for design purposes, the perceived sensual qualities of the water in the different corporeal orientations were analyzed, providing clues concerning which water qualities are needed to improve the outdoor microclimate perception, especially during the hot period of the day.

# Chapter Nine

# Concluding Discussion and Implication for Design

# Chapter 9. Concluding Discussion and Implication for Design

## 9.1 Introduction

This final chapter is a reflection on the entire research and draws together the various issues raised in the study. It returns to the research questions, and reflects on the aims and objectives which have directed the study towards the subjective investigation of the microclimate. Section 9.2 discusses the phenomenological understanding of the subjective perspective of microclimate and comfort, in the context of the phenomenological concepts discussed in Chapter two. This section also returns to the limitation and gaps, on both theoretical and methodological levels, in the conventional approaches –highlighted in Chapter One – that investigate microclimate and human thermal comfort, and which are raised for discussion due to the emergent findings. Section 9.3 moves towards formulating the implications and benefits of these new findings on the design of comfortable outdoor spaces in the Egyptian context. Then, the following sections consider reflections on the limitation and significance of knowledge as well as on the methodological approach and the quality of knowledge.

## 9.2 The Subjective Perspective of Microclimate and Comfort

### *9.2.1 An atmospheric perception*

The study started with the objective of researching microclimate perception, with a strong expectation, gained from popular scientific knowledge, that the perception of the microclimate is a spatial perception. The preliminary research question was centred on the investigation of the perception of spatial qualities, configurations and relationships in relation to experienced microclimate and this focus, in turn, gave relevance to Bohme's notion of creating atmospheres spatially. However, inspirations which came later from the phenomenology of natural climate evoked a significant question about: *What are we sensing as being a microclimate?* This revealed more concerning the knowledge expected to be produced from the study.

A significant finding of the study came to emphasize that human perception of comfort is a perception of an atmospheric configuration. It is revealed that the inherent sense of what constitutes the human perception of the microclimate and comfort is far beyond an

interpretation of spatial configuration, qualities, or relationships. This finding opposes the predominant thinking of the spatial environment as featuring the space's microclimate, and influencing the state of human thermal comfort. The subjective examination of the microclimate shows that the physical spatial environment is ignored in perception of the microclimate. This was strongly evident in making sense of shade comfort through feeling sheltered from direct and full sun's radiation. It was a perception relative to the sun, with no attention to the physical feature casting the shade.

### *9.2.2 The possible access to the intangible atmospheric entity*

Bohme (2008) points out the quasi-objective character of atmosphere, which has no secured ontological status due to its intangible entity; however, he also states that it has a character that can be inter-subjectively recognized. Disagreeing with Bohme's perspective, the findings reveal the possible tangible identification of human (dis)comfort and microclimate from a subjective perspective, which was brought to the fore from the immediate consciousness by the microclimate. The question of how people make sense of their microclimate (dis)comfort discloses how the feelings of comfort modifications are grounded inter-subjectively by the corporeal relationship to the sun's radiation. This relationship shapes an atmospheric configuration and captures the perception of something revealing itself atmospherically to the subjects. This emergent finding reveals a possible rational interpretation of its intangible entity, where our corporeal relationship to the sun creates the conditions for microclimate and comfort perceptions.

In this respect, Bohme (2008) argues that creating an atmosphere could be accessed from the object side, through setting the conditions in which an atmosphere appears. In my study, the knowledge established about human perception of (dis)comfort gives potential access to create (dis)comfort microclimate experiences, yet from the subject side, through adapting our physical orientations to the sun's radiation. Discussion of postural adaptation in most of the studies of human outdoor comfort is often communicated without any depth such as reporting the behaviour of shifting from sunny to shaded microclimate (Nikolopoulou et al., 1999). However, my study went further as it deeply captures the real essence of feeling sheltered and how it is provided without the necessity of a physical sheltering object.

Originally, this emergent knowledge offers a significantly new way of assessing sunny spaces, which moves further from the intuitive recognition of sun coverage as uncomfortable

microclimates in hot arid climates. The study revealed moments when shade coverage provided fake comfort, and others when comfort was perceived in sunny space. These findings have an implication which does not support the predominant aims of studies in this climate region about increasing human comfort through increasing shade coverage and minimizing sun coverage. Rather, the emphasis of designing a comfortable open space should be given to guide users' orientation relative to the sun's path, instead of consideration of sun and shade ground coverage. Moreover, this knowledge provides a deeper understanding of the aspects of 'environmental stimulation' and 'perceived control', which were developed as psychological aspects that influence human perception of comfort in Nikolopoulou and Steemers (2003). The study shows that diversity of microclimates is not perceived in terms of shade, semi-shade and sun, but could be realized through a design that allows the user to experience different orientations to the sun's radiations, i.e. to create the perception of different levels of comfort in the same sunny space possible.

The study shows that the (dis)comfort in the perceived microclimate was much reflected outwards on the objects in the space, rather than perceived through them. However, although the inherent sense of microclimate (dis)comfort from a subjective perspective ignored the perception of significant impacts of the spatial environment, the findings revealed the intrusion of the environmental qualities with variant levels upon our physical relationship to the direct and full sun, from screening, to soothing, to intensifying. This allowed the spatial environment through its concrete properties and sensory essences to act as the design tools that would help to invoke human perception of comfort.

### *9.2.3 Clarity and totality of weather and comfort perception*

The knowledge gained in this study revealed a particular facet about the subjective relation to the microclimate. Microclimate is an ensemble of natural atmospheric facts; however, human awareness of this natural atmosphere revealed the elemental qualities by which humans are affected. In the Egyptian context, the physical relationship to the sun's radiation shaped the state of comfort and the elemental qualities by which users are affected. The direct and full exposure to the sun was inevitably expressed as hot weather and sheltering from it was perceived as a comfortable weather.

The description of the microclimate as sunny or shaded, and microclimate feelings as hot, comfortable, uncomfortable, etc. given by this physical relation to the sun radiation reveals

that the microclimate and comfort, in subjective terms, was perceived in totality, which supports Bohme notion of this totality in perception as only possible in subjective terms (Howard, 2013). Moreover, this finding shows that from a phenomenological standpoint, the subjective relation to weather, as emphasised by Knebusch (2008), contradicts the scientific definition of weather. It is a clear perception given by the relationship to the sun's radiation that ignores and overlooks subtle changes. This clarity of how the microclimate feelings were described supports the argument raised in Chapter One about the inappropriateness of human thermal sensational scales. Subjective examination of human comfort reveals the apparent perception of the condition of thermal comfort, where slight changes are absolutely ignored and unfelt. Thus, the study did not support getting participants' votes on slight thermal sensational changes where the difference between points such as 'too hot, hot, slightly hot' is insignificant from a subjective perspective.

### *9.2.4 Microclimate perception as inside and outside of the subjects*

#### *9.2.4.1 A perception of local climate culture*

When discussing the human perception of climate –a lengthy meteorological time, from the phenomenological perspective in section 2.4.3, a question evolved about how the perceived microclimate would relate to a larger seasonal weather perception. The experientially based knowledge gained in the study revealed that the perception of the microclimate is an interplay between the deeply-rooted meaning of the 'summer sun' in the Egyptian climate context and immediate consciousness of the given physical orientation to this 'summer sun'. The perception of the microclimate indicated ingrained constructs of the longer meteorological time – summer season. This signifies how the perception of microclimate embraces a perception of a climate; which is also perceived in totality from a subjective perspective.

From a phenomenological standpoint, the perception of the microclimate was constituted by feelings that go beyond a mere momentary physical sensation caused by the experienced orientation to the sun's radiation; rather, making sense of the microclimate embraces an interplay of humans, place and time. Place and time were not found to be ultimately grounded by immediate experienced conditions, but, significantly, these aspects are understood and perceived in the virtue of being in the Egyptian climate context, and are constructed progressively through prolonged immersion and everyday encounters in the

local climate over longer periods of time. This immersion establishes a similar mode of perception that was both understood and inter-subjectively shared and communicated meaningfully about the nature and characteristics of the Egyptian climate context, which supports Bohme's (2008) thought about the significance of culture in having a similar mode of perception.

The habitual experience of the local climate gave the 'summer sun' the general meaning of being a harsh supplier of heat in this climate context, which, in turn, gave sun and shade patterns particular meaningful indications. Moreover, the impact of the climate culture is found in sharing a thermal significance to the experience of full and direct summer sun. The facial exposure to the sun was a meaningful exposure that psychologically affected thermal comfort and reflected on the whole bodily perception of the microclimate. This knowledge shows that microclimate is experienced from a certain viewpoint. It also may provide an explanation for Knebusch's (2008) indication of the feeling of weather as the feeling of a larger reality, which is beyond mere immediate feelings. The impact of local climate culture emphasises Lenzholzer and Koh's (2010) argument, in that they opposed getting participants' momentary sensations of the microclimate, and advocated gathering knowledge about long term thermal perception.

In this respect, this knowledge contributes to re-defining the aspect of 'past experience,' which is extensively tackled by several studies as a psychological aspect that influences microclimate perception. In this study, the findings reveal that past experience is much given to familiarity with climate context over having previous microclimate experiences of specific places. The familiarity with the Egyptian climate character was more influential than having previous experiences about the spaces in the park or associated microclimate conditions. Nevertheless, this may also relate to the Egyptian relation to parks as discussed in section 1.3, as these spaces are not routinely encountered.

Moreover, the emergent impact of this climate culture has a significance on the characteristics of the subjects who participate in microclimate research. This was perceived by me –the researcher – who showed neither discomfort nor harsh heat in experiencing the direct facial exposure to the sun beam in Newcastle, as it was obviously revealed in my experience in Egyptian context. This significance goes in agreement with a range of studies which considered the subjects' origins as an aspect that influences the evaluation of comfort

and thermal preference. However, the study makes clear that origin is not meant to be place of birth or nationality; rather, it is the prolonged immersion of the person in a particular climate context.

On the other hand, participants' conscious realization of the significance of the physical orientation to the sun on the perception of comfort developed their understanding of comfort conceptions and revealed that deep seated knowledge about climate and comfort had blurred identifications. Nevertheless, the emergent findings did not replace the evaluation of shade and sunny atmospheric patterns as indicators of comfort and discomfort. There was a questioning and communication between constructs held in mind, and the actual immediate experiences of the microclimate, where-in sometimes the taken for granted constructs were emphasized, while in other instances obvious awareness and attention was given to new knowledge gained experientially. This reflects that new knowledge gained from the intentional examination and perception of the microclimate does not replace the ingrained climate culture. Thus, the implication of these constructs should remain considered in design terms to enhance users' evaluation and preference.

#### *9.2.4.2 Microclimate as a perceptual medium of the environment*

Microclimate (dis)comfort was thought of as two-dimensional sun and shade patterns over the ground. However, the study emphasized that the experienced physical orientation to the sun's radiation creates a medium of perception that radiates outwards and impacts on the human relation with surrounding environment. The most evident example was shown in the perception of water, where the way in which water was perceived interpreted how the physical orientation to the sun configured and coloured one's relation to the surrounding context. Moreover, the physical orientation to sun radiation influenced the human relation to the finer atmospheric qualities, as revealed in human sensation of breeze (section 6.3).

This understanding strongly emphasizes Knebusch's (2008) thought of the weather as a horizon. It also provides an explanation of Bohme's description of the atmosphere as a sphere of presence that shapes human relation to the world and exhibits the microclimate (dis)comfort as an intermediate sphere in-between the subject and the environment (Bohme, 2008). Microclimate experience was disclosed, in agreement with several studies, as a significant medium in space perception and an integral aspect of enjoyment. The findings show how our feelings of the microclimate always corresponded to an emotional

relation of the subject towards the environment. Discussion of the microclimate as a perceptual medium also supports Heschong's (1979) thoughts and the work of Knez (Knez, 2003; Knez et al., 2003) emphasis on the microclimate perception as an elemental part of place experience. The experience of a comfortable microclimate allowed great levels of engagement with the context and increased enjoyment of the space. The perception of both comfort and enjoyment change the experiential perspective of a given pathway from a connector between spaces to a space suitable for short resting. On the other hand, the exposure to full and direct sun prompts human displeasure and isolation from the environment. This finding provides a different perspective of the impact of 'naturalness', which was developed as a psychological aspect that influence human perception of comfort in Nikolopoulou and Steemers (2003). My study showed that the positive perception of the surrounding context is strongly linked to the perceived microclimate (dis)comfort. This suggests that the design of a rich concentration of variant forms of vegetation would be depreciated in case the user is feeling uncomfortable.

This knowledge in continuation of the impact of climate culture provides a possible elaboration for Bohme's location of the atmosphere as inside and outside of the subjects at the same time (Bohme, 2008; Dalsgaard and Kortbek, 2009; Chandler, 2011).

### *9.2.5 An embodied multi-sensory perception*

The deep reading of the microclimate (dis)comfort suggested the interpretation of the perception of the microclimate as an embodied perception. Bodily behaviours provided a platform to understand the subjective account of the microclimate. Our bodies were not only creating their (dis)comfort through adapting postures, but also they were behaviourally engaged to reflect the experienced state of comfort through walking pace and facial expressions. This emphasises Heidegger's perspective of finding meaning in social behaviours (Molden, 2009), and Merleau-Ponty notions of embodiment discussed in the literature (Merleau-Ponty, 1945/2002; Wylie, 2007; Woodruff-Smith, 2011), in which the human body constitutes a way of perceiving and understanding the world. It also brings the significance of human motion in structuring perception as discussed in notions of Ingold (2000) and non-representational theory (Macpherson, 2006; Wylie, 2007), and indicated embodiment as an inconstant process of practical and expressive involvement with other objects and people in the world (Macpherson, 2006). The bodily corporeal movements

changed by changing the physical orientation to sun's radiation. The pace of the body's physical movements reflected a shared performance of the human body in the Egyptian climate context; in other words, these behaviours presented embodied acts of microclimate adapted from embodied acts of landscaping, which considered the familiar and recognisable performances of landscaping as walking, looking and, cycling (Wylie, 2007).

The review of literature shows a few discussion of the microclimate perception in the realm of sensory perception. In this study, the close reading of human perception of the microclimate showed a multi-sensory perception where significant links between vision and thermal senses in the perception of the microclimate were found. This link may manifest Bohme's analogy of weather as landscape (section 2.5.1), and allows the thought of thermal perception as unconscious of vision, similar to Pallasmaa (2005) discussion of touch.

In addition to the impacts gained from the visual environment which intruded upon the perceived level of microclimate (dis)comfort, as discussed in section 7.5, the concept of which (dis)comfort was held in mind illuminates the apparent emphasis of vision in determining and understanding thermal comfort. Further, examination of the feelings of discomfort emphasized a clear perception of heat caused by the experience of direct facial exposure to the sun, and this mode of contact with sun radiation indicated a whole body discomfort. The results of studies on the thermal sensitivity of human skin supported the significance of the face/head as a determinant of thermal discomfort in warm environments. This, at first, suggested that feelings of discomfort emerge from the physiological sensation of heat on the face. However, the relation between the immediate expression of discomfort and "eye contact" with the sun weakened this consideration, and allowed for the possibility of the interpretation of the uncomfortable microclimate perception as acquired from of the immediate visual perception of full and direct sun beam. This mode of exposure instigated an immediate discomfort perception, not only of the face but the whole body.

In this respect, the visual perception in this embodied multi-sensory perception of the microclimate is understood as an embodied vision, as discussed by some phenomenologists such as Merleau Ponty (Ingold, 2000; Macpherson, 2006; Wylie, 2007), in which the sense of sight is intimate and engaging (Pallasmaa, 2005). It was a perceptual sense, which incorporated and reinforced our perception of the microclimate comfort. The harsh meaning of the summer sun in the Egyptian context was recollected and perceived once being in a

direct visual contact with its radiation. This invokes how making sense of microclimate (dis)comfort is grounded psychologically by ingrained constructs of the local climate context. This understanding also coincided with discussions raised on the emphasis of vision in landscape perception (Ingold, 2000; Pallasmaa, 2005; Macpherson, 2006; Wylie, 2007), where the primacy of vision in perception is understood in historical and cultural terms rather than purely physiological terms.

### *9.2.6 Microclimate as felt-time phenomenon*

The study showed how time is thermally felt and emphasized the significance of time in the organization of the outdoor stays in the Egyptian context, as it was an integral psychological aspect in the expectation of comfort and enjoyment. The prolonged immersion in the Egyptian climate context has given time a (dis)comfort climatic significance. Feeling hot was a taken for granted sensation, expected for being outdoors in the investigated time period – summer day time. During the experiential examination, the awareness of time was referred to meaningfully to rationalize the immediate (dis)comfort feelings and anticipation of (dis)comfort. However, sometimes there was confusion between immediate feelings of (dis)comfort caused by the corporeal presence within the microclimate and the indication of time relative to comfort that is held in mind in the Egyptian climate context. This might relate to Fraser (2003) discussion of the relation and conflict between our understanding of time and our feelings of it elaborating that time understood subsumes time felt. This finding suggested that the aspect of time is incorporated in configuring human response to the microclimate comfort in the body of research, as reviewed in Chapter One, which assess outdoor comfort based on obtaining users' momentary sensational votes or perceptions.

Interestingly, when I started the research I believed in meteorological terms such as hottest months and midday –12 o'clock. However, the findings showed that subjective understanding was different. The study emphasized the phenomenological standpoint of both Knebusch (2008) and Howard (2013) in terms of seasons as being the human scale of climate perception. The intensity of heat over the whole summer season was perceived as a gestalt where the months of April and September, as shown in the study, were perceived as similar as the hottest months in meteorological terms. The period investigated in this study – which is not in the three hottest months – provides an evidence for the perception of stable heat over the summer period. Moreover, the length of a summer daytime was perceived as

a set of successive felt-time periods, where there is a stable weather character that describes each period of the day and determines the conditions of (dis)comfort during this period. This stability in perception has nothing to do with time on calendar, and might be a myth from a meteorological perspective; however, it is strongly gained from the character of the Egyptian climate, which has been steady and consistent over the last 30 years (WMO, Updated on 31 Jul 2014). This developed a sense of trust towards the climate as discussed by Stehr (1997), in which the subtle changes did not affect the construction of a stable perception of the Egyptian summertime.

This emergent knowledge may question the real benefit of studies on outdoor thermal comfort in hot arid region, which focus their examination and limit their establishment of summer comfort conditions to the three hottest months from June to August, with a specific consideration given to June, 21. From a subjective perspective, the meteorological significances of these time periods are disregarded. Moreover, the emergent finding about the perception of heat stability over a period of time throughout the day did not support getting participants' thermal sensations over shorter intervals of time. Instead, purposive selection of time periods that represent a change in subjective terms should be employed. Furthermore, the study did not support the meteorological significance given to the term of midday, i.e. 12 o'clock, in getting subjects evaluation of microclimate in research conducted in climate contexts similar to Egypt. The amount of shade is less in this time period; however, subjectively, the experience of peak heat during daytime was perceived for a noticeable period of time and had nothing to do with reading time on a watch, where 12 o'clock was perceived as similar to 2pm, 3pm and, even beyond.

Nevertheless, despite time being an apparent psychological aspect which guided the perceptive meaning of the sun and the intensity of heat, from a subjective perspective, the implication caused by the corporeal presence within the microclimate had the most reliable impact on the microclimate perception. The difficulty of facial exposure to full and direct sun extended even after the passage of the temporal period held in mind about harsh heat. This finding did not support the conventional focus of studies on outdoor thermal comfort on the midday period for being the hottest and most uncomfortable. Instead, careful consideration should be given to avoid this orientation to the sun's radiation in the design of comfortable outdoor spaces for a considerable part of the day time period, which significantly extends beyond midday.

## 9.3 Setting Conditions: The Way Forward for Design

### *9.3.1 Guiding users' orientation to the sun in the space*

The knowledge gained in this research establishes the idea of comfort as being related to maximizing users' experiences of a comfortable relationship to the sun's radiation. This knowledge places emphasis on the consideration of users' movements in relation to the sun's path in space design, especially throughout the hot period of the day. A principal aspect is the consideration of this relationship in the time period when the space is likely to be occupied. It is important in the context of orientation to study when the harsh solar exposure occurs, and, most importantly, the time period when the facial direct relationship is expected to be experienced. This raises the significance of the solar azimuth in the design of a comfortable outdoor space. The findings emphasized the important consideration of the time period when the sun moves in south western sky, where this period was experientially revealed as the hot period of the summer day in the Egyptian context. At the same time, this period is characterized by expecting frequent users to visit parks and outdoor spaces as the time increases away from noon time, yet the direct facial exposure to the sun remained the worst exposure that disturbed human comfort.

The implication of the knowledge established about perception of the (dis)comfort raises the need for greater consideration in the design of pathways than resting spaces. At rest, the corporeal body would create own microclimate comfort, through adapting their posture in choosing how to stay in relation to the sun's radiation. Thus, in the design of seating facilities, their placement and arrangement should consider the option of adapting position through being moveable. However, if the seats are fixed, their placement should allow the users to stay away from the direct sun beam during sitting period. However, in the network of pathways, users are dictated to walk in given relationship to the sun. Therefore, pathway orientation should be carefully considered so that users can walk comfortably. This advocates the design of pathways to consider the occurrence of users' direct exposure to the sun in the morning or later afternoon where the sun in both time periods has a different meaning. However, during the hot period of the day, minimizing the period of users' direct exposure to the sun should be sought in the design.

This understanding has a direct and significant implication on the aspect of spatial orientation. The knowledge established in this study proved that the aspect of spatial

orientation is capable of primarily ameliorating the human perception of the microclimate conditions regardless of the presence of sheltering features. This emphasis on the impact of orientation contradicts the variant literature on the context of orientation, which discusses orientation as a subsidiary aspect in the creation of outdoor human comfort. The study showed that the decision on orientation should not only aim to minimize the amount and duration of sun penetration. However, most importantly it should seek to eliminate users' experiences of the direct facial exposure to full and direct sun when the space is used during the hot period of the day.

Interestingly, in the context of orientation, findings which came from my experiential examination of the microclimate are inconsistent with the results of numerous experimental studies found on the optimum orientation in hot arid region. The study emphasized improved comfort capacity for EW orientation or deviation from it. This is due to the user's lateral exposure to the sun during the hot period of the day. This orientation would decrease, or even eliminate, the need for sheltering features, and stimulate a prolonged comfortable exposure to the sun's radiation over the course of park visiting times, and, most importantly, during hot time periods of the day. Moreover, the findings exhibited further design cues for improving comfort perception in an EW orientation, such as the contribution made by walking around the main waterscape in the case study which promoted users to turn northward away from the sun's path. In fact, in an EW orientation, in the time periods when the facial exposure to the sun occurs, the perception of time would strongly impart the meaning of this exposure, giving a different feeling to the direct facial exposure to the sun. On the other hand, the discomfort potential of NS, NE-SW and deviations from it were found in the study. Despite that this range of orientations is often preferred in hot arid region, they cause the harsh direct exposure to the sun to occur in the perceived hot period of the day, during the sun's path in the southern sky, regardless of the character of the vertical profile.

These findings also offer implications on the length of the pathways, where the duration of exposure was emphasized in this study in an agreement with Nikolopoulou and Steemers (2003) as a psychological aspect that impacted the perception of comfort. The design should aim to locate shorter paths in the orientation NS or deviation from it. Instead, longer pathways, for example the parks' main promenades, are preferable with an EW orientation deviations from it. In terms of shape, the findings showed that generally increasing

deviations and curved forms are preferred to linear extensions, especially in case where the pathway is extensively penetrated by the sun due to little vegetation. Significant curvatures allow a perceptible change in the corporeal relationship to the sun's path, invoking comfortable feelings without the need for vegetation sheltering. However, in the case of longer lengths orientated NS or deviating from it, the designs should principally aim to decrease the period of the user's facial exposure to the sun. This could be realized through the integration of different treatments, which would together improve users' microclimate perception:

- Design of deep forms, such as the regular arrangement of tall planting formations, to minimize the period when users will be directly exposed to the sun.
- An important consideration to soothe the period of axial sun penetration is the provision of an effective sheltering that minimize the users' direct visual contact with sun radiation in the southern sky. This is strongly related to the height and characteristics of the sheltering feature.
- Avoiding long linear extensions and promoting variant levels of deviations along the length. Slight deviations may be insignificant to change the direct facial exposure to the sun; however, with the effect of sheltering features, it would create galleries, which would help to cut off the continuous facial exposure and provide a perpetual and reliable sheltering from the sun during the axial penetration of the sun. This could be realized through considering planting vegetation, which are in leaf for a longer portion of the hot seasonal time, such as in April, which was experienced as hot summer, or through scattering built structures such as pergolas or sun shades along the extension.
- The previous guidelines are based on two directions of the usage of pathways, and focus on improving the experience of the user, who walks southward facing the sun's beam. Another concept to direct the user's orientation to the sun could be sought through a one direction pathway, in which the direction of walking prompts the user to be orientated northward away from the sun's path. This strategy is peculiar in parks' design. However, knowledge gained about subjective perception of comfort offers it for consideration.
- Increasing the flow of users northward could also be realized through locating focal or active features such as water spaces or active nodes to the north. Having the network of pathways directing to this focal feature would motivate the user to walk away from the

direct southern sun. This was a significant limitation in the design of Azhar Park, where the location of the main water space was southward, which increased encounters of users' experiences of direct sun along the NE-SW promenade until they reached the lake area.

### *9.3.2 Designing shaded atmospheres*

The study proved the intuitive knowledge that shading is a key strategy in the hot summer conditions. However, experiential examination clarified the importance of this condition as being strongly limited to outdoor longer stays at rest. Moreover, the study agreed with diverse studies on the important role of shade trees and the significance of the physical characteristics of tree 'canopies.' However, the contribution of this experiential study is a subjective understanding of the perception of the sheltering role of a tree and how we judge the shade quality bestowed by the canopy from the perspective of comfort.

From a subjective perspective, the perception of the sheltering function of trees showed that not all trees cast shade that evokes a sheltering perception. The perception of sheltering is not necessary realized through complete screening from the sun; rather, it is principally intuited through the capacity of the tree canopy to intrude upon the facial interaction with direct sun radiation. This perception was strengthened through the perception of having ample shade coverage to inhabit, and feelings of bodily immersion in shade. The experience of these qualities evoked the perception of immersion in a pool of shade.

The study emphasized the experiential comfort induced from trees with broad and spreading canopies, as these qualities increase the opportunity of experiencing the sheltering function of the trees. Moreover, these qualities provide ample shade and allow it to cover significant parts of the ground over the course of the day and throughout the sun's movement. The preference for broad and spreading canopies found in the study is consistent with several studies on planting thermal performance in the hot arid region, as these qualities allow the successful functional role expected from a tree in this hot climate region. On the other hand, the limitation of a small and round shape of tree canopy was found, as these qualities limited the perception of its sheltering function to staying beneath its canopy and concentrated its shade coverage around the canopy.

A significant contribution acknowledged through this study is the movement beyond the sheltering function of the tree canopy. The finding showed how shade, despite being an ultimate need, it is also subject to desire and preference. The reading of the experiential perceptions of various trees emphasized the significance of the canopies' qualities. The canopy was preferred for filtering direct sun whilst allowing the gradient of sunlight. It was also preferred for enabling the communication and interaction of the user with the surrounding environment, from in-between its branches and twigs, and from beneath the canopy. These qualities were intuited through the canopy's density and height. Despite the denser trees allow effective interception of sunlight, subjectively, the study showed a preference for trees with a sparser canopy character, which successfully allows the domination of shade, and gentle penetration of gradient of sun-light. These qualities evoked longer pleasure, allowing feelings of shade comfort while enjoining the sky view and the surroundings. On the other hand, feelings of displeasure, which disturbed the perceived quality of shade comfort, were evoked by trees with medium or smaller trunks and dense layers of leaves. These trees evoked users' isolation from the context and enclosure through the feeling of a canopy overhead, especially when the canopy was dense and spreading.

The sensation of breeze was also an aspect that encapsulates human enjoyment of shade. The impact of breeze sensation alongside the shaded microclimate was more perceptible and affecting the enjoyment of shaded experience than the actual cooling impact of shade beneath the canopy caused by the reduction in temperature. The proven scientific knowledge about the impact of canopy density and tree height on the sensation of breeze was found in the study. The planting of dense trees with smaller trucks evoked feelings of enclosure and claustrophobia beneath the canopies. However, with a sparser canopy, this arrangement evoked the perception of breeze sensation beneath its canopy.

Therefore, in pathways, the preference for sheltering is given to maximize regular planting of trees with broader, spreading and sparser or irregular canopy character on the flanks of pathways when oriented NS, NS-SW, and deviations from it. This arrangement would increase the opportunity to obstruct the user's relationship to direct southern sun. However, intermittent – or minimal – planting is recommended in case of longer pathways oriented EW. Trees with tall trunks are appreciated when planted in groups, as this formation would nicely promote the perception of sheltering without feeling enclosed and isolated by a canopy overhead. However, careful thought should be given to planting groups of trees with

smaller trucks, due to their possible negative impact on the level of shade' enjoyment. The study concluded the avoidance of planting, in groups, trees with smaller trunks' heights and highly dense and spreading canopies. Instead, pleasure and enjoyment are positively evoked in the shade of intermittent medium and smaller trees with spreading and sparser canopies. In case of using built structures such as pergolas, pergolas with a wooden lattice would allow the filtration of direct sun light, while an intertwine of light gradient would be enjoyable.

### *9.3.3 Evoking comfort through the visual environment*

The study showed the impacts gained from the visual environment which invoked the perception of the microclimate (dis)comfort. The findings reveal no connection between the paving materials' effect of surface albedo and the expected impact in the microclimate on one hand, and their subjective perception of it on the other hand, during the solar penetration. In the study, the thermal stress of marble pavement was emphasized due to the perceived glare effect, despite being a cool material with high albedo. Surprisingly, the thermal dimension of asphalt pavement was understated, even though there is established knowledge about the avoidance of dark colours in hot arid regions due to having low albedo. From a subjective perspective, asphalt was more comfortable to the eye than the marble stone when penetrated by sun. This concluded the consideration of the reflectivity of the paving materials and its degree of comfortableness to human sight. The design has to avoid the usage of large surfaces of reflective materials in spaces that are expected to be extensively penetrated by the sun, due to having little vegetation for longer time periods of the day. In this respect, thoughtfulness should be given to the selection of paving material of a pathway that is expected to be axially penetrated by the sun during its path in the south and south western horizon, as the orientation of the user to the sun while walking would negatively enlarge the effect of perceived reflectivity and perceived discomfort.

Moreover, the findings emphasized the visual preference for shade coverage as two-dimensional patterns over the course of the day. Perceptible shadows patterns scattered along the pathway, during the hot time period, induces a soothing impression through cutting the domination of sun over the ground, which improved the microclimate perception. Moreover, the behavioural attitude of stepping over these patterns induced a soothing effect during the hot period of the day. Consideration of shade as two dimensional patterns would be useful in pathways oriented E-W or deviated from it, where in this range

of orientation, the relief in the perceived microclimate is principally realized due to users' orientation away from the direct sun radiation in the hot period of the day. The visual perception of shadow coverage over the ground would, in turn, boost users' perceptions of comfort in the sunny microclimate. Moreover, the creep of shadows in this range of spatial orientations would improve the perception of comfort in the midday period. This advocates that designers should consider variant planting formations or built structures, on pathways' flanks, that would produce varieties of shadows patterns. This could be through planting ornamental vegetation such as conical bushes, with variant heights, which would allow the different creep of shadows. However, in the case of pathways axially penetrated by the southern sun during the height of the day, it is recommended to consider slight deviations in the extension of the pathways alongside provision of shade patterns to increase the opportunity of invoking an easing impression of the microclimate during the period of direct solar penetration.

### *9.3.4 Invoking refreshment through water*

From a climatic standpoint, a broad range of literature acknowledges the physical impact of water in the microclimate, proving a decrease in the temperature. However, the findings of my study did not show perception of any physical impact of water in the microclimate. This study went further towards understanding the meaning found about the cool impact of water that is held in mind. It emphasized the importance of the water feature in the preference for an outdoor space. This is in accordance with several studies done in the Egyptian context, showing how water features are favoured in the outdoor experience. The findings showed that the cooling capacity of water in subjective terms is recognized in feelings of esteem and/or refreshments evoked by presence of a water feature in the outdoor space. In the Egyptian context, the lack of having water features in the outdoor spaces led the presence of water to be perceived as an aspect considered to add a natural spirit, and improve human thermal acceptability and preference for the place. Nevertheless, the heat of Egyptian summer climate challenged the consistent effective reception and appreciation of its refreshing impression in the microclimate.

A significant contribution acknowledged by this study is emphasizing how our perception of water signals our immediate experienced microclimate (dis)comfort. This knowledge, in turn, signifies the key issue in the design of the water aspect is the consideration of the condition

of perception of the users. In this respect, the study audited the perceived sensual qualities of the water that were intuited and recognized in the different corporeal orientations to the sun's radiation and examined how water intervened and/or revealed itself to the subject and its impact on the subjective perception of comfort. This analysis provided design clues for the needed water qualities, in order for it to ameliorate the microclimate perception in the Egyptian context, especially during the critical hot period of the day.

During comfortable relationships to the sun, whether staying in shade or opposite to the sun's radiation, great visible engagement with water features, due to avoiding eye exposure to sun radiation was shown. The study showed that feeling sheltered from the sun allowed water flow to be seen more than heard. However, the experience of a direct facial exposure to the sun created an intense condition of perception that obscured the visual perception of water.

In the shade microclimate, comfort was principally constituted by feeling sheltered from the sun. Water was an aspect that added background to the atmosphere of shade and reflected a level of shade enjoyment. It was often esteemed in the shaded microclimate; however, the comfort of shade allowed conditions for revealing subjectivity in the expression and preference for the pleasure of water. This high subjectivity made it difficult to understand and admit an inter-subjective character of water that would inevitably lift the shaded experience. Nevertheless, the significant finding is how water –whatever its characteristics – did not negatively impact the comfort gained by being sheltered from the sun. Accordingly, in design terms, consideration of comfort and pleasure in the design of qualities providing shade would positively improve the receptiveness to water.

During the experiences of sunny microclimates, inter-subjectivity of expression and preference for water was discernibly emphasized. The perception of water illustrates how feelings of esteem for water aspect and dissatisfaction with its qualities were concurrent. The exposure to the sun during the hot time in the Egyptian microclimate context evoked the thermal conception of water, bringing to the fore the desire for the sensation of water coolness, and questioning the impact of water. Despite that the perception of various water formations in a sunny microclimate noticeably disclosed the absence of any perceived physiological improvement generated by water, the findings revealed that focal consideration should be given for the design of the water qualities in sunny exposed area in

order to improve the negative feelings generated from the exposure to summer sun, especially in case the space design compels the user's experience of the water feature alongside the direct facial orientation the sun.

In the sunny microclimate, water was strongly intuited and accessed through its audible character, which reflected its pattern of motion and the capability of inducing an effect in the experienced microclimate, during the hottest period of the day. The soft perceptible sound was inevitably disappointing alongside sun exposure, especially during the experience of a direct facial exposure to the sun. However, a discernible sound of running – splashing – water showed a positive impact that was intuited during the harshness of the direct facial exposure to the sun. It relieved the ultimate focus on the heat during the peak time period. Moreover, by staying in sun but being far from the direct facial exposure to sun's radiation, the active sound of water becomes visible as well as audible to the user, which strengthens the comfortable feelings in a sunny space during a hot time period.

This knowledge has implication for the design of water features in open spaces which are expected to be covered by sun for a long course of the hot time period, and which unavoidably prompt the user to experience water alongside the exposure to sun. The study showed the ineffectiveness of designing large water spaces with static, calm and motionless surfaces. Also, small features with calm and relative weak flow as illustrated in channels (rill) or fountains were rather provocative in the sunny microclimate. However, dynamic water and vital flows are preferred alongside the experience of sunny microclimates. The design of water should have a convincing perceptible sound in the sunny space. The active play of running water jets and fountains spread in the lake was shown to psychologically soothe the feelings of discomfort. Creating waterscape above the ground with vital flow such as fountains and sprays showed to be more useful, not only as strong aesthetic design attitude, but also as a strategy to achieve higher psychological cooling impression. On the other hand, findings showed that calm flow is more accepted and appreciated alongside a shaded experience for its restoration potential. The active sound of water was rejected in shaded microclimates in few occurrences, as it detracted the relaxation of the participant. This gives insights into preference for ground fountains and water channels with calm motion, in spaces that are reliably shaded throughout the hottest period of the day or in spaces exposed to the sun, yet with reliably shaded view gazing slots around.

Finally, the effectiveness of the experience of misting in improving the microclimate conditions directs the attention to the importance of misting systems technologies in outdoor spaces. The delight of the cooling touch of water was found. It created a conscious fresh and cool sensation in microclimate. This intervention proved its effectiveness in the sunny microclimates during the hot period of the day, not only when users stayed far away from direct facial exposure to the sun, but also during the moments of direct and full solar radiation. However, a main issue in arid climates is insufficient water and the necessity to manage the effective usage of water. Thus, it is important to consider the design of the misting system with the orientation of the space relative to the sun's path and the direction of breeze and, most importantly, the pattern of the user's experience of space in terms of movements and positions. Another consideration is the punctual spraying and splashing of water systems, in terms of frequency of droplets and creation of discernible audible sound that operates during the sun movement in the southern sky, while decreasing the flow of running and frequency of spraying in the rest of the daytime period.

## 9.4 Limitations of Knowledge Transferability

The concepts established in this study are applicable for any open space in the Egyptian context, but with consideration of the time in which this open space is used/ visited. The deep-rooted relationship found between the local climate familiarity and making sense of the microclimate (dis)comfort may limit the transferability of the findings to regions of hot arid climate, where the sun is a perceived as the most stressful aspect in summer.

However, the position of the sun may be a significant aspect that would raise a particular limitation related to the reliability of the established knowledge over the course of the summer period. The study signified the impact of the 'facial' and 'eyes' exposure to direct and full sun beam on the perceived microclimate. This understanding brings to attention the significance of sun altitude in the time of the year when the study was conducted. In Cairo, latitude is 30°6'N[1] (see Figure 5.2 in Chapter Five), the sun altitude is highest in June (86°), where the sun is almost overhead, and lowest in December (around 33°) (Rashid and Khater, 2009; Khavrus and Shelevytsky, 2010). However, during the months of August and September when this experiential examination was conducted, the sun altitude is around 55°.

[1] The sun altitude (position) and azmith (daily motion) depends on the latitude of the place.

The normal human vertical field of vision is more or less 135, around 60 upwards and 75 downwards from the typical line of sight (Spector, 1990). The consequences of this field of vision provides an explanation for the significance found in the study of eye contact with the sun during the period of investigation. However, this fact may lessen the emphasis on the face and eyes relationship to the sun in June and July, specifically, when the sun's altitude reaches the maximum 86° and becomes above the personal field of view.

Most of the studies on outdoor thermal comfort focus on studying the microclimate conditions in June and December, for being meteorologically known as the hottest and coldest months. From a subjective perspective, this study showed that heat over the summer season was perceived as a gestalt that is similar and consistent, and that subtle changes in temperature are ignored. However, the deviation of the sun from the direct eye contact in the hottest months of year would change how we make sense of dis(comfort), and specially how immediate discomfort is revealed.

The study supports that the perception of (dis)comfort would remain grounded by constructs of local climate culture and the taken for granted meaning of the 'summer sun' in the Egyptian climate. However, discomfort may be differently intuited and perceived in the metrological three hottest months. The position of the sun above the field of vision may suggest the decreased emphasis on the perception of discomfort as caused by eyes relationship to the sun; however, further experiential examination of the hottest months when the sun has highest altitude in the sky is needed to provide evidence and a holistic understanding of the microclimate perception and to justify the transferability of the knowledge established about the microclimate.

Despite this limitation, the period investigated in the study has a particular importance in the design of a comfortable space that is sought to be frequently used in hot summer time. This is due to the fact that over the course of a year period, the movement of the sun in moderate altitudes occupies a considerable length of the hot period of the year, as the sun moves from lowest to highest, then to lowest again and so on. This gives the produced knowledge in this study its emphasis and consideration.

## 9.5 Significance of the Experiential and Perceptual Knowledge in the Design of 'Comfortable Spaces'

In this study, the findings revealed the differences between subjective and experimental examinations of microclimate for discussion. Interestingly, the design implications concluded from the subjective examination of the microclimate did not often support the conclusions of previous experimental studies in hot arid regions, such as in the aspects of spatial orientation and reflectivity of paving materials. In conclusion, this study of the microclimate from a subjective perspective contributes to the conclusion that the design of a comfortable open space should consider the aspect of evoking and promoting comfortable feelings. This aspect is essential to be considered more than the impacts expected from the experimental investigations. The study recommends more consideration should be given to understand the human perception of the microclimate and comfort, and knowledge of experimental investigations should aim to complement and bring into practice experiential and perceptual knowledge.

## 9.6 Evaluation of the Learning Journey

### *9.6.1 A reflection on the methodological process*

In the early phase of this study, after the discussion of the limitation of the dominant approaches used to study outdoor thermal comfort, a key question was raised about how to examine the microclimate and comfort from a subjective perspective. Here, the concept of embodiment and Heidegger's notions of understanding our being in the world offered a fruitful methodological platform from which to understand our being within the microclimate, as these notions establish the understanding as not only restricted to descriptions, but also established out of our activities within the experienced microclimate, through the examination of bodies' engagement and unintentional behavioural actions and signals. These non-literal signs were a continuum to the descriptive words. It illuminated the feelings that were not reflected on verbally and clarified what was not seen clearly for the individual. Moreover, understanding of the microclimate revealed we cannot escape our historicity in understanding a lifeworld phenomenon. The impact of the ingrained knowledge about the Egyptian climate context reflected Heidegger's view of people and the world as indissolubly related in cultural, social and historical contexts (Seamon, 2000; Laverty, 2003).

The method employed in data gathering enabled the emergence of new and fresh perspectives of the microclimate. It was a process of learning that allowed a radical shift in our intuitive assessment of the microclimate (dis)comfort, from the side of the researcher as well as the participants. This was obviously productive where the data collected provided in-depth insights that moved beyond the conventional appreciation of shade comfort in summer of a hot arid climate. Employing intentional engagement and immersion in the microclimate through a conversational and unstructured approach allowed the deep immediate examination of the microclimate in a fresh way that is beyond spatial interpretation. The immediacy of the experience successfully captured the verbal and non-verbal expressions. In addition, intentionality enabled in-depth discovery and moving beyond objective description and opinion of the phenomenon to that which is experienced. This perspective of intentionality emphasizes Heidegger's view of human experience as being beyond conscious knowing (Rapport, 2007), and that consciousness is not separate from the world but a formation of the historically lived experiences (Laverty, 2003).

The study sought an understanding of the inter-subjective character of the microclimate to establish design concepts which reflect and fulfill human perception of comfort. At the same time, through setting off the analytical process with individual analysis, it respected subjectivity in expression and allowed the interpretation of the personal meanings inter-subjectively. In fact, employing seventeen participants while using an interpretative approach resulted in gathering large amounts of data that were far more than what was expected. Moreover, the deep analysis of every participant produced a vast amount of data for detailed analysis, which consumed a great time to handle. Nevertheless, this size was useful to reach the shared inherent sense of the microclimate (dis) comfort, and thus to establish for trustful knowledge for design purposes.

### *9.6.2 Giving voice and valuing historicity of the researcher*

Despite the fact that subjectivity is often seen as a critical issue that affects the trustworthiness of phenomenological research, in this study the researcher's voice represented a source of data. The issue of admitting that the researcher belonged to the Egyptian climate and legitimizing her subjectivity in the process of understanding were clearly emphasized in the methodological design. The phenomenological attitude employed in the research respected her historicity and subjectivity. However, it placed reduction and

subjectivity together in understanding the microclimate, where the researcher moved between bracketing her pre-understandings and being reflexively self-aware of them. This attitude gave the researcher a voice not only during the analytical process, but also during the data gathering process, as a participant. Understanding emerged from the inter-subjective space between the researcher and the participant experiencing the microclimate, where the researcher's voice is used throughout to represent the single person 'I' as well as the shared 'we.' This attitude legitimized the preoccupation of the researcher subjectively, and kept the focus on the participants.

## 9.7 Quality of Knowledge

Quality in qualitative research in social sciences relies heavily on the careful specification of methods as the only way to achieve reliable knowledge. Finlay (2008a) emphasized that the issue of trustworthiness in phenomenological research in the human sciences is one of the significant aspects that has been criticized. In this study, discussions of how interpretations arise from the data and the interpretive process itself are seen as critical from the view of valuing subjectivity and being based on inspiration as described by Holroyd (2007) and not methodological calculations.

Despite the presence of some efforts to establish qualitative criteria to help the readers to value and judge the quality of the research (van Manen, 1990; Smith et al., 2009), there is an absence of agreed language or universal set of criteria to describe or assess phenomenological research. However, the qualities of assessment revealed that the issue is no more subjectivity; instead, quality judgement lies in its relative power to draw the reader into the researcher's discoveries, allowing the reader to see the worlds of others in new and deeper ways (Finlay, 2008b; Smith et al., 2009). It is matter of 'interpretive appropriateness' or the 'power to convince' as referred to by Seamon (2000), and the interest of the reader to find in their own life and experiences what the research found.

Rapport (2007) emphasized that reliability is a primary concern. On a methodological level, in this study reliability of the established knowledge was approached in the method employed with the participants, as their immersion in the microclimate avoided momentary sensations and allowed them to intentionally examine, compare and question the dependability of their feelings caused by their orientation to the sun (section 6.2.4). Moreover, the researcher's intentional pre-immersion in the experience before

encountering it with the participants improved the truthfulness and reliability of the findings, supporting Gadamer's thought of prejudice as a means of truth (Rapport, 2007). This intentional engagement developed her conceptions of comfort and increased her familiarity with space and its associated microclimate through time, which gave real thrust to imagine herself in the participants' situations and interpret their words. Moreover, her immersion in the experience enhanced her intuitive reading of what underlines the participants' perception and meaning. Her pre-understanding was bracketed, while also being exploited as a source of insights. For example, when participants felt uncomfortable without indicating the reason behind their feelings, one interpretive projection from researcher behind this feeling was the physical orientation to sun radiation which was often recorded by the researcher during the tour. Although they explicitly referred to the sun as an annoying object, in their other instances, it was not explicitly clear for them all the time. Moreover, adequacy and credibility was approached in the analytical chapters through the use of reflexivity and the careful reference to the position of the researcher historicity and knowledge and her engagement in the process of understanding. The analytical process itself was a means of reliability as it provided the space for evaluation of the interpretation (Ajjawi and Higgs, 2007).

Quality was also sought through identifying the underlying inter-subjectivity, whilst respecting subjective expression. Quotations from participants offer rich description that enhances the reliability of the research (Rapport, 2007). In this research, quotations were extensively used as they provide the opportunity for readers to judge the soundness of the researcher's interpretation. This goes in line with Finlay (2008b), who emphasized that the value of a phenomenological research is established by honouring concrete individual instances. Participants' voices were respected through providing a considerable number of extracts to support the interpretation being made, allowing the reader to check this interpretation. Here, due to the relatively large number of participants for individual analysis, there was no space to provide an extract for every participant as done in most interpretative research. However, the researcher judiciously selected good and appropriate illustrations.

Reliability is also seen through displaying process, procedure and outcome (Rapport, 2007). In this respect, the researcher attempted to keep the decision trail highly visible to clarify the conditions that led to understanding and how decisions were arrived at about the data

collection and analysis and how the methodology relates to method. The organization of the analytical chapters aimed to show the progression of data gathering to the analysis and findings. The researcher was keen to immerse and transpose the reader in participants' experiences, physical environment, and microclimate conditions. This was done through inserting a whole chapter (Chapter 4), which provided an intense description of the spatial and atmospheric environments and participants' experiences. This aimed to prepare the reader to understand how the knowledge was established in the proceeding analytical chapters (Chapters 5, 6, 7, 8). Moreover, the researcher used to outline sets of experiential reflections which grounded knowledge gained from participants' conscious experiential encounters in the microclimates, to show the progression in understanding.

Also, credibility is approached in the sensitivity given to the research setting through developing the method to better suit the nature of the phenomenon, as well as social and cultural aspects in the Egyptian context. Moreover, there was an awareness of the existing literature related to the topic that helped to orient the study. However, as mentioned in section 3.7 the findings chapters included discussions with specific aspects in further relevant literature, which emerged from the new understanding, and were not referred to in the introduction chapter. This is common in a phenomenological study that examines phenomena in a fresh and new way. This aspect of sensitivity strengthens the credibility of the produced knowledge, and proves that the research process was not straight-forward and that the findings were not expected.

Finally, knowledge gained in this research acknowledges that understanding is a learning process in respect to Gadamar's perspective (Holroyd, 2007). The act of interpretation represented a gradual radical convergence of insight on the researcher. The conclusions presented in the study are no more and no less than interpretive possibilities that are open to change or scrutinize by other interested persons. This issue does not mean the failure of phenomenology as a method for understanding; rather, it acknowledges how human interpretation is always partial (Seamon, 2000). The research assumes that there is no absolute truth and, as Holroyd (2007) says, what we understand and know today is forever in the process of changing.

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# Appendices

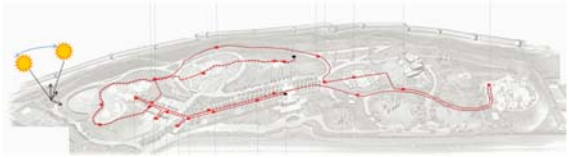
# Appendix 1

## List of Participants' Profiles

| Participant's Code | Age | Access | Date of tour | Remarks |
|---|---|---|---|---|
| M 1 | 24 | Convenient | 21/8/2012 2:00-5:00pm | |
| M2 | 26 | Convenient | 22/8/2012 2:30-6:00pm | |
| M3 | 27 | snow balling M2 | 22/8/2012 4:30-6:00 | |
| M4 | 21 | Convenient | 10/9/2012 3:30-6:00 | |
| F1 | 28 | Snowballing M9 | 27/8/2012 3:00-6:00 | |
| F2 | 56 | Convenient | 19/9/2012 3:50-5:00 | |
| F3 | 32 | Convenient | 30/8/2012 4:00-6:30 | Working In The Park (Aga Khan) |
| M5 | 31 | Convenient | 25/9/2012 3:30- 6:00 | |
| F4 | 47 | Snowballing F2 | 19/9/2012 3:50-5:00 | |
| M6 | 19 | Snowballing M4 | 26/9/2012 2:45-4:30pm | |
| M7 | 21-22 | Snowballing M4 | 26/9/2012 2:45-4:30pm | |
| F5 | 33 | Convenient | 20/9/2012 12:30-3:40 | |
| F6 | 35 | Gatekeeper F3 | 30/8/2012 4:00-6:30 | (IT) engineer in the park and resident of AL Darb Al Ahmar |
| F7 | 18 | Gatekeeper F3 | 30/8/2012 4:00-6:30 | A resident of AL Darb El Ahmar |
| F8 | 27 | Convenient | 12/9/2012 3:30-6:00 | |
| M8 | 30 | Snowballing F8 | 12/9/2012 3:30-6:00 | |
| M9 | 31 | Convenient | Pilot study (April 2012) | |

## Appendix 2

### Trail of Experiences lived by Every Participant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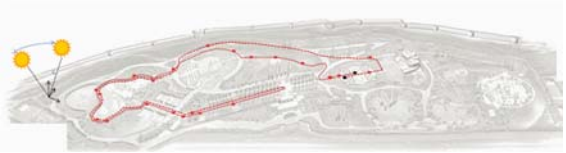
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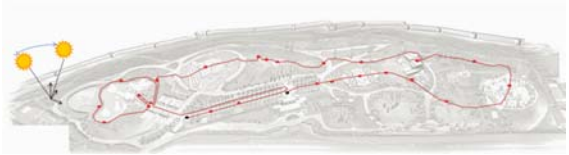
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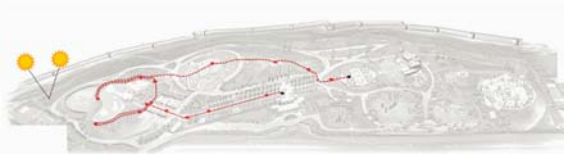
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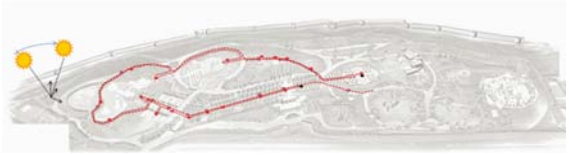
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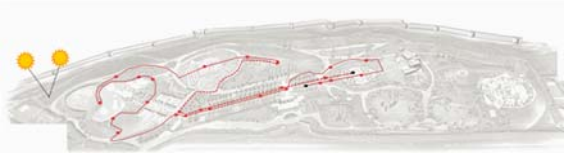
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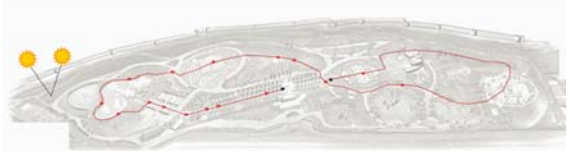
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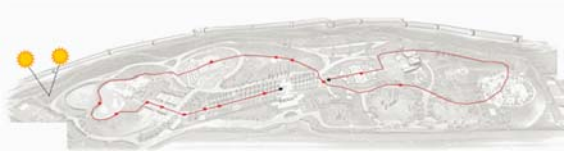
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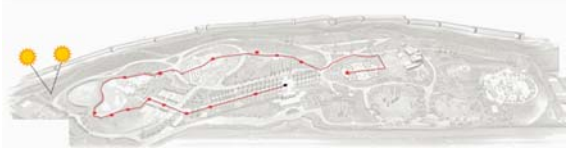
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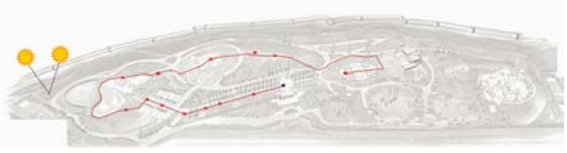
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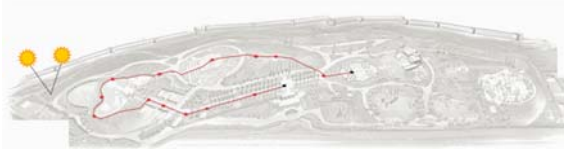
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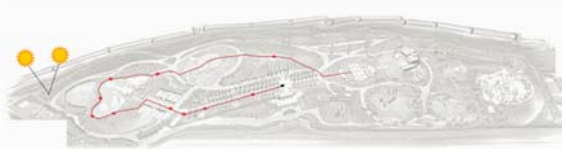
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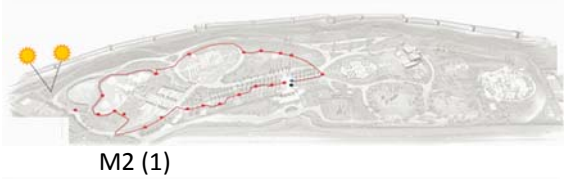
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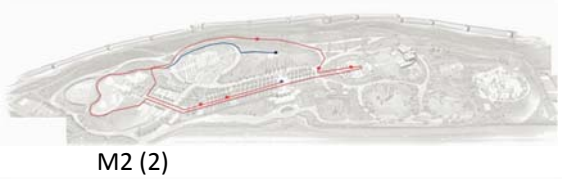
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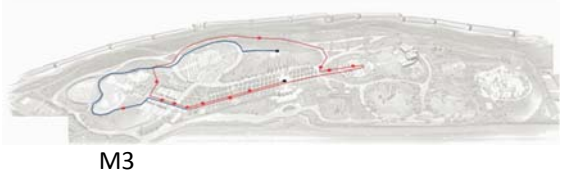
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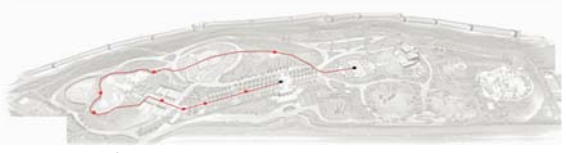
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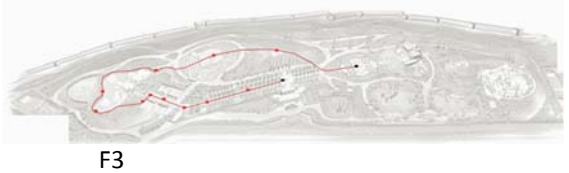
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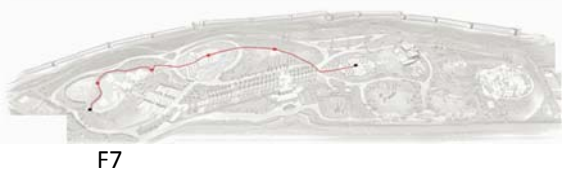

F7

# Appendix 3

## Interpretation of data

Extracts from participants' text showing the process of interpretation and the dialogue between researcher and text.

| Participant's (M5) description complied by researcher reflexive notes | Interpretation |
|---|---|
| **Gathering point:**<br>While walking back from the lake towards the lake café entrance, the participant suddenly stopped by a node, which as he described, was not noticed before:<br>*In this gathering point, I feel the breeze better in that posture and this node encourages me to slow down and take a break to enjoy the breeze and have a chat.* Looking around and facing the sun then adjusting his posture again: *When we were walking to the lake, my eyes were facing the sun and I didn't notice the presence of this gathering point. I only wanted to hide from the sun. I was bothered by my eyes' exposure to the sun, looking down most of the time. Facing the sun constituted my experience of the surrounding. However, now in this mode, I started to enjoy and observe unnoticed details.* Looking around: *For example I didn't notice these people resting over there on grass the first time. Now, I start to notice and perceive the surrounding. When I was facing the sun, I wasn't attentive to the sensation of breeze. Actually I didn't have time to feel anything, only walking faster. Now, I started to enjoy, contemplate and feel the breeze better. It is the first time I notice this gathering point. It prepares me to stop and enjoy the breeze.* | Impact of changing relationship to the sun's radiation in a complete sunny space.<br><br>Opposite to the sun: encourage the exploration of context and feeling comfortable,<br><br>Questioning: A comparison between staying facing the sun and opposite to the sun's radiation:<br><br>Staying opposite to the sun<br>The meeting point encourage him to stop and experience the place<br>Feeling the breeze in staying opposite to the sun's radiation<br><br>*Experiencing the same space as a passage in the first time but as a node in the second time*<br><br>Similar to his experience at the bridge, highest platform and the formal garden.<br><br>Direct exposure to the sun: *didn't have time* to observe / only walking faster to catch shade/ looking for changing his relationship to sun's radiation<br>Staying opposite to the sun: experiencing the place in a different way/ notice same places as new places<br><br>It seems that earlier when we were walking towards the lake and facing the sun's radiation, his aim was to catch shade at lake, not attentive to anything else?) |

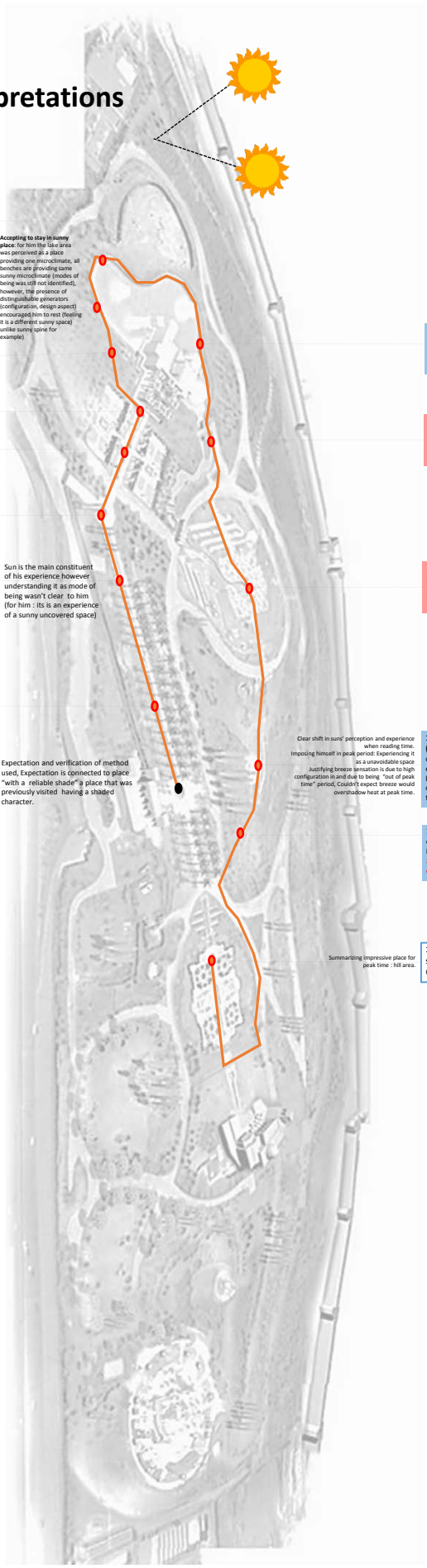
| Participant's (M4) description complied by researcher reflexive notes | Interpretation |
|---|---|
| **Walking northward along the shaded promenade:**<br>The promenade was not crowded and quiet<br>How do you experience the promenade right now?<br>*I enjoy the path here because I feel sheltered in walking now. The sun is not dominant on me, and it is slightly penetrating the spine. It is not annoying while walking, however, if I stopped in any of these sunny slots, I won't feel comfortable.* | Conscious to be being in shade<br>I feel sheltered in walking: valuing the presence of a shelter in-between that is filtering and sheltering the sun.<br>now: appreciation of shade at that time period<br><br>The path is dominated by shade with few sunny slots<br><br>Sense of enjoyment "*I enjoy the path:* shaded microclimate is accompanied by walking freely, interacting and reflecting on the context |
| | Conscious to experience of sunny slots perceive moments of discomfort).<br>The direct exposure to sun: is perceived as uncomfortable microclimate<br>Question: It seems that earlier when we were walking towards the lake and facing the sun's radiation, the participant was attentive to catch the shaded slot he spotted at the lake, and he was not attentive to anything else. |

| | |
|---|---|
| **Reaching the Promenade Extension One**<br>At the end of the shaded promenade, the participant spotted the sunny extension of the promenade:<br>*We are leaving the shaded area behind and going to be immersed in the sun...*<br>Are you happy?<br>*Of course not*<br>Don't you feel any pleasure by coming nearer to the water fountain? Looking at it: *it looks more visual feature rather than inducing an impact in the weather. It needs to be stronger; maybe it needs to be larger as well.*<br><br>Walking along the extension in complete sun:<br>*I need to walk faster. The main problem in this area is the direct facial exposure of the sun on my right cheek. It is very annoying to feel obliged to walk in that position for some time.* | <u>In shade:</u><br>Conscious to the shift to full sun experience. Perceiving it as a harsh microclimate<br>Immersion in sun: reveal the absence of any shaded slot nearby.<br>Subjectivity of water alongside shade's comfort.<br><br><u>Lived moment</u><br>Feeling unhappy<br>being forced to walk through it due to absence of other alternatives<br>The need to walk faster : bodily movements<br><br>The direct facial exposure is the main constituent of the experienced discomfort<br>Water rill/ fountain is not understated |

# Appendix 4

# Mapping of the Interpretations

Participant M8
Data: September 12, 2012
Time: 3:30pm-6:00pm



**Green space (imposition):** *"accept resting in it now due to its privileged views, pointing to its shaded edges*

**9- Walking(being-in):** *"Touching water is more powerful than heat,* waiting for the moment the drizzles will splash on his face.

**8- lake area (resting):** unconscious adaptation away from direct sun radiation, and enjoying great deal of active water happy by the jets *"i would like them to increase"* , breeze, openness, what is shade: *We are now sitting our bodies are uncovered by any slot of shade, but I'm not bothered (feeling sheltered due to his face away from direct sun).*

**Accepting to stay in sunny place**: for him the lake area was perceived as a place providing one microclimate, all benches are providing same sunny microclimate (modes of being was still not identified), however, the presence of distinguishable generators (configuration, design aspect) encouraged him to rest (feeling it is a different sunny space) unlike sunny spine for example)

**7- Towards lake area (walking):** expressing the preference for shaded experience without feeling enclosed by the shelter (comparing the palm promenade and secondary paths), lake during direct exposure evoked a desire to jump in water

**6- In front of lake café building (being-in):** staying in first shaded slot and commenting on water from shade (same water feature that was experienced before during walking in direct sun exposure

**5- Extension two:** emphasizing that shade is the main thing that could make a difference, water is too weak to be felt in the space. expressing sun as a main constituent

Returning back to shade to describe his experience in sunny node (shade is datum to return back to)the place for resting place (presence of shade nearby sunny node

Interrogating water from sunny position: *When I was staying in the sunny node, I need the water to be more than a visual aspect, feeling it is very influential to relief the heat*

**4- fountain node (being-in):** pleasant shade, breeze and water is supporting all these sensations (shade and breeze)

**3- Sunny promenade** perception of a clear shift from shade to sun, water is not felt in the space, but it is good to have it in this sunny space

Sun is the main constituent of his experience however understanding it as mode of being wasn't clear to him (for him : its is an experience of a sunny uncovered space)

**2- walking along the shaded promenade** "extremely happy by shade", "I felt the promenade is cooler just by **seeing** ample shade "perception of the promenade as an nice space

**1- Entrance Plaza (being-in):** being in the shaded corner is enough to make him break for some time, water is an "event/ liveable aspect" to be enjoyed from shade.

Expectation and verification of method used, Expectation is connected to place "with a reliable shade" a place that was previously visited having a shaded character.

**10- approaching shaded hill area at the lake (transposition):** expecting breeze sensation, justifying this expectation by the over-occupation

**11- Resting in shade near to water canal (being-in):** proximity to water, shade enable exploration and reflection, *".. this is also a wonderful place for this time period. In my next visit; I would like to sit here.."*

**12- Hill area (being-in):** impression of being good shaded place but lacking water, after spending some time, he experienced it as a nice shaded atmosphere created by natural tree formations *"soften"*

Clear shift in suns' perception and experience when reading time.
Imposing himself in peak period: Experiencing it as a unavoidable space
Justifying breeze sensation is due to high configuration in and due to being "out of peak time" period, Couldn't expect breeze would overshadow heat at peak time.

**13- Highest point (being-in**): feeling comfortable and enjoying the vibrant breeze, justifying this comfort is related to time period

**(being-in): impact of time perception and bodily relation to sun radiation:** *"Even now it is facing me, I'm conscious to its presence but I'm not feeling hot. it is not powerful as earlier. But still, It is more comfortable to stay away from it to see the surrounding better*

**14- Going down leaving the highest point : questioning his orientation to sun radiation and feeling of (dis)comfort: & emphasizing the impact of our bodily orientation to the sun** *: It is a matter of being walking in sun's direction or opposite to it..it surely has clear emphasis of shaping the experience and relation to the place .*

Summarizing impressive place for peak time : hill area.

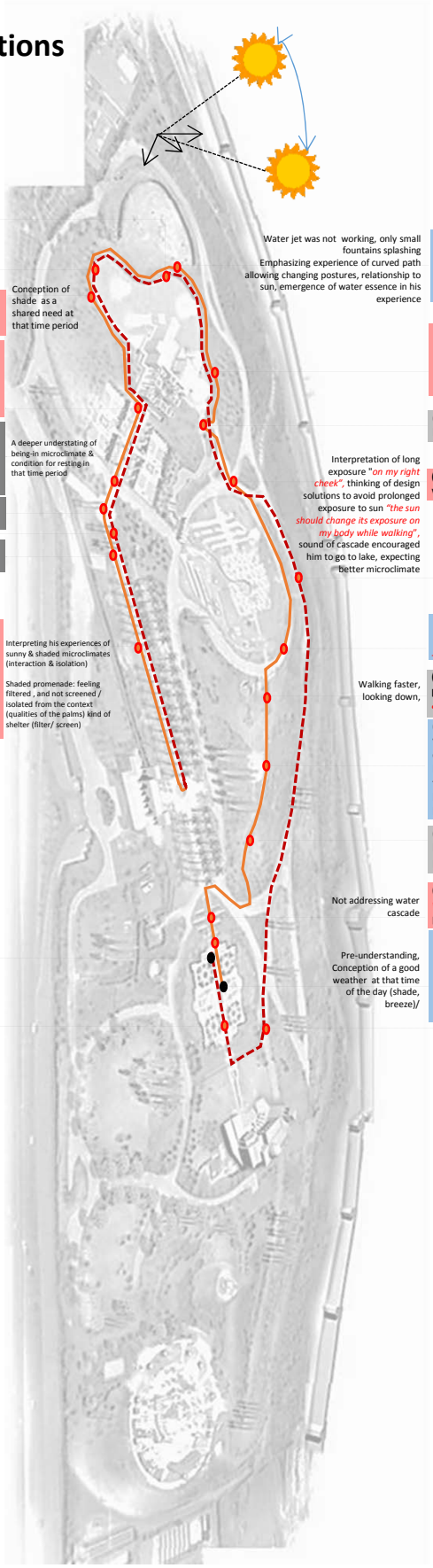
**15- Formal garden:** perception of the sun was away from being a source of heat, a pleasant source of light, expecting the space is unavoidable at 2 pm *"Absolutely not"* **(impact of time)**

shaded
Staying away from sun rays
Direct exposure to the sun

## Appendix

# Mapping of the Interpretations

**Participant M1**
**Data: August 21, 2012 "3rd day of Eid El Fetr**
**Time: 2:00-5:00pm**
**park was too crowded..**



**(21) Mid of path/ lake (break):** interrogating his previous experience, feeling comfortable at the same spot

Walking Nearer to transition shaded area: changing experience of sun" *not as hotter as first time", no need to have a break in shade* ***(impact of time was felt when he stayed away from direct sun)***

**(20) Lake path (walking):** annoyed by facing the sun, feeling no change in microclimate

**(12) Shaded area / lake (break):** a comfortable microclimate but not a pleasant atmosphere (crowded, enclosed & feeling claustrophobic)

Conception of shade as a shared need at that time period

**(13) Entrance area of lake building (a break):** a pleasant atmosphere to stop for a break, semi shade as shade, a scenic shot, "*break after long exposure to sun (lake)",* attentive to absence of water, but it did not disturb his comfort

Water jet was not working, only small fountains splashing
Emphasizing experience of curved path allowing changing postures, relationship to sun, emergence of water essence in his experience

**(11) Mid of path/ lake (resting):** pleasant place to rest in, sensing breeze better, "*sun changes its exposure on my body"* naturalness, a good atmosphere, interacting, need to see water

**Vast green meadow** justifying being an empty space, uncomfortable, dryness in the context, unable to enjoying scene of citadel

**(9) Shaded area / lake (break):** a comfortable microclimate but not a pleasant atmosphere (crowdedness, enclosure & absence of breeze sensation)

**(10) Leaving Shaded area :** conscious to exposure to sun on his body "*on my right cheek again",* showing preference for walking faster

**(8) Bridge (looking southward**: expecting a good view but the weather is harsh, tracking sun on his body,

**(14) Sunny promenade(extension two before fountain node (stopped to explore scenic shot): a** good scene, annoyed by direct exposure to sun, A desire of having a shaded resting place to enjoy the scenic view, emphasising the need for running water in a sunny space

A deeper understating of being-in microclimate & condition for resting-in that time period

Interpretation of long exposure "*on my right cheek",* thinking of design solutions to avoid prolonged exposure to sun *"the sun should change its exposure on my body while walking",* sound of cascade encouraged him to go to lake, expecting better microclimate

**(7) Shaded break: "** *a break from the sun*" for thinking, where to go, semi shade as shade

**(19) Nearer to fountain node:** developed understanding of the relation between posture (in shade, in direct sun), & breeze sensation

**(15) Fountain node:** refusing to rest on a sunny bench, unavailability of shaded bench, no water running

**(16) Walking along extension one)** uncomfortable place to rest in, justifying being an empty place. quick walking pace

**(22) Paved path (walking):** enjoying the views while walking, shaded from time to time (delayed desire for a sheltering)

**(6) Taking a photo:** sensation of breeze "*I felt the wind breeze better than when it was directly centred on my face"*

**Sloped shaded greenery: (imposition)**: a good place to rest in, shaded & natural greenery. Shade comfort is examined visually

**(18) Shaded promenade:** comfortable pleasant atmosphere, naturalness, domination of shade, citadel view, sensed breeze, character of spine, essence of breeze, interaction,

**(17) Entering shaded promenade** looking around, reflecting on a pleasant place for resting

Interpreting his experiences of sunny & shaded microclimates (interaction & isolation)

Shaded promenade: feeling filtered , and not screened / isolated from the context (qualities of the palms) kind of shelter (filter/ screen)

Walking faster, looking down,

**(5) Leaving highest point:** *it's hotter &getting even hotter,*

**Hill area (imposition):** good place to rest at that time period, pattern of resting, quiet place

**(26) Looking at hill top:** *Now when I adjusted my orientation away from direct sun radiation, I felt more comfortable in the place I like the place. There is a difference.*

**(4) Highest point:** a wonderful pleasant experience of view, breeze, enjoyment, forgetting the hotness, being-in a highest place

**promenade & plaza (transposition):** enjoying the scene, uncomfortable to stay in, for a reason, plaza is a part of the passage, looking for nearby shade if need to break

Exploring: differentiating between postures and views for daytime &night (relation of sun & breeze)

**(3) Up to Highest point:** Motivated to go to highest point for being "highest" expecting better microclimate (breeze & high place), bearing sunny microclimate for a motivation

**(25) Edge of formal garden looking at the promenade:** "*the sun, the sun, the sun",* a good visual experience uncomfortable microclimate

Not addressing water cascade

**(2) Stepped platforms (break): "***finally, after a long walk exposed to sun, a first shaded slot***"** , wonderful place, a sensed shift in weather

*If there is a* ***continuous*** *breeze in the space, it could sooth my heat & I would be encouraged to stay for some time enjoying the atmosphere in the promenade and view gazing at the citadel*

Pre-understanding, Conception of a good weather at that time of the day (shade, breeze)/

**(1) Formal garden (staying for a reason): (**no water), breeze sensation which couldn't sooth heat for longer stay, perception of dryness, choosing this place to stay for its quietness (open space and breeze).

**Stepped Platforms** (transposition): good place for resting, shaded, expecting a decrease in temperature, crowded due to shade's comfort,)

**(24) Formal garden:** the sun is highly dominant in the space, conflict between lived experience & time conception, could be better nearer to sun set

**(23) Stopping for a break in shade:** to enjoy scenic view and breeze in the shade (qualities of the canopy tree)

shaded
Staying away from sun rays
Direct exposure to the sun