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The contribution of design in sustaining social activities in central urban squares within large cities: the case of Belo Horizonte.

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ABSTRACT

The contribution of design in sustaining social activities in central urban squares within large cities: the case of Belo Horizonte.

Design plays an important role in facilitating (or inhibiting) the performance of social activities in urban open spaces. Although recent literature has acknowledged that visual and non-visual sensory aspects should be taken into account in the design of environments, most theory, practice and teaching of urban design have focused on the visual qualities of spaces. Furthermore, design processes have often been based on the practitioners own intuitions and preferences instead of knowledge of how people interact with urban open spaces.

The present research demonstrates that an approach to the multisensory design of urban open spaces responsive to user needs and preferences is feasible and holds the promise of guiding best practice in the creation of high-quality gathering urban open spaces. Using structured interviews, unstructured observation, behavioural mapping techniques, sketch maps and an innovative sensory-behavioural mapping technique, this research identifies fundamental urban design elements and qualities to inform a responsive multisensory approach to design.

The methodology proposed is hoped to motivate practitioners to apply environment behaviour knowledge throughout the process of multisensory urban design in different cultural contexts. Further, the urban design elements (props, boundaries, landmarks, spaces, atmospheres, views, anchors and repellents) that emerged from the present study as supportive of social activities in urban open spaces are applicable to the design of most gathering urban open spaces while robustness, richness and legibility are identified as key urban design qualities in attracting and retaining people in these spaces due to their responsiveness to various user needs and preferences.

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

The topic of the present research is the multisensory characteristics of urban open spaces and their influence on social behaviour and overall sense of well-being. This introductory chapter leads the reader into the research investigation through a summary of the background and a discussion on the significance of the research. Furthermore, the research question, the aim and the research objectives that are addressed in the subsequent chapters are stated. Next, this chapter presents the research scope and research strategy. At the end, an overview of the structure of the thesis is provided.

1.2 Significance of the present research

The role that design has to play in the generation of urban open spaces supportive of everyday stationary social activities is an important topic in theory and practice of urban design as well as in urban policy (Alex, 2008; Gehl, 2001; Gehl *et al.*, 2006; Mehta, 2009; Whyte, 1980, 1988). In the contemporary context, urban design has been considered a key tool in transforming vehicle-dominated urban open spaces to people-friendly ones, whilst enhancing the quality of urban life.

The on-going *interest in generating high quality environments* is reflected in the large amount of literature on public open spaces (Alex, 2008; Carr *et al.*, 1992; Francis, 2003; Gehl, 2001; Gehl *et al.*, 2006; Marcus and Francis, 1990; Robba and Macedo, 2003; Shaftoe, 2008; Ward Thompson, Aspinall and Bell, 2010; Whyte, 1980, 1988).However, despite the accumulated body of knowledge on the field, gaps still remain in our understanding of the role that urban design has to play in the generation of lively urban open spaces.

The term 'urban design', coined in the United States in the late 1950s, gradually replaced the expression 'civic design', a domain primarily interested in the design of civic buildings and their relationship to open spaces (Carmona *et al.*, 2003). Urban design has been consolidated as a multidisciplinary field concerned with the subjective-rational process of making places for people (Carmona *et al.*, 2003). In Brazil, issues related to the field of urban design began to be discussed in Curitiba in the 1970s, although it was only in the 1990s that the practice and theory of urban design was disseminated in the Brazilian territory[1] (Lima, 2008).

Urban design has been concerned with the *historical roots of places as well as their on-going transformations* (Zetter and Watson, 2006; Watson and Bentley, 2007). In this regard, Zetter and Watson (2006) argue that urban design may be better understood as a process rather than a product. Since urban environment is an ever changing system, continuous *monitoring* and *management* become crucial to guide the cumulative effect of incremental decisions (Carr *et al.*, 1992; Carmona *et al.*, 2003; Francis, 2003; Tibbalds, 2001).

The inherent complexity of urban design calls for joint effort among various disciplines and professions (Carmona *et al.,* 2003; Madanipour, 1997). The *multifaceted and interconnected dimensions of urban design* raise the question of 'who are urban designers?' To answer this query, Carmona *et al.* (2003) propose an enlightening distinction between 'knowing' and 'unknowing' urban designers.

The former category, *knowing urban designers*, includes those professionals employed for their urban design expertise as well as those people who acknowledge their own role in improving environmental quality, but who do not consider themselves urban designers, such as property developers. The *unknowing urban designers* comprise of those people who make urban design decisions without appreciating that this is what they are doing, such as some politicians, engineers and providers of infra-structure.

Carmona *et al.* (2003) point out that urban design is a process which necessarily involves 'paying' (e.g. investors) and 'un-paying' (e.g. pedestrians) clients. It follows that, urban design can be - and has been - regarded as an ethical activity that can contribute towards the generation of more equitable urban environments (Bentley *et al.*, 1985; Carmona *et al.,* 2003; Del Rio, 2009). The multiplicity of interests necessarily involved in the

[1]However, up until now there has been a shortage of Brazilian books that provide a comprehensive overview on the state-of-the-art (see, for example, Del Rio, 1990).

generation of urban environments, therefore, legitimatises participative processes of urban design (Zetter and Watson, 2006).

Inclusive design-management processes, intermeshed with post-occupancy evaluation, are said to contribute towards the generation of long-standing urban open spaces responsive to user needs (Carr *et al.*, 1992; Francis, 2003; Shaftoe, 2008). To suit user needs, it has been argued that design solutions should also be informed by up-to-date research on environment-behaviour relations instead of being based on urban designers' own preferences and intuition (Kaplan, Kaplan and Ryan, 1998; Mehta, 2009; Rapoport, 2005). In this regard, Goodey (2010, p.5) points out:

> I believe that the essential sources of urban design innovation have been drawn from a broad array of researched enquiries, critical observations of society and the built responses it generates, and creative experiments by practice. Political pronouncements and policies should remain as testable applications, rather than as the fashionable structure around which teaching and practice are partially draped.

Since most of the theory and practice of urban design have, in the past, focused on the role of visual qualities of urban open spaces in supporting social activities in them, there is a need to identify fundamental urban design elements and qualities to inform a responsive multisensory approach to design. In this matter, the major advances have been in sonic design due to new developments in the field of urban sound environment in terms of research and practice (Kang, 2007; Yang and Kang, 2005).

Recently, the importance of approaches to multisensory design has been widely acknowledged in urban design as well as in related fields (Bentley *et al.*, 1985; Berrizbeitia, 2007; Bloomer and Moore, 1977; Carmona *et al.*, 2003; Landry, 2006; Lynch, 1971; Malnar and Vodvarka, 2004; Pallasma, 2005; Rasmussen, 1959; Shaftoe, 2008). In the field of urban design, for example, Bentley *et al.* (1985) claim that in making spaces responsive, urban designers should attempt to design urban open spaces which provide choices and opportunities for people to experience positive sensory information.

> Constricted, we understand and interpret the city through the technical rather than the sensory, yet it is the sensory from which we build feeling and emotion and through which our psychological landscapes are built. These in turn determine how well or badly a place works – even economically, let alone socially or culturally – and how it feels to its inhabitants and visitors (Landry, 2006, p.40).
>
> [Spaces and places] affect our minds and senses. This is not just a trivial spin-off from their true technical purpose, for by affecting our minds and senses these

> spaces and places can profoundly influence our health and wellbeing, for better and worse (Shaftoe, 2008, p.56).

Despite the recent interest in theory on the role that multisensory urban design has to play in supporting everyday social activity, there is little empirical evidence to confirm such claims of a relationship between urban design multisensory characteristics and sustained social activity in urban open space. *The present research seeks to address this void in research and contribute towards the generation of liveable urban open spaces through the development of an evidence-based approach to the multisensory design of urban open spaces that are responsive to user needs and preferences.*

1.3 Research question

Based on the context discussed above, the following research question is generated:

> What are the theoretical and applied principles necessary for an understanding of the development of an evidence-based approach to multisensory design of urban open spaces that are responsive to user needs and preferences?

1.4 Research aim and objectives

In order to answer the research question within the context of the city of Belo Horizonte, the following overall aim and objectives are proposed:

> To develop an evidence-based approach to the multisensory design of urban open spaces that is responsive to user needs and preferences.

Objectives

> 01. To develop a theoretical framework which identifies the key concepts and theories to inform a multisensory approach for the design of urban open spaces that are responsive to user needs and preferences.
>
> 02. To develop a methodology to test this theoretical framework and to identify the most common user needs and preferences that a responsive multisensory approach to the design of urban open spaces should address.
>
> 03. To develop a contextual framework to understand historical, political, social and economic factors shaping current common user needs and preferences in central urban squares in Belo Horizonte.
>
> 04. To use the methodology in light of the contextual framework to identify and explain user needs and preferences in central urban squares in Belo Horizonte.

05. To analyse and review the findings from a multi-dimensional survey of user needs and preferences in central urban squares in Belo Horizonte against the theoretical and contextual framework to identify fundamental urban design elements and qualities to inform a responsive multisensory approach to design.

1.5 Research scope

The present study focuses on the fields of urban design and environmental psychology and is based on a multiple case study of three central urban squares located in the city of Belo Horizonte, the capital of Minas Gerais, a state in the southeast of Brazil: Liberdade Square, Raul Soares Square and Estação Square. The perspective adopted throughout the research considers that the multisensory facet of human-environment relations should inform design in order to enhance the responsiveness of urban open spaces to user needs and preferences.

The present research is concerned with the role of urban design in the generation of public urban open spaces that can potentially sustain pedestrian activities and promote an overall sense of well-being. Focusing on the gaps in knowledge identified above, the present research aims to empirically study the interrelationships between the multisensory characteristics of three central urban squares in Belo Horizonte and the behaviours and perceptions of their users through the use of multiple methods which involve studying real life situations.

1.6 Research strategy

The nature of the research question demanded the use of an array of complementary methods of data gathering, compilation and analysis. A mix of quantitative and qualitative methods were used because bringing them together yields different types of rationale about the topic under investigation (Bryman, 2008; Sommer and Sommer, 2002; Yin, 2009). The adoption of a combination of qualitative and quantitative methods was also motivated by its widespread use in social sciences (Bryman, 2008).

In addition, it has been suggested that an effective way to better understand user needs and preferences is by empirically studying the interrelationships between urban design characteristics, behaviours and perceptions of the users through the use of a mix of methods (Francis, 2003; Mehta, 2009). Thus, to answer the research question and achieve the research aim, as pointed earlier, it was necessary to conduct an empirical investigation.

The present research involved a cyclical reassessment of the methods of data gathering, compilation and analyses up to complete definition of the methodology. The inclusion of new methods of data gathering as well as the refinement of some techniques of data analysis were motivated by the new knowledge acquired through on-going engagements with experts in the fields of urban design and environmental psychology in seminars (Barros, 2007; Barros, 2008a, 2008b; Barros, 2009).

The present research adopted a multiple-case design because analytic conclusions independently arising from more than one case are considered more powerful than those from a single case alone (Yin, 2009). The present research, which followed a dialectic process of deduction and induction, involved a combination of desk based study and fieldwork.

1.7 Structure of the thesis

This thesis is organized into nine chapters. Following this introductory chapter, Chapters Two and Three define the theoretical underpinnings which underlie the present research. Chapter Four describes the research methodology and outlines how the empirical research is to be carried out. Chapter Five develops the contextual framework of the present study, Chapters Six, Seven and Eight discuss the findings and Chapter Nine provides the conclusion of the thesis.

Chapter One. Introduction. This is the present introductory chapter. It summarizes the research problem and presents the research question, aim and research objectives that are addressed in the following chapters. At the end, it provides an overview of the structure of the thesis.

Chapter Two. Human-environment relations. Chapter Two and Chapter Three address the research objective one. Instead of exploring the complex debates surrounding the existing distinct theoretical perspectives on human-environment relations, this chapter brings to light those concepts and theories based on environment-behaviour studies which should be taken into account in the multisensory design of urban open spaces that suit user needs and preferences. At the end, the chapter summarizes those key concepts and theoretical underpinnings used to build the theoretical framework of the present research.

Chapter Three. Urban design. This chapter complements the intellectual discussion in Chapter Two by a review of discussions that invites a consideration of the role of urban

design in the generation of urban open spaces responsive to user needs and preferences. This chapter refers to the research objective one: 'To develop a theoretical framework which identifies the key concepts and theories to inform an approach to the multisensory design of urban open spaces that are responsive to user needs and preferences'.

Chapter Four. Methodology. This chapter addresses the research objective two by developing a methodology to test the theoretical framework, developed in Chapters Two and Three, and to identify the most common user needs and preferences that a socially-responsive multisensory approach to the design of urban open spaces should address. This chapter outlines how the present research is to be carried out and discusses the reasons to use a combination of quantitative and qualitative methods of data collection and analysis. In addition, this chapter (i) presents the criteria used to select the case study sites and participants, (ii) discusses the methods of data collection applied to gather evidence, (iii) explains the training of the interviewers and observers, (iv) details the standardized procedures followed in the field, and (iv) describes the methods used to carry out the data analysis.

Chapter Five. The context. This chapter satisfies the research objective three by developing a contextual framework to understand historical, political, social and economic factors shaping current common user needs and preferences in central urban squares in Belo Horizonte. This chapter analyses the genesis and development of Liberdade Square, Raul Soares Square and Estação Square in parallel to a general overview of the major changes undergone by central urban open spaces within other large Brazilian cities. This contextualization is considered fundamental to identify and explain the contemporary user needs and preferences in the study areas.

Chapter Six. Users and activities. This chapter, as well as Chapters Seven and Eight, refer to the research objective four: 'To use the methodology in light of the contextual framework to identify and explain user needs and preferences in central urban squares in Belo Horizonte'. Demographic and behavioural data gathered through structured interviews, unstructured observations and behavioural mapping techniques are analysed in this chapter to identify and explain the activities currently supported by Liberdade Square, Raul Soares Square and Estação Square in Belo Horizonte. At the end, this chapter summarizes information on 'who does what where with whom and how' in the study areas.

Chapter Seven. The sensory elements. This chapter, as well as Chapter Eight, examines users' general perceptions and preferences towards Liberdade Square, Raul Soares Square and Estação Square to address the research objective four: 'To use the methodology in light of the contextual framework to identify and explain user needs and preferences in central urban squares in Belo Horizonte'. Data gathered through structured interview and sketch map technique is analysed in this chapter to (i) reveal, represent graphically and analyse the collective multisensory structure of Liberdade Square, Raul Soares Square and Estação Square, as well as (ii) indentify sensory preferences.

Chapter Eight. The most valued aspects. This chapter, as well as Chapters Six and Seven, refers to the research objective four: 'To use the methodology in light of the contextual framework to identify and explain user needs and preferences in central urban squares in Belo Horizonte'. Data gathered through structured interview is analysed in this chapter to identify the aspects of Liberdade Square, Raul Soares Square and Estação Square most valued by their users.

Chapter Nine. Conclusion. This chapter analyses and reviews the findings discussed in Chapters Six, Seven and Eight against the theoretical and contextual framework to identify fundamental urban design elements and qualities to inform a responsive multisensory approach to design, while addressing the research objective five. This chapter answers the main research question: 'What are the theoretical and applied principles necessary for an understanding of the development of an evidence-based approach to multisensory design of urban open spaces that are responsive to user needs and preferences?' and achieves the main aim of the investigation: 'To develop an evidence-based approach to the multisensory design of urban open spaces that are responsive to user needs and preferences'. In addition, this chapter evaluates the present research, discusses further research and highlights general contributions to the knowledge.

CHAPTER TWO

HUMAN-ENVIRONMENT RELATIONS

2.1 Introduction

This chapter introduces some key interconnected concepts based on environment-behaviour studies, an interdisciplinary field concerned with exploring the interactions between people and environments, to address the research objective: 'To develop a theoretical framework which identifies the key concepts and theories to inform an approach to the multisensory design of urban open spaces that are responsive to user needs and preferences'.

As discussed earlier (see Chapter One, section 1.2), it has been argued that urban design should be informed by up-to-date research on human-environment relations, instead of personal preferences and intuitions, if it is to suit user needs. The present study focuses on understanding how the sensory information acquired by sight, smell, hearing and touch, the most important senses in providing environmental information (Carmona *et al.*, 2003), influence the interactions between pedestrians and central urban squares.

It is assumed that interactions between people and environments can be described as involving four stages: *perception*, *cognition*, *evaluation* and *action* (Del Rio, 1999; Isaacs, 2000; Lang, 1987; Nasar, 1994; Rapoport, 1977; Rapoport, 1982). According to this model, first, at the perceptive level, sensory information is absorbed; second, the mind begins to work on the sensory input, applying meanings, associations and prior knowledge; third, evaluations and judgements are made; and fourth, action is taken. Although presented as a linear process, these stages define a continuum (Isaacs, 2000; Lang, 1987; Rapoport, 1977; Stevens, 2006) interweaved with *emotional reactions*.

The present study is developed in line with the theory of 'environmental probabilism'[1], which suggests that *in a given environment, some choices are more likely than others* (Carmona *et al.*, 2003; Porteous, 1977; Rapoport, 1977). Thus, it is assumed that environments do not control activities in a purely deterministic way, but either facilitate or inhibit certain actions (Rapoport, 2005). In this regard, this study accepts that urban design solutions should fit and be supportive of human needs and preferences if it is to contribute towards the generation of lively urban open spaces.

Given this general overview, this chapter will introduce key concepts and theories related to human-environment relations as well as some propositions to be tested in the latter chapters. At the end, this chapter summarizes the preliminary issues taken into account to build the theoretical framework of the present research.

2.2 Sensing environments

Perception and cognition are so closely intermeshed that their conceptual distinction is more one of degree and focus than a clear dichotomy. This research accepts that perception occurs in the presence of a sensory source, while *cognition* concerns mental processes (Downs and Stea, 1973; Golledge and Stimson, 1997). Thus, while perception is necessarily related to something occurring in the present, cognition can also be connected with past experiences or with what is going to happen in the future (Downs and Stea, 1973; Golledge and Stimson, 1997).

Perception occurs in the presence of numerous distinct stimuli, which, in turn, reach different sense organs. The psychologist Gibson (1966) in his seminal book *The senses considered as perceptual systems* proposes a distinction between 'stimulus energy' and 'stimulus information' which is worthwhile discussing. According to Gibson (1966, p.28), *stimulus energy* is defined as 'patterns and transformations of energy at receptors' that become *stimulus information* in the presence of a perceiver. While the objective environment is made of stimulus energy, the perceived environment is featured with stimulus information. Gibson (1966) also distinguishes two different levels of sensitivity: the 'passive' and the 'active receptors'. While the *passive receptors* respond each to its appropriate form of energy – optics, mechanics and chemistry – the *active receptors*,

[1] In addition to environmental probabilism, there are two other main viewpoints on the degree of environmental influence on our behaviour: 'environmental determinism' and 'environmental possibilism'. Environmental determinism negates the role of human agency and our behaviour is considered strongly determined by the environment, while environmental possibilism argues that people choose among the choices available to them in a given space (Carmona *et al.*, 2003; Porteous, 1977; Rapoport, 1977).

called 'perceptual systems', search out the information in stimulus energy and generate the raw material of perception. *While the stimulus energy is coordinated with passive receptors, the stimulus information is matched with perceptual systems.*

Interestingly, *although distinct receptors are continuously stimulated by a complex array of different and ever changeable stimuli, the perceiver obtains constant perceptions.* For example, while stimulus energy of optics may vary from place to place and from time to time, people perceive a constant object by vision. So, despite changing sensations of light, a reader perceives that these words have been printed on a paper sheet, a constant object.

To explain this puzzle, Gibson (1966) argues that human beings respond to permanent properties of the environment (that is, invariants of the energy flux at the receptors) as well as to the changes in such patterns. According to this approach, *perceptual systems may be compared to tentacles seeking and extracting information about the environment from the flowing array of ambient energy.* It follows that *movement is fundamental to perception*:

> ...perceiving an object by touch from a perceptual system perspective involves the collaboration of movements of the hand and the stimulation of the haptic sensory system. What purpose do these movements serve in perceiving? They produce a changing array of stimulation, and in so doing, allow the selective nature of perceiving to isolate or 'foreground' unchanging structure specifying the object (Heft, 2010, p.16).

Rapoport (1977) suggests that there may be two neural systems operating: a more primitive system, 'subliminal perception', which receives all stimuli energy, and the 'conscious perception' which deals with filtered data. According to Rapoport (1977), *although not all stimulus energies are noticed, they are received and may affect people sub-consciously.* Hence, the subliminal perception would set the scene against which some elements would stand out.

The notion of 'noticeable differences' developed by Rapoport (1977, 1982) is helpful in furthering the understanding of the selective character of perception. According to Rapoport (1977, 1982), *a sensory stimulus become noticeable as it become meaningful and/or salient to the individual within a specific socio-cultural context.* Thus, the concept of noticeable differences, developed by Rapoport (1977, 1982), overlaps the notion of stimuli information, developed by Gibson (1966), in that both can be interpreted in terms of figure-ground relations.

Noticeable differences can be of three kinds: fixed, semi-fixed and non-fixed elements (Hall, 1966; Rapoport, 1982). The *fixed elements* would include all those features which tend to last or change extremely slowly, such as monuments, street grids and columns. The *semi-fixed elements* would include those elements that change in a piecemeal mode, such as urban furniture, trees and curtains. Finally, *non-fixed elements* would be the most dynamic type of noticeable differences and are typically people, including their activities, vehicles and animals (Hall, 1966; Rapoport, 1977, 1982, 2005).

Rapoport (1979, 1982) argues that though being under control of codes, regulations, and the like, *fixed elements, tend to encapsulate lesser meanings than the semi-fixed and non-fixed elements*. For example, the semi-fixed elements that temporally decorated the central alameda of Liberdade Square to welcome the re-elected governor of the State of Minas Gerais in January 1st of 2007, reinforced its meaningful role as a civic and administrative hall of the Palácio da Liberdade (Liberdade Palace) (see Figure 2.1).

Figure 2.1: The central alameda of Liberdade Square in an everyday condition (left) and decorated to welcome the re-elected governor of the state of Minas Gerais on January 1st of 2007 (right).

However, the importance of the fixed-feature elements cannot be underestimated. On the contrary, by being permanent elements, they participate in the city's evolution, being integral parts of the physical structure of cities (Rossi, 1982), such as street grids and monuments. Nevertheless, the three types of noticeable differences – fixed, semi-fixed and non-fixed elements – reflect the systemic nature of urban environments.

Thus, *the concept of noticeable differences stresses the fact that urban designers are necessarily working with layering of systems that evolve in different speeds over time* (Rapoport, 2005). This awareness has motivated writers to argue in favour of the development of design solutions based on an understanding of how and why urban environments have arrived at their present state as well as how they may accommodate

growth, evolution and adaptation, while reinforcing enduring qualities (Berrizbeitia, 2007; Watson and Bentley, 2007).

The converging concepts of noticeable differences and stimulus information also shed some light on the identification of the raw materials of urban design (see Chapter Three, section 3.2). For now, it is sufficient to point out that the elements of urban design are considered for the purposes of this research to be a sub-set of noticeable differences (or stimulus information), or rather, those elements of the perceived environments open to manipulation by urban designers.

The concepts of cultural, sub-cultural and personal filters help to understand why perception varies between cultures, social groups, perceivers and over time (Del Rio, 1999; Hall, 1976; Rapoport, 1977, 2005; Rodaway, 1994). *Cultural filters* are the result of enculturation processes at a large scale. An enculturation process commonly occurs quite early in life and refers to the process of learning to comprehend environmental codes (Rapoport, 1982).

The *sub-cultural filters* reflect the fact that individuals belong to a series of social groups – age, gender, socio-economic class, etc – whose members are expected to share attitudes, preferences, and the like, and to act accordingly to their behaviour norms. Thus, sub-cultural filters are the result of specific enculturation processes. *Personal filters* reflect personal experiences and individual physiological abilities (Porteous, 1977; Rapoport, 2005). The concept of filters expresses the idea that one is always dealing with perceived environments:

> ...we see, hear, smell, taste and touch the world through the mediation, the filter or lens of our social milieu, the context within which we have become socialised, educated and familiarised. Even with one society, there are various subsidiary filters associated with an individual's socio-economic status, education, age and gender (Rodaway, 1994, p.23).

There have been several efforts to identify and classify the human sensory apparatus. In accordance with the ecological theory of perception developed by Gibson (1966), there are five broad and inter-related senses: the basic-orienting system, the visual system, the haptic system, the auditory system and the taste-smell system. This research focuses on smelling, touching, hearing and seeing, assumed to be the most valuable senses in providing environmental information (Carmona *et al.*, 2003).

The value of this categorization is primarily analytical and must be interpreted with care because it can lead us to overlook the integrated and inter-independent actions of the perceptual systems. For example, we perceive distance by the effort of moving our body from point A to B, by the need to project our voice, by hearing the hum from motor vehicles and by seeing palm trees in rows defining an alameda.

Vision is dependent on the pattern of light and the arrangement of surfaces with regard to light sources. Humans have been regarded as first and foremost visually oriented (Bentley *et al.*, 1985; Carmona *et al.*, 2003; Porteous, 1977). The visual system provides instantaneous, focused and detailed information on *spatial patterns* and is considered *more precise* than the other senses in acquiring information regarding *distance*, *directions* and *identification of elements* (Rodaway, 1994). Vision provides relatively *simultaneous perception of large spatial fields* and information on *colours*, *textures*, *shapes* (Rodaway, 1994). Alongside these types of *attributive information*, sight also furnishes us with *locational information* by acquiring information on size, form, movement and position of elements relative to other elements and us.

Since elements are perceived as having location and duration relative to other elements and to ourselves, it is said that vision also provides *temporal information.* Cullen (1961) argues in favour of designing spaces that provide opportunities to experience a fluid and dynamic spatial rhythm of here, there and change by means of an unfolding sequence of existing and emerging views. He calls this *serial vision.* Although humans tend to reduce visual perception to a snapshot, it is highly dynamic, since it results from a complex mix of apparently static and moving elements (Rodaway, 1994).

Sight mediates human-environment relations by maintaining a distance (Lynch, 1971; Rapoport, 1977). A visual element whose major dimension equals its distance from the eye is easier to analyse in detail. But when it is twice as far away, it is perceived as a unit and when it is three times as far, it tends to be seen in relation to other objects, although it is still dominant in the visual field. As the distance increases beyond four times the major dimension, it becomes part of a view, unless it has highly distinctive qualities to catch our attention.

Although sight excels the other senses in coding spatial patterns, seeing may occur without eliciting emotional reactions. By contrast, *smelling, touching and hearing involve more intense emotional responses* (Porteous, 1977). Since smell and touch are activated at short distances, fixed, semi-fixed and non-fixed elements perceived from great

expanses tend to provide emotional reactions not as intense as those inspected up close (Gehl, Kaefer and Reigstad, 2006; Porteous, 1977).

From the preceding, it becomes clear why some writers have argued that urban design should provide opportunities for pedestrians to perceive buildings (Gehl, Kaefer and Reigstad, 2006) and small-scale objects (Stevens, 2006; Whyte, 1980) at short distances if it is to contribute towards the generation of lively public open spaces. At short distances one can smell the perfume of a flower, touch textures or feel the coolness irradiated from a water fountain.

The present research assumes that humans transfer the perceptions of intimacy, meaning and emotional impact from their meetings with people to their meetings with environments (Gehl, Kaefer and Reigstad, 2006), from which follows that pedestrians tend to experience more intense emotional reactions when positioned at distances within 3m from urban design elements.

On examination of touch, *reciprocity*, an important *property of touch*, can be analysed into three different levels: 'exploratory activity', 'communication' and 'simple contact' (Rodaway, 1994). An *exploratory activity* takes place when perceivers actively and consciously investigate their surroundings, such as when people perform playful activities in water fountains (see Figure 2.2). Through *communication*, characterized by an actively intended contact among organisms, messages are exchanged, such as through a warm hug by a beloved person (see Figure 2.2).

Figure 2.2: Examples of touch as an explorative activity in the Hyde Park in London (left) and as communication in Estação Square in Belo Horizonte (right).

Simple contact is a consequence of the juxtaposition of two surfaces against one another in a way that the perceiver may not consciously take much notice of it (Rodaway,1994). For example, simple contact makes people largely unaware of wearing a pair of socks.

On examination of *forms of touch*, Rodaway (1994) identified four types: 'global touch', 'reach-touch', 'extended touch' and 'imagined touch'. *Global touch* is generally a passive experience and represents the body's general contact with the environment. The sensation of the global touch may be enhanced by the movement of the body through water or vegetation. The global touch is not so much about distances and spatial relationships, but about a general presence, including sensations of temperature and humidity.

Reach-touch is the touch of the hands and arms, fingers and toes. It is active and usually grounded in intention. Given the array of information gathered by the reach-touch, it plays an important role in exploratory activities and in supporting navigation through the environment. *Extended touch* is the one mediated by or enhanced with technology. The cane used by blind people and forks are examples of objects that allows extended touch. *The imagined touch*, on the other hand, is rooted in the memory and permits people to experience an intimacy with people and places which may be a great distance from the perceiver location in time and/or space.

In all types of touch, except the imagined touch, *movement of the touch organ relative to the object touched is crucial in obtaining locational, attributive and temporal information* (Gibson, 1966). While merely resting the tactual organ on a material may evoke the impression of separateness, to recognize the object in question through touch there is a need of acquiring attributive information (texture, shape, dimensions, size, proportion, the mass and weight of the objects, the perception of material rigidity and plasticity, temperature, relative humidity and vibration) which, in turn, demands movement. Thus, *tactile perception is piecemeal and dependent on movement* (Krueger, 1982).

Hearing is not a 'spatializing' faculty, although it enlarges our spatial awareness, including areas behind our head (Southworth, 1969; Tuan, 1977). The hearing sense helps people to identify the *character of environments*, the approximate *direction* and *distance* of sound sources of interest, while conveying the *sense of passing time*. In this regard, some studies have suggested that sounds may be regarded as *relevant temporal markers* when they are perceived as sonic irregularities or pulsations (Arkette, 2004; Hedfors and Berg, 2003; Southworth, 1969).

In addition, sounds can give a *sense of size and volume* (Tuan, 1977), such as the sound of footsteps in an empty cathedral, which creates an impression of cavernous vastness. It has been suggested that vehicular traffic sounds have become the dominant element in

urban open spaces (Porteous, 1996; Shaftoe, 2008), a proposition which is tested by the present study (see Chapter Seven, section 7.4). In addition, as already pointed, the hearing sense has been regarded as emotionally rich (Southworth, 1969; Tuan, 1977).

In this regard, previous research has identified that natural sounds are likely to provide higher levels of preference than urban sounds (Kang, 2007; Yang and Kang, 2005), while human sounds tend to be classified as indifferent by users of urban open spaces (Kang, 2007; Yang and Kang, 2005). The present study tests the following propositions concerning sound evaluation and preferences: (i) natural sounds tend to provide higher levels of satisfaction than urban sounds (see Chapter Seven, section 7.4), and (ii) human sounds tend to be regarded with relatively high levels of indifference (see Chapter Seven, section 7.4).

Soundscape is a term coined by Schafer (1994) to refer to the sonic environment humans live in. Schafer (1994) defined 'keynote sounds' as those which are equivalent to 'ground' in the 'figure-ground' relationship of visual perception, 'signals' as those foreground sound elements that constitute acoustic warning devices, and 'soundmarks' as the sonic counterparts of landmarks, or rather, refer to those sounds that are distinctive to an area.

Focusing on the sense of smell, this comprises a chemical encounter between sensory membranes in the nose and odour particles in the air (Rodaway, 1994). Hence, olfactory perception requires some type of movement and is always based on a relationship between what gives off smells and the person who sniffs.

The sense of smell is always excited by novelty. The term *adaptation*, or habituation, means that people's sensitivity to smell declines rapidly with exposure (Porteous, 1985). Hence, although familiarity with an odour may fade our sensitivity to the present encounter with it, a fresh encounter excites a recall of the odour and its associated experiences, offering a virtual interaction with places in the imagination (Rodaway, 1994).

Previous research has found that there are some smells, such as the odour of faeces, bad drains, bad meat or fish, and burnt cooking smells, that are *universally disliked*, while there are others, such as chemical and synthetic smells, which are generally disliked (Moncrieff, 1966, 1970). In this regard, the present study tests the following propositions concerning smell evaluation and preferences: (i) natural smells tend to provide higher levels of satisfaction than smells of residues (see Chapter Seven, section 7.5), and (ii)

smells are likely to trigger emotionally powerful experiences (see Chapter Seven, section 7.5).

Two types of olfaction are identified by Rodaway (1994): 'generalised' and 'specialised'. They differ from each other in that the *generalised olfaction* results from a kind of passive encounter with odours, while *specialised olfaction* is characterised by exploratory behaviour (see Figure 2.3). The specialised olfaction tends to take place when certain odours, intensities, associations or memories cause a kind of agitation in the individual (Rodaway, 1994).


Figure 2.3: Users sniffing roses, an example of specialised olfaction, in urban open spaces in London.

The olfactory sense enables us to identify different odours, associate them with specific sources and/or situations and establish a strong emotional bond between the individual and the environment (Porteous, 1985; Rodaway, 1994; Tuan, 1977). The accuracy and longevity of the odour memory is not only specially remarkable, but also relevant as it plays a role in remembering general experiences and in associating current and past place-related experiences (Rodaway, 1994).

Smells vary both from day to day and throughout the day, resulting in a *distinctive experience of duration* (Porteous, 1985). Thus, smells can be perceived on a cyclical basis, recurring daily, weekly, seasonally or annually, enriching our experience of time (Porteous, 1985). Because smells are not randomly spread, but located with reference to source, odours can give *directional information* as well as an *estimate of the relative distance* through the intensity of an odour (Tuan, 1977). The term 'smellscape' has been popularized by Porteous (1985, p.359) to suggest that 'smells may be spatially ordered or place-related'. However, Porteous also (1985, p.359) stresses that:

> ...any conceptualization of smellscape must recognise that the perceived smellscape will be non-continuous, fragmentary in space and episodic in time,

> and limited by the height of our noses from the ground, where smells tend to linger.

Nevertheless, from the above, it may be argued that the *sense of smell, although the least informative of all senses, also provides the perceiver with some kind of attributive, temporal and locational information about the surroundings.* Consequently, without smell, an apparently 'non-spatial' sense, much of our ability to locate ourselves in space would be lost (Rodaway, 1994).

2.3 Cognition

In order to perform our daily activities, we need not only to select sensory information, but also to organize and synthesise it (Downs and Stea, 1977). *Cognitive mapping* refers to psychological processes by which our minds work on the sensory input captured by our sensory systems, applying meanings, associations and prior knowledge. The traditional definition of cognitive mapping, used by many researchers, states that:

> Cognitive mapping is a process composed of a series of psychological transformations by which an individual acquires, stores, recalls, and decodes information about the relative locations and attributes of the phenomena in his everyday spatial knowledge (Downs and Stea, 1973, p.7).

The above definition implies that cognitive mapping results from an interactive and selective process (Downs and Stea, 1977). It is *interactive* because the direct transaction with surroundings shapes the general way of thinking about, recognizing, and organizing environmental inputs. It is *selective* in its operation because the sheer volume of possible spatial information to be encoded and stored impels people to do so.

The selective character of the process of thinking about environment is mostly shaped by two criteria: 'functional importance' and 'distinctiveness' (Downs and Stea, 1977). The former criterion reflects the fact that *we tend to know and remember what is useful to us* and the latter refers to the degree to which *parts of the environment stand out from the background as figure-elements.*

Reinforcing the previous idea, evidence suggests that singular form, visibility, intensity of use and significance, in some form of combination, explain *why some elements stand out in our cognitive map*, while others do not (Appleyard, 1969). From the preceding, it would be expected that singularity, visibility, usefulness and pleasantness, in some form of

combination, are likely to characterize the visual elements that constitute the collective cognitive map of urban open spaces.

Although *distinctiveness* and *functionality* have been considered to be the two major criteria for selectivity, the process of thinking about spatial relations is not a passive process that simply selects information from what is available in the spatial environment. On the contrary, as will be clear from the following discussion, it is an active process, which frequently goes beyond the sensory information given.

2.3.1 Cognitive maps

The term 'cognitive map', or some of its alternative expressions: cognitive systems (Canter, 1977), environmental images (Lynch, 1960), image system (Goodey, 1974), has been intensively used in environmental psychology literature without being explicitly defined since it is frequently implicitly assumed by researchers that their readers understand what it is. In this regard, Kitchin (1994) points out that some problematic definitions of the term cognitive map have punctuated the literature.

For the purposes of the present research, *cognitive map is an output of the cognitive mapping process defined as a mental construct which helps to reduce, classify and order information about environments* (Golledge and Stimson, 1997). Thus, 'cognitive maps ... are not just a set of mental structures denoting relative position, but contain attributive values and meanings' (Kitchin, 1994, p.2).

Cognitive maps include 'whereness' (locational), 'whatness' (attributive) and 'wheness' information (Downs and Stea, 1977; Lee, 2003). *Whereness* refers to where something or someone is located and it is needed to work out distance and direction (Downs and Stea, 1973,1977; Lee, 2003). *Whatness* information characterizes and evaluates elements in a given location (Downs and Stea, 1973, 1977; Lee, 2003), while *wheness* information tells people about when events take place in a location (Downs and Stea, 1977; Lee, 2003).

From the preceding, it becomes clear that *cognitive maps may provide people with information of where one is, what may happen next, whether it is pleasant or unpleasant and what action may be taken* (Lang, 1994). The evaluative information 'pictured' in the cognitive maps implies that human-environment transactions leave in our head positive and negative codes, which, in turn, influence our choices and preferences.

Another important facet of *cognitive maps is that although they are stable, they are not fixed* (Goodey, 1974; Kitchin, 1994). In this regard, it has been said that the longer our exposure to natural (or artificial[2]) sources of stimulation, the greater the quantity, and possibly accuracy, of information stored in our memory (Bell *et al.*, 1990; Kaplan and Kaplan, 1982).

According to Lynch (1960), our 'environmental image', an alternative expression for cognitive map as pointed earlier, may be analysed in terms of 'identity', 'structure' and 'meaning'. *Identity* relates to identifiable elements that are recognized as separate entities. *Structure* refers to spatial relationships among elements, and *meaning* has to do with emotional or functional value of the elements.

In addition, *cognitive maps are incomplete, distorted, schematised, and augmented* (Downs and Stean, 1973; Golledge and Stimson, 1997). *Augmentation*, known as the addition of aspects that do not feature in the objective environment, reflects the active facet of cognitive mapping, a process which frequently goes beyond the sensory information captured by the perceptual systems.

From the previous discussion it is reasonable to argue that *cognitive map stands for our perceived environment and that its tangible components are noticeable differences, including non-fixed, semi-fixed and fixed elements*. Cognitive maps are framed by cultural, sub-cultural and personal filters as well as by the objective environment per se. It follows that *although cognitive maps tend to vary from person to person, commonalities amongst individual cognitive maps can also be detected because of the physiological similarities among individuals, the socio-cultural basis of environmental cognition and the objective aspects of environments*:

> It is likely that individuals belonging to a fairly uniform group in a specific area will not have mental maps which are entirely unrelated. Contrariwise, each unique map will interdigitate with others in varying degrees, so that an overall public image is apparent (Porteous, 1977, p.107).

Thus, although cognitive maps are unique to each perceiver, areas of agreement are expected to appear in the interaction between an objective environment and perceivers from the same culture (Lynch, 1960). *The present research is interested in eliciting, representing graphically and analysing information assembled from collective cognitive maps because by exhibiting consensus among significant numbers of pedestrians,*

[2] Artificial sources of stimulation refer to speaking, writing, designing, and other types of man-made substitutes for natural stimulus.

collective maps can inform the design of urban open spaces responsive to the most common pedestrian needs.

Since cognitive maps are mental constructs, the problem becomes one of externalizing the cognitive map from the mind of the perceiver. In this regard, it is important to be aware that an individual can externalise information assembled from his/her cognitive map in either words or images. For instance, one can verbally describe Raul Soares Square as well as draw a sketch map of it.

However, it is assumed that *external representation assembled from cognitive maps*, frequently referred to the literature as 'spatial products', will not reflect how well the perceiver knows an environment (Lynch, 1984) because *spatial products are framed by demand* (Canter, 1977; Kaplan and Kaplan, 1982; Lynch, 1984). For example, although an individual may sketch a map showing the most interesting urban open spaces to visit in the city of Belo Horizonte, it does not mean that s/he would not be able to graphically externalize its most dangerous locations.

Spatial products reflect the incompleteness, distortions, abstractions and augmentation that characterise the cognitive maps in the mind of the perceivers (Bell *et al.*, 1990; Canter, 1977; Downs and Stea 1973, 1977; Lang, 1994; Lynch, 1960; Sommer and Sommer, 2002). However, augmentation is likely to be concealed in externalized representation of cognitive maps by an error referred to as *inferential structuring*, which consists of representing features which were only inferred (Bell *et al.*, 1990).

The importance of studying cognitive maps has been argued on the basis that behaviour is mediated by them (Downs and Stea, 1973, 1977; Golledge and Stimson, 1997; Goodey, 1974; Kitchin, 1994, 2000; Lang, 1994; Lee, 2003; Porteous, 1977). In this regard, Golledge and Stimson (1997, p. 191) argue:

> ...people respond not directly to their real environment, but their mental representation or *image* of it, and as a result, the location of human activities and the spatial pattern of their movements will be the outcomes of perceptual and cognitive structuring of their environment [N.B. the term *image* is used instead of the term cognitive map].

However, the formation of cognitive maps is a two way process that depends on the perceiver and the observer (Lynch, 1960). It follows that in the same way that cognitive maps frame behaviour, activities play a key role in forming cognitive maps, reasoning

which implies some degree of congruence between collective cognitive maps and behavioural patterns.

If it is accepted that there is a *strong congruence between cognitive map and activity*, more accurate prediction of behaviour may, therefore, be possible and cognitive map-activity studies become highly valuable for general design awareness (Porteous, 1977). Nevertheless, it is important to bear in mind that the *concept of cognitive map-activity congruence* is supported by several authors:

> In operating within any environment, man is involved in the 'image system'. He perceives, selectively, certain information by means of his various senses and adds this information to his store of mental images. Images from other environments as well as the image of the environment under consideration, will be 'consulted' before behaviour is decided upon. Behaviour itself will be varied by motivation and the play of social, political and economic factors, but when it does take place the environment itself will be affected and the individual's information on that environment will be supplemented (Goodey, 1974, p.8).

Given this background, it may be argued that *instead of urban designers relying on their own preferences and rule-of-thumb, they should aim to understand how users perceive and cognise the objective environment, by studying externalizations of information assembled from cognitive maps.* The present research attempts to better understand the interrelationship between collective cognitive maps and pedestrian activity patterns as part of an attempt to define evidence-based guidelines to inform multisensory approaches to design of urban open spaces more responsive to pedestrian needs.

2.3.2 Meanings

The organizing nature of the process of thinking about spatial relations is reflected in our tendency to attribute meanings to the innumerable bits of sensory information acquired through our perceptual systems (Downs and Stea, 1977). It has been accepted that the formation of categories, such as 'urban squares', is an essential first step in making sense of the world. In addition, people seem to react in terms of what a setting means to them, which, in turn, explains why some studies have focused on the importance of meaning that settings hold for people (see, for example, Rapoport, 1982).

Rapoport (1982) argues that meanings oscillate between two extremes: 'perceptual' and 'associational meanings'. While the former class refers to lesser abstract meanings, such as 'tree', the latter refers to the most subjective ones, such as 'relaxing'. *Noticeable differences would correspond to perceptual meanings and would function as 'hooks' for*

intangible meanings. In this regard, Tuan (1977, p.17) points out: 'Human beings ... try to embody their feelings, images, and thoughts in tangible material'. In a few words, this research accepts that intangible meanings are attached to fixed, semi-fixed and non-fixed elements (Golledge and Stimson, 1997; Rapoport, 1982; Tuan, 1977).

Giving this background, one question that might be posed is *how urban environments elicit meanings*. A well-known answer to this question is that *environments function as communications devices*, or rather, they encode in themselves information that people decode (Lynch, 1971; Rapoport, 1982, 2005). Hence, people appear to act in accordance with their readings of the cues available, which are interpreted in terms of one's culture or particular subculture (Rapoport, 2005).

It follows that *people may act quite differently in different socio-cultural contexts*. For example, sitting, walking, lying, and playing on the grass in public urban squares in Brazil are considered a misuse of such spaces. The Decree Law 9605 (Senado Federal, 1998), reinforces this behavioural norm, as it prescribes punishment of one to six months of prison for those who damage ornamental plant in public open spaces. In contrast, the performance of these same activities on the grass of some public green areas around England is not only expected, but highly desirable (see Figure 2.4).

Figure 2.4: The behavioural norms framing the use of green areas within public open spaces located in Belo Horizonte (left) and London (right).

Thus, from the above, it becomes clearer that the *socio-cultural context indubitably plays a role in constraining and facilitating opportunities to perform outdoor activities*. Culture and sub-cultures, therefore, play the important role of enabling people to co-act through sharing notions of adequate behaviour (Porteous, 1977; Rapoport, 1982). According to Rapoport (1979, p.906) 'one way of looking at culture is in terms of the most common choice made'.

Cultural conventions require a certain degree of permanence in order to serve as a means for communication and to protect the nervous system from information overload (Hall, 1976; Rapoport, 1982). If meanings encoded in the environment of any particular culture were not stable, a totally idiosyncratic interpretation would require too much information processing while making any social interaction extremely difficult (Porteous, 1977; Rapoport, 1982).

The stable cues and meanings encoded in an environment of any particular culture are likely to elicit more automatic, consistent and uniform behavioural responses. So, if the rules encoded in an environment are widely shared as well as unambiguous and consistent, they tend to trigger appropriate meanings and, hence, adequate behaviour (Rapoport, 1982). In this regard, Rapoport (1982) argues that the *environment may be said to act as mnemonic, reminding people of the behaviour expected of them.*

On the other hand, *it is important to consider the active role played by perceivers in their transactions with urban open spaces.* Frequently groups and individuals consciously reject meanings that they fully understand and add new ones. For instance, a group of people in the city of Belo Horizonte decided to behave as though the Estação Square was a beach during the Carnival holiday and a local resident decided to sun-bathe on a routine basis in Raul Soares Square after its complete refurbishment, concluded in 2008, as if she were in Europe or in one of the city's clubs (see Figure 2.5). This example illustrates that although environments may inhibit, facilitate, remind, predict and prescribe behaviour, they do not determine it as long as one can refuse to act as expected (Rapoport, 1982).

Figure 2.5: An individual and a group of people adding meanings to Raul Roares Square (left) and Estação Square (right), respectively.

It is also important to bear in mind that *socio-cultural contexts are stable but not fixed.* The dynamic aspect of such contexts requires learning through continuous exploration of our

surroundings, or rather, constant, but not frenetic, adaptation. Hence, *the socio-cultural context is an important consideration for the study of meaning because the interpretation of the cues is necessarily contextual*: 'without context, the code is incomplete since it encompasses only part of the message' (Hall, 1976, p.86).

From the preceding account, it may be concluded that the same behaviour may be read as appropriate or inappropriate depending on the context. For example, the woman's decision to wear a bikini to get a sun tan in Raul Soares Square attracted the attention of the public and divided opinion, although it is an ordinary activity in the city's clubs.

From the above discussion it becomes clear that meanings tend to be more widely shared in urban open spaces characterised by readable activity patterns. Easily graspable behavioural norms provide opportunities for people to take advantage of the choices available, while contributing to an overall sense of well-being (Bentley *et al.*, 1985; Hall, 1966; Lynch, 1971; Rapoport, 1982).

2.4 Emotional reactions

Emotional reactions arise from interactions between people and environments (Nasar, 1988,1994; Rapoport, 2005; Russel, 1988; Yang and Kang, 2005). Positive, negative and ambivalent emotional reactions can be automatically elicited by environments (Kaplan, 1987; Nasar, 1994). Emotional reactions[3] are assumed to have the potential to alter people's mood, defined as a subjective state not directed to any object (Porteous, 1996; Russel, 1988).

It follows that to say that a setting is pleasing, is to say that it has the capacity to produce pleasure and so on. In this sense, Russel (1988, p.127) stresses that 'affective quality is a key factor determining the human response to an environment'. The emotional reactions triggered by elements of urban design may reflect their environmental adequacy or inadequacy to support effective human functioning, as pointed out by Kaplan, Kaplan and Ryan (1998, p.57):

> Aesthetic reactions reflect neither a casual nor a trivial aspect of the human makeup. Rather, they appear to constitute a guide to human behaviour that is both ancient and far-reaching. Underlying such reactions is an assessment of the environment in terms of its compatibility with human needs and purposes.

[3] Favourable emotions elicited by environments are usually referred to as aesthetic responses.

> Thus, aesthetic reaction is an indication of an environment where effective human functioning is likely to occur.

From the preceding, it may be argued that aesthetic quality of urban open spaces is an issue which matters not only to urban designers, planners and policy makers, but also to the general public. For the purposes of the present research, aesthetic experience is multisensory, instead of purely visual, affective and cognitive (Taylor, 2009). Aesthetic experience is also necessarily cognitive because human beings unavoidably project meanings on the sensory information acquired through their senses and react to them.

In this regard, Nasar (1994) proposes to divide the positive emotional reactions elicited from transactions between people and environments into two large categories: 'affect' and 'affective appraisal'. The former term represents favourable emotional responses that arise independent of, and before, cognition, while the latter refers to those positive emotional responses that occur at the cognitive stage (Kaplan, 1987; Nasar, 1994).

Positive emotional reactions triggered by sensory information and/or sensory patterns are classified as affect, while those aroused by meanings are termed affective appraisal (Nasar, 1994). Thus, the present research conceptually distinguishes between direct and cognitively mediated positive emotional reactions (Isaacs, 2000; Nasar, 1994; Taylor, 2003, 2009).

Focusing on the *sources of emotional reactions*, they may be elicited by sensory information (e.g. thermal delights), sensory patterns (e.g. geometrical shapes) as well as meanings (e.g. historic). *Sensory aesthetics* focuses on the understanding of our emotional responses to colours, odours, sounds and textures, while *formal aesthetics* is concerned with the appreciation of sensory patterns and *symbolic aesthetic* is interested in studying the emotional reactions aroused by meanings (Lang, 1987, 1988, 2000).

Although visual aesthetics has dominated urban design theory and practice, it is important to bear in mind that non-visual sensory effects are also sources of aesthetic responses. In this regard, as discussed previously, *although sight excels the other senses in coding spatial patterns, seeing may occur without eliciting emotional reactions, while smelling, touching and hearing do involve intense emotional responses* (Porteous, 1977).

The type and intensity of emotional reactions aroused by environments vary to a degree amongst people because of the filters (Lang, 1994; Nasar, 1989). However, despite this variability, *there are some generalities in the human condition and in the environment per*

se which permit that certain emotional responses are shared amongst many people (Taylor, 2003, 2009).

2.5 Action

Gehl (2001) classified the outdoor activities in three broad categories: necessary, optional and social activities. *Necessary activities*, such as waiting for the bus, are those which are more or less compulsory and their incidence is influenced only slightly by the environment (see Figure 2.6). The performers of necessary activities are to a greater or lesser degree required to carry them out throughout the year and under nearly all environmental conditions.

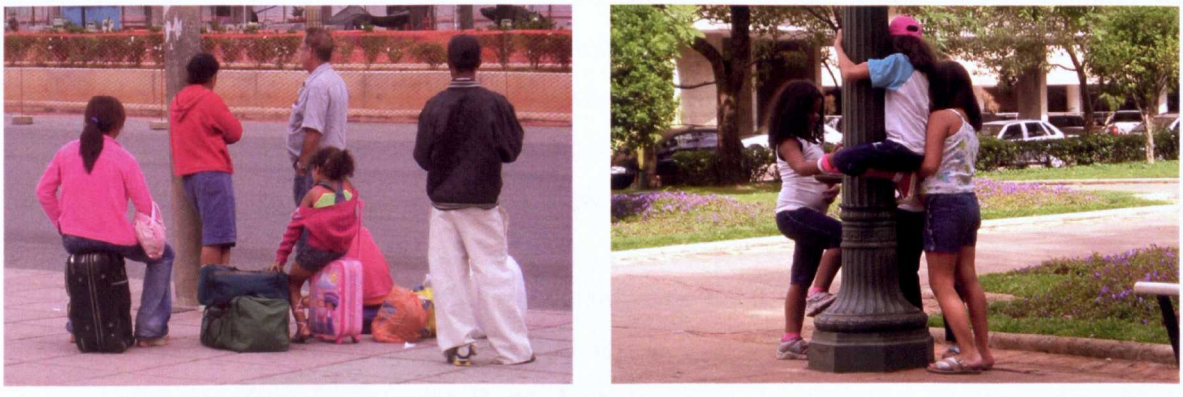


Figure 2.6: People waiting for the bus in Estação Square (left) and children engaging in playful activities in Liberdade Square in Belo Horizonte (right).

Optional activities are defined as those pursued only when time and external conditions, including the weather, are optimal (Gehl, 2001). Thus, this category includes those activities that the participants choose to perform when they have time available and when the physical environment invites them to do so, such as engaging in playful activities.

Social activities develop in connection with necessary and optional activities because they take place every time two people are sharing the same space (Gehl, 2001). *Social activities can be quite intense or more superficial.* More *comprehensive* forms of social contacts, such as discussions, tend to take place more frequently in outdoor spaces where there are people with common interests or backgrounds, while the most *superficial* ones, such as people-watching, are more common in spaces occupied by a mass of unknown people (Gehl, 2001). For example, impersonal conversation between people who do not know each other can be frequently observed in the central squares of the city of Belo Horizonte, mostly used by inhabitants from the metropolitan area and tourists

(Andrade, 2007). In some situations, it has been argued that *some individuals may prefer to perform noncommittal social contacts in outdoor settings, which can also be highly appealing* (Andrade, 2007).

Some writers have stressed that *distance is frequently used to regulate intimacy and intensity in various social experiences* (Canter, 1974; Gehl, 2001; Gehl, Kaefer, and Reigstad, 2006; Hall, 1966; Lynch, 1971; Rapoport, 1977). In this regard, *more intense forms of social contact are assumed to take place at short distances because when distance between people is reduced, the amount of sensory information acquired by them increases greatly because the senses of smell and touch, activated at short distances, start to supplement vision and hearing* (Gehl, 2001; Gehl, Kaefer, and Reigstad, 2006).

Although interpersonal distances vary from group to group and/or from situation to situation (Canter, 1974), in urban open spaces, *people are felt to be in direct relation to each other at 1 up to 3m* (Gehl, 2001; Lynch, 1971). Thus, this research accepts that all those pedestrians reported to perform optional stationary activities at a distance smaller than 3m are felt in direct relation to each other.

In the present research, pedestrian activities are divided into two broad categories: dynamic and stationary activities. *Dynamic activities* are defined as those that demands movement from point A to point B on foot or using an assistive device, such as a wheelchair. *Stationary activities*, in turn, include all range of social activities which are not within the umbrella of dynamic activities. Walking is an example of dynamic activities, while sitting and standing are types of stationary activities in urban squares. The term *ambulant users* for the purposes of this research will be used to refer to those users in urban squares performing dynamic social activities, while *stationary users* refers to those performing some sort of stationary activity.

In this regard, Rapoport (1990) hypothesises that perceptual qualities plays a larger role than associational ones in supporting pedestrian movement and that for sitting associational qualities tend to be more important than they are for walking. It follows that stationary activities are more related to *liking* than ambulant activities. This reasoning, in some way, converges towards Gehl's (2001) claim that while optional stationary activities tend to depend on high quality outdoor urban open spaces, walking, most often a kind of necessary activity, tends to be carried out under nearly all conditions.

Since the present study attempts to understand how multisensory design may contribute towards the generation of urban open spaces likely to attract and retain people in them, optional stationary activities, which are highly influenced by the multisensory aspects of urban open spaces, define the mainstream this study, although data on dynamic activities is also dealt with.

2.6 Conclusion

To conclude, this section highlights the interrelated concepts and issues, mostly derived from environment-behaviour studies, taken into account to build the theoretical framework of the present research. It is argued that the following concepts and issues should iform the development of an approach to the multisensory design of urban open spaces that are responsive to user needs and preferences:

Human-environment relations. Transactions between pedestrians and urban open spaces are considered to entail four interrelated stages: (i) perception, (ii) cognition, (iii) evaluation, and (iv) action. According to this model, first, at the perceptive level, sensory information is absorbed; second, the mind begins to work on the sensory input, applying meanings, associations and prior knowledge; third, evaluations and judgements are made; and fourth, action is taken. Although presented sequentially, perception-cognition-evaluation-action defines a continuum interwoven with emotional reactions, which can be positive, negative or ambiguous.

Perception. Perception is defined as a highly dynamic process that consists in acquiring meaningful and/ or salient sensory information - images, sounds, smells, textures and so on - from the environment through the human sensory apparatus. Hence, perception is regarded as selective, multisensory and multimodal. The sensory information filtered by our senses is defined as noticeable differences, which can be of three kinds: fixed, semi-fixed and non-fixed elements.

Fixed elements are defined as those that change extremely slowly (e.g. street grid), semi-fixed are those that change in a quicker pace than the fixed ones (e.g. urban furniture) and the non-fixed elements are the most dynamic of all elements (e.g. human activities). This study, therefore, presupposes that the perceived environments are made of visual and non-visual noticeable differences. The interactions between pedestrians and urban open spaces are assumed to be intermediated by personal, sub-cultural and cultural filters, which, in turn, explain why perception varies between pedestrians. The concept of

filters expresses that one is always dealing with perceived, as opposed to objective, environments.

Cognition. The present research defines *cognition* as psychological processes by which our mind works on the sensory input, acquired by our sensory apparatus, applying meanings, associations and prior knowledge. A *cognitive map*, an output of the cognitive stage, is defined as a dynamic mental construct which provides perceivers with information of where one is, what may happen next, whether it is pleasant or unpleasant and what action may be taken (see Figure 2.7).

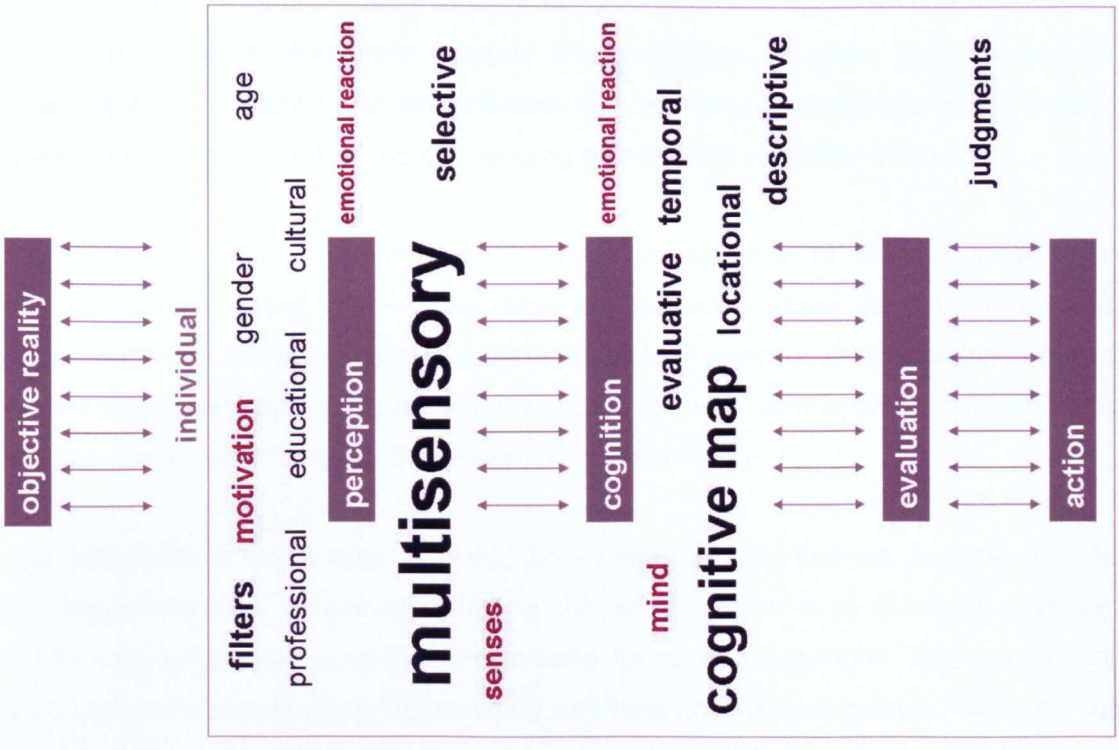


Figure 2.7: A graphical representation of the stages involved in human-environment relations.

Cognitive maps metaphorically correspond to a snapshot of how a person believes a given space is at a specific moment in time. This research assumes that cognitive maps consist of locational (or whereness information), attributive (or whatness information) and temporal information (or wheness information). *Locational information* refers to spatial relationships among noticeable differences. The *attributive information* includes *descriptive* and *evaluative information* associated with noticeable differences. Hence, this study presupposes our transactions with environments leave in our cognitive maps positive and negative codes, which, in turn, may influence our future choices and preferences. Finally, the *temporal information* refers to how regular and predictable an event is in a specific location.

Cognitive maps are framed by cultural, sub-cultural and personal filters. Thus, if on the one hand cognitive maps vary from person to person, according to their sensory apparatus as well as cultural, social, educational and professional filters, among other factors, on the other hand, the present study accepts that these mental constructs also overlap due to the proper structure of the physical environment, physiological similarities among individuals, and the socio-cultural bases of environmental cognition.

Accepting that a mismatch between designers' and pedestrians' perspectives is great, due to highly distinctive professional filters, this research argues that *the development of procedures for eliciting information assembled from collective cognitive maps is important because it is likely to contribute towards the generation of urban open spaces more responsive to user needs and preferences.* For the purposes of this study, *collective cognitive* maps are defined as the overlapping of individual cognitive maps.

Cognitive maps influence behaviour because people tend to consult these mental constructs before acting. To explore how multisensory urban design characteristics support pedestrian activity in central squares, this study explores the congruence between collective cognitive maps and pedestrian patterns in three central urban squares in Belo Horizonte, Brazil (see Chapters Six, Seven, Eight and Nine).

Social behaviour in urban open spaces. Social activities are defined as those that take place every time two people are sharing the same space. It is assumed that social activities can range from superficial to intense forms of interactions. The former would include passive contacts, such as watching and hearing unknown people, while the latter would include conversations. The present research identifies two categories within the broader umbrella of outdoor social activities: (i) necessary and (ii) optional.

Necessary activities refer to those more or less compulsory social activities whose incidence is only slightly influenced by the multisensory urban design characteristics. *Optional activities* refer to those that take place when there is time available and the multisensory urban design characteristics are favourable to their performance. The basic outdoor social activities - walking, standing, sitting, seeing, hearing and talking - can be classified as necessary or optional activities.

Meanings. The present research assumes that urban open spaces carry meanings. To explore the meanings associated with central urban squares, this research distinguishes between (i) perceptual and (ii) associational meanings. The former refers to tangible

meanings (or noticeable differences) and the latter to more intangible ones. In this regard, the present research tests the propositions developed by Rapoport (1990): (i) perceptual qualities plays a larger role than associational ones in supporting pedestrian movement (see Chapter Eight, section 8.3), and (ii) for sitting associational qualities tend to be more important than they are for walking (see Chapter Eight, section 8.3).

The development of perceptual meanings is considered a precondition for the development of associational meanings because people tend to project feelings and thoughts in tangible materials. Thus, noticeable differences are assumed to anchor associational meanings. It follows that fixed, semi-fixed and non-fixed elements act as mnemonics by communicating behavioural norms, which, in turn, defines what is appropriate and expected in a specific setting and situation.

Emotional reactions. This research assumes that 'we transfer the perceptions of intimacy, meaning and emotional impact from our meetings with people to our meetings with buildings (Gehl, Kaefer and Reigstad, 2006) and presupposes that fixed and semi-fixed elements have a greater emotional impact on pedestrians at distances up to 3m when all senses are likely to be engaged at some point.

To reinforce the idea discussed in the conceptual framework that touch, sense of smell and hearing are senses connected to human emotions (see sections 2.2 and 2.4), the present study tests the following proposition in the latter chapters: tactile (see Chapter Seven, section 7.3), sonic (see Chapter Seven, section 7.4) and olfactory experiences (see Chapter Seven, section 7.5) are likely to trigger emotionally powerful experiences in their perceivers.

The following chapter invites a consideration of how the multisensory design may contribute towards the generation of urban open spaces responsive to user needs and preferences. Issues related to elements of urban design, pedestrian needs and urban design qualities are also explored.

CHAPTER THREE

URBAN DESIGN

3.1 Introduction

This chapter, as Chapter Two, refers to research objective one: 'To develop a theoretical framework which identifies the key concepts and theories to inform an approach to the multisensory design of urban open spaces that are responsive to user needs and preferences'. A literature review based on the accumulated knowledge in the field of urban design is carried out in this chapter. By assuming that the way that the elements of urban design are classified influences what professionals pay attention to and, therefore, the way urban open spaces are conceived (Lang, 1994), the first section of this chapter indentifies concepts to inform the analysis of the multisensory structure of urban open spaces.

Furthermore, this chapter introduces the concepts of 'behaviour setting' and 'affordance' because they invite a consideration of how multisensory urban design characteristics of urban open spaces and meanings associated with them may either facilitate or constrain the performance of everyday pedestrian activities. In addition, by assuming that well-used urban open spaces are those responsive to the demands and expectations of their users (Carr *et al.*, 1992; Francis, 2003), this chapter identifies, through a literature review on the topic, the most common user needs that urban open spaces can help satisfy.

In parallel, this chapter discusses how 'permeability', 'variety', 'visual appropriateness', 'richness', 'robustness', 'legibility' and 'personalisation', urban design 'qualities which support responsiveness' according to Bentley *et al.* (1985, p.144), may contribute towards the generation of lively urban open spaces. This chapter concludes with a summary of the main issues and concepts likely to inform a multisensory approach to design of urban open spaces responsive to user needs and preferences.

3.2 Elements of urban design

> Maybe, if we want urban designers to pay more attention to non-visual aesthetics, we should change the name of their discipline to something that is less visually biased in its terminology! (Shaftoe, 2008, p.63).

Most of the theory and practice of urban design, as mentioned earlier, has focused on the visual aspects of open spaces, emphasis which has led practitioners to over-emphasise the appearance of urban open spaces, even though urban design necessarily influences the multisensory quality, meanings and behavioural patterns which compose urban settings.

Thiel (1961), for example, identified three components of the visual space: 'objects', 'surfaces' and 'screens'. *Objects* are defined as 'three dimensional convex forms' (e.g. a bench, a post light, a tree, etc), *surfaces* as 'two dimensional plane form' (e.g. a façade, a floor finish, etc), and *screens* as 'perforated surfaces or closely spaced objects' (e.g. a fence, an alameda of palm trees, etc) (Thiel, 1961, p.35).

The position and qualities of these elements, according to Thiel (1961), play a distinctive role in shaping the perceptible form of visual spaces, which, in turn, can be classified in two groups: 'space run' and 'space area'. The former category includes those visual spaces of where any one overall dimension (length, breadth or height) is two or more times greater than any other dimension, and the latter refers to the remaining types of spaces.

The direction of the greater dimension of a run, vertical or at right angles to a given direction of motion, defines two sub-categories within the category 'space run': 'vertical run' (e.g. a square enclosed by skyscrapers) and 'lateral run' (e.g. a long avenue enclosed by one-story buildings). The richness of adopting this classification is that these terms have the sense of a three-dimensional qualifier to a two dimensional plan form (Thiel, 1961).

On examination of the possible ways that spatial articulations could be established between runs and areas, Thiel (1961) verified that three types of *linkages* could take place: 'merge', 'port' and 'end'. A *merge* occurs when two or more areas and runs flow into the other, while a *port* exists when a constriction occurs when passing from one space to another, and an *end* refers to the spatial relations which do not categorize them either as a merge or a port.

Thiel (1961) points out that *some visual spaces may exist within others.* Hence, run and areas may function as cells of larger visual spaces, implying that some degree of subjectivity may permeate their identification. It follows that abstract (run and areas) and concrete (objects, surfaces and screens) elements constitute the palette of urban designers.

In the seminal book, *The image of the city,* Lynch (1960) identified that 'paths', 'nodes', 'edges', 'districts', and 'landmarks' are fundamental elements that frame our reading of and orientation within cities. *Paths* are defined as continuous elements along which people feel they can move (e.g. streets). *Nodes* correspond to either junctions of paths (e.g. a square) or concentrations with a thematic activity where people imagine that they can enter (e.g. entrance of a coach station). *Landmarks* are distinctive points which function as external references to people (e.g. mountains). *Edges* are lines that break (e.g. rivers) or contain (e.g. medieval wall) or run parallel to (e.g. flyover) the form. *Districts* are made of paths, nodes, landmarks and edges which all together define more or less homogeneous areas within a city (e.g. shanty towns). Bentley *et al.* (1985) compare paths, nodes, landmarks and edges with a skeleton which is fleshed out with districts.

Stevens (2006, 2007a, 2007b) found that playful activities in public open spaces are generally framed by 'paths', 'intersections', 'boundaries', 'thresholds' and 'props'. Stevens (2006, 2007a, 2007b) argues that while paths, intersections, boundaries, props and threshold, do mediate playful interactions between the various occupants of the urban space, by supporting opportunities to be experienced up close with the body, district and landmarks, by contrast, are defined as elements which simply orient movement.

On examination of Stevens' classification, *paths* are defined as lines along which the observer moves or plays. *Intersections* are junctions of paths. *Props* cover a variety of small-scale objects (e.g. signs, benches, etc) that inspire non practical forms of close up interactions. *Boundaries*, a refinement of the concept of edges, are lines that limit different domains. This element can be fixed (e.g. building façade to separate public from private) or moveable and temporary (e.g. chalk line to separate actors from audience). *Thresholds* correspond to openings in the boundaries (e.g. doorways), being a kind of 'blurred space in-between' (Stevens, 2007a, p.86). Threshold differs from a boundary in that it joins different domains, while the latter separates them.

The elements of urban design identified by Lynch (1960) and Stevens (2006, 2007a, 2007b) can be explained in terms of the Gestalt theory of visual perception[1]: path, edge and boundary are *elements of continuity*; node, landmark, props and thresholds are *figure* elements against the background; and districts may be explained in terms of *proximity and similarity*.

Although Lynch (1960), Thiel (1961), and Stevens (2006, 2007a, 2007b) recognize that a wealth array of stimuli frame the interactions between people and environments, all elements of urban design identified by them are referable to components of the visual space. The notion of *noticeable differences* developed by Rapoport (1977, 1982), by contrast, leads urban designers to take into account the dynamic and systemic character of urban open spaces (see Chapter two, section 2.2).

Depending of their perceived speed of change, noticeable differences can be of three types: fixed, semi-fixed and non-fixed elements. The fixed elements tend to endure (e.g. street grid); the semi-fixed change more habitually (e.g. urban furniture); and the non-fixed are the most dynamic type of noticeable differences (e.g. activities).

From the preceding account, it can be argued that fixed and/or semi-fixed elements can be described as the building blocks of paths, nodes, edges, landmarks, districts, boundaries, props and thresholds. For example, some landmarks, such as the Christ the Redeemer in Rio de Janeiro, can be described as highly visible and distinctive fixed element.

Building on these past classifications, the present research suggests that although non-visual stimuli (e.g. smells, sounds, temperatures and so on) do not impose on the perceivers a concrete particular spatial form, they do impose the cognition of an *atmosphere*, which may reinforce the character of a space or of any of its establishing elements, including objects, surfaces and screens.

For example, intense car traffic in the streets around a central urban square is likely to generate in the perceivers the cognition of a sonic-olfactory boundary. Although non-fixed objects, people, cars and animals, are not elements of urban design, by being sensory

[1] The 'law of proximity' states that elements at short distance from each other tend to be grouped together, the 'law of similarity' that elements that share similar characteristics, such as colour, textures, etc, tend to be perceived as single units, the 'law of good continuance' that people tend to perceive continuous elements as single units, the 'law of area' that smaller a closed area, the more it tends to be perceived as a figure and the 'law of closedness' that areas with closed contours tend to be seen as units more generally than those without them.

sources, they potentially play an active role in the cognition of atmospheres. In this regard, Stevens (2006, p.818), for example, points out:

> Members of the public also have significant potential to produce space, rather than just perceive it: as sounds, as smell, physically through their bodies, as well as through images.

Thus, *the cognition of sensory atmospheres on the perceivers is imposed by fixed and semi-fixed sensory sources, opened to manipulation by urban designers, as well as by non-fixed sources, whose activity patterns are influenced by the milieu.* Rivers, water-fountains and people are examples of fixed, semi-fixed and non-fixed multisensory sources, respectively. It may be argued that these *atmospheres* should be taken into account by urban designers throughout the process of design because they influence behaviour within them and the quality of the urban experience.

According to the proposed framework, any component of the objective environment, depending on its perceptible properties, may function as different elements of urban design, sequentially or simultaneously. For example, a water fountain may simultaneously function as a landmark to a passer-by at a great distance from it who uses it as an axial point to aid navigation through spaces and as a prop to people in its vicinity sensing its visual, sonic and tactile appeal. Moreover, the sounds and thermal stimulus acquired from the water fountain may impinge on its perceivers the cognition of a highly distinctive sonic-thermal atmosphere.

Although the concepts identified in this section can inform the analysis of the multisensory structure of urban open spaces, it is thought that *urban designers should go beyond the reading of the collective multisensory structure of urban open spaces, which means understanding how specific multisensory urban design characteristics influence social behaviour and the quality of the urban experience.*

3.3 Manipulating the elements of urban design

To understand everyday social activity in relation to central squares, the concept of 'behaviour setting', coined by Barker (1968, cited in Mehta, 2009, p.30) is of special interest for this research because it leads to the conclusion that certain multisensory patterns in central squares may be able to support some pedestrian activities more comfortably than others. *Behaviour setting* is defined as consisting of a specific layout, commonly referred to as milieu, and a recurring pattern of behaviour (Lang, 1994; Mehta,

2009; Rapoport, 2005). The milieu, composed of fixed and semi-fixed elements, carries meanings and defines the 'stage' within which expected non-fixed elements frequently occur. The concept of 'space' differs from setting in that the former can contain many settings simultaneously or may become different settings at different times (Rapoport, 2005).

In urban spaces, some settings endure, while some others change and some are replaced. Several settings of different scales have been modified temporarily or more permanently through the manipulation of semi-fixed elements. For example, through the arrangement of semi-fixed elements, parking is transformed in urban squares by practitioners, while instantaneous settings are frequently created by ordinary people in public open spaces (see Figure 3.1).

Figure 3.1: Examples of personalisation in the Regent Park in London (left) and Estação Square in Belo Horizonte (right).

The process of modifying settings through the manipulation of semi-fixed elements, when performed by ordinary people, is often called 'personalisation' (see, for example, Bentley *et al.*, 1985, Rapoport, 2005). According to Bentley *et al.* (1985), designing for *personalisation of environments* matters because it (i) allows people to confirm and communicate their values and tastes to others, and (ii) brings to light activity patterns that feature settings.

It has been argued that temporary personalisation in urban open spaces is welcome because it allows their users to develop ties with these spaces (Carr *et al.*, 1992). In addition, it is thought that temporary personalisation in public open urban space is highly desirable because it can facilitate the reading of the several activities that take place over time while addressing the user desire for stimulation, exploration.

Fixed, semi-fixed and non-fixed elements communicate meanings, which, in turn, define what is socially appropriate and expected in a specific setting and situation. For example, usually on Sundays, a segment in the Afonso Pena Avenue in the city of Belo Horizonte is featured with semi-fixed elements (e.g. bollards, signs and several tents displaying handmade products) and non-fixed elements (e.g. several people walking at a leisurely pace) that altogether communicate that the avenue has become an open market closed to vehicular traffic.

As pedestrians move through urban environments, they cross various settings, such as squares, streets, open markets, shopping centres, bus stations, beaches, and so on. *Since each setting communicates a specific behaviour, the transactions between pedestrians and urban open spaces are likely to be characterised by predictable changes in behaviour, assuming that perceivers are very often inclined to follow the behavioural norms encoded in the settings.*

When the *perceived level of congruence between the milieu and the standing activities is reduced to a point below acceptable level* or (i) behaviour has to change to be accommodated by the milieu or (ii) the milieu has to be modified to afford the intended behaviour or (iii) both have to change until an acceptable level of fit between the two are achieved or (iv) the milieu is abandoned (Lang, 1994). Sometimes an abandoned milieu is reused whenever it accommodates a specific behaviour and other times it is changed to accommodate new intended behaviour (Lang, 1994).

Focusing on the *functional fit between the environment and the individual*, Gibson (1979, p.127) argues that 'the affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill'. *Affordances* are defined as perceptible properties of milieus that have functional significance for an individual: it indicates what one can do.

The perceiving of affordances is dependent on the needs, wants and physiological capacities of the perceiver. For example, the 'benches' that feature in the Liberdade Square in the city of Belo Horizonte may function as 'tables', 'props to stretch', 'seats' and 'beds' to different perceivers with specific needs, wants and physiological capacities (see Figure 3.2). The *concept of affordance* is of special interest for this research because it *motivates designers to consider the properties of the environment and of the individual simultaneously and invites a consideration of the possibilities and constraints for activities afforded by specific milieus* (Heft, 2010). The concept of affordance has practical

implications because it may help the designers to conceive proposals with user characteristics in mind (Moore and Mosco, 2010).

Figure 3.2: The benches in Liberdade Square in Belo Horizonte affording reading (top left), stretching (top right), sitting (bottom left) and lying (bottom right).

Affordances are said to be automatically perceived. Gibson (1979) defines affordances as invariants, as perceptible properties of the environments that are always there, independently of being perceived or not by a certain individual in a specific situation. Windsor (2004) stretches the traditional concept of affordance by asserting that it is not invariant, but *culturally relative as long as sensory information is always perceived in relation to the context available.* Rapoport (1982) similarly argues that environments act as mnemonics (see Chapter Two, section 2.3.2). However, *the perceiver is not a simply decoder, but assumes an active role by adding meanings to the milieu in ways that may challenge the status quo* (Stevens, 2006).

It is thought that *creative users are able to give new meanings to existing milieus by eliciting deeply hidden affordances and using them in ways that enhance the vitality of settings.* For example, the handrail around the bandstand located in the Liberdade Square was primarily designed to protect users from hazards. As expected, a significant number of people tend to use this semi-fixed element as a physical support to lean their bodies

against. However, a creative group of teenagers challenged the status quo by using the handrail as a physical support to engage in risky bodily activities (see Figure 3.3). Thus, just as the creative reader makes a new book through reading, it is said that the creative user makes a new setting by using the milieu in ways not previously imagined. From the preceding discussion, it is suggested that an understanding of user needs and wants matters in the process of designing gathering urban open spaces.

Figure 3.3: The handrail around the bandstand in Liberdade Square affording the performance of risky playful activities (left) and providing protection against hazard (right).

3.4 User needs and urban design qualities

In 1954, Sidney H. Williams (p.112) argued that 'a real improvement of the urban environment must stem from a consideration of all the fundamental human needs'. In order to continue a discussion on this historically persistent topic it is firstly important to analyse *why an understanding of pedestrians needs matters in the process of designing lively urban open spaces.*

Nowadays, it is widely accepted that *people tend to prefer urban open spaces which facilitate the fulfilment of their needs* (Carr *et al.,* 1992; Francis, 2003; Kaplan, 1987; Lang, 2000): 'needs trigger motivations to (...) be in settings that display specific characteristics' (Lang, 2000, p.87). As discussed earlier (see section 3.3), the milieu and expected activities should fit each other well because the greater the perceived level of congruence between those two, the more likely the setting is to be preferred.

Given this background, it is sensible to assert that 'the mix and distribution of needs addressed by a civic place is critical to its character and success' (Childs, 2004, p.50). The most widely used model of human needs appears to be that of Abraham Maslow (1954,1987). In fact, despite being much criticized, it has been the one on to which recent models have been mapped (see, for example, Alfonzo, 2005; Childs, 2004; Lang, 2000).

According to *Maslow's model*, in its most recent form, the *stronger needs take precedent over the weaker* in descending order as follows: 'physiological needs', such as hunger; 'safety needs', such as protection from violence; 'belonging and love needs', which concern membership in a group; 'esteem needs', or desire of an individual to be held in high value by themselves and others; 'self-actualization needs', or desire to fulfil one's total capacities; 'cognition needs', which represent thirst for knowledge; and 'aesthetics needs', which concern the experience of pleasantness for its own sake.

The notion of a hierarchy of needs proposed by Maslow (1954, 1987) has been contested. Childs (2004), for example, advocates that the *fulfilment of basic needs may aid the fulfilment of higher needs and vice-versa*. Likewise, Canter (2004) argues that *the human needs interact and points out that higher needs are always available to people*. It follows that people may fulfil some upper needs despite the unfulfilling of lower ones, as illustrated by the following episode brought to light by Canter (2004, p.51):

> ...one of the persons rescued from the Estonia disaster recalled that they had talked about the beauty of the night when they were shivering in their life rafts.

Although several fundamental human needs are largely met through social and cultural mechanisms, it has been recognized that settings can also help to fulfil some of them (see, for example, Alfonzo, 2005; Childs, 2004; Kaplan and Kaplan, 1989; Lang, 2000). Based on the awareness that lively urban open spaces tend to be the ones which address the needs of their users (Carr *et al.*, 1992; Francis, 2003), the following paragraphs review the most common user needs likely to be satisfied in urban open spaces. In addition, this section discusses how designing for *legibility, visual appropriateness, richness, personalisation, robustness, variety* and *permeability* may offer users of urban open spaces the choice of having their most common needs satisfied.

The *prospect-refuge theory*, developed by Appleton (1988, 1996), postulates that whenever a milieu, natural or man-made, is perceived as providing *opportunity to see and not be seen*, it is likely to be preferred because humans are inclined to choose settings that make successful adaptation more likely (Appleton, 1996; Kaplan and Kaplan, 1989).

According to the *understanding-and-exploration framework* developed by the psychologists Kaplan and Kaplan (1982, 1989), *'understanding' and 'exploration' are pervasive human needs. Understanding* refers to human need to make sense of what is going on around them while *exploration* refers to human desire of expanding their

horizons and finding out what lies ahead. The setting which fulfils our need of *understanding* is *easier to describe and summarize*, while the one that motivates *exploration* is *rich in possibilities* (Kaplan and Kaplan, 1982; Kaplan, 1987). *Settings can be responsive to both understanding and exploration or none of these needs, being all combinations possible* (Kaplan and Kaplan, 1982; Kaplan, 1987).

The *prospect-refuge model clearly overlaps the understanding-and-exploration framework* in that *refuge* stands for *understanding* and the notion of *prospect* for *exploration*. Moreover, both models lead to a conception of human beings as 'animals constantly assessing the possibilities presented to them by environments, and making their choices accordingly' (Kaplan and Kaplan, 1982, p. 88); an implication also suggested by the *concept of affordance* (see section 3.3).

The understanding-and-exploration model asserts that 'coherence' and 'legibility' would make settings understandable, while 'complexity' and 'mystery' would evoke exploration. Coherence concerns how easily a scene hangs together in a relatively small number of components and *legibility* deals with the readability of the visual structure. Legible settings are defined as well-structured visual spaces easy to understand.

Kaplan and Kaplan (1989) point out that their concept of legibility differs from the one forged by Lynch (1960). The notion of legibility introduced by Lynch (1960) is about coherence and structure of the visual space, while the term is adopted by Kaplan and Kaplan (1989) to refer to the most structural (and inferential) aspect of understanding. In few words, Lynch's idea of legibility stands for the notion of understanding developed by the Kaplans.

Thus, designing for legibility contributes towards the generation of recognisable environments which, in turn, are likely to address the user need for understanding. According to the approach to urban design developed by Bentley *et al.* (1985), the five components of urban legibility identified by Lynch (1960) - path, node, edge, district and landmark - can be applied to inform the design of legible urban open spaces. Likewise, it may be argued that *visual appropriateness* also addresses user need for understanding since detailed appearance may help users to understand the choices available within an urban setting (Bentley *et al.*, 1985).

In accordance with the understanding-and-exploration framework, *complexity* is understood in terms of variation of elements contained in a scene, while *mystery*

comprises the promise of new information, arousing curiosity, a mind focused on a variety of possibilities of what may come next. A setting high in mystery is characterized by connections between what is seen and what is anticipated. Mystery encourages one to enter to explore and acquire further information (Kaplan, 1987; Kaplan and Kaplan, 1989). Cullen's (1961, p.51) discussion of 'those aspects of here and there in which here is known but the beyond is unknown' partially overlaps the notion of mystery.

The importance of designing to address the user need for exploration tends to be validated by previous empirical research which has found that the opportunity to experience 'discovery' tends to draw people to public open spaces (Carr *et al.*, 1992). *Discovery*, according to Carr *el al.* (1992, p.134), 'represents the desire for stimulation and the delight we all have in new, pleasurable experiences'. According to this broad definition, it may be argued that *discovery*[2] *overlaps the notion of exploration and prospect.*

From the preceding, it may be said that design for *richness* matters in addressing user need for discovery because whenever a milieu offers choice of noticing a wealth of positive sensory experiences, *the user desire for new positive experiences is likely to be satisfied.* Developing the design for *personalisation* may also contribute towards the generation of urban open spaces which satisfy the users' need for discovery since through temporary transformation of urban open spaces *new opportunities to amusement become available.*

Robustness, quality which affects the degree one could use a milieu for different purposes at short and long term (Bentley *et al.*, 1985), is another urban design quality which addresses the user need for discovery because *changing social activities enable users' interest to endure* (Carr *et al.*, 1992). It may be argued that *variety of uses* have an impact on the delivering of environments responsive to user need of discovery because it contributes to meeting different people. *Permeability* by encouraging freedom to walk about offers opportunities for exploration.

Alongside discovery, the opportunities to experience active forms of engagement, comfort, relaxation and passive forms of interaction have been identified by previous research as important reasons drawing people to public urban open spaces (Carr *et al.*, 1992; Francis, 2003).

[2] In contrast, Francis (2003) distinguishes *discovery* from *fun*: discovery stands for 'opportunities for discovery-based learning and education' (Francis, 2003, p.25), while 'challenge and risk are ingredients of *fun*' (Francis, 2003, p.27).

Active engagement represents direct and dynamic involvement with other people within it or the milieu (Carr *et al.*, 1992; Francis, 2003). According to empirical research by Whyte (1980), although there is not too much mingling in plazas, interesting features or events appear to propel strangers to talk to each other, phenomenon termed 'triangulation'.

In this regard, it may be argued that *richness*, by offering a range of opportunities to experience enjoyable sensory experiences, may facilitate *triangulation* in urban open spaces. Likewise, through *personalisation*, or rather, design solutions likely to motivate people to put their own temporary stamp on them, more intense forms of social interaction may occur since this temporary event may catalyse social mingling.

In parallel to the common need of experiencing more intense forms of social contacts in public open spaces with acquaintances, friends, people that one does not know, and so on, close encounters with elements of the milieu represent another dimension of active engagement (Carr *et al.*, 1992). If it is accepted that high quality multisensory environments, by providing a diversity of pleasant signs, sounds, smells, temperatures and so on, may facilitate the performance of explorative, risky and playful activities, it may be argued that design for achieving richness matters.

Comfort has been considered a basic need in urban open spaces (Carr *et al.*, 1992; Shaftoe, 2008). It has been said that the perceived level of comfort is likely to increase when the milieu either facilitates the effective performance of on-going activity or eliminates (or at least attenuates) the factors that might inhibit it (Alfonzo, 2005; Gehl *et al.*, 2006; Shaftoe, 2008).

Designing for *robustness* may address users' need for comfort because robust spaces are those where different activities are comfortably accommodated. Since a sense of anxiety accompanies disorientation (Lynch, 1960), it may be argued that *legibility* may also enhance one's sense of *psychological comfort* by helping people to feel micro-located.

If is it accepted that the experience of a wealth of pleasant sensory information demands the attenuation, if not elimination, of overwhelming and distracting sensory information, *richness* may also enhance one's sense of comfort.

Previous studies indicate that *passive engagement*, such as people-watching, is another common user need in public open spaces (Carr *et al.*, 1992; Francis, 2003). Passive

interactions, which do not involve either talking or doing anything special, can lead to a sense of *relaxation* (Carr *et al.*, 1992; Francis, 2003).

Relaxation, which differs from *comfort* in that it offers a higher level of release, can be satisfied by just viewing urban open spaces (Carr *et al.*, 1992; Francis, 2003). Some elements of urban settings have been considered stimulants of relaxing experiences, including: (i) people, (ii) interesting features, (iii) compelling views, (iv) fauna, (v) plants, (vi) trees, (vii) flowers, (viii) water, (ix) favourable weather conditions, (x) performers, and (xi) programmed events (Carr *et al.*, 1992; Francis, 2003; Thwaites and Simkins, 2007).

Designing for *richness* may contribute towards the generation of relaxing urban open spaces because the perception of positive sensory information may induce a sense of tranquillity and offer the opportunity to do nothing. Likewise, *robustness*, by sustaining different types of activities, and permeability, by facilitating ambulant activities, may provide opportunity to people-watch, or rather, to relax. Given this background, it may be concluded that some urban design qualities are likely to meet an array of user needs.

Finally, it is important to stress that although the present research assumes that practitioners should strive to manipulate elements of urban design in order to generate milieus responsive to user needs, the same need may be fulfilled by highly distinctive design solutions (Carr *et al.*, 1992). In this regard, some design solutions may facilitate the fulfilment of pedestrian needs better than others while some proposals may even inhibit their satisfaction. In this regards, Mikellides' (2004, p.185) warns:

> *Knowing* about human needs is an important first step, *understanding* these needs a vital second, but evoking and expressing them through their *translation* in built form is a culminant third.

3.5 Conclusion

This chapter and Chapter Two define the theoretical framework of the present research. The key concepts and issues which should be taken into account throughout a multisensory approach to design of urban open spaces responsive to user needs and preferences are:

Elements of urban design. The present research defines *elements of urban design* as those *components of urban settings open to manipulation by practitioners* (Lang, 2000). Through a review of how elements of urban design have been classified by different writers (Lynch 1960; Thiel, 1961; Rapoport, 1977; Stevens, 2006), a framework to inform

the reading of the multisensory structure of urban open spaces was developed (see Table 3.1).

Table 3.1: The elements of urban design according to the conceptual frameworks developed by Lynch (1960), Thiel (1961), Rapoport (1977) and Stevens (2006).

Lynch (1960)	**Thiel (1961)**	**Rapoport (1977)**	**Stevens (2006)**
Paths	Run	Fixed-elements	Paths
Nodes	Area	Semi-fixed elements	Intersections
Landmarks	Surface		Boundaries
Edges	Screen		Props
Districts	Object		Thresholds
	Port		
	Merge		
	End		

Source: the author based on Stevens (2006).

The proposed framework *is not meant to be an end in itself, but an ever evolving template which permits other classifications to be added to it.* In short, it may be described as *composed of a series of interconnected and overlapping categorizations* which are hoped to lead urban designers to consider the multisensory aspects of spaces throughout the process of urban design.

Urban setting and urban space. Urban setting for the purposes of the present research is defined as consisting of a specific multisensory structure, usually referred to as milieu, meanings, and a recurring pattern of behaviour. Thus, a milieu, which also carries meanings, defines a situation within which a regular and expected pattern of activities occurs.

The *concept of urban space differs from urban setting* in that the former can contain many settings simultaneously or may become different settings at different times. The present research accepts that certain multisensory patterns will accommodate some expected activities more comfortably than others.

Affordances are defined as culturally relative environmental properties that when noticed, provide information of what one can do. Thus, the noticing of affordances is dependent on one's needs, wants and physiological capacities. The concept of affordance is important as far as the purposes of this research are concerned because it leads designers to consider the milieu and the individual simultaneously. This research argues that the *milieu and expected activities should fit each other well because greater the perceived level of congruence between those two, more likely the setting is to be preferred.*

User needs. The *prospect-refuge theory* (Appleton, 1988, 1996), postulates that whenever a milieu is perceived as providing *opportunity to see and not be seen*, it is likely to be preferred. The model developed by Appleton overlaps the framework proposed by the Kaplans in that the idea of *refuge* stands for *understanding* and the notion of *prospect* for *exploration.*

The opportunities to experience discovery, comfort, relaxation, passive and active forms of engagement have been identified by previous empirical research as important reasons drawing people to public urban open spaces. In this regard, it is argued that pedestrian needs do not form a hierarchy, but a mosaic, where one does not take precedence over the other.

Although the theoretical discussion in this chapter was not meant to be an exhaustive analysis on how robustness, permeability, personalisation, richness, variety of uses, legibility and visual appropriateness may address the common user needs of comfort, relaxation, discovery, passive and active forms of social interaction, it does suggest that these seven urban design qualities are likely to meet an array of user needs. The following chapter describes a multifaceted methodological model to identify the most common user needs and preferences in any given small-scale urban open space.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

Despite many attempts to enhance the quality of urban life through urban design, considered one important tool in the generation of people-friendly urban open spaces (Isaacs, 2000), the experience of urban environments around the world has still too often exacerbated the need for respite. Central open spaces within large cities, for example, are still commonly characterised by noise, atmospheric pollution and other sorts of intrusive sensory information.

The contemporary condition, therefore, raises issues regarding the effectiveness of some design proposals in contributing towards the generation of well-used urban open spaces, and calls for new approaches to urban design (Isaacs, 2000). In this regard, although recent literature has acknowledged that visual and non-visual sensory aspects should be taken into account in the design of urban environments (see, for example, Bentley *et al.*, 1985; Lynch, 1971; Malnar and Vodvarka, 2004; Pallasma, 2005; Shaftoe, 2008), most theory, practice and teaching of urban design have focused on the visual qualities of spaces.

On top of that, design processes have often been based on the practitioners own intuitions and preferences instead of knowledge of how people interact with urban open spaces. In light of the preceding, the present research aims 'to develop an evidence-based approach to the multisensory design of urban open spaces that are responsive to user needs and preferences' to address the research question:

> What are the theoretical and applied principles necessary for an understanding of the development of an evidence-based approach to multisensory design of urban open spaces that are responsive to user needs and preferences?

This chapter addresses research objective two by developing a methodology to test the theoretical framework, developed in Chapters Two and Three, and to identify the most common user needs and preferences that a socially-responsive multisensory approach to the design of urban open spaces should address. The criteria for selection of the case study sites are introduced in the following section. Next, the sampling techniques applied to choose the participants are discussed. Further, the set of methods for data gathering, the training of the interviewers and observers as well as the procedures followed in the field are described. Next, the overall analytic strategy adopted to analyse the case study evidence is presented as well as the methods used to compile and analyse the data. At the end, a summary of key methodological issues are highlighted.

4.2 Selection of the case study sites

A case study approach was preferred to answer the main research question and achieve the main aim of this investigation because it presents distinct advantages when (i) the study is focused on contemporary events in a context-specific situation, and (ii) the research aims to expand previous developed theories (Yin, 2009). On examination of the advantages of a case study approach, Golledge and Stimson (1997, p.18) highlight:

> ...[it] has potential as a tool to help develop explanation, particularly through the use of repetitive case study studies that confirm or refute verification of postulated explanatory factors.

A negative aspect of multiple case study design is that it is likely to require extensive resources and time (Yin, 2009). Nevertheless, since a multiple case-study design tends to be more robust than an in-depth single case study, it was the preferred study approach (Golledge and Stimson, 1997; Yin 2009). The selection of the case study sites was based on their suitability in providing information for answering the main research question as well as achieving the main aim of this study. Thus, central urban squares were chosen as the main unit of analysis for this research because this typology, by attracting people in greater variety and quantity than other urban squares, represents a potentially enlightening opportunity to explore how the most common human needs and preferences may be met by urban open spaces. In order to have a clearer definition of the main unit of analysis of the present research, this study adopts the following concept:

> [Central] urban squares are public open spaces [located in the city centre] meant for leisure and social mingling, accessible to the population and free of vehicles. (Robba and Macedo, 2003, p. 17).

The choice for investigating central urban squares in Brazil was motivated by the fact that although these spaces have historically been one of the most well-used public urban open spaces in the country (Robba and Macedo, 2003), there is a scarcity of studies focusing on them (see, for example, Alex, 2008; Robba and Macedo, 2003). It follows that by studying these popular public urban open spaces in Brazil, lessons may be learned on how to design urban open spaces for the fulfilment of user needs and preferences.

The preference for studying central urban squares within the city centre of Belo Horizonte, an important metropolis in Brazil, was encouraged by the on-going public efforts to transform its vehicle-dominated inner core into a pedestrian-friendly area as part of an overall strategy to generate more sustainable forms of urban living. The selection of central urban squares within the city of Belo Horizonte means that all case studies share the same macro-scale characteristics.

Alongside the above criteria, the cases would also have to belong to different typologies of central urban squares: 'hard-landscaped urban squares' and 'landscaped urban squares'[1]. The former category includes those urban squares characterized with a predominantly hard surfaced area, resembling plazas in Europe, and the latter includes those urban squares where paved areas and planting tend to be finely balanced.

This condition was applied because if a particular proposition was demonstrated across cases, despite them being sufficiently diverse for comparative analysis, the external generalizability of the research would be greatly expanded (Yin, 2003). Responding to all predefined criteria, as well as time and economic constraints, the following three central urban squares within the city of Belo Horizonte were selected: Liberdade Square and Raul Soares Square, both landscaped central urban squares, and Estação Square, an example of a hard-landscaped central urban square.

Since any space is likely to become different settings at different times (see Chapter Three, section 3.3), this study defined a time boundary in order to include in the investigation only a section of the life cycle of the central urban squares under scrutiny: weekdays during the lunch-time break, between 12.00 and 14.00 o'clock. This time boundary was chosen because it is a period when a large range of everyday static and dynamic pedestrian activity is likely to occur. This study, therefore, focuses on identifying and explaining user needs and preferences in Liberdade Square, Raul Soares Square

[1] The proposed typologies overlap the sub-categories of 'grand public place' proposed by Marcus, Francis and Russel (1990). The hard-landscaped urban square would stand for 'city plaza' and the landscaped urban square would refer to 'city square', described as midway between a plaza and a park.

and Estação Square, central urban squares in Belo Horizonte, during weekdays from 12.00 until 14.00 o'clock.

4.3 Sampling techniques

Non-parametric sampling

Probability and non-probability sampling are the two general ways of constructing a sample, however, if the aim is to generalize research findings from a subset of the population, the sample must be representative[2]. Probability sampling is a mechanism to reduce bias in sample selection, allowing, therefore, a greater generalization to the population from which it was drawn. As suggested by the terminology, in a probability sampling, the probability for the inclusion of any given unit is known (Bryman, 2008; Coolican, 2004; Sommer and Sommer, 2002).

Since pedestrians are a shifting population there is no accessible sampling frame - listing of all units in the population - from which a probability sampling could be constructed. Thus, although in non-probability sampling there is always the possibility of sampling bias and sampling error, it was adopted to select in situ the participants of this research as it is considered the most adequate technique when the sampling frame is unavailable (De Vaus, 2002a, 2002b).

There are three types of non-probability samples: quota, purposive and convenience. From all types of non-probability sampling, the convenience sample, taking what is available to the researcher by virtue of its accessibility, was used because despite it being the least likely of any technique to produce representative samples, it is very useful for exploratory research (Bryman, 2008; De Vaus, 2002a, 2002b). Given that the data collected from convenience sampling does not allow definitive findings to be generated because the data will not be an accurate representation of the population, strategies to enhance its representativeness are thus desirable (De Vaus, 2002a, 2002b; Sommer and Sommer, 2002).

In order to make the convenience samples more representative, steps to approach random selection and reduce bias were pursued by this research. The instruments A and B were applied on different weekdays to include a wide variety of people in the sample.

[2] Coolican (2004) points out that since a truly representative sample is an abstract ideal, statistical generalizations should always be made with caution.

Another procedure followed to diminish the likelihood of socially desirable answers as well as refusals, was the selection of individuals who were by themselves and who did not obviously look in the other direction of the interviewers.

On top of that, randomized procedures were adopted to allow for the self-selection of the participants. Ambulant users were self-selected by stopping at a short distance from the traffic-lights within the case study sites at times when they could be interviewed and stationary users by performing a stationary optional activity at times when they could be approached by an interviewer, who, in turn, was following a pre-determined route in the study area.

Those users performing necessary stationary activities, such as waiting for the bus, selling products, and begging, were not approached by the trained interviewers because their behavioural patterns do not tend to be dependent on the external conditions but on the need to perform a specific task (see Chapter Two, section 2.5). Pedestrians 15 years old or less were also excluded from this research because their behavioural patterns are also usually influenced by other factors rather than the multisensory characteristics of the case study sites, such as by the consent of an older person.

Point sampling

Point sampling is the name given to a technique used to increase the representativeness of the information gathered through behavioural mapping. In point sampling, the observer concentrates on each individual in a group just long enough to record the behaviour s/he was performing when s/he was first seen before going on to observe the next person (Coolican, 2004). As a result, what the users did after they were first seen is not recorded. Any necessary stationary activities, such as waiting for the bus, selling products, and begging, as well as those optional stationary activities performed by users who looked younger than 16 years of age were not recorded for the reasons outlined above.

4.4 Methods of data collection

This section defines the methods adopted by the present research to gather data, discusses the motives that have led to their selection, points out their strengths and weaknesses and discusses the strategies used to minimise their limitations. Issues related to the training of interviewers and observers are also discussed at the end of this section. Multiple methods to data gathering were chosen because different types of evidence are

likely to yield different types of rationale about the topic under scrutiny, extending understanding (Bryman, 2008; Coolican, 2004; Sommer and Sommer, 2002). The methods chosen to gather data are: (i) structured interview in situ, (ii) sketch map produced by respondents, (iii) unstructured observation, and (iv) behavioural mapping, including place-centred mapping and retrospective individual-centred mapping (see Table 4.1).

Table 4.1: The methods of data gathering used to collect evidence in situ.

Methods	Structured interview in situ	Sketch map	Unstructured observation	Place-centred mapping	Individual-centred mapping
Major multisensory urban design characteristics	x	x	x		
Evaluations	x				
Meanings	x				
Optional stationary activities			x	x	
Ambulant stationary activities			x		x
Users profile	x			x	x

Two instruments, type A and type B, were created to obtain qualitative and quantitative data. The instrument type A consists of open and closed questions as well as retrospective individual-centred mapping technique (see Appendix C). It was constructed to assess walking preferences and perceptions from the stand point of ambulant users. The instrument type B is characterised by open and closed questions as well as sketch maps and was developed to gather data on perceptions from the stand point of stationary users (see Appendix C).

Both instruments resemble each other in that they (i) are characterized by open-ended and closed questions, (ii) begin with factual questions as a mean of establishing a good relationship with the participants, (iii) close with routine questions, regarding age, gender and level of education, to enhance rapport with the participants, who would, therefore, know exactly what content would be associated with their identification; and (iv) introduce more thoughtful questions after straightforward preliminary factual questions, when fatigue is unlikely.

Two other methods to gather data were also considered: (i) a walk-by observation, and (ii) semi-structured interview. A *walk-by observation* is a technique which consists in walking

and recording the stationary people observed in situ as well as their locations, activities and postures. Although this method demands less time and resources than place-centred mapping technique, since it can be performed by one observer, it was not used to gather data on stationary behavioural patterns in the central urban squares because the pilot-test showed that the attentive and slow walk of the researcher looked suspicious to some users, causing a reactive effect.

The use of semi-structured interviews to gather data on users' perception of the study areas was also considered since this method is a powerful tool to discuss complex and emotionally loaded issues, such as urban experience, in depth. The flexible structure of semi-structured interviews allows the exploration of topics of interest which emerges throughout the interview process. However, the short period of time usually spent by users in central urban squares during their lunch break did not allow the development of in-depth discussions. Thus, the data gathered by the semi-structured interviews applied in situ are not analysed.

4.4.1 Structured interview

Interviews may be described as a dialogue with a purpose (Sommer and Sommer, 2002). It provides an efficient way of exploring complex feelings, attitudes, beliefs and opinions because it allows the interviewers to pursue half-answered questions and encourage more thorough and detailed responses since they can probe for additional information (Sommer and Sommer, 2002). Interviews also have the advantage of (i) being less likely to be incomplete, (ii) yielding a higher response rate than self-administered questionnaires, and (iii) encouraging the participation of people from a variety of backgrounds because 'people talk more easily than they write' (Gillham, 2000a, p.13).

The structured interview is a type of interview consisting of a set of questions formulated before the interview and asked in a specific order and manner to all respondents (Sommer and Sommer, 2002). The structured interview was selected for use in this research because it (i) allows combining information from several participants contacted by different trained interviewers in different case study sites, and (ii) presents a smaller risk of interviewer bias, when compared with unstructured and semi-structured interviews.

Despite the preceding paragraphs having presented a fairly strong case for applying structured interviews, their negative features were also considered and strategies to minimise some of them were put in place. Focusing on the disadvantages of structured

interviews, this method is (i) time-consuming, (ii) expensive, and (iii) open to bias (Sommer and Sommer, 2002). The awareness that structured interviews are also open to bias motivated a great care in constructing the question format and in training interviewers in order to guarantee the gathering of valid data (Sommer and Sommer, 2002).

A balanced mix of closed and open-ended questions was used. Closed questions, also known as multiple-choice questions, are those that ask interviewees to select among predetermined alternatives provided by the researcher. Two levels of measurement were applied: nominal, to inform categorical information, and ordinal, to provide scores indicating the intensity and direction (for or against) of a person's feelings about an object and event.

To elicit attitudes, five scales were used (e.g. 'very pleasant', 'pleasant', 'indifferent', 'unpleasant', and 'very unpleasant'). However, to simplify the analysis, these categories were frequently combined into fewer broader categories (e.g. 'unpleasant', 'indifferent' and 'pleasant'). Nevertheless, a middle position in scales was always provided in order to respect the respondent's right to have neutral feelings.

Although scales are somewhat unreliable as the results depend on the respondent's mental set at the time of the interview (Appleyard, 1981; Sommer and Sommer, 2002), scales were used because they provide numerical scores that can be used to compare the attitudes with regards to each case study site. Moreover, during the pilot of the instruments type A and type B, it was verified that respondents were able to summarize their feelings quite rapidly, as verified in past research (see, for example, Appleyard, 1981).

Focusing on the disadvantages of using closed-questions, they: (i) strike many respondents as impersonal, mechanical and demeaning because the selection of multiple-choices is perceived as artificial, limited and constraining, and (ii) are more likely to generate socially desirable answers. On examination of the positive features of using closed questions, the analysis of answers given to them is relatively straightforward (Gillham, 2000a, 2000b).

Thus, while closed question format was preferred whenever the answer was a fairly predictable and factual one, open-ended questions, by contrast, were favoured when (i) information on feelings, opinions and values were required, (ii) the researcher wanted to avoid the suggestion of answers to the participant, (iii) the issue under investigation

afforded a too large range of possible answers, (iv) the researcher did not know all the possible answers to the questions.

Several categories of open-ended questions were used: closed questions with an open-ended category (e.g. Other, please specify), open-ended questions to which there was a defined range of possible responses (e.g. What smells have you already perceived in this urban square?), self-coding open questions (e.g. age) and open-ended questions to which there was a wide range of possible answers (e.g. Why, in your opinion, is this place pleasing?). Through the use of open-ended questions, descriptive, locational and evaluative information could be assembled from the interviewees' cognitive maps.

The advantages afforded by open-ended questions are: (i) more realistic information can be gathered in terms of what participants feel, think and value, (ii) real discoveries may emerge through their analysis, (iii) respondents do not feel frustrated by the imposed constraint of closed questions, and (iv) data is obtained on the respondent's own words.

In addition, asking open-ended questions is considered a useful method for determining the salience of an issue because it is assumed that 'in answering an open-ended question, those items that stand out in a person's mind will be mentioned first' (Sommer and Sommer, 2002, p.138). Focusing on the disadvantages in using open-ended questions, their coding is time-consuming and expensive.

Training of the interviewers

The awareness that face-to face interviews are more open to bias than most of the other methods motivated an intense preparation before applying the actual interviews. The researcher's own interviewing training merged practice with thinking. In order to become familiar with the procedure of interviewing and to create an opportunity for some feedback, practice with people unconcerned with the research was performed by the researcher.

This training was helpful in improving the researcher's interviewing skills, but it also served to try out several questions in order to identify those which needed rethinking. This cyclical process prompted the development of the first draft of both instruments, type A and B. As hundreds of people were to be contacted, different interviewers were invited to participate in the data collection phase. Those who accepted the invitation were trained and received a payment per time of field interviewing. The training was conducted in parallel to the piloting of the questions as part of an attempt to generate cost-savings.

The training-piloting was divided into an indoor and outdoor phase. During the indoor phase, the interviewers had the opportunity, in a more tranquil manner, to (i) get familiarised with the instruments type A and type B; (ii) enhance their interviewing skills; and (iii) make suggestions about aspects of the instruments which could be improved. If new items were added throughout the training sessions, the instruments type A and type B were revised and tested in the following one.

Throughout the outdoor phase, the researcher evaluated the performance of each interviewer in the field. This phase was considered to be essential (i) to certify that the respondents with different backgrounds understood the questions and answered them appropriately; and (ii) to identify necessary final adjustments in order to fine-tune the research instruments.

The minor modifications demanded throughout the outdoor training sections, resulted in the revision of the interview schedule and its application in the following training session. After putting the data gathering instruments into its final form, the outdoor training sessions continued in order to certify that the interviews were being delivered in a standardized format by all interviewers.

The standardization of how the interviews were conducted - in terms of both the asking of questions and recording of answers - meant that any variation in responses was due to differences in opinions and not because of the manner the interview was delivered. Thus, this final phase of the training aimed to ensure that the error component, which would have an adverse effect on the validity of the data, was kept to a minimum.

4.4.2 Sketch map

The sketch map is one behavioural research method whose most common use consists of asking people to draw on a blank sheet of paper a map of an area, which can be of small or large environments, indoors or outdoors (Bechtel, 1987; Bell *et al.*,1990, Sommer and Sommer, 2002). Since the early 1960s, the sketch map has been frequently used to elicit information assembled from cognitive maps (see, for example, Appleyard, 1970; Appleyard, Lynch and Meyer, 1964; Canter, 1977; Lynch, 1960, Thwaites and Simkins, 2007).

Focusing on the major limitations of sketch maps, it has been argued that (i) drawing ability and familiarity with cartography may influence the type and level of detail imprinted

in the maps (Bell *et al.*, 1990; Kitchin, 2000), (ii) some maps are not drawn in enough detail to be interpreted (Bechtel, 1987), (iii) only a proportion of the population will be prepared and willing to sketch a map (Canter, 1977; Lynch, 1984), (iv) content, style, and scale may be influenced by paper size (Bell *et al.*, 1990; Kitchin, 2000), (v) resulting drawings are often difficult to compare, score and code (Bell *et al.*, 1990; Kitchin, 2000), and (vi) drawings do not provide evaluative information (Canter, 1977; Sommer and Sommer, 2002).

In addition to the above, it has been argued that sketch maps are incomplete, distorted and simplified environmental representations (Bell *et al.*, 1990; Canter, 1977; Downs and Stea, 1973, 1977; Lang, 1994; Lynch, 1960; Sommer and Sommer, 2002). Graphical representations of cognitive maps contain distortions, omissions, and other errors such as augmentation, known as the addition of features that are not there (Bell *et al.,* 1990; Downs and Stea, 1973, 1977).

The types and degree of errors within graphical representations of cognitive maps tend to vary with familiarity because, the greater the exposure, the greater the accuracy and quantity of information stored in memory tends to be (Bell *et al.,* 1990; Kaplan and Kaplan, 1982).

Focusing on the positive features of sketch maps, it has been said that it is a useful tool for (i) gaining insight into perceptions concerning spatial knowledge (Canter, 1977; Lynch, 1984; Sommer and Sommer, 2002; Thwaites and Simkins, 2007). Despite the limitations of graphic tasks, the piloting phase demonstrated that it was possible to minimize some of its weaknesses.

The strategy of providing an outline map was pursued as part of an attempt to counteract the likelihood of the case study sites having been designed at different scales, resulting in drawings that would be difficult to compare, score and code (Sommer and Sommer, 2002). In addition, as suggested by Lynch (1960), the interviewers took notes of the elements pictured in the outline maps, as they were drawn, in order to minimize the possibility of the graphic representations being misinterpreted.

Finally, the pilot phase demonstrated that an insignificant number of interviewees refused to engage in the act of drawing. Focusing on the critiques that sketch maps are inaccurate representations of our environmental knowledge, it is important to bear in mind that the

selectivity and distortion of sketch maps reveal what is important to the perceiver (Sommer and Sommer, 2002).

Moreover, the awareness that the instructions given to the subject defines the sort of information to be assembled from their cognitive maps impelled the researcher to formulate a question that would propel the participants to provide information on the visual structure of the case study sites (Lynch, 1984).

Finally, in order to counteract the limitation of sketch maps in providing evaluative information about places, this technique was complemented with open-ended questions and five scale which featured the instruments type A and type B (see section 4.4.1).

4.4.3 Unstructured observation

Observation methods can take various forms, all of them involving people watching other people and reporting their behaviour and interactions in a given setting. The main advantage afforded by these methods over other techniques is the opportunity to gain immediate knowledge of the way people behave in environments. A major limitation of observation is that since it deals with behaviours, it is difficult to deduce beliefs, attitudes, or opinions.

Unstructured observation is described by Sommer and Sommer (2002, p. 49) as an 'eye ball inspection of what is happening'. This technique was carried out in an earlier stage of the research to yield necessary information for (i) compiling a provisional list of the behavioural categories to be recorded in the subsequent systematic (or structured) observations sessions, and (ii) developing questions to be asked in the interview phase.

During the unstructured observation sessions, the researcher (i) located herself in discrete vantage points for maximum visibility of the ongoing pedestrian activities, and (ii) recorded static and dynamic activities using field notes, diagrams, and photos. During this period, the researcher acted as a participant observer, using the benches, secondary seating areas, and so on, in the study areas.

The following information was hand-written by the researcher throughout the unstructured observations: (i) where, what time, what date and in which weather conditions the casual observation took place, (ii) descriptions of pedestrian activities within the case study sites, and (iii) personal comments (see Table 4.2).

Table 4.2: Instrument developed to gather data during the unstructured observation sessions.

	Diagrams
Urban square	
Data	
Weekday	
Time	
Weather	
Impressions	**Descriptions**

Photos were discretely taken because visual recording affords further analysis after the event and at a more leisurely pace than is possible in the field. Although it has been pointed out that a limitation of primary data obtained by photography is that the carrying and operation of a camera may influence ongoing behaviour (Sommer and Sommer, 2002), it was not thought to be an issue in this research since all case study sites are well-known touristic attractions in the city.

4.4.4 Behavioural mapping

Behavioural mapping is one means to systematically observe and record information about a large number of people in a given area (Bell *et al.*, 1990). Behavioural maps, by contrast, are charts that illustrate where and what behaviour occurs in a setting (see section 4.7.2). Place-centred maps show how individuals arrange themselves in space in a particular time and individual-centered maps are based on recording the behaviour of individuals over time (Sommer and Sommer, 2002).

The purpose of behavioural mapping is to (i) locate activities in space, (ii) identify types and frequencies of behaviour, as well as (iii) demonstrate their association with a particular physical condition. Although behavioural mapping can produce unexpected and surprising findings without demanding the use of expensive equipments, it can be tiring, intrusive, and time-consuming, while requiring further research to explain the behaviours observed (Sommer and Sommer, 2002).

Individual-centred mapping

Individual-centred mapping technique was used in this study because it links the design features of settings with ambulant behaviour in both time and space. Individual-centred

maps were produced retrospectively by asking ambulant users to represent with a line, in a colourful and sufficiently detailed map (see Appendix B), their route through the urban square in question. The interviewers were allowed to draw the line in accordance with the interviewee's account whenever s/he asked them to do so.

The preparation of the colourful maps of the study areas demanded a series of field visits to check and update the maps provided by the Prefeitura de Belo Horizonte. At the end of this stage, colourful and sufficiently detailed plans of each case study site were prepared. Individual-centred maps were done retrospectively since it is far less time consuming than first-hand observation of users' ambulant behaviour (see section 4.7.2).

Place-centred mapping

Place-centred mapping technique was used in this research because it connects the design features of settings with stationary behaviour in both time and space. Place-centred maps were constructed to study the optional stationary usage of the three case study sites and involved the following steps: (i) preparation of colourful maps of the areas to be directly observed, as described above, (ii) creation of a coding system to minimize the effort required in recording, (iii) definition of a systematic procedure to be followed in the observation sessions, (iv) training of observers, (v) piloting of the instrument until satisfaction, and (vi) data gathering and analysis.

The awareness that observation sessions longer than 20 minutes tire people, compromising the accuracy of the data gathered, impelled the researcher to subdivide the case study sites into 12 smaller spatial unties, each one to be observed by one trained observer. The division of the case studies took into consideration that the size of the areas to be observed as well as the density of users within them do influence the time necessary to record behaviour (Moore and Cosco, 2010). To make the observations more representative, the following measures were employed: (i) the scheduling of the observation sessions on different weekdays, and (ii) the definition of a systematic procedure to be followed in the field, encompassing the employment of point sampling (see section 4.3).

Training of the observers

Observers were intensively trained prior to commencement of the systematic observation sessions. The training, which involved an indoor and outdoor phase, was undertaken in a

relaxed atmosphere where the observers were free to ask questions. During the indoor phase, the photos taken throughout the unstructured observations were used to prepare the various observers to record behaviour in a systematic and reliable manner.

After some tryouts, a check on reliability of the behavioural categories was made and those behavioural categories which did not achieve 90 percent agreement among the observers were dropped from the data analysis because unclear and unreliable observational categories are possible sources of error in systematic observation.

The categories 'senior', 'adult' and 'teenagers' as well as 'observing' and 'contemplating' proved to be unreliable in the check reliability and were dropped. Finally, a coding system, including only those categories which proved reliable, was developed to minimize the effort required in recording observations (see Table 4.3). Once the observers became familiarized with the coding system to be used in the observation session, training sessions in situ were arranged.

Table 4.3: The optional stationary optional activities recorded during the observation sessions and their respective definitions.

	Category	Description
Who	Male	Gender.
	Female	
	Undesirables	Beggars, mendicants, etc.
How	Standing	Postures.
	Sitting	
	Lying	
	Others	
What	Observing	People merely looking towards one fixed direction or different ones.
	Talking	People conversing to each other in a stationary position.
	Dating	Lovers hand in hand, kissing, hugging each other, etc.
	Touching	People performing explorative touch, such as touching a shrub.
	Reading/writing	People writing or reading a book, magazine, sign, etc.
	Photographing	People taking photos.
	Playing	People undertaking playful behaviour such as doing acrobatics and so on.
	Undefined	People with their eyes closed, who may be sleeping, meditating, etc.
	Listening	People listening headphone, radio, etc.
	Others	Other optimal stationary activities.
	Intergenerational	Stationary activities performed by people from different generations.

The outdoor training included explanations and tryouts of the procedures to be followed during the observation sessions to avoid changes in the observational procedures in the middle of the observation sessions (see Figure 4.1). During this phase, the trained observers were instructed about the importance of blending in with the crowd. One extra observer was trained in case someone was unable to fulfil their commitments. Finally, it is important to point out that only the essential information was given to the trained observers to avoid bias.

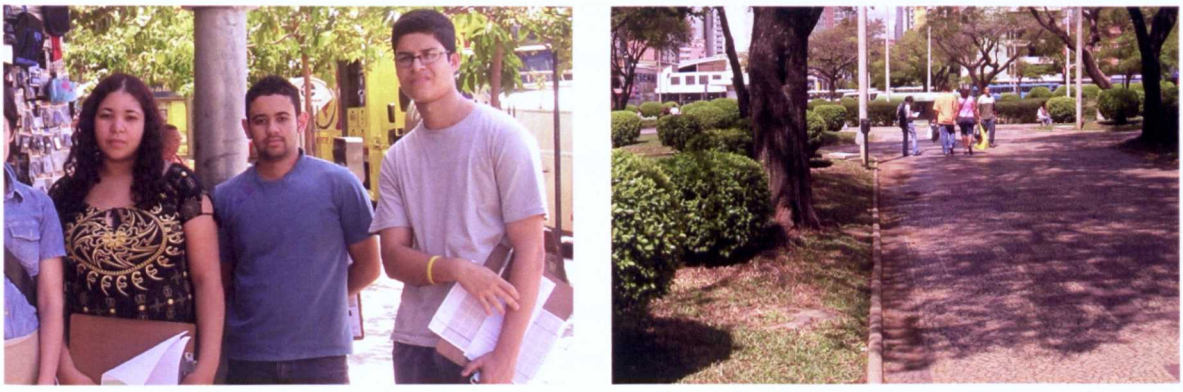


Figure 4.1: A group of trained observers posing for a photo before the commencement of an observation session in Estação Square (left) and one trained observer in action in Raul Soares Square (right).

4.5 Fieldwork

During the process of applying the instruments type A and B, all trained interviewers were told to dress neatly and carry clipboards that would convey the research purposes at a glance (see Figure 4.2). All the interviewers were trained to ask the set of questions in the same order and manner and were instructed to read twice over any question of interest in case of doubts or misunderstandings. Standardized probes were defined to encourage more thorough and detailed open-ended responses.

Figure 4.2: Trained interviewers applying face-to-face structured interviews in Estação Square.

As part of the standardized procedure all interviewers were instructed to: (i) introduce themselves, (ii) explain the research subject, (iii) ensure that the participants rights and welfare, such as confidentiality and anonymity, were protected, and (iv) hand out to all those who agreed to participate, an information sheet where all the relevant pieces of information were written (see Appendix A).

On completion, the trained interviewers were instructed to express appreciation for the person's time and effort. The recording of information gathered in situ was mostly guided

by how it would be used. All answers to open-ended 'what' and 'why' questions were handwritten close to what was spoken in order to speed up the task of classifying them into fixed categories. If the respondent's replies were recorded exactly as spoken, irrelevant information, such as requests for more information and so on, would have been recorded.

In addition, all answers to open-ended 'where' questions were pictured in supplementary maps attached in the instrument because the pilot of the instrument showed that it would be a most effective way of capturing locational data and bringing it into the Geographic Information System (GIS) environment. The gathering of locational information in written form was demonstrated to be (i) time consuming to record and upload into the GIS environment, and (ii) more prone to inaccuracy.

Different coloured pencils were used to relate 'attributive data' to 'locational data' assembled from the users' cognitive maps. More specifically, for those open-ended questions to which there was a defined range of five possible responses, a colour was associated with each of them: blue was the colour connected to the first answer, red was connected to the second, green to the third, black to the forth and yellow to the fifth.

For example, supposing that the following range of five attributive data - 'car', 'voices', 'water', 'barks', and 'footsteps' - were given to the question: 'What are the sounds that you frequently hear in this urban square in a weekday between 12 and 14 o'clock?' According to the procedure defined, the locational data gathered through the answering of the question: 'Where do you usually hear the sound of *'car'* more clearly in this urban square?' would be graphically registered with a blue pencil in the map attached. The answer to the question 'Where do you usually hear *'voices'* more clearly in this urban square?' would be pictured with a red pencil, and so forth.

The sketch maps[3] produced by the interviewees in an outline map attached to the instrument type B were supplemented by handwritten information identifying all fixed and semi-fixed elements drawn. The procedure adopted consisted of (i) asking the question *"what is it?"* whenever a respondent drew a feature, and (ii) recording the answer on an attached paper sheet (see Figure 4.3). This strategy was pursued to (i) avoid misinterpretations of the elements pictured in the sketches, (ii) record the sequence[4] in

[3] The piloting phase revealed that the sketch map was an efficient strategy to gather tangible descriptive information about the space in question.

[4] It is assumed that in answering open-ended questions, those items mentioned first are cognitively more important to the respondent (Sommer and Sommer, 2002).

which the fixed and semi-fixed elements were drawn, and (iii) speed up the coding process, which focused most of the time on the handwritten material.

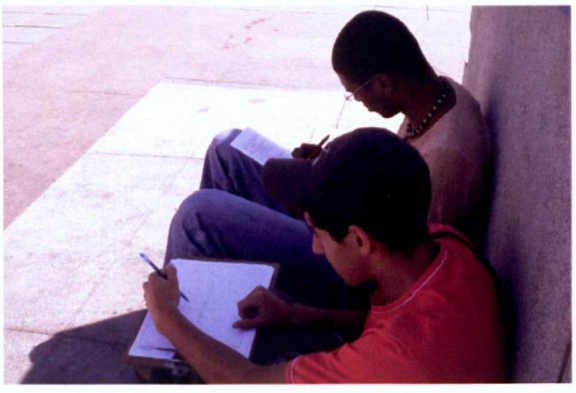


Figure 4.3: A participant sketching the Estação Square during the fieldwork activities while a trained interviewer takes notes of the elements drawn by him.

Although tape and video recording can increase the accuracy of the information gathered, these expensive equipments were not used during the application of the structured interviews because (i) they are likely to incite robberies, a serious issue in central areas of large cities, (ii) several participants could be made uncomfortable by the presence of the recorder, (iii) confidentiality could be compromised, and (iii) it would involve a time-consuming process of transcription.

4.6 An overall analytic strategy for analysing case study evidence

The present investigation started with the development of a rich theoretical framework which identified the key concepts and theories to inform an evidence-based approach to the multisensory design of urban open spaces that are responsive to user needs and preferences (see Chapters Two and Three). Different perspectives were brought together to build the theoretical framework of this study because the use of multiple perspectives to interpret a single set of data is considered an important way of strengthening the research design (Golledge and Stimson, 1997).

Aiming towards 'analytic generalization', 'in which a previously developed theory is used as a template with which to compare the empirical results of the case study' (Yin, 2009, p.38), the findings of the present research are analysed against the theoretical framework (see Chapters Two and Three) and contextual framework (see Chapter Five). In line with the replication logic that characterises multiple case study designs, each study area was used to confirm or refute the verification of the propositions derived from the theoretical

discussion (Yin, 2009). Such 'replications' are potentially powerful in convincing the reader of a general phenomenon.

4.7 Data compilation

4.7.1 Coding

The hand-written answers to open-ended questions were analysed through coding, a '...process by which lengthy answers are reduced and sorted into specific response categories' (Sommer and Sommer, 2002, p.128). In a few words, the coding phase refers to the process of allocating answers into categories. By grouping similar responses, data becomes more manageable and converted to a form suited to statistical analysis (De Vaus, 2002b).

The coding process involved: (i) typing the verbatim hand-written answers; (ii) translating the open-answers in Portuguese to English; (iii) skimming over the material to identify common themes and sub-themes; (iv) developing a coding scheme from the answers gathered; (v) piloting the coding system; and (vi) coding the responses. The data was analysed with the help of the statistical software Statistical Package for the Social Sciences (SPSS) and the tagcrowd web tool[5] was used for better visualisation of the most common themes and subthemes.

The answers given to the self-coding open question "How old are you?" were not further coded because their numeric form made them already suitable for statistical analysis. On the other hand, the responses given to open-ended questions to which there was a range of possible answers demanded the development of multilevel coding schemes. The timetable and budget constraints limited the definition of the maximum number of responses to be analysed.

Although the theoretical framework and the research question guided development of the coding schedules, as additional subthemes emerged during the process of familiarization with the data, they were added to the list. Thus, a dialectic process of deduction and induction characterized the elaboration of the coding schemes. The classification systems took into consideration the need for developing discrete themes as well as mutually exclusive and exhaustive subthemes (De Vaus, 2002a). Hence, a distinctive code for 'missing data' and another one for 'others answers' were always included.

[5] Tagcrowd, created by Daniel Steinbock, generates a word cloud, which is a visualization of word frequency in a given text. For further information, visit the site: http://tagcrowd.com/.

The coding systems developed usually comprised two different levels of detail ranging from level one, composed of broad themes, and level two, which resulted from the subdivision of those themes into subthemes. The coding systems incorporated as few themes and subthemes as possible mainly because the use of a large number of categories was likely to result in a series of virtually unreadable tables and graphs (De Vaus, 2002b).

A piloting test of the coding system was performed to check the reliability of the coding. The piloting involved the training of one volunteer in using the scoring system. The training took place in a relaxed atmosphere where the volunteer (coder) was free to ask questions throughout the training process, which included: (i) explanation of the scoring system, and (ii) practice under the supervision of the researcher.

The check on reliability consisted in verifying whether the rate of agreement between the volunteer and the researcher was more or less than 90%. If it was less than 90%, as recommended by Sommer and Sommer (2002), the coding categories would be revised and reliability would be checked in a new set until satisfactory. Once the categories were created, the multiple answers were coded using the Multiple-Dichotomy Method and Multiple-Response Method. The former method consists of treating each possible answer as a separate variable to which interviewees provide either a 'yes' answer or an implied 'no' answer and the latter approach involves the creation of separate variables to contain the responses provided by an respondent (De Vaus, 2002b).

The Multiple-Dichotomy Method involved (i) creating for each category a separate variable with the values 1 and 0, (ii) coding each interviewee on each of the variables: where the respondent mentioned a specific category, it was coded as 1, otherwise as 0 (De Vaus, 2002b). The general assumption that items that stand out in a person's mind are those mentioned first (Del Rio, 1999; Sommer and Sommer, 2002), impelled the use of the Multiple-Response Method to code multiple responses to an open-ended question.

The Multiple-Response Method consisted of (i) creating variables, such as 'first-mentioned', 'second-mentioned', and so on; (ii) allocating the set of categories developed for each of the variables; (iii) coding the responses into the variables (De Vaus, 2002b). Since every case must have a code for each variable, separate codes for non-responses were defined. Hence, whenever no information was coded to any variable, distinctive codes were allocated to non-responses.

The data for each respondent was entered into the SPSS programme, but before any analysis was performed, the data set was checked for errors. The procedure, although time consuming, is considered essential since some mistakes when entering the data can distort statistical analysis (Pallant, 2007). Once the data file was cleaned, a suitable statistical technique to address the research questions was chosen.

A coding scheme, based on referential aspects, was specially designed to code the smells[6] recalled by the participants. To convert the large number of smells cited to a more manageable form, the responses given by the participants were classified according to olfactory source because, according to Engen (1974), people naturally associate odours with their source and/or situations.

The classes designed to code the sounds mentioned by the participants expanded from the basic classification derived from soundscape studies (Schafer, 1994). Thus, it was also based on referential aspects, or rather, the sounds cited were grouped according to sound origin. The nature of the sub-categories of smells and sounds was used to define their grouping, which is an approach referred to by De Vaus (2002a, 2002b) as 'substantive recoding'.

4.7.2 Maps

Sensory-behavioural maps

Several empirical findings support the assumption that our activities are influenced by our cognitive map (see Chapter Two, section 2.3.1). Thus, if it is accepted that there is a strong congruence between cognitive map and activity, an efficient way to understand pedestrian needs and preferences in central urban squares within large cities would be through the study of the interrelationships between user activity patterns and information assembled from collective cognitive maps.

According to Porteous (1977, p.130) 'image-activity studies are valuable for behaviour prediction...and general design awareness'. Given this background, this research attempts to understand the most common user needs and preferences by empirically

[6] Any smell consists of a mixture of many different chemicals, including the perceiver's own body odours. The 'odoriferous cloud' formed by the vapour continuously thrown off by the smell source can become contaminated by other smells as it is carried by the winds. As human beings inspire this mixture of different chemicals, the olfactory sense enables them to perceive one distinct smell, rather than a series of individual components, and associate it with particular sources and/or situations (McCarthy, 1996; Rodaway, 1994).

studying the interrelationships between urban design characteristics of central urban squares and the perceptions and social behaviours of their users.

The sensory and behavioural data collected during the fieldwork activities were uploaded on to the GIS environment because this software: (i) allows the display of data in an clear manner, (ii) provides information to answer 'where' and 'how many' questions, (iii) reveals hidden trends and distributions by showing relationships between different features, and (iv) allows data to be collated and analysed in a multitude of different ways with flexibility likely to facilitate analysis.

The generation of the sensory as well as behavioural composite thematic diagrams involved the following steps: (i) importing the maps in to digital format (AutoCAD) to GIS environment, (ii) definition of the information to be uploaded in the columns of the attribute table, (iii) data entry using the keyboard, and (iv) checking for data-entry errors. Although sensory and behavioural maps provided valuable information individually, these maps were combined in a multitude of different ways to provide added insights.

Sensory maps

This research proposes a qualitative method to elicit, visualize, and analyse the collective multisensory cognitive structure of the case study sites from the stand point of their users. Structured interviews and sketch maps were the mix of methods adopted to elicit information on the most characteristic and salient multisensory aspects of the study areas. The subdivision of the pedestrian spatial continuum of each case study site into discrete sub-units guided the transfer of the information recorded during the fieldwork activities into the GIS environment.

The sequence-experience notation system developed by Thiel (1961) guided such subdivision (see Chapter Three, section 3.2). In this regard, although the classification proposed by Thiel (1961) relates to visual space, it seemed robust enough to guide the mapping of the non-visual sensory information associated with Liberdade Square, Raul Soares Square and Estação during weekdays from 12.00 until 14.00.

The sub-division of the pedestrian spatial continuum in discrete small spatial unities was preferred to allow their subsequent collapsing into larger categories (see Figure 4.4). Although this procedure caused some of the fine details of the original information to be sacrificed, such inaccuracy was not considered an issue because 'as with any type of

mapping system, there is some level of abstraction' (Amoroso, 2010, p.49). In addition, information assembled from the cognitive maps themselves is likewise intrinsically distorted and imprecise (see Chapter Two, section 2.3.1).

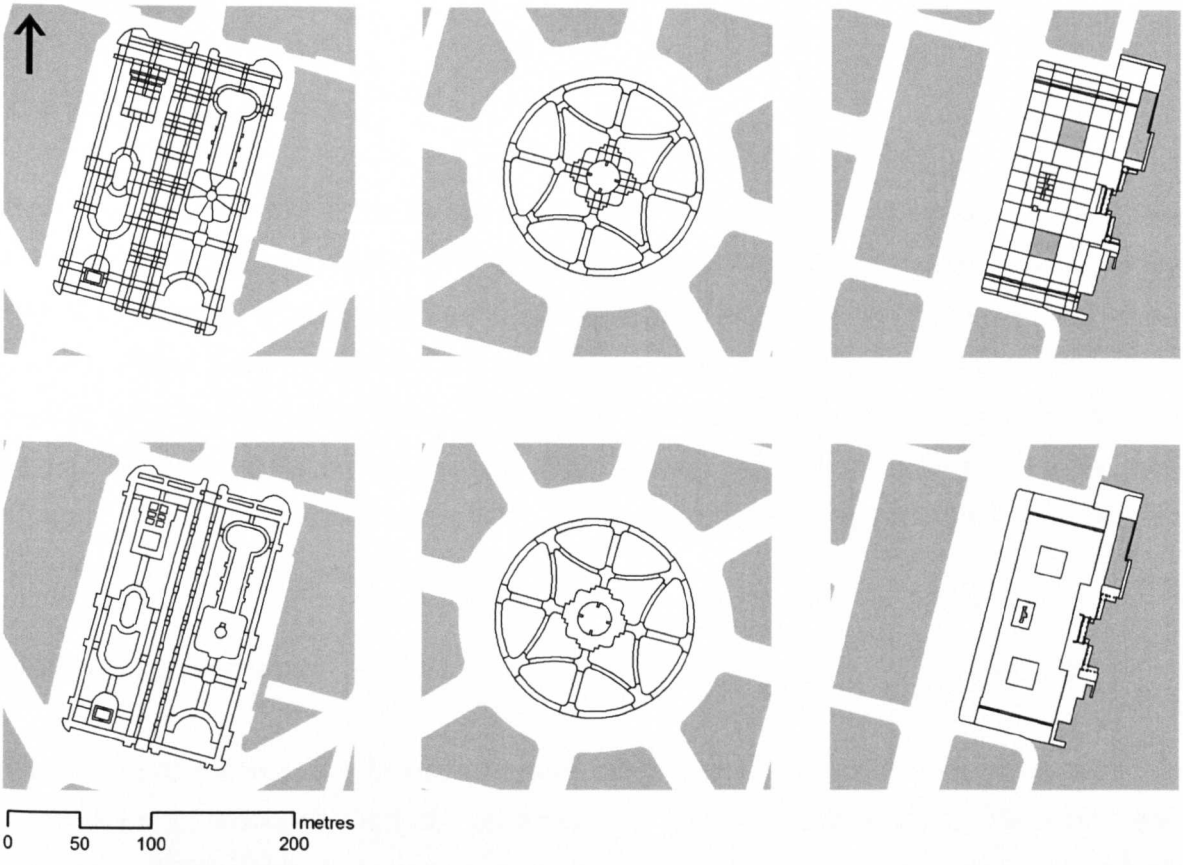


Figure 4.4: The subdivision of the pedestrian spatial continuum of each case study site in as many discrete runs and areas (top) and the subsequent collapsing of the spatial sub-units into larger categories (bottom).

The sensory data gathered in the field were uploaded in GIS environment through the use of a keyboard. By layering information provided by the participants, the perceived multisensory cognitive structure of each case study site was elicited, given a graphical representation and then analysed. The following thematic sensory maps were produced: (i) visualscape, (ii) floorscape, (ii) soundscape, and (iv) smellspace (see Chapter Seven).

The visualscape and floorscape maps indicate those visual and tactile elements that feature the study areas and which matter most to their users, respectively. Choropleth maps were preferred to represent the collective visualscape and floorscape of the study areas because they tend to depict quantitative data properly through a specific color progression (see Chapter Seven).

The soundscape and smellscape maps represent graphically the sonic and olfactory elements which were most often associated with the study areas by their users, respectively. Dot distribution maps were chosen to visualize the collective soundscape

and smellscape of the urban squares under scrutiny because they tend to be an effective way to represent events which do not have well-defined boundaries. Dot distribution maps produced in this research use a dot symbol and each dot represents one mention (see Chapter Seven).

Individual-centred maps

Individual-centered maps are based on recording the behaviour of individuals over time (Sommer and Sommer, 2002). The information gathered with instrument type A on the routes followed by the ambulant users was uploaded into a GIS environment. Individual-centred maps were combined into composite maps to provide information on where people walk in the study areas. Graduated line maps were chosen to visualize the pedestrian traffic in Liberdade Square, Raul Soares Square and Estação Square (see Chapter Six). The thickness of the lines represented in the graduated line maps implies 'flow' (see Chapter Six, section 6.4).

Place-centred maps

Place-centred maps deal with instantaneous cross sections of behaviour and are useful in understanding stationary activity patterns that define urban settings (Sommer and Sommer, 2002). The behavioural data recorded during the structured observation sessions were uploaded into the GIS environment and were combined into thematic composite behavioural maps showing location, density, and usage of each case study site (see Chapter Six).

4.8 Data analysis

4.8.1 Interpretative analysis

A qualitative pursuit based on an inductive reasoning guided the interpretation of the composite thematic maps produced from the data gathered during the fieldwork activities. The reading of the thematic maps attempted to search for what appeared to be significant from the mosaic of graphical information produced, as done by other researchers.

The interpretative analysis of the thematic maps focused on searching for clustering, concentrations, linkages and intensity (see, for example, Thwaites and Simkins, 2007).

The analysis of the composite thematic maps was more a case of theoretically informed interpretation than measurement of factual data.

4.8.2 Statistical analysis

The data statistical analysis was preceded by a process of screening and cleaning the data, which included (i) checking categorical and continuous variables for errors, and (ii) finding and correcting errors in the data file (Pallant, 2007). During the process of checking for errors, frequencies for each variable were checked and out-of-range responses were identified and corrected in order to avoid the distortion of the statistical analyses. Throughout the process, whenever needed, the original data was accessed. Attention was also given both to missing values on individual variables and to the cumulative loss of cases across a set of variables as too much missing data may compromise statistical analysis (De Vaus, 2002b).

Descriptive statistics

Descriptive statistics were conducted to summarize information on perception and use of each case study site and sum up the profile of the respondents.

Inferential statistics

Inferential statistics, also known as tests of significance, were adopted in order to be able to claim confidently that the propositions set out to be tested had been supported by the evidence. These tests are used to deal with the chance fluctuation, known as sampling error or sampling variation, which are inevitable when taking small samples from large populations. In other words, inferential statistics are used to infer something from samples to whole populations from which they were drawn.

The alternative and null hypotheses are central concepts in the process of significance testing. The alternative hypothesis refers to the working hypothesis and may be defined as an assumption that an effect exists, while the null hypothesis, by contrast, is an 'assumption of no effect in the population from which samples are drawn' (Coolican, 2004, p.344). Following a statistical test the null hypothesis is either accepted or rejected. It follows that the acceptance of the propositions (alternative hypothesis) set out to test is dependent on the rejection of the null hypothesis.

A common practice in social sciences is to reject the null hypothesis when the probability of an effect occurring under it is equal or less than 5 in 100 ($p \leq .05$). However, a significant result does not prove anything but rather renders support to the alternative hypothesis and, in turn, to the conceptual framework established by this research. The null hypotheses in this research were tested taking into account the conventional set level of 'alpha' of $p \leq .05$. Nevertheless, it is the actual values of p found that are reported in the result chapters.

As far as the significant testing process is concerned, there is always a risk of researchers reaching wrong conclusions due to the possibility of committing Type 1 error or Type 2 error. The former error refers to the chance of rejecting the null hypothesis when it is, in fact, true. However, according to Pallant (2007), this possibility may be minimised by selecting the appropriate alpha level, with .05 and .01 being the most commonly used levels in social science, and those adopted by this research.

However, there is still the possibility of accepting the null hypothesis when it is, in fact, false, issue referred to as a Type 2 error. Type 2 error is inversely related to Type 1 error. Thus, attempts to control for a Type 1 error increase the likelihood of committing a Type 2 error. In this regards, it has been said that the increase of the sample size may guard against a Type 2 error (Coolican, 2004).

Statistical tests are divided into two different broad classes: parametric and non-parametric. However, the use of parametric tests is conditioned by a series of stringent assumptions. In this regard, parametric approaches assume that: (i) the dependent variable is measured at the interval or ratio level, (ii) scores are obtained from a random sample from the population, (iii) each observation or measurement must not be influenced by any other observation or measurement, (iv) the populations from which the samples are taken are normally distributed, and (v) samples are obtained from populations of equal variances.

When the parametric assumptions are not met, different authors have different opinions about how to proceed. According to Pallant (2007), some statistics writers argue that most of the parametric statistical techniques, regarded as more sensitive in detecting differences amongst groups or relationships, are fairly 'robust' and tolerate minor violations of assumptions, particularly if there is a good sample size.

As far as this research is concerned, the non-parametric statistics versions were preferred because the data (i) did not meet the stringent parametric assumptions, but mostly

because 'non-parametric techniques are ideal for use when you have data that is measured on nominal (categorical) and ordinal (ranked) scales' (Pallant, 2007, p.210), and (ii) meet the non-parametric underlying assumptions of the non-parametric versions: random samples and independent observations.

The choice of the inferential statistics in this research was guided by (i) the nature of the data analysed (categorical, ordinal or continuous), and (ii) the underlying assumptions and requirements of the test in question. Four non-parametric tests were used in this research: Chi-square Test for Independence, Chi-square for goodness of fit, also referred to as the one-sample chi-square, Kruskall-Wallis, also known as the Kruskal-Wallis H Test, and Mann-Whitnney U Test (see Table 4.4). Those results which were not significant are not presented numerically as the significant ones are, but just reported as 'there is no relationship between the variables'. SPSS was the software package adopted for the statistical analysis.

Table 4.4: Non-parametric tests carried out in the present research.

Independent variable	Dependent variable	Non-parametric tests	Objectives	Further assumptions
Categorical	Categorical	Chi-square test for independence	To explore the relationship between two categorical variables.	The lowest expected frequency in any cell should be 5 or more.
Categorical	Categorical	Chi-square for goodness-of-fit	To explore the proportion of cases from a sample and compare these with hypothesised values.	
Categorical	Continuous	Kruskall-Wallis	Similar in nature to Mann-Whitnney U Test, it tests for differences between three or more different groups of people or two sets of data on a continuous measure.	
Categorical	Continuous	Mann-Whitnney U Test	To compare the mean score on some continuous variable when there are two different groups of people or two sets of data.	Data must be at least at ordinal level.

Source: the author based on Pallant (2007).

4.9 Conclusion

This study applies a mix of complementary methods to data gathering because multiple sources of evidence are likely to yield different types of rationale to answer the research questions, satisfy the objectives and test the propositions that emerged from the theoretical discussion in Chapter Two and Three. The selection of methods for data gathering took into account time and budget constraints.

Central urban squares were chosen as the main unit of analysis of this research because it is a typology that tends to attract people in greater variety and quantity than other urban open spaces, and therefore it would represent a potentially enlightening opportunity to explore how the most common pedestrian needs may be fulfilled by urban open spaces and provide data to answer the research question: 'What are the theoretical and applied principles necessary for an understanding of the development of an evidence-based approach to multisensory design of urban open spaces that are responsive to user needs and preferences?' For the purposes of this research, central urban squares are defined as:

> ...public open spaces [located in the city centre of urban agglomerations] meant to leisure and social mingling, accessible to the population and free of vehicles (Robba and Macedo, 2003, p.17).

A set of criteria guided the selection of the case study sites. Responding to all predefined criteria, as well as economic constraints, three cases were selected: Liberdade Square and Raul Soares Square, both urban squares where hardscape and planting are finely balanced, and Estação Square, an urban square whose area is predominantly hard surfaced.

Point-sampling was applied to record stationary activities during the observation sessions and convenience sampling, a type of non-probability sampling, to select the interviewees. In the point sampling what is recorded is what people are doing when the observers first see them and convenience sampling refers to 'taking what you can get' (Sommer and Sommer, 2002, p.239). In order to make the convenience samples more representative, steps to approach random selection and reduce bias were pursued.

The following methods for data collection were adopted: (i) structured interview, (ii) unstructured observation, (iii) people-centred mapping, (iv) retrospective individual-centred mapping and (v) sketch mapping technique. The large mix of data collected was compiled, processed and analysed. The graphical representations were analysed through a theoretically informed interpretation as part of an attempt to arrive at a form of explanation and understanding of user needs and preferences. The quantitative analysis was related to frequencies and non-parametrical statistical tests. Finally, it is important to stress that the method of generalization adopted by this research to interpret the findings is known as analytic generalization. Thus, the results presented in the next chapters should be interpreted as aiming to expand theory and treated as a set of probable assumptions rather than a set of quantitative predictions.

CHAPTER FIVE

THE CONTEXT

5.1 Introduction

This chapter addresses research objective three by contextualizing the three study areas of the present research: Liberdade Square, Raul Soares Square and Estação Square, urban squares located within the central area[1] of the city of Belo Horizonte (see Figure 5.1).

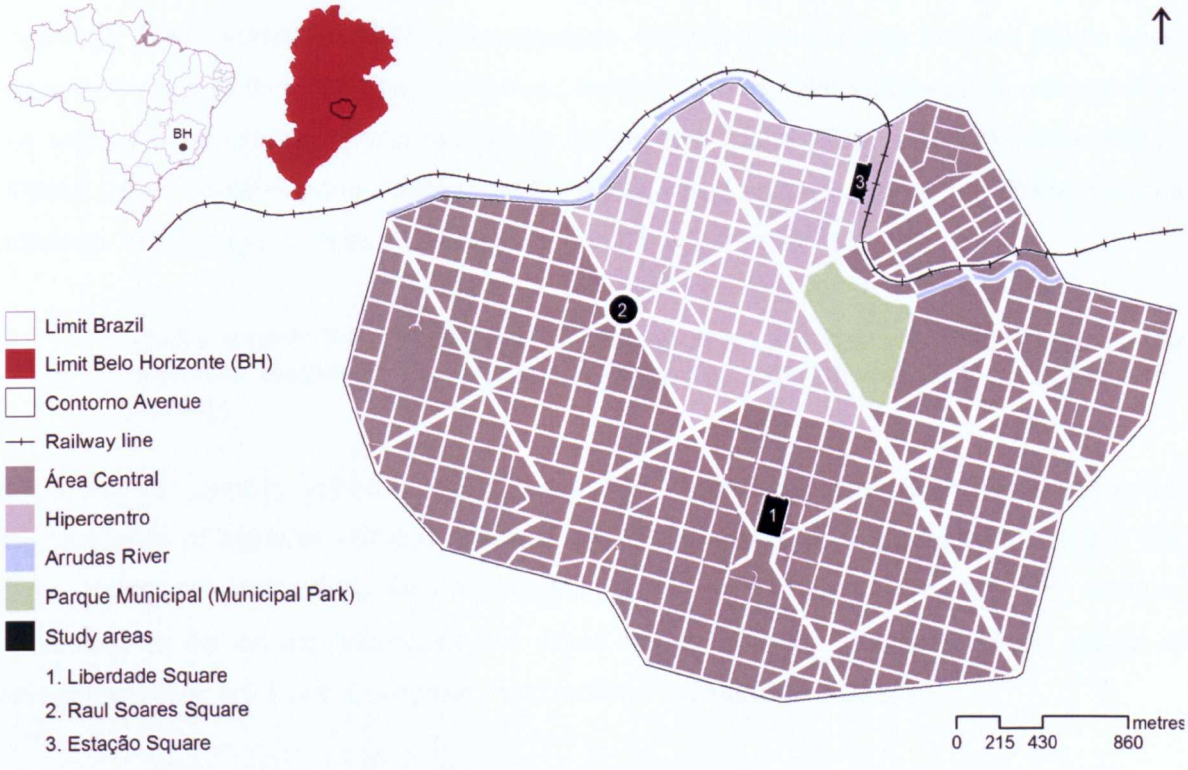


Figure 5.1: Location plan of Liberdade Square, Raul Soares Square and Estação Square in Belo Horizonte.

Source: adapted by the author from drawings provided by Prefeitura de Belo Horizonte (Belo Horizonte Prefecture).

[1] The term 'central area' and 'traditional city centre' will be respectively used in this research to refer to the areas currently named Área Central (Central Area) and Hipercentro (Hypercentre) in the development master plan of the city (Prefeitura de Belo Horizonte, 1996).

Such contextualization is considered fundamental to understand historical, political, social and economic factors shaping current common user needs and preferences in these central urban squares. In this regard, this chapter describes the genesis and development of the central area of the city of Belo Horizonte concomitantly to a general overview of the major changes undergone by central areas of large cities in the context of Brazil from the 19th century until the present.

In addition, the design solutions and the major transformations confronted by Liberdade Square, Raul Soares Square and Estação Square during this period are discussed in parallel to the origin and evolution of central urban squares in Brazil. The contextual framework developed in this chapter as well as the theoretical framework developed in Chapters Two and Three guide the data analysis in Chapters Six, Seven and Eight.

5.2 From 1897 until the 1930s: the genesis

The morphological structure of urban open spaces within the Brazilian colonial cities resembled the European medieval open spaces in that they were shaped by rows of buildings. The colonial Brazilian urban squares, therefore, evolved as treeless public open spaces in front of temples where religious, military, commercial and recreational activities as well as social mingling and circulation would take place (Robba and Macedo, 2003). These urban squares were multifunctional public open spaces shared by different social classes. In this regard, Robba and Macedo (2003, p.22) point out:

> That's where the inhabitants of the colonial city claimed their territory, the believers displayed their faith, the powerful their power, and the poor, their poverty.

From the 19th century until the 1930s, urban interventions in Brazil were mostly informed by principles of hygiene, comfort and embellishment which were in vogue in Europe. Far from being an imposition, the importation of urban models during the 19th century '...proved to be an expression of the urban needs of Latin American elites, eager to strengthen their links with European metropolises' (Almandoz, 2002, p.5).

It was during this period, on December 12th, 1897, that the city of Belo Horizonte, formerly named Cidade de Minas (City of Minas), was established in the valley of the Arrudas River, in an area previously occupied by the colonial village Curral Del Rey (see Figure 5.2).

Source: Salles (n.d.).

Source: Rua do Rosário (189-).

Figure 5.2: The village Curral Del Rey.

Belo Horizonte was designed by the engineer Aarão Reis to be the new capital of the state of Minas Gerais, inaugurating the practice of designing and building new towns in the country (Villaça, 2004) (see Figure 5.3). The transfer of the capital, from the colonial city of Ouro Preto to the new town of Belo Horizonte, was part of a strategy to stimulate economic growth and integration of the State (Maciel, 1998).

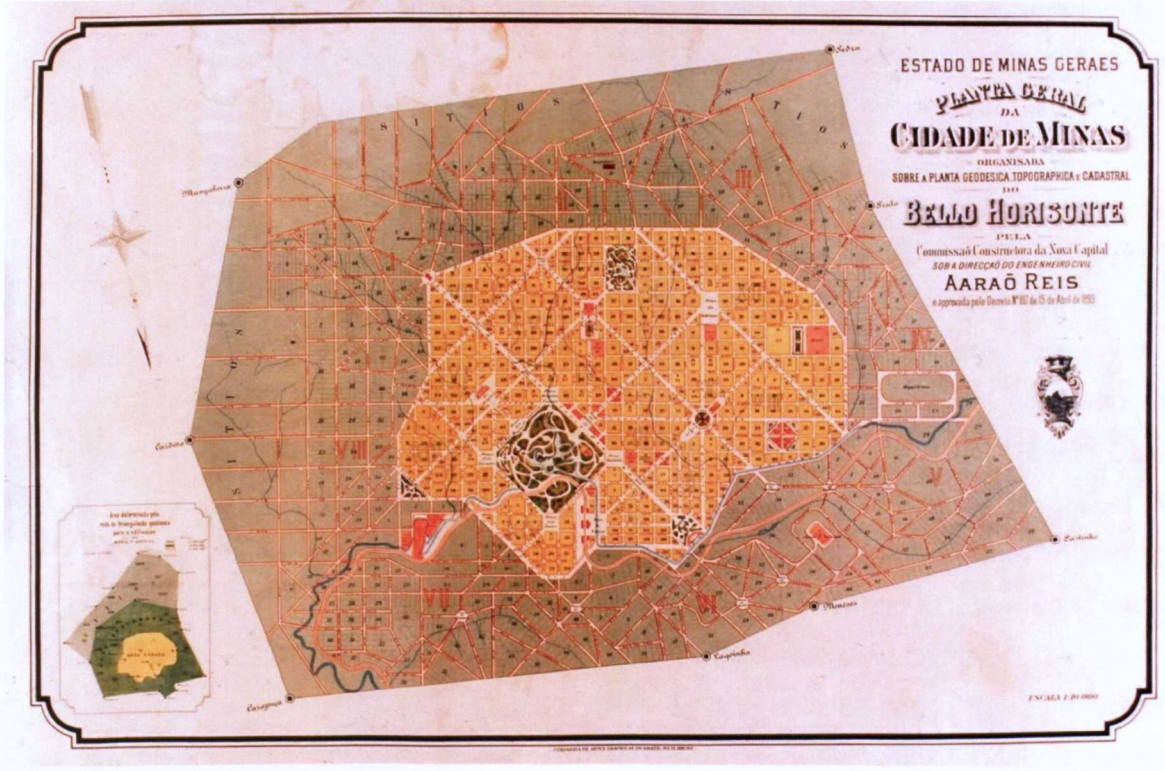


Figure 5.3: The original plan of the city of Belo Horizonte (approved in 1895).
Source: Planta geral Belo Horizonte (1895).

The engineer Aarão Reis proposed the demolition of the colonial village Curral Del Rey in order to give space to the first republican city to be planned and established in Brazil (Robba and Macedo, 2003; Villaça, 2004). Coherent with the spirit of the time, principles

of hygiene, comfort and embellishment informed the design of the new capital (Maciel, 1998; Robba and Macedo, 2003; Villaça, 2004).

The monumental urban designs manifested in Haussmann's Paris (1853-69), Washington DC (1830), and La Plata (1892) inspired Aarão Reis (Maciel, 1998). The original plan of the city of Belo Horizonte, approved in 1895, was characterized by three concentric zones: zona urbana (urban zone), zona suburbana (suburban zone) and the zona rural (rural zone). The zona urbana, currently named Área Central in the Plano Diretor de Belo Horizonte (Development Master Plan of Belo Horizonte) (Prefeitura Municipal de Belo Horizonte, 1996), corresponds to the area limited by the circular Contorno Avenue. This region was conceived as the first area to be occupied. The zona suburbana, which circumscribed the zona urbana, represented the zone of expansion of the new city and the zona rural would constitute Belo Horizonte's greenbelt (Maciel, 1998).

To contrast with the picturesque morphology of the colonial city of Ouro Preto, Aarão Reis proposed a regular grid of orthogonal streets cut by diagonal boulevards in the zona urbana. The boulevards would reinforce the monumental character of the arrangement by defining long perspective views towards great buildings, monuments and landscaped urban squares, located at key intersections. A total of 952,651 m^2 of green public open spaces characterised the original plan of the city of Belo Horizonte (Maciel, 1998).

Rui Barbosa Square, urban open space located in front of the Estação Ferroviária Central (Central Railway Station), was conceived by Aarão Reis to function as the entrance square of the city of Belo Horizonte (Caldeira, 1998). This public urban square, which used to be intercepted longitudinally by the Arrudas River, is limited by the railway line as well as Caetés, Guaicurus and Bahia streets. To traverse the Arrudas River, David Campista Bridge was constructed. While Rui Barbosa Square was situated in one of the lowest regions within the area limited by the Contorno Avenue, Liberdade Square, by contrast, would occupy one of the highest topographical areas within it. Liberdade Square was conceived to be the civic and administrative centre of the new capital of the state of Minas Gerais (Caldeira, 1998). This public urban square, located within the zona urbana in the junction of João Pinheiro, Brasil and Bias Fortes avenues, was intended to function as a kind of 'atrium' of the Palácio da Liberdade (Liberdade Palace), an administrative building symmetrically positioned in relation to the longitudinal axis of the João Pinheiro Avenue.

Although Liberdade Square was originally designed to be the civic and administrative centre of the state of Minas Gerais, the secretaries of the state were scattered within the urban tissue of the city of Belo Horizonte in the 1960s and 1970s, reducing the Liberdade Square to a civic centre (Caldeira, 1998). Recently, some of the listed buildings facing Liberdade Square have undergone internal and external physical changes, some of them highly significant, in order to accommodate the new cultural uses envisaged by the public authorities (see Figure 5.4). Public funds have been directed towards the transformation of the area into a cultural complex: Circuito Cultural Praça da Liberdade (Cultural Circuit Liberdade Square).

Figure 5.4: Some of the listed buildings facing Liberdade Square under refurbishment during the fieldwork activities.

In parallel, a new architectural complex, designed by the architect Oscar Niemeyer, was built in the Northern part of the city of Belo Horizonte to accommodate the administrative state apparatus (2010). Nowadays, some of the buildings that compose the Circuito Cultural Praça da Liberdade are now in use, such as the museums Espaço TIM UFMG do Conhecimento (Knowledge's Space TIM UFMG, 2010) and Museu das Minas e do Metal EBX (Museum of the Mine and of the Metal EBX, 2010), while other buildings are still under refurbishment.

Raul Soares square, formerly known as Praça Quatorze de Setembro (Fourteenth of September Square), was conceived by Aarão Reis as a type of roundabout linking the east and west regions of the city as well as its south and north portions. The fact that Raul Soares Square was established only some decades after the establishment of the city of Belo Horizonte reinforces the idea that in the new towns it is the street grid that defines the location and shape of urban squares and not the rows of buildings, as was the case in the colonial Brazilian cities (Robba and Macedo, 2003).

The origin of the city of Belo Horizonte coincided with the period when the 'landscaped urban square', those characterised by great quantities of greenery, proliferated in Brazil (Robba and Macedo, 2003). This type of urban square emerges in Brazil as a space for strolling, social mingling, and contemplation of the scenery by privileged layers of the population (Andrade, 2007; Robba and Macedo, 2003). Thus, as implied by the above, the landscaped urban square at that time carried behavioural norms in no way similar to those followed in the colonial plaza:

> ... the landscaped square ceased to be ... the stage for secular and religious, civil and military life in the city. The square becomes now the beautiful landscaped setting intended for recreational activities and contemplative leisure, a place for the population to meet and stroll (Robba and Macedo, 2003, p.29).

The first landscaped urban squares implemented in Brazil turned out to be highly influenced by Eclecticism. Robba and Macedo (2003) categorize Eclectic design solutions for urban open spaces in two broad categories: the Romantic and Classical lines. These styles resemble each other in that both are characterized by (i) great quantity of permeable area, (ii) planting of exotic European species, and (iii) picturesque elements (reflecting pools, monuments, fountains, busts). However, the Romantic line differs from the Classical line in that the former is characterized by (i) organic and sinuous lines, (ii) meandering lakes, as well as (iii) paths and trails running through the entire space, and the latter by (i) geometric and symmetric plantings, (ii) axes, and (iii) formal shrubbery and ground cover, placed along the borders of beds and paths (Robba and Macedo, 2003). In tune with the new vision towards city design, Romantic design solutions were implemented in Liberdade Square[2] and Rui Barbosa Square in 1903 and 1906, respectively (see Figure 5.5).

Figure 5.5: The first landscape solution, in Romantic style, implemented in Liberdade Square.
Source: Praça da Liberdade (1905).

[2] The first landscape architectural solution of Liberdade Square was designed by Antônio Nunes de Almeida in collaboration with the landscape architect Paul Villon (Caldeira, 1998).

It was only in the 1920s that the Classical line strongly influenced the process of city building in Belo Horizonte. From the 1920s onwards, the new capital asserted itself as an important administrative, commercial and cultural centre (Caldeira, 1998; Sant'anna, 2008). The visit of the sovereigns of Belgium, King Alberto and Queen Elizabeth, as well as of the President Epitáfio Pessoa in 1920, catalysed several physical transformations within the urban zone, such as the refurbishment of Liberdade Square and Rui Barbosa Square. The design solution implemented in Liberdade Square in 1920 was conceived by Reinaldo Dierberger in congruence with the Classical style (see Figure 5.6).

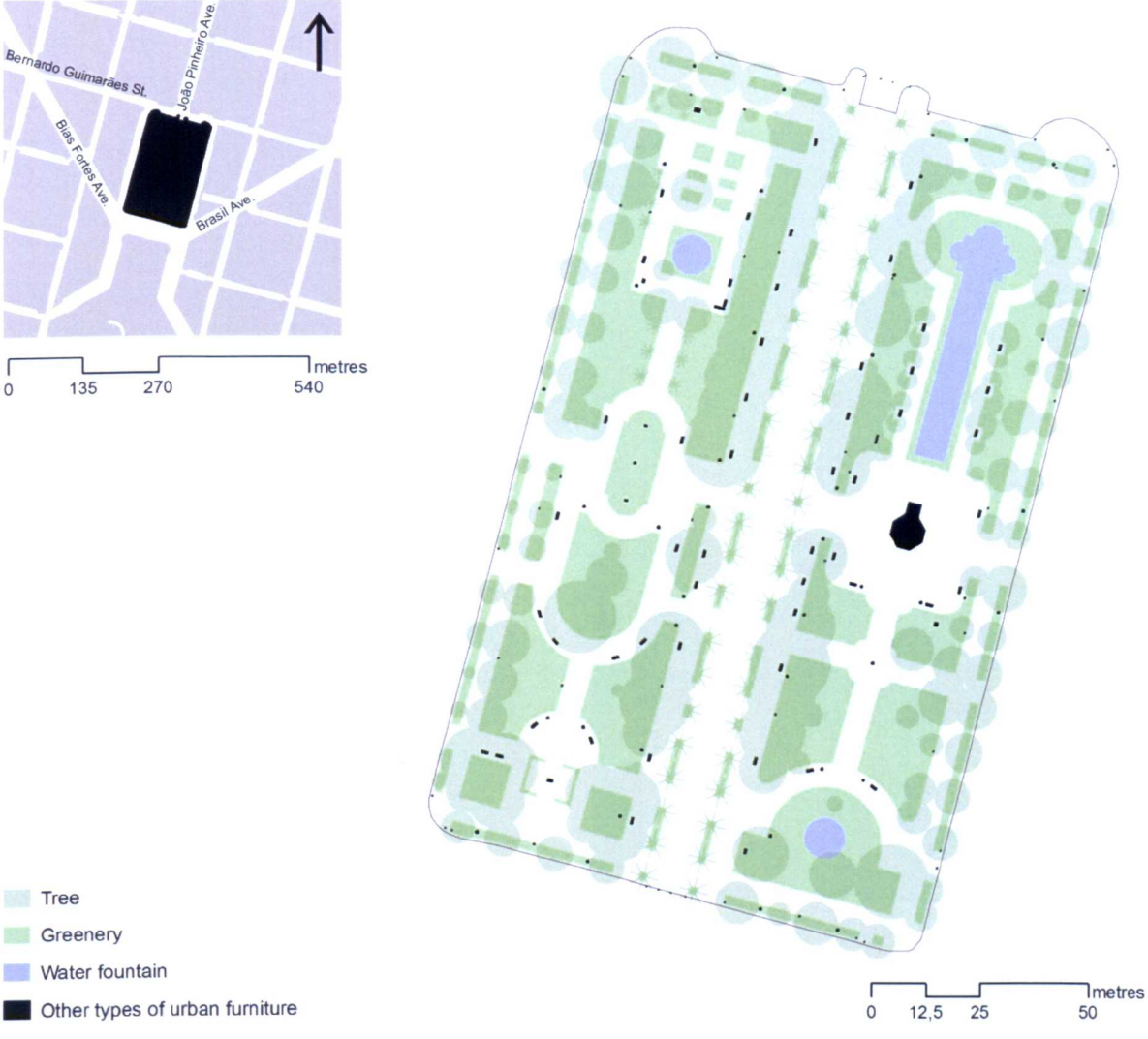


Figure 5.6: Site plan of Liberdade Square (survey in 2007).

Source: adapted by the author from drawings provided by Prefeitura de Belo Horizonte.

One major element which would feature the previous design solution in Romantic style, was preserved in this new proposal: the bandstand located in the east portion of the urban square. The overall structure of the new design solution would be characterised by geometric gardens defining longitudinal central axes and focal monuments, water

fountains and buildings. Reinforcing the monumentality of the composition, other important administrative buildings in Eclectic style were symmetrically disposed in relation to the central alameda of palm trees in the Liberdade Square.

Six years after the refurbishment of Liberdade Square, the western portion of the Rui Barbosa Square, in the area limited by Bahia, Caetés, Guaicurus streets and by the Arrudas River, was also redesigned by Magno de Carvalho in accordance with the Classical style[3]. The refurbishment works included the construction of geometric gardens, two water fountains, two pergolas as well as the installation of eight sculptures: four statues, each representing the spring, winter, autumn and summer seasons, two tigers and two lions (see Figure 5.7).

Figure 5.7: The landscaped portion of Rui Barbosa Square after its restoration.

Continuing the analysis of the evolution of the city of Belo Horizonte, the surroundings of Liberdade Square progressively assumed an elitist character (Villaça, 1998) within the zona urbana. In parallel, in nearby Rui Barbosa Square, an elitist city centre emerged. Although lower-classes, responsible for the construction of the capital, were initially tolerated within the zona urbana of the city of Belo Horizonte, it was always a predominantly elitist zone (Costa, 1994).

[3] The landscaped portion of Rui Barbosa Square was under restoration works during the fieldwork activities.

As the construction of the city continued, the lower classes were gradually re-established in the zona suburbana, while the upper and middle classes would segregate themselves in the zona urbana (Villaça, 1998). In fact, the urban interventions that took place in Brazil during this period were usually used as an excuse to expel the lower income communities from the central areas. It was in this context that the traditional city centre of Belo Horizonte, located in the north portion of the area limited by the Contorno Avenue, emerged as a predominantly elitist area, where the sophisticated commerce, bookstores, coffee shops, cinemas and restaurants would concentrate[4].

In parallel to the genesis and consolidation of the new capital of Minas Gerais, large scale sanitation works and beautification projects transformed the morphology of several colonial cities in Brazil. From 1903 to 1906, for example, the mayor of the city of Rio de Janeiro, Pereira Passos, dedicated himself to the modernization of the city, which included: the expansion of the port, the widening of streets, the tearing down of old colonial houses, the construction of Eclectic public open spaces, as well as the eviction of the poor to the outskirts of the city (Del Rio, 2009; Villaça, 2004).

5.3 From 1930s up to 1980s: towards an efficient city

The implementation of an industrial production model in the country in the 1930s attracted to Brazilian cities a significant contingent of people in search of jobs. Although a significant proportion of urban inhabitants were excluded from the mainstream of urban life, worsening the socio-economic disparities in the country, the cities in Brazil would still represent 'modernity' and 'progress'. During this period, the limits of large cities expansion and growing densities are observed in the central areas of large cities.

It was in this context that modernism gradually became the hegemonic urban model in the country until the 1980s (Del Rio, 2009). The embracing of modernism by Brazil overlaps the consolidation of the industrial production model in the country, a period when urban efficiency became more important than the search for beauty (Del Rio, 2009; Robba and Macedo, 2003).

[4] In this context, a secondary city centre emerged in the Lagoinha, a lower-income neighbourhood located in the zona suburbana, to provide for the demands of the lower-classes. In the 1920s there were more people living outside the area limited by the Contorno Avenue than inside it, and in the 1940s there were still blocks completely empty inside the zona urbana. Thus, the consolidation of the city of Belo Horizonte was from the zona suburbana towards the zona urbana, and not the other way around, as originally intended by Aarão Reis.

The modernity of the new town of Goiânia, designed by the architect and town planner Atílio Corrêa Lima in the early 1930s to be a new industrial centre in the undeveloped interior of Brazil, although still heavily influenced by the garden city movement, definitely pointed towards a new vision towards city building (Del Rio, 2009).

Likewise, some urban open spaces projected in Brazil would be clearly inspired by the modernist forms of expression, such as the gardens of the Ministério da Educação e Saúde (Department of Education and Health) in the city of Rio de Janeiro, designed by Roberto Burle Marx in the 1930s.

According to Robba and Macedo (2003), the modernist projects of public urban open spaces that were developed in Brazil at that time would be characterised by (i) new formal tendencies allowing for organic and/or geometric designs detached from any classical rule of academic composition, and (ii) solutions that would attempt to facilitate the performance of both passive and active forms of engagement, such as sporting activities.

However, in urban squares within city centres or densely occupied areas, the modernist design solutions would tend to facilitate pedestrian circulation and passive forms of engagement (Robba and Macedo, 2003). The modern urban Brazilian squares were characterised by (i) organic, geometric and mixed forms for pavings, paths, beds and reflecting pools, (ii) freedom in the formal composition, (iii) plantings as a three-dimensional element in the configuration of spaces, configuring enclosures and corners, (iv) wide use and appreciation of native and tropical flora, (v) planting ground cover as large carpets, and (vi) icons and signs reflecting national and regional cultures (Robba and Macedo, 2003).

Although modernism was embraced by Brazil in the 1930s, the new vision towards city building was gradually absorbed by designers, or rather, modernist design solutions would be implemented in the country in the same time to urban open spaces whose solutions were, by contrast, highly influenced by the Eclectic style. It was in this transitional period that Raul Soares Square and the gardens of Cassino da Pampulha (Pampulha Casino), currently Museu de Arte da Pampulha (Pampulha Art Museum), were implemented in the city of Belo Horizonte in 1936 and 1942, respectively.

Raul Soares Square was conceived by the architect Érico de Paula as a classic Eclectic circular urban open space of 70 metres of diameter. The geometric centre of Raul Soares Square coincides with the point where the axes of the Bias Fortes, Amazonas, Augusto de

Lima and Olegário Maciel avenues intercept each other (see Figure 5.8). Designed to hold the Second Congresso Eucarístico Nacional (II National Eucharistic Congress) on 3rd September 1936, it is the unique circular urban square within the zona urbana of the city of Belo Horizonte.

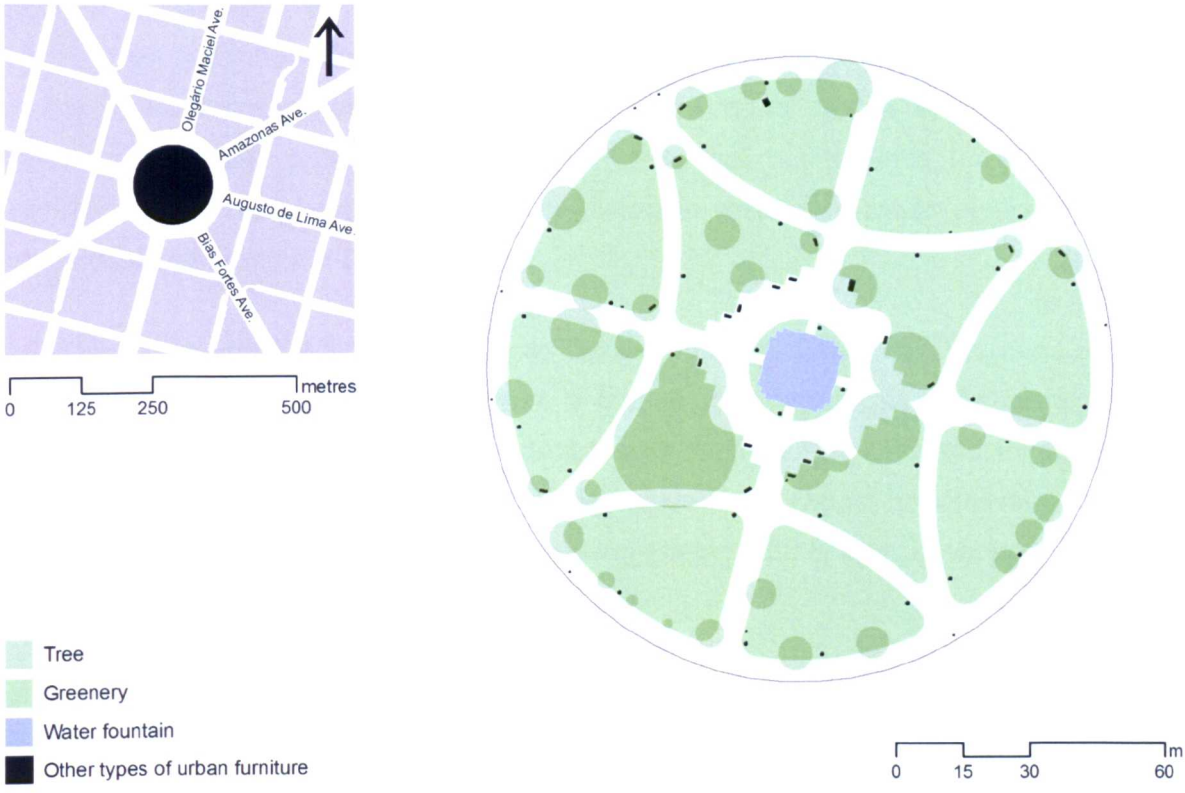


Figure 5.8: Site plan of Raul Soares Square (survey 2007).
Source: adapted by the author from drawings provided by Prefeitura de Belo Horizonte.

This project, whose classical structure has been preserved throughout the years, is characterised by geometric beds defining crosswise paths and a central area dominated by a luminous and sonorous water fountain. This ornamental element is the focal point of the paths within this urban square whose axes are aligned with the axes of Augusto de Lima and Amazonas avenues (see Figure 5.8). All paths that feature in Raul Soares Square are symmetrically disposed and richly decorated with marajoara motives in Portuguese stone, reflecting the national culture.

Continuing the description of the development of the public urban open spaces in the context of Brazil, six years after Raul Soares Square was inaugurated, the gardens of the Pampulha Cassino, designed by Burle Marx in accordance with the modernist principles, were concluded. The design of the gardens was characterised by large carpets of vegetation of various colours, with masses of shrubbery and marsh plants delineating sinuous lines, an organic pond and winding paths in Portuguese stone. Burle Marx

became a well-known Brazilian landscape architect for proposing new forms of expression in line with the modernist artistic tendencies. Nevertheless, from the preceding account, it becomes clear that the modernism coexisted with the eclectic style for some time.

It was during the 1930s and the 1940s that the first sky-scrapers were built in the zona urbana of the capital of Minas Gerais. Gradually, the process of city building became increasingly dependent on modernist models and the skyline of the traditional city centre changed dramatically due to the multiplication of tower blocks in parallel with the demolition of historic buildings in the name of 'progress'. In the 1940s, for example, Raul Soares Square represented the locus of luxurious residential tower blocks within the urban tissue of the city of Belo Horizonte.

In 1950 the governor of the state of Minas Gerais, Jucelino Kubitschek, decided to build in the surroundings of Raul Soares Square a monumental mixed-use tower block, named Conjunto JK (Complex JK). The architect Oscar Niemeyer was invited to design this architectural complex, to be equipped with laundries, cake shops, hairdressers, cinemas, among other facilities as well as a mix of different flats, 1200 in total, of varying prices and typologies.

In the 1940s and 1950s several low rise historic houses in the proximity of Liberdade Square, considered at that time a noble location in which to live, were gradually substituted by residential towers blocks (Caldeira, 1998). The Edifício Niemeyer (Niemeyer Building), concluded in 1954, was the first residential tower block to be constructed adjacent to the square. Designed by the architect Oscar Niemeyer, this tower represented a rupture with the volumetric scale and with the architectural typology of the area. The curved shape of the modernist tower of 12 stories would contrast with both the altimetry of the complex, which tended to be limited to four levels, and the eclectic style of the administrative buildings around it.

From the 1950s until the 1970s, the large cities in Brazil witnessed an unprecedented expansion of their borders (Caetano, 2008; Robba and Macedo, 2003; Villaça, 1998), in parallel with the saturation of their traditional city centres. The growing density in large cities led to the proportion of public open spaces in the urban tissue being reduced (Robba and Macedo, 2003). During this period, vehicular demands guided the structuring of Brazilian cities, transforming central areas of large cities in to vehicle-dominated environments (Del Rio, 2009). It was in this situation, that the quality of urban life in the

central areas of large cities deteriorated significantly and the remaining green areas within them became highly valued by the population at large (Robba and Macedo, 2003).

In the 1950s and the 1960s the population of the city of Belo Horizonte increased significantly (Maciel, 1998), while a steep growth in car traffic within its traditional city centre was observed (Sant'anna, 2008). On top of that, only a portion (26.09%) of the green public open space predetermined in the original plan of the city was implemented (Maciel, 1998), in spite of their potential role in enhancing climatic, sonic and atmospheric urban conditions.

In the 1950s, the on-going physical decline experienced by the traditional city centre of the capital of Minas Gerais, impelled the upper and middle classes to migrate towards the south portion of the area limited by the Contorno Avenue (Sant'anna, 2008). As the elites abandoned the traditional city centre of Belo Horizonte, it gradually became a popular centre (Villaça, 1998).

On tow of the upper and middle classes, a new elitist centre, Savassi, gradually emerged in the south portion of the area limited by the Contorno Avenue (Andrade, 2007; Villaça, 1998). Public funds were directed towards the enhancement of Savassi. Further to this, the city of Belo Horizonte experienced a rapid process of metropolization, which resulted in larger traffic flows of vehicles streaming through it.

In this context, the environmental quality of the traditional city centre declined even more. Car-orientated proposals guided the process of city building in the city of Belo Horizonte at that time. In 1963, for example, the original area of Rui Barbosa Square was severely diminished to allow the duplication of the Andradas Avenue, a proposal which also resulted in the removal of the two pergolas that were features of the square.

On examination of what was going on in the national scene at that period, it was in 1960 that the city of Brasília was inaugurated, representing the climax of '... the country's dreams of modernization, industrialization, and advancement from the agrarian past' (Del Rio, 2009, p.9). Modernism then became strongly consolidated in the Brazilian cultural context and the morphology of the Brazilian cities became even more dependent on the functionality of vehicular circulation and transportation systems.

In the 1970s, nine metropolitan regions were created around the largest Brazilian cities, the Região Metropolitana de Belo Horizonte (Belo Horizonte Metropolitan Region; RMBH)

being one of them. Investments in roadway systems at that time were at the top of the public agenda (Sant'anna, 2008). This policy ended up favouring the emergence of shopping centres and gated communities in the urban fringe of large Brazilian cities (Costa, 1994), accentuating the depopulation of their traditional city centres.

5.4 From 1980s up to now: towards a democratic city

In the 1980s there was a rise in Brazil of different ways of understanding and coping with urban issues, alongside an ecological consciousness. This decade, punctuated by the reestablishment of the democracy and the strengthening of the public forums and community participation, marked the beginning of the post-modern era in the country, a period when democracy became a central issue in city building (Del Rio, 2009). In parallel, new formal languages for the design of urban open spaces, including a more permissive programme of activities, began to emerge in Brazil.

According to Robba and Macedo (2003), this new formal language, termed 'contemporary', includes: (i) decorative collage and irreverence, and (ii) graphic formalism. On examination of their programme of activities, the contemporary proposals (i) focus on pedestrian use and circulation, (ii) include the introduction of commercial and service use, and (iii) attempt to create adaptable spaces to be used in a variety of ways (Robba and Macedo, 2003).

Reflecting the spirit of the time, it was in the 1980s that important recommendations to enhance the pedestrian circulation within the central area of the city of Belo Horizonte were launched by the public authorities (Sant'anna, 2008; Vilela, 2006). The Projeto da Área Central (Central Area Project; PACE), for example, was a specific action created at that time that attempted to contribute towards the physical revival of the central area of Belo Horizonte through physical interventions to optimize both pedestrian and vehicular traffic (Sant'anna, 2008; Vilela, 2006).

In 1999 the Plano da Área Central (Central Area Plan), also named PACE, was created. Some of the physical interventions orchestrated by PACE-99 also aimed to enhance pedestrian accessibility within the central area of the city of Belo Horizonte (Sant'anna, 2008; Vilela, 2006). In 2002, BH-Hipercentro (BH-Hypercentre), a specific action to regenerate the Hipercentro of the city of Belo Horizonte, was launched. BH-Hipercentro attempted to articulate the various proposals and urban projects in development within the

traditional city centre of the capital of Minas Gerais, then, under the supervision of different sectors of the prefecture (Sant'anna, 2008; Vilela, 2006).

From 2004 onwards, the regeneration of the central area of Belo Horizonte has been orchestrated by the Programa Centro Vivo (Alive Centre Programme). This programme has contemplated not only the physical regeneration of the central area of the capital of Minas Gerais, but it has also been concerned with its economic, infrastructural, cultural and safety dimensions. Recent studies have indicated a significant reduction in the criminality within the central area of Belo Horizonte (CDL, 2010; Prefeitura Municipal de Belo Horizonte, 2007) (see Figure 5.9). Although further research to understand this event is needed, the main motives frequently cited to explain it are: (i) the enhancement of the physical appeal of urban open spaces, (ii) effective placement of urban furniture to create barrier-free pavements, (iii) installation of Closed Circuit Tele-Vision (CCTV) at strategic points in the urban fabric to increase surveillance, and (iv) development of specific actions in partnership with different institutions to promote a safe central area (Prefeitura Municipal de Belo Horizonte, 2007).

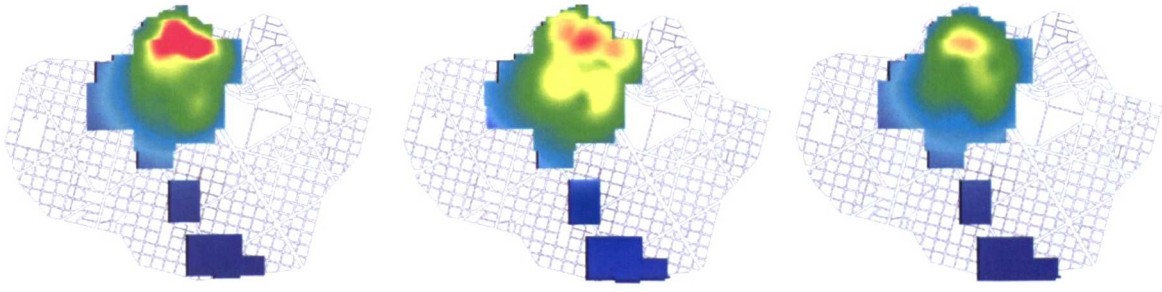


Figure 5.9: Maps indicating frequency of criminal occurrences as well as their spatial distribution in the central area of the city of Belo Horizonte in 2004, 2005 and 2006 (from left to right). The red indicates more than 300 criminal occurrences and the dark blue less than three.

Source: Centro de Estudos de Criminalidade e Segurança Pública, 2002, cited in Prefeitura de Belo Horizonte (2007, p.11).

Up to the present, several urban projects planned by the Programa Centro Vivo have been implemented in the central area of Belo Horizonte, including the refurbishment of the Estação Square (2004) as well as the restoration of both Rui Barbosa Square (2007) and Raul Soares Square[5] (2008). The refurbishment of the Estação Square, developed by Eduardo Beggiato, Edwirges Leal and Flávio Grillo, which used to be a car parking, was clearly inspired by the contemporary forms of expression.

[5] The restoration of Raul Soares Square was the first project of the Orçamento Participativo Digital (Digital Participatory Budget; OP Digital) to be implemented in the city of Belo Horizonte. The OP Digital is a modality of the Orçamento Participativo (Participatory Budget; OP) that allows people to choose, through internet or telephone voting, where public funds are going to be directed within the city. This event, therefore, suggests that the population of Belo Horizonte have demanded high quality public open spaces within the central area of the city.

The creation of a 'hard-landscaped urban square', as opposed to a landscaped urban square, by Beggiato, Leal and Grillo was possibly motivated by the large number of users of public mode of transportation who walk through this urban square in a daily basis as well as by the fact that Estação Square frequently held shows, public celebrations, manifestations, among other large public events. To create a monumental scenic character, rows of monumental lamp-posts were designed alongside the Caetés and Guicurus streets (Beggiato, Leal and Grillo, 2003). An alameda of trees featured with benches, bins and public telephones was also proposed along Caetés and Guiacurus streets (see Figure 5.10).

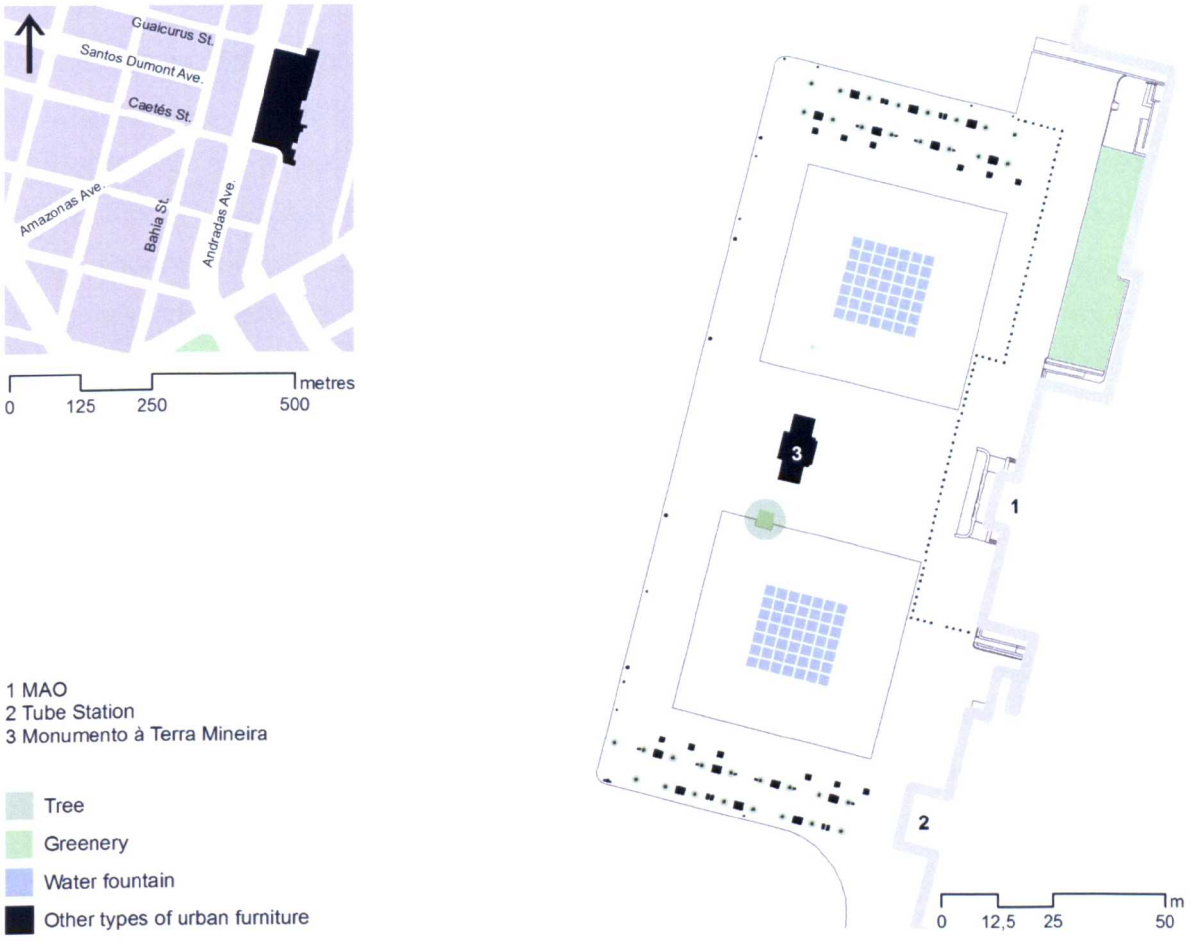


Figure 5.10: Site plan of Estação Square (survey in 2007).

Source: adapted by the author from drawings provided by Prefeitura de Belo Horizonte.

The Museu de Artes e Ofícios (Museum of Arts and Crafts; MAO), a magnificent building in eclectic style, dominates the symmetric composition proposed by the architects (see Figures 5.10 and 5.11). The Monumento à Terra Mineira (Monument to Mineira Land), sculptured by Júlio Staracce and installed in 1930, is a highly visible element as well as the water fountains, symmetrically arranged in relation to the longitudinal axis of the Santos Dumont Avenue (see Figures 5.10 and 5.11).

Figure 5.11: The MAO in eclectic style (left) and the Monumento à Terra Mineira (right) featuring the esplanade of Estação Square.

In accordance with the previous nationwide census conducted by the Instituto Brasileiro de Geografia e Estatística (Brazilian Census Bureau; IBGE, 2000), the city of Belo Horizonte has nowadays approximately 2,232,747 inhabitants distributed in an area of 330.90 Km². The capital of Minas Gerais is today one of the largest cities in Brazil as well as an important economic centre, in which commerce and services (80%) congregate along industrial activities (20%) (Magalhães, 2008). The city is well-known for its year-round agreeable tropical climate, which includes a dry winter and a rainy summer, with an average annual temperature of 21,1°C with small variations between seasons (Prefeitura Municipal de Belo Horizonte, n.d.).

The central area of Belo Horizonte has nowadays approximately 75,620 inhabitants distributed in an area of 8.68 Km² (IBGE, 2000). It is currently a mixed-use economically active area concentrating services as well as commercial, institutional and residential uses. By congregating a complex of hospitals, the most important financial activities, theatres, museums, shopping centres, schools and public institutions, among other urban facilities, the central area of the city of Belo Horizonte attracts a significant contingent of people from the Região Metropolitana de Belo Horizonte[6] (Belo Horizonte Metropolitan Region; RMBH) on a daily basis (Monteiro, 2008).

In this regard, Andrade (2007) points out that the central urban squares within the city of Belo Horizonte have become intensely used by a significant number of people from the other municipalities that compose the RMBH. Listed buildings, monuments and public

[6] In accordance with projections, the RMBH would have in 2009 approximately 4,939,053 inhabitants (IBGE, 2009) distributed in an area of 9,459.10 Km². The cities that currently constitute of the Região Metropolitana de Belo Horizonte are: Belo Horizonte, Betim, Caeté, Contagem, Ibirité, Lagoa Santa, Nova Lima, Pedro Leopoldo, Raposos, Ribeirão das Neves, Rio Acima, Sabará, Santa Luzia, Vespasiano, Mateus Leme, Igarapé, Esmeraldas, Brumadinho, São José da Lapa, Confins, Juatuba, Mário Campos, São Joaquim de Bicas, Sarzedo, Baldim, Capim Branco, Taquaraçu de Minas, Florestal, Itaguara, Matozinhos, Nova União, Jaboticatubas e Itatiaiuçu.

open spaces built at different periods and designed in distinct styles, scales and heights currently punctuate the landscape of the central area of the city of Belo Horizonte (see Figures 5.12, 5.13 and 5.14).

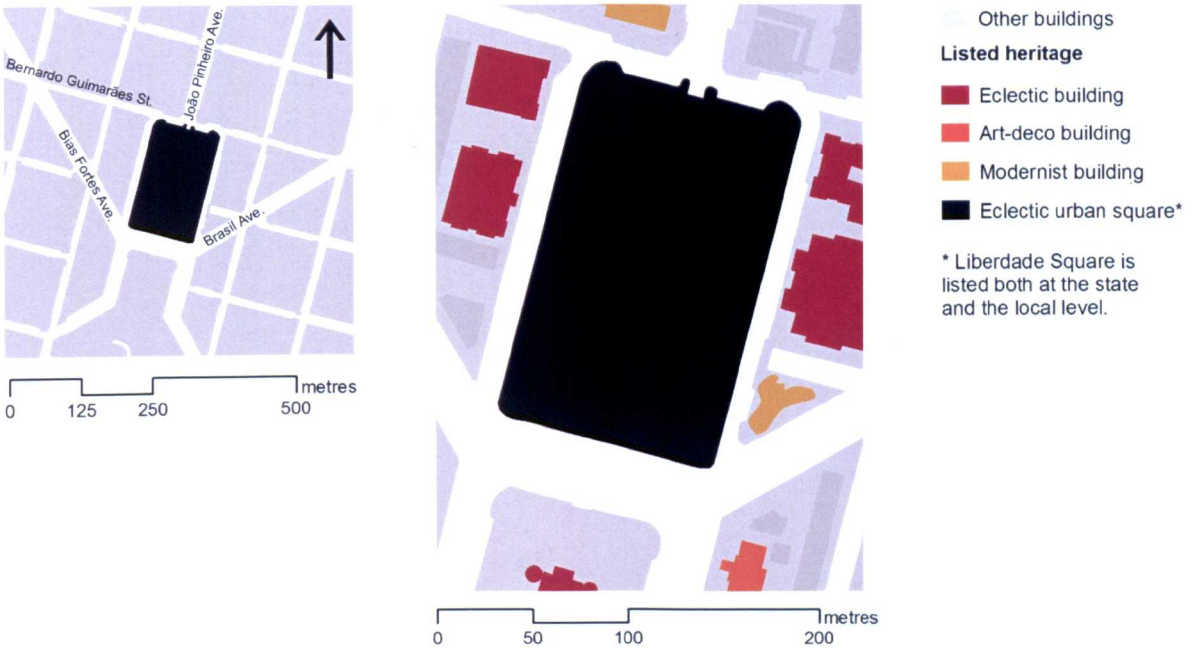


Figure 5.12: Site plan showing listed heritage surrounding Liberdade Square in 2006.
Source: adapted by the author from drawings provided by Prefeitura de Belo Horizonte.

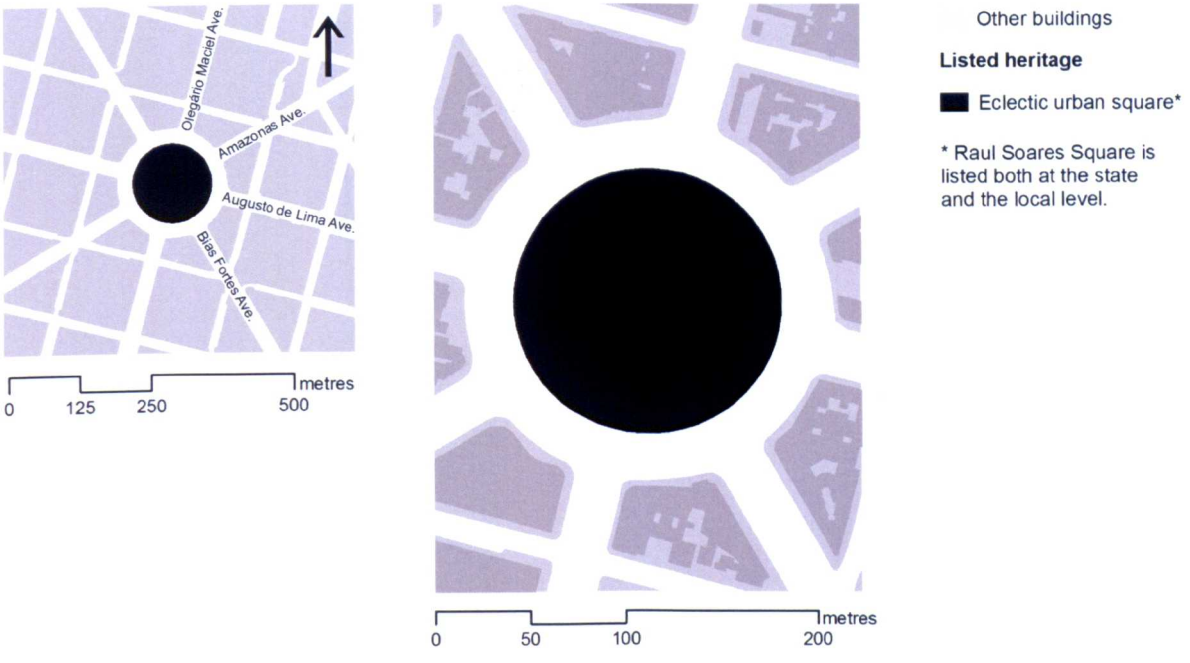


Figure 5.13: Site plan showing listed heritage surrounding Raul Soares Square in 2006.
Source: adapted by the author from drawings provided by Prefeitura de Belo Horizonte.

Despite the physical changes undergone by the zona urbana since the establishment of the city of Belo Horizonte, the classical structures originally proposed to Liberdade

Square, Raul Soares Square and the landscaped portion of Rui Barbosa Square have been preserved in their essence throughout the years. Liberdade Square, Raul Soares Square and the landscaped portion of Rui Barbosa Square are currently listed both at the state and local levels, reflecting their historical and socio-cultural importance to the population (see Figures 5.12, 5.13 and 5.14).

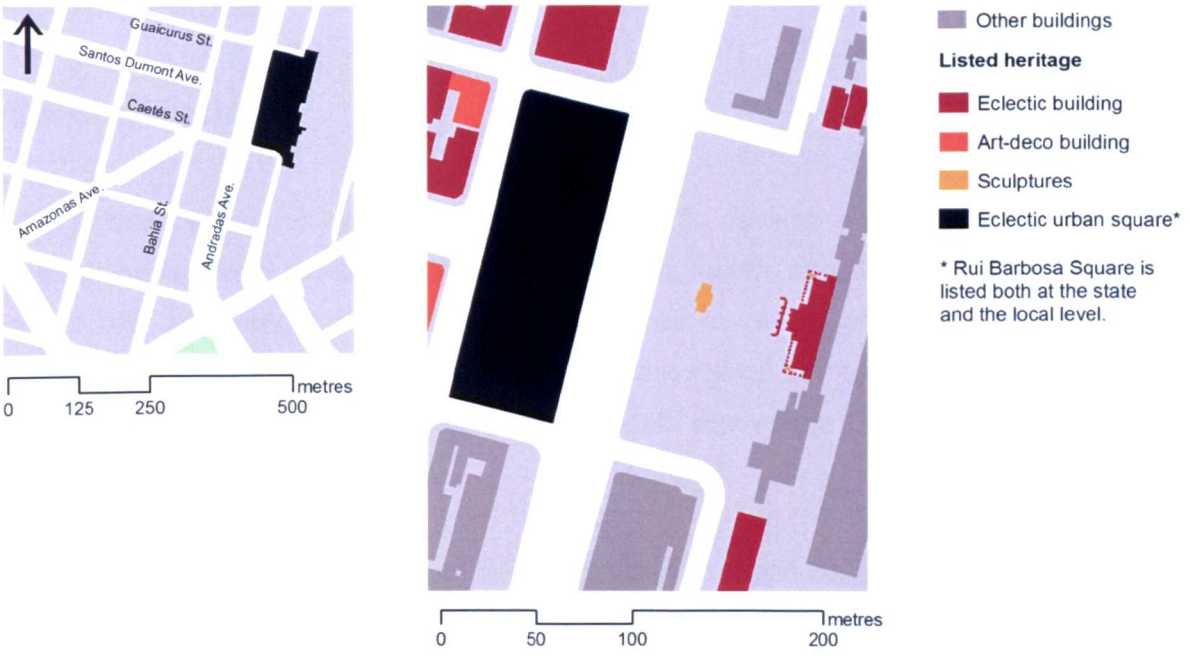


Figure 5.14: Site plan showing listed heritage surrounding Estação Square in 2006.
Source: adapted by the author from drawings provided by Prefeitura de Belo Horizonte.

The visual heterogeneity which characterises the central area of the city of Belo Horizonte as well as the variety of uses within it reflect the dramatic changes undergone by the capital of Minas Gerais since its establishment. Although the appearance of the central area of the city of Belo Horizonte as a whole is highly varied, the tower block typology predominates (see Figure 5.15).

Figure 5.15: The tower block typology predominates in the central area of the city of Belo Horizonte.
Source: Centro Sul / Vista aérea (n.d.) Source: Parque Municipal / Vista aérea (n.d.)

Finally, it is important to point out that even though PACE, PACE-99, BH-Hipercentro, Programa Centro Vivo and Plano Diretor de Belo Horizonte have altogether attempted to enhance the quality of the urban experience within the central area of Belo Horizonte, this region is still commonly characterised by intense volume of vehicles, mostly private automobiles, saturation of the infra-structure and high levels of visual, sonic and atmospheric pollution.

5.5 Conclusion

This chapter addresses research objective three: 'To develop a contextual framework to understand historical, political, social and economic factors shaping current common user needs and preferences in central urban squares in Belo Horizonte'. The contextual framework developed in this chapter as well as theoretical framework (see Chapters Two and Three) of the present research guide the data analysis in Chapters Six, Seven and Eight.

Public open urban spaces in the context of Brazil have been confronted by several forces that have conditioned their use as well as their design solutions (see Table 5.1). Nowadays, sound policies concerning the creation and maintenance of public open spaces, alongside the implementation of effective design solutions have been highly appreciated by the Brazilian urban population.

Table 5.1: Evolution of central urban squares in Brazil.

PERIOD	STYLE	VISION		SOCIAL USE
Before 1987	Colonial	European city		Democratic
From 1987 until the 1930s	Eclectic	Beautiful city		Elitist
From 1930s until 1980s	Modernist	Efficient city	(car-driven)	Popular
From 1980s up to now	Contemporary	Democratic city	(pedestrian-driven)	

Source: the author based on Robba and Macedo (2003) and Del Rio (2009).

However, despite the many strategies to regenerate existing urban centres in Brazil, central urban open spaces within large cities in the country, identified as fundamental spaces for socialization (Alex, 2008; Del Rio, 2009; Robba and Macedo, 2003), have still too often exacerbated the need for respite. For example, even though PACE, PACE-99, BH-Hipercentro, Programa Centro Vivo and Plano Diretor de Belo Horizonte have attempted to regenerate the central area of the capital of Minas Gerais, this space is still characterised by high levels of visual, sonic and atmospheric pollution, congestion and so on.

The contemporary condition, therefore, raises issues regarding the effectiveness of some design proposals in contributing towards the generation of people-friendly urban open spaces and calls for new approaches to urban design. From the above, it may be said that there is a pressing need to better understand the role played by design in the generation of people-friendly urban open spaces.

In this regard, it is important to bear in mind that design is now considered a key tool in the generation of socially-responsive urban open spaces since it does influence on how people will choose to spend time in a space, and on their attitude toward it (Isaacs, 2000).

Based on the context discussed above, the present research attempts to demonstrate that an approach to urban design which takes into account the multisensory aspects of urban open spaces, alongside user needs and wants, is feasible and holds the promise of guiding best practice in the generation of urban open spaces likely to attract and retain people within them. In light of the theoretical (see Chapters Two and Three) and contextual framework of the present research, demographic and behavioural data gathered through structured interviews, unstructured observations and behavioural mapping techniques are analysed in the next chapter to address the research objective four.

CHAPTER SIX

USERS AND ACTIVITIES

6.1 Introduction

This chapter describes social patterns in Liberdade Square, Raul Soares Square and Estação Square during weekdays from 12.00 until 14.00. Information on users' perceptions, preferences and attitudes towards the study areas are investigated in Chapters Seven and Eight. The importance of these analyses are based on the assumption that an effective way to understand common user needs and preferences in urban open spaces is by empirically studying the interrelationships between urban design characteristics, behaviours and perceptions of the users (Francis, 2003; Mehta, 2009). The results in this chapter refer to research objective four: 'To use the methodology in light of the contextual framework to identify and explain user needs and preferences in central urban squares in Belo Horizonte'. Demographic and behavioural data obtained with the instruments type A and type B (see Chapter Four, section 4.4), unstructured observations (see Chapter Four, section 4.4.3) and behavioural mapping techniques (see Chapter Four, section 4.4.4) are examined in this chapter with the help of the statistical software SPSS and the GIS-supported software ArcView.

6.2 Users

6.2.1 Teenagers, young adults, adults and seniors users

To identify who are the current users of Liberdade Square, Raul Soares Square and Estação Square, demographic data obtained with the instruments type A and type B (see Chapter Four, section 4.4) are used in this section to describe the age groups of those people likely to carry out optional stationary and ambulant activities in Liberdade Square, Raul Soares Square and Estação Square during weekdays from 12.00 until 14.00. This

research adopts the age groups classification proposed by Thiel (1997, cited in Portella, 2007), who categorized people from 0 to 4 as within the babies group, 5 to 12 as within the children group, 13 to 17 as within the teenagers group, 18 to 29 as within the young adults group, 30 to 65 as within the adults group, and more than 65 as within the seniors group. Babies, children and teenagers 15 years old or less were excluded from the present research.

The quantitative analysis of data obtained from instrument type B shows that the *age distribution of users performing optional stationary activities was rather wide* in all study areas, varying from 16 to 74 years in Liberdade Square (mean of 31.34 years), 16 to 73 years in Raul Soares Square (mean of 33.91 years), and 16 to 68 years in Estação Square (mean of 31.48 years) (see Appendix C). Figure 6.1 shows that about *90% of users in the current samples were young adults and adults aged 18-65*, while teenagers in the ranges of 16-17 and seniors were minorities.

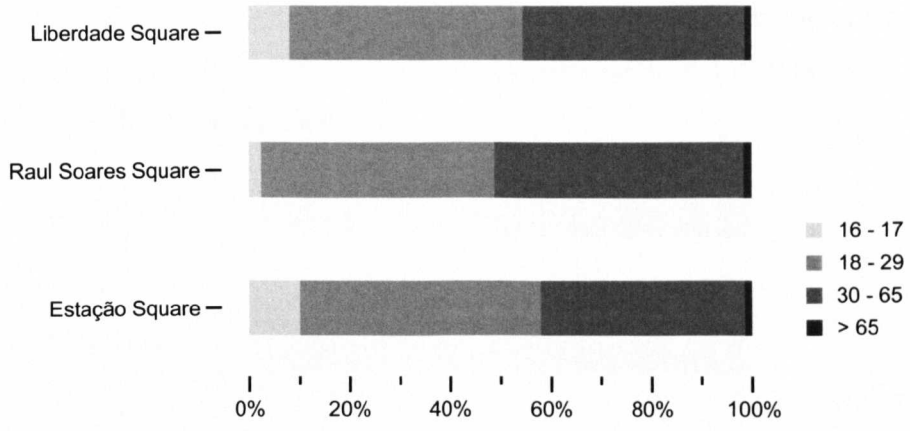


Figure 6.1: Age groups of stationary users in the current samples.
Source: instrument type B, fieldwork 2007.

Chi-square for goodness-of-fit tests indicate there was a significant statistical difference in the proportion of stationary users within the categories (i) teenagers in the ranges of 16-17 identified in Estação Square (10%), (ii) young adults identified in Liberdade Square (47.9%), Raul Soares Square (46.4%), and Estação Square (46.3%), (iii) adults in Liberdade Square (44.3%) and Estação Square (40.7%), and, finally, (iv) seniors in Liberdade Square (1.3%), Raul Soares Square (1.6%) and Estação Square (1.4%), when compared with the values of 5.7%, 33.1%, 54.6% and 6.6%, that reflect, respectively, the percentages of teenagers in the ranges of 16-17, young adults, adults and seniors

residents in the RMBH[1], values obtained in the last nationwide census (IBGE, 2000) (see Table 6.1).

Table 6.1: Proportion of stationary users within the categories of teenagers in the ranges of 16-17, young adults, adults and seniors, when compared with the values of 5.67%, 33.15%, 54.61% and 6.57%, respectively, which were obtained in a previous census of the RMBH (2000).

	Case studies		
	Liberdade Square	Raul Soares Square	Estação Square
Teenagers	none	none	p=.028
Young adults	p=.001	p=.002	p=.001
Adults	p=.012	none	p=.001
Seniors	p=.010	p=.024	p=.014

Source: instrument type B, fieldwork 2007.

The quantitative analysis of data obtained from the instrument type A shows that the *age range of ambulant users in the current samples was also rather wide*, varying from 16 to 77 years in Liberdade Square (mean of 32.50 years), 16 to 71 years in Raul Soares Square (mean of 32.91 years), and 16 to 70 years in Estação Square (mean of 35.61 years). Figure 6.2 shows that the *large majority of ambulant users in the current samples were young adults and adults aged 18-65*, while teenagers in the ranges of 16-17 and seniors were minorities (see Appendix C).

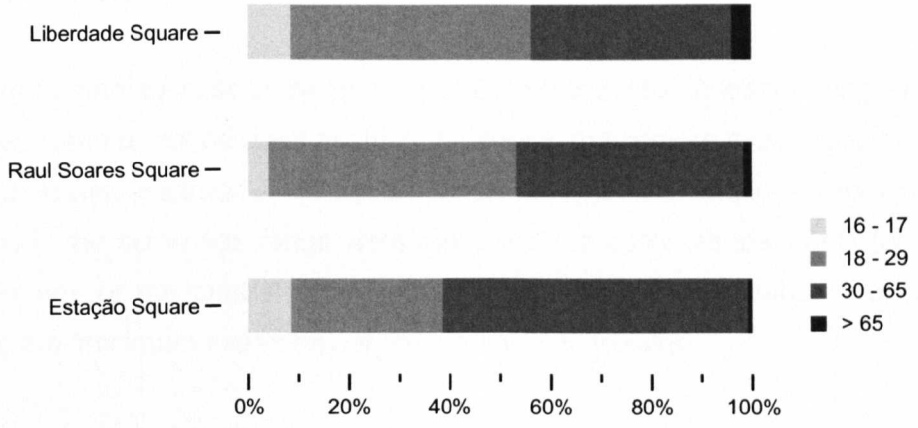


Figure 6.2: Age groups of ambulant users in the current samples.

Source: instrument type A, fieldwork 2007.

Chi-square for goodness-of-fit tests indicate there was a significant statistical difference in the proportion of ambulant users within the categories (i) young adults identified in Liberdade Square (47.7%) and Raul Soares Square (49.2%), (ii) adults in Liberdade Square (40.0%) and Raul Soares Square (45.2%), and, finally, (iii) seniors in Raul Soares

[1] This research assumes that central urban squares in the context of Belo Horizonte become metropolitan urban squares, or rather, gathering public open spaces routinely used by residents of the RMBH who depend on the central area of the capital of Minas Gerais to perform their daily leisure activities (see Chapter Five, section 5.4).

Square (1.6%) and Estação Square (0.8 %), when compared with the values of 33.1%, 54.6% and 6.6%, that reflect, respectively, the percentages of young adults, adults and seniors residents in the RMBH, values obtained in the last nationwide census (2000) (see Table 6.2). No significant statistical difference was identified in the proportion of ambulant users within the category teenagers in the range of 16-17.

Table 6.2: Proportion of ambulant users within the categories of teenagers in the ranges of 16-17 young adults, adults and seniors, when compared with the values of 5.67%, 33.15%, 54.61% and 6.57%, respectively, which were obtained in a previous census of the RMBH (2000).

	Case studies		
	Liberdade Square	Raul Soares Square	Estação Square
Teenagers	none	none	none
Young adults	p=.001	p=.001	none
Adults	p=.001	p=.035	none
Seniors	none	p=.023	p=.007

Source: instrument type A, fieldwork 2007.

These findings show that *different central urban squares offer different degrees of choices and opportunities to people in different age groups to carry out stationary and ambulant activities*. However, it is interesting to note that *with the increase of age, people are less likely to carry out stationary and ambulant activities within central urban squares* in the context of Belo Horizonte.

Thus, *central urban squares* in the context of Belo Horizonte, at least during weekdays at lunch breaks, *tend to not be used as much by adults and seniors as they are by teenagers and young adults*. Pearson's chi-square analysis was not employed to test whether pedestrians in the same age range were more likely to carry out stationary (or ambulant) activities in any of the central urban squares under scrutiny because the assumption concerning the 'minimum expected cell frequency' was violated.

6.2.2 Educational differences among users

Demographic data obtained with the instruments type A and type B (see Chapter Four, section 4.4) are used in this section to describe the educational level of those people likely to carry out optional stationary and ambulant activities in Liberdade Square, Raul Soares Square and Estação Square during weekdays from 12.00 until 14.00. The quantitative analysis of data obtained from the instrument type B shows that the *educational level of the stationary users in the current samples is generally medium* with about 46-56% in all study areas possessing a second degree (see Figure 6.3). The percentages of stationary

users 25 years old[2] (or more) who possessed a university degree (or a higher qualification) in Liberdade Square, Raul Soares Square and Estação Square were 39.1%, 5.95% and 6.33%, respectively (see Appendix C).

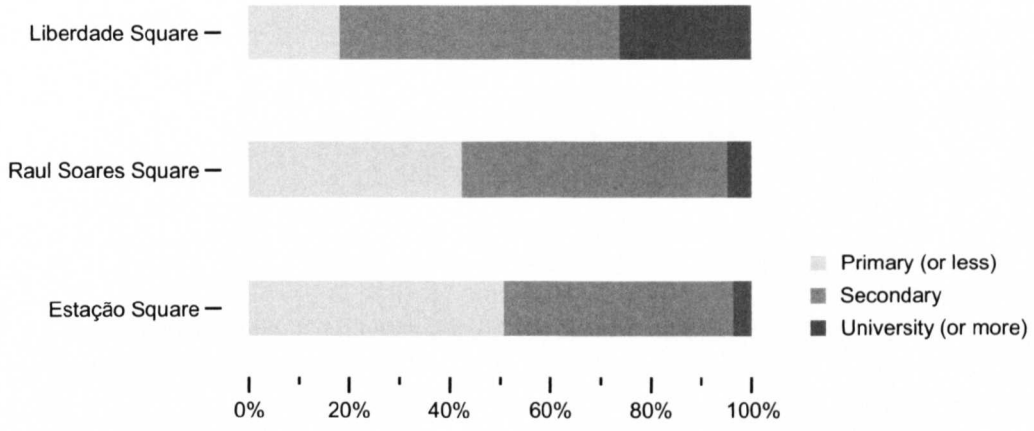


Figure 6.3: The educational levels of stationary users in the current samples.
Source: instrument type B, fieldwork 2007.

The calculation of the lower and higher estimates of the true values suggests that stationary users 25 years old (or more) possessing a university degree (or a higher qualification) tend to be a minority in central urban squares in the context of Belo Horizonte during weekdays from 12.00 until 14.00 (see Appendix C). However, Pearson's chi-square test revealed that the proportion of stationary users within this group was higher in Liberdade Square than in Raul Soares Square or Estação Square (p=.001).

From the preceding account, it can be concluded that although *people 25 years old (or more) possessing a university degree (or a higher qualification) are not likely to carry out stationary activities in central urban squares in the context of Belo Horizonte, some central urban squares tend to attract a larger proportion of stationary users within this group than others central urban squares do.*

The quantitative analysis of data obtained from the instrument type A shows that the educational level of the *ambulant users 25 years old (or more) in the case study sites was generally medium* with about 54-64% having a second degree (see Figure 6.4). The percentage of ambulant users 25 years old (or more) who possessed a university degree (or a higher qualification) in Liberdade Square, Raul Soares Square and Estação Square were 38.7%, 21.3% and 15.1%, respectively.

[2] Only the data provided by participants 25 years old (or more) were considered in the analyses within this section because from this age onwards, people would be expected to have concluded their university degree.

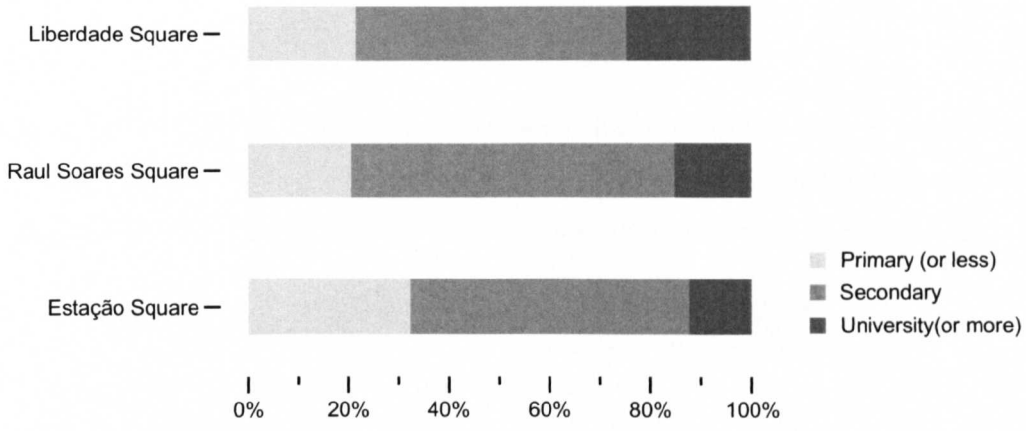


Figure 6.4: The educational levels of ambulant users in the current samples.
Source: instrument type A, fieldwork 2007.

The calculation of the lower and higher estimates of the true values shows that *ambulant users 25 years old (or more) possessing a university degree (or a higher qualification) is a minority group in central urban squares in the context of Belo Horizonte* (see Appendix C). However, Pearson's chi-square test revealed that the *proportion of ambulant users within this group was higher in Liberdade Square than in Raul Soares Square or Estação Square* (p=.002).

From the preceding account, it can be concluded that *although pedestrians 25 years old (or more) possessing a university degree (or a higher qualification) account for the minority of stationary and ambulant users in central urban squares in the context of Belo Horizonte, some central urban squares tend to attract a larger proportion of pedestrians within this group than others.*

The findings of the present research, therefore, reinforces the idea discussed previously that *central urban squares in the context of Belo Horizonte are no longer elitist spaces as they used to be up to the 1950s* (see Chapter Five, section 5.3). These areas, by contrast, are more likely to be described as *popular public urban open spaces.*

6.2.3 Male and female users

Demographic data obtained with the instruments type A and type B (see Chapter Four, section 4.4) and place-centred mapping technique (see Chapter Four, section 4.4.4) are used in this section to describe the gender of those people likely to carry out optional

stationary and ambulant activities in Liberdade Square, Raul Soares Square and Estação Square during weekdays from 12.00 until 14.00.

The quantitative analysis of data obtained from the instrument type B shows that male users accounted for 67.8%, 77.6% and 65.0% of stationary users interviewed in Liberdade Square, Raul Soares Square and Estação Square, respectively (see Figure 6.5).

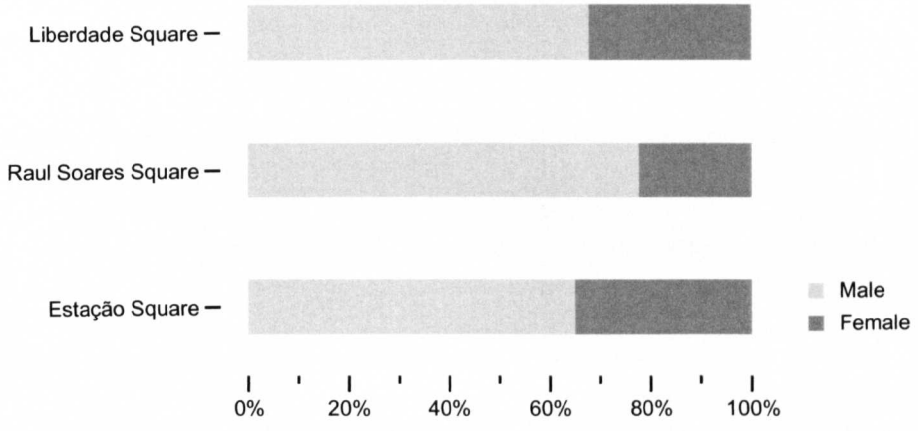


Figure 6.5: Gender of the stationary users in the current samples.

Source: instrument type B, fieldwork 2007.

The quantitative analysis of the data obtained through place-centred mapping corroborates the findings of the above analysis. Figure 6.6 shows that men were about 60-80% of users reported to carry out optional stationary optional activities in Liberdade Square (57.8%), Raul Soares Square (82.4 %) and Estação Square (77.3%).

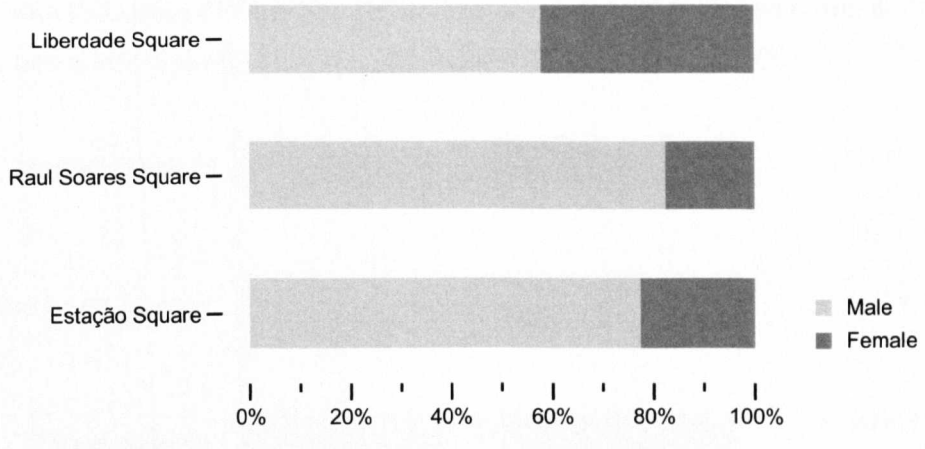


Figure 6.6: Gender of the users who were observed carrying out optional stationary activities in the current samples.

Source: place-centred mapping, fieldwork 2006.

Chi-square test for goodness-of-fit was used to test for a statistically significant difference in the proportion of male and female stationary users identified in the current samples as

compared with the value of 47% that reflects the proportion of male residents in the RMBH, ≥ 16 years old, a value obtained in the nationwide census (IBGE, 2000). It revealed that *none of the central urban squares under scrutiny were used by a larger proportion of male users carrying out optional stationary activities than the other areas were.* Table 6.3 shows that *optional stationary activities in Liberdade Square, Raul Soares Square and Estação Square are more likely to be carried out by men than women,* according to the analysis of the data obtained with both instrument type B and place-centred mapping technique.

Table 6.3: Proportion of male users identified in the current samples as compared with the value of 47% that was obtained in a previous census of the RMBH (2000).

	Case studies		
	Liberdade Square	Raul Soares Square	Estação Square
Instrument B	p<.001	p<.001	p<.001
Place-centred mapping	p<.001	p<.001	p<.001

Source: place-centred mapping, fieldwork 2006 and instrument type B, fieldwork 2007.

The quantitative analysis of data obtained from the instrument type A shows that the percentage of male ambulant users in Liberdade Square, Raul Soares Square and Estação Square were 49.2%, 60.3% and 53.1%, respectively (see Appendix C). Figure 6.7 shows that the proportion of male and female ambulant users in the current samples was about 50-60%.

Chi-square test for goodness-of-fit was used to test for a statistical significant difference in the proportion of male and female ambulant users identified in the current samples as compared with the value of 47% that reflect the proportion of male residents in the RMBH, ≥ 16 years old, a value obtained in the nationwide census (IBGE, 2000).

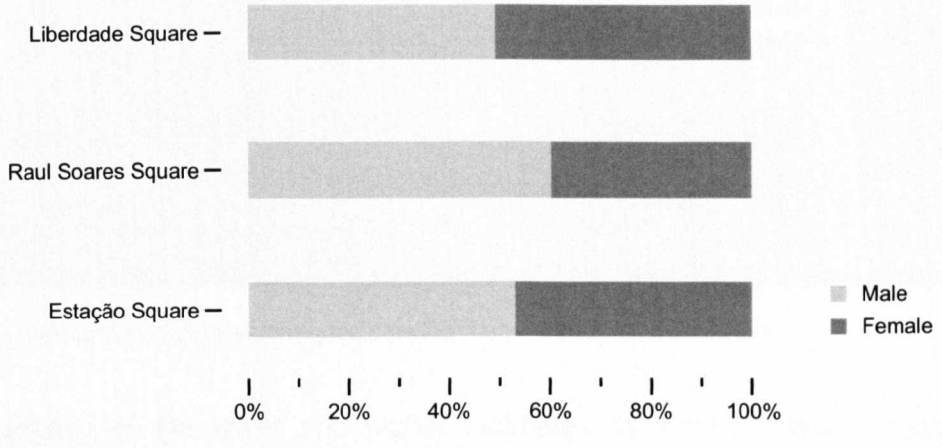


Figure 6.7: Gender of the ambulant users in the current samples.

Source: instrument type A, fieldwork 2007.

Table 6.4 shows that there was (i) no significant difference in the proportion of male ambulant users identified in Liberdade Square and Estação Square, as compared with the value obtained in the previous nationwide census, and (ii) a significant difference in the proportion of male ambulant users identified in Raul Soares Square (60.3%), as compared with the value obtained in the previous nationwide census (47%). Thus, women were as likely as men to walk through Liberdade Square and Estação Square and less likely than men to walk through Raul Soares Square. This result, therefore, validates the findings from previous study that *women tend to be more discriminating than men to where they are going to spend time* (Whyte, 1980).

Table 6.4: Proportion of male ambulant users identified in the current samples as compared with the value of 47% that was obtained in a previous census of the RMBH (2000).

Case studies		
Liberdade Square	Raul Soares Square	Estação Square
none	$p<.003$	none

Source: instrument type A, fieldwork 2007.

6.2.4 Marginalized users

For the purposes of this research, marginalized users include those people usually perceived as unpleasant or threatening, such as beggars, mendicants, derelicts, and so on (see Figure 6.8). The quantitative analysis of the data obtained from place-centred mapping shows that marginalized stationary users were those least frequently observed performing stationary optional activities in Liberdade Square (3.2 %), Raul Soares Square (14.7 %) and Estação Square (4.7%) (see Appendix C).

Figure 6.8: A marginalized user watching the passing scene in Raul Soares Square.

The calculation of the lower and higher estimates of the true values suggests that *marginalized people are a minority in all the study areas* (see Appendix C). However, although marginalized people are less likely than non marginalized ones to carry out

optional stationary activities in central urban squares in the context of Belo Horizonte, at least during weekdays at lunch time, Pearson's chi-square test revealed that *marginalized users were more likely to perform optional stationary activities in Raul Soares Square, an urban square which lacked adequate maintenance during the fieldwork activities, than in Liberdade Square and in Estação Square, both comparatively very well-maintained urban squares* (p=.001).

6.2.5 Users who do not know each other

The quantitative analysis of data obtained from the instrument type B shows that the percentage of users who normally carry out stationary social activities at least once per week during weekdays at lunch break in Liberdade Square (70.5%), Raul Soares Square (57.6%) and Estação Square (72.9%) was about 60-75%. The calculation of the lower and higher estimates of the true values indicates that the *majority of stationary users of Liberdade Square and Estação Square were likely to spend time within them, during weekdays at lunch time, at least once per week* (see Appendix C). Pearson's chi-square tests (with Yates Continuity Correction) revealed that the proportion of users in Raul Soares Square used to carry out stationary activities in it on a weekly basis (or more) was significantly lower than the proportion observed in Estação Square (p =.013) and Liberdade Square (p =.026).

The quantitative analysis of data obtained from instrument type A shows that the percentage of ambulant users who normally walk at least once per week during weekdays at lunch break in Liberdade Square (73.8%), Raul Soares Square (62.7%) and Estação Square (80.8%) was about 60-80%.The calculation of the lower and higher estimates of the true values shows that the *majority of ambulant users in Liberdade Square, Raul Soares Square and Estação Square were likely to walk through them during weekdays at lunch time at least once per week* (see Appendix C).

If on the one hand, central urban squares in the context of Belo Horizonte, as well as other central public open spaces around the world, have been identified as those ones mostly used by people who do not know each other (Andrade, 2007; Stevens, 2006), the findings of this present research, on the other hand, suggest that although the users of central urban squares may not know each other, some of them may be able to recognize each other.

The results of the present research show that the central urban squares within the context of Belo Horizonte are not as plural and inclusive as they are supposed to be. In this regard, it is interesting to note that during the initial years of the city of Belo Horizonte, its central urban spaces were mostly used by the local elite instead of being truly plural spaces (see Chapter Five, section 5.2). Thus, the evidence of the present research tends to support the argument developed by Jackson (1998) that most public urban open spaces were (and are) to varying degrees exclusionary.

Although it was out of the scope of the present research to explore why minority groups, such as elderly, have not performed social activities in Liberdade Square, Raul Soares Square and Estação Square, it is very likely that these social groups may have chosen to socialise in other urban settings, such as shopping centres. Since different social groups have distinct and sometimes conflicting needs, it may be argued that those design solutions which conciliate the needs of various social groups are more likely to contribute towards the generation of urban open spaces to be used by a wider range of users.

6.3 Stationary activities

6.3.1 Sitting activities

This section identifies and represents graphically the optional stationary activities likely to take place in Liberdade Square, Raul Soares Square and Estação Square during weekdays at lunch break. The quantitative analysis of the data obtained from place-centred mapping shows that 81.5%, 77.9% and 64.8% of stationary users were observed performing sitting activities in Liberdade Square, Raul Soares Square and Estação Square, respectively (see Figure 6.9).

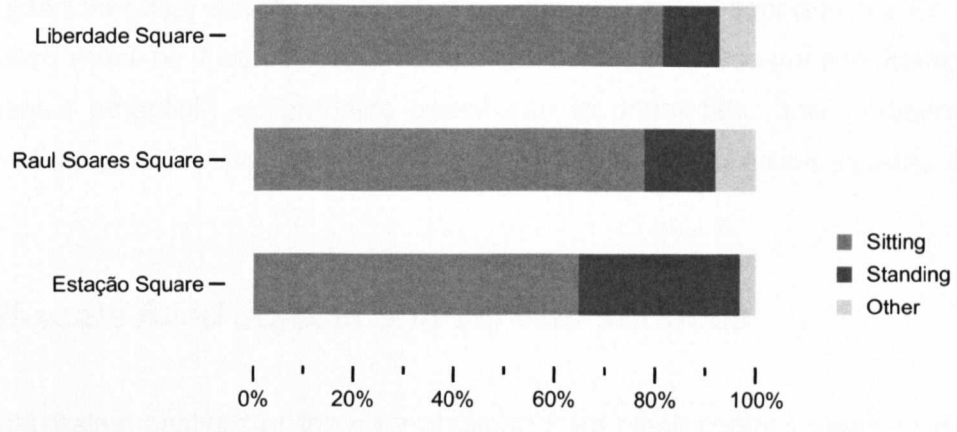


Figure 6.9: Sitting, standing and other optional stationary activities reported to occur in the current samples.
Source: place-centred mapping, fieldwork 2006.

Pearson's chi-square tests revealed that sitting activities were more likely to occur in Liberdade Square and Raul Soares Square than in Estação Square (p=.001). Thus, the findings of the present research suggest that *Liberdade Square and Raul Soares Square tend to offer a higher degree of choice and opportunities to carry out sitting activities than Estação Square did.*

The calculation of the lower and higher estimates of the true values suggests that *the majority of optional stationary activities reported to occur in Liberdade Square, Raul Soares Square and Estação Square were likely to be sitting activities* (see Appendix C). During the fieldwork activities, which took place during weekdays at lunch time, sitting spaces under shade appeared to be preferred than similar sitting spaces which would not offer shelter from the sun (see Figure 6.10).

Figure 6.10: Users carrying out sitting activities under shade in Estação Square.

The lack of sitting spaces in Estação Square where one could enjoy favourable climatic conditions may explain why this urban square did not retain the same proportion of sitters than the other study areas did. Nevertheless, sitting activities accounted for the large majority of activities reported to occur in all study areas during the fieldwork activities. If it is accepted that high quality public open spaces offer many opportunities for sitting, one conclusion must be that Liberdade Square, Raul Soares Square and Estação Square represent a potentially enlightening opportunity to understand how multisensory urban design characteristics may attract and retain users in central urban squares within large cities.

Small-scale fixed objects and vertical surfaces

The quantitative analysis of the data obtained from place-centred mapping demonstrate that 89.2%, 96.2% and 94.0% of the sitters were at a distance within 1m from small-scale

objects (e.g. trunks of trees and pieces of urban furniture) and vertical surfaces in Liberdade Square, Raul Soares Square and Estação Square, respectively (see Appendix C). The calculation of the lower and higher estimates of the true values indicates that *the majority of sitting activities were carried out at a distance within 1m of small-scale fixed objects and vertical surfaces in all the study areas* (see Appendix C).

The findings of this research, therefore, demonstrate that sitters in central urban squares in the context of Belo Horizonte preferred carrying out social activities on or near small-scale fixed objects and vertical surfaces. The observations of this study also support this. Sitters in Liberdade Square, Raul Soares Square and Estação Square carried out optional social activities on or near benches, sculptures, tree trunks, façades, building walls, fences, trashcans, lamp posts, drinking fountain and so on.

In this regard, small-scale fixed objects and vertical surfaces (or screens) have been identified as important characteristics in retaining people in public open spaces and possibly supporting social behaviour (Marcus, Francis and Russel, 1990; Mehta, 2009; Stevens, 2006).

Primary and secondary sitting spaces

The quantitative analysis of the data obtained from place-centred mapping shows that 69.6%, 56.6% and 23.4% of the sitters were observed performing optional stationary activities in the benches, named as a primary sitting space by Gehl (2001) and Marcus, Francis and Russel (1990), within Liberdade Square, Raul Soares Square and Estação Square, respectively (see Figure 6.11).

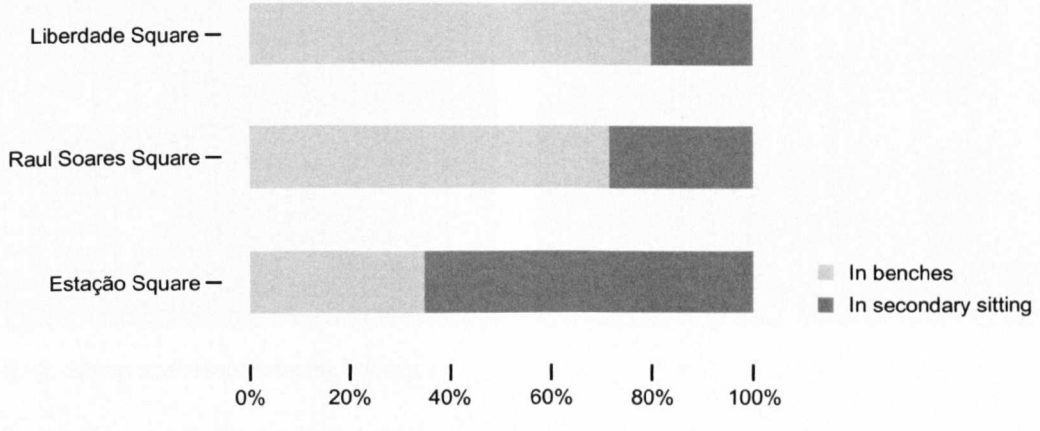


Figure 6.11: Users carrying out sitting activities in benches and secondary sitting spaces in the current samples.

Source: place-centred mapping, fieldwork 2006.

The calculation of the lower and higher estimates of the true values shows that the *majority of sitting activities in Liberdade Square and Raul Soares Square occurred in the benches within them, while the majority of sitting activities in Estação Square were carried out in the secondary sitting spaces located within it*, such as steps (see Appendix C). Thus, the findings of the present research suggest that while the benches within Liberdade Square and Raul Soares Square tended to retain users, those in Estação Square did not.

Behavioural maps show that all benches in Liberdade Square were reported as having been used by at least one stationary user during the observation sessions, while two benches in Raul Soares Square and 12 benches in Estação Square were not used at all. The lack of benches in Estação Square where one could enjoy favourable climatic conditions may explain why the benches within this urban square appeared to be avoided by people. The majority of sitters in Estação Square were observed spending time in secondary sitting spaces, such as kerbs, steps and so on, where they would be able to enjoy good climatic conditions (see Figure 6.12).

Figure 6.12: Sitting spaces in Estação Square.

The findings of this research, therefore, reinforce the idea that users of central urban squares seek opportunities to experience favourable climatic conditions (Mehta, 2009;

Whyte 1980, 1988). In this regard, it is important to bear in mind that sitting spaces under shade were preferred at lunch time in the context of a city characterized with a tropical climate with an average annual temperature of 21,1ºC with small variations between seasons (see Chapter Five, section 5.4).

Therefore, it should be considered that people's preference for sitting spaces under shade or in the sun may vary throughout the day, seasons as well as geographic locations. Recent research in the United States, for example, found that sitting spaces in the sun were preferred during spring and avoided in summer (Mehta, 2009).

Although the findings of the present study generally support the claims that benches are an important asset in supporting sitting activities in urban open spaces, as identified by previous research (Marcus, Francis and Russel, 1990; Mehta, 2009; Whyte, 1980), it also shows that users tend to prefer sitting spaces which provide opportunities to enjoy favourable climatic conditions.

The behavioural maps of this research show that the most used benches in Liberdade Square, Raul Soares Square and Estação Square were located at short distances from the frequently used pedestrian routes and away from heavy vehicular traffic (see Figures 6.13, 6.14 and 6.15). This finding tends to validate the claims that stationary users seek opportunities to people-watch, a kind of passive social interaction, when considerable space is likely to provide favourable weather conditions (Marcus, Francis and Russel, 1990).

Ambulant users per route

- 0 - 3
- 4 - 9
- 10 - 18
- 19 - 29
- 30 - 51

Stationary users per bench

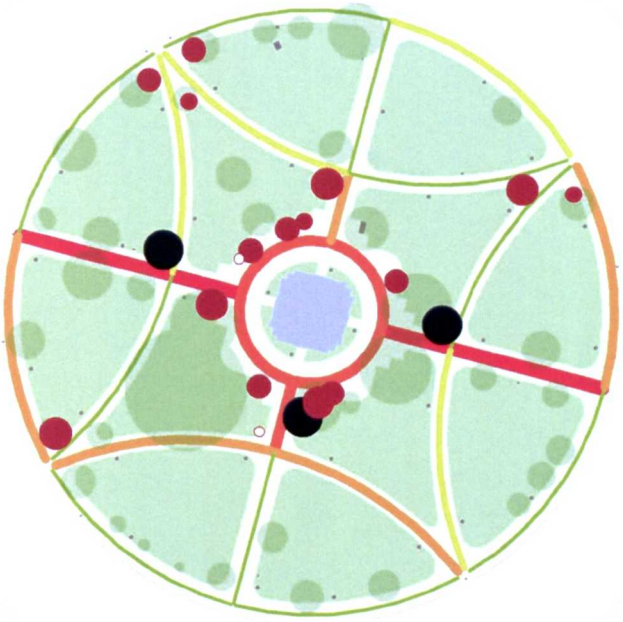
- 2 - 3
- 4 - 5
- 6
- 7 - 8
- 9 - 11

Urban design elements

- Water fountain
- Bandstand
- Other types of urban furniture
- Tree
- Greenery
- Paved area

Figure 6.13: Behavioural map showing the distribution of (i) stationary users per bench, and (ii) ambulant users per route in Liberdade Square.

Source: place-centred mapping, fieldwork 2006 and instrument type A, fieldwork 2007.



Ambulant users per route

- 3 - 8
- 9 - 14
- 15 - 21
- 22 - 46
- 47 - 73

Stationary users per bench

- 0
- 1 - 2
- 3 - 4
- 5 - 6
- 7 - 8

Urban design elements

- Water fountain
- Other types of urban furniture
- Greenery
- Tree
- Paved area

Figure 6.14: Behavioural map showing the distribution of (i) stationary users per bench, and (ii) ambulant users per route in Raul Soares Square.

Source: place-centred mapping, fieldwork 2006 and instrument type A, fieldwork 2007.

Figure 6.15: Behavioural map showing the distribution of (i) stationary users per bench, and (ii) ambulant users per route in Estação Square.

Source: place-centred mapping, fieldwork 2006 and instrument type A, fieldwork 2007.

6.3.2 Basic and complex stationary activities

The quantitative analysis of the data obtained from place-centred mapping shows that 'conversing' accounted for 46.6%, 38.2% and 46.1% of the optional stationary activities reported to occur in Liberdade Square, Raul Soares Square and Estação Square, respectively. 'Watching' accounted for 24.4%, 33.1% and 30.5% of the optional stationary activities observed in Liberdade Square, Raul Soares Square and Estação Square, respectively.

All the other activities were more infrequent sorts of activities, including dating, playing games, playing instruments, and so on, and corresponded to 29.1%, 28.7% and 23.4% of the optional stationary activities recorded in Liberdade Square, Raul Soares Square, and Estação Square, respectively (see Appendix C). This result suggests that central urban squares within the city of Belo Horizonte tend to accommodate a variety of social activities.

Since conversing and watching were those stationary social activities reported to occur more frequently in all the study areas, for the purposes of the present research, they will be classified as 'basic activities', as opposed to 'complex activities', which would include all the other types of stationary activities observed in Liberdade Square, Raul Soares Square and Estação Square.

The calculation of the lower and higher estimates of the true values suggests that the *majority of activities observed in all the study areas were basic activities: conversing and watching* (see Appendix C). A Pearson's chi-square test revealed no significant difference in the proportions of basic activities observed in Liberdade Square, Raul Soares Square and Estação Square. Thus, the findings of the present research show that *conversing and watching are the optional stationary activities most likely to be carried out in central urban squares in the context of Belo Horizonte.*

6.3.3 Passive and active engagement

Passive, as opposed to active, social interactions involve seeing rather than talking or doing (Carr *et al.*, 1992; Francis, 2003). Watching the passing scene is an example of passive social interaction, while walking and conversing are types of active social interaction. By grouping all the activities reported to occur in the study areas under these

two broad categories, active and passive social interactions, the quantitative analysis of the data obtained from place-centred mapping technique shows that the percentage of active social activities observed in Liberdade Square (61%), Raul Soares Square (47.8%) and Estação Square (58.6%) was about 45-60%.

The calculation of the lower and higher estimates of the true values indicates that the majority of stationary activities reported to occur in Liberdade Square were forms of active interactions while approximately one-half of those observed in Raul Soares Square and Estação Square were under this same category (see Appendix C). Thus, while *active forms of interaction tended to be the predominant type of optional stationary activity in Liberdade Square, passive forms of interaction tended to be carried out in Raul Soares Square and Estação Square as often as active forms of engagement did.*

Pearson's chi-square tests revealed that the proportion of stationary active interactions reported to occur in Liberdade square were significantly higher than the ones observed in Raul Soares Square and Estação Square (p=.023). This finding suggests that Liberdade Square offered a higher degree of choice and opportunity to carry out active forms of interaction than the other two study areas did.

The quantitative analysis of the data obtained from place-centred mapping technique shows that 'conversing' accounted for 76.3%, 80% and 76% of the optional stationary active social interactions reported to occur in Liberdade Square, Raul Soares Square and Estação Square, respectively (see Appendix C). The calculation of the lower and higher estimates of the true values shows that *conversing accounted for the majority of stationary active social interactions observed in all the study areas* (see Appendix C). Thus, conversing was carried out more often than any other form of stationary active social interaction in all the study areas.

A Pearson's chi-square test revealed no significant difference in the proportions of conversing reported to occur in all the study areas, in other words, stationary users in Liberdade Square were as likely to converse with other users as the stationary users in Raul Soares Square and Estação Square were.

The quantitative analysis of the data obtained from place-centred mapping technique shows that 'watching' accounted for 62.4%, 63.4% and 73.6% of the passive social interactions reported to occur in Liberdade Square, Raul Soares Square and Estação Square, respectively. The calculation of the lower and higher estimates of the true values

suggests that *watching accounted for the majority of passive social interactions observed in all the study areas* (see Appendix C). A Pearson's chi-square test revealed no significant difference in the proportions of watching reported to occur in Liberdade Square, Raul Soares Square and Estação Square.

Therefore, this result shows that central urban squares tend to offer choices and opportunities to watch the passing scene, a type of passive social interaction likely to engender a sense of relaxation. The people-centred maps of optional stationary activities in the three urban squares suggest that conversing tends to take place away from the roads characterized by heavy vehicular traffic, while watching activities tend to be carried out in locations from where one has (i) reasonable viewing distances, (ii) unhindered views, and/or (iii) interesting views (see Figures 6.16, 6.17 and 6.18).

Figure 6.16: Behavioural map showing the distribution of stationary users engaged in (i) conversing, (ii) watching, and (iii) other optional stationary activities in Liberdade Square.

Source: place-centred mapping, fieldwork 2006.

Figure 6.17: Behavioural map showing the distribution of stationary users engaged in (i) conversing, (ii) watching, and (iii) other optional stationary activities in Raul Soares Square.

Source: place-centred mapping, fieldwork 2006.

Figure 6.18: Behavioural map showing the distribution of stationary users engaged in (i) conversing, (ii) watching, and (iii) other optional stationary activities in Estação Square.

Source: place-centred mapping, fieldwork 2006.

6.3.4 Group and single activities

'Group stationary activities', as opposed to 'single stationary activities', are defined as those activities which necessarily require social interaction in the same space. Conversing and dating would be examples of group stationary activities, while reading and watching would be examples of single stationary activities. Although some single stationary activities may be performed conjointly with other people in the same space, such as playing instruments, they do not depend on it.

By grouping all the optional stationary social activities reported to occur in the study areas in these two broad categories, group and single stationary social activities, the quantitative analysis of the data obtained from place-centred mapping shows that the proportion of group stationary activities in Liberdade Square (58.2%), Raul Soares Square (47.1%) and Estação Square (52.3%) was about 45-60%. A Pearson's chi-square test revealed that *group activities were as likely as single activities to occur in any of the study areas.*

6.3.5 Activity clusters

Distance is used to regulate intimacy and intensity in various social experiences (Canter, 1974; Gehl, 2001; Hall, 1966; Lynch, 1971; Rapoport, 1977). In this regard, research has suggested that in urban public open spaces people tend to be felt in direct relation to each other, whether pleasant or unpleasant, within a distance of 3m from each other (Gehl, 2001; Lynch, 1971).

More meaningful forms of human contact take place at shorter distances because in this circumstance the amount of sensory information gathered increases greatly as long as other senses start to supplement the sense of sight (Gehl, 2001; Gehl, Kaefer and Reigstad, 2006).

The quantitative analyses of the evidence obtained from place-centred mapping were divided into two categories: (i) users at a distance of 3m from any other (or less), and (ii) users at a distance greater than 3m from any other. A Chi-square test for independence (with Yates Continuity Correction) indicated *a significant association between group stationary activity and spatial proximity in all the case study sites* (see Table 6.5). This result indicates that *stationary users at a distance within 3m from each other are more*

likely to carry out more intense forms of social contact, such as conversing, than those at greater distances.

Table 6.5: Association between group activity and spatial proximity.

Case studies		
Liberdade Square	Raul Soares Square	Estação Square
χ^2 (1, n=464)=, p =.001, *phi*=.55	χ^2 (1, n=464)=, p =.001, *phi* =.78	χ^2 (1, n=128)=, p =.001, *phi* =.54

Source: place-centred mapping, fieldwork 2006.

The preceding account, therefore, demonstrates that spatial proximity, or rather, *physical layout of central urban squares can provide choices and opportunities to carry out social activities at short distances from other people, situations which, in turn, may propel users to start a conversation.* Figures 6.19, 6.20 and 6.21 show the distribution of optional stationary activities carried out by (i) 'marginalized users', (ii) 'non marginalized users', and (iii) 'both classes of users' at a distance ≤ 3m from each other. As discussed, *marginalized users* are those people perceived as threatening and unpleasant, such as mendicants.

The behavioural maps of people engaged in optional stationary social activities suggest that marginalized users tend to (i) not be up close to highly visible pieces of urban furniture; (ii) form clusters with other marginalized users and (iii) be at distances greater than 3m from non marginalized users. Figures 6.19, 6.20 and 6.21 suggest that *marginalized users tend to occupy the backstage of central urban squares* in the context of the city of Belo Horizonte, while the *most visible locations tend to be occupied by large groups of non marginalized users.*

As discussed, although short distances between members of these two groups do not mean that they will start a conversation, being up close to each other does mean that more complex forms of social contact may grow from it. In this regard, the result of the present research suggests that *marginalized and non-marginalized users tend to avoid being at short distances from each other*, a situation which inhibits the development of more intense forms of social contacts. This result reinforces the idea that different social groups may have different needs and preferences (see section 6.2.5). It follows that to attract and retain members of different social groups within a space, conflicting needs and preferences should be anticipated and addressed in the design solutions of urban open spaces.

However, it is interesting to note that *close contacts between marginalized and non marginalized users were observed more frequently at Liberdade Square*, the most valued

of all case study sites (see Chapter Eight, section 8.2). This result, therefore, suggests that *different social groups are more likely to carry out close social interactions in high quality environments.*

The largest activity clusters in the study areas were reported to occur in highly visible locations within them and/or in focal multifunctional pieces of urban furniture, such as the bandstand in Liberdade Square and the Monumento à Terra Mineira in Estação Square (see Figures 6.19, 6.20 and 6.21). Gehl (1987, p.152) concluded from his studies on public open spaces that 'events grow from inward, from the edge toward the middle of public open spaces'. In this regard, the opposite phenomenon was observed in Liberdade Square, Raul Soares Square and Estação Square: *while the largest clusters tended to occur in the 'middle', few optional stationary activities were observed in the 'edges'of the study areas* (see Figures 6.19, 6.20 and 6.21).

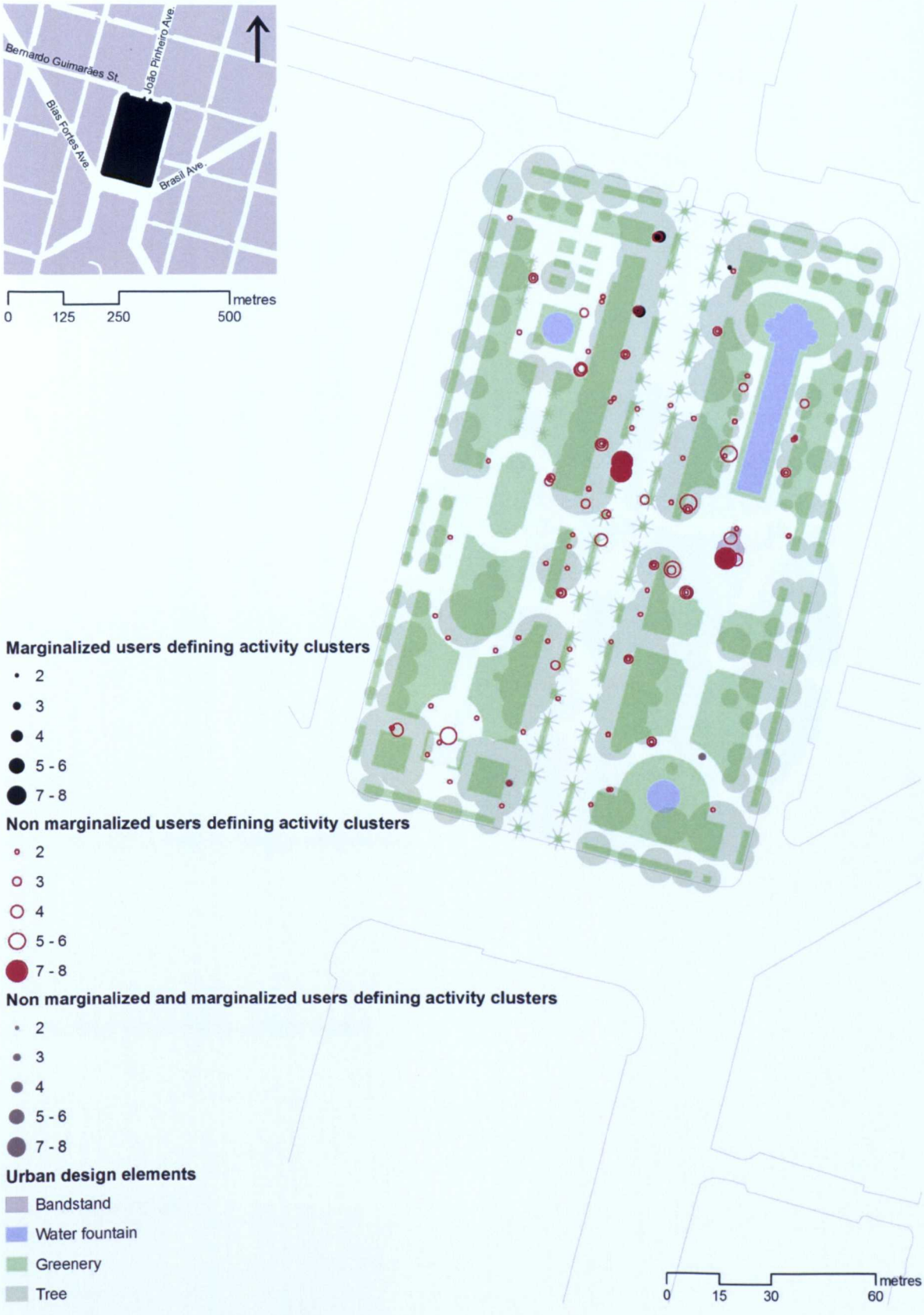


Figure 6.19: Behavioural map showing activity clusters in Liberdade Square.

Source: place-centred mapping, fieldwork 2006.

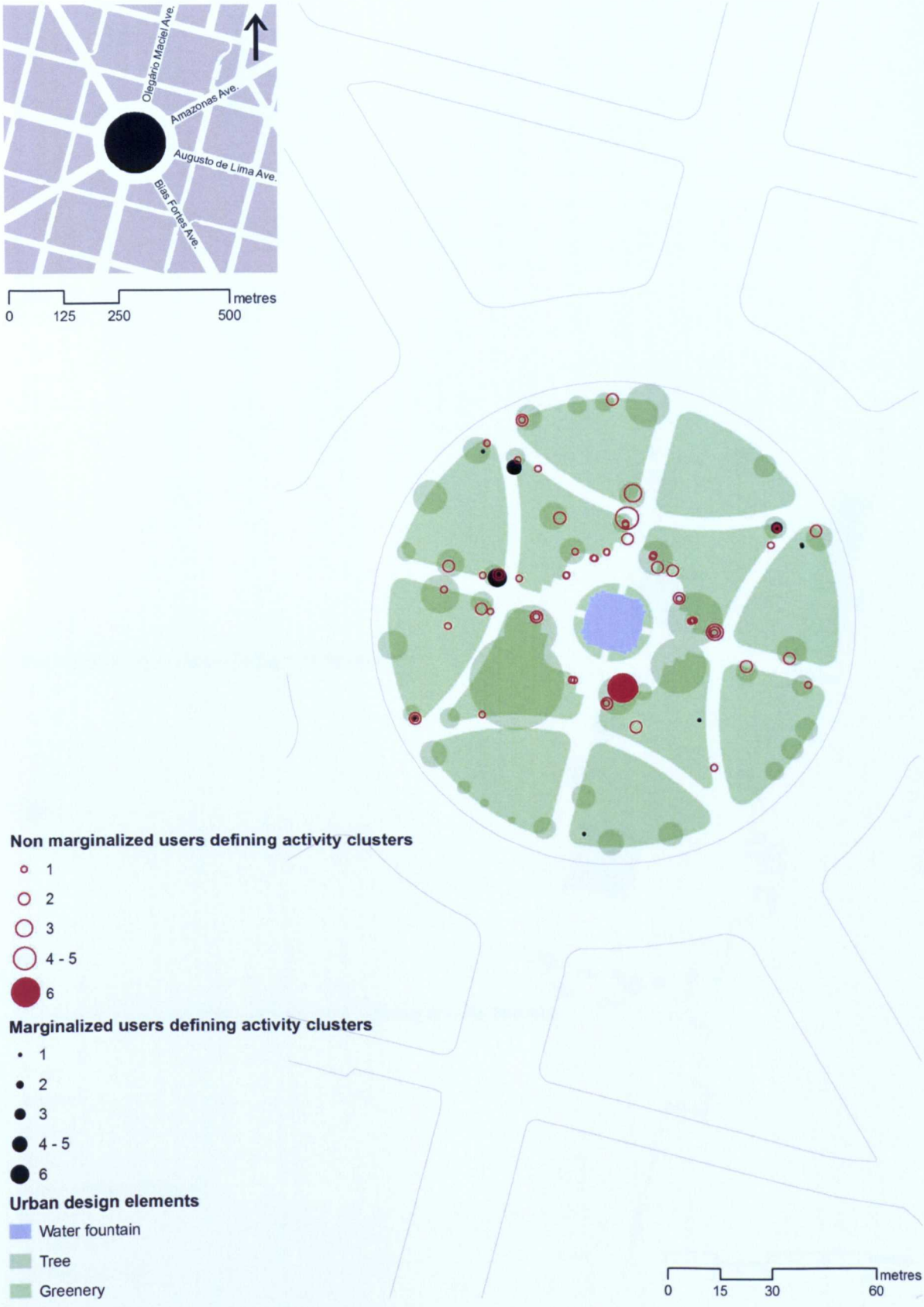


Figure 6.20: Behavioural map showing activity clusters in Raul Soares Square.

Source: place-centred mapping, fieldwork 2006.

Figure 6.21: Behavioural map showing activity clusters in Estação Square.

Source: place-centred mapping, fieldwork 2006.

6.4 Ambulant activities

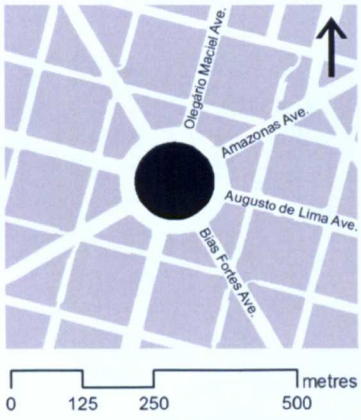
This research adopts the categorization proposed by Gehl (2001), and divides the pedestrian ambulant activities into two sub-categories: necessary and optional walking. While the former can be defined as a purposive activity whose main motivation is to arrive at a particular destination, the latter can be described as strolling or walking at a leisurely pace and includes all others sorts of ambulant activities (see Chapter Two, section 2.5).

The surveys of pedestrian routes in Liberdade Square, Raul Soares Square and Estação Square suggest that the *most used routes in these central urban squares are short cuts and parts of the walking network* of the central area of the city of Belo Horizonte. The major pedestrian route in Liberdade Square connects Bias Fortes and Brasil avenues (see Figure 6.22), in Raul Soares Square it is along Augusto de Lima Avenue (see Figure 6.23), and in Estação Square it is along Caetés Street (see Figure 6.24).

This result, therefore, suggests ambulant users in central urban squares within the context of the city of Belo Horizonte tend to take the shortest route, a finding which, in turn, provides support to the idea that the *act of walking in public urban open spaces tends to be of a very functional nature, or rather, that it tends to be within the category necessary walking* (Gehl, 2001).

Figure 6.22: Survey of pedestrian routes in Liberdade Square.

Source: instrument type A, fieldwork 2007.



Ambulant users per route

- 3 - 8
- 9 - 14
- 15 - 21
- 22 - 46
- 47 - 73

Urban design elements

- Water fountain
- Other types of urban furniture
- Greenery
- Tree
- Paved area

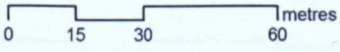


Figure 6.23: Survey of pedestrian routes in Raul Soares Square.

Source: instrument type A, fieldwork 2007.

Figure 6.24: Survey of pedestrian routes in Estação Square.

Source: instrument type A, fieldwork 2007.

The surveys of pedestrian routes also show that ambulant users are quite sensitive to obstacles (see Figures 6.22, 6.23 and 6.24). The unstructured observations show that the edges of the flower beds in Liberdade Square and Raul Soares Square functioned as a kind of lateral reference to ambulant users, who preferred to walk along but not too close to these lines.

While *ambulant users were observed walking in the centre of the paved areas, stationary users tended to locate themselves at short distances from the boundaries of the green spaces* (see Figure 6.25). It is also important to note that, the *paths, although of differing widths and shapes, seemed to accommodate comfortably well the pedestrian traffic as well as stationary activities in all the case study areas.*

Figure 6.25: Users carrying out stationary and ambulant activities in Liberdade Square (left) and Raul Soares Square (right).

The quantitative analysis of the data obtained with instrument A shows that 73.1%, 88.1% and 86.2% of the ambulant users in Liberdade Square, Raul Soares Square, and Estação Square did not interrupt their walking while in these squares, respectively. The calculation of the lower and higher estimates of the true values indicates that the *majority of ambulant users in all the study areas did not interrupt their walking while in these areas* (see Appendix C).

The preceding evidence, therefore, also reinforces the idea that *the majority of walking in public urban open spaces tends to be a purposive activity whose main motivation is to arrive at a particular destination*. It addition, it shows that the *number of ambulant users who just walk through the case study sites tends to be significantly higher than those who choose to perform stationary activities of longer or brief duration in them.*

A Pearson's chi-square test revealed that *ambulant users were more likely to stop in Liberdade Square, the most appreciated of all study areas to carry out stationary and*

ambulant activities (see Chapter Eight, section 8.2), than in Raul Soares Square and Estação Square (p=.003). Thus, although the majority of ambulant users tend to just pass through central urban squares, highly valued central urban squares appear to motivate a larger number of ambulant users to stop in them, at least for a few minutes.

6.5 Conclusion

The findings presented in this chapter are based on the analysis of demographic and behavioural evidence obtained from instrument type A and type B, behavioural mapping techniques and unstructured observations. In the following paragraphs, the main results of this chapter, which mostly consider 'who does what where with whom and how' in Liberdade Square, Raul Soares Square and Estação Square during weekdays from 12.00 until 14.00, are highlighted. The results discussed in this chapter refer to the research objective four: 'To use the methodology in light of the contextual framework to identify and explain user needs and preferences in central urban squares in Belo Horizonte'.

Age. The evidence of the present research shows that the age distribution of stationary and ambulant users was rather wide in Liberdade Square, Raul Soares Square and Estação Square and that these central urban squares, at least during weekdays at lunch breaks, were not used as much by adults and seniors as they are by teenagers and young adults (see section 6.3.2).

One conclusion from the above must therefore be that *with the increase of age, people are less likely to carry out stationary and ambulant activities within central urban squares in the context of Belo Horizonte*. The findings of the present research, therefore, reinforce the idea that the freedom of action of elderly is frequently restricted in public open spaces (Carr *et al.*, 1992).

Educational level. The evidence of the present research suggests that the educational level of ambulant and stationary users in central urban squares in the context of Belo Horizonte is generally medium and that the majority of them do not possess a university degree (or a higher qualification) (see section 6.2.2). The findings of this chapter, therefore, reinforces the idea discussed in Chapter Five (see section 5.4) that central urban squares in the context of Belo Horizonte are no longer elitist spaces. In addition, it was found that people with more years of formal education are more likely to carry out ambulant and optional stationary activities in some central urban squares than in others, as shown in Table 6.6.

Table 6.6: A graphical representation of the proportion of stationary and ambulant users, 25 years old (or more), possessing a university degree (or a higher qualification) in Liberdade Square, Raul Soares Square and Estação Square.

	Case studies		
	Liberdade Square	Raul Soares Square	Estação Square
University degree (or more)			

Source: instruments type A and type B, fieldwork 2007.

Gender. Reinforcing the idea that public open spaces are dominated by men (Carr *et al.*, 1992; Whyte, 1980), the evidence in the present research shows that the majority of people who choose to spend time in central urban squares in the context of Belo Horizonte tend to be men (see section 6.3.2). The evidence of the present research also shows that neither men nor women were more likely to use one central urban square than another to carry out optional stationary activities (see Tables 6.7 and 6.8).

Table 6.7: A graphical representation of the proportion of male and female users carrying out optional stationary activities interviewed in Liberdade Square, Raul Soares Square and Estação Square.

	Case studies		
	Liberdade Square	Raul Soares Square	Estação Square
Male stationary users			
Female stationary users			

Source: instrument type B, fieldwork 2007.

Table 6.8: A graphical representation of the proportion of male and female users carrying out optional stationary activities observed in Liberdade Square, Raul Soares Square and Estação Square.

	Case studies		
	Liberdade Square	Raul Soares Square	Estação Square
Male stationary users			
Female stationary users			

Source: place-centred mapping, fieldwork 2006.

It was found that the same proportion of male and female ambulant users are likely to use Liberdade Square and Estação Square, while male ambulant users tend to predominate in Raul Soares Square, the only study area which was not well-maintained during the fieldwork activities (see Table 6.9). Thus, the findings of the present research tend to

reinforce the claim that the need for protection against crime and violence is more salient in women that in men (Francis, 2003; Whyte, 1980).

Table 6.9: A graphical representation of the proportion of male and female ambulant users interviewed in Liberdade Square, Raul Soares Square and Estação Square.

	Case studies		
	Liberdade Square	Raul Soares Square	Estação Square
Male ambulant users			
Female ambulant users			

Source: instrument type A, fieldwork 2007.

Marginalized users. The findings of the present research suggest that marginalized users tend to account for the *minority of users* likely to carry out optional stationary activities in central urban squares in the context of Belo Horizonte (see section 6.2.4). However, it was found that this social group is more likely to perform optional stationary activities in unmaintained central urban squares than in well-cared urban open spaces (see Table 6.10). Further research to explain this event in the context of the city of Belo Horizonte is needed.

Table 6.10: A graphical representation of the proportion of marginalized users carrying out optional stationary activities in Liberdade Square, Raul Soares Square and Estação Square.

	Case studies		
	Liberdade Square	Raul Soares Square	Estação Square
Marginalized stationary users			

Source: place-centred mapping, fieldwork 2006.

Familiarity. It was found that the majority of people who walk through central urban squares in the context of Belo Horizonte during weekdays from 12.00 until 14.00 tend to do so very often, at least in a weekly basis. It follows that although the users of central urban squares may not know each other, some users may be able to recognize other users. This situation, in turn, may enhance their sense of psychological comfort.

Stationary activities. Sitting activities accounted for the majority of optional activities observed in the study areas rather than standing or other posture activities. This finding, therefore, suggests that central urban squares in the context of Belo Horizonte have been able to attract and retain users within them. In addition, it was also found that sitting

activities were more likely to occur in some central urban squares than in others (see Table 6.11).

Table 6.11: A graphical representation of the proportion of optional sitting activities reported to occur in Liberdade Square, Raul Soares Square and Estação Square during the observation sessions.

	Case studies		
	Liberdade Square	Raul Soares Square	Estação Square
Sitting activities			

Source: place-centred mapping, fieldwork 2006.

Climatic conditions. Those central urban squares which provided greater opportunities for shade, Liberdade Square and Raul Soares Square, were the ones where a larger proportion of optional sitting activities were observed. In this regard, although it was verified that benches are an important asset in supporting sitting activities, users tended to prefer sitting spaces, not necessarily benches, where favourable weather conditions could be enjoyed (see section 6.3.1). From the preceding, it may be inferred that *comfort tends to be a common user need.*

Besides climatic conditions, it was found *that the most used benches were those which provided opportunities to people-watch, a kind of passive social interaction, and protection against sensory intrusion, such as intrusive sounds from vehicular traffic* (see section 6.3.1). Thus, it can be concluded, that *users of central urban squares seek out opportunities to meet their need for passive sorts of engagement and protection against unpleasant sensory information, or rather, physical comfort.*

Props and boundaries. The large *majority of stationary users in the study areas preferred to carry out social activities on or near small-scale fixed objects and vertical surfaces* (see section 6.3.1), elements of urban design which have been identified as important characteristics in retaining people in public open spaces and possibly supporting social behaviour (Marcus, Francis and Russel, 1990; Mehta, 2009; Stevens, 2006). From the preceding, it may be inferred that *users of central urban squares seek out opportunities to address their need of physical comfort.*

Basic stationary activities. Conversing and watching are identified as the optional stationary activities most likely to be carried out in central urban squares in the context of Belo Horizonte (see section 6.3.2). Thus, it may be argued that *people seek out*

opportunities to address their needs of passive and active forms of social interaction when spending time within central urban squares.

Passive and active forms of social interaction. Watching was identified as the most frequent type of passive social interaction observed in the study areas, while conversing was identified as the kind of active social interaction more likely to be carried out in these spaces (see section 6.3.3). In addition, the results of the present study show that conversing tends to take place away from the roads characterized by heavy traffic. Thus, it may be inferred that *users of central urban squares seek out opportunities to meet their need of active forms of interactions as well as comfort.*

The findings of this chapter shows that watching activities tend to be carried out in locations from where one has (i) reasonable viewing distances, (ii) unhindered views, or (iii) interesting views (see section 6.3.3). Given this background, it may be concluded that *users of central urban squares seek out opportunities to address their need of passive forms of interactions as well as discovery*, afforded by interesting views, *and psychological comfort.*

Spatial proximity. The findings from the present research indicate a significant association between group stationary activity and spatial proximity in all the case study sites and that *stationary users at a distance within 3m from each other are more likely to carry out group activities, which allows more intense forms of social contact, than those at greater distances* (see section 6.3.5). One conclusion from the above, therefore, must be that *physical layout does influence the degree of opportunities to start a conversation*, a type of active form of engagement.

Activity clusters. The results presented in this chapter shows that marginalized users are unlikely to be up close to highly visible pieces of urban furniture. In addition, it was found that this social group tend to form clusters with other marginalized users or to be by themselves at distances greater than 3m from non marginalized users (see section 6.3.5). Thus, it can be concluded that *marginalized people tend to occupy the backstage of central urban squares* in the context of the city of Belo Horizonte, while *the most visible locations tend to be occupied by large groups of non marginalized users.*

However, close contacts between these two social groups were observed more frequently in Liberdade Square (see section 6.3.5), the most appreciated of all the study areas (see Chapter Eight, section 8.2).The evidence of this research, therefore, suggests that

marginalized and non marginalized users are more likely to carry out close social interactions in high quality environments, or rather, it does reinforces the idea that *high quality urban open spaces do 'foster social inclusion... and citizenship'* (DTLR, 2002, p.5).

The largest activity clusters in the study areas were reported to occur in highly visible locations within them and/or in focal multifunctional pieces of urban furniture (see section 6.3.5).

Ambulant activities. The findings of this research show that (i) the *most used routes in the study areas are short cuts and are possibly part of the walking network* of the central area of the city of Belo Horizonte, (ii) ambulant users are *quite sensitive to obstacles*, (iii) *spatial physical boundaries functioned as a kind of lateral reference to ambulant users*, who preferred to walk in the centre of the paved walks, while *stationary users tended to locate themselves near the spatial physical boundaries*, and (iv) the *paths* within the study areas, although of differing widths and shapes, seemed to *accommodate comfortably well the pedestrian flow of traffic as well as stationary activities in all the case study area*s (see section 6.4).

Having analysed the behavioural dimension of the study areas, the next chapter elicits, represents graphically and examines the multisensory structure of the study areas as well as the sensory preferences of their users. The aspects of Liberdade Square, Raul Soares Square and Estação Square most valued by their users are discussed in Chapter Eight.

CHAPTER SEVEN

THE SENSORY ELEMENTS

7.1 Introduction

It has been suggested that an effective way to understand common user needs and preferences in urban open spaces is by empirically studying the interrelationships between urban design characteristics, behaviour and perceptions of the users (Francis, 2003; Mehta, 2009). Thus, having investigated social behaviour in Liberdade Square, Raul Soares Square and Estação Square in Chapter Six, this chapter, as well as the following one, examines users' perceptions and preferences towards these central urban squares, to identify and explain user needs and preferences in central urban squares in Belo Horizonte. Through the analysis of the data obtained with the instrument type B (see Chapter Four, section 4.4), this chapter reveals, represents graphically and examines the collective multisensory structure of Liberdade Square, Raul Soares Square and Estação Square and sensory preferences. The statistical software SPSS, the ArcView and the tagcrowd web tool are adopted to help with the data analysis. The results in this chapter refer to the research objective four: 'To use the methodology in light of the contextual framework to identify and explain user needs and preferences in central urban squares in Belo Horizonte'.

7.2 The visual elements

Through the analysis of the data gathered with the sketch map technique (see Chapter Four, section 4.4.2), this section investigates users' general perception of landscapes with the help of the statistical software SPSS and ArcView. Most of the following analysis considers those visual elements sketched by at least ten participants. For the purposes of this research, the term visual element of urban design is used to refer to those components of the perceived visible environment which are open to manipulation by

designers. However, it is important to bear in mind that visual elements may also be sources of sonic, olfactory and tactile experiences, mostly when experienced up close (see Chapters Two and Three).

The three elements first-drawn by the participants are quantified into frequencies with the help of the statistical software SPSS. The results in Liberdade Square, Raul Soares Square and Estação Square are illustrated in Figures 7.1, 7.2, and 7.3, respectively, where, as discussed above, those elements which were drawn by less than ten participants are not included. Figures 7.1, 7.2 and 7.3 show that *distinctive and indistinctive elements were most likely to be drawn first and second or third, respectively. The sequence in which the elements were drawn by the participants suggests that users of central urban squares also have the instinct to distinguish what researchers define as distinctive and indistinctive elements.*

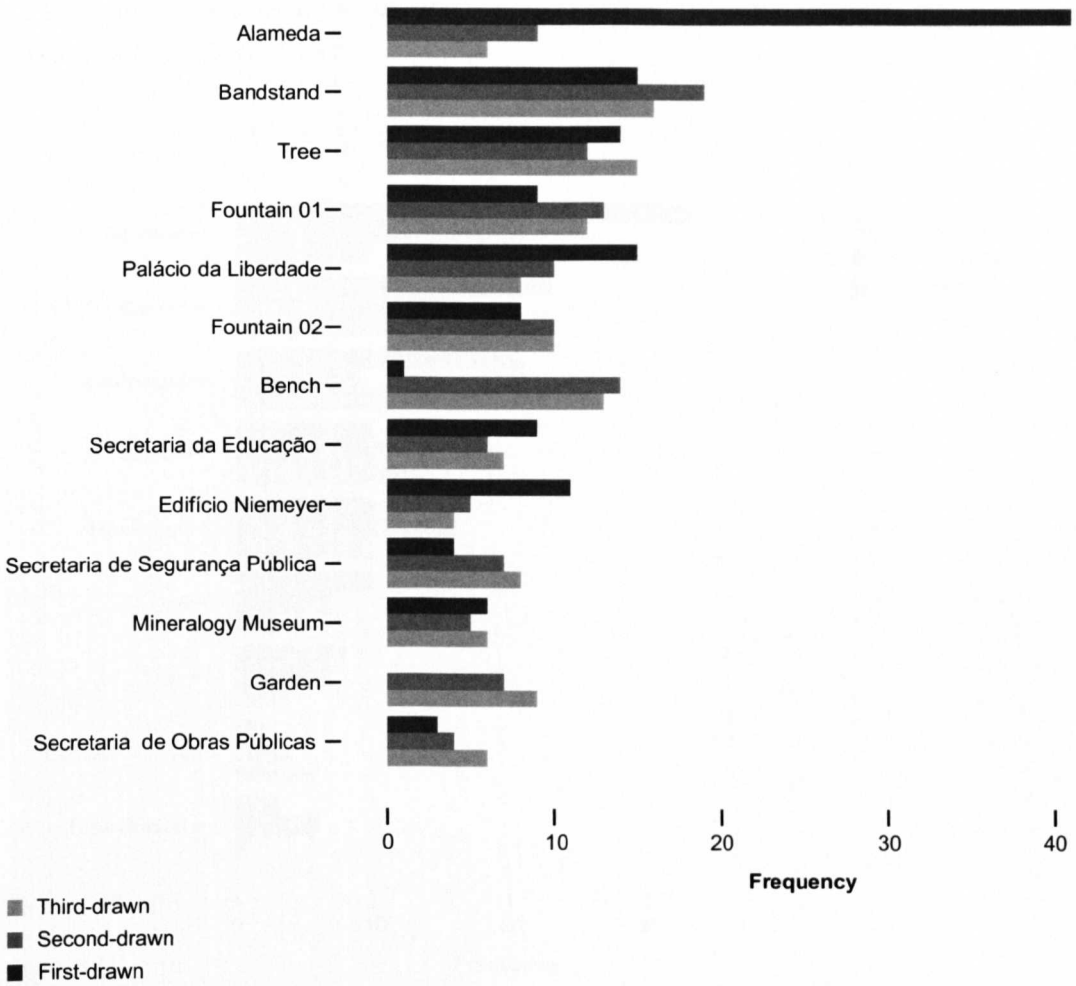


Figure 7.1: The major elements which define the collective visual structure of Liberdade Square.

Source: instrument type B, fieldwork 2007.

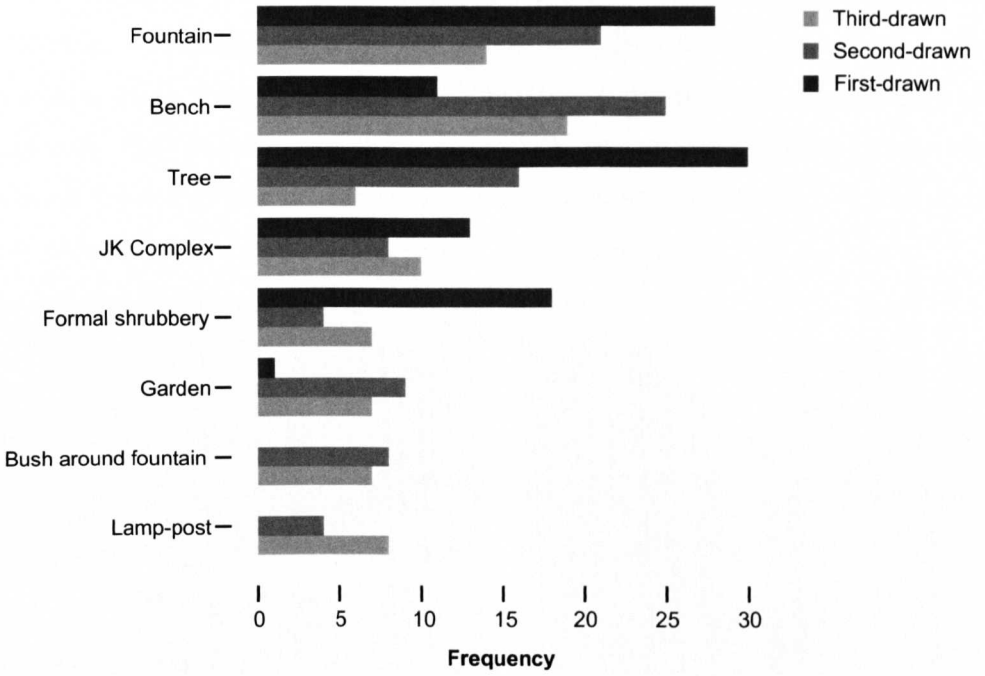


Figure 7.2: The major elements which define the collective visual structure of Raul Soares Square.
Source: instrument type B, fieldwork 2007.

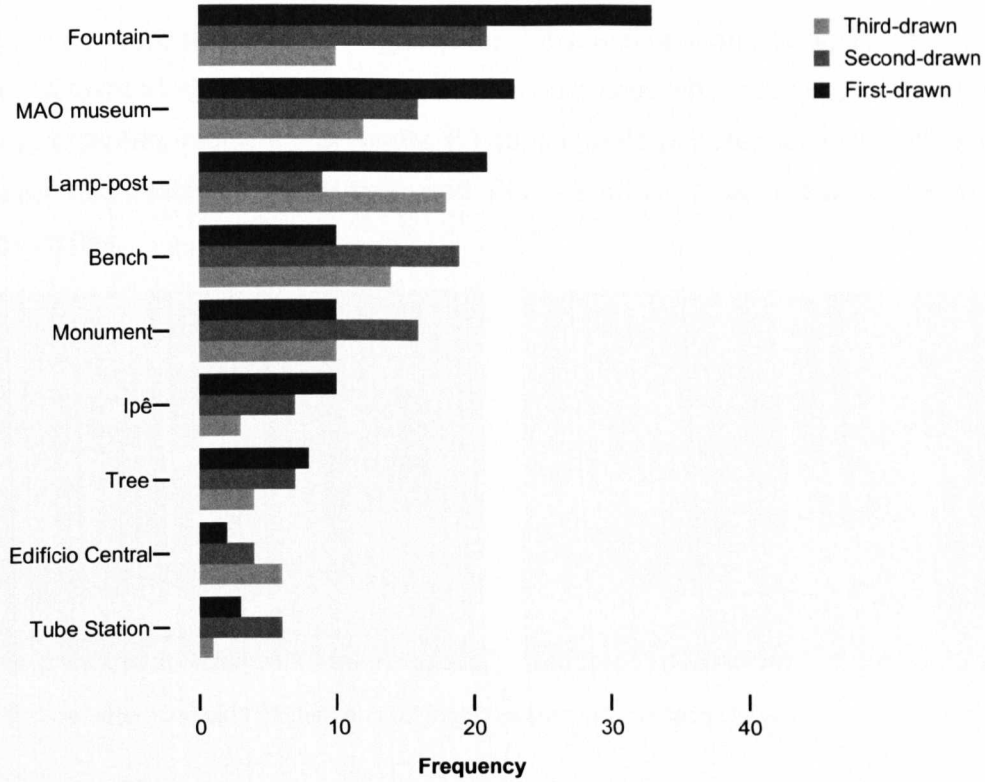


Figure 7.3: The major elements which define the collective visual structure of Estação Square.
Source: instrument type B, fieldwork 2007.

In *Liberdade Square*, the alameda of palm trees (56 references) was sketched by the largest number of participants (see Figure 7.4). This distinctive linear space is more like a monumental outside room, paved with cobblestones, from where people can see a fine vista towards the Palácio da Liberdade (33 references). Behavioural maps and observations show that this corridor characterised by spaces in the sun and under shade was frequently used by sitters and ambulant users (see Figure 7.4).

Figure 7.4: Some views from the central alameda (left) and towards the bandstand (right) in Liberdade Square.

The bandstand (50 references) as well as the water fountains 01 (34 references) and 02 (28 references) are distinctive pleasant focal points within Liberdade Square which can be seen from different angles (see Figure 7.5). Observations and behavioural maps show that the bandstand is also a useful prop which provides physical support to (i) carry out stationary activities in clusters or singly, (ii) contemplate panoramic views, (iii) experience favourable micro-climatic conditions, and (iv) see other people and to be seen from different angles.

Figure 7.5: The water fountains 01 (left) and 02 (right) located in Liberdade Square.

The trees (41 references) and gardens (21 references) in Liberdade Square define its background and function as sources of multisensory delights as well as the water fountains within this square. Observations and behavioural maps (see Chapter Six,

section 6.3.1) show that users tended to carry out optional activities at short distances from trees, gardens and benches (28 references).

The Palácio da Liberdade (33 references), the focal point of the central alameda, presents a distinctive and aesthetically pleasant form as well as the Secretaria da Educação (Secretary of Education) (22 references), the Secretaria de Segurança Pública (Secretary of Public Safety) (20 references), the Edifício Niemeyer (Niemeyer Building) (19 references), the Mineralogy Museum Professor Djalma Guimarães (17 references) and the Secretaria de Obras Públicas (Secretary of Public Works) (13 references) (see Figure 7.6).

Figure 7.6: Views from Liberdade Square towards the Palácio Liberdade, the Secretaria de Obras Públicas, the Secretaria da Educação, Edifício Niemeyer, Mineralogy Museum Professor Djalma Guimarães and the Secretaria de Segurança Pública (clockwise direction).

These buildings differ from the other elements sketched in that they cannot be inspected up close by those within the square. They function as landmark features for those people within Liberdade Square. Table 7.1 shows that *distinctiveness, visibility, usefulness and pleasantness are properties likely to be present in some form of combination in the major elements which define the collective visual structure of Liberdade Square.*

This result reinforces the idea discussed in the conceptual framework (see Chapter Two, section 2.3) that singular form, visibility, intensity of use and meaningfulness, in some form of combination, explain why some elements stand out in the human cognitive maps, while others do not (Appleyard, 1969).

Table 7.1: Key attributes of the major elements which define the collective visual structure of Liberdade Square.

			visibility	distinctiveness	pleasantness	usefulness
Open space	Alameda	(56 references)	x	x	x	x
Urban furniture	Bandstand	(50 references)	x	x	x	x
	Fountain 01	(34 references)	x	x	x	
	Fountain 02	(28 references)	x	x	x	
	Bench	(28 references)				x
Greenery	Tree	(41 references)			x	x
	Garden	(21 references)			x	x
Buildings	Palácio da Liberdade	(33 references)	x	x	x	
	Secretaria da Educação	(22 references)	x	x	x	
	Edifício Niemeyer	(19 references)	x	x	x	
	Secretaria da Segurança Pública	(20 references)	x	x	x	
	Mineralogy Museum Professor Djalma Guimarães	(17 references)	x	x	x	
	Secretaria de Obras Públicas	(13 references)	x	x	x	

Source: instrument type B, fieldwork 2007.

Table 7.2 shows that *the visual elements which compose the collective visual structure of Liberdade Square, depending on the perceptible properties, play specific roles, while some of them play more than one role simultaneously.* For example, the bandstand within Liberdade Square functions as a prop for sitters watching the passing scene from it, a node where several stationary users gather together, and a landmark to an ambulant user walking through the square. However, it is interesting to point out that *the large majority of elements drawn by the participants in Liberdade Square functions as a landmark and/or prop* (see Table 7.2).

Table 7.2: The different roles played by the major visual elements of Liberdade Square.

		Run	Area	Surface	Screen	Objects	Port	Merge	End	Fixed	Semi-fixed	Path	Node	Landmark	Edge	District	Boundary	Prop	Threshold
Open space	Alameda	x								x		x	x						
Urban furniture	Bandstand					x				x			x	x				x	
	Fountain 01					x				x				x				x	
	Fountain 02					x				x				x				x	
	Bench					x					x							x	
Greenery	Tree					x					x							x	
	Garden	x	x								x					x			
Buildings	Palácio da Liberdade			x						x				x					
	Secretaria da Educação			x						x				x					
	Edifício Niemeyer			x						x				x					
	Secretaria de Segurança Pública			x						x				x					
	Mineralogy Museum Prof. Djlama Guimarães			x						x				x					
	Secretaria de Obras Públicas			x						x				x					

Source: instrument type B, fieldwork 2007.

In *Raul Soares Square*, the water fountain (63 references), a singular and distinctive focal point viewed from different directions, was the element drawn by the largest number of participants. Despite occupying a prominent position, this element, at the time that the fieldwork activities took place, was not operating, due to mechanical problems, and lacked adequate maintenance, as did the urban square as a whole. Graffiti, litter floating in the reflecting pool, bad smells and antisocial behaviour were noticed during the unstructured observations (see Figure 7.7).

Figure 7.7: The lack of adequate maintenance of the water fountain in Raul Soares Square.

The geometric gardens (61 references), contained by distinctive spherical shrubs (29 references) and punctuated by trees (52 references) as well as the bushes around the water fountain (15 references) set the background scene of the square. The greenery in Raul Soares Square differed from its water fountain in that it seemed to be able to offer multisensory delights, such as coolness and pleasant smells, to its users. Not surprisingly, the trees and plants were elements highly valued by the users of Raul Soares square, while the water fountain was not (see Chapter Eight, sections 8.4 and 8.5).

The benches (55 references) were the second most often drawn element by users of Raul Soares Squares. Behavioural maps and observations shows that benches, lamp posts (12 references) and other fixed objects, such as trunk of trees, provided physical support to a variety of stationary activities (see Chapter Six, section 6.3.1). Nevertheless, the benches and the light posts may be described as elements of functional importance within this urban square. The Conjunto JK (JK Complex) (31 references) is a monumental and distinctive tower block located in the adjacent to Raul Soares Square. It is visible from almost everywhere within the square as well as from several points within the central area of the city of Belo Horizonte (Figure 7.8). The Conjunto JK, therefore, is likely to function as a landmark element to those people within Raul Soares Square.

Figure 7.8: Views from Raul Soares Square towards the Conjunto JK.

Table 7.3 shows that *visibility, distinctiveness, usefulness and pleasantness are properties likely to be present in the elements drawn by the participants in Raul Soares Square*. This result, therefore, reinforces the idea discussed in the conceptual framework (see Chapter Two, section 2.3) that singular form, visibility, intensity of use and meaningfulness, in some form of combination, explain why some elements stand out in the human cognitive maps, while others do not (Appleyard, 1969).

Table 7.3: Key attributes of the major elements which define the collective visual structure of Raul Soares Square.

			visibility	distinctiveness	pleasantness	usefulness
Urban furniture	Water fountain	(63 references)	x	x		
	Bench	(55 references)				x
	Lamp-post	(12 references)				x
Greenery	Tree	(52 references)			x	x
	Formal shrubbery	(29 references)		x	x	
	Garden	(17 references)			x	x
	Bush around the fountain	(15 references)	x		x	
Buildings	Conjunto JK	(31 references)	x	x		

Source: instrument type B, fieldwork 2007.

Table 7.4 shows that *the visual elements which compose the collective visual structure of Raul Soares Square, depending on the perceptible properties, play specific roles, while some of them play more than one role simultaneously.*

Table 7.4: The different roles played by the major visual elements of Raul Soares Square.

		Run	Area	Surface	Screen	Objects	Port	Merge	End	Fixed	Semi-fixed	Path	Node	Landmark	Edge	District	Boundary	Prop	Threshold
Urban furniture	Water fountain					x				x				x				x	
	Benches					x					x							x	
	Lamp-posts					x					x							x	
Greenery	Trees					x					x							x	
	Formal shrubbery					x				x					x		x		
	Garden		x								x					x			
	Bush around the fountain			x							x				x		x		
Buildings	Conjunto JK			x						x				x					

Source: instrument type B, fieldwork 2007.

For instance, the formal shrubbery defines an edge (lateral reference) for ambulant users as well as a boundary where sitters may control their level of exposure and monitor what is going on in the space (see Table 7.4). However, Table 7.4 also shows that the majority of the elements which compose the collective visual structure of Raul Soares Square are likely to function as a landmark, edge, boundary or prop.

In *Estação Square*, the water fountains (64 references) were the elements most frequently drawn by the participants. This distinctive and highly visible element balances the symmetric composition of the square, being also a source of multisensory delights, including visual, thermal, tactile and aurally pleasant sensations. Observation shows that the water fountains anchored active and passive forms of engagement, such as playful activities and people-watching (see Figure 7.9).

Figure 7.9: The water fountains in Estação Square anchoring passive and active forms of engagement.

Thus, the water fountains within Estação Square may be described as visible, distinctive, pleasant and useful elements, like the MAO (51 references), former Estação Ferroviária Central (see Figure 7.10). This building dominates the composition and is the focal point of Santos Dumont Avenue. In addition, behavioural maps and observation show that the steps, walls and columns of this building provided physical support for sitting and standing activities under shade (see Chapter Six, section 6.3.1).

Figure 7.10: Users in Estação Square spending time in the surroundings of MAO.

The Monumento à Terra Mineira (36 references) and the monumental lamp-posts (48 references) located alongside the Caetés and Guaicurus streets may be described as distinctive, visible elements, pleasant and useful elements (see Figure 7.11).

Figure 7.11: Users spending time in the surroundings of the Monumento à Terra Mineira (top) and the monumental lamp-posts (bottom) in Estação Square.

Behavioural maps and observations (see Chapter Six, section 6.3.1) show that these elements provided physical support to stationary users carrying out sitting and standing activities while experiencing positive micro-climatic conditions (see Figure 7.11). While large activity clusters tended to occur in the steps around the Monumento à Terra Mineira,

singly activities, or in pairs, were observed nearby the monumental lamp-posts (see Chapter Six, section 6.3.5).

The Ipê (20 references), a highly visible tree situated in the esplanade, and the trees (19 references) defining the alamedas alongside Caetés and Guaicurus streets, differ from the water fountains, MAO, Monumento à Terra Mineira, and also the monumental lamp-posts within the Estação Square in that they do not have a singular form, although they resemble them in the way in which they provide the opportunity for users to experience a wealth of positive sensory sensations. Thus, the Ipê may be an important element to users of Estação Square mostly because of its pleasantness and visibility (see Figure 7.12).

Figure 7.12: Users carrying out stationary activities in the surroundings of the Ipês in the esplanade of the Estação Square at different times of the year.

Observation shows that the use intensity nearby the Ipê oscillated throughout the year because when it flourishes, between the months of August and September, it loses its leaves, diminishing the degree of opportunities to experience positive sensory information, such as the smell of fresh air and favourable climatic conditions (see Figure 7.12).

In was also observed that the trunks of the trees within Estação Square occasionally provided physical support to carry out stationary activities as well as its benches (43

references). However, observation shows that the benches, although in wood and with backs, were not likely to retain users for long periods because the large majority of these elements were in the sun (see Chapter Six, section 6.3.1). As discussed, in a city with a tropical climate, such as the city of Belo Horizonte, shaded and semi-shaded sitting spaces tend to be preferred as they are likely to offer opportunity to experience favourable climatic conditions during lunch breaks.

The Edifício Central (12 references), a large commercial building, is likely to function as a landmark feature to users within Estação Square. By contrast, the tube station (10 references) is neither a highly distinctive nor visible building. However, observations and behavioural maps (see Chapter Six, section 6.3.5) show that the vertical surfaces defining the main entrance of the tube station provides physical support to sitting and standing activities (see Figure 7.13).

Figure 7.13: View from Rui Barbosa Square towards MAO (top) and vistas from Estação Square towards Edifício Central (bottom left) and tube station (bottom right).

Table 7.5 shows that visibility, distinctiveness, usefulness and pleasantness are properties likely to be present, in some form of combination, in the major components of the collective visual structure of Estação Square. Table 7.6 shows that *the visual elements which compose the collective visual structure of Estação Square, depending on their perceptible properties, play specific roles, while some of them play more than one role*

simultaneously. In this regard, the water fountains within Estação Square can be described as an element likely to be perceived as a landmark by those walking through the square and as prop to those inclined to perform playful activities (see Table 7.6).

Table 7.5: Key attributes of the major elements which define the collective visual structure of Estação Square.

			visibility	distinctiveness	pleasantness	usefulness
Urban furniture	Water fountain	(64 references)	x	x	x	x
	Lamp-post	(48 references)	x	x	x	x
	Bench	(43 references)				x
	Monumento à Terra Mineira	(36 references)	x	x	x	x
Greenery	Ipê	(20 references)	x	x	x	x
	Tree	(19 references)	x		x	x
Buildings	MAO	(51 references)	x	x	x	x
	Edifício Central	(12 references)	x	x		
	Tube Station	(10 references)				x

Source: instrument type B, fieldwork 2007.

Table 7.6: The different roles played by the major visual elements of Estação Square.

		Run	Area	Surface	Screen	Objects	Port	Merge	End	Fixed	Semi-fixed	Path	Node	Landmark	Edge	District	Boundary	Prop	Threshold
Urban furniture	Water fountain					x					x			x				x	
	Lamp-post					x					x			x	x		x	x	
	Bench					x					x				x		x	x	
	Monumento à Terra Mineira					x				x				x				x	
Greenery	Ipê					x					x			x				x	
	Tree				x						x				x		x	x	
Buildings	MAO			x						x				x	x		x		
	Edifício Central			x						x				x					
	Tube Station			x			x			x				x				x	x

Source: instrument type B, fieldwork 2007.

However, the table above also shows that the majority of the elements which compose the collective visual structure of Estação Square functions as landmark, edge, boundary and/or prop. By layering information obtained with the sketch map technique, the collective visual structure of Liberdade Square, Raul Soares Square and Estação Square

was given a graphical representation with the help of the GIS-supported software ArcView (see Figures 7.14, 7.15 and 7.16).

The evidence of the present research shows that *visibility, distinctiveness, usefulness and pleasantness are properties likely to be present in the main components that define the collective visual structure* of central urban squares. This result, therefore, reinforces the idea discussed in the conceptual framework (see Chapter Two, section 2.3) that distinctiveness, visibility, intensity of use and meaningfulness, in some form of combination, explain why some elements stand out in the human cognitive maps, while others do not (Appleyard, 1969).

It was found that different elements accommodate distinctive roles depending on their physical properties, the nature of the activity in progress as well as users' inclinations. It follows that the perceptible qualities of elements of urban design affect the degree to which they support certain actions. In addition, if it is accepted that sketch maps reveal what is important to the participant (see Chapter Four, section 4.4.2), one important conclusion from the preceding account must be that *boundaries, props, edges and landmarks are regarded as important urban design elements by users of central urban squares*.

Figure 7.14: The graphical representation of the collective visual cognitive structure (or visualscape) of Liberdade Square.

Source: instrument type B, fieldwork 2007.

Figure 7.15: The graphical representation of the collective visual cognitive structure (or visualscape) of Raul Soares Square.

Source: instrument type B, fieldwork 2007.

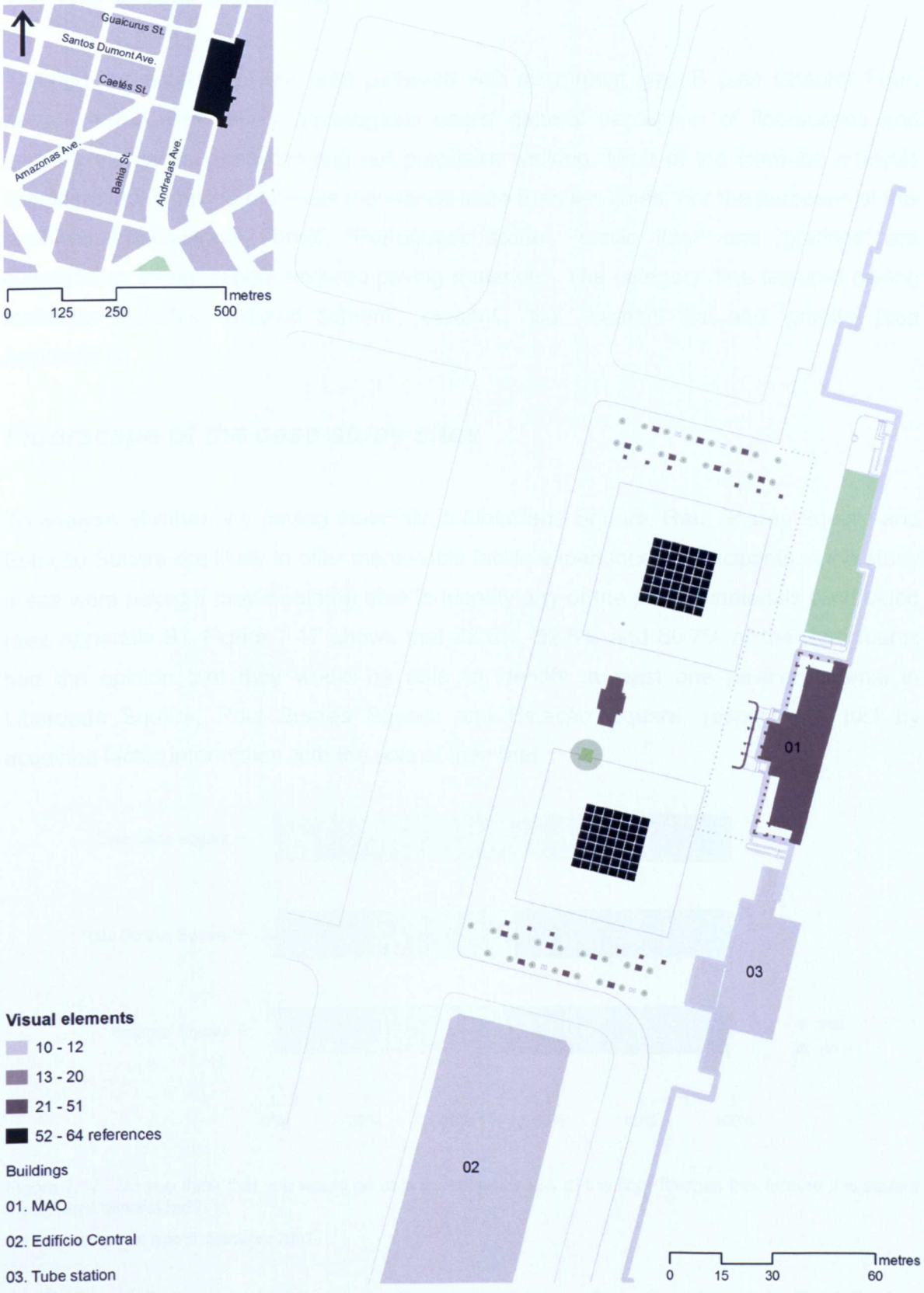


Figure 7.16: The graphical representation of the collective visual cognitive structure (or visualscape) of Estação Square.

Source: instrument type B, fieldwork 2007.

7.3 The tactile elements

Through the analysis of the data gathered with instrument type B (see Chapter Four, section 4.4.2), this section investigates users' general perception of floorscapes and tactile preferences when carrying out purposive walking. Most of the following analysis considers those paving materials mentioned more than ten times. For the purposes of this research 'cobblestone', 'brick', 'Portuguese stone', 'tactile floor' and 'gratings' are classified as being 'coarse textured paving materials'. The category 'fine textured paving materials' includes 'textured cement', 'cement', 'tile', 'cement tile' and 'granite' (see Appendix C).

Floorscape of the case study sites

To analyse whether any paving materials in Liberdade Square, Raul Soares Square and Estação Square are likely to offer memorable tactile experiences, participants in the study areas were asked if they would be able to identify any of the paving materials blindfolded (see Appendix B). Figure 7.17 shows that 82.6%, 52.8% and 50.7% of the participants had the opinion that they would be able to identify at least one paving material in Liberdade Square, Raul Soares Square and Estação Square, respectively, just by acquiring tactile information with the sole of their feet.

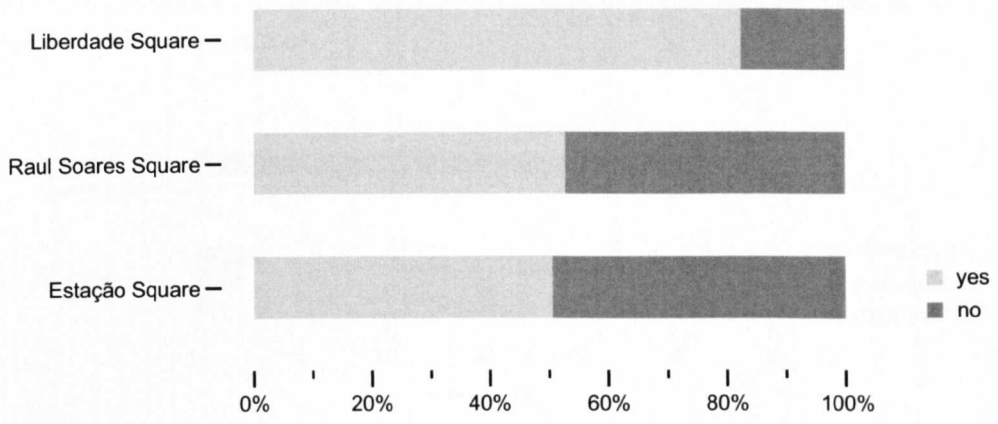


Figure 7.17: Do you think that you would be able to recognize any of the floor finishes that feature this square if you were blindfolded?

Source: instrument type B, fieldwork 2007.

It was found that users in Liberdade Square are more likely than users in Raul Soares Square and Estação Square to sense memorable tactile experiences with the soles of their feet when walking through it (p=.001). This finding, therefore, suggests that *different*

central urban squares provide different degrees of choices and opportunities to experience memorable tactile experiences with the soles of their feet while walking. The three paving materials first-cited by participants as offering memorable tactile experiences through the soles of their feet were quantified into frequencies with the help of the statistical software SPSS. Results in Liberdade Square and Estação Square[1] are illustrated in the Figures 7.18 and 7.19, respectively, where those textured paving materials which were mentioned less than ten times are not included.

Cement tile paving and tactile floor paving in Estação Square as well as textured cement paving and cobblestone in Liberdade Square, all *paving materials covering pedestrian routes, were likely to be the first-cited paving materials.* The brick in Liberdade Square, a *paving material located along the borders of the pedestrian routes, was most often cited second.*

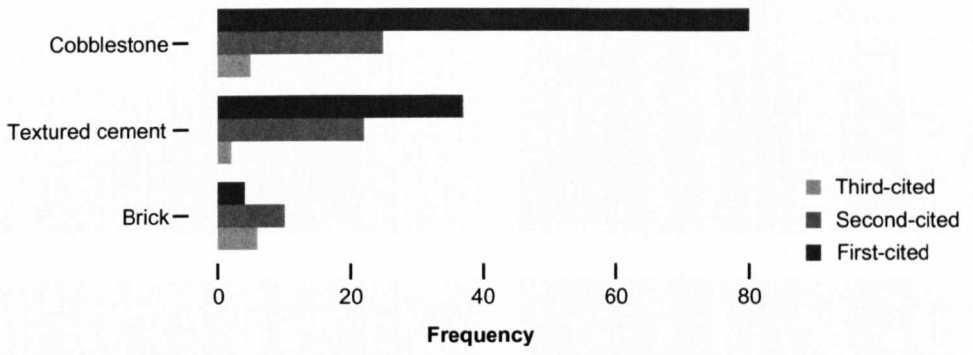


Figure 7.18: Paving materials in Liberdade Square whose tactile properties were perceived as memorable.
Source: instrument type B, fieldwork 2007.

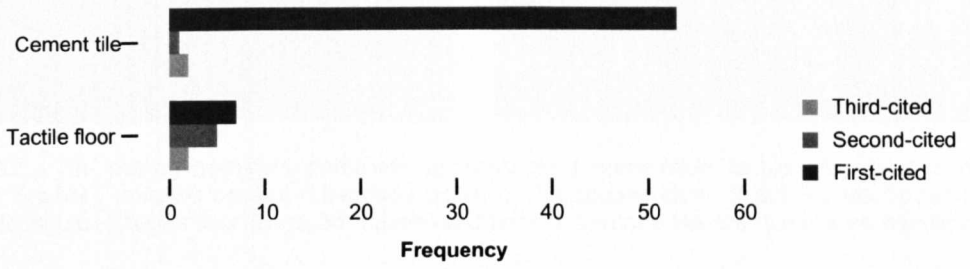


Figure 7.19: Paving materials in Estação Square whose tactile properties were perceived as memorable.
Source: instrument type B, fieldwork 2007.

Those paving materials mentioned more than ten times as presenting memorable tactile properties are cobblestone (110 mentions), textured cement paving (61 mentions) and brick (20 mentions) *in Liberdade Square*, Portuguese stone *in Raul Soares Square* (66

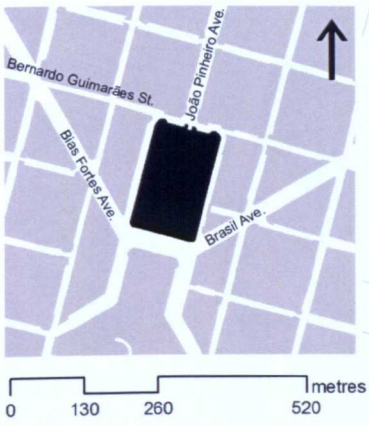
[1] Raul Soares Square was excluded from this analysis because Portuguese stone is the only material which features its paved area.

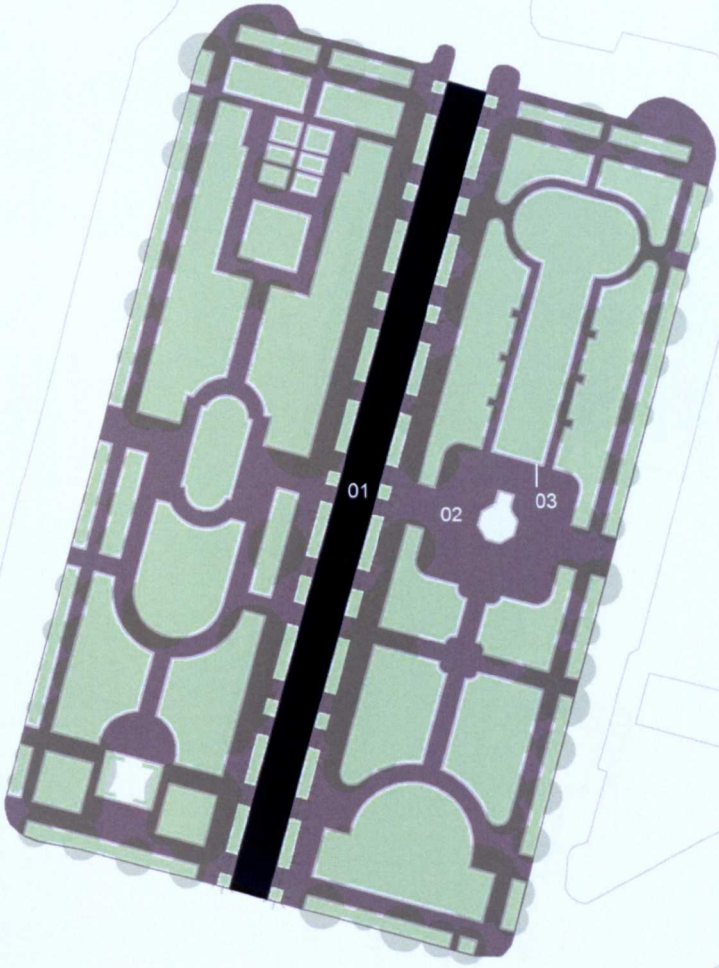
mentions), as well as cement tile paving (56 mentions) and tactile floor paving (14 mentions) in *Estação Square* (see Figure 7.20).

Figure 7.20: The paving materials perceived as presenting memorable tactile properties: cobblestone (Liberdade Square), textured cement (Liberdade Square), Portuguese stone (Raul Soares Square), cement tile (Estação Square), tactile floor (Estação Square) and brick (Liberdade Square) (clockwise direction).

By layering information provided by the participants, the collective tactile structure[2] of Liberdade Square and Estação Square is given a graphical representation with the help of the GIS-supported software ArcView (see Chapter Four, section 4.7.2). Figures 7.21 and 7.22 show the location of the most salient paving materials perceived as presenting memorable tactile properties in Liberdade Square and Estação Square.

[2] The graphical representation of the collective tactile structure of Raul Soares Square was not generated because Portuguese stone is the only material which features its paved area.





Tactile elements

- 20
- 21 - 61
- 62 - 110 references
- Greenery
- Tree

Paving materials

01. Cobblestone

02. Textured cement

03. Brick

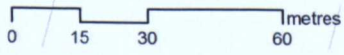


Figure 7.21: The graphical representation of the collective tactile cognitive structure (or floorscape) of Liberdade Square.

Source: instrument type B, fieldwork 2007.

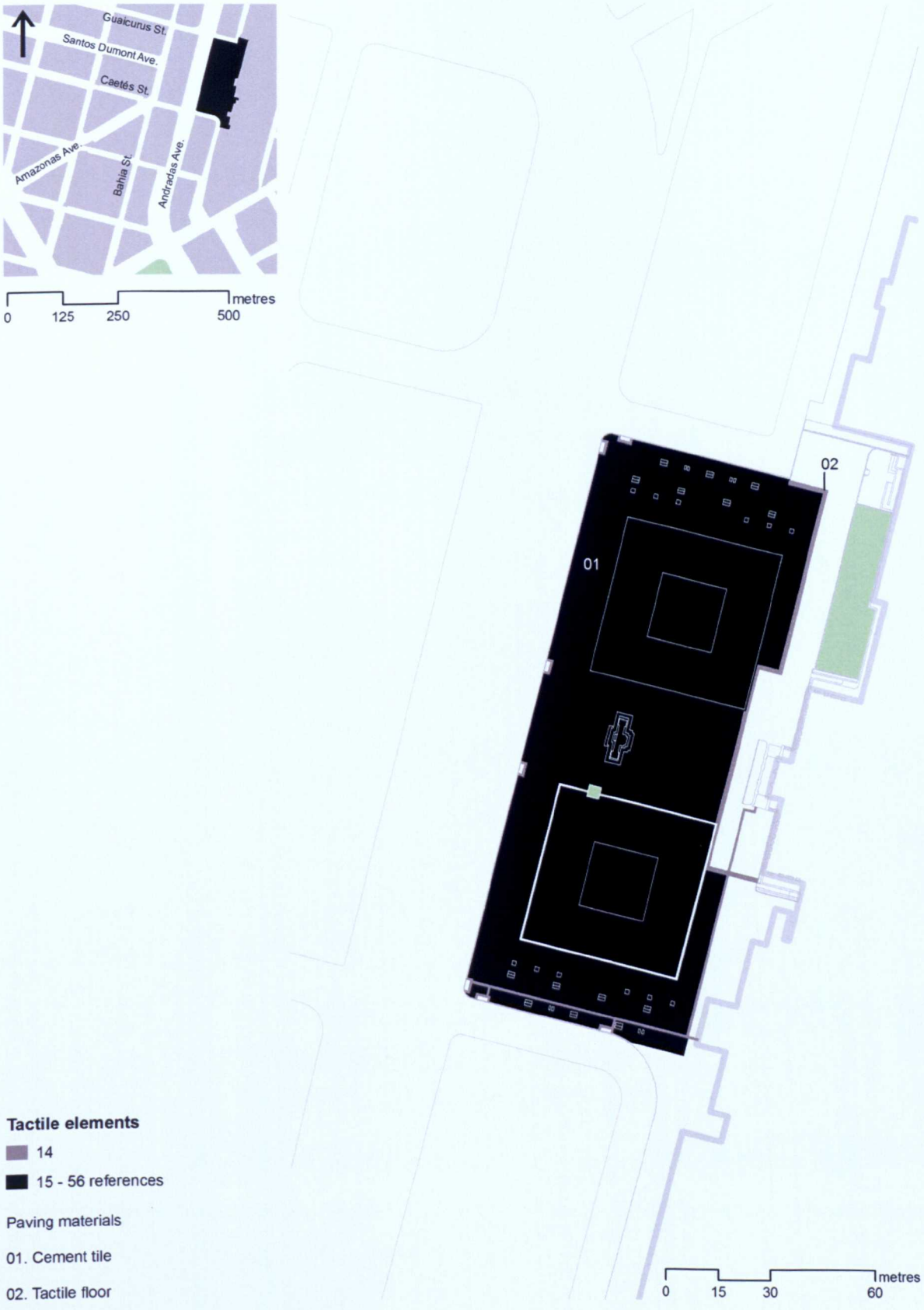


Figure 7.22: The graphical representation of the collective tactile cognitive structure (or floorscape) of Estação Square.

Source: instrument type B, fieldwork 2007.

Tactile preferences

To analyse tactile preferences, the participants were asked to classify the paving material noticed by them into 'very uncomfortable', 'uncomfortable', 'indifferent', 'comfortable' and 'very comfortable'. These categories were further grouped into 'uncomfortable', 'indifferent', and 'comfortable' to facilitate the analysis. The results shown in Figures 7.23, 7.24 and 7.25 suggest that 'coarse textured paving materials' (cobblestone, brick, and tactile floor) tend to be more often classified as 'uncomfortable' to walk on than 'fine textured paving materials' (textured cement paving and cement tile).

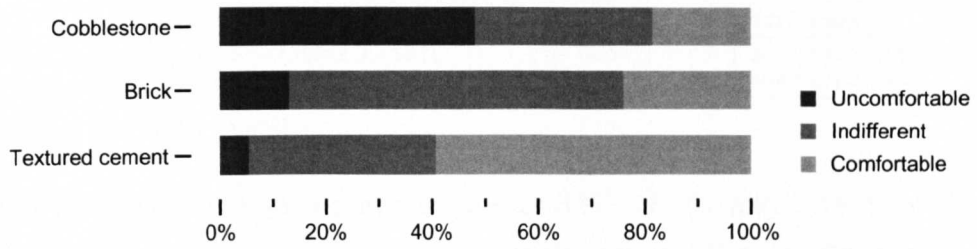


Figure 7.23: Evaluation of the tactile properties of the most salient paving materials associated with Liberdade Square.

Source: instrument type B, fieldwork 2007.

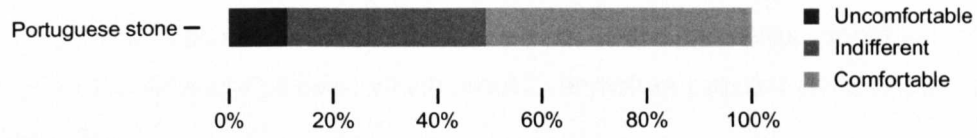


Figure 7.24: Evaluation of the tactile properties of the most salient paving materials associated with Raul Soares Square.

Source: instrument type B, fieldwork 2007.

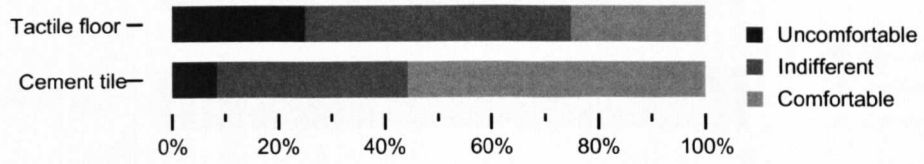


Figure 7.25: Evaluation of the tactile properties of the most salient paving materials associated with Estação Square.

Source: instrument type B, fieldwork 2007.

However, as far as this finding is concerned, it is important to bear in mind that evidence of this research suggests that the majority of walking though the study areas are a kind of short cut (see Chapter Six, section 6.4). It follows that 'coarse-textured paving materials'

may have been classified as more 'uncomfortable' than 'fine-textured paving materials' to perform purposive walking in the study areas. Thus, for other types of walking such as walking for leisure, coarse-textured paving materials may even be preferred.

A Mann-Whitney U test[3] revealed that fine textured paving materials (textured cement, cement, tile, cement tile and granite) tend to provide higher levels of satisfaction when walking than those characterised by coarse textures (cobblestone, brick, tactile floor paving and gratings) (see Table 7.7).

Table 7.7: Difference between fine and coarse textured paving materials in terms of levels of preference.

Case studies	
Liberdade Square	Estação Square
fine (Md=3, n=151) and coarse (Md=2, n=181), U =6725, z =-8.51, p = .001	fine (Md=2, n=171) and coarse (Md=3, n=28), U=1152, z=-4.89, p =.001

Source: instrument type B, fieldwork 2007.

The category 'uncomfortable' accounted for 24.1%, 11.3% and 13.6% of the tactile classifications in Liberdade Square, Raul Soares Square and Estação Square (see Figure 7.26). The calculation of the lower and higher estimates of the true values shows that the *minority of the tactile experiences through the sole of the feet provided by Liberdade Square, Raul Soares Square and Estação Square were classified as 'uncomfortable'* (see Appendix D). Observations generally support this. The paved areas of the study areas, at the time that the fieldwork activities took place, were in better condition than the pavements in the adjacent streets, which would very often present deficiencies, such as uneven surfaces.

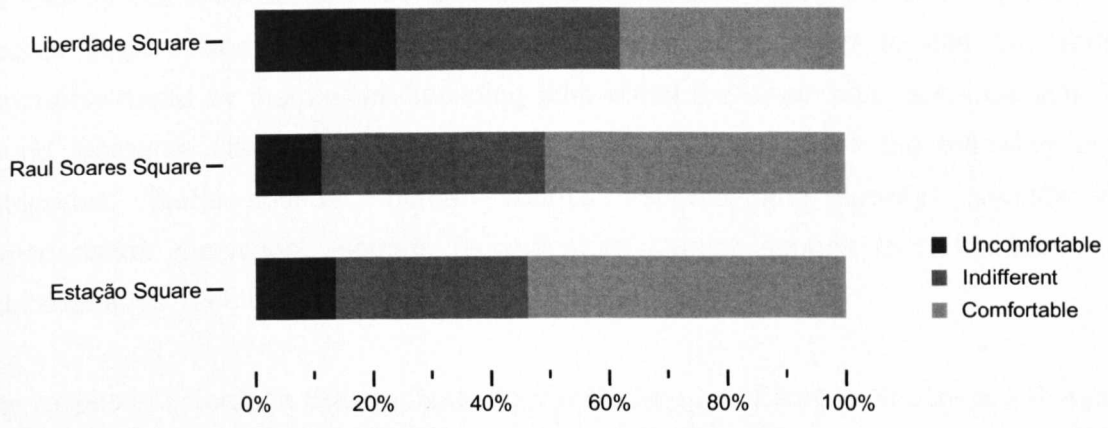


Figure 7.26: Classification of the paving materials in Liberdade Square, Raul Soares Square and Estação Square.

Source: instrument type B, fieldwork 2007.

[3] Raul Soares Square was excluded from the analyses because its paved area is covered exclusively with Portuguese stone.

The calculation of the lower and higher estimates of the true values also indicates that the *majority of the tactile experiences acquired through the soles of the feet when carrying out purposive walking in Liberdade Square, Raul Soares Square and Estação Square tend to trigger a sense of comfort or discomfort* in their perceivers (see Appendix D). Thus, the findings of the present research tend to support the idea discussed in the theoretical framework that *touch is a sense connected to human emotions and likely to trigger emotionally powerful experiences* (see Chapter Two, section 2.4). From the preceding it may be concluded that *ambulant users are highly sensitive to tactile quality of the paved areas and that they tend to value positively those fine textured paving materials while carrying out purposive walking.*

7.4 The sound elements

This section investigates users' general perception of soundscapes and sonic preferences with the help of the statistical software SPSS, ArcView, and tagcrowd web tool. Most of the following analysis considers those sound elements mentioned more than ten times by the participants in Liberdade Square, Raul Soares Square and Estação Square. Data gathered with the instrument type B (see Chapter Four, section 4.4.2) guides the investigation in this section.

Soundscape of the case study sites

To identify the most salient sound elements associated with Liberdade Square, Raul Soares Square and Estação Square, participants were asked to cite the sounds commonly heard by them when spending time within the urban square in question. The sound elements cited by the participants were grouped under the following broad categories: 'fauna sounds', 'human sounds', 'sounds and society', 'sounds from transportation machines', 'sounds as indicators', 'water sounds from fountain' and 'miscellaneous' (see Chapter Four, section 4.7.1).

The results in Liberdade Square, Raul Soares Square and Estação Square are illustrated in the Figures 7.27, 7.28 and 7.29 respectively, where those sounds which were mentioned less than ten times are not included. The citations grouped under the categories, 'fauna sounds', 'human sounds', *'sounds from construction'*, and 'water sound from the fountain', *informative sounds, were more likely to be cited second or third*, while

'sounds from transportation machines', *intrusive sounds, were the most often first-cited sounds* in all the study areas.

Figures 7.27, 7.28 and 7.29 show that sounds produced by vehicular traffic were frequently associated with Liberdade Square, Raul Soares Square and Estação Square by their users. The evidence of the present research, therefore, tends to validate the idea that *'sounds from transportation machines' have become the dominant sound element in central urban spaces within large cities* (Porteous, 1996).

In Liberdade Square, 'sounds from transportation machines' (134 mentions) were the ones mentioned most often by the participants. In addition, 'fauna sounds' (85 mentions), 'human sounds' (52 mentions), 'water sounds from fountains' (25 mentions) and 'sounds as indicators' (19 mentions) were also frequently associated with this central urban square by its users (see Appendix D).

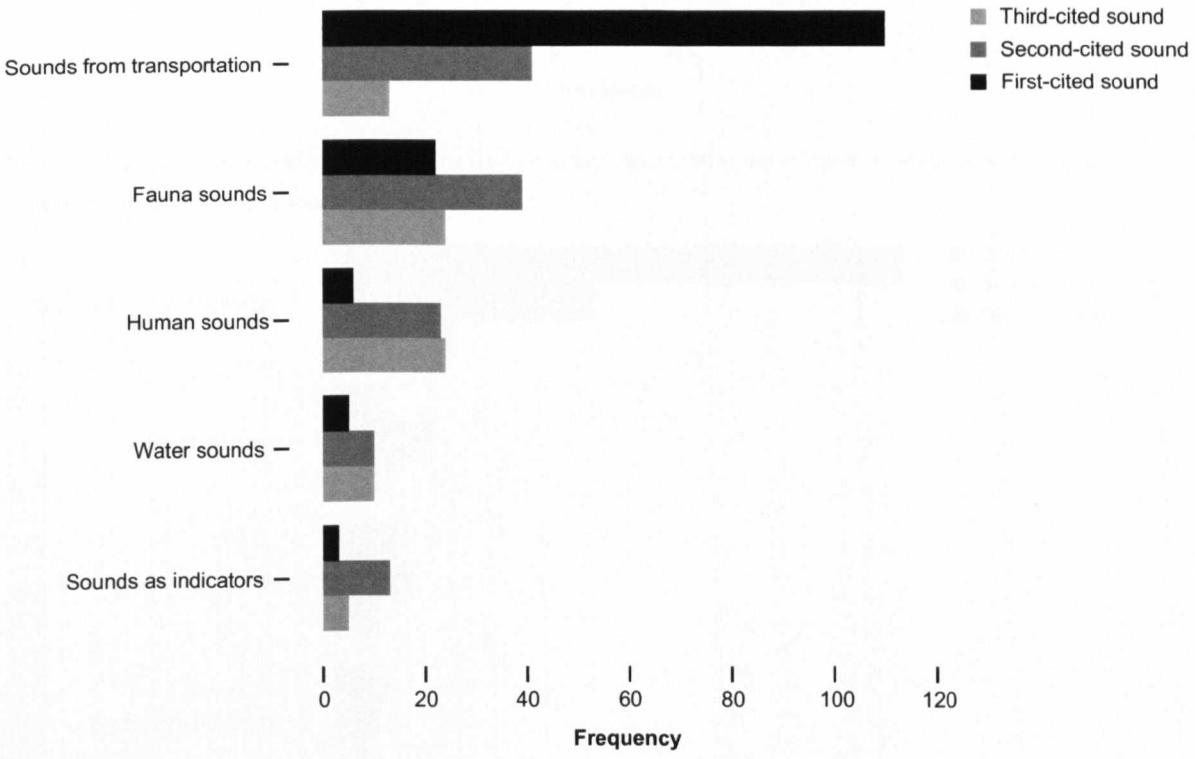


Figure 7.27: Classes of sound elements most frequently cited by the participants in Liberdade Square.
Source: instrument type B, fieldwork 2007.

In Raul Soares Square, 'sounds from transportation machines' (113 mentions) were the ones mentioned most frequently by the participants. The other sound elements associated with this central urban square by its users included: 'human sounds' (35 mentions), 'sounds as indicators' (34 mentions), 'sounds of society' (14 mentions) and 'fauna sounds'(13 mentions) (see Appendix D).

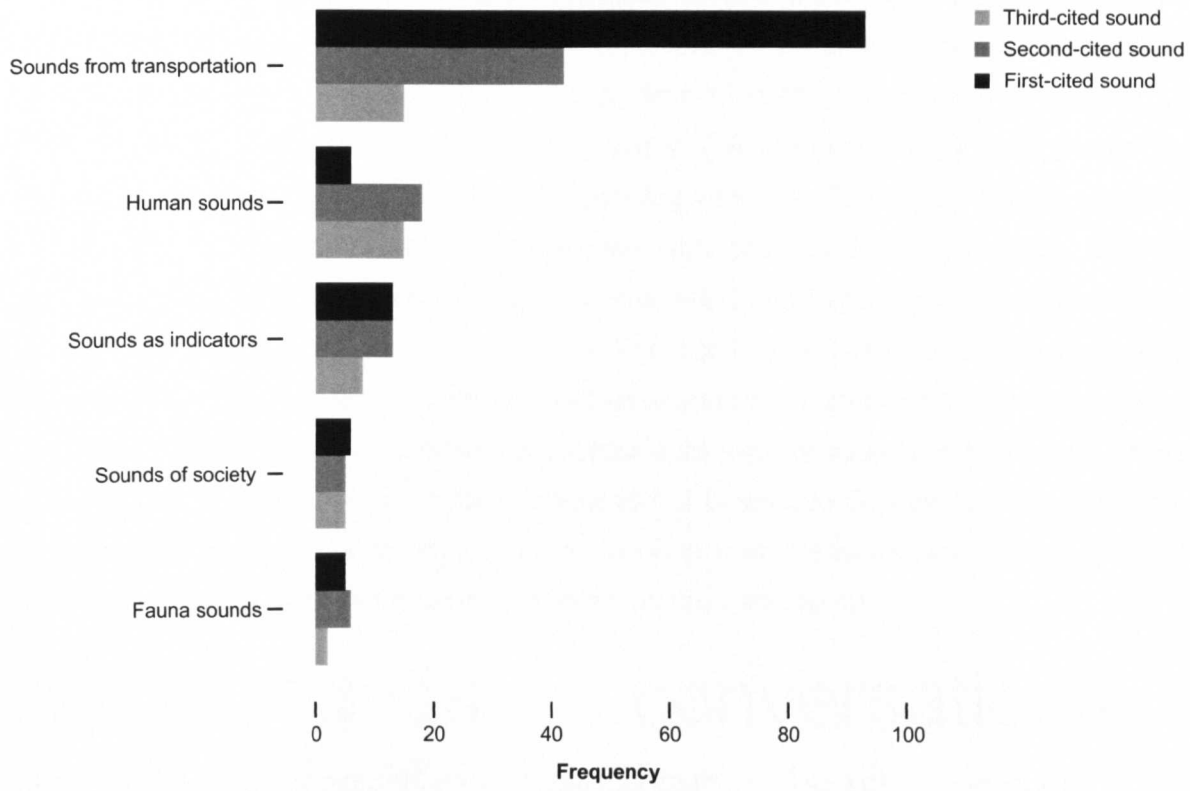


Figure 7.28: Classes of sound elements most frequently cited by the participants in Raul Soares Square.

Source: instrument type B, fieldwork 2007.

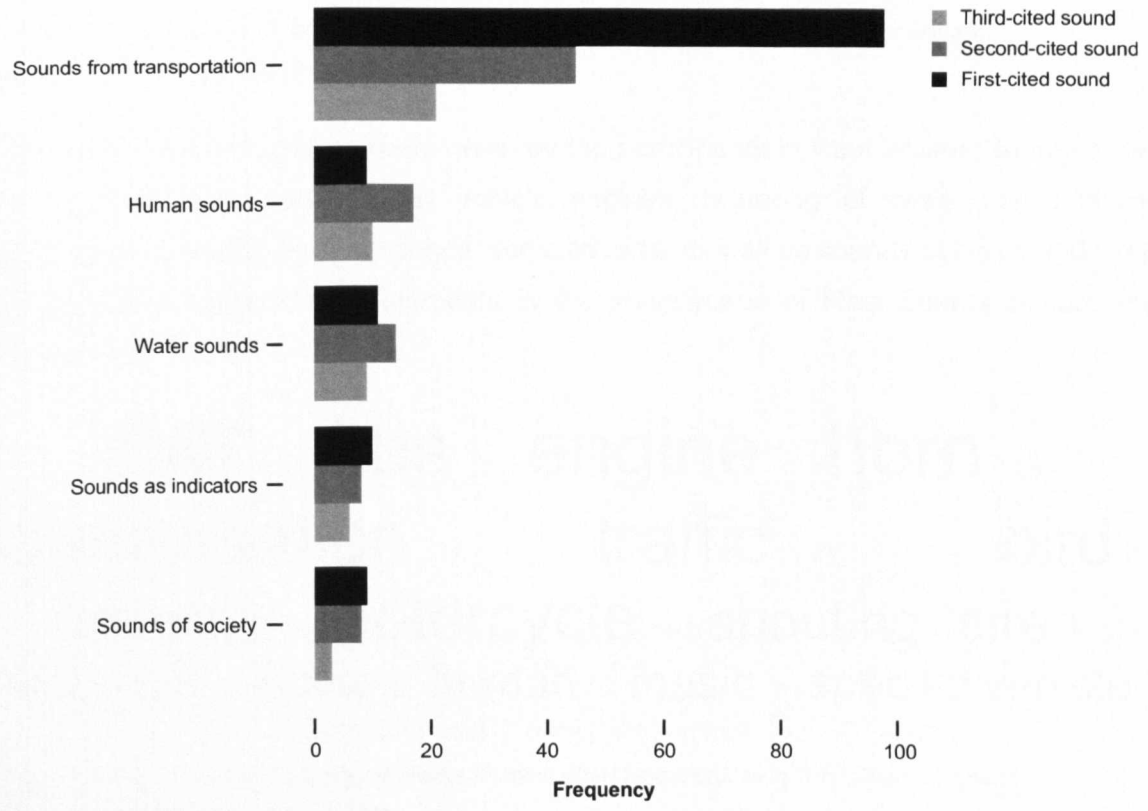


Figure 7.29: Classes of sound elements most frequently cited by the participants in Estação Square.

Source: instrument type B, fieldwork 2007.

As in the other study areas, in Estação Square, 'sounds from transportation machines' (127 mentions) were the ones mentioned most often by the participants. In addition, 'human sounds' (35 mentions), 'water sounds from fountain' (34 mentions), 'sounds as indicators' (22 mentions) and 'sounds of society' (19 mentions) were also frequently associated with this central urban square (see Appendix D). To provide a more detailed description of the types of sounds associated with each of the study areas, specific answers were grouped under subcategories, quantified into frequencies and uploaded to the tagcrowd web tool for easy visualization. The word cloud from the answers given by the participants in Liberdade Square shows that sounds from cars and buses, twittering of birds, conversations, water sounds from fountains as well as sounds of horns and sirens are all salient sound elements in the soundscape of Liberdade Square (see Figure 7.30). As discussed earlier, in Liberdade Square, 'sounds from transportation machines' (134 mentions) were the ones mentioned most often by the participants.

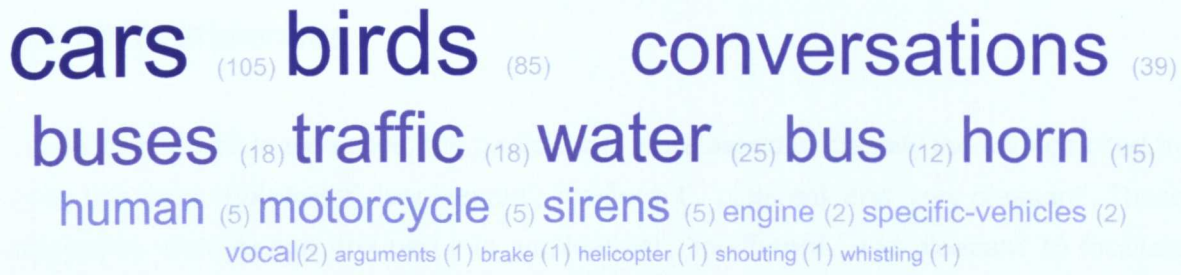


Figure 7.30: Word cloud of the sound elements most often associated with Liberdade Square.
Source: instrument type B, fieldwork 2007.

The word cloud from the answers given by the participants in Raul Soares Square shows that sounds from cars, buses, vehicle engines, twittering of birds, conversations, arguments, shouting, human sounds, sonic adverts, as well as sounds of horns and sirens are all highly salient sound elements in the soundscape of Raul Soares Square (see Figure 7.31).

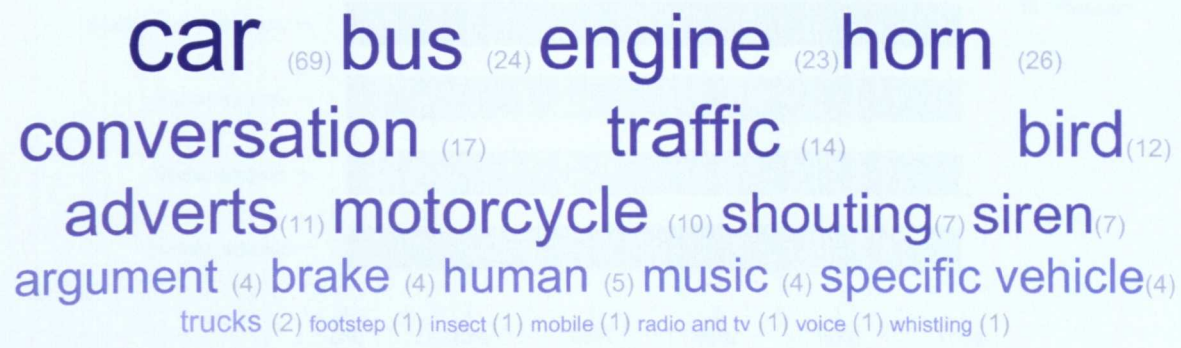


Figure 7.31: Word cloud of the sound elements most often associated with Raul Soares Square.
Source: instrument type B, fieldwork 2007.

The word cloud from the answers given by the participants in Estação Square shows that sounds from cars, buses, tube, train, truck and motorcycle, sonic adverts, music, water sounds from fountain, conversations, human sounds, voices as well as sounds of horn and siren are all highly salient sound elements in the soundscape of Estação Square (see Figure 7.32).

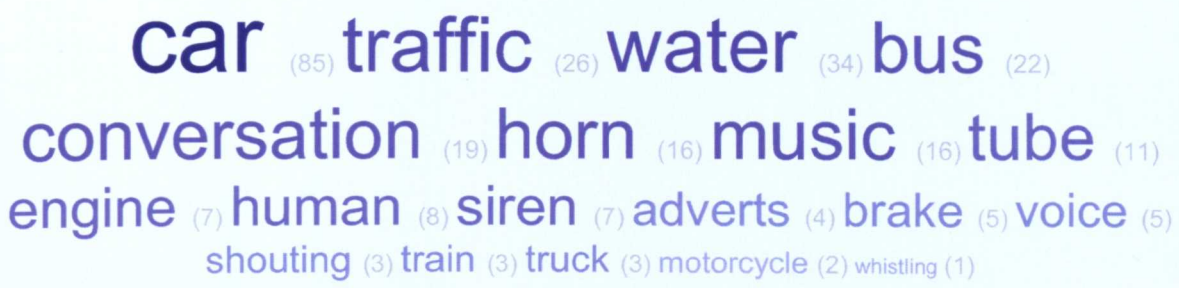


Figure 7.32: Word cloud of the sound elements most often associated with Estação Square.
Source: instrument type B, fieldwork 2007.

Sound preferences

To analyse sound preferences, the participants were asked to classify the sounds cited by them into 'very unpleasant', 'unpleasant', 'indifferent', 'pleasant' and 'very pleasant'. These categories were further grouped into 'unpleasant', 'indifferent', and pleasant' to facilitate the analysis (see Chapter Four, section 4.4.1).

The results shown in Figures 7.33, 7.34 and 7.35 suggest that while 'fauna sounds' and 'water sound from fountain' tend to be classified as 'pleasant', 'sounds from transportation machines' and 'sounds as indicators' tend to be classified as 'unpleasant' by users of central urban squares in the context of Belo Horizonte.

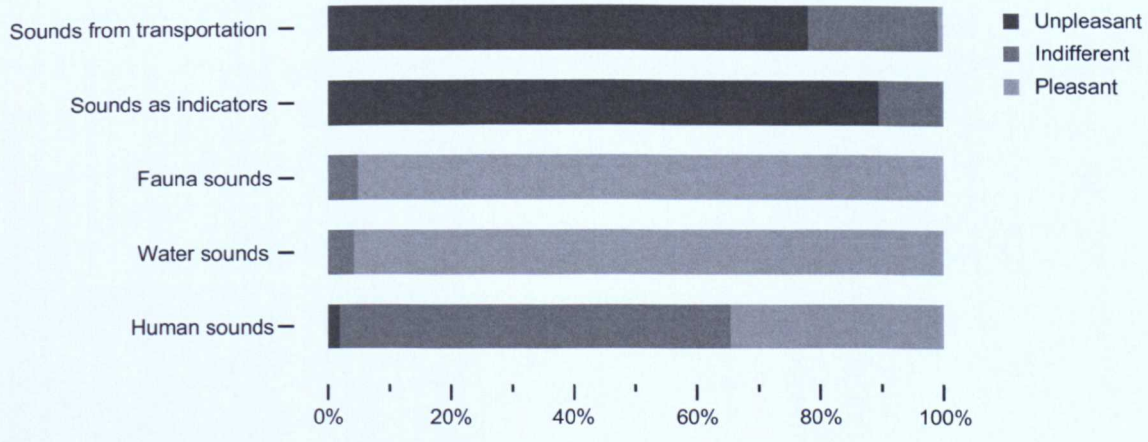


Figure 7.33: Evaluation of the most salient sound elements associated with Liberdade Square.
Source: instrument type B, fieldwork 2007.

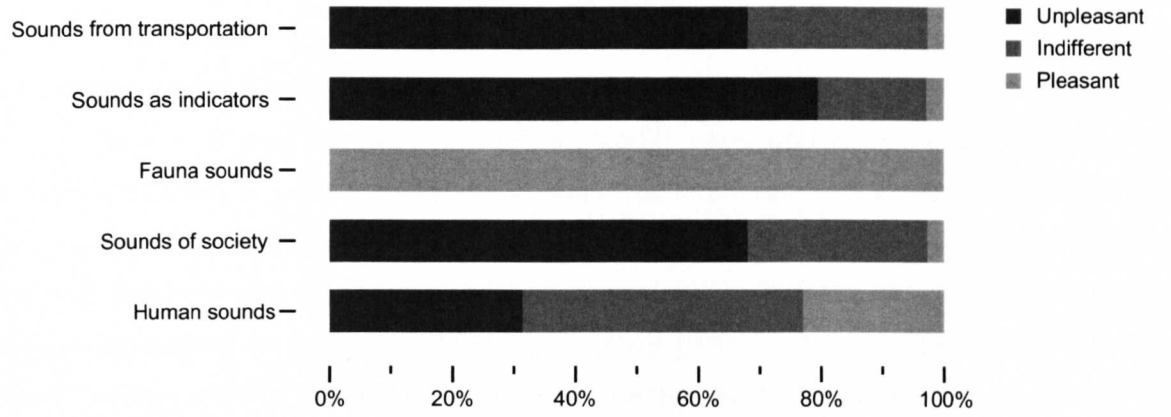


Figure 7.34: Evaluation of the most salient sound elements associated with Raul Soares Square.

Source: instrument type B, fieldwork 2007.

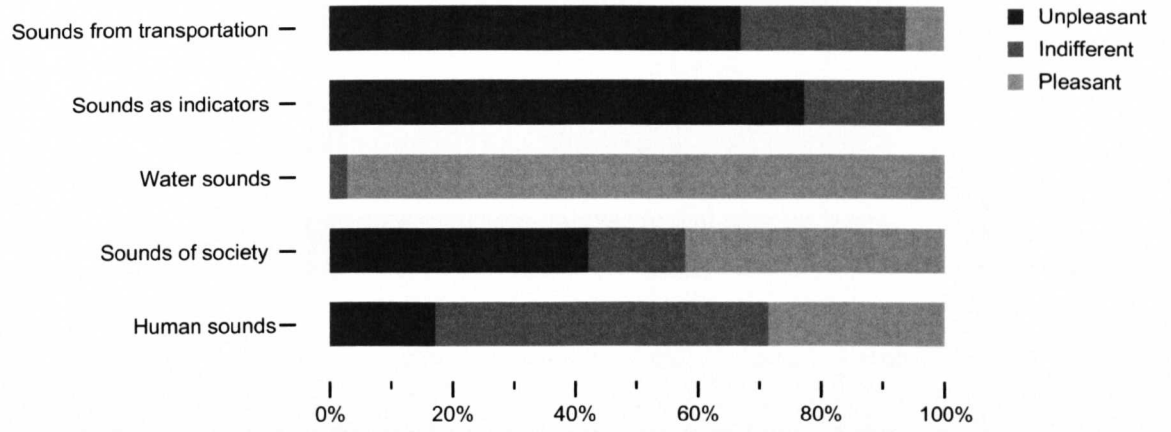


Figure 7.35: Evaluation of the most salient sound elements associated with Estação Square.

Source: instrument type B, fieldwork 2007.

Corresponding to the results of other researchers (Kang, 2007; Yang and Kang, 2005) a Mann-Whitney U test revealed that *'natural sounds' ('water sound from fountain' and 'fauna sounds') tend to provide higher levels of preference than 'urban sounds' ('sounds from transportation machines', 'sounds as indicators' and 'sounds from construction') in all the study areas* (see Table 7.8).

Table 7.8: Difference between 'natural sounds' and 'urban sounds' in terms of levels of preference.

Case studies		
Liberdade Square	Raul Soares Square	Estação Square
natural (Md=3, n=108) and urban (Md=1, n=155), U =134, z =-14.87, p = .001	natural (Md=3, n=13) and urban (Md=1, n=149), U =26, z =-6.92, p = .001	natural (Md=3, n=38) and urban (Md=1, n=153), U =176.5, z =-9.92, p = .001

Source: instrument type B, fieldwork 2007.

Figures 7.33, 7.34 and 7.35 also show that *sounds within the category 'human sounds'*, such as conversations, *were most often classified as 'indifferent' by the participants* in Liberdade Square, Raul Soares Square and Estação Square, a result which corresponds to the findings of previous research (Kang, 2007; Yang and Kang, 2005). Figure 7.36 indicates that few sounds tend to be classified as 'indifferent' in Liberdade Square, Raul Soares Square and Estação Square. The calculation of the lower and higher estimates of the true values shows that *sound elements associated with the study areas were likely to trigger emotionally powerful experiences on their perceivers*, as suggested by the bar chart below (see Appendix D). This result reinforces the idea discussed within the conceptual framework that hearing is a sense which affects people's sense of well-being and should be taken into account more by designers (see Chapter Two, section 2.4).

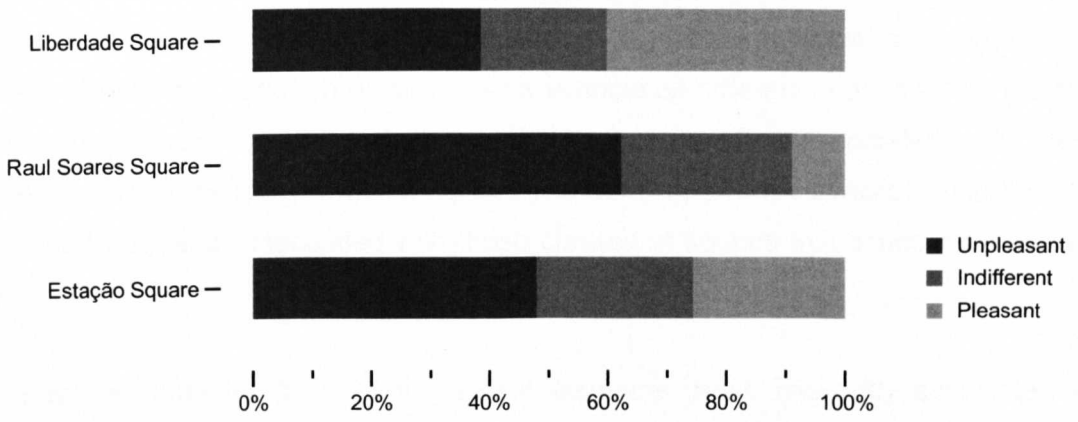


Figure 7.36: Classification of the major sound elements associated with Liberdade Square, Raul Soares Square and Estação Square.

Source: instrument type B, fieldwork 2007.

A Mann-Whitney U test found that the *satisfaction levels with sounds associated with Liberdade Square were significantly higher than those associated with Estação Square*, which, in turn, were *significantly higher than those associated with Raul Soares Square* (see Table 7.9). Thus, it can be concluded that *different central urban squares offer different degrees of choices and opportunities to experience positive sonic experiences.*

Table 7.9: Difference in the satisfaction levels with the sound elements associated with Liberdade Square, Raul Soares Square and Estação Square.

Case studies		
Liberdade Square and Raul Soares Square	Liberdade Square and Estação Square	Raul Soares Square and Estação Square
sounds in Liberdade Square (Md=2, n=324) and sounds in Raul Soares Square (Md=1, n=313), U=33794, z =-7.93, p =.001	sounds in Liberdade Square (Md=2, n=324) and sounds in Estação Square (Md=2, n=246) U=34059, z =-3.19, p =.001	sounds in Raul Soares Square (Md=1, n=313) and sounds in Estação Square (Md=2, n=246) U=31056, z =-4.393, p =.001

Source: instrument type B, fieldwork 2007.

Mapping the soundscape of central urban squares

This section elicits, represents (in dot distribution maps), and analyses the soundscape (or collective sonic structure) of the study areas. The soundscape maps use a dot symbol where each dot represents a value (number of citations). Dot distribution maps were preferred to represent the collective sonic structure of the study areas because they provide an effective way to display events which do not have well-defined boundaries (see Chapter Four, section 4.7.2).

To represent the collective sonic cognitive structure of the study areas, participants were asked to provide 'whereness' information about those sounds cited by them. By layering information obtained with the instrument type B, the collective sonic structure of Liberdade Square, Raul Soares Square and Estação Square is given a graphical representation with the help of ArcView. Although different users associated different spaces within the study areas with different sounds, certain sounds were more often associated with specific spaces and/or elements. The following analysis considers those spaces within the study areas most frequently associated with those classes of sounds mentioned more than ten times.

The graphical representation of the sound elements most frequently associated with Liberdade Square shows that (i) 'sounds from transportation machines' and 'sound as indicator' were most often associated with the boundary of this urban square, (ii) 'human sounds' as well as 'fauna sounds' were most frequently expected to be heard in its central alameda and in the space punctuated by the bandstand, and (iii) 'water sound from fountain' was most often associated with the adjacent areas of the water fountain perpendicular to Golçalves Dias Street (see Figure 7.37).

Thus, while the boundary of Liberdade Square was associated with unpleasant and intrusive sounds, the central alameda as well as the water fountain perpendicular to Gonçalves Dias Street tended to be associated with highly appreciated sonic experiences. The sound elements in the soundscape of Liberdade Square suggest that this urban space is a type of popular oasis within a busy urban context.

The graphical representation of the sound elements most frequently associated with Raul Soares Square shows that (i) 'sounds from transportation machines', 'sound as indicator' and 'social sounds' were most often associated with the boundary of this urban square,

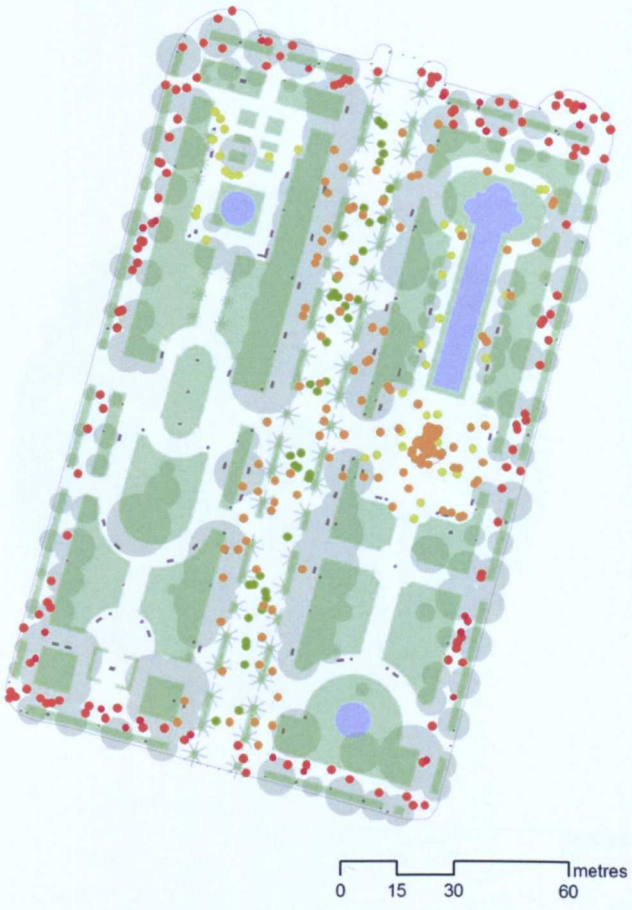
and (ii) 'human sounds' as well as 'fauna sounds' were most frequently expected to be heard in its inner core (see Figure 7.38).

Thus, the boundary of Raul Soares Square was associated with unpleasant sounds, while its inner core tended to be associated with sonic experiences highly appreciated as well as human sounds. The soundscape of Raul Soares Square also suggests that although this open space is located in a heavy traffic context, its inner core, is likely to function as a kind of sonic oasis.

The graphical representation of the sound elements most frequently associated with Estação Square shows that (i) 'sounds from transportation machines' and 'sound as indicator' were most often associated with the zone alongside the Andradas Avenue, a heavy traffic avenue in the city of Belo Horizonte, (ii) 'human sounds' and 'social sounds' were most commonly expected to be heard in the alameda of trees alongside the Caetés Street, zone frequently walked by users of the tube and from where music from the bars located in the Edifício Central could be heard, and (iii) 'water sound from fountain' was most frequently associated with the area surrounding these elements (see Figure 7.39).

Thus, while the zone along the Andradas Avenue was associated with intrusive sonic experiences likely to be classified as unpleasant, the alameda along Caetés Street tended to be associated with social sounds and well as human sounds, a sound usually classified as 'indifferent'. Finally, the water fountains within the Estação Square are sources of positive sonic experiences.

One conclusion from the above must be that although sonic experiences in central urban squares do not impose on their perceivers a particular concrete spatial form, they do impinge on them the cognition of atmospheres, which, in turn, are likely to enhance the character of a space, or of any of its establishing elements. Thus, the *above findings reinforce the idea discussed in the theoretical framework that atmosphere is a key urban design element* (see Chapter Three, section 3.2).

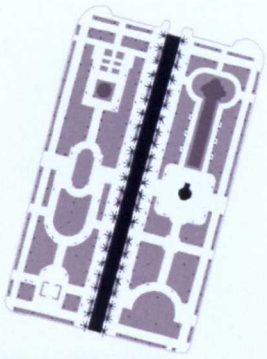


Sound elements

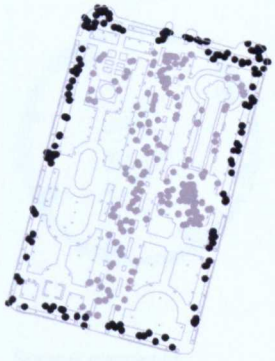
1 Dot = 1 mention

Unpleasant sounds
- Sounds from transportation machines
- Sounds as indicators

Pleasant sounds
- Fauna sounds
- Water sounds
- Human sounds



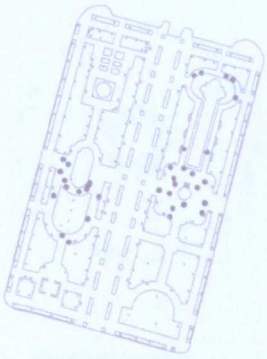
Visual elements
- 5 - 13
- 14 - 22
- 23 - 34
- 35 - 56 references



Sound elements

1 Dot = 1 mention

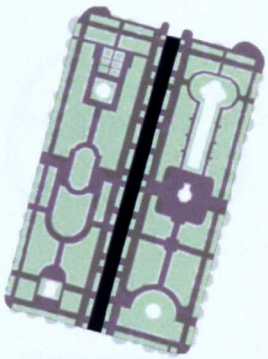
- Unpleasant sounds
  - Sounds of transportation
  - Sounds as indicators
- Pleasant sounds
  - Fauna sounds
  - Water sounds
  - Human sounds



Smell elements

1 Dot = 1 mention

- Pleasant smell
  - Smell of greenery
  - Smell of flowers
  - Smell of fresh air



Tactile elements
- 20
- 61
- 110 references

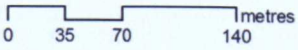
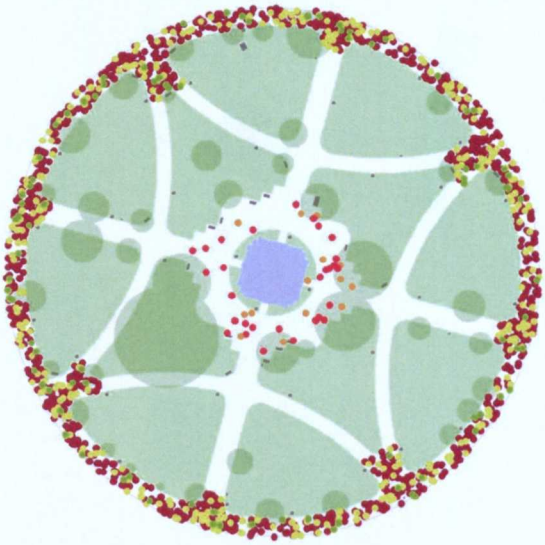


Figure 7.37: The graphical representation of the collective sonic structure (or soundscape) of Liberdade Square.

Source: instrument type B, fieldwork 2007.



Sound elements

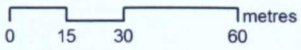
1 Dot = 1 mention

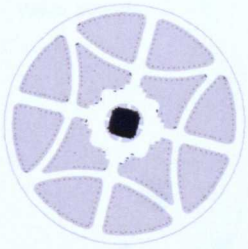
Unpleasant sounds

- Sounds from transportation machines
- Sounds as indicators
- Sounds of society

Pleasant sounds

- Human sounds
- Fauna sounds





Visual elements

- 12 - 17
- 18 - 31
- 32 - 52
- 53 - 63 references

Sound elements

1 Dot = 1 mention

- Unpleasant sounds
  - Sounds from transportation
  - Sounds as indicators
  - Sounds of society
- Pleasant sounds
  - Human sounds
  - Fauna sounds

Smell elements

1 Dot = 1 mention

- Unpleasant smell
  - Smell of urine
  - Smell of urban residue
  - Smell of human body
  - Smell of transportation
  - Smell of excrement
  - Smell of drugs

Tactile elements

- 66 references

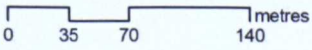


Figure 7.38: The graphical representation of the collective sonic structure (or soundscape) of Raul Soares Square.

Source: instrument type B, fieldwork 2007.

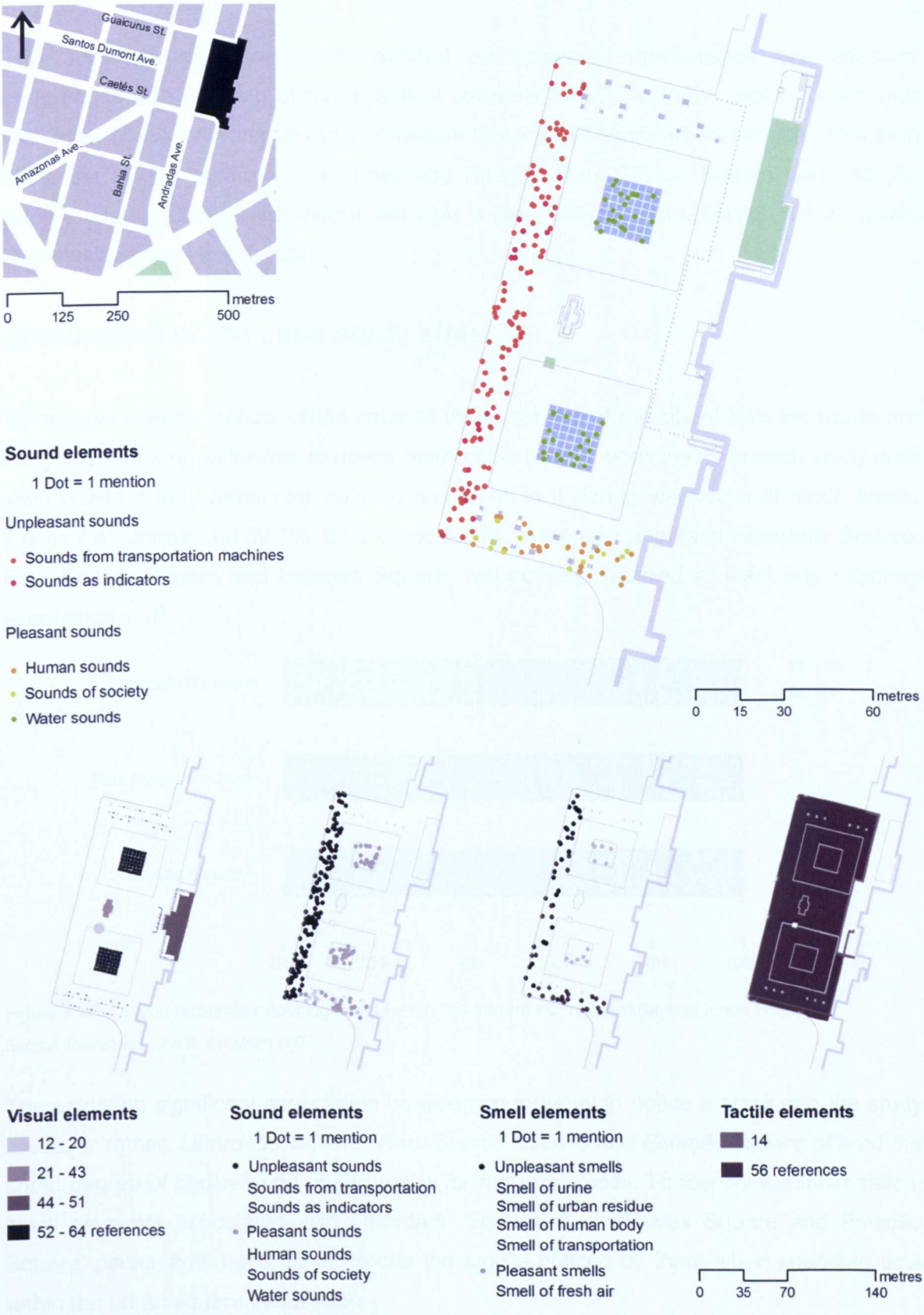


Figure 7.39: The graphical representation of the collective sonic structure (or soundscape) of Estação Square.

Source: instrument type B, fieldwork 2007.

7.5 The smell elements

This section investigates users' general perception of smellscapes and olfactory preferences with the help of the statistical software SPSS, ArcView, and tagcrowd web tool. Most of the following analysis considers those smell elements mentioned more than ten times by the participants in Liberdade Square, Raul Soares Square and Estação Square. Data gathered with instrument type B (see Chapter Four, section 4.4.2) guides the investigation in this section.

Smellscape of the case study sites

To analyse whether central urban squares in the context of the city of Belo Horizonte are likely to provide opportunities to notice memorable smells, participants in each study area were asked if they remember noticing any smell in it during weekdays at lunch break. Figure 7.40 shows that 59,1%, 68.0% and 55.5% of the participants in Liberdade Square, Raul Soares Square and Estação Square, respectively, recalled at least one olfactory experience in it[4].

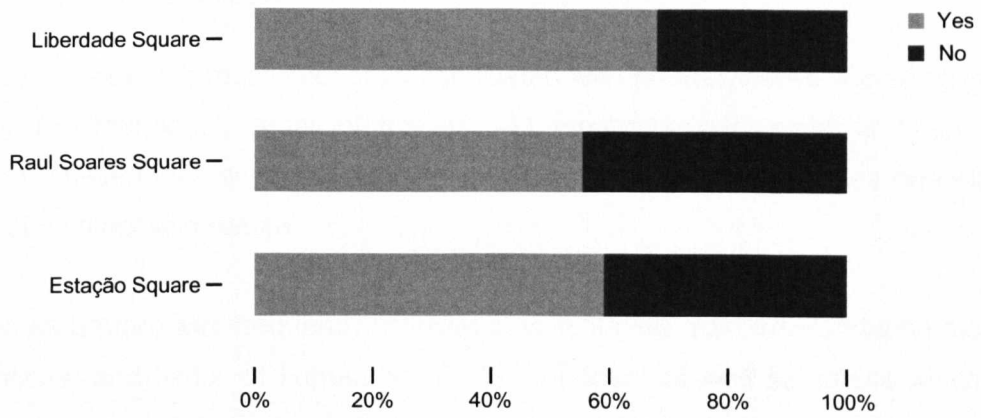


Figure 7.40: Do you remember noticing any smell in this square during weekdays at lunch break?
Source: instrument type B, fieldwork 2007.

There was no significant association between opportunity to notice a smell and the study areas, or rather, *Liberdade Square, Raul Soares Square and Estação square offered the same degree of choices and opportunities for noticing smells*. To identify the most salient smell elements associated with Liberdade Square, Raul Soares Square and Estação Square, participants were asked to cite the smells noticed by them when spending time within the urban square in question.

[4] Since humans are more able to recognise smells than to recall them (Rodaway, 1994), it is possible that a larger number of participants may have noticed a smell in the urban squares under scrutiny.

The smell elements mentioned by the participants were grouped under the following broad categories: 'smell of urine', 'smell of excrement', 'smell of urban residue', 'smell of human body', 'smell of flowers', 'smell of greenery', 'smell of transportation machines', 'smell of food', 'smell of fresh air', 'smell of drugs' and 'miscellaneous' (see Chapter Four, section 4.7.1). The results in Liberdade Square, Raul Soares Square and Estação Square are illustrated in the Figures 7.41, 7.42 and 7.43 respectively, where those smells which were mentioned less than ten times are not included.

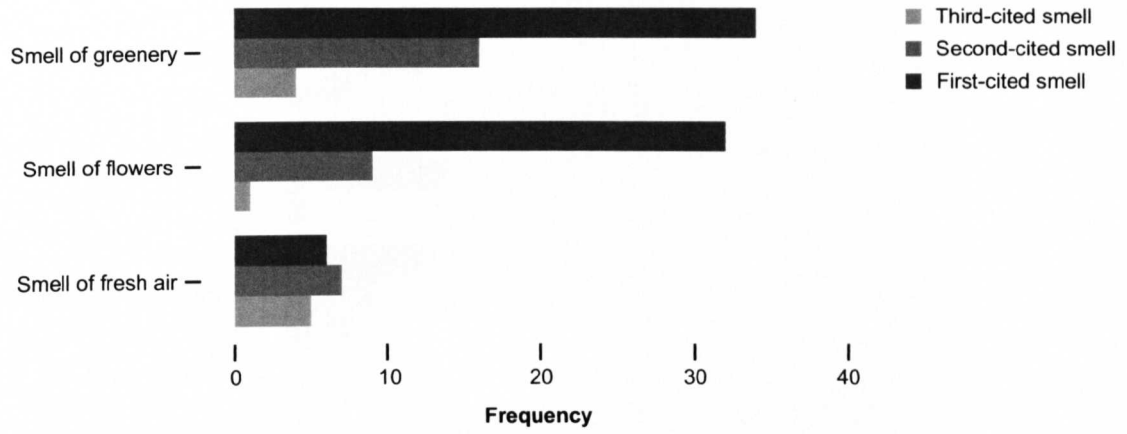


Figure 7.41: Types of smells noticed in Liberdade Square by its users.
Source: instrument type B, fieldwork 2007.

Liberdade Square was most frequently associated with natural smells, including 'smell of greenery' (43 mentions), 'smell of flowers' (41 mentions) and 'smell of fresh air' (19 mentions). These smell elements suggest that Liberdade Square provides opportunity to be in close contact with nature.

Raul Soares Square was frequently associated with 'smells from transportation machines' (13 mentions) and 'smell of human body' (13 mentions) as well as smells which reflect lack of adequate maintenance and anti-social behaviour, including: 'smell of excrement' (38 mentions), 'smell of urine' (31 mentions), 'smell of urban residue' (25 mentions), and 'smell of drugs' (13 mentions).

Estação Square was most frequently associated with 'smell of urine' (37 mentions). In addition, the users of Estação Square associated it with smell of 'urban residue' (26 mentions), 'smell of fresh air' (12 mentions), 'smell of human body' (11 mentions), and 'smell from transportation machines' (10 mentions). These smell elements suggest that Estação Square is a gathering urban open space which provides opportunity to experience fresh air. The 'smell of urine' indicates that anti-social behaviour may take place within this urban square.

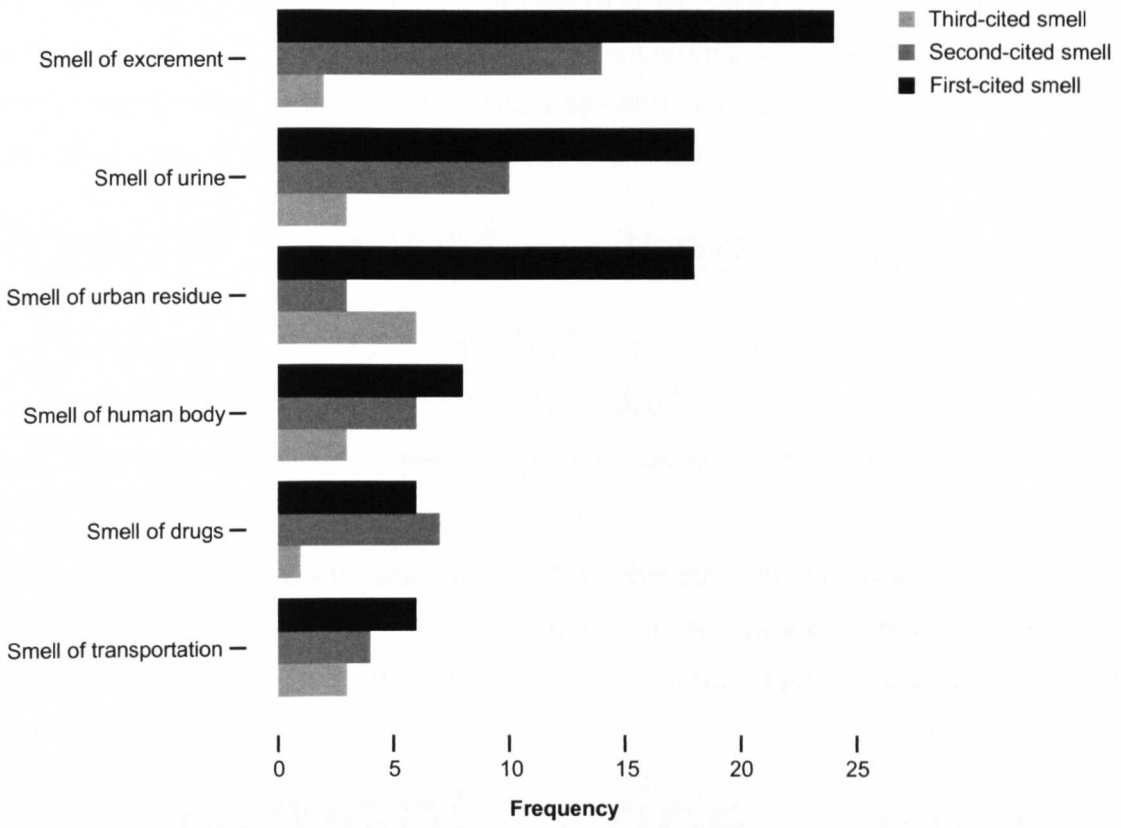


Figure 7.42: Types of smells noticed in Raul Soares Square by its users.

Source: instrument type B, fieldwork 2007.

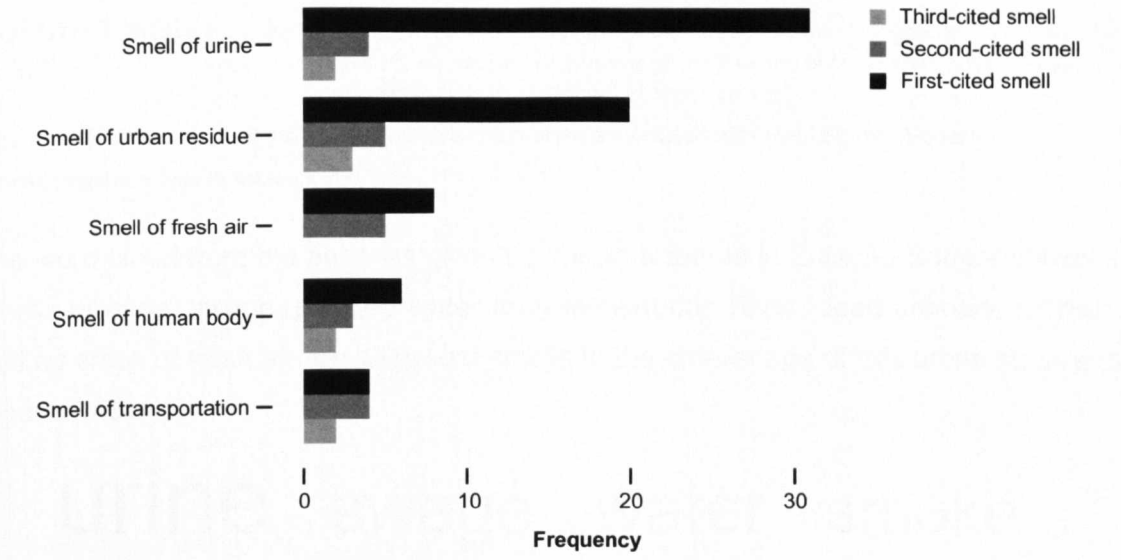


Figure 7.43: Types of smells noticed in Estação Square by its users.

Source: instrument type B, fieldwork 2007.

To provide a more detailed description of the types of smells associated with each of the study areas, specific answers were grouped under subcategories, quantified into

frequencies and uploaded to the tagcrowd web tool for easy visualization. The word cloud from the answers given by the participants in Liberdade Square shows that smells of flowers, plants, trees, cypress, soil, grass, roses and fresh air are all highly salient smells in the smellscape of this urban square (see Figure 7.44).

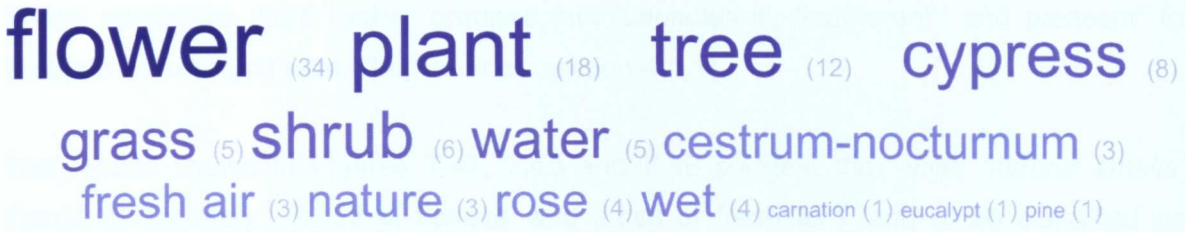


Figure 7.44: Word cloud of the smell elements most often associated with Liberdade Square.
Source: instrument type B, fieldwork 2007.

The word cloud from the answers given by the participants in Raul Soares Square shows that smells of excrement, rubbish, urine, dead animals, swage, rotten food, sewer and drugs as well as smoke from vehicles are all odours frequently associated with this central urban square (see Figure 7.45).

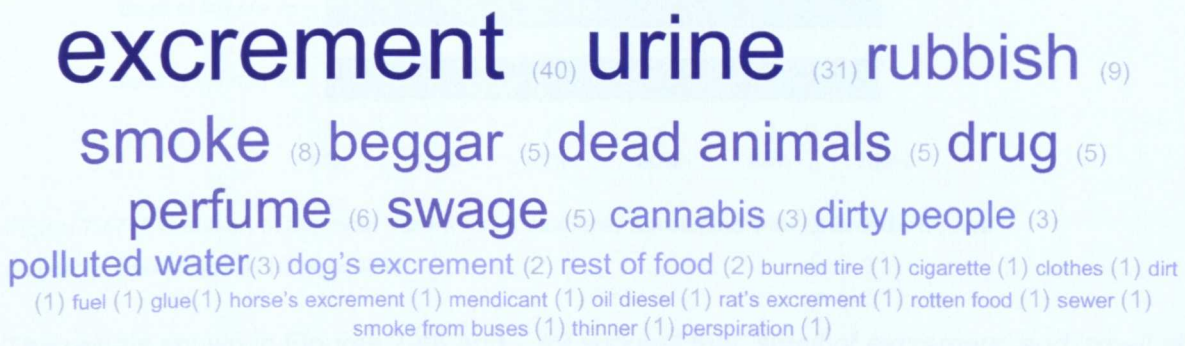


Figure 7.45: Word cloud of the smell elements most often associated with Raul Soares Square.
Source: instrument type B, fieldwork 2007.

The word cloud from the answers given by the participants in Estação Square shows that smells of urine, swage, polluted water from the Arrudas River, dead animals, rubbish as well as smell of fresh air are all salient smells in the smellscape of this urban square (see Figure 7.46).

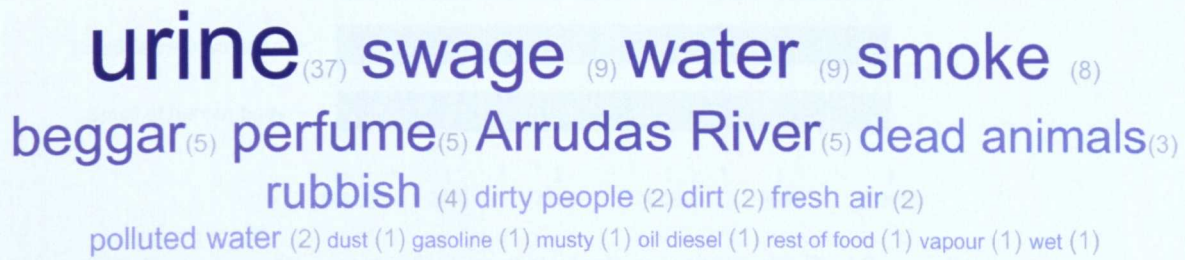


Figure 7.46: Word cloud of the smell elements most often associated with Estação Square.
Source: instrument type B, fieldwork 2007.

Smell preferences

To analyse olfactory preferences, the participants were asked to classify the smells cited by them into 'very unpleasant', 'unpleasant', 'indifferent', 'pleasant' and 'very pleasant'. These categories were further grouped into 'unpleasant', 'indifferent', and pleasant' to facilitate the analysis (see Chapter Four, section 4.4.1).

The results shown in Figures 7.47, 7.48 and 7.49 suggest that while *'natural smells'* ('smell of greenery', 'smell of flowers' and smell of fresh air') *tend to be classified as 'pleasant', 'urban smells'* ('smell of transportation machines' and 'smell of urban residue'), *'smell of excrement', 'smell of urine', 'smell of drugs' and 'smell of human body' tend to be classified as 'unpleasant' by users of central urban squares in the context of Belo Horizonte.*

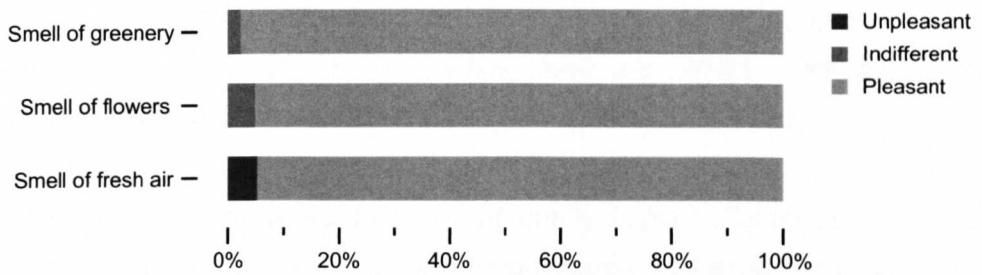


Figure 7.47: Evaluation of the most salient smell elements associated with Liberdade Square.
Source: instrument type B, fieldwork 2007.

The results shown in Figures 7.48 and 7.49 suggest that *'smell of excrement' and 'smell of urine' are highly unpopular smells.*

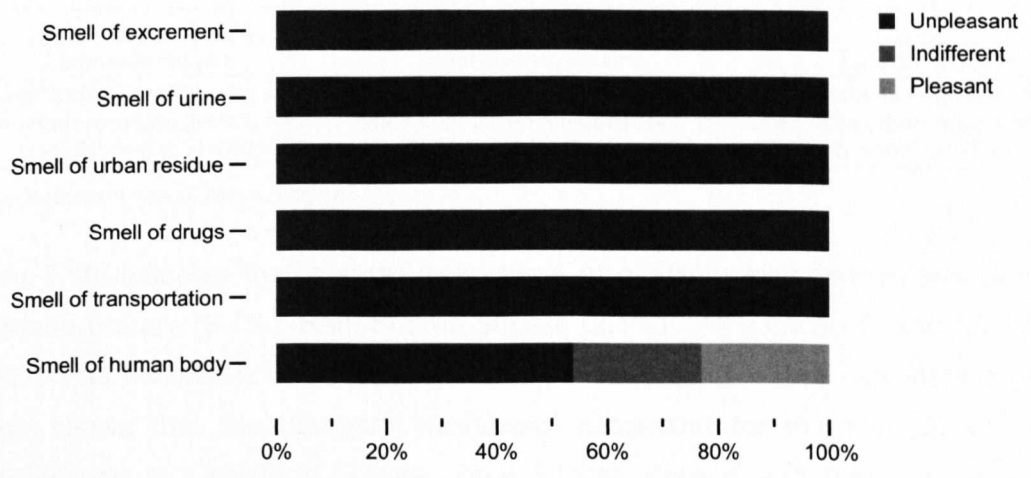


Figure 7.48: Evaluation of the most salient smell elements associated with Raul Soares Square.
Source: instrument type B, fieldwork 2007.

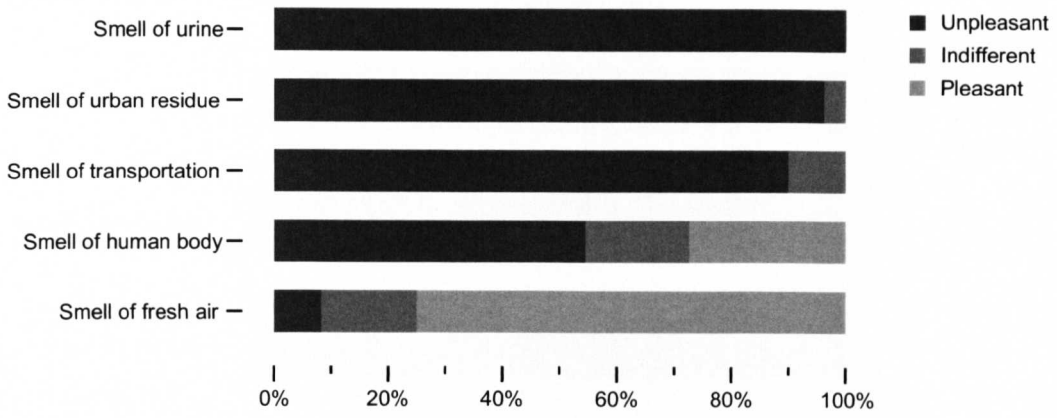


Figure 7.49: Evaluation of the most salient smell elements associated with Estação Square.
Source: instrument type B, fieldwork 2007.

This finding in some way converges towards previous research which found that there are some smells, such as *faeces odour, bad drains, bad meat or fish, and burnt cooking smells, which are universally disliked, while there are others, such as chemical and synthetic smells, which are generally disliked* (Moncrieff, 1966, 1970).

A Mann-Whitney U test revealed that *'natural smells'* ('smell of greenery', 'smell of flower' and 'smell of fresh air') *tended to provide significantly higher levels of preference than 'smells of residues'* ('smell of excrement', 'smell of urine' and 'smell of urban residues') in Liberdade Square, Raul Soares Square and Estação Square, as expected (see Table 7.10).

Table 7.10: Difference between 'natural smells' and 'smells of urban residue' in terms of levels of preference.

Case studies		
Liberdade Square	Raul Soares Square	Estação Square
natural (Md=3, n=103) and smell from urban residues (Md=1, n=9), U =6.5, z =-8.8, p =.001	natural smells (Md=3, n=14) and smell from urban residues (Md=1, n=94), U =47, z =-9.9, p =.001	natural smells (Md=3, n=14) and smell from urban residues (Md=1, n=70), U =36.5, z =-8.4, p =.001

Source: instrument type B, fieldwork 2007.

Figure 7.50 indicates that a small percentage of olfactory experiences associated with Liberdade Square (6.7%), Raul Soares Square (2.1%) and Estação Square (6.3%) were classified as 'indifferent'. The calculation of the lower and higher estimates of the true values shows that the category 'indifferent' accounted for the minority of olfactory classifications in Liberdade Square, Raul Soares Square and Estação Square. This finding, therefore, confirms the idea discussed in the theoretical framework that *the sense*

of smell is likely to trigger emotionally powerful experiences because it is connected to human emotions.

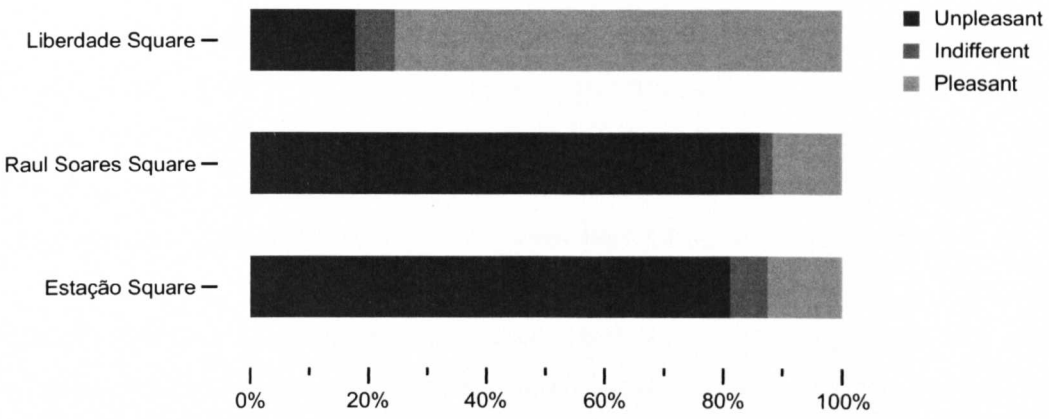


Figure 7.50: Classification of the major smell elements associated with Liberdade Square, Raul Soares Square and Estação Square.

Source: instrument type B, fieldwork 2007.

A Mann-Whitney U test found that the *satisfaction levels with smells associated with Liberdade Square were significantly higher than those associated with Raul Soares Square and Estação Square.* In contrast, it revealed no difference in the satisfaction levels with the smells associated with Raul Soares Square and Estação Square (see Table 7.11). Thus, the evidence of this research suggests that *Liberdade Square tends to offer a higher degree of choices and opportunities to experience positive sensory experiences than Raul Soraes Square and Estação Square*, at least during weekdays at lunch time.

Table 7.11: Difference in the satisfaction levels with the smells elements associated with Liberdade Square, Raul Soares Square and Estação Square.

Case studies		
Liberdade Square and Raul Soares Square	Liberdade Square and Estação Square	Raul Soares Square and Estação Square
Smells in Liberdade Square (Md=3, n=135) and smells in Raul Soares Square (Md=1, n=145), U =3013, z =-11.38, p =.001	Smells in Liberdade Square (Md=3, n=135) and smells in Estação Square (Md=1, n=112) U =2467, z =-10.22, p=.001	none

Source: instrument type B, fieldwork 2007.

Mapping the smellscape of central urban squares

This section elicits, represents (in dot distribution maps), and analyses the smellscape (or collective olfactory structure) of the study areas. The smellscape maps use a dot symbol where each dot represents a value (number of citations). Dot distribution maps were preferred to represent the collective olfactory structure of the study areas because they

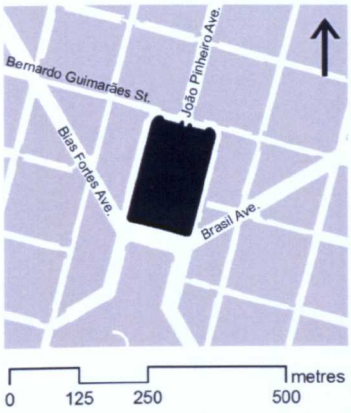
provide an effective way to display events which do not have well-defined boundaries (see Chapter Four, section 4.7.2).

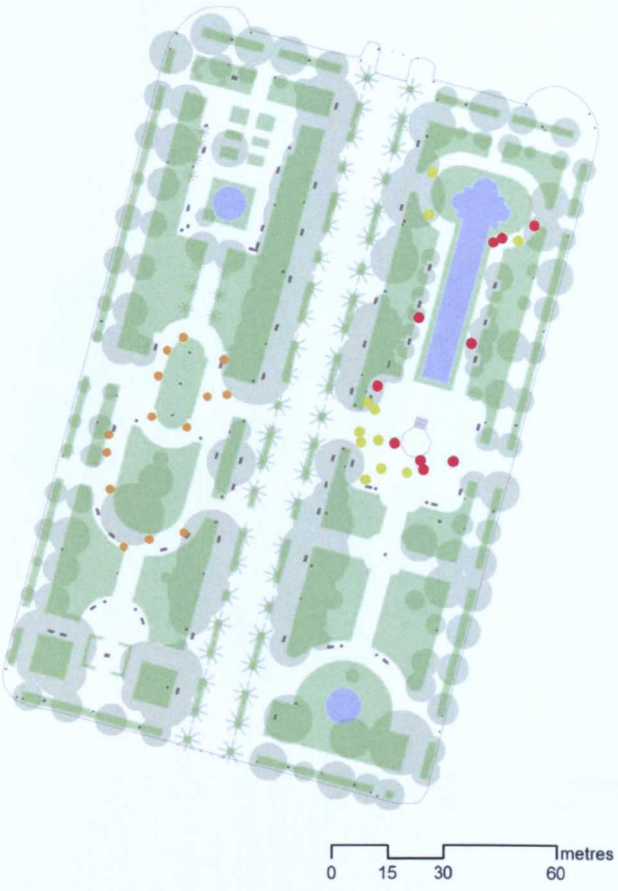
To represent graphically the collective olfactory cognitive structure of the study areas, participants were asked to provide 'whereness' information about those smells cited by them. By layering information obtained with instrument type B, the collective olfactory structure of Liberdade Square, Raul Soares Square and Estação Square is given a graphical representation with the help of ArcView (see Chapter Four, section 4.7.2).

Although different users associated different spaces within the study areas with different smells, certain smell events were more often associated with specific spaces and or elements. The following analysis considers those spaces within the study areas most frequently associated with those classes of smells mentioned more than ten times.

The evidence in this research shows that the *smellscape in Liberdade Square, Raul Soares Square and Liberdade Square are quite distinctive from each other* (see Figure 7.51, 7.52 and 7.53). The graphical representation of the olfactory elements most frequently associated with Liberdade Square shows that (i) 'smell of greenery' and 'smell of fresh air' were more frequently associated with the surrounds of the water fountain perpendicular to Gonçalves Dias Street, and (ii) 'smell of flowers' was most often associated with the proximities of the garden bordered by roses located in front of the Secretaria da Educação (see Figure 7.51). The smell elements which define the smellscape in Liberdade Square, all of them highly appreciated, suggest that this urban square provides opportunity to be in close contact with nature.

The graphical representation of the smells most frequently associated with Raul Soares Square shows that (i) 'smell of urine', 'smell of excrement', 'smell of urban residues', 'smell of drugs' and 'smell of human body' were most often associated with the inner core of the square, and (ii) 'smells of transportation machines' were most frequently associated with its boundaries (see Figure 7.52). The graphical representation of the smells most frequently associated with Estação Square shows that (i) 'smell of urine' and 'smell of human body' were frequently associated with the zone along the Caetés Street, (ii) 'smell of urban residues' and 'smell of transportation machines' were most often associated with the proximities of the Andradas Avenue, and (iii) 'smell of fresh air' was expected to be perceived in the adjacent areas of the water fountains (see Figure 7.53).



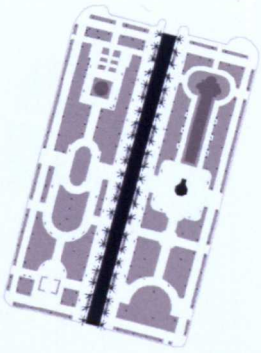


Smell elements

1 Dot = 1 mention

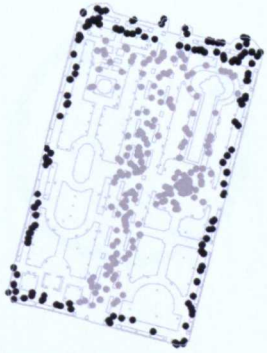
Pleasant smells

- Smell of greenery
- Smell of flower
- Smell of fresh air



Visual elements

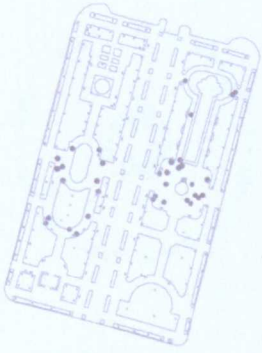
- 5 - 13
- 14 - 22
- 23 - 34
- 35 - 56 references



Sound elements

1 Dot = 1 mention

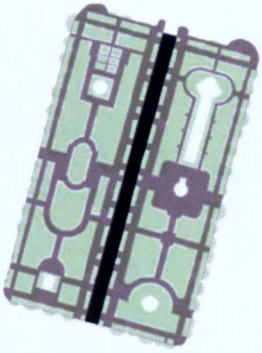
- Unpleasant sounds
  - Sounds of transportation
  - Sounds as indicators
- Pleasant sounds
  - Fauna sounds
  - Water sounds
  - Human sounds



Smell elements

1 Dot = 1 mention

- Pleasant smell
  - Smell of greenery
  - Smell of flowers
  - Smell of fresh air



Tactile elements

- 20
- 61
- 110 references

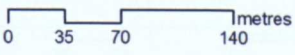
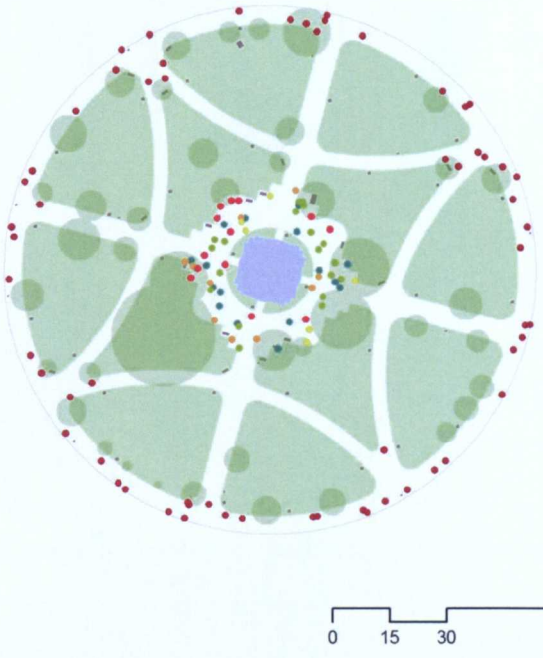


Figure 7.51: The graphical representation of the collective olfactory structure (or smellscape) of Estação Square.

Source: instrument type B, fieldwork 2007.

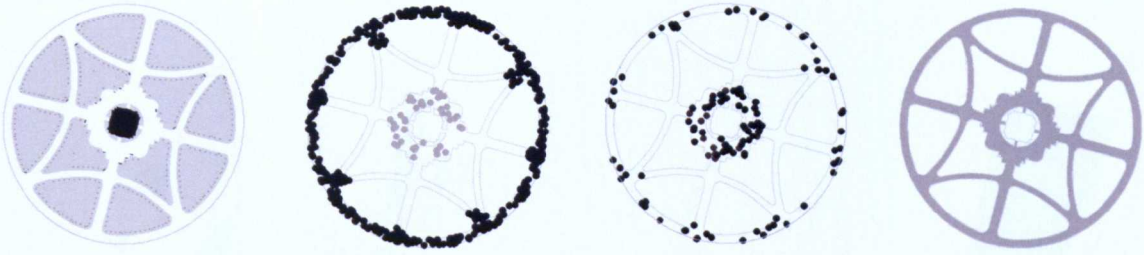


Smell elements

1 Dot = 1 mention

Unpleasant smells

- Smell of urine
- Smell of urban residue
- Human smells
- Smells from transportation
- Smell of excrement
- Smell of drugs



Visual elements

- 12 - 17
- 18 - 31
- 32 - 52
- 53 - 63 references

Sound elements

1 Dot = 1 mention

- Unpleasant sounds
  - Sounds from transportation
  - Sounds as indicators
  - Sounds of society
- Pleasant sounds
  - Human sounds
  - Fauna sounds

Smell elements

1 Dot = 1 mention

- Unpleasant smell
  - Smell of urine
  - Smell of urban residue
  - Smell of human body
  - Smell of transportation
  - Smell of excrement
  - Smell of drugs

Tactile elements

66 references

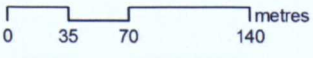
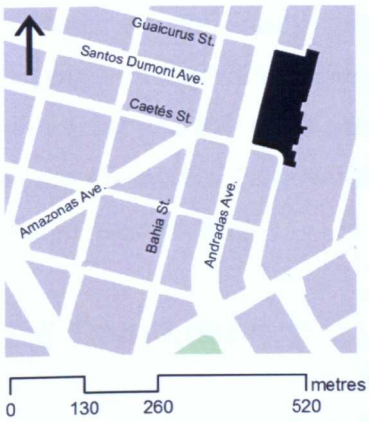
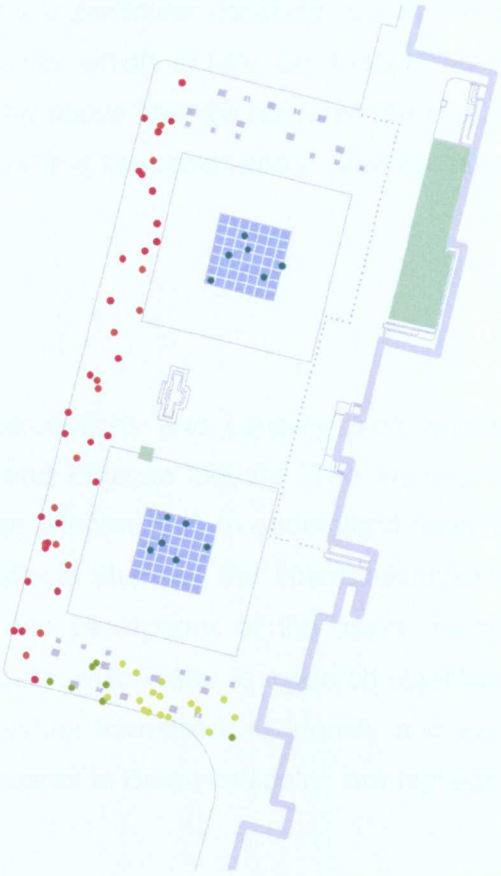


Figure 7.52: The graphical representation of the collective olfactory structure (or smellscape) of Raul Soares Square.

Source: instrument type B, fieldwork 2007.



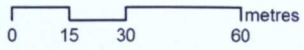


Smell elements

1 Dot = 1 mention

Unpleasant smells
- Smell of urine
- Smell of urban residue
- Smell of human body
- Smells of transportation

Pleasant smells
- Smell of fresh air



Visual elements
- 12 - 20
- 21 - 43
- 44 - 51
- 52 - 64 references

Sound elements

1 Dot = 1 mention
- Unpleasant sounds
  - Sounds from transportation
  - Sounds as indicators
- Pleasant sounds
  - Human sounds
  - Sounds of society
  - Water sounds

Smell elements

1 Dot = 1 mention
- Unpleasant smells
  - Smell of urine
  - Smell of urban residue
  - Smell of human body
  - Smell of transportation
- Pleasant smells
  - Smell of fresh air

Tactile elements
- 14
- 56 references

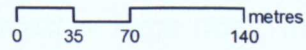


Figure 7.53: The graphical representation of the collective olfactory structure (or smellscape) of Estação Square.

Source: instrument type B, fieldwork 2007.

From the above it must be concluded that *although olfactory experiences in central urban squares do not impose on their perceivers a particular concrete spatial form, they do impinge on them the cognition of atmospheres, which, in turn, are likely to enhance their character and influence behaviour.* Thus, the *above findings reinforce the idea discussed in the theoretical framework that atmosphere is a key urban design element* (see Chapter Three, section 3.2).

7.6 Conclusion

This chapter examined users' general perceptions and sensory preferences towards Liberdade Square, Raul Soares Square and Estação Square. The importance of this analysis is based on the assumption that an effective way to understand human needs in central urban squares is through the empirical study of the interrelationships between urban design characteristics, behaviours and perceptions of the users (Francis, 2003; Mehta, 2009). The main results of this chapter, which refer to research objective four: 'To use the methodology in light of the contextual framework to identify and explain user needs and preferences in central urban squares in Belo Horizonte', are highlighted in the following paragraphs.

Sensory preferences. It was also found that natural sounds tend to offer higher levels of satisfaction than urban sounds, while human sounds tend to be classified as 'indifferent' (see section 7.4), both findings corresponding to the results of other researchers (Kang, 2007; Yang and Kang, 2005). The preceding account showed that natural smells tend to provide higher levels of satisfaction than smells of urban and human residues (see section 7.5). This finding in some way converges towards previous studies that found that there are some smells, such as faeces odour, bad drains, bad meat or fish and burnt cooking smells, that are universally disliked, while there are others, such as chemical and synthetic smells, which are generally disliked (Moncrieff, 1966, 1970). The evidence of the present research shows that fine textured paving materials tend to provide higher levels of satisfaction when carrying out purposive walking than those characterised by coarse textures (see section 7.3).

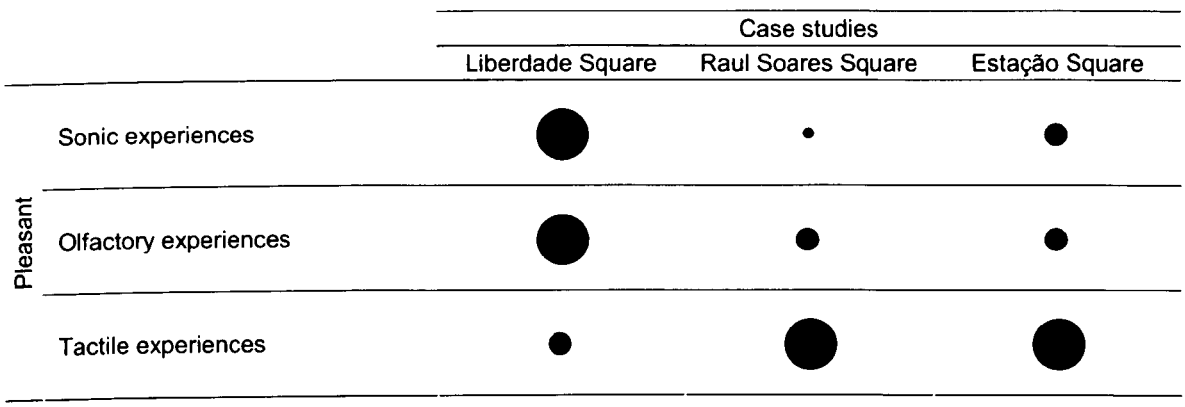
Given this background, it may be concluded that *people are calling for more naturally appealing sensoryscapes in central urban squares within the context of large cities.* In contrast, corresponding to the results by other researchers, the significant number of 'sounds from transportation machines' cited in Liberdade Square, Raul Soares Square

and Estação Square suggest that it may have become the dominant sound element in central urban spaces (Porteous, 1996).

Richness. It was found that different central urban squares offer different degrees of choices and opportunities to experience positive sensory experiences (see Table 7.12). In this regard, the evidence of the present research shows that the sonic experiences offered by Liberdade Square tend to be preferred to those offered by Estação Square, which, in turn, tend to be preferred to those offered by Raul Soares Square.

The olfactory experiences offered by Liberdade Square tend to be more appreciated than those offered by Estação Square and Raul Soares Square. Finally, the tactile experiences acquired through the soles of feet offered by Estação Square and Raul Soares Square tend to be preferred to those provided by Liberdade Square (see Table 7.12).

Table 7.12: A graphical representation of the different degrees of choices and opportunities to experience pleasant non-visual sensory information in Liberdade Square, Raul Soares Square and Estação Square.



Source: instrument type B, fieldwork 2007.

Emotional reactions. The findings of the present research show that tactile (see section 7.3), sonic (see section 7.4) and olfactory experiences (see section 7.5) are likely to trigger emotionally powerful experiences in their perceivers, reinforcing the idea discussed within the conceptual framework that touch, sense of smell and hearing are senses connected to human emotions (see Chapter Two, sections 2.2 and 2.4). Thus, as discussed earlier (see Chapter Two, section 2.4), although visual aesthetic has dominated urban design theory and practice, the evidence of the present research shows that *non-visual sensory effects are also important sources of aesthetic responses.*

Urban design elements. The evidence of the present research shows that *boundaries, props, edges and landmarks are perceived as important urban design elements by users of central urban squares* in the context of Belo Horizonte (see section 7.2). In this regard,

it was verified that *distinctiveness, visibility, usefulness and pleasantness are properties likely to be present, in some form of combination, in the major elements which define the collective visual structure of central urban squares* (see section 7.2), corresponding to the results of previous research (see, for example, Appleyard, 1969).

In addition, it was found that *the major visual elements which compose the collective visual structure of central urban squares, depending on their perceptible properties, play specific roles, while some of them play more than one function simultaneously* (see section 7.2). Thus, the evidence of the present research suggests that *robustness does matter to users of central urban squares, possibly because robust urban design elements address many user needs* (see Chapter Three, section 3.4).

The preceding account shows that although non-visual sensory experiences provided by central urban squares do not impose on their perceivers a particular concrete spatial form, they do impinge on them the cognition of *atmospheres*, which, in turn, are likely to reinforce the character of spaces and/or of any of their components (see sections 7.4 and 7.5). Thus, it may be argued that *atmosphere is a key urban design element which should be taken into account in the multisensory design of urban open spaces that are responsive to user needs and preferences* (see Chapter Three, section 3.2).

Sensory mapping technique. The innovative sensory mapping technique developed to elicit and present graphically the collective multisensory structure of urban open spaces proved to be robust enough to inform evidence-based approaches to the multisensory design of urban open spaces that are responsive to user needs and preferences.

Having examined the behavioural patterns accommodated by Liberdade Square, Raul Soares Square and Estação Square (see Chapter Six), the collective multisensory structure of these central urban squares and sensory preferences, the following chapter identifies the aspects of Liberdade Square, Raul Soares Square and Estação Square most valued by their users.

CHAPTER EIGHT

THE MOST VALUED ASPECTS

8.1 Introduction

This chapter identifies and examines the aspects of Liberdade Square, Raul Soares Square and Estação Square most valued by their users. The investigation in this chapter complements the results obtained in Chapters Six, which focuses on the analysis of social activities in the study areas, and Chapter Seven, which reveals and examines the collective multisensory structure of the study areas and sensory preferences.

The importance of these analyses is based on the assumption that an effective way to understand common user needs and preferences in central urban squares is by empirically studying the interrelationships between urban design characteristics and social behaviours and perceptions of the users (Francis, 2003; Mehta, 2009). Further discussions and explanations are given in Chapter Nine, which sets out the main conclusions and final remarks of the present research.

Data obtained with instruments type A and type B (see Chapter Four, section 4.4) is analysed in this chapter with the help of the statistical software SPSS and the tagcrowd web tool. The results in this chapter refer to research objective four: 'To use the methodology in light of the contextual framework to identify and explain user needs and preferences in central urban squares in Belo Horizonte'.

8.2 Evaluation

Stationary users carrying out optional social activities were asked to evaluate the quality of the space where they were spending time and ambulant users were asked to evaluate the quality of the route that they had just experienced in the urban square in question.

Five scales were used for answers to both questions: 'very unpleasant', 'unpleasant', 'indifferent', 'pleasant' and 'very pleasant'.

However, since participants gave very high scores, it was assumed that anything other than the highest score would indicate reservations about their experience in the study areas. Thus, the classification scheme was recoded into the categories 'unpleasant' and 'pleasant' in order to enhance the real and relevant differences between the cases on such variable. Such procedure is advised by Pallant (2007) who argues that a non-discriminate measure makes the sample appear homogeneous by minimizing variation.

Stationary activities

To verify how well stationary activities were accommodated by Liberdade Square, Raul Soares Square and Estação Square, participants carrying out optional social activities were asked to evaluate the quality of the space where they were spending time within the urban square under scrutiny. Figure 8.1 shows that only few stationary users in Liberdade Square (2.7%), Raul Soares Square (23.2%) and Estação Square (15.0%) evaluated the space where they were carrying out a stationary activity as 'unpleasant'.

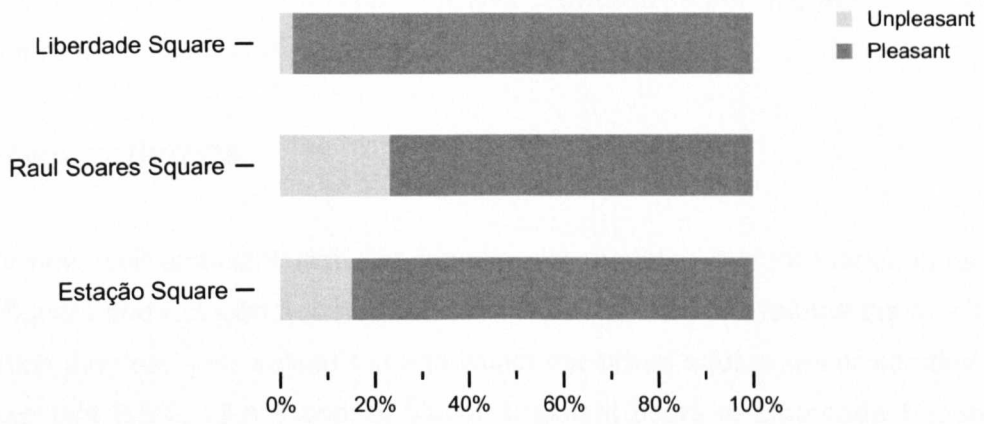


Figure 8.1: Evaluation of how well Liberdade Square, Raul Soares Square and Estação Square accommodate sitting activities.

Source: instrument type B, fieldwork 2007.

The calculation of the lower and the higher estimates of the true values revealed that the majority of stationary users were satisfied with the quality of the location where they were spending time in these urban squares (see Appendix E). The results of this research, therefore, suggest that *central urban squares in the context of Belo Horizonte were likely to be perceived as public open spaces which provided for pleasurable optional stationary activities.*

A Kruskal-Wallis test found that the satisfaction levels with the spaces where the stationary optional activities were being carried out in Liberdade Square, Raul Soares Square and Estação Square differed significantly (p=.001). Mann-Whitney U tests revealed that the *satisfaction scores of stationary users in Liberdade Square were significantly higher than those of stationary users in Estação Square, which, in turn, were significantly higher than those of stationary users in Raul Soares Square* (see Table 8.1).

Table 8.1: Differences between stationary users in Liberdade Square, Raul Soares Square and Estação Square in terms of evaluation of static experience in these urban squares.

Case studies		
Raul Soares Square and Estação Square	Raul Soares Square and Liberdade Square	Estação Square and Liberdade Square
U=7500.5, N 1=125, N 2=140, two-tailed p=.013	U=4862, N 1=125, N 2=149, two-tailed p=.001	U=6800.5, N 1=140, N 2=149, two-tailed p=.001

Source: instrument type B, fieldwork 2007.

The preceding evidence suggests that Liberdade Square tended to accommodate stationary social activities better than the other study areas did. On the one hand, *the performance of optional stationary activities in central urban squares in the context of Belo Horizonte*, at least during the weekdays at lunch time, *tended to be perceived by pedestrians as a highly pleasant activity*. On the other hand, the results of this research also show that *different central urban squares provide different degrees of choices and opportunities to carry out high quality stationary social activities*.

Ambulant activities

To verify how well ambulant activities were accommodated by Liberdade Square, Raul Soares Square and Estação Square, participants were asked to evaluate the quality of the route which they had just walked through within the urban square under scrutiny. Figure 8.2 shows that 8.5%, 29.4% and 20.0% of ambulant users in Liberdade Square, Raul Soares Square and Estação Square, respectively, classified the route that they walked through in these urban squares as 'relatively unpleasant'.

The calculation of the lower and the higher estimates of the true values showed that *the minority of ambulant users in all study areas classified these spaces as 'relatively unpleasant' to walk through* (see Appendix E). It follows that *walking in central urban squares in the context of Belo Horizonte*, at least during weekdays at lunch time, *tended to be an experience highly valued by pedestrians*.

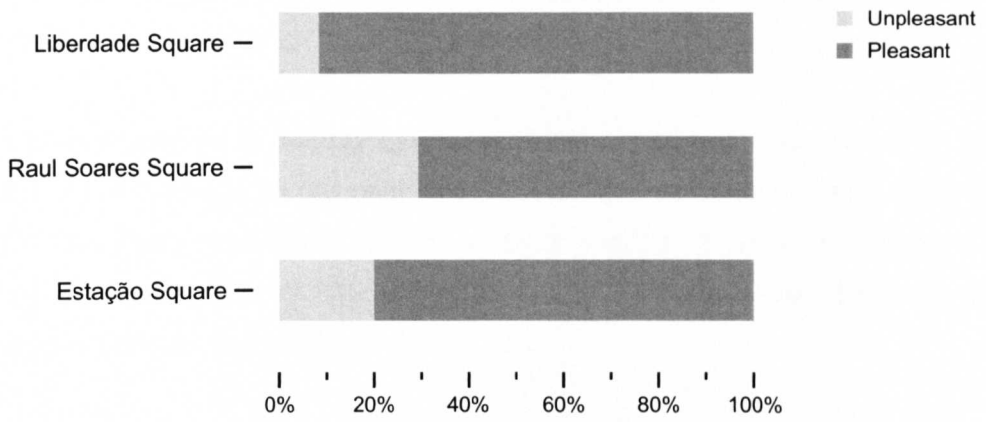


Figure 8.2: Evaluation of how well Liberdade Square, Raul Soares Square and Estação Square accommodate ambulant activities.

Source: instrument type A, fieldwork 2007.

A Kruskal-Wallis test found that the satisfaction levels with the route where ambulant users had walked through in Liberdade Square, Raul Soares Square and Estação Square differed significantly (p=.001). Mann-Whitney U tests revealed that the *satisfaction scores of ambulant users in Liberdade Square were significantly higher than those of ambulant users in Estação Square, which, in turn, were significantly higher than those of ambulant users in Raul Soares Square* (see Table 8.2).

Table 8.2: Differences between ambulant users in Liberdade Square, Raul Soares Square and Estação Square in terms of evaluation of walking experience in these urban squares.

Case studies		
Raul Soares Square and Estação Square	Raul Soares Square and Liberdade Square	Estação Square and Liberdade Square
U=6719.5, N 1=126, N 2=130, two-tailed p=.005	U=4626, N 1=126, N 2=130, two-tailed p=.001	U=6251.5, N 1=130, N 2=130, two-tailed p=.001

Source: instrument type A, fieldwork 2007.

The preceding evidence suggests that Liberdade Square tended to accommodate ambulant activity better than the other central urban squares under scrutiny. Thus, *central urban squares in the context of Belo Horizonte*, at least during the weekdays at lunch time, *tended to offer highly pleasurable walking experiences, although different central urban squares provided different degrees of choices and opportunities to carry out high quality walking.*

A Kruskal-Wallis test found no significant difference in satisfaction levels across ambulant and stationary users in Liberdade Square, Raul Soares Square and Estação Square. Thus, *central urban squares in the context of Belo Horizonte appear to accommodate*

equally well both stationary and ambulant activities. This finding was consistent with the findings through observations.

Paved surfaces seemed to accommodate comfortably well both the pedestrian traffic and the stationary activities in all the case study areas: while ambulant users were observed walking in the open pavement, stationary users tended to locate themselves at short distances from the edges of the paved areas, small-scale fixed objects and vertical surfaces (see Chapter Six, section 6.4).

One conclusion from the previous account must be that *central urban squares tend to be highly appreciated by pedestrians as a space to carry out both stationary and ambulant activities*, at least during weekdays at lunch break. The findings discussed in this section, therefore, support the idea discussed in Chapter Five (see section 5.4) that *central urban squares within large cities in the context of Brazil tend to be highly appreciated by pedestrians* (Robba and Macedo, 2003).

Thus, the findings of the present research are in line with those studies which argue that the reported decline in the public realm is much exaggerated (Brill, 1989; Loukaitou-Sideris and Banerjee, 1998). In this regard, although much of the discussion about public space has been in terms of decline and abandonment, the evidence of the present research shows that despite the changes confronted by Liberdade Square, Raul Soares Square and Estação Square (see Chapter Five, section 5.4), these spaces are highly valued urban open spaces.

8.3 The most valued aspects of central urban squares

Participants were asked to explain why they classified the space where they were carrying out stationary (or ambulant) activities in the study areas as 'very unpleasant', 'unpleasant', 'indifferent', 'pleasant' or 'very pleasant'. To identify the most important aspects of central urban squares considered by pedestrians as supportive of stationary activities, the answers given by those participants who had a positive attitude toward the study areas are analysed in the following paragraphs.

The first-cited reasons given by them were coded into two different levels of detail (see Table 8.3). The most general level of the proposed multilevel coding scheme distinguished between perceptual and associational aspects. The former refers to tangible aspects of central urban squares, while the latter refers to the most subjective ones.

To provide a more detailed descriptive account of what perceptual and associational aspects of central urban squares were perceived by pedestrians as supportive of stationary and ambulant activities, specific answers were grouped under 15 subcategories (see Table 8.3).

Finally, the specific answers under those subcategories first-cited by at least 10% of the participants were uploaded to the tagcrowd web tool for an even more detailed account of the aspects perceived as highly supportive of static and ambulant activities.

It is interesting to note that the subcategories identified in this research overlap some of the most common pedestrian needs discussed in the literature review (see Chapter Three, section 3.4). It follows that the answers given by the participants suggest that they tend to appreciate those aspects of central urban squares which tend to address their common needs and preferences (see Appendix E).

Table 8.3: Multilevel coding scheme of the most common user needs in central urban squares.

PERCEPTUAL	**Non-visual**	Concerns mostly with sonic and olfactory cues.
	Kinaesthetic	Refers to sensation of motion, which results from a combination of visual and tactile sensation. Comments regarding spatial and geometric characteristics of environments, changes of level, curves, speed of movement, among other aspects would be examples of kinaesthetic aspects.
	Visual	Refers to pure visual quality of townscapes and landscapes, including vistas, panoramic views, and so on.
	Social	Relates to people.
	Climatic	Refers to air movement, temperature, humidity, lighting, among others.
	Natural	Refers to natural elements, such as water, trees, plants, flowers, animals, etc.
	Atmosphere	Refers to comments related to the overall ambience of a space.
	Maintenance	Refers to cues related to care of environments, such as lack of dirt, dust, etc.
	Built	Relates to opportunities to experience man-made features, such as urban furniture, buildings, monuments, etc.
	Others	Refers to other positively evaluated perceptual aspects of the environment.
ASSOCIATIONAL	**Relaxing**	Refers mostly to relaxing associations.
	Protection	Relates to a sense of protection against accidents, crime, violence or intrusive sensory information.
	Active leisure	Refers mostly to leisure associations which include opportunity for talking and doing, or rather, to perform active social interactions.
	Passive leisure	Refers mostly to leisure associations which include opportunity to perform passive social interactions, such as watching the passing scene.
	Others	Refers to other associational aspects such as fun, discovery, etc.

The perceptual and associational qualities

In this section, the first-cited answers given by the stationary and ambulant users to explain their positive attitudes toward the study areas were grouped under the categories 'perceptual' or 'associational' aspects to verify if (i) perceptual qualities play a larger role than associational ones in supporting pedestrian movement (Rapoport, 1990), and (ii) for sitting, an activity more related to liking, associational qualities tend to be more important than they are for walking (Rapoport, 1990).

The importance in testing these propositions, developed by Rapoport (1990), in the context of Brazil, a country where studies focusing on the relation of environments and people have been largely neglected, is especially illuminating because 'if any patterns and regularities occur in otherwise very different cultures (...) it is likely that they are basic or, at least, important and significant' (Rapoport, 1990, p.244).

In Liberdade Square, Raul Soares Square and Estação Square, perceptual aspects were first-cited by 52.4%, 53.7% and 59% of the stationary users, respectively (see Figure 8.3). Pearson's chi-square test revealed that the proportion of perceptual and associational aspects first-cited by the stationary users did not differ significantly across the three study areas.

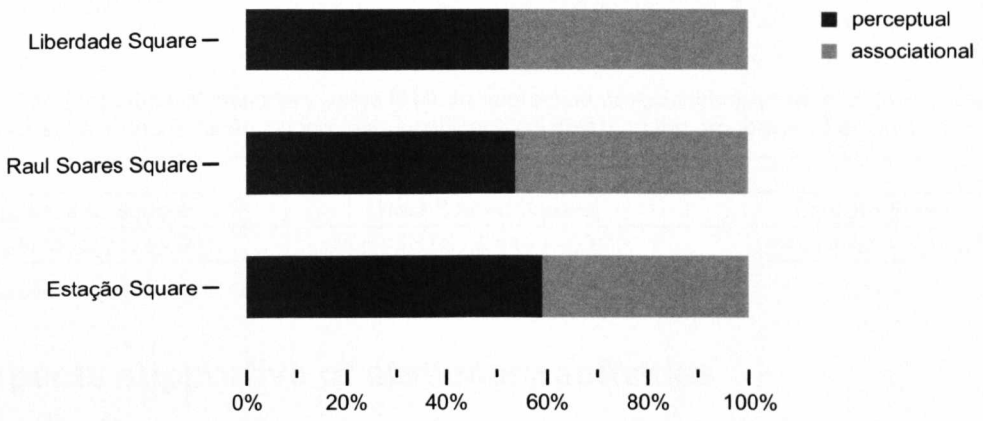


Figure 8.3: Aspects first-cited by interviewees in Liberdade Square, Raul Soares Square and Estação Square as supportive of stationary activities within these urban squares.

Source: instrument type B, fieldwork 2007.

Perceptual aspects were first-cited by 83.1%, 83.3% and 77% of the ambulant users in Liberdade Square, Raul Soares Square and Estação Square, respectively (see Figure 8.4). Pearson's chi-square test revealed that the proportion of perceptual and

associational aspects first-cited by the ambulant users did not differ significantly across the three study areas.

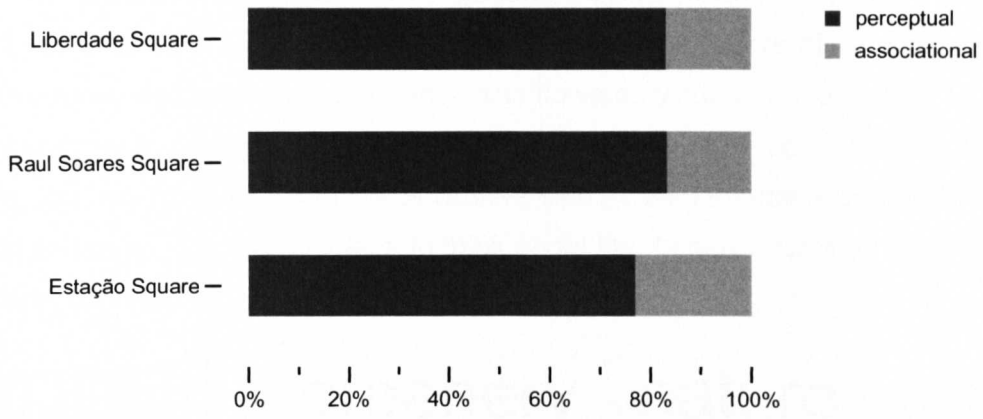


Figure 8.4: Aspects first-cited by interviewees in Liberdade Square, Raul Soares Square and Estação Square as supportive of ambulant activities within these urban squares.

Source: instrument type A, fieldwork 2007.

Pearson's chi-square test (with Yates Continuity Correction) revealed *that stationary users were more likely to value associational aspects and less likely to value perceptual aspects of central urban squares than ambulant users in all the study areas* (see Table 8.4). Thus, the findings of this study reinforce the idea that *perceptual qualities play a larger role than associational ones in supporting pedestrian movement and that for sitting*, an activity more related to liking, *associational qualities tend to be more important than they are for walking* (Rapoport, 1990).

Table 8.4: The proportion of stationary users likely to appreciate associational qualities of Liberdade Square, Raul Soares Square and Estação Square was significantly higher than the proportion of ambulant users.

Case studies		
Liberdade Square	Raul Soares Square	Estação Square
χ^2=25.74, df=1, p=.001	χ^2=16.56, df=1, p=.001	χ^2=6.64, df=1, p=.010

Source: instruments type A and B, fieldwork 2007.

8.4 Aspects supportive of stationary activities

To provide a more detailed descriptive account of those aspects of central urban squares perceived by their users as supportive of stationary social activities, those sub-categories grouped under the two broad classes 'perceptual' and 'associational' aspects cited by at least 10% of the participants are analysed in the following paragraphs. The specific answers under these sub-categories were uploaded in the tagcrowd web tool in order to provide a finer description of the aspects of central urban squares most valued by their stationary users.

In Liberdade Square, 'relaxing associations' (56 references), 'natural aspects' (29 references) and 'climatic conditions' (16 references) accounted for 39.2%, 20.3% and 11.2% of the aspects most valued by its stationary users, respectively (see Figure 8.9). The analysis of the word cloud suggests that the stationary users of Liberdade Square tended to appreciate greenery, trees, birds, and flowers, wind, sun and shade, as well as the tranquillity and calmness triggered by this urban square (see Figure 8.5). As a stationary user interviewed in Liberdade Square said: 'I like Liberdade Square because it is tranquil and quiet. It is a great place to think about life. I enjoy observing the plants and the gardens.' (B1145)[1].

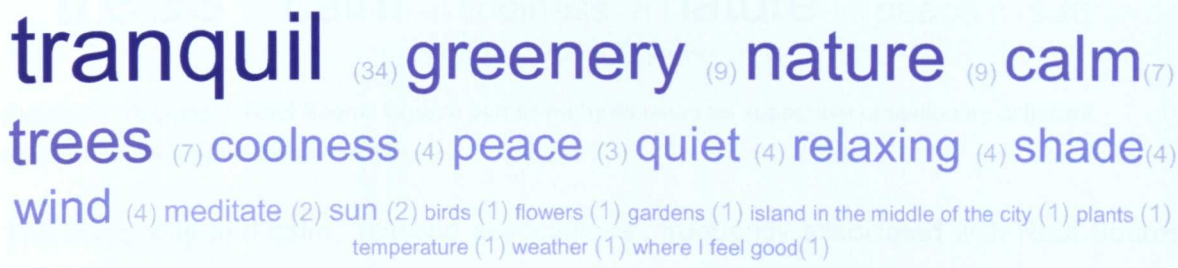


Figure 8.5: Aspects of Liberdade Square perceived by its users as supportive of stationary activities.
Source: instrument type B, fieldwork 2007.

This was consistent with the findings through observations. Stationary users were observed spending time on the benches located in the shaded or semi-shaded spaces under trees. The variety of sensory experiences provided by greenery, trees, flowers, floor textures and other elements, may have created interest and engaged stationary users in various activities (see Figure 8.6).

Figure 8.6: Users carrying out stationary activities at short distances from natural elements in Liberdade Square.

[1] In order to identify the instrument used to gather data, the case study and the participant number, a series of codes were defined. The codes for the data collection technique – instrument type A (A) and instrument type B (B) – are followed by the case study numbers – Liberdade Square (1), Raul Soares Square (2) and Estação Square (3) – which are then followed by the identification number of the participant (001, 002, 003, etc) i.e. (A1001).

In Raul Soares Square, 'relaxing associations' (27 references), 'natural aspects' (22 references) and 'climatic conditions' (18 references) accounted for 28.4%, 23.2% and 18.9% of the aspects most valued by its stationary users, respectively (see Figure 8.9). The analysis of the word clouds suggests that the trees and greenery as well as shade and freshness provided by Raul Soares Square were highly appreciated by its users (see Figure 8.7).

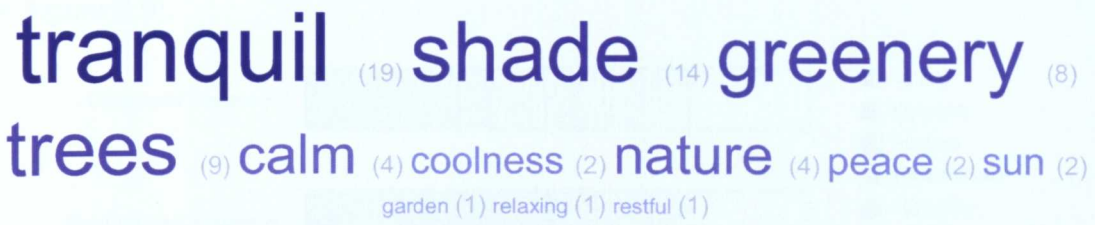


Figure 8.7: Aspects of Raul Soares Square perceived by its users as supportive of stationary activities.
Source: instrument type B, fieldwork 2007.

The tranquillity and calm, 'relaxing associations', frequently associated with Raul Soares Square suggest that its stationary users tend to assign restorative value to the stationary activities carried out in this urban square. The following comment illustrates the importance of these aspects to those who carried out stationary activities in this urban square: 'Raul Soares Square is always a tranquilizer, there is greenery, you mix yourself with the nature and get calm.' (B2109).

The observations of this study generally support this. Most stationary users in Ral Soares Square were observed spending time on the benches located in the shaded or semi-shaded spaces under trees. The variety of sensory experiences provided by plants seemed to have created interest and engaged stationary users in various activities, such as lying among the flower beds or sitting on the root of a tree.

The analysis of the word cloud suggests that the wide views as well as the shade and coolness provided by Estação Square are highly appreciated by its users (see Figure 8.8). The observations of this study generally support this. Most stationary users were observed spending time on shaded or semi-shaded sitting spaces.

Figure 8.8: Aspects of Estação Square perceived by its users as supportive of stationary activities.
Source: instrument type B, fieldwork 2007.

It is interesting to note that the lack of opportunities to experience favourable weather conditions is an issue to some stationary users, as the following comment illustrates: 'There is no cover and too much sun in Estação Square. There is nothing to protect us from the sun here' (B3132). In Estação Square, 'relaxing associations' (30 references), 'visual aspects' (15 references) and 'climatic conditions' (10 references) accounted for 30.0%, 15.0% and 10.0% of the aspects most valued by its stationary users, respectively (see Figure 8.9).

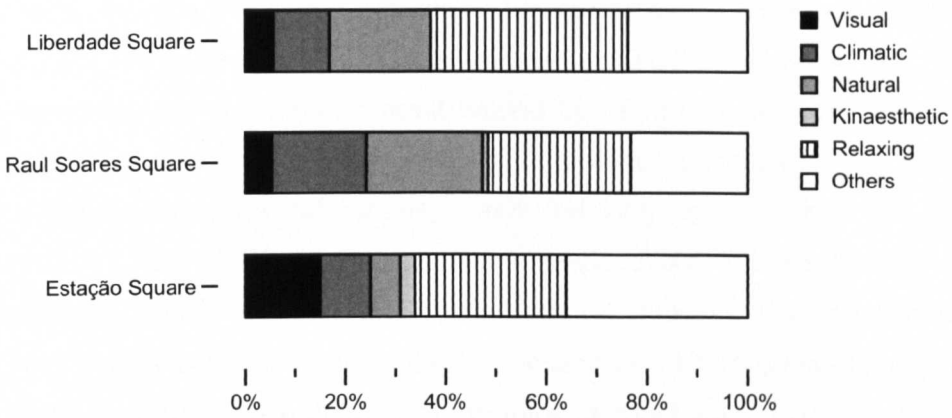


Figure 8.9: Aspects of Liberdade Square, Raul Soares Square and Estação Square perceived by their respective users as supportive of stationary activities.

Source: instrument type B, fieldwork 2007.

The following comment illustrates the importance of these aspects to the stationary users of Estação Square: 'It is good to rest, relax and watch the time go by'. (B3073). The sense of tranquillity frequently associated within Estação Square suggests that its stationary users tend to assign restorative value to the stationary activities carried within this urban square.

The findings here, therefore, suggest that stationary users of central urban squares in the context of Belo Horizonte tend to appreciate the opportunities provided by these spaces to experience (i) favourable climatic conditions, (ii) plants, (iii) water, (iv) trees, (v) grennery, (vi) flowers, (vii) fine vistas[2], and (viii) a sense of relaxation.

The findings in this chapter, therefore, suggest that the study areas tend to be perceived by their users as spaces of retreat which provide opportunities to have relaxing experiences within the city of Belo Horizonte.

[2] It is interesting to note that the most appreciated perceptual aspects of Liberdade Square, Raul Soares Square and Estação Square are all considered stimulants of restorative experiences (see Chapter Three, section 3.4).

8.5 Aspects supportive of ambulant activities

To provide a more detailed descriptive account of those aspects of Liberdade Square, Raul Soares Square and Estação Square most valued by their ambulant users, those sub-categories grouped under 'perceptual' and 'associational aspects' cited by at least 10% of the participants are analysed in the following paragraphs.

In Liberdade Square, 'natural aspects' (49 references), 'climatic conditions' (18 references) and 'relaxing associations' (13 references) accounted for 41.5%, 15.3% and 11.0%, respectively, of the aspects most valued by its ambulant users. In Raul Soares Square, 'natural aspects' (35 references), 'climatic conditions' (14 references), 'kinaesthetic sensations' (9 references) and 'relaxing associations' (12 references) accounted for 41.7%, 16.7%, 10.7% and 14.3% respectively, of the aspects most valued by its ambulant users. In Estação Square, 'natural aspects' (24 references), 'visual aspects' (15 references) and 'kinaesthetic sensations' (10 references) accounted for 24.0%, 15.0% and 10.0% respectively of the aspects most valued by its ambulant users (see Figure 8.10).

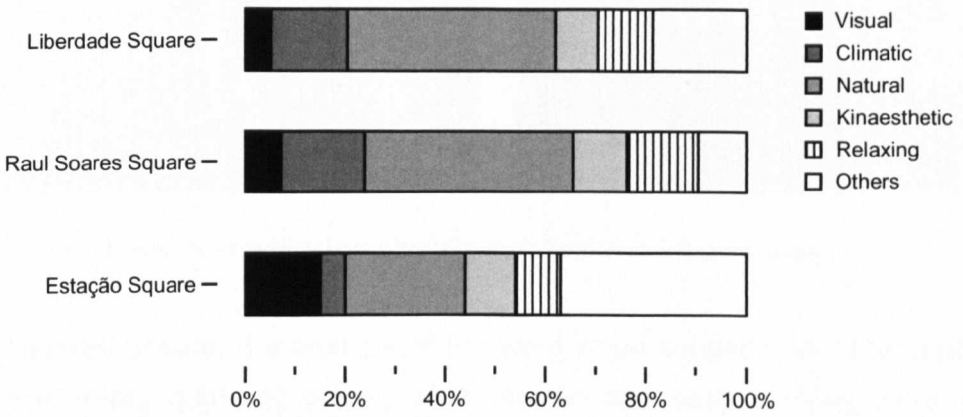


Figure 8.10: Aspects of Liberdade Square, Raul Soares Square and Estação Square perceived by their users as supportive of ambulant activities.

Source: instrument type A, fieldwork 2007.

The specific answers under the sub-categories first-cited by at least 10% of the participants were uploaded in the tagcrowd web tool in order to provide a finer description of the aspects of central urban squares most valued by their ambulant users. In Liberdade Square, the analysis of the word cloud suggests that the opportunity to experience trees, gardens, plants, water fountains and flowers, wind, freshness, coolness and shade, were highly appreciated by ambulant users as well as the tranquillity and peacefulness aroused by this urban square (see Figure 8.11). As an ambulant user in

Liberdade Square commented: 'The green area of Liberdade Square transmits peace and energy' (A1067).

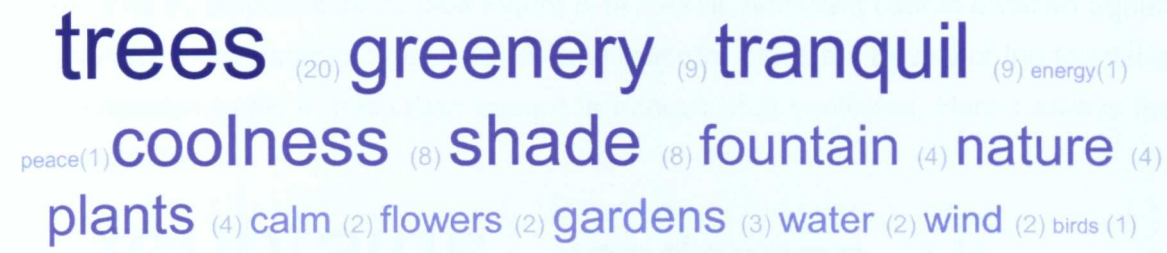


Figure 8.11: Aspects of Liberdade Square perceived by its users as supportive of ambulant activities.
Source: instrument type A, fieldwork 2007.

This was consistent with the findings through observations. The variety of sensory experiences provided by flowers, greenery, trees, water sounds attracted attention and stimulated ambulant users to interrupt their walking to smell flowers and so on (see Figure 8.12).

Figure 8.12: The roses in Liberdade Square attracting the attention of ambulant users.

In Raul Soares Square, the analysis of the word cloud suggests that the opportunity to experience trees, gardens, plants, wind, shade and easy walking were all highly appreciated by ambulant users as well as the tranquillity and peacefulness aroused by this urban square (see Figure 8.13). As an ambulant user in Raul Soares Square commented: 'It is like an oasis for me' (A2016).

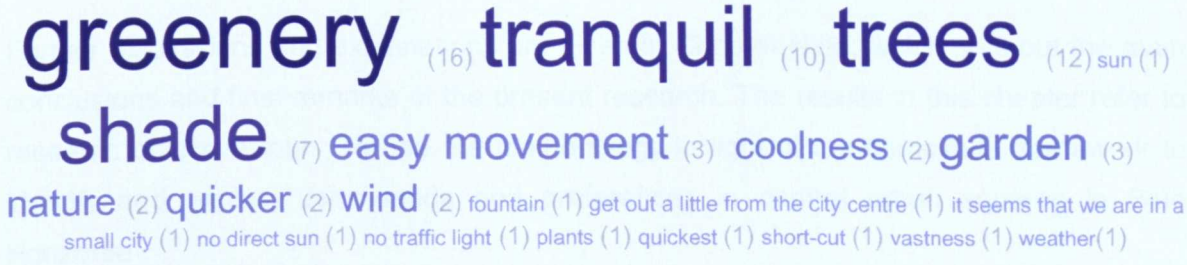


Figure 8.13: Aspects of Raul Soares Square perceived by its users as supportive of ambulant activities.
Source: instrument type A, fieldwork 2007.

In Estação Square, the analysis of the word cloud suggests that the opportunity to experience water, wide views, vastness, no barriers to movement and short cuts were all appreciated by ambulant users (see Figure 8.14). As an ambulant user in Estação Square commented: 'I like Estação Square for several reasons. I love the beauty of the fountains. The pedestrian traffic in this urban square is tranquil. It is ventilated. Here I always feel safe.' (A3115).

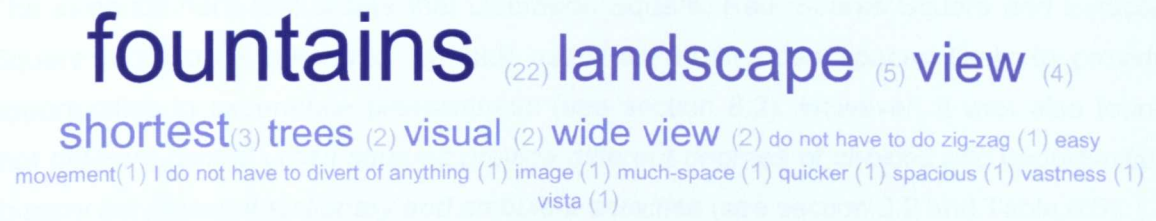


Figure 8.14: Aspects of Estação Square perceived by its users as supportive of ambulant activities.
Source: instrument type A, fieldwork 2007.

Through the analysis of data gathered with instrument type A, this section identified those aspects of central urban squares perceived by their ambulant users as supportive of pedestrian movement. To conclude, it was found that for walking, natural aspects, including plants, trees, flowers and water, tend to be highly valued by ambulant users. This subcategory was the most frequently cited in all case study sites. In addition, climatic, visual and kinaesthetic conditions were also appreciated by ambulant users, although these aspects were appreciated by a larger number of participants in some study areas than in others.

8.6 Conclusion

Through the analysis of evidence obtained with instruments types A and B, this chapter identified and examined the aspects of Liberdade Square, Raul Soares Square and Estação Square most valued by their users. In this regard, it is important to bear in mind that user preferences are assumed to reflect conditions conducive of wellbeing (Kaplan and Kaplan, 1989).

Further discussions and explanations are given in Chapter Nine, which sets out the main conclusions and final remarks of the present research. The results in this chapter refer to research objective four: 'To use the methodology in light of the contextual framework to identify and explain user needs and preferences in central urban squares in Belo Horizonte'.

Central urban squares: an urban element highly valued by their users. The findings of the present research reinforce the idea that *central urban squares are spaces highly valued by their users* (see section 8.2). In addition, the evidence here suggests that *central urban squares within the context of Belo Horizonte tend to be perceived by their users as spaces which provide opportunities to have relaxing experiences.*

The evidence here also shows that Liberdade Square, Raul Soares Square and Estação Square tend to be perceived by their users as urban open spaces likely to provide opportunities to experience pleasantness (see section 8.2). However, it was also found that *different central urban squares provide different degrees of choices and opportunities to carry out pleasant stationary and ambulant activities* (see section 8.2 and Table 8.5).

Table 8.5: Graphic representation of the different degrees of choices and opportunities offered by Liberdade Square, Raul Soares Square and Estação Square to carry out pleasant stationary and ambulant activities.

		Case studies		
		Liberdade Square	Raul Soares Square	Estação Square
Pleasant	Optional stationary activity			
	Ambulant activity			

Source: instruments type A and B, fieldwork 2007.

It was verified that the most appreciated urban square for walking (Liberdade Square) was also the most valued for sitting, while the least liked for walking (Raul Soares Square) was also the least appreciated for sitting (see section 8.2). The evidence of the present research, therefore, supports the idea that although spaces supportive for ambulant and static behaviour are likely to require different characteristics (Rapoport 1990), *spaces may be designed to be equally supportive of both ambulant and static behaviour.* Thus, it may be argued that *urban open spaces may be designed to address the needs of both stationary and ambulant users.*

In addition, the findings of this study provide support to the propositions developed by Rapoport (1990) who hypothesized that *perceptual qualities plays a larger role than associational ones in supporting pedestrian movement and that for sitting associational qualities tend to be more important than they are for walking* (see section 8.3). From the preceding account, it can be concluded that *stationary activities are more related to liking than ambulant activities* (Rapoport, 1990). This finding, in some way, converges towards Gehl's (1987) claim that while stationary activities of longer duration tend to depend on

high quality outdoor urban open spaces, walking, most often a kind of necessary activity, tend to be carried out under nearly all conditions.

Most valued aspects. The findings of the present research shows that favourable climatic conditions, natural elements, mostly plants, trees, water and flowers, fine vistas and a sense of relaxation are aspects highly valued by the stationary users of the study areas (see section 8.4). It follows that some urban design elements, such as positive sensory information, greenery, water and fine vistas, as well as certain meanings associated with some urban open spaces, such as relaxation, are able to attract and retain people within them. The results discussed in this chapter, therefore, tend to validate Mehta's findings that *some physical characteristics are able to generate and anchor stationary activities within urban open spaces.*

These same aspects, favourable weather condition, greenery, water, fine vistas and a sense of relaxation, were also positively valued by the ambulant users in Liberdade Square, Raul Soares Square and Estação Square, in addition to the pleasurable experience of sensing their own body in continuous movement (kinaesthetic sensations). Thus, the evidence of the present research provides support to the idea that *an unimpeded path to walk tends to be positively valued by ambulant users because while the experience of motion is pleasing, its interruption is typically accompanied by a feeling of tension and frustration* (Taylor, 2003).

The following chapter examines and reviews the findings discussed in Chapters Six, Seven and Eight in the light of the theoretical framework (see Chapter Two and Three) and contextual framework (see Chapter Five) to answer the research question and achieve the research aim.

CHAPTER NINE

CONCLUSION

9.1 Introduction

This chapter draws together the various strands of the present study: the background problem, the main question, the aim and the research objectives. Furthermore, the findings discussed in Chapters Six, Seven and Eight are discussed in the light of the theoretical framework developed in Chapters Two and Three and of the contextual framework developed in Chapter Five to answer the research question and achieve the research aim. Next, this chapter examines (i) the implications of the findings of the present research for the design of urban open spaces, (ii) evaluates the present research, (iii) discusses further research, and (iv) highlights the contribution to the knowledge.

9.2 Reviewing the research problem, question, aim and objectives

The present research was related to the role played by the multisensory characteristics of central urban squares within large cities in addressing user needs and preferences. It was found that although a consideration of the multisensory aspects of urban open spaces throughout the process of design has been regarded as highly important (Bentley *et al.*, 1985; Carmona *et al.*, 2003; Landry, 2006; Lynch, 1971; Malnar and Vodvarka, 2004; Pallasma, 2005; Shaftoe, 2008; Taylor, 2009), which is a major step forward from simply reducing urban design to appearances, most of the theory has focused on the importance of high visual quality in public urban open spaces.

The research problem was, therefore, defined as the lack of studies which investigate how experience and social behaviour are influenced by the multisensory aspects of urban environments. To solve this problem, quantitative and qualitative methods of data

collection and analysis were employed and a multiple case study design was adopted. The following research question was derived from the research problem:

> 'What are the theoretical and applied principles necessary for an understanding of the development of an evidence-based approach to multisensory design of urban open spaces that are responsive to user needs and preferences?'

The aim of this research was 'To develop an evidence-based approach to the multisensory design of urban open spaces that are responsive to user needs and preferences'. The research objectives for answering the research question were defined as follows:

> 01. To develop a theoretical framework which identifies the key concepts and theories to inform a multisensory approach for the design of urban open spaces that are responsive to user needs and preferences.
>
> 02. To develop a methodology to test this theoretical framework and to identify the most common user needs and preferences that a responsive multisensory approach to the design of urban open spaces should address.
>
> 03. To develop a contextual framework to understand historical, political, social and economic factors shaping current common user needs and preferences in central urban squares in Belo Horizonte.
>
> 04. To use the methodology in light of the contextual framework to identify and explain user needs and preferences in central urban squares in Belo Horizonte.
>
> 05. To analyse and review the findings from a multi-dimensional survey of user needs and preferences in central urban squares in Belo Horizonte against the theoretical and contextual framework to identify fundamental urban design elements and qualities to inform a responsive multisensory approach to design.

9.3 Answering the research question

This section returns to the main research question 'What are the theoretical and applied principles necessary for an understanding of the development of an evidence-based approach to multisensory design of urban open spaces that are responsive to user needs and preferences?' while addressing the research aim: 'To develop an evidence-based approach to the multisensory design of urban open spaces that are responsive to user needs and preferences'.

The following paragraphs summarize responses to the main research question in light of the results presented in Chapters Six, Seven and Eight, the theoretical framework

developed in Chapters Two and Three, and the contextual framework developed in Chapter Five.

The key urban design elements that emerged from the present research as supportive of social activities in urban open spaces are: props, boundaries, landmarks, spaces, views, atmospheres, anchors and repellents.

Props (e.g. bench) and *boundaries* (e.g. fence) are defined as those elements of urban design which provide practical support to carry out all sorts of stationary activities (see Chapter Three, section 3.2). While the former is perceived as a three-dimensional object, the latter is a sort of continuous vertical surface (or screen), not necessarily impenetrable.

A *landmark* element is a highly visible and distinctive object which stands out from the background when seen from distance (see Chapter Three, section 3.2). Landmark features are perceived as a coordinate axis (e.g. tower block) and help users to feel micro-located, enhancing their sense of orientation (see Chapter Three, section 3.2).

Visual *spaces* are shaped by objects, surfaces or screens (see Chapter Three, section 3.2) and may be used as channels for movement, gathering points or both. Depending on their perceptible properties, spaces may reinforce one's sense of here-ness (e.g. intersection), there-ness (e.g. path) or transition (e.g. main entrance of a tube station) (Thwaites and Simkins, 2007).

It was found that visual spaces within central urban squares tend to stand out in the mind of the perceivers only when their boundaries enhance one's sense of enclosure, such as the alameda of palm trees in Liberdade Square (see Chapter Seven, section 7.2).

Views (e.g. panoramic views) and *atmospheres* (e.g. traffic noise) are respectively defined as remarkable visual and non-visual sensory effects produced by fixed, semi-fixed and non-fixed elements of urban settings. Atmospheres are able to reinforce the character of urban settings, while triggering intense emotional reactions, which, in turn, may be positive or negative (see Chapter Three, section 3.2).

In addition, the findings of the present research suggest that while some elements of urban design are able to attract and retain users, others act as supports and yet others even repel people from some spaces, reinforcing the results of previous research (see, for example, Mehta, 2009).

Anchors refer to those urban design elements appreciated by a significant number of users while *repellents* are those elements associated with unpleasant experiences. By triggering emotional reactions, *anchors tend to attract users and inspire fascination* while *repellents are defined as those which induce mental fatigue.*

However, according to the findings discussed in Chapters Six, Seven and Eight, some components of the objective environment may function as different elements of urban design, sequentially or simultaneously, depending on their perceptible properties and on how they are used and experienced by people.

For example, a distinctive and highly visible object will be a landmark, prop and anchor if it helps people to feel micro-located, provides practical support to carry out stationary activities and pleases users. The results of the present research, therefore, *calls for designers to take into account the dynamic, fluid and emotional character of human mutlisensory experience of urban open spaces.*

The provision of well-articulated *props* as well as permeable and irregular *boundaries*, which allow sitting and wide views, is often recommended to encourage stationary activities in urban open spaces (Gehl, 1987; Gehl, Kaefer and Reigstad, 2006; Marcus, Francis and Russel, 1990). The evidence of the present research supports this.

Behavioural maps showed that the large majority of users carrying out optional sitting activities in Liberdade Square, Raul Soares Square and Estação Square, 90-95%, located themselves at distances within 1m from props (e.g. trunks of trees, columns of buildings, benches, sculptures) or boundaries, such as vertical surfaces (e.g. façades) and screens (e.g. fences) (see Chapter Six, section 6.3.1). Thus, the evidence of the present research shows that *props and boundaries play an important role in sustaining stationary activities in urban open spaces.*

The notion of *support effect* helps to understand the popularity of *props* and *boundaries* (Gehl, 2001; Gehl, Kaefer and Reigstad, 2006). In this regard, it has been said that fixed and semi-fixed objects, as well as vertical surfaces or screens, tend to be preferred for carrying out stationary activities of longer duration when their attributes address the user needs for psychological and physical comfort (Gehl, 2001; Gehl, Kaefer and Reigstad, 2006).

One's sense of security may be enhanced by those props and boundaries which allow people to set their backs against them and monitor what is going on in space (Gehl, 2001; Gehl, Kaefer and Reigstad, 2006). When one's back is protected, personal territory is reduced, making it easier for the individual to foresee any undesirable close contact and react in time. In addition, props and boundaries may provide practical support to the effective performance of stationary social activities (see Figure 9.1).

Figure 9.1: A column of the MAO (top left), a lamp-post in Estação Square (top right), a palm tree in Liberdade Square (bottom left) and a tree in Raul Soares Square (bottom right) functioning as props.

Further, observations suggest that *depending on the perceptible characteristics and arrangement of props in space, a varied mix of user needs may be addressed by them, enhancing their role as social magnets.*

Figure 9.2, for example, shows the lamp posts in Liberdade Square being used to perform different types of activities by different user groups at different times of the day. The preference for carrying out stationary social activities at short distances from props and boundaries, therefore, may also be explained on the basis of their *affordances*. Affordances, as discussed earlier in Chapter Three (see section 3.3), are defined as 'perceptible properties of the environment that have functional importance for an individual' (Heft, 2010, p.18).

Figure 9.2: The lamp-posts in Liberdade Square accommodating different uses.

It follows that *robustness*, an urban design quality which affects the degree which an individual has choices and opportunities to use a space for different purposes, *does contribute towards the enhancement of liveliness in gathering urban open spaces* (Bentley *et al.*, 1985). However, not only robustness, but also richness and legibility, emerged from the present study as key urban design qualities in attracting and retaining people in urban open spaces.

The *wealth of sensory information* users acquire by not being in the open pavement away from any physical artefact is probably another important factor in users' preferences for carrying out sitting activities close up to props and boundaries. At short distances from props and boundaries, depending on the variety and quality of their sensory effects, *intense positive emotional reactions* are more likely to be experienced because all senses may become engaged at some point (Gehl, Kaefer and Reigstad, 2006).

Sensory-behavioural composite maps show that *spaces as well as their components offer different degrees of choice and opportunity to experience positive sensory effects and that stationary users tend to prefer locations where a variety of sensory delights are more likely to be noticed*. Figures 9.6, 9.7 and 9.8 show that the most used benches were those

located in zones associated with pleasant sensory effects and away from sensory repellents. The evidence of the present research, therefore, suggests that *richness* is an urban design quality supportive of stationary activities and meaningful experiences in urban open spaces.

The *prospect-refuge theory* (Appleton, 1988, 1996) which refers to human preferences for zones which allow concealment (refuge) and wide *views* into adjacent spaces (prospect), also appear to explain user preference for carrying out stationary activities at short distances from *props* and *boundaries*. Observations show that at short distances from props and boundaries, people reduce their level of exposure. Figure 9.3, for example, suggest that users carrying out optional stationary activities at short distances from trees, whose canopies extend over them, may experience a sense of being contained and concealed (Crankshaw, 2009).

Figure 9.3: Trees defining green boundaries in Liberdade Square (right) and Raul Soares Square (left).

The *edge effect* which refers to human preference for staying at the border of spaces from where they can control their level of exposure and monitor what is going on in space (Gehl, 1987; Gehl, Kaefer and Reigstad, 2006) also explains why users tended to carry out stationary activities at short distances from *boundaries*, usually made of vertical surfaces, screens and/or objects.

A supplementary explanation for the popularity of boundaries is discussed by Hall (1966) and Preece (1991) who point out that *irregular boundaries help users, singly or in groups, to keep their distance from others in an identifiable and partly private location* (see Figure 9.3). It appears that the permeability, irregularity and height of boundaries influence their intensity of use because these properties tend to affect the degree of choice and opportunities users can control their level of exposure.

The evidence of the present research shows that highly visible and distinctive objects, although unattractive and inaccessible, were also regarded as highly meaningful by stationary users of central urban squares, such as the water fountain (63 references) in Raul Soares Square (see Chapter Seven, section 7.2). One possible explanation for this phenomenon is discussed by Crankshaw (2009, p.19) who points out that 'elements can enhance the sense of prospect by pulling one's view farther into the distance and by giving meaning to spatial zones'.

In this regard, it has been said that *landmark* features, which by definition are necessarily highly visible and distinctive objects, by guiding the eye, may help people to feel *micro-located* enhancing their sense of psychological comfort (Kaplan, Kaplan and Ryan, 1998; Thwaites and Simkins, 2007). Figure 9.4 illustrates that the Ipê (20 references) and the Monumento à Terra Mineira (36 references) may have been regarded as important elements within Estação Square by their users because they may enhance their sense of direction and prospect (see Chapters Seven, section 7.2).

Figure 9.4: The Ipê in Estação Square enhancing the sense of prospect by pulling users' view farther into the esplanade.

The significant number of landmark elements sketched by the stationary users of Liberdade Square, Raul Soares Square and Estação Square supports the claims that understanding is a pervasive human need (see Chapter Seven, section 7.2). The importance of landmarks in enhancing the *legibility* of urban open spaces has been highlighted throughout the literature (Bentley *et al.*, 1985; Lynch, 1960; Thwaites and Simkins, 2007; Taylor, 2009). The evidence of the present research, therefore, suggests that *designing for legibility may also contribute towards the generation of spaces supportive of social activity*.

Depending on the position of landmark elements in relation to other components of the setting, it may not only provide for understanding but also for exploration (Kaplan, Kaplan

and Ryan, 1998). For example, a partial view of the bandstand in Liberdade Square may motivate exploration, considered another pervasive human need (see Figure 9.5).

Figure 9.5: The bandstand as a landmark feature in Liberdade Square addressing the user needs for exploration (left) and understanding (right).

Benches, as well as surfaces where people can sit, have been identified as important urban design characteristics that support stationary activities in gathering urban open spaces (Mehta, 2009; Whyte, 1980, 1988). In this regard, it is often recommended that urban open spaces designed to retain people in them should provide *sitting spaces where favourable climatic conditions can be experienced* (Marcus, Francis and Russel, 1990).

The evidence of the present research generally supports this. It was verified during the fieldwork activities that while the benches in Estação Square, most of them in the sun, were used by a small parcel of users carrying out optional stationary activities in this urban square, the benches in Liberdade Square and Raul Soares Square, most of them located under shade and semi-shaded spaces, accommodated the large majority of stationary activities reported to occur in these spaces (see Chapter Six, section 6.3.1).

In addition, observations show that benches located under shade and semi-shaded spaces within Liberdade Square and Raul Soares Square were preferred to similar ones in the sun for carrying out optional stationary activities (see Chapter Six, section 6.3.1). Those benches located under shade and semi-shaded spaces may have been preferred to those in the sun because by being located in zones where thermal delights could be experienced, these semi-fixed objects potentially addressed the common user needs for *physical comfort* and *relaxation*. In this regard, Thwaites and Simkins (2007, p.63) point out:

> 'Physical and micro-climatic shelter as well as opportunities to sit, lie and maybe sleep all help to induce a sense of tranquillity and offer a chance to do nothing'.

Besides climatic condition, the evidence of the present research showed that the *most used benches in all the study areas were away from heavy traffic roads and along frequently used pedestrian routes* (see Chapter Six, section 6.3.1). Stationary users may have preferred to carry out stationary activities in these props possibly because they afforded the satisfaction of *comfort* and *passive engagement*, common user needs in urban open spaces. Benches away from heavy traffic roads and along frequently used pedestrian routes afford simultaneously a certain degree of *protection against unpleasant sensory information* as well as opportunity to carry out *people-watching*.

The preceding evidence tends to validate the claim that *users of central urban squares seek out locations within urban open spaces which offer as many advantages as possible* (Gehl, 1987). Thus, as discussed earlier, the results of the present research suggest that *the urban design elements which encapsulate a more varied range of affordances responsive to user needs tend to attract and retain a large number of users in central urban squares*. Thus, *robustness*, once more, emerges as a highly fundamental quality in making urban open spaces supportive of stationary activities.

Reinforcing the above reasoning, it is interesting to note that those urban design elements which accommodated the largest number of stationary users at the same time in the study areas, the bandstand in Liberdade Square and the Monumento à Terra Mineira in Estação Square (see Chapter Six, section 6.3.6), are visible, distinctive, *useful* and *pleasing* urban design elements which potentially address user needs for psychological and physical comfort, relaxation, discovery, passive and active engagements.

The evidence of the present research, therefore, suggests that *pleasant multipurpose elements*, by presenting a mix of affordances responsive to a variety of user needs, may become an important anchor in urban open spaces likely to enhance the robustness of the space which contains it. On top of that, it may be argued that a significant number of stationary users may have chosen to carry out stationary activities in these anchors because *focal elements* which accommodate activity clusters may generate an overall *sense of protection against violence and criminal acts*.

If the users clustered in focal elements may feel protected by being simultaneously seen from different directions, these same users may also enhance the sense of protection of those people walking or spending time at short distances from them. People carrying out stationary activities in focal points define a symbiotic situation where users police themselves.

Another explanation for the popularity of *pleasant multipurpose elements* is given by Marcus, Francis and Russel (1990) who argue that *people look for elements in urban open spaces which may provide physical support to all sorts of social activities and function as hooks for more intangible associations.*

Gehl (1987, p.152) concluded from his studies on public open spaces that 'events grow from inward, from the edge toward the middle of public open spaces'. On this matter, the opposite phenomenon was observed in Liberdade Square, Raul Soares Square and Estação Square: *while the largest clusters tended to occur in the 'middle', few optional stationary activities were observed in the 'edges'* of the study areas (see Figures 9.9, 9.10 and 9.11).

However, it is important to take into account that the edges referred to by Gehl (1987) were irregular and permeable façades of buildings likely to address one's need for physical and psychological comfort while offering opportunities to experience positive sensory effects, including those produced by the goods on display, overhangs and so on. In contrast, the central urban squares under scrutiny differ from those referred to by Gehl (1987) in that their perimeters are defined by busy roads.

Thus, while the edges along busy roads were frequently associated with unpleasant and intrusive sensory information produced by motorized vehicles, the geometric centres of the study areas tended to be associated with valued sensory effects, such as water sounds, natural smells, fine views and so on (see Chapter Seven, sections 7.4 and 7.5). Thus, paraphrasing Gehl (1987), it may be concluded that *events grow from the surroundings of sources of positive sensory information toward the open pavement and away from sources of intrusive sensory information.*

It has been recommended that urban designers should conceive solutions that *engage all senses* while triggering *positive emotional reactions* (Bentley *et al.*, 1985; Shaftoe, 2008). In this regard, the findings of the present research confirm that *olfactory, tactile and aural sensory effects are likely to trigger intense rather than indifferent emotional reactions* in the users of central urban squares (see Chapter Seven, sections 7.3, 7.4 and 7.5).

In addition, it was verified that those *olfactory and aural sensory effects produced by natural elements tend to provide a higher degree of satisfaction than those produced by urban elements* (see Chapter Seven, sections 7.3 and 7.4). Therefore, it appears that

users of urban open spaces are calling for more *naturally appealing sensoryscapes* in central urban squares.

On top of that, the results of the present research indicates that the opportunity to experience *positive sensory experiences may override negative aspects* of central urban squares and attract people to carry out stationary activities in these gathering urban open spaces, reinforcing the results of previous research (see, for example, Kang, 2007). The opportunity to notice a wealth of pleasant sensory effects produced by trees and other forms of greenery in Raul Soares Square, for example, may explain its popularity despite its associations with intrusive sensory information, lack of care and incivilities (see Chapters Seven, sections 7.2, 7.4, 7.5 and Eight, section 8.2).

It has been said that users seek out opportunities to experience positive sensory information (Gehl, Kaefer and Reigstad, 2006) as well as protection from overwhelming, unpleasant, distracting and intrusive sensory information (Gehl *et al.*, 2006; Kaplan, Kaplan and Ryan, 1998; Thwaites and Simkins, 2007). The results of the present research suggest, as discussed above, that *the quality and variety of sensory effects afforded by central urban squares do influence the distribution of optional stationary activities within them.*

The preference for carrying out stationary activities at short distances from pleasant sensory sources, preferably located away from spaces associated with intrusive sensory information, may be explained by the ART theory (Kaplan, Kaplan and Ryan, 1998). In accordance with this theory, people process information through two types of attention: directed attention and fascination (or involuntary attention).

Directed attention is a limited human resource which is used to (i) deal with complex issues and problems, as well as (ii) screen out sensory information unnecessary to the effective performance of the activity in progress, such as traffic noise during a conversation. The depletion of directed attention in human everyday life demands opportunities for recovery which, in turn, best takes place in environments where involuntary attention is more likely to be used.

According to the ART theory, restorative settings are able to 'deliver general sensation of revival, or renewal mitigating mental fatigue' (Thwaites and Simkins 2007, p. 63) by providing psychological distance from the setting causing mental fatigue (being away), affording opportunity to experience breadth of scope and possibility (extent), matching the

demands of the users (compatibility) as well as engaging and holding effortless attention (fascination).

In this regard, it has been said that nature, including *trees, water, flowers* and *plants*, are likely to inspire fascination which makes them *stimulants of restorative experiences*, often associated with pleasure, relaxation and a sensation of revival (Kaplan, Kaplan and Ryan, 1998; Thwaites and Simkins, 2007). It follows that those urban open spaces which are able to provide restorative benefits have the capacity to enhance mental-health and a sense of well-being (Kaplan and Kaplan, 1989; Kaplan, Kaplan and Ryan, 1998; Ward Thompson, Aspinall and Bell, 2010).

It is well established in literature that contact with nature has the ability to reduce levels of stress in human-beings as well as having mood-enhancing effects (Kaplan and Kaplan, 1989; Kaplan, Kaplan and Ryan, 1998). In this regard, recent research has concluded that *well-designed and attractive urban environments may have restorative effects on people similar to those of attractive natural environments* (Karmanov and Hamel, 2008). This view is supported by the findings from the present research.

Estação Square, a hard-landscaped urban square, for example, provided higher levels of pleasantness to its stationary and ambulant users than Raul Soares Square, a landscaped urban square. In this regard, as discussed earlier, Lynch (1971) points out that there are plenty of highly popular urban squares which are not featured with green areas and that cover everything with greenery does not necessarily generate a successful urban open space.

The opportunity to experience *favourable climatic conditions, natural elements and fine views, along with a sense of relaxation, were often cited as the main reasons to enjoy* Liberdade Square, Raul Soares Square and Estação Square (see Chapter Eight, sections 8.4 and 8.5). This result, therefore, reinforces the claim that favourable thermal conditions, flowers, water, trees, greenery and fine views are stimulants of restorative experiences.

In addition, the sense of relaxation frequently associated with the study areas indicates that contact with high quality central urban squares may reduce levels of stress (see Chapter Eight, section 8.2). Thus, it may be argued that *central urban squares within large cities in Brazil tend to be perceived as important urban assets because of their restorative properties,* reinforcing the results of previous research (see, for example, Robba and Macedo, 2003).

From the preceding account, it may also be argued that *people in large cities have been attracted to perform stationary activities in central urban squares because the wealth of positive sensory information offered by some locations within these spaces is likely to have restorative effects on them.*

The evidence of the present research, therefore, suggests that the *positive sensory information produced by trees, and other forms of greenery, water, thermal delights and fine views, alongside the sense of relaxation provided by them, tend to function as anchors. It follows that richness is an urban design quality likely to attract and retain people in central urban squares in the context of Belo Horizonte.*

Further, the findings of the present research showed that *ambulant users* in central urban squares tend to *perform purposive walking* and *prefer short cuts instead of routes associated with positive sensory information* (see Figures 9.12, 9.13 and 9.14). This result, therefore, confirms the claim that *purposive walking, a kind of necessary activity, tends to take place independently of the external conditions* (Gehl, 2001).

Thus, the *design of routes in central urban squares*, where the majority of users tend to perform purposive walking, *should consider the walking networks of the city in order to avoid unreasonable detours*, likely to trigger frustration (Taylor,2003). Nevertheless, these *short cuts should be detailed to achieve richness in order to enhance one's sense of well-being.*

In addition, it was found that *natural elements, favourable climatic conditions, fine views and kinaesthetic experience are highly appreciated by ambulant users* who may also experience a *sense of relaxation* throughout their walking (see Chapter Eight, section 8.5). It was confirmed that *for ambulant users perceptual aspects tend to be more important than the associational aspects*, as hypothesized by Rapoport (1990) (see Chapter Eight, section 8.3).

It was verified that *ambulant users are highly sensitive to the tactile quality of the paved areas and that they tend to appreciate fine textured paving materials* when carrying out purposive walking (see Chapter Seven, section 7.3). In this regard, all urban design characteristics likely to facilitate an effective walking through central urban squares tended to be appreciated by ambulant users, including *spaciousness and no barriers to movement* (see Chapter Eight, section 8.5). The findings of the present research, therefore, provide *empirical-based evidence which supports the claim that to address*

ambulant user needs for comfort, routes should provide room for walking, no obstacles and good surfaces (Gehl *et al.*, 2006).

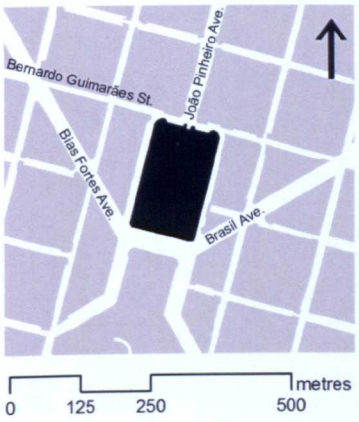
Richness is defined by Bentley *et al.* (1985) as an urban design quality which implies different opportunities to notice positive sensory experiences. The findings of this research showed that *positive sensory experiences are not only valued by users of central urban squares, but they are also likely to attract and retain stationary users in central urban squares.*

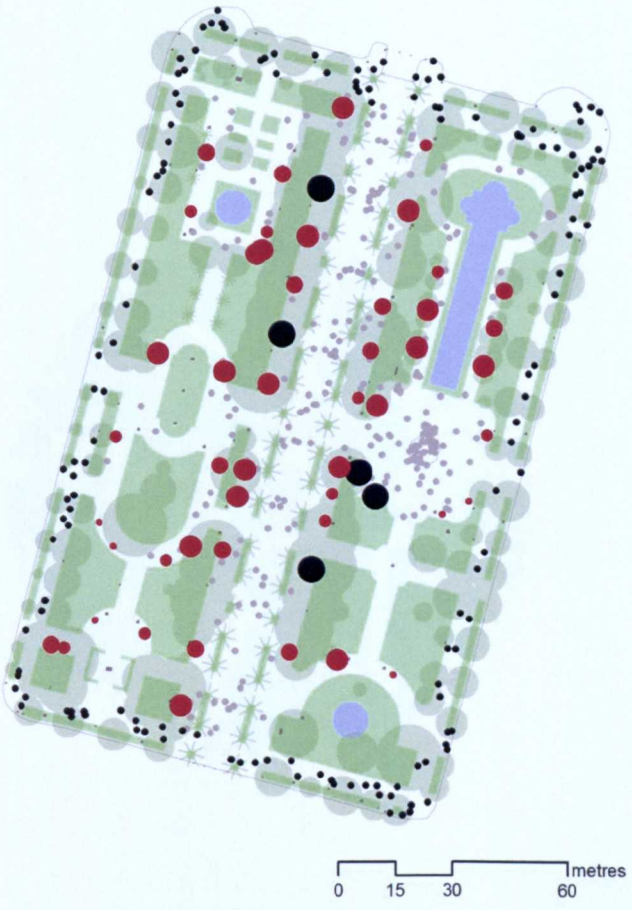
From the preceding account, it may be argued that the quality of the sensory experience provided by urban open spaces tends to be highly important to its users because it influences their sense of well-being and social behaviour.

In addition, the results of the present research indicate that *the quality of the experience provided by an urban open space and the behaviour norms transmitted by it are not only a matter of design, but also of management.*

For example, the study area which lacked adequate maintenance and presented signs of incivilities during the fieldwork activities, Raul Soares Square, was significantly less appreciated than Liberdade Square and Estação Square, both regularly maintained (see Chapter Eight, section 8.2). Thus, the findings here tend to support the claim made by Carr *et al.* (1992) and Shaftoe (2008) that *the responsiveness of both urban design and management to user needs and preferences are likely to generate well-used urban open spaces.*

Finally, the preceding discussion indicates that props, boundaries, landmarks, spaces, atmospheres, views, anchors and repellents as well as robustness, richness and legibility play a key role in attracting and retaining people in central urban squares within large cities because of their responsiveness to various user needs and preferences.





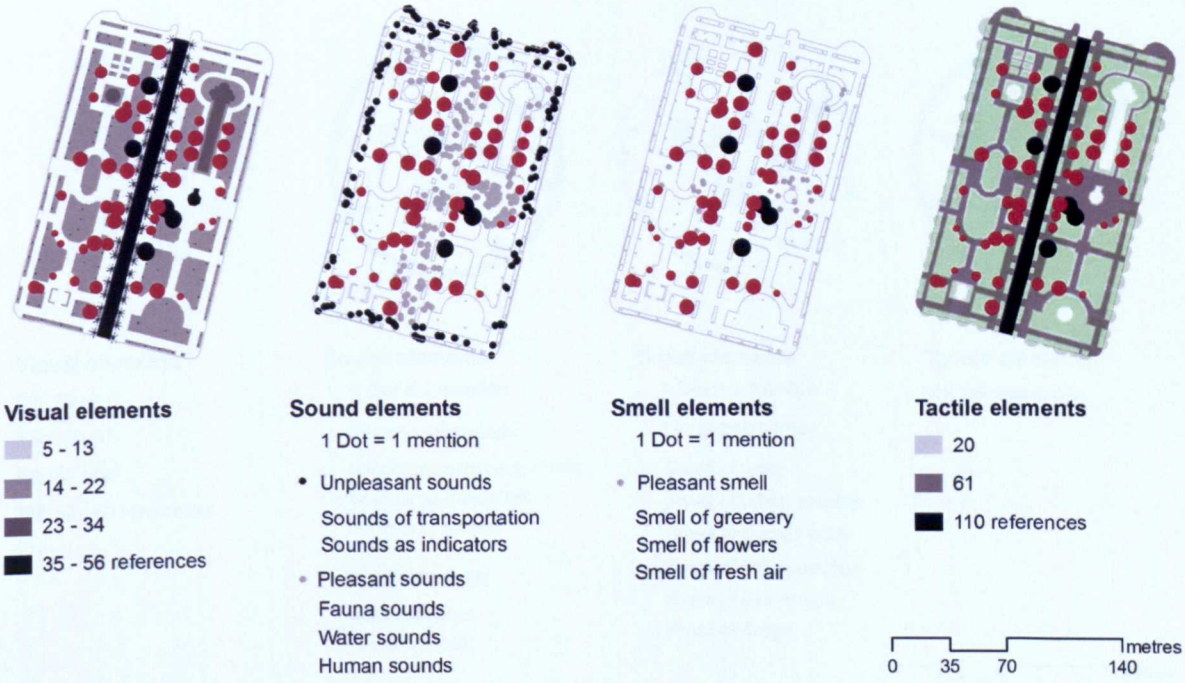


Figure 9.6: Sensory-behavioural maps of Liberdade Square representing its collective multisensory cognitive structure as well as the distribution of users carrying out optional stationary activities in its benches.

Source: place-centred mapping, fieldwork 2006 and instrument type B, fieldwork 2007.

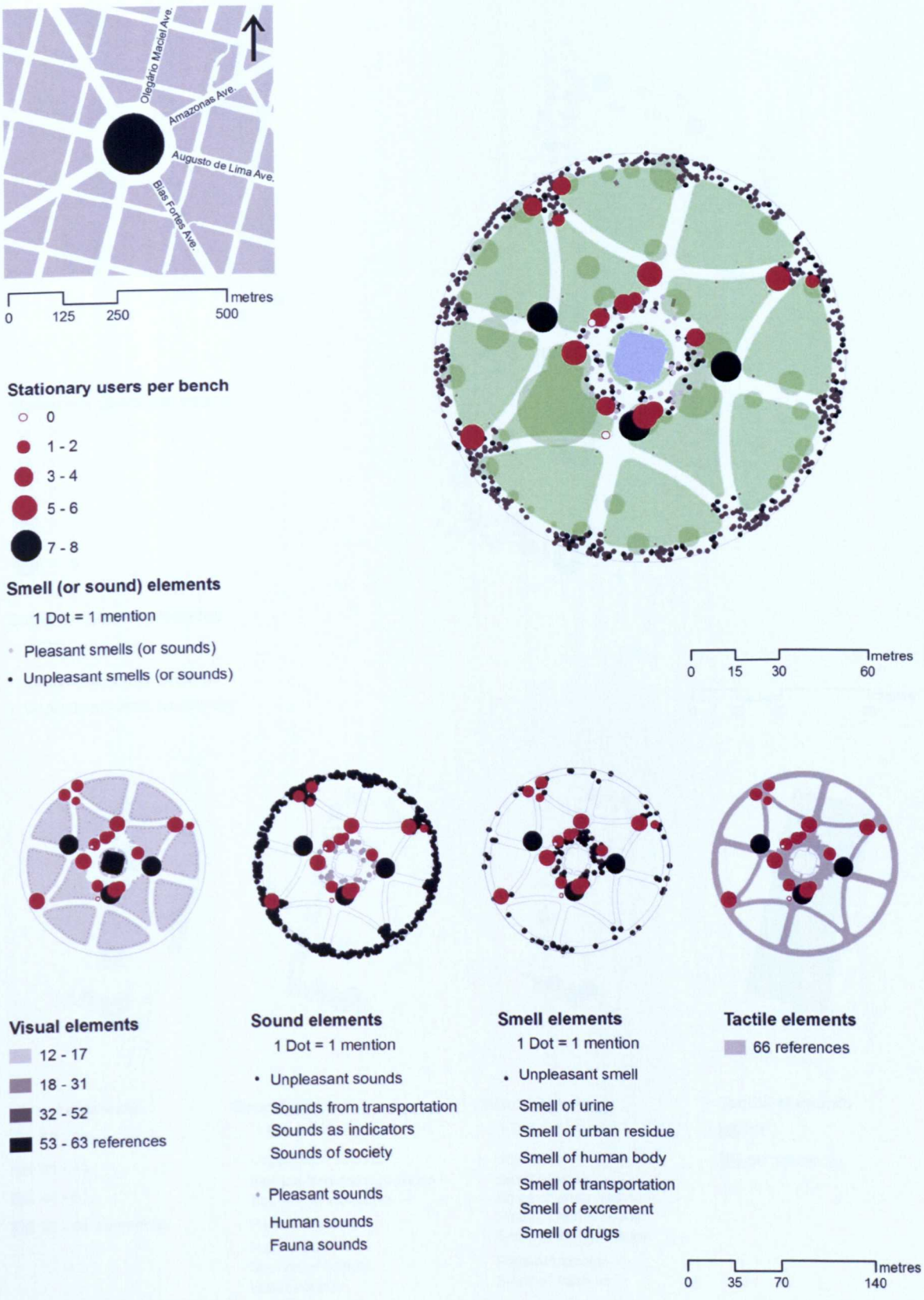
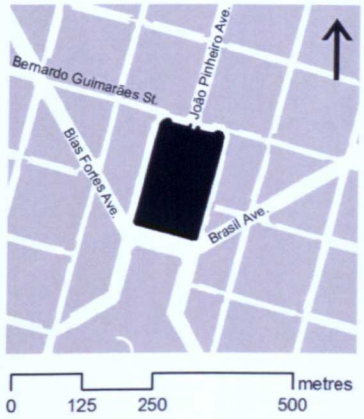


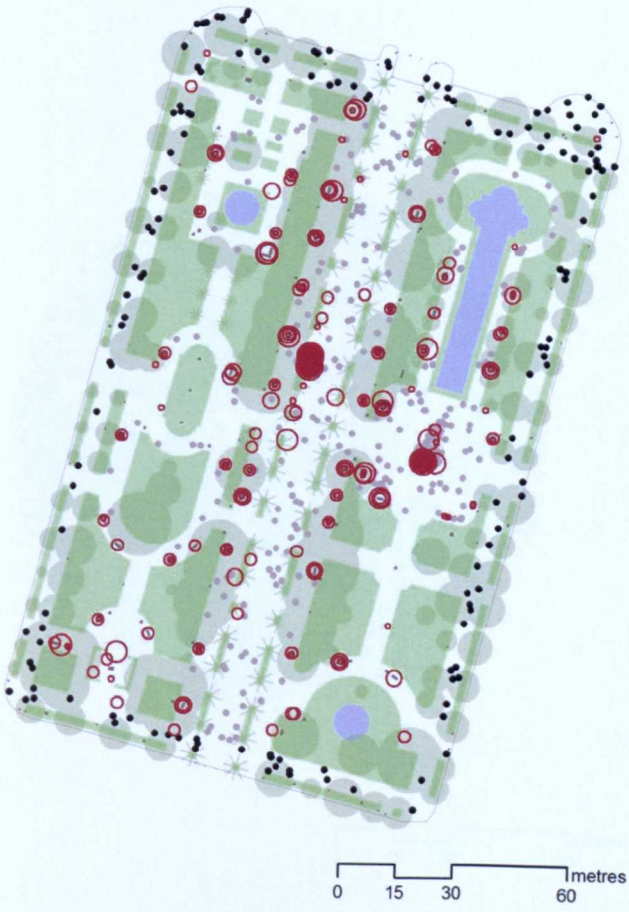
Figure 9.7: Sensory-behavioural maps of Raul Soares Square representing its collective multisensory cognitive structure as well as the distribution of users carrying out optional stationary activities in its benches.

Source: place-centred mapping, fieldwork 2006 and instrument type B, fieldwork 2007.

Figure 9.8: Sensory-behavioural maps of Estação Square representing its collective multisensory cognitive structure as well as the distribution of users carrying out optional stationary activities in its benches.

Source: place-centred mapping, fieldwork 2006 and instrument type B, fieldwork 2007.





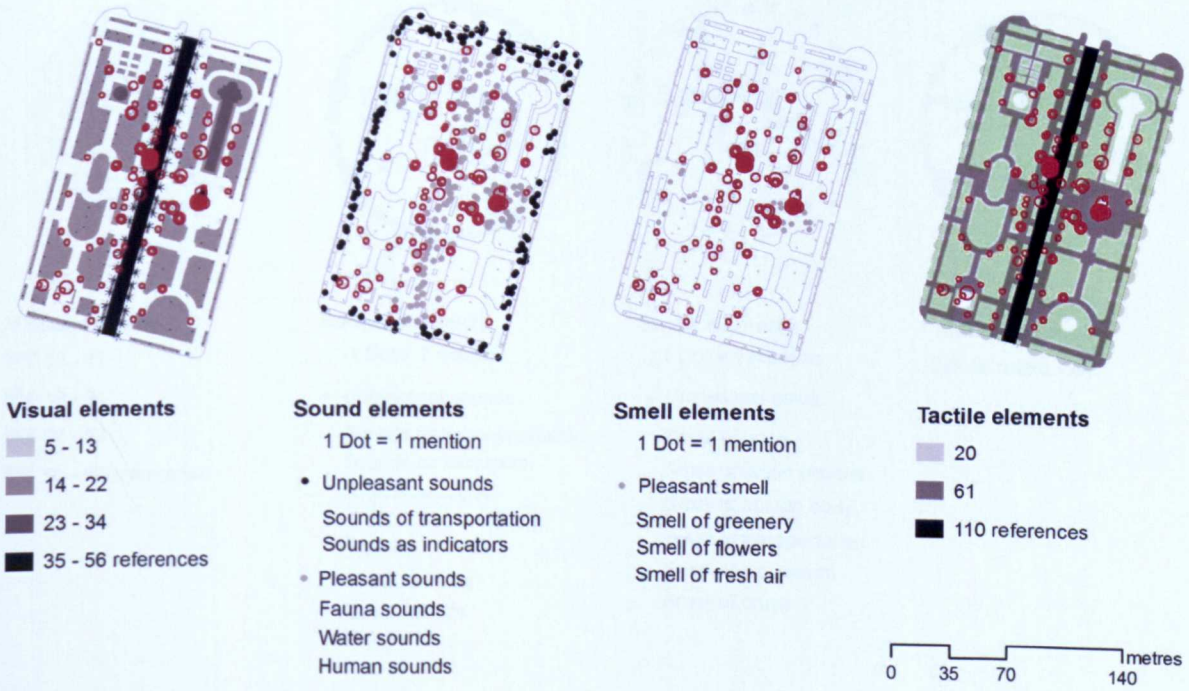
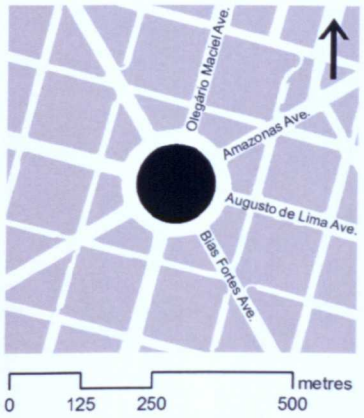
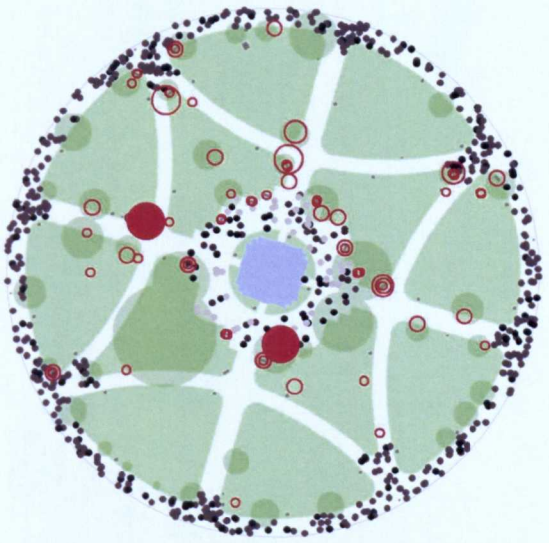


Figure 9.9: Sensory-behavioural maps of Liberdade Square representing its collective multisensory cognitive structure as well as the distribution of activity clusters within it.

Source: place-centred mapping, fieldwork 2006 and instrument type B, fieldwork 2007.





Users defining activity clusters

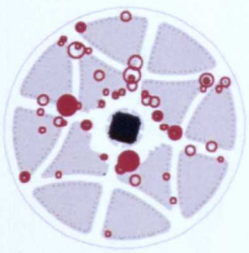
- 1
- 2
- 3
- 4 - 5
- 6

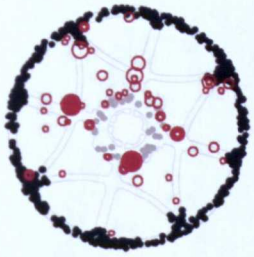
Smell (or sound) elements

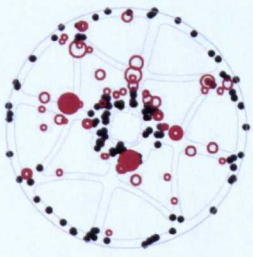
1 Dot = 1 mention

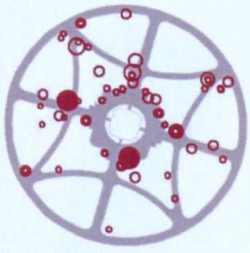
- Pleasant smells (or sounds)
- Unpleasant smells (or sounds)

metres
0 15 30 60









Visual elements

- 12 - 17
- 18 - 31
- 32 - 52
- 53 - 63 references

Sound elements

1 Dot = 1 mention

- Unpleasant sounds
  - Sounds from transportation
  - Sounds as indicators
  - Sounds of society
- Pleasant sounds
  - Human sounds
  - Fauna sounds

Smell elements

1 Dot = 1 mention

- Unpleasant smell
  - Smell of urine
  - Smell of urban residue
  - Smell of human body
  - Smell of transportation
  - Smell of excrement
  - Smell of drugs

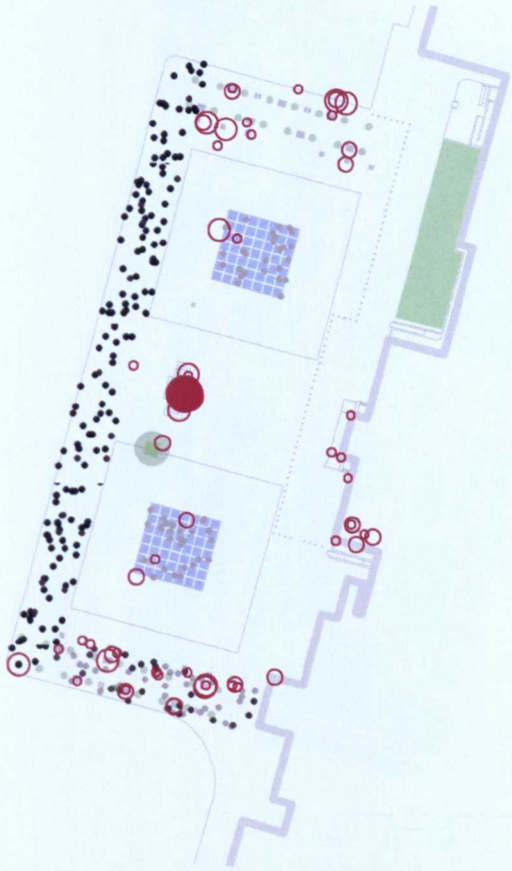
Tactile elements

- 66 references

metres
0 35 70 140

Figure 9.10: Sensory-behavioural maps of Raul Soares Square representing its collective multisensory cognitive structure as well as the distribution of activity clusters within it.

Source: place-centred mapping, fieldwork 2006 and instrument type B, fieldwork 2007.



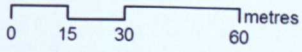
Users defining activity clusters

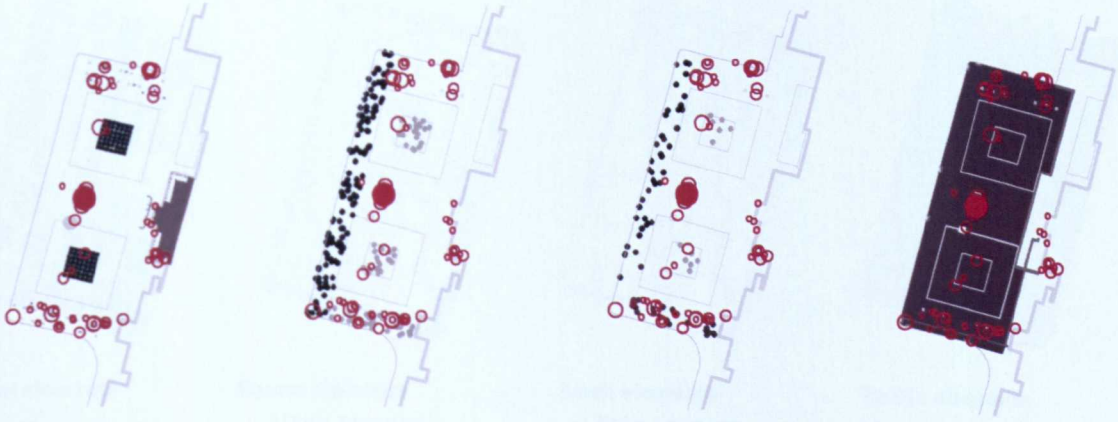
- 1
- 2
- 3 - 4
- 5 - 7
- 8 - 18

Smell (or sound) elements

1 Dot = 1 mention

- Pleasant smells (or sounds)
- Unpleasant smells (or sounds)





Visual elements

- 12 - 20
- 21 - 43
- 44 - 51
- 52 - 64 references

Sound elements

1 Dot = 1 mention

- Unpleasant sounds
  - Sounds from transportation
  - Sounds as indicators
- Pleasant sounds
  - Human sounds
  - Sounds of society
  - Water sounds

Smell elements

1 Dot = 1 mention

- Unpleasant smells
  - Smell of urine
  - Smell of urban residue
  - Smell of human body
  - Smell of transportation
- Pleasant smells
  - Smell of fresh air

Tactile elements

- 14
- 56 references

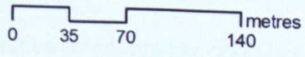
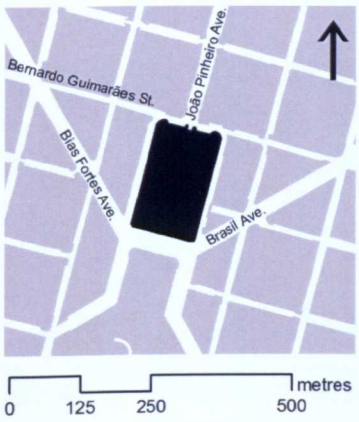


Figure 9.11: Sensory-behavioural maps of Estação Square representing its collective multisensory cognitive structure as well as the distribution of activity clusters within it.

Source: place-centred mapping, fieldwork 2006 and instrument type B, fieldwork 2007.



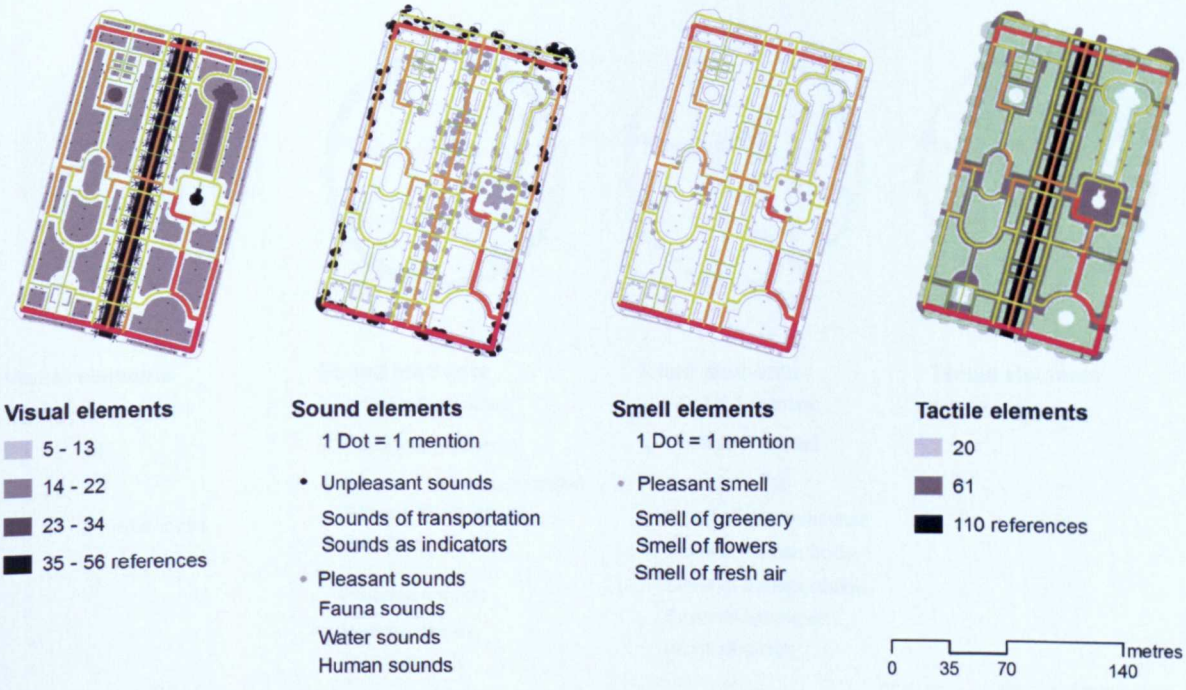
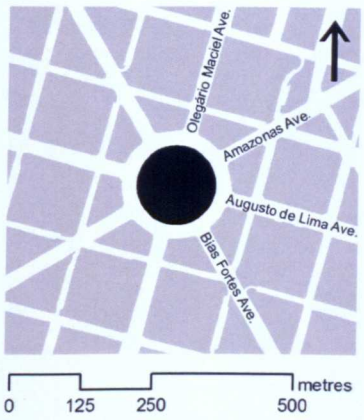
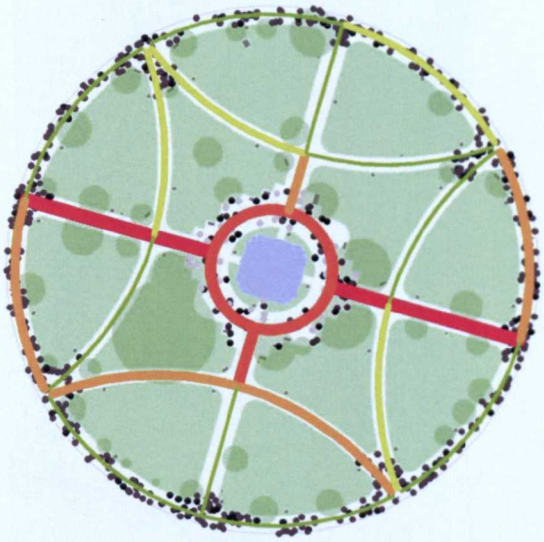


Figure 9.12: Sensory-behavioural maps of Liberdade Square representing its collective multisensory cognitive structure as well as the distribution of pedestrian traffic within it.

Source: instruments type A and B, fieldwork 2007.





Ambulant users per route

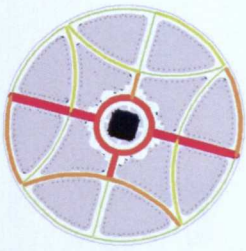
- 3 - 8
- 9 - 14
- 15 - 21
- 22 - 46
- 47 - 73

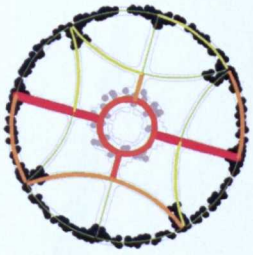
Smell (or sound) elements

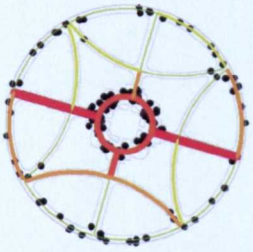
1 Dot = 1 mention

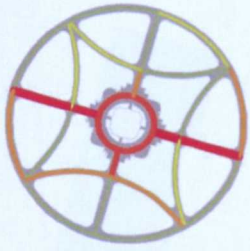
- Pleasant smells (or sounds)
- Unpleasant smells (or sounds)

0 15 30 metres 60









Visual elements

- 12 - 17
- 18 - 31
- 32 - 52
- 53 - 63 references

Sound elements

1 Dot = 1 mention

- Unpleasant sounds
  - Sounds from transportation
  - Sounds as indicators
  - Sounds of society
- Pleasant sounds
  - Human sounds
  - Fauna sounds

Smell elements

1 Dot = 1 mention

- Unpleasant smell
  - Smell of urine
  - Smell of urban residue
  - Smell of human body
  - Smell of transportation
  - Smell of excrement
  - Smell of drugs

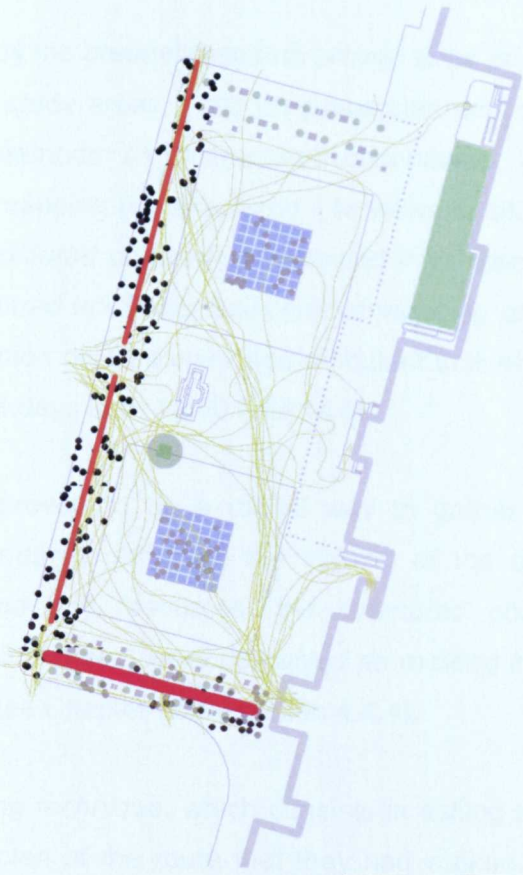
Tactile elements

66 references

0 35 70 metres 140

Figure 9.13: Sensory-behavioural maps of Raul Soares Square representing its collective multisensory cognitive structure as well as the distribution of pedestrian traffic within it.

Source: instruments type A and B, fieldwork 2007.



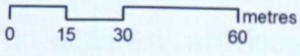
Ambulant users per route

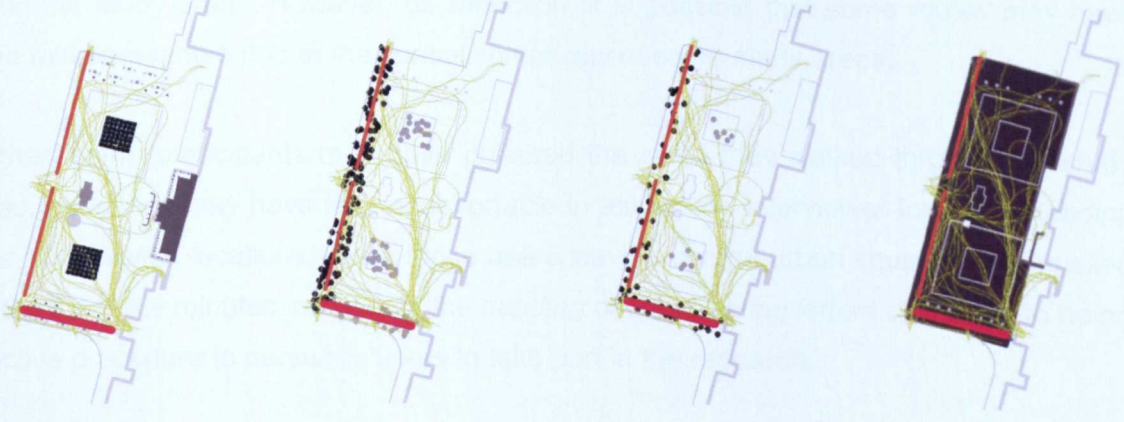
- 1
- 2 - 33
- 34 - 38
- 39 - 84

Smell (or sound) elements

1 Dot = 1 mention

- Pleasant smells (or sounds)
- Unpleasant smells (or sounds)





Visual elements

- 12 - 20
- 21 - 43
- 44 - 51
- 52 - 64 references

Sound elements

1 Dot = 1 mention

- Unpleasant sounds
  - Sounds from transportation
  - Sounds as indicators
- Pleasant sounds
  - Human sounds
  - Sounds of society
  - Water sounds

Smell elements

1 Dot = 1 mention

- Unpleasant smells
  - Smell of urine
  - Smell of urban residue
  - Smell of human body
  - Smell of transportation
- Pleasant smells
  - Smell of fresh air

Tactile elements

- 14
- 56 references

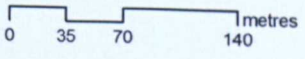


Figure 9.14: Sensory-behavioural maps of Estação Square representing its collective multisensory cognitive structure as well as the distribution of pedestrian traffic within it.

Source: instruments type A and B, fieldwork 2007.

9.4 Evaluating the research and further research

The use of multiple sources of evidence by the present research proved to be an essential strategy to obtain a holistic view of the study areas. Data on perception and behaviour was gathered through the use of five methods: (i) unstructured observation, (ii) place-centred mapping, (iii) individual-centred mapping (iv) structured interviews in situ, and (v) sketch map techniques. While the *unstructured observation* provided information on the overall use of the study areas, *place-centred* and *individual-centred mapping techniques* were respectively used to gather information on stationary and ambulant activity patterns which identify the study areas during weekdays from 12.00 until 14.00.

The *place-centred mapping technique* proved to be a useful way to gather data on stationary behaviour in central urban squares. Although the training of the observers demanded a significant amount of time and resources, *the structured observation sessions, which did not last more than 15 minutes, were perceived as exciting instead of tiring activities by the trained observers* (see Chapter Four, section 4.4.4).

A retrospective *individual-centred mapping technique*, which consists in asking ambulant users to draw on a sufficiently detailed plan of the route that they had walked through, proved to be a quick and simple method to acquire information on ambulant activities within the study areas. However, on reflection, it is possible that some routes may have been misrepresented due to the spatial complexity of some study areas.

Further, some participants may have guessed the route they walked through the study areas, once they may have felt uncomfortable in asking the interviewer for help. *Standing near traffic lights*, locations where those users leaving central urban squares are impelled to stop for some minutes, as well as the *handing of the covering letters* confirmed to be an effective procedure to persuade users to take part in the research.

Sketch maps proved to be a good technique to gather data on *tangible aspects* of the study areas. In addition, *the recording of the elements sketched by the participants on a separate piece of paper by the trained interviewers*, as suggested by Lynch (1960), *demonstrated to be an adequate strategy to diminish the possibility of miscoding some features* and help to speed up the data analysis.

The *application of structured interviews in situ* was a helpful way of gathering rich data on how pedestrians perceive the central squares, while allowing the researcher to have first-

hand experiences. The overlapping of the training of the interviewers with the piloting of the instruments saved time. In addition, the opportunity given to the interviewers to comment and suggest alterations on the instruments and procedures to be followed in situ triggered a collective sense of ownership.

The elaboration of *specific open-ended questions to elicit sonic, olfactory and tactile sensory information* associated with the study areas was a useful tactic to gather data on the major non-visual sensory characteristics of the study areas. On reflection, it is thought that the recording of the paving materials perceived as being able to provide memorable tactile experiences could have been based on a standard terminology defined beforehand, instead of being handwritten close to what was spoken in order to speed up the analyses.

The *recording of the open-ended 'where' questions* in sufficiently detailed plans by the interviewer demonstrated to be an effective way of capturing locational information associated with non-visual sensory aspects of the study areas. Although the same procedure was used to capture data on 'where' memorable tactile surfaces were located within the study areas, it demonstrated to be an unnecessary question since it generated highly predictable information.

Nevertheless, the *recording of the answers to 'where' questions in supplementary maps was a straightforward way of capturing locational data and bringing it to the GIS environment.* A written description of routes or locations associated with any non-visual sensory attribute would not only have demanded a great amount of time to describe it in words during the interview process, but the data analysis would have been much more time-consuming and error prone.

The *sensory-behavioural mapping technique* developed by the present research to represent perceptual and behavioural data graphically proved to be *highly useful to understand the links between the collective multisensory structure of the central urban squares and behaviour.* However, *there is still scope for refining the proposed integrative mapping technique through its piloting at larger scales as well as in different types of public open spaces.* In this regard, it is interesting to note that recent representation tools tend to be focused on perceptual (Sepe, 2009; Ward Thompson, 2010) or behavioural (Moore and Cosco, 2010) aspects of urban open spaces.

The *ArcView* software was very helpful in *constructing composite maps* by overlaying data provided by individual participants and/or trained observers. This software also allowed

the deconstruction of these composite representations in *different thematic maps*, which, in turn, provided further information on perception and use of central urban squares. On the other hand, *data input and checking for data-entry errors required many hours of labour.*

On reflection, *space syntax*, could have been applied to the dataset to further our understanding of the spatial characteristics of central urban squares likely to address user needs and preferences. In this regard, recent research has begun to refine concepts and applications of space syntax, commonly applied to buildings and cities, and explored their use in natural landscape contexts, where vistas are shaped more generously, such as the views offered by the central urban squares under scrutiny in the present study (see, for example, Dalton and Hanson, 2010).

The adoption of a *multiple case study design* in the present empirical investigation enhanced the robustness of the results, although it required extensive resources and time. In this regard, even though many findings presented in Chapters Six, Seven and Eight are significant, they should be interpreted with caution since generalizations are made on the basis of how three central urban squares located in one large Brazilian city are perceived and used during weekdays from 12.00 until 14.00.

Although the incorporation of a *larger number of central urban squares* located in different large Brazilian cities as well as a *consideration of all the life cycle over a twelve-month period* of the study areas would have been advantageous, it was impossible to achieve due to time and resource constraints. These research limitations in themselves, therefore, present opportunities for further research.

Even though recent empirical studies have addressed *user needs in specific types of open spaces*, such as streets (CABESpace, 2007; Alfonzo, 2005; Mehta, 2009), gardens (Grahn *et al.*, 2010), green spaces (Grahn and Stigsdotter, 2010), there is still considerable scope for extending research on how multisensory urban design characteristics influence social activities and meaningful experiences in different types of urban open spaces. In this regard, the *methods used in the present research could readily be applied to other types of spaces as well as cultural contexts.*

It was not possible for this research to examine how multisensory aspects of urban open spaces influence the perception and behaviour of minority groups, including children, elderly, women, disabled people, and so on. Hence, it is considered highly useful to

expand the present research in order to investigate *different user perspectives*. However, to do so, significant changes in the methodology proposed would have to be pursued to incorporate the views of some minorities, such as blind people.

A *post-occupancy evaluation of Raul Soares Square*, whose sonorous water fountain has recently been restored, provides a unique opportunity to study the influence that adequate levels of maintenance and the introduction of an intentionally designed positive multisensory source may have on perception and social behaviour (see Figure 9.15). Finally, the present research can also be extended *to incorporate other sensory factors likely to influence the quality of urban experience*, such as colours.

Figure 9.15: Raul Soares Square before and after restoration (from top to bottom).

9.5 Original contribution to the knowledge

It is argued in theory that urban design decisions must be made in ways which 'increase the choice of sense-experiences which users can enjoy' (Bentley *et al.*, 1985, p.11) because people seek for opportunities to experience positive sensory information in public open spaces (Landry, 2006; Gehl, 1987). The *importance of the present study* was justified by the fact that *urban design thinking and guidance have so far focused on the*

visual quality of urban open spaces despite the multisensory character of interactions between people and environments.

The *general contributions to knowledge* which stem from this research include: (i) the development of a theoretical framework which identifies the key concepts and theories to inform a multisensory approach for the design of urban open spaces that are responsive to user needs and preferences, (ii) the development of an adaptable methodological strategy, including an integrative sensory-behavioural mapping technique, to identify and explain user needs and preferences in urban open spaces, and (iii) the identification of fundamental urban design elements and qualities to inform a socially-responsive multisensory approach to design of urban open spaces intended for gatherings.

The key elements (props, boundaries, landmarks, spaces, atmospheres, views, anchors and repellents) and urban design qualities (robustness, richness and legibility) that emerged from the present study as supportive of social activities in urban open spaces are applicable to the design of most gathering urban open spaces due to their responsiveness to various user needs and preferences.

The present research, therefore, contributes to the discussions in the field of urban design by developing theoretical and applied principles necessary for an understanding of the development of an evidence-based approach to multisensory design of urban open spaces that are responsive to user needs and preferences. In addition, the methodology, including the integrative sensory-behavioural mapping technique, developed by the present research demonstrated its merits in identifying and explaining user needs and preferences in urban open spaces.

The sensory-behavioural mapping technique developed by the present investigation is a relatively robust method processed with GIS software which offers a means to investigate the interrelationships between the urban design characteristics of urban open spaces and the social behaviour and perceptions of their users. This method allows the graphical display of perceptual and behavioural data in a clear manner, reveals hidden trends, and allows data to be statistically summarized as well as collated and analyzed in a multitude of different ways (see Chapter Four, section 4.7.2).

Since the output of this method is connected to the visual thinking styles of designers, it is hoped that practitioners, as well as students, may feel motivated to apply environment-behaviour knowledge in the design of urban open spaces. To summarize, the present

research contributes to the theoretical debate on quality of urban open spaces by providing an adaptable methodological model as well as findings which have implications for policy and practice of urban design.

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APPENDIX A

Key definitions and acronyms.

AMBULANT USERS refer to those pedestrians walking in public urban open spaces.

NECESSARY ACTIVITIES include those of a very functional nature (e.g. destination trips). According to Gehl (1987, p.135), 'the act of walk is often a necessary act', or rather, walking in public open spaces tend to be within the category of destination trips.

OPTIONAL ACTIVITIES include those activities that the perceivers choose to perform when they have time available and when the multisensory urban design characteristics invite them to do so (e.g. strolling trips, playful activities, etc).

PEDESTRIAN ACTIVITIES include two sub-categories: dynamic and stationary activities. Dynamic activities are defined as those that demand movement from point A to point B on foot or using an assistive device, such as a wheelchair. Stationary activities, in turn, include all whole range of social activities which are not within the umbrella of dynamic activities. Walking through and lingering are examples of dynamic activities, while sitting, standing and lying are types of stationary activities in urban squares.

STATIONARY USERS refer to those pedestrians performing some sort of stationary social activity in public urban open spaces.

USER NEEDS 'are defined as those amenities and experiences that people seek in enjoying public open spaces. Needs provide the basic level of support and function in open space; they are prerequisite for having an enjoyable landscape experience and provide the basis for much design criteria' (Francis 2003, p.4).

VISUAL URBAN DESIGN ELEMENTS refer to those components of the human visible environment, small-scale objects, surfaces and screens, which are open to manipulation by urban designers. If on the one hand, visual elements are necessarily components of visual spaces, on the other hand, they may also be sources of sonic, olfactory and tactile experiences.

ART Attention Restorative Theory

CCTV Closed Circuit Tele-Vision

GIS Geographic Information System

IBGE Instituto Brasileiro de Geografia e Estatística (Brazilian Census Bureau)

MG Minas Gerais

MAO Museu de Artes e Ofícios (Museum of Arts and Crafts)

PACE Projeto Área Central (Central Area Project)

PACE-99 Plano Área Central (Central Area Plan, 1999)

PBH Prefeitura de Belo Horizonte (Belo Horizonte Prefecture)

RMBH Região Metropolitana de Belo Horizonte (Belo Horizonte Metropolitan Region)

SPSS Statistical Package for the Social Sciences

APPENDIX B

Material related with the instruments developed to gather data.

Information sheet (instrument type A)

VIVENCIANDO ESPAÇOS PÚBLICOS

Sinta-se convidado(a) a participar de uma pesquisa conduzida por Paula Barros, doutoranda pelo Joint Centre for Urban Design da Universidade de Oxford Brookes, Inglaterra, Reino Unido. Este estudo vem sendo supervisionado pelo Professor Brian Goodey e Professora Georgia Butina, ambos professores da Universidade de Oxford Brookes. Antes de decidir se você quer ou não ser entrevistado, é importante que você entenda por que essa entrevista vem sendo conduzida e o que ela envolve. Por favor, leia as instruções abaixo cuidadosamente.

Sinta-se convidado(a) a participar se você tem mais de 16 anos.

CONTEÚDO: Esta entrevista foi elaborada com o intuito de explorar como as pessoas avaliam os espaços abertos de Belo Horizonte. Seu ponto de vista é importante e pode contribuir para a melhora da qualidade dos espaços públicos dos grandes centros urbanos e na elaboração de uma abordagem arquitetônica que leve em conta a forma como os ambientes urbanos têm sido vivenciados pelas pessoas. Como avaliações urbanas são influenciadas pelas experiências individuais, perguntas com relação à sua idade, sexo e educação também compõem a entrevista. Não há respostas certas ou erradas.

TEMPO: Apesar do tempo estimado para responder todas as perguntas seja de aproximadamente 05 minutos, sinta-se à vontade para respondê-las no seu ritmo.

CONFIDENCIALIDADE: Todas as respostas a serem dadas durante essa entrevista são confidenciais. Sua identidade permanecerá anônima e nenhuma informação capaz de te identificar será salva no computador.

SEUS DIREITOS: Sua participação é inteiramente voluntária e você não tem obrigação de responder a itens dessa entrevista que você considere ofensivo. Não há respostas certas ou erradas. Se você decidir interromper a sua participação, você pode fazê-lo a qualquer momento sem nenhuma penalidade. Se você tem alguma pergunta com relação aos seus direitos como respondente, favor contactar o diretor do Comitê de Ética de Pesquisa da Universidade de Oxford Brookes (ethics@brookes.ac.uk).

RESULTADOS: As informações coletadas serão mantidas de acordo com a política de integridade acadêmica da Universidade de Oxford Brookes. A informação será armazenada na forma eletrônica por um período de cinco anos. O estudo completo estará à disposição para ser consultado na biblioteca da Universidade de Oxford Brookes a partir da data da sua conclusão.

Para maiores informações com relação à pesquisa, favor entrar em contato com:

Paula Barros paula.barros@brookes.ac.uk
Professor Emeritus Brian Goodey brian.goodey@btinternet.com
Professora Georgia Butina Watson gbutina@brookes.ac.uk

Este estudo foi aprovado pelo Comitê de Ética de Pesquisa da Universidade de Oxford Brookes.

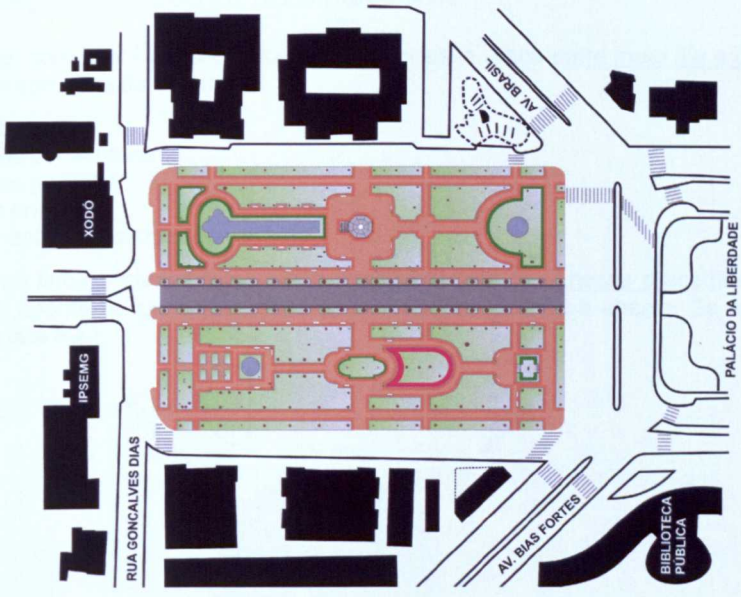
Instrument type A applied in Liberdade Square

VIVENCIANDO ESPAÇOS PÚBLICOS EM BELO HORIZONTE

01. Durante semana, com qual frequência você passa por essa praça entre meio dia e duas horas? Escolha a opção que mais se aproxima da sua rotina:

☐ quase todos os dias
☐ uma ou duas vezes por semana
☐ uma ou duas vezes por mês
☐ poucas vezes por ano
☐ nunca estive aqui antes nesse horário

02. Indique com uma linha o caminho que você acabou de percorrer nessa praça:[Mostre com um ponto onde vocês estão e aponte as principais referências indicadas no mapa abaixo. Se a pessoa não quiser desenhar, desenhe para ela.]



03. Você preferiu percorrer esse caminho em específico e não um outro caminho qualquer nessa praça para:[Se a pessoa falar mais de uma opção, pergunte: *QUAL O PRINCIPAL MOTIVO QUE TE LEVOU A FAZER ESSE CAMINHO?*]

☐ cortar caminho ☐fugir do sol ☐curtir o ambiente ☐exercitar o corpo ☐outro motivo:

04. Na sua opinião, esse caminho que você acabou de percorrer nessa praça é:

☐ muito agradável
☐ agradável
☐ nem agradável nem desagradável
☐ desagradável
☐ muito desagradável
☐ sem opinião [não leia]

05. Por quê? Por que na sua opinião esse caminho que você acabou de percorrer nessa praça é... [repetir a resposta dada acima]? [Se a resposta for curta, pergunte: *COMO ASSIM?* Ao final da resposta leia-a e diga: *ALGUM OUTRO MOTIVO?*]

06. Hoje, ao caminhar por essa praça você parou, mesmo que só por alguns minutos, em algum local?

☐ sim ☐ não [Vá para a pergunta 09]

07. Onde? Circule no mapa onde você parou.

08. Você parou para: [Marque todas as opções mencionadas. Se a pessoa parou em mais de um lugar, indicar o que ela fez em cada parada]

☐ observar, o quê? ☐ conversar ☐ ler ☐ namorar ☐ cochilar ☐ outra razão, qual?

09. [não leia] Sexo do entrevistado: ☐ masculino ☐feminino

10. Qual a sua idade?

11. Qual a sua formação escolar?

☐ ensino médio incompleto ou menos
☐ ensino médio completo

☐ superior incompleto
☐ superior completo
☐ pós-graduação incompleta ou mais

MUITO OBRIGADA PELA SUA COLABORAÇÃO!

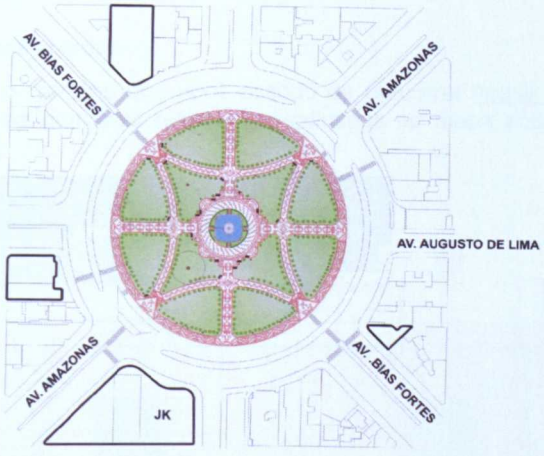
Instrument type A applied in Raul Soares Square

VIVENCIANDO ESPAÇOS PÚBLICOS EM BELO HORIZONTE

01. Durante semana, com qual frequência você passa por essa praça entre meio dia e duas horas? Escolha a opção que mais se aproxima da sua rotina:

☐ quase todos os dias
☐ uma ou duas vezes por semana
☐ uma ou duas vezes por mês
☐ poucas vezes por ano
☐ nunca estive aqui antes nesse horário

02. Indique com uma linha o caminho que você acabou de percorrer nessa praça:[Mostre com um ponto onde vocês estão e aponte as principais referências indicadas no mapa abaixo. Se a pessoa não quiser desenhar, desenhe para ela.]



03. Você preferiu percorrer esse caminho em específico e não um outro caminho qualquer nessa praça para:[Se a pessoa falar mais de uma opção, pergunte: *QUAL O PRINCIPAL MOTIVO QUE TE LEVOU A FAZER ESSE CAMINHO?*]

☐ cortar caminho ☐fugir do sol ☐curtir o ambiente ☐exercitar o corpo ☐outro motivo:

04. Na sua opinião, esse caminho que você acabou de percorrer nessa praça é:

☐ muito agradável
☐ agradável
☐ nem agradável nem desagradável
☐ desagradável
☐ muito desagradável
☐ sem opinião [não leia]

05. Por quê? Por que na sua opinião esse caminho que você acabou de percorrer nessa praça é... [repetir a resposta dada acima]? [Se a resposta for curta, pergunte: *COMO ASSIM?* Ao final da resposta leia-a e diga: *ALGUM OUTRO MOTIVO?*]

06. Hoje, ao caminhar por essa praça você parou, mesmo que só por alguns minutos, em algum local?

☐ sim ☐ não [Vá para a pergunta 09]

07. Onde? Circule no mapa onde você parou.

08. Você parou para: [Marque todas as opções mencionadas. Se a pessoa parou em mais de um lugar, indicar o que ela fez em cada parada]

☐ observar, o quê? ☐ conversar ☐ ler ☐ namorar ☐ cochilar ☐ outra razão, qual?

09. [não leia] Sexo do entrevistado: ☐ masculino ☐feminino

10. Qual a sua idade?

11. Qual a sua formação escolar?

☐ ensino médio incompleto ou menos
☐ ensino médio completo
☐ superior incompleto
☐ superior completo
☐ pós-graduação incompleta ou mais

MUITO OBRIGADA PELA SUA COLABORAÇÃO!

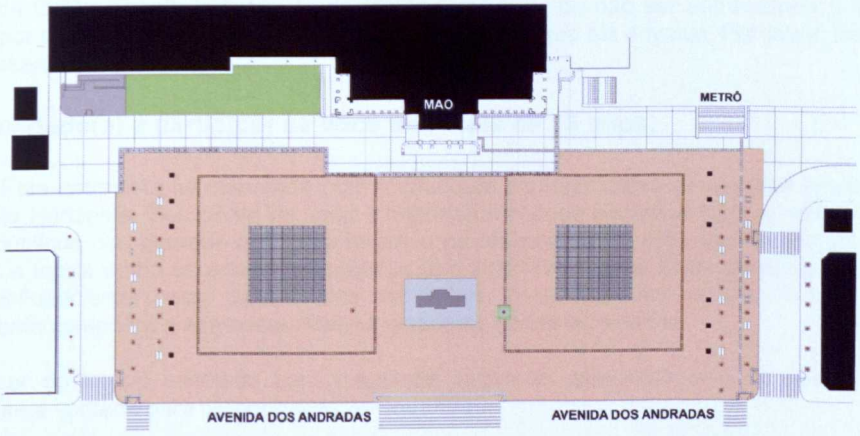
Instrument type A applied in Estação Square

VIVENCIANDO ESPAÇOS PÚBLICOS EM BELO HORIZONTE

01. Durante semana, com qual frequência você passa por essa praça entre meio dia e duas horas? Escolha a opção que mais se aproxima da sua rotina:

☐ quase todos os dias
☐ uma ou duas vezes por semana
☐ uma ou duas vezes por mês
☐ poucas vezes por ano
☐ nunca estive aqui antes nesse horário

02. Indique com uma linha o caminho que você acabou de percorrer nessa praça:[Mostre com um ponto onde vocês estão e aponte as principais referências indicadas no mapa abaixo. Se a pessoa não quiser desenhar, desenhe para ela.]



03. Você preferiu percorrer esse caminho em específico e não um outro caminho qualquer nessa praça para:[Se a pessoa falar mais de uma opção, pergunte: *QUAL O PRINCIPAL MOTIVO QUE TE LEVOU A FAZER ESSE CAMINHO?*]

☐ cortar caminho ☐fugir do sol ☐curtir o ambiente ☐exercitar o corpo ☐outro motivo:

04. Na sua opinião, esse caminho que você acabou de percorrer nessa praça é:

☐ muito agradável
☐ agradável
☐ nem agradável nem desagradável
☐ desagradável
☐ muito desagradável
☐ sem opinião [não leia]

05. Por quê? Por que na sua opinião esse caminho que você acabou de percorrer nessa praça é... [repetir a resposta dada acima]? [Se a resposta for curta, pergunte: *COMO ASSIM?* Ao final da resposta leia-a e diga: *ALGUM OUTRO MOTIVO?*]

06. Hoje, ao caminhar por essa praça você parou, mesmo que só por alguns minutos, em algum local?

☐ sim ☐ não [Vá para a pergunta 09]

07. Onde? Circule no mapa onde você parou.

08. Você parou para: [Marque todas as opções mencionadas. Se a pessoa parou em mais de um lugar, indicar o que ela fez em cada parada]

☐ observar, o quê? ☐ conversar ☐ ler ☐ namorar ☐ cochilar ☐ outra razão, qual?

09. [não leia] Sexo do entrevistado: ☐ masculino ☐feminino

10. Qual a sua idade?

11. Qual a sua formação escolar?

☐ ensino médio incompleto ou menos
☐ ensino médio completo
☐ superior incompleto
☐ superior completo
☐ pós-graduação incompleta ou mais

MUITO OBRIGADA PELA SUA COLABORAÇÃO!

Information sheet (instrument type B)

VIVENCIANDO ESPAÇOS PÚBLICOS

Sinta-se convidado(a) a participar de uma pesquisa conduzida por Paula Barros, doutoranda pelo Joint Centre for Urban Design da Universidade de Oxford Brookes, Inglaterra, Reino Unido. Este estudo vem sendo supervisionado pelo Professor Brian Goodey e Professora Georgia Butina, ambos professores da Universidade de Oxford Brookes. Antes de decidir se você quer ou não ser entrevistado, é importante que você entenda por que essa entrevista vem sendo conduzida e o que ela envolve. Por favor, leia as instruções abaixo cuidadosamente.

Sinta-se convidado(a) a participar se você tem mais de 16 anos.

CONTEÚDO: Esta entrevista foi elaborada com o intuito de explorar como as pessoas avaliam os espaços abertos de Belo Horizonte. Seu ponto de vista é importante e pode contribuir para a melhora da qualidade dos espaços públicos dos grandes centros urbanos e na elaboração de uma abordagem arquitetônica que leve em conta a forma como os ambientes urbanos têm sido vivenciados pelas pessoas. Como avaliações urbanas são influenciadas pelas experiências individuais, perguntas com relação à sua idade, sexo e educação também compõem a entrevista. Não há respostas certas ou erradas.

TEMPO: Apesar do tempo estimado para responder todas as perguntas seja de aproximadamente 15 minutos, sinta-se à vontade para respondê-las no seu ritmo.

CONFIDENCIALIDADE: Todas as respostas a serem dadas durante essa entrevista são confidenciais. Sua identidade permanecerá anônima e nenhuma informação capaz de te identificar será salva no computador.

SEUS DIREITOS: Sua participação é inteiramente voluntária e você não tem obrigação de responder a itens dessa entrevista que você considere ofensivo. Não há respostas certas ou erradas. Se você decidir interromper a sua participação, você pode fazê-lo a qualquer momento sem nenhuma penalidade. Se você tem alguma pergunta com relação aos seus direitos como respondente, favor contactar o diretor do Comitê de Ética de Pesquisa da Universidade de Oxford Brookes (ethics@brookes.ac.uk).

RESULTADOS: As informações coletadas serão mantidas de acordo com a política de integridade acadêmica da Universidade de Oxford Brookes. A informação será armazenada na forma eletrônica por um período de cinco anos. O estudo completo estará à disposição para ser consultado na biblioteca da Universidade de Oxford Brookes a partir da data da sua conclusão.

Para maiores informações com relação à pesquisa, favor entrar em contato com:

Paula Barros paula.barros@brookes.ac.uk
Professor Emeritus Brian Goodey brian.goodey@btinternet.com
Professora Georgia Butina Watson gbutina@brookes.ac.uk

Este estudo foi aprovado pelo Comitê de Ética de Pesquisa da Universidade de Oxford Brookes.

Instrument type B

VIVENCIANDO ESPAÇOS PÚBLICOS EM BELO HORIZONTE

01. Ao longo do dia, ao caminhar pelas ruas e praças de Belo Horizonte você normalmente:

☐ sente alguns cheiros
☐ sente poucos cheiros
☐ não sente cheiro de nada [eliminar]

02. Durante a semana, com qual frequência você visita essa praça entre meio dia e duas horas da tarde? Escolha a opção que mais se aproxima da sua rotina:

☐quase todos os dias
☐uma ou duas vezes por semana
☐uma ou duas vezes por mês
☐poucas vezes por ano
☐nunca estive aqui antes nesse horário [eliminar]

03. Na sua opinião, esse lugar onde nós estamos sentados é:

☐ muito agradável
☐ agradável
☐ indiferente
☐ desagradável
☐ muito desagradável
☐ sem opinião [não leia]

04. Por quê? Por que, na sua opinião, esse lugar onde nós estamos sentados é... [repetir a resposta dada acima]? [Se necessário, pergunte: *COMO ASSIM?* Ao final, leia a resposta e diga: *ALGUM OUTRO MOTIVO?*]

APARÊNCIA

05. Por favor, complete o mapa esquemático dessa praça. Desenhe nesse mapa as coisas que podemos ver nessa praça e os principais prédios que a circundam. Faça apenas um esboço. Enquanto você faz o desenho, me diga o que você está desenhando. [Explique o mapa e escreva a sequência de coisas desenhadas. Se necessário, pergunte: O QUE É ISSO?]

CHEIROS

06. Ao caminharmos pela cidade sentimos vários tipos de odores, desde aromas agradáveis até mau cheiro. Apesar de ser uma sensação momentânea, alguns dos vários cheiros sentidos por nós ficam registrados na nossa memória. Você se lembra de já ter sentido algum cheiro, agradável ou desagradável, nessa praça nos dias da semana entre 12 e 2 hrs? [Ao final, ler a resposta e dizer: ALGUM OUTRO CHEIRO?]

☐ sim, quais cheiros? ☐ não [vá para a pergunta 09] ☐ não sei [não leia]

1.	2.	3.	4.	5.

07. Na sua opinião, o cheiro de [falar o cheiro] é:

	☐	☐	☐	☐
☐ muito agradável	☐	☐	☐	☐
☐ agradável	☐	☐	☐	☐
☐ indiferente	☐	☐	☐	☐
☐ desagradável	☐	☐	☐	☐
☐ muito desagradável	☐	☐	☐	☐
☐ não sei [não leia]	☐	☐	☐	☐

08. Onde você estava nessa praça a última vez que você sentiu o cheiro [falar o cheiro]? [Marque com um "X" o local onde vocês estão e colora as áreas no mapa em anexo usando as cores da legenda].

SONS

09. Ao caminharmos pela cidade, estamos continuamente ouvindo sons, dos mais variados tipos e intensidades. Quais são os sons que você ouve nessa praça durante a semana entre meio dia e duas hrs da tarde? [Se necessário, repetir o som: *CARRO*? Ao final, ler os sons citados e dizer: ALGUM OUTRO SOM?]

1.	2.	3.	4.	5.

10. Na sua opinião, o som de [falar o som] é:

	1.	2.	3.	4.	5.
☐ muito agradável	☐	☐	☐	☐	☐
☐ agradável	☐	☐	☐	☐	☐
☐ indiferente	☐	☐	☐	☐	☐
☐ desagradável	☐	☐	☐	☐	☐
☐ muito desagradável	☐	☐	☐	☐	☐
☐ não sei [não leia]	☐	☐	☐	☐	☐

11. Onde nessa praça você normalmente ouve [falar o som] com mais clareza, mais nitidez? [colora as áreas no mapa em anexo usando as cores da legenda]

TEXTURAS

12. Quais são os pisos dessa praça? [se necessário, dizer: QUAL O NOME DO PISO? Ao final, ler os pisos mencionados e dizer: ALGUM OUTRO PISO?]

1.	2.	3.	4.	5.

13. Se você caminhasse por essa praça com os seus olhos vendados, você seria capaz de identificar algum dos seus pisos? [se o piso for mencionado pela primeira vez, escreva-o na tabela acima e grife-o]

☐ sim, quais pisos? [grife-os na tabela acima] ☐ não [vá para a pergunta 09] ☐ não sei [não leia]

14. Na sua opinião, caminhar sobre [falar o piso] é:

	1.	2.	3.	4.	5.
☐ muito comfortável	☐	☐	☐	☐	☐
☐ comfortável	☐	☐	☐	☐	☐
☐ indiferente	☐	☐	☐	☐	☐
☐ descomfortável	☐	☐	☐	☐	☐
☐ muito decomfortável	☐	☐	☐	☐	☐
☐ não sei [não leia]	☐	☐	☐	☐	☐

SOBRE VOCÊ

15. [*não leia*] Sexo do entrevistado ☐ masculino ☐ feminino

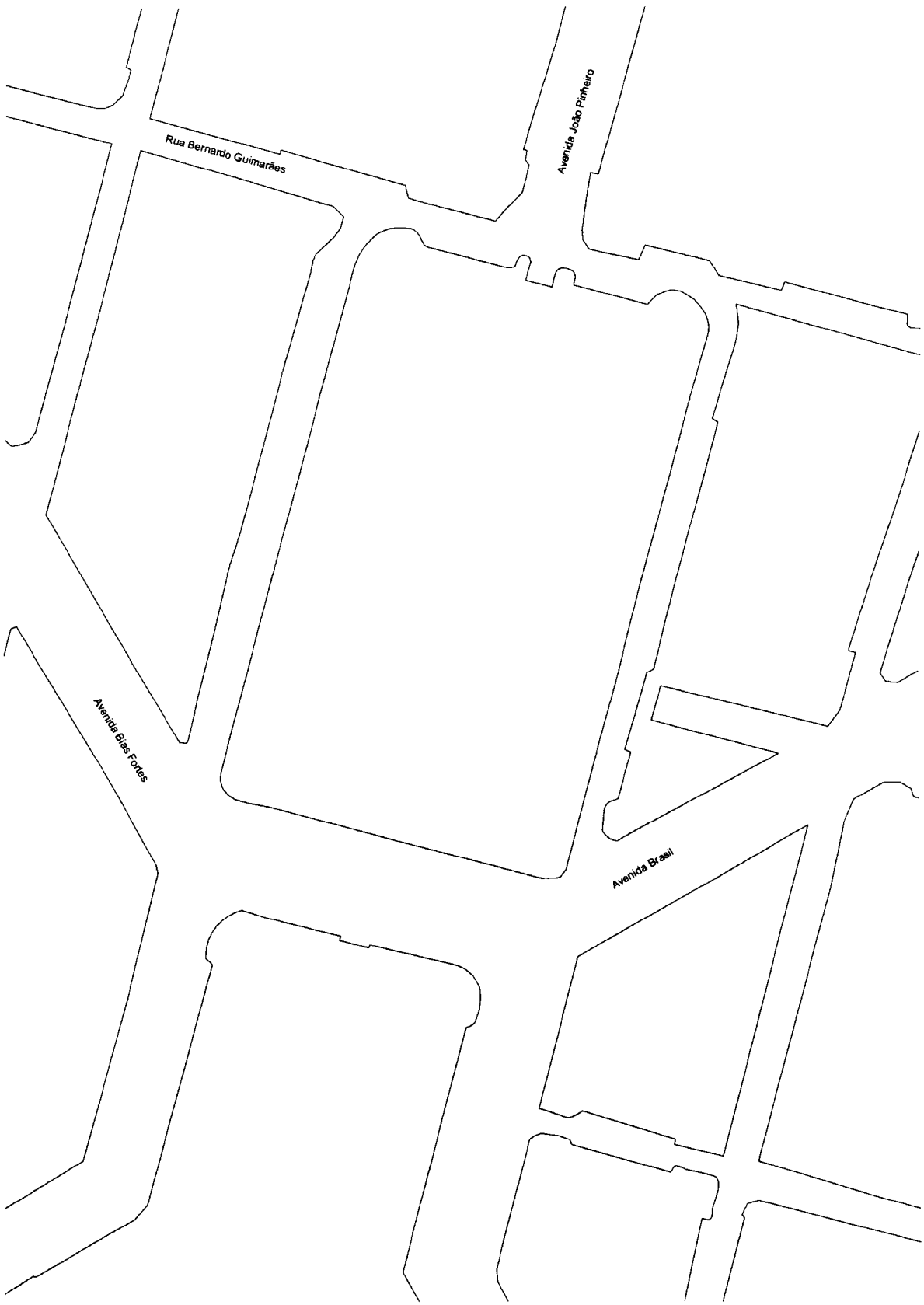
16. Qual a sua idade?

17. Qual a sua formação escolar?

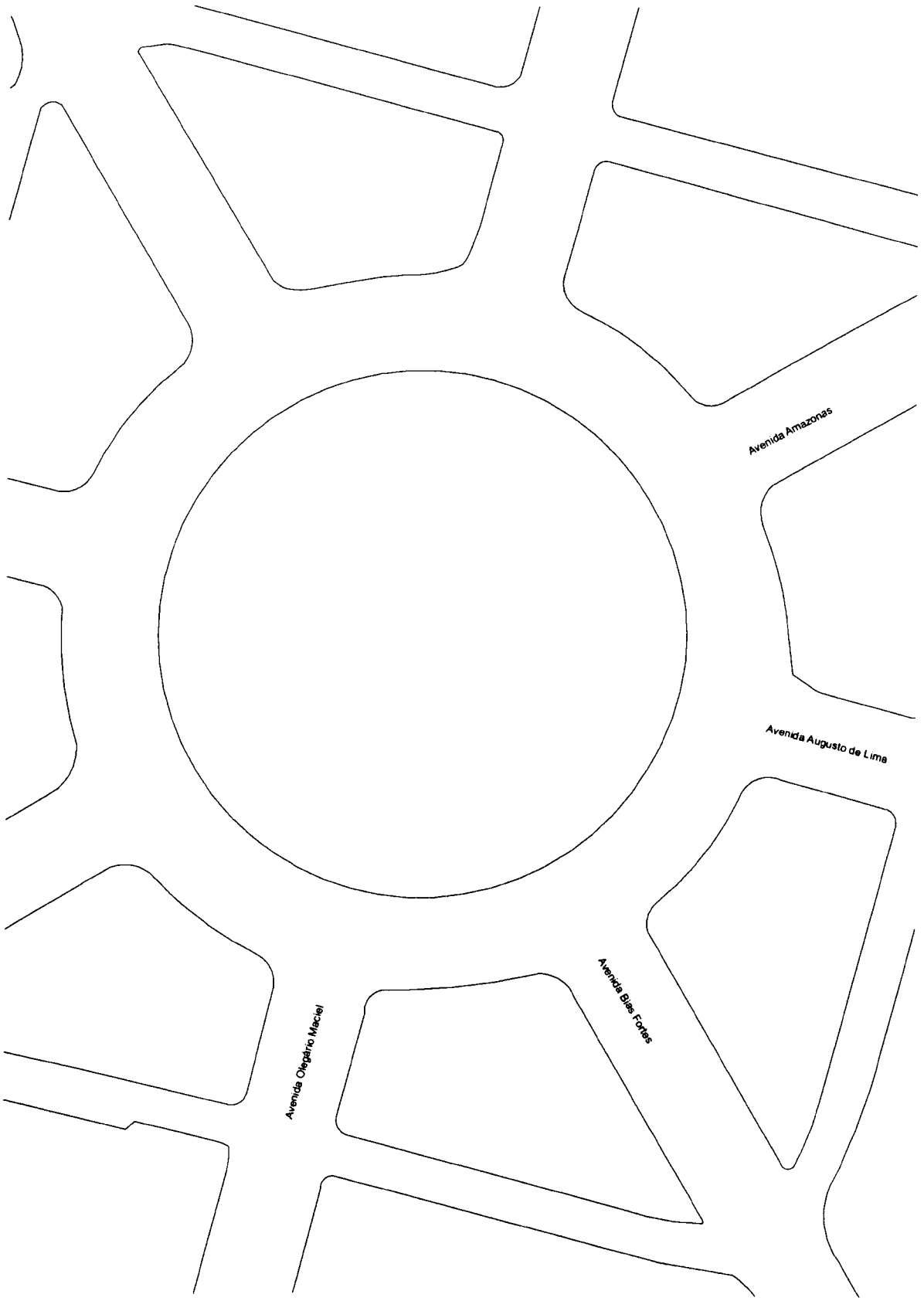
☐ ensino médio incompleto ou menos
☐ ensino médio completo
☐ superior incompleto
☐ superior completo
☐ pós-graduação incompleta ou mais

MUITO OBRIGADA PELA SUA PARTICIPAÇÃO!

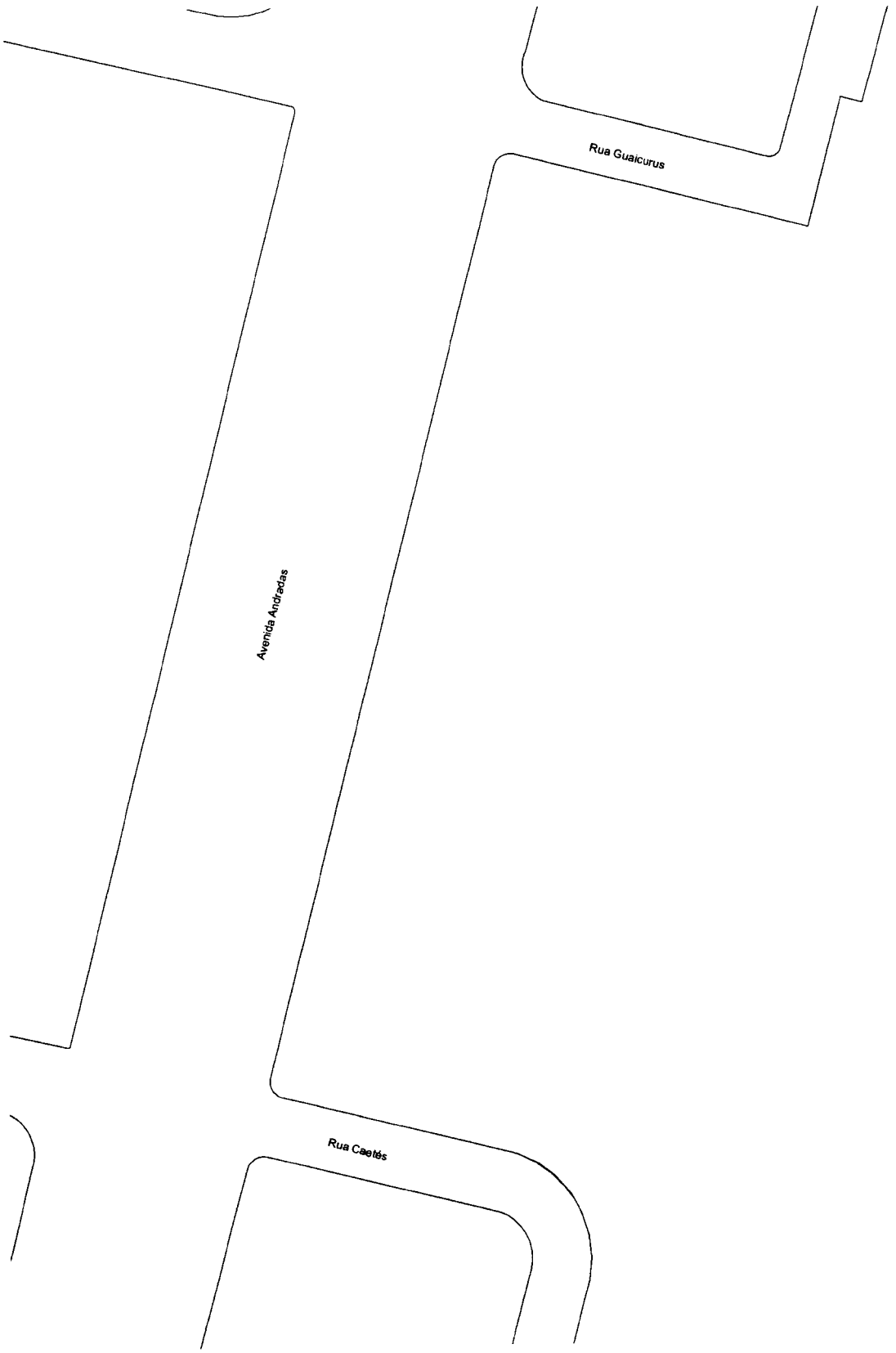
Outline map of Liberdade Square (instrument type B)



Outline map of Raul Soares Square (instrument type B)



Outline map of Estação Square (instrument type B)



APPENDIX C

Summary of findings on behavioural patterns.

Age group of stationary users in the current samples

	Liberdade Square	Raul Soares Square	Estação Square
	(n=149)	(n=125)	(n=140)
Minimum	16	16	16
Maximum	74	73	68
Mean	31.34 years	33.91 years	31.48 years

Source: instrument type B, fieldwork 2007.

Frequencies of stationary users by different age groups

		Liberdade Square		Raul Soares Square		Estação Square	
		No. of responses	Percent	No. of responses	Percent	No. of responses	Percent
16 - 17	(teenager)	12	8.1%	3	2.4%	14	10.0%
18 - 29	(young adult)	69	46.3	58	46.4	67	47.9
30 - 65	(adult)	6	44.3	62	49.6	57	40.7
>65	(senior)	2	1.3	2	1.6	2	1.4
TOTAL		149	100.0	125	100.0	140	100.0

Source: instrument type B, fieldwork 2007.

Age group of stationary users in the current samples

	Case studies		
	Liberdade Square	Raul Soares Square	Estação Square
	(n=130)	(n=126)	(n=130)
Minimum	16	16	16
Maximum	77	71	70
Mean	32.50 years	32.91years	35.61 years

Source: instrument type B, fieldwork 2007.

A minority of stationary users in the study areas are likely to possess a university degree (or more).

Case studies		
Liberdade Square	Raul Soares Square	Estação Square
(n=92, s.e.= 5.09) 49.3%<true value	(n=84, s.e.= 2.59) 11.2%< true value	(n=79, s.e.= 8.89) 24.1%< true value

Source: instrument type B, fieldwork 2007.

Frequencies of ambulant users by different age groups

		Case studies					
		Liberdade Square		Raul Soares Square		Estação Square	
		No. of responses	Percent	No. of responses	Percent	No. of responses	Percent
16 – 17	(teenager)	11	8.5%	5	4.0%	11	8.5%
18 – 29	(young adult)	62	47.7	62	49.2	39	30.0

CONTINUATION ON THE NEXT PAGE.

Continuation:

		Liberdade Square		Raul Soares Square		Estação Square	
		No. of responses	Percent	No. of responses	Percent	No. of responses	Percent
30 - 65	(adult)	52	40.0	57	45.2	79	60.8
>65	(senior)	5	3.8	2	1.6	1	0.8
TOTAL		130	100.0	126	100.0	130	100.0

Source: instrument type A, fieldwork 2007.

Frequencies of stationary users with primary degree (or less), secondary degree and university degree (or more)

	Liberdade Square		Raul Soares Square		Estação Square	
	No. of responses	Percent	No. of responses	Percent	No. of responses	Percent
Primary degree (or less)	27	18.1%	53	42.4%	71	50.7%
Secondary degree	83	55.7	66	52.8	64	45.7
University degree (or more)	39	26.2	6	4.8	5	3.6
TOTAL	149	100.0	125	100.0	140	100.0

Source: instrument type B, fieldwork 2007.

Frequencies of ambulant users with primary degree (or less), secondary degree and university degree (or more)

	Liberdade Square		Raul Soares Square		Estação Square	
	No. of responses	Percent	No. of responses	Percent	No. of responses	Percent
Primary degree (or less)	28	21.5 %	26	20.6%	42	32.3%
Secondary degree	70	53.8	81	64.3	72	55.4
University degree (or more)	32	24.6	19	15.1	16	12.3
TOTAL	130	100.0	126	100.0	130	100.0

Source: instrument type A, fieldwork 2007.

A minority of ambulant users in the study areas are likely to possess a university degree (or more).

Liberdade Square	Raul Soares Square	Estação Square
(n=75, s.e.= 5.62)	(n=75, s.e.= 4.72)	(n=93, s.e.= 3.71)
49.9%< true value	30.7%< true value	22.5%< true value

Source: instrument type A, fieldwork 2007.

Gender of stationary users

	Liberdade Square		Raul Soares Square		Estação Square	
	No. of responses	Percent	No. of responses	Percent	No. of responses	Percent
Male	101	67.8%	97	77.6%	91	65.0%
Female	48	32.2	28	22.4	49	35.0
TOTAL	149	100	125	100	140	100

Source: instrument type B, fieldwork 2007.

Gender of stationary users

	Liberdade Square		Raul Soares Square		Estação Square	
	No. of users	Percent	No. of users	Percent	No. of users	Percent
Male	268	57.8%	112	82.4%	99	77.3%

CONTINUATION ON THE NEXT PAGE.

Continuation:

	Liberdade Square		Raul Soares Square		Estação Square	
	No. of users	Percent	No. of users	Percent	No. of users	Percent
Female	196	42.2	24	17.6	29	22.7
TOTAL	464	100	136	100	128	100

Source: place-centred mapping, fieldwork 2006.

Gender of ambulant users

	Case studies					
	Liberdade Square		Raul Soares Square		Estação Square	
	No. of responses	Percent	No. of responses	Percent	No. of responses	Percent
Male	64	49.2%	76	60.3%	69	53.1%
Female	66	50.8	50	39.7	61	46.9
TOTAL	130	100	126	100	130	100

Source: instrument type A, fieldwork 2007.

Marginalized and non-marginalized users observed performing optional stationary activities in the study areas

	Case studies					
	Liberdade Square		Raul Soares Square		Estação Square	
	No. of users	Percent	No. of users	Percent	No. of users	Percent
Marginalized	15	3.2%	20	14.7%	6	4.7%
Non-marginalized	454	96.8	116	85.3	122	95.3
TOTAL users	469	100	136	100	128	100

Source: place-centred mapping, fieldwork 2006.

A minority of stationary users in the study areas are likely to be marginalized people

Liberdade Square	Raul Soares Square	Estação Square
(n=469, s.e.=.81)	(n=136, s.e.=3.04)	(n=128, s.e.=1.87)
4.8 %<true value	20.8%< true value	8.44%< true value

Source: place-centred mapping, fieldwork 2006.

How often stationary users of Liberdade Square, Raul Soares Square and Estação Square spend time in them during weekdays at lunch break

	Case studies					
	Liberdade Square		Raul Soares Square		Estação Square	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Twice per month or less	44	29.5%	53	42.4%	38	27.1%
At least once per week	105	70.5	72	57.6	102	72.9
TOTAL users	149	100	125	100	140	100

Source: instrument type B, fieldwork 2007.

The majority of stationary users of Liberdade Square and Estação Square tend to spend time in them on a weekly basis, or more often.

	Case studies	
Liberdade Square	Raul Soares Square	Estação Square
(n=149, s.e.=3.73)	(n=125, s.e.=4.42)	(n=140, s.e.=3.75)
66.1%<true value<77.9%	48.8%< true value<66.44%	65.4%< true value<80.4%

Source: instrument type B, fieldwork 2007.

How often ambulant users of Liberdade Square, Raul Soares Square and Estação Square walk in them during weekdays at lunch break

	Case studies					
	Liberdade Square		Raul Soares Square		Estação Square	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Twice per month or less	34	26.2%	47	37.3%	25	19.2%
At least once per week	96	73.8	79	62.7	105	80.8
TOTAL users	130	100	126	100	130	100

Source: instrument type A, fieldwork 2007.

The majority of ambulant users of Liberdade Square, Raul Soares Square and Estação Square tend to walk in them at least in a weekly basis.

Liberdade Square	Raul Soares Square	Estação Square
(n=130, s.e.=3.85), 66.1%> true value	(n=126, s.e.=4.31), 54.1%> true value	(n=130, s.e.=3.45), 73.9%> true value

Source: instrument type A, fieldwork 2007.

Body position of the stationary users performing optional activities in all the case study sites

	Case studies					
	Liberdade Square		Raul Soares Square		Estação Square	
	No. of activities	Percent	No. of activities	Percent	No. of activities	Percent
Lying	30	6.5%	11	8.1%	4	3.1%
Sitting	378	81.5	106	77.9	83	64.8
Standing	52	11.2	19	14	41	32
Other positions	4	0.9	0	0	0	0
TOTAL activities	464	100	136	100	128	100

Source: place-centred mapping, fieldwork 2006.

The majority of optional stationary reported to occur in Liberdade Square, Raul Soares Square and Estação Square were sitting activities.

Liberdade Square	Raul Soares Square	Estação Square
(n=464, s.e.=1.80) 79.3%>true value	(n=136, s.e.=3.56) 70.8%> true value	(n=128, s.e.=4.22) 56.4%> true value

Source: place-centred mapping, fieldwork 2006.

Frequencies of sitters performing optional stationary activities in benches and secondary sitting spaces in the current samples

	Case studies					
	Liberdade Square		Raul Soares Square		Estação Square	
	No. of users	Percent	No. of users	Percent	No. of users	Percent
Benches	302	79,9%	75	70,8%	29	34,9%
Secondary sitting spaces	76	20,1	31	29,2	54	65,1
TOTAL	378	100	106	100	83	100

Source: place-centred mapping, fieldwork 2006.

Sitting activities reported to occur in the benches within Liberdade Square, Raul Soares Square and Estação Square.

Liberdade Square	Raul Soares Square	Estação Square
(n=378, s.e.=2.06) 75.78%>true value	(n=106, s.e.=4.41) 61.98%> true value	(n=83, s.e.=5.23) 45.4%< true value

Source: place-centred mapping, fieldwork 2006.

Frequencies of sitters performing optional stationary activities at a distance within 1m from small-scale objects and vertical surfaces in the current samples

	Liberdade Square		Raul Soares Square		Estação Square	
	No. of users	Percent	No. of users	Percent	No. of users	Percent
≤ 1m	337	89.2%	102	96.2%	78	94.0%
> 1m	41	10.8	4	3.8	5	6.0
TOTAL	378	100	106	100	83	100

Source: place-centred mapping, fieldwork 2006.

The majority of sitting activities were not reported to occur in the open pavement more than 1m from any small-scale physical object or vertical surface.

Liberdade Square	Raul Soares Square	Estação Square
(n=378, s.e.=1.6)	(n=106, s.e.=1.86)	(n=83, s.e.=2.61)
86.0%>true value	92.5%> true value	88.8%> true value

Source: place-centred mapping, fieldwork 2006.

'Did you stop, at least for a few seconds, in this square?'

	Case studies					
	Liberdade Square		Raul Soares Square		Estação Square	
	No. of responses	Percent	No. of responses	Percent	No. of responses	Percent
No	95	73.1%	111	88.1%	112	86.2%
Yes	35	26.9	15	11.8	18	13.8
TOTAL	130	100.0	126	100.0	130	100.0

Source: instrument type A, fieldwork 2007.

Frequencies of optional stationary activities observed in each of the case study sites

	Case studies					
	Liberdade Square		Raul Soares Square		Estação Square	
	No. of activities	Percent	No. of activities	Percent	No. of activities	Percent
Conversing	216	46.6%	52	38.2%	59	46.1%
Seeing	113	24.4	45	33.1	39	30.5
Dating	54	11.6	12	8.8	6	4.7
Others	81	17.5	27	19.9	24	18.8
TOTAL activities	464	100	136	100	128	100

Source: place-centred mapping, fieldwork 2006.

The majority of activities reported to occur in Liberdade Square, Raul Soares Square and Estação Square were conversing and watching.

Liberdade Square	Raul Soares Square	Estação Square
(n=464, s.e.=2.1)	(n=136, s.e.=3.88)	(n=128, s.e.=3.74)
67.1%>true value	63.5%> true value	76.6%> true value

Source: place-centred mapping, fieldwork 2006.

The majority of activities reported to occur in Liberdade Square was within the category of active forms of social interactions, while approximately one-half of those observed in Raul Soares Square and Estação Square were within this same category.

Liberdade Square	Raul Soares Square	Estação Square
(n=464, s.e.=2.26)	(n=136, s.e.=4.28)	(n=128, s.e.=4.35)
56.5%<true value<65.5%	39.2%< true value < 56.4%	49.9%< true value < 67.3%

Source: place-centred mapping, fieldwork 2006.

Characteristics of the stationary users observed performing optional activities in the case study sites

Case studies											
Liberdade Square				Raul Soares Square				Estação Square			
date	male	female	total	date	male	female	Total	date	male	female	total
14.09	73	72	145	05.09	20	4	24	13.09	33	5	38
05.10	62	36	98	12.09	35	9	44	04.10	26	10	36
24.10	64	47	111	19.09	25	4	29	11.10	16	8	24
25.10	69	41	110	26.09	32	7	39	18.10	24	6	30
TOTAL	268	196	464	TOTAL	112	24	136	TOTAL	99	29	128

Source: place-centred mapping, fieldwork 2006.

Frequencies of stationary activities observed in each of the case study sites

	Case studies					
	Liberdade Square		Raul Soares Square		Estação Square	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Conversing	216	46.6%	52	38.2%	59	46.1%
Seeing	115	24.8	45	33.1	39	30.5
Dating	54	11.6	12	8.8	6	4.7
Reading	25	5.4	10	7.4	4	3.1
Undefined	15	3.2	10	7.4	3	2.3
Listening	6	1.3	1	0.7	2	1.6
Touching environmental features	2	0.4	0	0.0	8	6.3
Touching belongings	11	2.4	2	1.5	0	0.0
Touching own body	2	0.4	0	0.0	0	0.0
Playing	5	1.1	0	0.0	2	1.6
Writing	2	0.4	0	0.0	0	0.0
Talking mobile	4	0.9	4	2.9	1	0.8
Photographing/posing	5	1.1	0	0.0	0	0.0
Drinking	0	0.0	0	0.0	1	0.8
Eating	1	0.2	0	0.0	0	0.0
Playing music	1	0.2	0	0.0	0	0.0
TOTAL activities	464	100	136	100	128	100

Source: place-centred mapping, fieldwork 2006.

The distribution of the optional stationary and their clusters patterns per observation session

	Case studies											
	Raul Soares Square				Estação Square				Liberdade Square			
	05.09	12.09	19.09	26.09	13.09	04.10	11.10	18.10	14.09	05.10	24.10	25.10
One user group	16	14	11	17	4	14	7	5	13	21	19	29
Number of users in twos	2	14	10	22	6	4	14	12	56	50	50	48
Number of users in threes	0	6	3	0	6	18	3	6	36	12	30	9
Number of users in fours	0	4	0	0	4	0	0	0	8	12	12	12
Number of users in fives	0	0	5	0	0	0	0	0	5	0	0	5
Number of users in sixes	6	6	0	0	0	0	0	0	12	0	0	0
Number of users in sevens	0	0	0	0	0	0	0	7	7	0	0	7
Number of users in eights	0	0	0	0	0	0	0	0	8	8	0	0
Number of users in nines (or more)	0	0	0	0	18	0	0	0	0	0	0	0
TOTAL users	24	44	29	39	38	36	24	30	145	103	111	110

Source: place-centred mapping, fieldwork 2006.

The distribution of the optional stationary activities and their clusters patterns

	Case studies					
	Raul Soares Square		Estação Square		Liberdade Square	
	No. of users	Percent	No. of users	Percent	No. of users	Percent
One user group	58	42.6%	30	23.4%	82	17.5%
Clusters of two users	48	35.3	36	28.1	204	43.5
Clusters of three users	9	6.6	33	25.8	87	18.6
Clusters of four users	4	2.9	4	3.1	44	9,4
Clusters of five users	5	3.7	0	0	10	2,1
Clusters of six users	12	8.8	0	0	12	2,6
Clusters of seven users	0	0	7	5.5	14	3,0
Clusters of eight users	0	0	0	0	16	3,4
Clusters of nine users or more	0	0	18	14.1	0	0
TOTAL users	136	100	128	100	469	100

Source: place-centred mapping, fieldwork 2006.

APPENDIX D

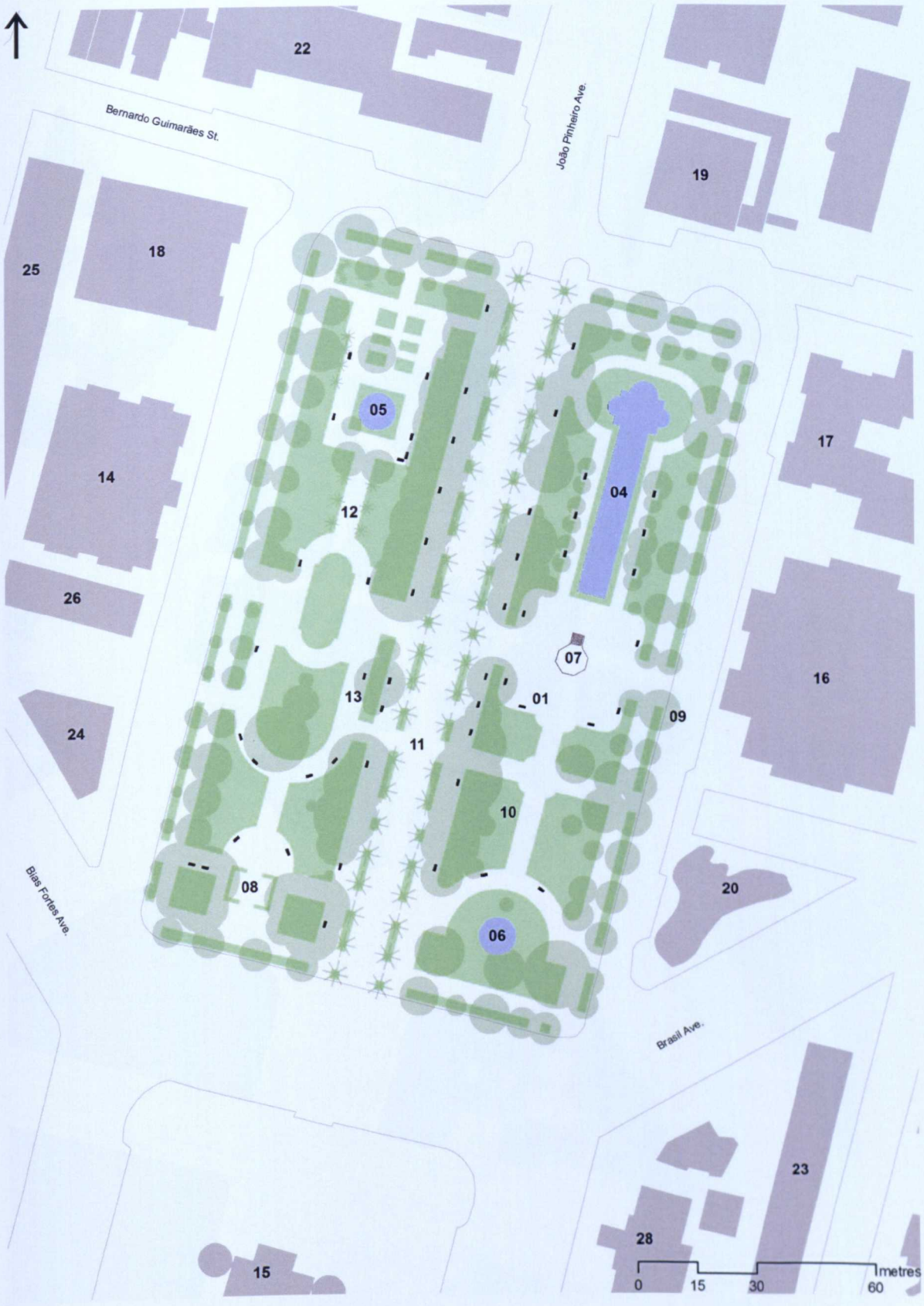
Summary of findings on the perception of the study areas.

The major visual elements which define the collective visual cognitive structure of the study areas

	Case study sites					
	Raul Soares Square		Estação Square		Liberdade Square	
Urban furniture	01	Bench	01	Bench	01	Bench
	02	Lamp-post	02	Lamp-post	02	Lamp-post
	03	Dustbin	03	Dustbin	03	Dustbin
	04	Water fountain	04	Water fountain	04	Water fountain 01
			05	Bus stop	05	Water fountain 02
			06	Bollards	06	Water fountain 03
			07	Public telephone	07	Bandstand
			08	Monument	08	Bust
Vegetation	05	Tree	09	Tree	09	Tree
	06	Garden	10	Garden	10	Garden
	07	Formal shrubbery	11	Ipê		
	08	Bush around fountain				
Open space	09	Central area	12	Esplanade	11	Alameda
	10	Path	13	Grate	12	Alameda 02
					13	Path
Buildings	11	Building 01	14	Building 01	14	Building 01
	12	Building 02	15	Building 02	15	Building 02
	13	Building 03	16	Building 03	16	Building 03
	14	Building 04	17	Building 04	17	Building 04
	15	Building 05	18	Building 05	18	Building 05
	16	Building 06	19	Building 06	19	Building 06
	17	Building 07			20	Building 07
	18	Building 08			21	Building 08
	19	Building 09			22	Building 09
	20	Building 10			23	Building 10
	21	Building 11			24	Building 11
	22	Building 12			25	Building 12
	23	Building 13			26	Building 13
	24	Building 14			27	Building 14
	25	Building 15			28	Building 15
	26	Building 16				
	27	Building 17				

Source: instrument type B, fieldwork 2007.

Site plan showing the major visual elements which define the collective visual cognitive structure of Liberdade Square



Source: instrument type B, fieldwork 2007.

Site plan showing the major visual elements which define the collective visual cognitive structure of Raul Soares Square

Source: instrument type B, fieldwork 2007.

Site plan showing the major visual elements which define the collective visual cognitive structure of Estação Square

Source: instrument type B, fieldwork 2007.

'Could you please draw the things that you see in Liberdade Square and the buildings that you can see from it ?' Multiple-dichotomy method for multiple-response questions

		Liberdade Square			
		"What is it that you have just drawn?"	Yes (code=1)	No (code=0)	Total *N*
Buildings	01	Building 01	22	122	144
	02	Building 02	33	111	144
	03	Building 03	19	125	144
	04	Building 04	13	131	144
	05	Building 05	2	142	144
	06	Building 06	4	140	144
	07	Building 07	20	124	144
	08	Building 08	1	143	144
	09	Building 09	6	138	144
	10	Building 10	1	143	144
	11	Building 11	17	127	144
	12	Building 12	3	141	144
	13	Building 13	2	142	144
	14	Building 14	3	141	144
	15	Building 15	1	143	144
Open space	16	Alameda 01	56	88	144
	17	Alameda 02	1	143	144
	18	Path	4	140	144
Urban furniture	19	Bench	28	136	144
	20	Lamp post	3	141	144
	21	Dustbin	1	143	144
	22	Water fountain 01	34	110	144
	23	Water fountain 02	28	116	144
	24	Water fountain 03	8	136	144
	25	Bandstand	50	94	144
	26	Bust	1	143	144
Greenery	27	Tree	41	103	144
	28	Garden	21	123	144

Source: instrument type B, fieldwork 2007.

'Do you remember experiencing any smell, pleasant or unpleasant, in this square during the week, between mid day and 14:00 o'clock?'

	Case studies					
	Liberdade Square		Raul Soares Square		Estação Square	
	No of users	Percent	No of users	Percent	No of users	Percent
Yes	88	59.1%	85	68.0%	76	55.5%
No	61	40.9	40	32.0	61	44.5
TOTAL users	149	100.0	125	100.0	137	100.0

Source: instrument type B, fieldwork 2007.

'Could you please draw the things that you see in Raul Soares Square and the buildings that you can see from it ?' Multiple-dichotomy method for multiple-response questions

		Raul Soares Square			
		"What is it that you have just drawn?"	Yes (code=1)	No (code=0)	Total *N*
Buildings	01	Building 01	9	105	114
	02	Building 02	31	83	114
	03	Building 03	1	113	114

CONTINUATION ON THE NEXT PAGE.

Continuation:

		Raul Soares Square			
		"What is it that you have just drawn?"	Yes (code=1)	No (code=0)	Total *N*
	04	Building 04	1	113	114
	05	Building 05	3	111	114
	06	Building 06	2	112	114
	07	Building 07	4	110	114
	08	Building 08	1	113	114
	09	Building 09	1	113	114
	10	Building 10	2	112	114
	11	Building 11	4	110	114
	12	Building 12	3	111	114
	13	Building 13	1	113	114
	14	Building 14	4	110	114
	15	Building 15	1	113	114
	16	Building 16	5	109	114
	17	Building 17	2	112	114
Open space	18	Central area	2	112	114
	19	Path	8	106	114
Urban furniture	20	Bench	55	59	114
	21	Lamp post	12	102	114
	22	Dustbin	3	111	114
	23	Water fountain	63	51	114
Vegetation	24	Tree	52	62	114
	25	Garden	61	53	114

Source: instrument type B, fieldwork 2007.

'Which smell(s) have you already experienced in this urban square during the week, between 12.00 and 14.00?'

	Liberdade Square			Raul Soares Square			Estação Square		
	yes	no	total	yes	no	total	yes	no	total
Smell of urine	2	86	88	31	54	85	37	38	75
Smell of excrement	3	85	88	38	47	85	7	68	75
Smell of urban residue	4	84	88	25	60	85	26	49	75
Smell of human body	6	82	88	13	72	85	11	64	75
Smell of flowers	41	47	88	6	79	85	0	75	75
Smell of greenery	43	45	88	6	79	85	2	73	75
Smell of transportation	9	79	88	13	72	85	10	65	75
Smell of food	0	88	88	1	84	85	3	72	75
Smell of fresh air	19	69	88	2	83	85	12	63	75
Smell of drugs	2	86	88	13	72	85	3	72	75
Miscellaneous	3	85	88	0	85	85	1	74	75

Source: instrument type B, fieldwork 2007.

'Which smell(s) have you already experienced in this urban square during the week, between 12.00 and 14.00?'

	Liberdade Square			
	Freq	**First-cited**	**Second-cited**	**Third-cited**
Smell of urine	2	urine(2)	-	-
Smell of excrement	2	horse's excrement (1), excrement(1)	-	-

CONTINUATION ON THE NEXT PAGE.

Continuation:

	Liberdade Square			
	Freq	**First-cited**	**Second-cited**	**Third-cited**
Smell of urban residue	4	sewage(2)	dust(1)	swage(1)
Smell of human body	8	beggar(1), perfume(1)	beggar(1), perfume(2)	perfume(2), mendicant(1)
Smell of flowers	42	flower(27), cestrum nocturnum(3), rose(1), carnation (1)	flower(6), rose(3)	flower(1)
Smell of greenery	54	shrub(3), plant(12), cypress(7), grass(2), tree(7), pine tree(1) eucalyptus (1), nature(1)	shrub(1), plant(6), cypress(1), grass(2), tree(4), nature(2)	shrub(2), grass(1), tree(1)
Smell of transportation	9	vehicle(4), bus(1), smoke(1)	smoke(2)	smoke(1)
Smell of food	-	-	-	-
Smell of fresh air	18	fresh air(5), water(1)	fresh air(3), water(3), wet(1)	wet(3), water(2)
Smell of drugs	2	cigarette (1)	drink(1)	-
Miscellaneous	2	pollution(1)	pollution(1)	-

Source: instrument type B, fieldwork 2007.

'Which smell(s) have you already experienced in this urban square during the week, between 12.00 and 14.00?'

	Raul Soares Square			
	Freq	**First-cited**	**Second-cited**	**Third-cited**
Smell of urine	31	urine(18)	urine(10)	urine(3)
Smell of excrement	40	excrement(21), horse's excrement (1), dog's excrement(1), rat's excrement(1)	excrement(13), dog's excrement(1)	excrement(2)
Smell of urban residue	27	polluted water(1), rubbish(6), swage(5), dirty(1), sewer(1), dead animals (4)	polluted water(2), dead animals (1)	leftover food (2), rotten food(1), rubbish(3)
Smell of human body	17	perspiration(1), beggar(2), perfume(2), dirty people(3)	beggar(1), perfume(3), old clothe(1), mendicant(1)	beggar(2), perfume(1)
Smell of flowers	6	flower(2)	flower(4)	-
Smell of greenery	9	shrub(1),plant(1)	plant(3), nature(2)	plant(2)
Smell of transportation	12	smoke(3), smoke from buses(1), burned tire(1), fuel(1)	smoke(3)	smoke(2), oil diesel(1)
Smell of food	1	food(1)	-	-
Smell of fresh air	-	-	-	-
Smell of drugs	14	drug(1), cannabis(4), glue(1)	drug(3), cannabis(2), thinner(1), cigarette(1)	drug(1)
Miscellaneous	-	-	-	-

Source: instrument type B, fieldwork 2007.

'Which smell(s) have you already experienced in this urban square during the week, between 12.00 and 14.00?

	Estação Square			
	Freq	**First-cited**	**Second-cited**	**Third-cited**
Smell of urine	37	urine(31)	urine(4)	urine(2)

CONTINUATION ON THE NEXT PAGE.

Continuation:

	Estação Square			
	Freq	**First-cited**	**Second-cited**	**Third-cited**
Smell of excrement	6	-	excrement(6)	-
Smell of urban residue	28	leftover food(1), polluted water from Arrudas River(5), polluted water(2), rubbish(1), sewage(8), dirt(2), dead animals(1)	rubbish(3), sewage(1), dead animals(1)	dust(1), musty(1), dead animals(1)
Smell of human body	12	beggar(2), perfume(4), dirty people(1)	beggar(2), perfume(1)	beggar(1), dirty people(1)
Smell of flowers	-	-	-	-
Smell of greenery	2	tree(2)	-	-
Smell of transportation	10	smoke(3), gasoline(1)	smoke(3),oil diesel(1)	smoke(2)
Smell of food	3	food(1), pop corn(1)	pastry(1)	-
Smell of fresh air	13	fresh air(1), wet(1), vapour(1), water(5)	fresh air(1), water(4)	-
Smell of drugs	3	drink(1)	cigarette(1) , cachaça(1)	-
Miscellaneous	1	pollution(1)	-	-

Source: instrument type B, fieldwork 2007.

'In your opinion, this smell is...'

	Classification of the smells noticed by the respondents in Liberdade Square			
	Unpleasant	Indifferent	Pleasant	Total
Smell of urine	2	0	0	2
Smell of excrement	3	0	0	3
Smell of urban residue	3	1	0	4
Smell of human body	2	2	2	6
Smell of flowers	0	1	42	43
Smell of greenery	0	2	39	41
Smell of transportation	9	0	0	9
Smell of fresh air	1	0	18	19
Smell of drugs	2	0	0	2
Miscellaneous	2	0	1	3
TOTAL	24	6	102	132

Source: instrument type B, fieldwork 2007.

'In your opinion, this smell is...'

	Classification of the smells noticed by the respondents in Raul Soares Square			
	Unpleasant	Indifferent	Pleasant	Total
Smell of urine	31	0	0	31
Smell of excrement	38	0	0	38
Smell of urban residue	25	0	0	25
Smell of human body	7	3	3	13
Smell of flowers	0	0	6	6
Smell of greenery	1	0	5	6
Smell of transportation	10	3	0	13
Smell of food	0	0	1	1
Smell of fresh air	0	0	2	2
Smell of drugs	13	0	0	13
TOTAL	125	6	17	148

Source: instrument type B, fieldwork 2007.

'In your opinion, this smell is...'

	Classification of the smells noticed by the respondents in Estação Square			
	Unpleasant	Indifferent	Pleasant	Total
Smell of urine	37	0	0	37
Smell of excrement	7	0	0	7
Smell of urban residue	25	1	0	26
Smell of human body	6	2	3	11
Smell of greenery	0	0	2	2
Smell of transportation	9	1	0	10
Smell of food	2	1	0	3
Smell of fresh air	1	2	9	12
Smell of drugs	3	0	0	3
Miscellaneous	1	0	0	1
TOTAL	91	7	14	112

Source: instrument type B, fieldwork 2007.

'Which sounds do you hear in this urban square during the week, between 12.00 and 14.00?'

	Case studies								
	Liberdade Square			Raul Soares Square			Estação Square		
	yes	no	total	yes	no	total	yes	no	total
Sounds of water	25	121	146	0	124	124	34	103	137
Sounds of fauna	85	61	146	13	111	124	4	133	137
Human sounds	52	94	146	35	89	124	35	102	137
Sounds and society	3	143	146	14	110	124	19	118	137
Sounds of transportation machines	134	12	146	113	11	124	127	10	137
Sounds of construction and demolition	3	143	146	2	122	124	4	133	137
Sounds as indicators	19	127	146	34	90	124	22	115	137
Miscellaneous	6	140	146	3	121	124	1	136	137

Source: instrument type B, fieldwork 2007.

'Which sounds do you hear in this urban square during the week, between 12.00 and 14.00?'

	Liberdade Square			
	Freq	**First-cited**	**Second-cited**	**Third-cited**
Sounds of water	25	water (5)	water (10)	water (10)
Sounds of fauna	85	birds (22)	birds (39)	birds (24)
Human sounds	53	conversations (4), human sounds (1), vocal (1)	conversations (18), human sounds (4), vocal (1)	conversations (22), arguments (1), shouting(1)
Social sounds	3	music (1)	-	musical instruments(1), radio and tv (1)
Sounds of transportation	164	traffic (13), engine(1), specific vehicles (1), buses (15), cars (80)	traffic (2), specific vehicles (1), buses (12), cars (22), motorcycle (3), helicopter (1)	traffic (3), engine(1), buses (3), cars (3), motorcycle (2), brakes(1)
Sounds of construction	3	-	construction(1)	construction(2)
Sounds as indicators	21	horn (2), sirens (1)	whistling (1), horn(10), sirens(2)	horn (3), sirens(2)
Miscellaneous	6	-	wind (1)	wind (2), trees (2), pollution (1)

Source: instrument type B, fieldwork 2007.

'Which sounds do you hear in this urban square during the week, between 12.00 and 14.00?'

	Raul Soares Square			
	Freq	**First-cited**	**Second-cited**	**Third-cited**
Sounds of water	-	-	-	-
Sounds of fauna	12	bird (5)	insect(1), bird(5)	bird (2)
Human sounds	37	conversation(4), argument(1), shouting(1)	conversation(10), argument(1), shouting(2), human(3)	conversation(3), argument(2), shouting(4), human(3), whistling(1), footstep(1), voice(1)
Social sounds	16	music(1), adverts from cars(5)	music(1), adverts from cars(4)	music(2), radio and tv(1), adverts from cars(2)
Sounds of transportation	150	traffic(12), engine(16), specific vehicle(1), bus (10), car(52), motorcycle (1), brake(1)	traffic(1), engine(7), bus (13), car(15), motorcycle (4), brake(2)	traffic (1), specific vehicle(3), bus (1), car(2), trucks(2), motorcycle (5), brakes(1)
Sounds of construction	2	bomb(1)	bomb(1)	-
Sounds as indicators	34	mobile(1), horn(11), siren(1)	horn(10), siren(3)	horn(5), siren(3)
Miscellaneous	2	-	wind (1), machinery(1)	wind (1)

Source: instrument type B, fieldwork 2007.

'Which sound do you hear in this urban square during the week, between 12.00 and 14.00?'

	Estação Square			
	Freq	**First-cited**	**Second-cited**	**Third-cited**
Sounds of water	34	water (11)	water (14)	water (9)
Sounds of fauna	4	bird(1)	bird(2)	bird(1)
Human sounds	35	conversation(5), human(1), voice(3)	conversation(10), shouting(2), human(3), voice(2)	conversation(4), human(4), shouting(1)
Social sounds	20	music(7), adverts from cars(2)	music(6), adverts from cars(2)	music(3)
Sounds of transportation	164	traffic(14), engine(5), bus(9), car(67), brake(2), tube(1)	traffic(10), engine(1), bus(10), car(16), truck(1), train(2), motorcycle(1), brake(1), tube(3)	engine(1), bus(3), car(2), truck(2), train(1), motorcycle(1), brakes(2), traffic(2), tube(7)
Sounds of construction	4	-	construction(2)	hammering (1), brushing (1)
Sounds as indicators	24	whistling(1), horn(7), siren(2)	horn(6), siren(2)	horn(3), siren(3)
Miscellaneous	1	-	-	wind(1)

Source: instrument type B, fieldwork 2007.

'In your opinion, this sound is...'

	Evaluation of the sounds heard in Liberdade Square			
	Unpleasant	Indifferent	Pleasant	Total
Sounds of water	0	1	23	24
Sounds of fauna	0	4	80	84
Human sounds	1	33	18	52
Sounds and society	0	0	3	3
Sounds of transportation machines	104	28	1	133
Sounds of construction and demolition	2	1	0	3

CONTINUATION ON THE NEXT PAGE.

Continuation:

	Evaluation of the sounds heard in Liberdade Square			
	Unpleasant	Unpleasant	Unpleasant	Unpleasant
Sounds as indicators	17	2	0	19
Miscellaneous	1	0	5	6
TOTAL	125	69	130	324

Source: instrument type B, fieldwork 2007.

'In your opinion, this sound is...'

	Evaluation of the sounds heard in Raul Soares Square			
	Unpleasant	Indifferent	Pleasant	Total
Sounds of water	0	0	0	0
Sounds of fauna	0	0	13	13
Human sounds	11	16	8	35
Sounds and society	5	3	6	14
Sounds of transportation machines	77	33	3	113
Sounds of construction and demolition	2	0	0	2
Sounds as indicators	27	6	1	34
Miscellaneous	1	2	0	3
TOTAL	123	60	31	214

Source: instrument type B, fieldwork 2007.

'In your opinion, this sound is...'

	Classification of the sounds heard in Estação Square			
	Unpleasant	Indifferent	Pleasant	Total
Sounds of water	0	1	33	34
Sounds of animals	0	0	4	4
Human sounds	6	19	10	35
Sounds and society	8	3	8	19
Sounds of transportation machines	85	34	8	127
Sounds of construction and demolition	2	2	0	4
Sounds as indicators	17	5	0	22
Miscellaneous	0	1	0	1
TOTAL	118	65	63	246

Source: instrument type B, fieldwork 2007.

'Do you think that you would be able to recognize any of the paving materials which feature this square if you were blindfolded?'

	Case studies					
	Liberdade Square		Raul Soares Square		Estação Square	
	No of users	Percent	No of users	Percent	No of users	Percent
Yes	123	82.6 %	66	52.8%	70	50.7%
No	26	17.4	59	47.2	68	49.3
TOTAL users	149	100.0	125	100.0	138	100.0

Source: instrument type B, fieldwork 2007.

'What are the paving materials which feature Liberdade Square?'

	Liberdade Square		
	Yes	No	Total citations
Cement paving	135	197	332

CONTINUATION ON THE NEXT PAGE.

Continuation:

	Liberdade Square		
	Yes	No	Total citations
Textured cement paving	46	286	332
Cobblestone	145	187	332
Brick	6	326	332

Source: instrument type B, fieldwork 2007.

'What paving materials in Liberdade Square do you think that you would be able to recognize blindfolded?'

		Liberdade Square		
		Yes	No	Total citations
Fine texture	Cement paving	2	191	193
	Textured cement paving	61	132	193
Coarse texture	Cobblestone	110	83	193
	Brick	20	173	193

Source: instrument type B, fieldwork 2007.

'In your opinion, this paving material, which features Liberdade Square, is comfortable, neither comfortable nor uncomfortable or uncomfortable to walk on?'

		Classification of the paving textures in Liberdade Square			
		Uncomfortable	Indifferent	Comfortable	Total
Fine texture	Cobblestone	65	45	25	135
	Cement paving	1	1	4	6
Coarse texture	Textured cement paving	8	51	86	145
	Brick	6	29	11	46
	TOTAL	80	126	126	332

Source: instrument type B, fieldwork 2007.

'What paving materials in Raul Soares Square do you think that you would be able to recognize blindfolded?'

	Raul Soares Square		
	Yes	No	Total
Portuguese stone	66	59	125

Source: instrument type B, fieldwork 2007.

'In your opinion, the portuguese stone in Raul Soares Square, is comfortable, neither comfortable nor uncomfortable or uncomfortable to walk on?'

	Evaluation of the floor textures noticed in Raul Soares Square			
	Uncomfortable	Indifferent	Comfortable	Total
Portuguese stone	14	47	63	124
TOTAL classifications	14	47	63	124

Source: instrument type B, fieldwork 2007.

'What paving materials in Estação Square do you think that you would be able to recognize blindfolded?'

	Estação Square		
	Yes	No	total
Tile paving	5	85	90

CONTINUATION ON THE NEXT PAGE.

Continuation:

	Estação Square		
	Yes	No	total
Cement tile paving	56	34	90
Cement paving	6	84	90
Tactile floor finish	14	76	90
Grate	6	84	90
Granite	3	87	90

Source: instrument type B, fieldwork 2007.

'In your opinion, this paving material in Estação Square is...'

	Uncomfortable	Indifferent	Comfortable	Total
Cement paving	3	4	8	15
Tile paving	1	1	8	10
Cement tile paving	11	47	73	131
Tactile floor	4	8	4	16
Grate	8	3	1	12
Granite	0	2	13	15
TOTAL classifications	27	65	107	199

Source: instrument type B, fieldwork 2007.

The true proportion of tactile experiences sensed through the feet classified as 'uncomfortable'

Liberdade Square	Raul Soares Square	Estação Square
(n=332, s.e.=2.35)	(n=124, s.e.=2.84)	(n=199, s.e.=2.43)
28.8%>true value	16.98% >true value	18.5% >true value

Source: instrument type B, fieldwork 2007.

The true proportion of tactile experiences sensed through the feet classified as 'indifferent'

Liberdade Square	Raul Soares Square	Estação Square
(n=332, s.e.=2.66)	(n=124, s.e.=4.36)	(n=199, s.e.=3.32)
43.3%>true value	46.6% >true value	39.3% >true value

Source: instrument type B, fieldwork 2007.

The true proportion of olfactory experiences classified as 'indifferent'

Liberdade Square	Raul Soares Square	Estação Square
(n=135, s.e.=2.15)	(n=145, s.e.=1.19)	(n=112, s.e.=2.29)
10.4%>true value	4.5% >true value	10.9% >true value

Source: instrument type B, fieldwork 2007.

The true proportion of sonic experiences classified as 'indifferent'

Liberdade Square	Raul Soares Square	Estação Square
(n=324, s.e.=2.27)	(n=313, s.e.=2.56)	(n=246, s.e.=2.81)
25.8%>true value	33.9% >true value	32% >true value

Source: instrument type B, fieldwork 2007.

'Could you please draw the things that you see in Estação Square and the buildings that you can see from it ?' Multiple-dichotomy method for multiple-response questions

		Estação Square			
		"What is it that you have just drawn?"	Yes (code=1)	No (code=0)	Total *N*
Buildings	01	Building 01	10	103	123

CONTINUATION ON THE NEXT PAGE.

Continuation:

		Estação Square			
		"What is it that you have just drawn?"	Yes (code=1)	No (code=0)	Total *N*
	02	Building 02	51	72	123
	03	Building 03	12	111	123
	04	Building 04	1	122	123
	05	Building 05	1	122	123
	06	Building 06	1	122	123
Open space	07	Esplanade	2	121	123
	08	Grate	3	120	123
Urban furniture	09	Bench	43	80	123
	10	Lamp post	48	75	123
	11	Dustbin	3	120	123
	12	Water fountain	64	59	123
	13	Bus stop	1	122	123
	14	Bollards	1	122	123
	15	Public telephone	5	118	123
	16	Sculpture	36	87	123
Vegetation	17	Tree	19	104	123
	18	Ipê	20	103	123
	19	Flower beds	3	120	123

Source: instrument type B, fieldwork 2007.

APPENDIX E

Summary of findings on the evaluations of the study areas.

'In your opinion, the route that you have just walked in this square is:'

	Case studies					
	Liberdade Square		Raul Soares Square		Estação Square	
	No. of users	Percent	No. of users	Percent	No. of users	Percent
Relatively unpleasant	11	8.5%	37	29.4%	26	20.0%
Relatively pleasant	60	46.2	76	60.3	73	56.2
Very pleasant	59	45.4	13	10.3	31	23.8
TOTAL users	130	100	126	100	130	100

Source: instrument type A, fieldwork 2007.

The true proportion of answers 'relatively unpleasant' given by ambulant users

	Case studies		
	Liberdade Square	Raul Soares Square	Estação Square
Instrument type A	(n=130, s.e.=2.44) 13.4%>true value	(n=126, s.e.=4.06) 35.5% >true value	(n=130, s.e.=3.51) 27.0% >true value

Source: instrument type A, fieldwork 2007.

'In your opinion, this place where you are seated is:'

	Case studies					
	Liberdade Square		Raul Soares Square		Estação Square	
	No. of users	Percent	No. of users	Percent	No. of users	Percent
Relatively unpleasant	4	2.7%	29	23.2%	21	15.0%
Relatively pleasant	80	53.7%	88	70.4	98	70.0
Very pleasant	65	43.6%	8	6.4	21	15.0
TOTAL users	149	100%	125	100	140	100

Source: instrument type B, fieldwork 2007.

The true proportion of answers 'relatively unpleasant' given by stationary users

	Case studies		
	Liberdade Square	Raul Soares Square	Estação Square
Instrument type B	(n=149, s.e.=1.33) 5.4% >true value	(n=125, s.e.=3.78) 30.8% >true value	(n=140, s.e.=3.02) 21.0%>true value

Source: instrument type B, fieldwork 2007.

'Why, in your opinion, is this place where you are pleasant?'

	Case studies					
	Liberdade Square		Raul Soares Square		Estação Square	
	No. of responses	Percent	No. of responses	Percent	No. of responses	Percent
Perceptual aspects	75	52.4%	54	56.8%	63	54.3%
Associational aspects	68	47.6	41	43.2	53	45.7
TOTAL responses	143	100	95	100	116	100

Source: instrument type B, fieldwork 2007.

Aspects first-cited by stationary users under the categories *perceptual* and *associational aspects*

Sub-categories		Case studies					
		Liberdade Square		Raul Soares Square		Estação Square	
		No. of users	Percent	No. of users	Percent	No. of users	Percent
	Perceptual aspects						
	Non-visual	09	6.3	02	2.1	04	4
	Kinaesthetic	-	-	01	1.1	03	3
	Visual	08	5.6	05	5.3	15	15
	Social	04	2.8	01	1.1	03	3
	Climatic	16	11.2	18	18.9	10	10
	Natural	29	20.3	22	23.2	06	6
	Built	-	-	-	-	05	5
	Atmosphere	-	-	-	-	07	7
	Maintenance	09	6.3	02	2.1	06	6
	Others	-	-	-	-	-	-
	Associational aspects						
	Relaxing	56	39.2	27	28.4	30	30
	Protection	02	1.4	07	7.4	03	3
	Active leisure	01	0.7	-	-	03	3
	Passive leisure	05	3.5	05	5.3	04	4
	Others	04	2.8	05	5.3	01	1
	Total of users	143	100	95	100	100	100

Source: instrument type B, fieldwork 2007.

'Why, in your opinion, is the place where you are located in Liberdade Square pleasant?'

PERCEPTUAL ASPECTS		
Freq. citations	**Categories**	**Users answers**
09	Non-visual	air is not polluted (B3006, B3025) air (B3008) because of its higher location, little pollution (B3029) unpolluted air (B3031) little noise (B3044) silence (B3067) little noise (B3130) air (B3142)
08	Visual	landscape (B3004, B3119) view (B3014) wide vista (B3018) vista (B3051, B3091, B3093, B3103)
00	Kinaesthetic	none
04	Social	tourists (B3035) people (B3061, B3096, B3144)
16	Climatic	shade (B3003, B3023, B3072, B3146) wind (B3007, B3040, B3092, B3026) temperature (B3048) coolness (B3082, B3112, B3117, B3108) weather (B3116) sun (B3121, B3001)
29	Natural	trees (B3005, B3017, B3033, B3114, B3131, B3024, B3102) greenery (B3010, B3012, B3013, B3042, B3046, B3056, B3074, B3109, B3132) nature (B3011, B3057, B3068, B3070, B3087, B3101, B3127, B3129, B3149) plants (B3015) birds (B3041) gardens (B3049) flowers (B3118)
00	Built	none
00	Atmosphere	none
09	Maintenance	well maintained (B3030, B3032, B3090) clean (B3055, B3097, B3106) cared for (B3062) cleanliness (B3080) fresh (B3082)
00	Others	none
ASSOCIATIONAL ASPECTS		
Freq. citations	**Categories**	**Users answers**
02	protection	safety (B3124) fewer people, we can concentrate more (B3099)
01	active engagement	date (B3060)
05	passive engagement	seat, think about life (B3002), rest (B3038, B3053, B3094, B3141)

CONTINUATION ON THE NEXT PAGE.

Continuation:

Freq. citations	Categories	Users answers
01	others	leisure area (B3063) south zone of the city (B3089) cozy (B3125) place very near the city centre (B3059)
56	relaxation	calm (B3016, B3073, B3115, B3138, B3147, B3009, B3126) meditate (B3019, B3054) peace (B3020, B3058, B3075) island in the middle of the city (B3036) tranquil (B3043, B3052, B3065, B3066,B3078, B3079, B3081, B3095, B3105, B3107, B3111, B3113, B3120, B3122, B3133, B3135, B3136, B3139, B3145, B3148, B3021, B3022, B3037, B3039, B3050, B3064, B3076, B3077, B3084, B3086, B3098, B3100, B3128, B3134) relaxing (B3045, B3047, B3123, B3085) quiet (B3069, B3083, B3104, B3140) where I feel good (B3034)

Source: instrument type B, fieldwork 2007.

'Why, in your opinion, is the place where you are located in Raul Soares Square pleasant?'

PERCEPTUAL ASPECTS		
Freq. citations	**Categories**	**Users answers**
02	Non-visual	no smell of excrement (B1046) air (B1125)
05	Visual	wide view (B1030) landscape (B1080, B1092) various things (B1088) many beautiful things (B1098)
01	Kinaesthetic	core (B1005)
01	Social	people (B1061)
18	Climatic	coolness (B1006, B1102) shade (B1009, B1011, B1036, B1042, B1053, B1058, B1062, B1072, B1111, B1112, B1115, B1117, B1120, B1121) sun (B1100, B1114)
22	Natural	greenery (B1017, B1021, B1027, B1043, B1081, B1082, B1087, B1119) nature (B1018, B1041, B1083, B1097) trees (B1060, B1073, B1079, B1090, B1096, B1108, B1127, B1007 B1040) garden (B1068)
00	Built	none
00	Atmosphere	none
02	Maintenance	clean (B1049) cleanliness (B1078)
00	Others	none
ASSOCIATIONAL ASPECTS		
Freq. citations	**Categories**	**Users answers**
27	Relaxing	tranquil (B1003, B1025, B1031, B1044, B1051, B1052, B1056, B1067, B1075, B1077, B1091, B1103, B1105, B1107, B1110, B1113, B1123, B1109, B1128) calm (B1008, B1050, B1074, B1126), relaxing (B1085), restful (B1089), peace (B1101, B1122)
07	Protection	safer (B1034, B1047), not many street urchins (B1004) good people (B1032) there are shoddy people here, but there we have many more (B1033) no one disturbs (B1095, B1054),
00	Active leisure	none
05	Passive leisure	rest (B1002, B1084), wait (B1035), individuality (B1104), to think a little (B1106)
05	Others	healthy (B1020), moment of distraction (B1070), distract the mind (B1118), leisure area (B1012), movement (B1015)

Source: instrument type B, fieldwork 2007.

'Why, in your opinion, is the route that you have just walked through this particular square pleasant?

	Case studies					
	Liberdade Square		Raul Soares Square		Estação Square	
	No. of responses	Percent	No. of responses	Percent	No. of responses	Percent
Perceptual aspects	99	83.9%	71	80.7%	79	79.0%
Associational aspects	19	16.1%	17	19.3%	21	21.0%
TOTAL responses	118	100%	88	100%	100	100%

Source: instrument type B, fieldwork 2007.

The calculation of the standard errors suggests that the majority of ambulant users in Liberdade Square, Raul Soares Square and Estação Square first-cited 'perceptual aspects' as supportive of pedestrian movement.

	Case studies		
	Liberdade Square	Raul Soares Square	Estação Square
Instrument type A	(n=118, s.e.=3.43)	(n=88, s.e.=4.06)	(n=100, s.e.=4.21)

Source: instrument type A, fieldwork 2007.

'Why, in your opinion, is the place where you are located in Estação Square pleasant?'

PERCEPTUAL ASPECTS		
Freq. citations	**Categories**	**Users answers**
04	Non-visual	cannot smell bad smell (B2053) air (B2082) unpolluted air (B2131) not too smelly (B2140)
15	Visual	view (B2005, B2133) landscape (B2013, B2032, B2039, B2044, B2071, B2080, B2085, B2087, B2113, B2145) wide view (B2036, B2069) appearance (B2099)
03	Kinaesthetic	spacious (B2028) space (B2045) sensation of space (B2094)
03	Social	people circulating (B2046) flux of people (B2136) watching people passing by (B2127)
10	Climatic	shade (B2058, B2062, B2074, B2081, B2089, B2109, B2139) coolness (B2068) sun (B2092) wind (B2135)
06	Natural	trees (B2007) fountain (B2124) water (B2011, B2144) fountains (B2024) green (B2079)
05	Built	architecture (B2012, B2040, B2105) museum (B2129) benches (B2143)
07	Atmosphere	atmosphere (B2059, B2060, B2065, B2097, B2101, B2126, B2052)
06	Maintenance	clean (B2064, B2098, B2102, B2115, B2137) cleanliness (B2103)
00	Others	none
ASSOCIATIONAL ASPECTS		
Freq. citations	**Categories**	**Users answers**
30	relaxation	tranquil (B2001, B2008, B2015, B2025, B2026, B2035, B2037, B2057, B2063, B2077, B2085, B2090, B2095, B2111, B2114, B2117, B2118, B2123, B2017, B2018) rest (B2014, B2023, B2042, B2130), peace (B2070) no tumult (B2072) forgot my problems (B2076) calm (B2141, B2030) no annoyance (B2138)
03	protection	police officer (B2022) there are not as many thieves (B2033) familiar people (B2110)
03	active engagement	workmates (B2034) talk (B2016) walk along (B2027)
04	passive engagement	kill the time (B2047) sit (B2083, B2119) stay thinking (B2086)
01	others	leisure (B2091)

Source: instrument type B, fieldwork 2007.

Aspects first-cited by ambulant users under the categories *perceptual* and *associational aspects*

		Case studies					
		Liberdade Square		Raul Soares Square		Estação Square	
		No. of users	Percent	No. of users	Percent	No. of users	Percent
Sub-categories	**Perceptual aspects**						
	Non-visual	06	5.1	01	1.2	02	2
	Kinaesthetic	10	8.5	09	10.7	10	10
	Visual	06	5.1	06	7.1	15	15
	Social	02	1.7	02	2.4	03	3
	Climatic	18	15.3	14	16.7	05	5
	Natural	49	41.5	35	41.7	24	24

CONTINUATION ON THE NEXT PAGE.

Continuation:

	Liberdade Square		Raul Soares Square		Estação Square	
	No. of users	Percent	No. of users	Percent	No. of users	Percent
Built	02	1.7	-	-	09	9
Atmosphere	03	2.5	03	3.6	05	5
Maintenance	02	1.7	-	-	04	4
Others	-	-	-	-	-	-
Associational aspects						
relaxation	13	11	12	14.3	09	9
protection	02	1.7	02	2.4	09	9
active engagement	01	.8	-	-	01	1
passive engagement	-	-	-	-	-	-
others	04	3.4	-	-	04	4
Total of users	118	100	84	100	100	100

Source: instrument type A, fieldwork 2007.

'Why, in your opinion, is the route that you have just walked in Liberdade Square pleasant?'

PERCEPTUAL ASPECTS		
Freq. citations	**Categories**	**Users answers**
06	Non-visual	air is unpolluted (A3038) air (A3048) air, is less polluted (A3068) air is less polluted (A3114) sweet-smelling (A3129) noise of the water (A3052)
06	Visual	landscape (A3005, A3055, A3119) appearance (A3046) view of the square (A3071) arrangement of the palm trees (A3093)
10	Kinaesthetic	if I do not walk through here, I would have difficulties (A3001) shortest (A3013) larger (A3017) good to walk (A3018) spacious (A3019) lights and the pedestrian crossings (A3041) flat (A3064) quicker (A3101) traffic light easy and quick to cross (A3105) practical, quick (A3113)
02	Social	movement of people (A3011) beautiful people (A3089)
18	Climatic	shade (A3032, A3034, A3037, A3043, A3083, A3097, A3125, A3031) coolness (A3040, A3050, A3077, A3095, A3042, A3085, A3086, A3116) wind (A3112, A3130)
49	Natural	trees (A3054, A3084, A3126, A3008, A3015, A3016, A3030, A3044, A3051, A3069, A3075, A3090, A3115, A3124, A3131, A3009, A3056, A3058, A3092, A3118) plants (A3012, A3094, A3104, A3128) greenery (A3024, A3027, A3053, A3062, A3070, A3072, A3082, A3110, A3122) birds (A3039) fountain (A3047, A3061, A3098, A3123) flowers (A3057, A3117) gardens (A3060, A3111, A3106) water (A3063, A3108) nature (A3066, A3088, A3091, A3103)
02	Built	architecture (A3080) monument (A3074)
03	Atmosphere	atmosphere (A3003, A3029, A3099)
02	Maintenance	clean (A3025) well maintained (A3120)
00	Others	none
ASSOCIATIONAL ASPECTS		
Freq. citations	**Categories**	**Users answers**
13	Relaxation	tranquil (A3002, A3004, A3026, A3035, A3059, A3078, A3081, A3100, A3087) energy (A3021) calm (A3036, A3065) peace (A3067)
02	Protection	no tumult (A3073) safer (A3096)
01	Active engagement	friends (A3023)
00	Passive engagement	none
04	Others	it is different (A3020) point of reference (A3022) itinerary (A3107) reminds me of the Christmas lights (A3121)

Source: instrument type B, fieldwork 2007.

'Why, in your opinion, is the route that you have just walked through Raul Soares Square pleasant?'

PERCEPTUAL ASPECTS		
Freq. citations	**Categories**	**Users answers**
01	Non-visual	fresh air (A1078)
06	Visual	landscape (A1008, A1029, A1036, A1043, A1056, A1098)
09	Kinaesthetic	easy movement (A1003, A1054, A1107) no traffic lights (A1070) short cut (A1052) quicker (A1066, A1082) quickest (A1117) vastness (A1083)
02	Social	men (A1034) people (A1081)
14	Climatic	sun (A1018) weather (A1044) coolness (A1045, A1113) no direct sun (A1050) wind (A1058, A1069) shade (A1059, A1064, A1076, A1101, A1114, A1055, A1079)
35	Natural	fountain (A1038) garden (A1001, A1041, A1062) greenery (A1007, A1016, A1027, A1032, A1049, A1057, A1068, A1085, A1088, A1091, A1095, A1108, A1110, A1112, A1116, A1120) nature (A1072, A1084) plants (A1067) trees (A1096, A1033, A1102, A1103, A1123, A1100, A1014, A1020, A1022, A1031, A1061, A1075)
00	Built	none
03	Atmosphere	atmosphere (A1047, A1074, A1109)
00	Maintenance	none
00	Others	none
ASSOCIATIONAL ASPECTS		
Freq. citations	**Categories**	**Users answers**
12	Relaxation	tranquil (A1002, A1004, A1006, A1012, A1017, A1024, A1025, A1071, A1097, A1126) get out of the city centre (A1013) it seems that we are in a small city (A1089)
02	Protection	there are not the same amount of beggars that there used to be (A1087) run away from the traffic (A1011)
00	Active engagement	none
00	Passive engagement	none
00	Others	none

Source: instrument type B, fieldwork 2007.

'Why, in your opinion, is the route that you have just walked through Estação Square pleasant?'

PERCEPTUAL ASPECTS		
Freq. citations	**Categories**	**Users answers**
02	Non-visual	there is not the nasty smell of smoke (A2046) water noise (A2078)
15	Visual	landscape (A2007, A2011, A2027, A2092, A2114) view (A2021, A2056, A2076, A2083) wide view (A2016, A2049) visual (A2054, A2096) image (A2080) vista (A2119)
10	Kinaesthetic	shortest (A2035, A2084, A2113) quicker (A2039) spacious (A2053) I do not have to zig-zag (A2072) easy movement (A2079) much space (A2091) I do not have to divert around anything (A2107) vastness (A2130)
03	Social	women (A2002) people (A2124) full of women (A2106)
06	Climatic	open air (A2005) shade (A2006, A2063) breeze (A2033) cool air of the fountain (A2110)
24	Natural	fountains (A2008, A2038, A2048, A2073, A2024, A2067, A2093, A2115, A2022, A2028, A2032, A2068, A2071, A2087, A2097, A2118, A2120, A2122, A2125, A2132, A2133, A2026) trees (A2044, A2050)
09	Built	architecture (A2004, A2082) benches (A2089) building (A2123) Central Station (A2001) monuments (A2029, A2041) monument (A2074) museum (A2128)
05	Atmosphere	atmosphere (A2051, A2070, A2075, A2085, A2098)
04	Maintenance	cleanness (A2040) regenerating (A2057) cleaner (A2058) clean (A2112)
00	Others	none

CONTINUATION ON THE NEXT PAGE.

Continuation:

ASSOCIATIONAL ASPECTS		
Freq. citations	**Categories**	**Users answers**
09	Relaxation	more tranquil (A2018, A2030, A2111) tranquil (A2062, A2086, A2102, A2103, A2116) tranquility (A2099)
09	Protection	does not have delinquents (A2034) no street urchins (A2069) no fights (A2012) safe (A2009) safety (A2042, A2055, A2095) not much danger (A2045) no risk (A2047)
01	Active engagement	take photos (A2036)
00	Passive engagement	none
04	Others	got used (A2020) busier (A2065) historic for me (A2100) touristic (A2131)

Source: instrument type B, fieldwork 2007.

APPENDIX F

Open answers given by the participants.

'Why do you have this opinion about this route?'

Answers given by ambulant users interviewed in Liberdade Square	ID
If I do not walk through here, look the difficulties that I would have: I would have to cross, to wait for the traffic lights, there are five traffic lights there, and here there are only two.	001
I think it is **tranquil**, beautiful; the people are relaxing, reading. The people are not stressed. When you leave here, the fast pace returns.	002
Because of the **atmosphere**, the trees, the air. The only aspect that I do not like here are the crossings, they are not nice.	003
The atmosphere is **tranquil**.	004
The **landscape**.	005
Because it is a path which takes adavantage of the square, and of its beauty.	006
The landscape doesn't make any difference, it does not catch my attention.	007
Because of the **trees**, fountain, the shade, the cleanliness. The square is very beautiful.	008
Because it is well **arboreous** and at there is too much noise here.	009
Only because of the acess to the square.	010
Walking through the square I see the **movement of people**, cars and the square in itself. We can be distracted.	011
Because of the **plants**, shade of the trees. It is better walk surrounded by flowers than by asphalt.	012
Because it is a beautiful path. It is the **shortest** route and it is very fresh.	013
The weather was bad, the sky, it may rain.	014
There are **trees**, it is arboreous, there are beautiful landscapes. Everything that has green is arboreous, the flowers, the fountain influences the quality of our day.	015
Because of the **trees**, roses, the landscape around the square. For me, this point that I walk through is the most beautiful.	016
It is **larger**, more spacious, more shaded.	017
The square is a place **good to walk**, to stay, to walk. Pleasing to anyone. Path that I have to walk through.	018
It is a **spacious space**, with lots of trees. Usually, in the streets where we walk everything is squeezed together, the space where we have to walk is not like the space that we have here inside the square. We see trees everywhere, the pleasant smell of the plants.	019
It is different. It has a cool landscape. The trees, birds, the bandstand, the flux of people.	020
Energy, resting.	021
It is a **point of reference** and the nature.	022
I meet my friends, I rest, smoke, see the girls. I listen to my MP3.	023
I have never stopped to notice it, but the **greenery**, the flowers. It is tranquiller to walk around in.	024
Because the square is too beautiful, **clean** and pleasant.	025
Because it is very nice and **tranquil**.	026
Lots of **greenery**, birds singing.	027
Because this path is quicker to my destination.	028

CONTINUATION ON THE NEXT PAGE.

Answers given by ambulant users interviewed in Liberdade Square	ID
Because I like to walk in the middle of the square to enjoy the **atmosphere**, which is very tranquil, beautiful, fresh and very pleasant.	029
Because there are many **trees** which obstruct the sun, the air smells of grass.	030
Because I **run away from the sun**, I feel safer when I walk here. I like the square, I talk to people during my lunch break.	031
There is **shade**, less noise, many beautiful women. I rest here during lunch time.	032
Becasue I am always in a hurry.	033
Because it has **shade**, it is a beautiful place.	034
Because it is a **tranquil** place, it transmits peace.	035
Because the square is beautiful, **calm** and it has beautiful gardens.	036
Because it has **shade**, it is tranquil. It is a safe place and I love walking in this square.	037
Becasue I am in a hurry and I love walking in the middle of the square. The **air is not polluted** and the atmosphere is pleasant.	038
Because it is beautiful. But I got lost and because of this I walked into the square. But it has **birds**, people with who look nice and who do not make me feel unsafe and it is fresh.	039
It is **fresh**, beautiful, safe, a familiar place, I live nearby. I like this square.	040
Because it is the best route to cross over because of the traffic **lights and the pedestrian crossings**.	041
The **air is fresher**, the shade, the square's appearance, beautiful.	042
Shade, sort cut.	043
The square is beautiful, many **trees**.	044
Because I always walk in a hurry, so I do not pay attention.	045
Because of the **appearance**, tranquility and leisure.	046
I think the first **fountain**, the biggest, is very beautiful, the trees, the garden.	047
The **air** is pleasant, the atmosphere is beautiful and relaxing.	048
I am used to it, I walk here on a daily basis, and the square is beautiful and calm.	049
It is **fresh**, it has shade, I walk tranquilly. It is good to see the square well maintained.	050
Many **trees**.	051
Because I like the **sound from the water**, this is the path with fewer people.	052
Because you see pleasant and unpleasant things. I like the **greenery**.	053
Because there are lots of trees, ventilation, beauty, unpolluted air.	054
The **landscape** is beautiful, the fountains.	055
I could go to the other side, but here is more **arboreous**.	056
You come to look at the **flowers**, the fountains, the green, the roses.	057
Because there are lots of trees, there are many benches to sit down on, enjoy the atmosphere and observe the people.	058
Tranquil, tranquil tranffic.	059
Because of the **gardens**, shade. The context as a whole.	060
The **fountain** is fresh, the weather is nice. The garden is beautiful, well maintained. When you arrive here in the square it seems that people walk more slowly. The ambience and atmosphere is nice. There is cooler air from the fountains and from the trees.	061
Because of the **greenery**, the fountain, there is the palace there.	062
Water, I like water very much, it has the power to calm us down. Many trees, less pollution.	063

CONTINUATION ON THE NEXT PAGE.

Answers given by ambulant users interviewed in Liberdade Square	ID
It is **flat** and has lots of trees, the smell of the trees. I come straight here, I only cross to arrive in the square.	064
It seems **calmer**, tranquiller. It is a little out of the way of traffic, it seems that you are in a park.	065
I like to walk through this square because of the nature, to see people practising sport. It is very beautiful. It is only bad because of this traffic, but the other things compensate this. Sometimes you see butterflies and birds singing in the trees. It is a very nice place to be.	066
It transmits **peace**, tranquility, it is a little out of the way of traffic. The green area of Liberdade Square transmits peace and energy.	067
Because of the **air, it is less polluted,** the place is ventilated, the plants decorate it and you get away from the pollution and noise a little.	068
Because of the **trees**, shade and because I also like the fountains. I think the square is beautiful.	069
I like the **greenery**, to feel the cooler temperature from the water fountain. It is good and gives peace. I like hearing the birds singing, the shows which take place in the square are very good. It is a tradition, the square is everything; it is culture.	070
We have a **view of the square**, we contemplate the beauty of the palace and Niemeyer's building. It has shade, lots of trees, a sensation of breathing unpolluted air.	071
Because of the **greenery**, trees, I think it is calm and tranquil.	072
Because there is **no commotion**, there is shade and tranquillity.	073
Because of the **nature**, the fountains which are on and the flowers in the trees. The garden is well maintained.	074
Because it is beautiful, there are enough **trees** and it is fresh.	075
Too warm, high temperature.	076
In addition to being beautiful and **refreshing**, visually the square is well maintained. There are trees and lots of shade.	077
Because it is **tranquil**, it has a delicious air, the atmosphere is nice. It is quiet and very well guarded, there are cameras.	078
Because there are always people smoking, so for this reason it becomes pleasant.	079
The **architecture of the square** is interesting. You change atmosphere a little, it is fresher.	080
Because it is **tranquil**, there are lots of trees, fresh.	081
Because of the **greenery**, the landscape of the square is very plesant, in addition to the shade, which is great.	082
The trees provide **shade**, the air is fresh, good to read a book.	083
Because there are lots of trees, the square becomes fresher, there is no mess, the people like to read here. Tranquility.	084
The **fresh air** from the trees, the birds and their singing, the sensation of being in a small city.	085
Because it is **cool**, it is clean, few people, lots of trees.	086
It is **tranquiller**, there are fewer people, there is not much sunshine. You can see everything around you.	087
It is an extra link with **nature**. It is good because it always has bins available. It always has couples. We always feel motivated to stop and stay, to think about life. We feel pleasure in walking through all this natural surrounding: the plants, trees, flowers.	088
I like the square because it is very beautiful and you can meet **beautiful people who are easy going**. Many flowered trees, the layout of the fountains, trees, bandstand, everything is beautiful. There are many birds as well, birds are important because they decorate the square, are part of the ecology, are beautiful and sing well. A sublime music to our ears.	089
Contact with **trees**, people that I do not know. Easier to breathe, there is no pollution. Places with many trees are a good thing.	090

CONTINUATION ON THE NEXT PAGE.

Answers given by ambulant users interviewed in Liberdade Square	ID
Because of the contact with **nature**, the square is well maintained. Any part of the square is pleasant.	091
I like walking through this square because it is **lined with trees**, of course. It is very beautiful. Easy to circulate.	092
I like the **arrangement of the palm trees** and their shade. There are lots of little benches where we can rest. I think that the view is beautiful.	093
Because of the **plants**. In the city we do not find too much vegetation and in the square, despite of its central location, we find a lot of vegetation.	094
Because it is **fresh**, I like the trees.	095
Because it is **safer**. Because the traffic is intense on the streets.	096
Because of the **shade**, the air. It only needs to be a little less noisy.	097
I like walking here because we can walk around the square. The **fountain** is very beautiful. It makes us want to jump inside and swim in it. It is ventilated. There are plants, trees, shade. These plants that outline the fountain have a lovely smell.	098
I like the **atmosphere**, the look of the square, it has many trees. The square is well maintained.	099
It is **tranquil**, it has trees, shade and there is no bad smell. The noise from the cars is not as intense as the noise here on the corner. There is no smell of sewage in the centre of the square.	100
Because you arrive **quicker**.	101
Because the atmosphere of the square is nice. It is not very pleasant becasue of the traffic.	102
Because of the **nature,** the buildings.	103
The plants, I love roses and the birds. I am an ambulant seller of candles that have the shape of a rose.	104
Traffic lights are easy and quick to cross over.	105
Because of the **landscape architecture**.	106
Itinerary, visual.	107
Beautiful, we want to jump into the **water**.	108
Because it is full of trees, where the air circulates. Plants, flowers, fountain. It is very fresh.	109
I see the **greenery**, we can see the landscape. It is safe.	110
Because we can see the **garden** and the beauty of the fountains when they are working.	111
It is beautiful, **ventilated**, tranquil. The cars are near, but when you are inside the square, you feel distant from the traffic, you are separated from it. The noise does not interfere in my sense of relaxation when I am in the square.	112
I feel content here. Any route is pleasant. This is **practical, quick**. There are no barriers.	113
The **air is less poluted**. It is a beautiful square. There is no public toilet. I feel content. Sometimes, I sit down to contemplate and to analyse what the community needs. The palace is beautiful; anyone can have access to it.	114
Because of the amount of **trees**, and green areas, it gives a sense of tranquillity. You run away of the mess of daily life, the traffic, the urban environment.	115
It is beautiful, **cool**, there are many trees.	116
To see **flowers** and coconut palm trees. A well maintained square. You see people seated.	117
Because there are many trees in the centre of the square. It is a place of leisure.	118
Because of the **landscape** and its appearance.	119
Beautiful, **well maintained**. To observe the flowers and gardens, pleasant people. Memories of my youth spent in the rose garden. I talk to the roses.	120
This path **reminds me of christmas lights**. The fountain is on.	121

CONTINUATION ON THE NEXT PAGE.

Answers given by ambulant users interviewed in Raul Soares Square	ID
Because the square is **rubbish**, it does not improve nor get worse, it always stays the same way.	019
Because of the **trees**, because of its format. It is beautiful and traditional.	020
-9 (missing)	021
Because of the **trees**, the gardens.	022
It is nice, it is good to see **nature**.	023
At this time it is **tranquil**, it has shade, it has more decent people.	024
Because it is **tranquil**, it is shaded, fresh.	025
Because I stop only as it is a short cut, I do not stay to see if it is pleasant or not.	026
Because of the **greenery**, the pavement is well leveled. I enjoy admiring the landscape.	027
Because I walk around.	028
The square in itself is pleasant, because of the **landscape**. It is beautiful, the green pleases me very much.	029
I think the square is beautiful, but it is full of **beggars** who disturb us. But the square has the fountain, and it has many trees and it is big.	030
You can observe the **trees**, it is tranquiller. You see the square better.	031
Because there is the **greenery**, the square is beautiful, with flowers. It is a nice square.	032
Because it is **arboreous**, it offers more ranquility. The landscape is beautiful, it is pleasurable to see it.	033
Because of the **men**.	034
I do not care about the route.	035
Look, because of the **landscape**, ranquility, because of the green. I enjoy this route.	036
I feel **safe** when I walk on the square's pavement because there are many crossings. I have already been robbed at the traffic light and I prefer it here.	037
I cross the square because of the water **fountain**. I am going to study and this is the better route.	038
It is not unpleasant because it is **not a dirty path**. It is not like the other paths that we are used to walking on.	039
Insecurity, excrement, the smell of drugs, rubbish, beggars, people who drink cachaça, lack of lighting at night. The square is very ugly.	040
Because of the **garden**, trees, green.	041
There is no life, there are no flowers and it is empty. The water fountain is switched off, full of beggars. It is unsafe.	042
Landscape. They maintain the lawn. Because it is clean.	043
I enjoy the **weather**. The square is well maintained. Trees. I enjoy the shade of the trees. I enjoy bringing my sleeping mat and sleeping in the square.	044
It is **fresher**. Mainly I of the sun. At this time the sun is too hot. I have come to find shade.	045
There are many **strange people** in the square. Sun, heat, the square is too open, it does not have as many trees as it should have.	046
Because of the **atmosphere**, because of the greenery and it is fresher than normal streets.	047
More **safety** because there are not many urchins around the square.	048
The path is not plesant because of the beggars, but is pleasant because of the **greenery**, unpolluted air, and I like it. It is beautiful, I have always enjoyed this square but it is also dangerous.	049
Because there is **no direct sunlight** here. The trees obscure the sun.	050
It is not pleasant because of the amount of **beggars**, bad smell. It lacks safety. There is no surveillance. I have already been robbed. I enjoy the greenery, it is good to have squares in the midlle of these concrete jungles, the air is cleaner, it colours the city and if it was safer, it would be a good resting place during my lunch break.	051

CONTINUATION ON THE NEXT PAGE.

Answers given by ambulant users interviewed in Raul Soares Square	ID
In addition to being a **short cut**, I walk under the shade of the trees.	052
It is too **dangerous** and there is no surveillance. There are many beggars who are hidden by the plant shrubs. But the square could get better if it was kept cleaner and with more shaded areas, benches and offered more safety.	053
There is no traffic, **free to move** without having to interrupt my walking. The square provides shade depite being abandoned. It is beautiful. The fountain should function for the square refresh a little.	054
Because there is **shadow** and lots of greenery.	055
Local **landscape**.	056
Because I oberserve the **greenery**, walking in the shaded areas, hearing birds singing, and there is less traffic.	057
It is more **ventilated**, fresher, it has shade, green and it is monitored. There are enough trees.	058
Because of the **shade** in the square to get away from the sun, stay near the trees.	059
Because of the **bad smell** and dirt. This square has to be better maintained, kept neat. There are too many beggars	060
Because of the **trees**, the air. It is an healthier ambience.	061
Because the **garden** is neat, beautiful, fresh. The trees cut, the lawn trimmed.	062
I enjoy it because it is a quicker route, but it is very **unsafe**, mainly at night. But the square has shade and greenery. There are few benches and beggars, who exhale a bad smell, sleep on the benches. I have already been threatened by one of them. I do not like the square, but I have to walk through it.	063
It is not too pleasant because of the beggars. There is **shade**, I like the shade from the tree.	064
Suspicious people, attacks. The square is nice, beautiful, but it could be better maintained in order for people not feel fear of walking through it.	065
It is **quicker**, there is no crossing. I enjoy walking through squares in BH, they have shade, something that the other pavements do not have.	066
Because of the **plants**, flowers. The ambience brings happiness to our day.	067
Lots of **greenery**, trees. It triggers a wonderful sensation, fresh air.	068
Beautiful, **well entilated**, there are trees.	069
Because there are **no traffic lights** and I feel safer walking through the square. I have already been run over by a car and I avoid walking through traffic.	070
Tranquil, few people walk on the pavement. I can cross just once instead of having to cross the road many times.	071
Because of the **nature**, sun, and unpolluted air. It is good to sunbathe sometimes. To exercise the body.	072
Raul Soares square appears abandoned. I am afraid of being robbed here. They can trap us and go to the other side.	073
The **atmosphere** is beautiful. The square, the trees, here is very nice. The trees are beautiful.	074
We can be distracted by the **people**. You can see many different people.	081
There are **trees**, it is tranquil, it triggers serenity. It has a beautiful landscape in contrast with the cars.	075
Because of the **shade**. It is more shaded on the side that I circulate.	076
Because it is the **path that I walk everyday**.	077
There is **fresh air**, landscape.	078
Because of the **shade**, it is safer when we think about vehicles. Something public. We have freedom to circulate, and look around. Unpolluted air in the heart of the city.	079
Some **bandits** stay there, in the square.	080

CONTINUATION ON THE NEXT PAGE.

Answers given by ambulant users interviewed in Raul Soares Square	ID
I would like to arrive at my destination **quicker**, through the middle.	082
Vastness of the space. You can have a certain image of the square that from inside you will not have.	083
I can see the **nature**, fresh air, I get out of the routine of the office.	084
The **greenery**, the garden in itself is very pleasant. The streets are cemented, and there is an intense heat. The square is the opposite, it has green on both sides, the trees. If the fountain was on it would be better.	085
It is my route. **It diminishes the time of the walking**. It is really a way through.	086
Because today **there are not the same amount of beggars that there used to be**.	087
Because of the **greenery**. It is cleaner. There is no traffic. The square is green. We look for green areas to walk through or linger. If you walk through any other path, there are traffic lights.	088
In this square **it seems that we are in a small town**. It is a unique square here in BH. It is more tranquil and greener. Despite of the traffic around, in the middle of the square you do not feel it as much.	089
-9 (missing)	090
Uniformity of the **green areas**, we feel more at one with nature. The boys trimming the bushes caught my attention.	091
Because there is nothing during the walk that makes this path pleasant or unpleasant.	092
Dirty, lack of maintanance. The employees do not care, they throw rubbish in the drainage sewage, blocking everything.	093
Bad smell, dirty, there is dirt in the square. Bad smell of the excrements.	094
Because of nature's **green**, temperature, no vehicles movement is a plus.	095
Lots of trees. Here in the city centre there is a lack of unpolluted air.	096
Because the path is **tranquil**, no annoyance.	097
The **landscape**, the green. It is a beautiful square.	098
We see many people in the square, many **beggars**. I am afraid of being robbed by them, mainly at night.	099
Because it has **trees**, it is fresh. To walk inside the square is much better than walking in the street. In the street there are many barriers and in the square it is fresher and we have less worries, it is more spacious to walk through.	100
Because of the **shade** cast by the trees and the peace. Despite of the noise around it, inside we feel peaceful because of nature.	101
The path is **lined with trees**, but there is a need to plant more trees and greener areas. The atmosphere is pleasant.	102
The shops, the movement from the market. Lots of trees, it provides a lot of shade. Beggars, beggars defecating excrements in the square. The square is traditional in BH.	103
I do not like Raul Siares Square because the **beggars** use it as it were a public toilet. There is no surveillance here. The square is beautiful and arboureous, mainly the fountain.	104
I never stopped to observe, I only use as a route from lunch to my workplace, but I think it is beautiful, but it is **badly maintained** and unsafe.	105
It is dangerous. Too many beggars, bad smell and the high bushes make us feel insecure. Not enough shade in the path, too much noise.	106
Because it **facilitates motion, I do not need to walk between cars**, although the square is full of beggars. I am afraid, I have already been robbed here, but the square is beautiful and if they really refurbish it, it will get better than it is.	107
It is useful and pleasurable at the same time, the walking with the **green** of the square.	108
The **atmosphere**, the fresh air. It is very quiet.	109

CONTINUATION ON THE NEXT PAGE.

Answers given by ambulant users interviewed in Raul Soares Square	ID
I never stopped to observe, I only use as a route from lunch to my workplace, but I think it is beautiful, but it is **badly maintained** and unsafe.	105
I see the **greenery**, the square. The environment. If there wasn't the square and no trees, it would be bad, unpleasant.	110
-9 (missing)	111
The **green** area, many trees, shade. The air is better.	112
Because it is **fresh** and it is near the city centre.	113
Because there is **shade**, green, the square is beautiful and arboreous.	114
The square is **mistreated**, abandoned. In the old days there was a luminous fountain, which used to be the attraction when I was a child. There is too much deliquency.	115
The **green**, the landscape, the flowers and the gardening caught our attention. The fountain, but it is turned off. When it is turned on, it is beautiful.	116
It is the **quickest**, most viable route.	117
The **atmosphere**, the pollution, there is water, but the people do not please me. They should be in another place.	118
I **got used** to the square. I enjoy walking through the square.	119
Green of the trees. I enjoy walking in the square.	120
Because of the **dirt**, the excrements of the beggars.	121
I dislike walking through here because of the **beggars** lying on the benches. They make us feel unsafe.	122
Because it is **lined with trees**, there is lots of shade.	123
I feel good, I **got used to** passing through it. When you do the same thing all everyday, you feel good.	124
There is no difference walking outside or inside.	125
Because of the **tranquil** atmosphere, arboreous.	126

Source: instrument type A, fieldwork 2007.

'Why do you have this opinion about this route?'

Answers given by ambulant users interviewed in Estação Square	ID
Beautiful, I stay staring at the **Central Station** building, the fountain. It is very beautiful.	001
Because I see **women**, I have just met a friend. Because the square is clean.	002
Because I work here and I have got used to the square.	003
Because of the **architecture**.	004
Open air, tranquil.	005
Shade.	006
Landscape.	007
Because of the **water**, people.	008
Because it is **safe**, the landscape now is beautiful, in addition they are building a water cooler on the other side, in the Rui Barbosa Square.	009
Because today is too warm and there is no shade here.	010
The **landscape** is beautiful, the square is well maintained.	011
No fight, a tranquil atmosphere.	012
The square regeneration.	013
You always walk around frightened.	014

CONTINUATION ON THE NEXT PAGE.

Answers given by ambulant users interviewed in Estação Square	ID
Because I just walk here to cross.	015
Because it is **easier to see**, more tranquil.	016
I do not observe too much when I am in this square.	017
The path through the square is **tranquiller**.	018
Because I do not see anything that pleases or dipleases me.	019
I have **got used to** walking here. It is because of the flux of people, I like busy places. You know different people.	020
I think the **view** is very beautiful, the square. We can see the little square, the fountains.	021
The **fountain**, the care, the cleaness. The people are more polite. The fountain is water, water is life, it is impossible for you cross the square and not look at it. We think about life.	022
I do not like walking through the square because there are too many beggars lying around and too many children begging.	023
Because of the **fountains**, the cleanliness and the traffic, it is tranquil. The fountain is a source of leisure and it is easier to circulate with the changes that have taken place.	024
Because of the street urchins. If you are alone, they can take everything. I think here is getting worse than Rio de Janeiro.	025
The square is very beautiful because of what it has inside it. The **water flow** gives a very beautiful view, it looks like a waterfall.	026
The path is beautiful, the **landscape** that it has. Because of the green area, the construction that they have just finished. It got very beautiful.	027
Because with this **fountain**, the square gets cool, it gives a sense of well-being and is wonderful at night.	028
Because of the **monuments**, they are a cultural point of reference. I think it is beautiful. I wish I could visit the museum, but there is not enough time to do it.	029
Tranquiller, more spacious, there is not much movement and it is in straight line.	030
There is a lack of safety; there are many bums and beggars.	031
Because of the **fountain**, it omits cooler air and as a result it becomes a more pleasant place.	032
I like Estação Square because it is ventilated. The place is spacious and the wind flows without barriers. It gives a sensation of vastness.	033
The environment **does not have delinquents** as it used to have. There are more people working. The water is cool, refreshing. The sound of the water calms you down.	034
The **shortest route**, well signed, and closer.	035
Take photos and cool down in the water, the sun is warm. Take photos to remember, add them to Orkut social networking site to exibit them.	036
It is dangerous, there is little surveillance.	037
Better signage, marvilhous **water**, there is safety, shade, and beautiful trees.	038
Because it is good and the path is **quicker**.	039
Because of the **cleanliness**, beautiful people, fewer beggars. Air is not as polluted.	040
Because of the **monuments**, the square in itself. The architecture of the square.	041
Safety reasons. Good infra-structure in the square. The fountain is on, lighting and safety.	042
It is the path that I do everyday, there is no reason to like or dislike it. I got used to doing this route everyday.	043
Beautiful **trees**, cleanliness of the square. The building has become more beautiful after the refurbishment. The fountain.	044
There is **not much danger**; the sun shines little as well. The space is free and beautiful as there are trees and the fountain.	045

CONTINUATION ON THE NEXT PAGE.

Answers given by ambulant users interviewed in Estação Square	ID
The square is very beautiful, **there is not the nasty smell of smoke**. There are fewer people, the fountain is marvilhous. When it is spring, the ipê bloom.	046
It is a path with **no risk** into the square, there are no risks of accidents.	047
I enjoy walking through here because the water cools the environment, the square is all paved and it is clean.	048
Because I have a **vista of the square as a whole**.	049
Due to the fact of it having many **trees**, many people, few street urchins, the space is now been more explored than ever, there are more shows.	050
Because the square was renovated, the **atmosphere** gots better.	051
I walk here during the morning and the afternoon and it is normal, there is no disturbance.	052
Because it is **spacious** and busy, I do not see much danger. And after the refurbishment it became a lot safer and more pleasant, despite of not having protection against the sun next the bus stop.	053
It is beautiful, the square is very beautiful, the square's **visual**.	054
Because of the **safety**, guards, fountains, lots of trees. It is now beautiful, the museum of arts is very beautiful. I use the square a lot. I did not used to use it much, but after the refurbishment it became very nice. The graffiti is outside of the square. Before everything was lifeness.	055
The square gives us a **view** better than it used to have. Before it was very bad.	056
The refurbishment of the square gets a 10 out of 10 because they are **regenerating** it. They have added municipal guards and military police to protect it at night.	057
Because the square was regenerated, it is **cleaner**.	058
Because there is no shade to protect against the sun.	059
Because it is nice.	060
Because the square became more beautiful after the refurbishment.	061
Tranquil, it has sun, the fountain cools me down.	062
It has **shade** and it is a quicker route.	063
Too much visual pollution, it has too much stuff, mixture. There is this thing.	064
It is **busier**, you have more safety. We run less risk of being robbed. The view, the panorama is beautiful.	065
Because of the sun, at other times the path it pleasant.	066
Because of the **fountains** when they are on and the green of the Rio Branco.	067
The square is beautiful, the **fountain**. It is lacking trees.	068
It is a better path, **no street urchins**.	069
After the refurbishment the **atmosphere** improved.	070
The **fountain**, the square is more beautiful now.	071
It is the better route, I **do not have to zig-zag across**.	072
They have created a **water feature** which decorates the square and because we have the station. We have to cultivate it. The building is one of the references inside the city.	073
I love to see this **monument** in the square. It got very beautiful after the refurbishment.	074
The **atmosphere** is beautiful and the architecture. Although it has become very modern in relation to the other buildings but tt gives a contrast.	075
The **view** is beautiful.	076
It is **cool** and ventilated.	077
There is the sound of **water**, and on the other side there are the palm trees.	078
It is the **easiest path to take**, it is the easiest to cross.	079

CONTINUATION ON THE NEXT PAGE.

Answers given by ambulant users interviewed in Estação Square	ID
Because of the **image**.	080
Because it is the easiest path to my destination.	081
The **architecture** caught our attention.	082
The regeneration gave took the square to another level, it removed the street urchins.	083
It is the **shortest route**, normal.	084
I like walking through this square because of the **atmosphere**, the water. It is the only place where I feel tranquil. It is safe. But sometimes it gets uncomfortable, with deliquents, although I sleep on a corner there. I like to keep looking at the monument, I do not know why. I feel good here. Here the air flows, and the wind, despite not having trees. There is no marquee or kiosk. At least four benches would make this place better. A bandstand would be nice here too.	085
Because it is **tranquil** and there is no one annoying you.	086
Because of the refurbishment, it is now very good. The **fountain** and the square as a whole.	087
Because of the safety, there is no surveillance. At this time there is not as much noise as at night.	088
There are **benches** to sit downand observe the fountain.	089
The usual path, routine.	090
Because it has lots of **space**, good to walk through.	091
Because of the **landscape**, very beautiful.	092
Because of the beauty of the place, the **fountains**.	093
I only walk here due to necessity and because of this I do not find it neither pleasant nor unpleasant.	094
Because of the **safety aspect**.	095
The **visual** of the square, the architecture. I like it.	096
It is nice, I like to see the **fountain**.	097
Because of the **atmosphere**, water. After the refurbishment it became nice.	098
I walk **tranquilly**; there is signage, not many people.	099
This square is **historic to me.** I have known it for many years, it is part of BH's history. I like it.	100
Because it is my usual path.	101
Because it is **tranquil**.	102
It is **tranquil** to walk through, in addition to the beautiful landscape.	103
I **am used to it**, I walk here everyday, I do not notice anything.	104
The square is beautiful after the refurbishment.	105
It is beautiful, **full of women and few beggars**.	106
It is simpler to get to my destination, **I do not have to divert anywhere else**.	107
Because of the pollution and there are too many cars.	108
Many homeless people. It gets unpleasant because these type of people transform the square into a place to live and not to rest.	109
The **cool air from the fountain** is pleasant. I like the people near the fountain.	110
Because it is now more beautiful after the refurbishment. The square is **tranquiller**, calmer.	111
Now it is **clean**. It is more beautiful. It did not have a fountain, it had nothing. They decorated the square, on all sides, They improved the design.	112
It **shortened my route**. It was very ugly before. Now it is beautiful, I arrive quicker in the centre.	113
The renovated **landscape**. The part of the museum. It does not look like an abandoned square. It gives a sense of security. Whoever walks here feels good. Before the museum was dirty. The paint colour was strange. Today with its original colour it stands out. The fountain also stands out, mainly when it is turned on.	114

CONTINUATION ON THE NEXT PAGE.

Continuation:

Answers given by ambulant users interviewed in Estação Square	ID
I like Estação Square for several reasons. I love the beauty of the fountains. The pedestrian traffic in this urban square is tranquil. It is ventilated. Here I always feel safe. There I have already been robbed.	115
The place is **tranquil**. The fountains make it a pleasant place. The water, the dew which it omits is very nice and very cooling.	116
The **atmosphere** is good. There is no reason. I do not know how to explain why. I do not have anything to say.	117
Because it has the **fountain**, the museum, the garden is beautiful. It is a beautiful place. The view here in front of the square. The square besides the garden have some details that together make a difference.	118
Because of the **vista**. I am in love with BH.	119
I think the **fountain** is beautiful. The clock, the tube. I like everything from the station. I like everything here. It has become very beautiful.	120
Because the incompetent authorities do not have morals. To not be disturbed by beggars. Beggars approach you all the time. There is a smell of cannabis.	121
I see a beautiful **fountain**. The square is ventilated. We appreciate the beautiful things in addition to being a practical path to my place of lunch.	122
I think it is a beautiful place despite of never stopping. The **building** and the fountain are very beautiful.	123
I can have contact with **people**, people from other States and other cities. The fountain. The water flowing is beautiful. Before it only had cars. Today the square is more people-friendly. It has become a place where leisure activities and shows can take place. It is a cultural point.	124
Because there is a **fountain**, The Museum of Arts and Crafts and the square. After the refurbishment it became more beautiful. Before it did not have fountain. The museum was uglier and it was also more dangerous.	125
Too much violence. There are many beggars. It hasn't been completed.	126
Little security, little safety. There is no one to keep an eye on it. It would need a bridge.	127
It is very beautiful, pleasant. The **museum** is very beautiful, the fountain, the water fall. The square after the refurbishment has become more beautiful.	128
I do not like it because of the beggars who sleep in the square's benches. It becomes dangerous. There are a lot of street urchins who also rob people.	129
Because of the **vastness**, you feel the air, the fountain turned on.	130
Because of the restauration, because it is one of the main **touristic points** of Belo Horizonte.	131
Because the **fountain** is on, the plants. The square is greener.	132
Because of the beauty of the square. The **fountain** is beautiful. The columns with lights are very interesting. The area is available.	133
Because I like the **landscape** very much, plants, the monument. It helps to distract our minds.	134

Source: instrument type A, fieldwork 2007.

'Why do you have this opinion about this place?'

Answers given by stationary users interviewed in Liberdade Square	ID
Sunny, I do not like sombre places. Here is calm.	001
You can **sit, think about life, inhale unpolluted air**. It is a place to express ourselves, to think about life.	002
It is a **shaded** place, the air is not polluted and it is well ventilated, it has many trees.	003
The **landscape**, the green, the square is fresh, clean. It is very good.	004
The **trees**.	005

CONTINUATION ON THE NEXT PAGE.

Answers given by stationary users interviewed in Liberdade Square	***ID***
The **air is not polluted**, lots of tranquility.	*006*
Here is **ventilated**, comfortable and here we can get a sunbath.	007
Because of the **air** that we inhale here and the landscape is very interesting. Here we are closer to nature.	008
It makes us **feel calmer**, the contact with nature, although there is no nature around it.	009
The **greenery**, the birds, we feel as though we are far away despite of the traffic around.	010
The **nature**.	011
It is one of the few places, a unique place where we can find such a **green** area, people walking, it is very beautiful. The architecture, the landscape and the greenery.	012
The **greenery**, the nature. Here you can be in contact with nature. The tranquility. It is very calm in comparison with the rest of the city, the traffic the chaos. Here is very different from the capital itself.	013
Because of the **view** and birds that are singing. The square is well maintained, with flowers. It is a beautiful place to be. It is easy to come to because it is near to work.	014
From here I can see the **plants**, the birds, the trees and the place is calm.	015
It is **calm**, peaceful, people walking from one side to the other. Relaxation of the body and the mind, I am resting, relaxing.	016
There are lots of **trees**, birds signing, good breeze.	017
I have a **wide view**, I can see everything around me. Here it is fresh and tranquil.	018
I **meditate**. Flowers. I fell well. This place has life.	019
It is about **peace**, tranquility, beauty.	020
Tranquility. Beautiful, calm, I can rest during my lunch break.	021
Tranquility, little noise. A ventilated place, fresh.	022
Shade, birds, nature. I can take my shoes off. Culture because there are lots of events.	023
The **arborization** that projects shade. It is beautiful.	024
The **air is not polluted**, the blue of the sky, the trees, the green, the people, place to rest. It is very good.	025
The **wind** and trees.	026
Because it was the only place that I found to sit.	027
Place of silence, a tranquil place.	028
Because of its higher location, there is little pollution. Because it has a lot of trees. I do not know other reasons. We feel safe, here the weather is pleasant.	029
It is **well maintained**, people are aware of the importance of keeping the square clean. The gardens are always renewed. People use the space well.	030
Unpolluted air, safety, cleanliness.	031
As it is a public space it is **well maintained**. The single fact that it is well maintained and well treated, has made it a pleasant place.	032
Because of the **trees**. It is in the heart of the square. Shade, tranquility. Tranquility to rest and kill time during the lunch break.	033
It is a place **where I feel good**, there are no delinquents. Birds, small trees.	034
Tourists, cans inside the bin and the people. It is a place of justice. It is monitored by the police men, safety and respect.	035
It is an **island in the middle of the city** that allows you to get out of the rush. Because it is in front of the fountain, we feel a good sensation when we see the water fountain.	036
Because of the **tranquility**, it seems that we are out of the city. Less confusion. The beauty of the place, a historic place, it is a reference in BH.	037

CONTINUATION ON THE NEXT PAGE.

Answers given by stationary users interviewed in Liberdade Square	**ID**
Because we feel good, it is a good place **to rest**.	038
Tranquility of the space, the green of the square.	039
Ventilated, a place of leisure for the people, place to rest.	040
Birds, nature, it ventilates the mind. I think it is one of the best places. The smell from the trees.	041
Too much **greenery**.	042
It is **tranquil**, transmits peace.	043
Little noise, cleanliness. The people make us feel safe.	044
It is **relaxing**, restful; it is a place to rest.	045
Because of its **green** area. The people are tranquil; the tranquility of the atmosphere.	046
It is **relaxing**, distracting, trees, waters.	047
Because the **temperature** is pleasing. We can smell of the grass. The landscape is beautiful, although there are too many cars around it. There is empty space to sit.	048
Because it is a really beautiful square, its **gardens** are beautiful and it is well equipped.	049
Tranquility, well maintained, the greenery is very beautiful, the birds, the flowers.	050
Because it affords a beautiful **view**, it is fresh and we can hear birds.	051
Because it is a **tranquil**, beautiful place, it transmits peace.	052
It is a good place **to rest**, to talk.	053
It is a pleasing place **to meditate**.	054
Because it is **clean**, fresh air. It is very good.	055
Lots of **greenery**, tranquility. Here is where I come during my lunch break whenever I can.	056
It allows you to have contact with **nature**, birds, people, friends. I feel well here, looking at nature, I am always here before I start work or during my lunch break.	057
It transmits **peace**, fresh air.	058
Because it is a **place very near the city centre**, you can relax nicely. Here you stay in contact with your inner self. It is an odd, detached, unique place. In this place people stay within a good distance from one another. This distance allows you to have your own moment. Whoever comes here wants to be alone. When people sit in the benches, other people sit beside them.	059
Liberty's Square is one of the best places **to date**, to relax the mind.	060
Because of its **social character, a place where you meet a diversity of people**. It is a comfortable place and the people feel comfortable here.	061
The ambience is good because of the **care they have with the square**. And there is a great flux of people.	062
Because it is an **area of leisure**. We can sit; rest and have a tranquil lunch break.	063
Because the ambience brings **tranquility**.	064
If I were in another place, I would not be as **tranquil** as I am here. The fresh air, the shade, beautiful women.	065
It is **tranquil**, despite of the traffic noise. It is tranquil if we consider that we are in a big city. It has a nice green area.	066
The **silence**, birds song, trees. The landscape in itself, the air is not polluted.	067
Closer to **nature**.	068
Because it is **quiet, tranquil,** there is no robbery.	069
Because of **nature**, it is tranquil if we think that we are in the centre of the city.	070
Firstly because of the lack of care with the square. There is no control of the paths and of the gardens, people walk on the grass, they lay down on it. There are a lot of buses moving around the square.	071

CONTINUATION ON THE NEXT PAGE.

Answers given by stationary users interviewed in Liberdade Square	ID
Firstly because of the **shade** of the trees, the proximity of the water fountain brings a fresh breeze from the water. Tranquillity, rest.	072
Here is **calm**, comfortable, public, free.	073
Green, tranquility, it is a calm place.	074
It brings **peace**, the silence of the square, the gardens are very pleasant, the fact that it is well maintained, safe.	075
Tranquility, the nature here, the mild weather.	076
It is a place where you can spend you lunch break **tranquilly**. It is a beautiful place to observe and it is pleasant.	077
Because the ambience is **tranquil**, safe and full of greenery. Flowers, people moving.	078
It is **tranquil**, beautiful and it has a lot of greenery.	079
The **cleanliness** of the square, the care with the plants, the architecture and all the urban design.	080
Because it is a **tranquil** place. It is beautiful and it makes us feel closer to nature.	081
Because it is a beautiful and **fresh** place.	082
Quiet, less traffic noise, good to see.	083
Tranquility, cleanliness of the square, people walking.	084
Because of the **element of relaxation**, the peace, birds, the shade, trees. The ambient is pleasant, good people use the space together.	085
Because it affords **tranquility**, appears that we are inside a park. The trees, the flowers. More tranquil because we do not see delinquents.	086
Contact with **nature**, with the cosmos. You watch people crossing the square. I was praying, in contact with myself. A moment to organize ourselves, it is therapeutic.	087
It does not disturb me, but it is not the most pleasant place. The benches are more comfortable, but they are busy at this time.	088
It is beautiful, it is in the **southern part of the city,** the people are beautiful and the square's architecture is beautiful.	089
Because it is a **well maintained** place, the ambient is good, the people are tranquil. You encounter flowers, trees, birds.	090
The **views** that we have from here, the tranquillity.	091
Because it is **ventilated**, clean, tranquil. We forget our problems.	092
The **views**, flowers, water, nature and the sun.	093
Because it is a good place **to rest**, the air is not polluted. The place is calm, the views beautiful.	094
Because it is **tranquil**, the nature. In a big city it is difficult to have a place like this.	095
I like to be here because I always see **people moving** through this place. The shade is very good.	096
Because it is a **clean** place, the gardens are well maintained. There are birds.	097
Because of the **tranquillity**.	098
Because there are **fewer people**, **we can concentrate more**, we can read.	099
Tranquility, a time that I have to study.	100
A piece of **nature** in the middle of the city.	101
The **arborization**, the gardens, the birds and mainly the cleanliness of the space.	102
We have a **view of the square, I can see the buildings** and the square is well maintained. It is safe, it has a pleasing ambience and the people are tranquil.	103
Because it is a **quiet** place, it is peaceful. A place to rest.	104
It is **tranquil** and beautiful.	105

CONTINUATION ON THE NEXT PAGE.

Continuation:

Answers given by stationary users interviewed in Liberdade Square	ID
It is **clean** and organized.	106
It is **tranquil**, the people are discrete.	107
Fresh air, shade, sun, little noise.	108
Because of the **green** area, the architectural grouping, the birds that complement the ambient, the quality of the air.	109
It is good to use.	110
It is **tranquil**, there is shade on sunny days and when it is cooler as it is today, I can sunbathe here.	111
It is **fresh**, tranquil, beautiful gardens, pleasant people.	112
It makes me feel **tranquil**, in peace.	113
Because of the **trees**, shades. It is beautiful.	114
Because it is a **calm** place. It is comfortable, a place to rest.	115
Because of the **weather**, landscape. It has a pleasing climate, despite of the smoke from the cars.	116
Because it is **fresh**, there is shade, and we can see beautiful people all the time.	117
Flowers, people. It is about peace, it is a place to think. A lot of women.	118
Because of the **landscape**, the architectural grouping, the shade is very good and the fresh water as well.	119
Because it is a **tranquil**, calm place.	120
Because of the **sun**, vista and ambience.	121
It is **tranquil**.	122
It allows **me to relax** after lunch, think about life, the green area, nature, the water fountains. A tranquil space inside the metropolis.	123
Because of the **safety**, the infra-structure is good, the greenery and the square is big and very clean.	124
This place is cool, **cosy**. The historic buildings around the square, the palace. A touristic point in BH.	125
Due to its beauty, **calmness** and location.	126
Nature, the water from the bigger fountain, not polluted air.	127
Tranquillity, safety, beauty.	128
Because I am in contact with **nature**. It is tranquil, ventilated. The square makes me forget the urban routine.	129
Because this place is only a **little noisy** and we can get away from the office routine.	130
Because of the **trees** and the landscape is very beautiful.	131
Because of the **greenery** in the middle of the city, the people walk through here.	132
There are a lot of mosquitos and everyday someone comes to ask for money. It is **tranquil**, I enjoy sitting on the floor, near the tree, there are not too many people here.	133
The environment offers tranquility. It is a space reserved for leisure activities, resting. It is out of the agitation of the city. For being a calm environment, it is good to contemplate the people, the things, the square.	134
It is **tranquil**.	135
It is the most **tranquil** location, the green area.	136
This place is **clean**, neat, pleasant, its location is very good.	137
Calm, tranquil, a little peace.	138
Tranquil, silence. You get to forget about life life, switch off from life.	139

CONTINUATION ON THE NEXT PAGE.

Continuation:

Answers given by stationary users interviewed in Liberdade Square	ID
Because it is **quiet,** fresh. Today is cold. Clean, familiar.	140
Because I **rest**, listen to my MP3 player, and see people. The square is beautiful, and well maintained by MBR.	141
Because I feel a pleasant **air** and it is fresh, with trees around.	142
Because the sun reflects here and the place where we are seated has a very hard surface.	143
I love to sit here in the square and **people watch**. The birds singing and the tranquility are also great.	144
I like Liberdade Square because it is **tranquil** and quiet. It is a great place to think about life. I enjoy observing the plants and the gardens.	145
Because it literally has **shade** and fresh water.	146
Because it is the only **calm** place in the Savassi.	147
Because it is **tranquil**, the birds, it is clean, I can rest.	148
Because it is beautiful, there is a little bit of **nature** in the middle of the city, there is shade and it is tranquil.	149

Source: instrument type B, fieldwork 2007.

'Why do you have this opinion about this place?'

Answers given by stationary users interviewed in Raul Soares Square	ID
Pollution, cars, bad smells, beggars who do not shower, urinate and defecate in the square.	001
It is a place **to rest**; it has safety, beautiful women walking through it. I feel as if I were in a small city.	002
It is a place where I feel **tranquil**, it has shade, and benches where I can sit. I work seated and in the shade, it is better, I can be by myself.	003
There are not many street urchins, we can rest, we can think a little. It is tranquil, there are not many people to disturb you.	004
It is **more or less in the centre**, near the fountain, more movement within the square.	005
Fresh, shade, tranquil.	006
Because the square has many trees, the trees provide shade to rest.	007
It is calm. We can stay without worrying too much about the beggars. There are policemen all the time here.	008
The **shade**, we can rest, de-stress.	009
-9 (missing)	010
Because of the **shade**, the benches.	011
A **leisure area**, we can sit, rest a little, breath the fresh air, we have time to breath a little. Sometimes the person runs from one side to the other. It is a meeting place, where the people wait for another person, talk, engage in a conversation.	012
The square is not a place to be proud of because of the broken benches and because of the people who use it and for me it is indifferent being in the square or in another place.	013
Because I do not like the city too much. I like small cities more than here.	014
There is a lot of **movement**, we can be distracted. A lot of vegetation, lots of trees and shade.	015
In this square there are all types of people. What makes this place unpleasant is the lack of safety. There are too many dirty people on the benches. Homosexuals and women disrespect the other people who use the square. There is no toilet.	016
Due to the **greenery** within it, the tranquillity, the safety.	017
Due to the **nature**, the tree hide the sun. Everything is clean, the trees are well looked after. It is tranquil here.	018

CONTINUATION ON THE NEXT PAGE.

Answers given by stationary users interviewed in Raul Soares Square	ID
When we finish work, we leave everything clean here. During the night, the beggars leave rubbish, dirty blankets,and old shoes that give off an unpleasant odour.	019
Healthy. The ambient has hygienic, there is more freedom, and cleaner air. A lot of the people who used to pass here were beggars. We are returning to the old more hygienic times,.	020
There is a lot of **greenery**, the landscape is beautiful, a lot of trees of different sizes and species. It is helps with our breathing. Beautiful gardens.	021
I felt this square is unpleasant because there are too many beggars, and homeless people, a lot of dirty, stagnated and polluted water, broken benches, lack of benches, thieves, a lack of safety in general.	022
The stagnated water around the fountain may bring illness due to the excrement,.	023
There is no back on the seats, too dirty, ants dominating the garden, direct sunlight. The vista that we have from the square in general is that it is abandoned. Unsafe place.	024
Tranquil place, there are benches to rest. Despite the traffic around the square, there is not too much noise. The shade is nice.	025
Firstly, there is no safety. The square is too dirty, I do not walk through it during the night.	026
The **green** landscape, too many different people, you get to know a lot of people.	027
You see everything, you do not fell tranquil. Like now, I could smell people smoking, and the beggars. You see everything.	028
It has been transformed into a car orientated place, no investment has been made here. There are no attractions. It generates a sense of insecurity. There is a stigma attached to it. It is a place which whas been forgotten by the government and by the council. People walk suspiciously through here. In the area near to the JK's building, which has a obscured vision, is infamous for being a poor and damaged region. It is an ugly building.	029
It is a place where you have a **wide view** and it is tranquil. The landscape is beautiful.	030
There is little hygiene. It is **tranquil**. The place in itself is beautiful, but a special touch is missing to make it a better place. It is very pleasant.	031
It is a place where a lot of **good people** walk through; people who talk to us, despite of also having a lot of bad people as well, but in smaller numbers, thank God. I also have the habit of stopping here whenever I have time available.	032
If it had been swept, it would be hygienic. Here it is 10 times better than the region that I know in Rio de Janeiro. **There are poor people here, but in Rio there are many more**. It seems that it was not swept; it is one of the most beautiful squares in Belo Horizonte. It is unique in BH. The Savassi's Square is a cross roads, but it is not a square.	033
Safer, it is an environment to rest in or talk with a friend.	034
It is a **pleasant place to wait**. The landscape is beautiful and it has shade.	035
Because we are under the **shade**, it is fresh, we have shade.	036
The right thing would be if there were more benches, but they are broken. They should be more careful with the garden, refurbish the floor. The water fountain does not work, it is covered in graffiti. The square was abandoned long ago, forgotten.	037
There is too much dirt, too many beggars, loads of dirt.	038
Because I am seated on the floor, which is unpleasant. I prefer sitting on the bench. Too many leaves and ants. I tried lying down during my lunch break, but it is impossible.	039
It is because there are many trees, fresh air, benches to sit, we can read a little. Generally, where there are trees the air is cleaner, independent of being near to traffic.	040
We are close to **nature**, there are trees, shade. If we were not here, we would be in the sun. It is very ventilated here. The continous flux of people is pleasant.	041
Due to the **shade** from the trees, the traffic of people, which is frequent.	042
Due to the **green**, silence, ventilation.	043
It is **tranquil**, fresh, there are lots of trees and the air is pure.	044
I do not feel safe here. There are a lot of motorcyclist.	045

CONTINUATION ON THE NEXT PAGE.

Answers given by stationary users interviewed in Raul Soares Square	ID
There is **no smell of excrement**, I am in the shade, there is nobody disturbing the tranquillity.	046
It is **safer** during the day. See the movement.	047
Because the square is destroyed, or rather, any place where I sit it does not matter, because there is no maintenance and abandoned.	048
Clean, I do not see dodgy people, I do not see any danger.	049
The place is **calm** and tranquil, there are not too many people.	050
It is **tranquil**, good to be there, there is no violence, a place where we can date.	051
It is **tranquil**, it has shade, the place is clean.	052
It has **shade**, grass, it is very nice. There is no bad smell. Beautiful woman pass by.	053
There is **no inspection disturbing our work**. The people pass and say good morning, good afternoon, they look at our work.	054
I feel this place is unpleasant because there are a lot of people using drugs here, there is little safety to use your mobile phone.	055
It is **tranquil**, pure air, greater contact with nature. It is good for your health. You are out of the mess, the people can leave behind the commotion of the city centre.	056
No direct sunlight, it is fresh, it is under a tree.	057
Because of the **shade**, but with a better view, a good landscape.	058
The majority of people who pass through this place are too negative. The place is unsafe.	059
The landscape has a lot of **trees**, I like trees, they are beautiful. The green and the square are well maintained.	060
The **people**, the tranquillity of the square, lots of tranquillity.	061
Because of the **shade** and trees of the square, the air is pure and fresh.	062
Because it is indifferent here due to its dirty and badly maintained condition.	063
The place is too dirty, maybe due to the presence of beggars, who do their business. The presence of thieves leaves the place feeling unsafe, despite of the police surveillance, it is still unsafe.	064
I feel good here.	065
Because we have a fountain which has not been used, the cleanliness. There are too many delinquents and the maintenance is constant, mainly in the square.	066
Because it is **tranquil**, there is shade. It is good to rest.	067
Due to the **garden**, trees. The few trees in the heart of the square make the square a pleasant place. It is a place to rest, sit, accommodate.	068
Thieves, street urchins... It would have to have police. If there is not, the street urchins can steal. A lot of people walk through here. I do not walk here at night, at 6pm. **If there is no one, I do not sit, it is better not to. At any time, if there are no people around, I do not sit down.** It is badly maintained. Liberty Square is nice. There is bad smell.	069
A pleasant moment, a **moment of distraction** during the lunch hour, watching the movement.	070
Because it is uncomfortable and nothing is pleasant.	071
Shade, the place is tranquil and quiet. A smaller flux of people in relation to other parts.	072
Because of the **trees**. To sit on the bench, there is shade.	073
Because it is a **calm** and clean place.	074
Tranquil, calm. At this time there is less violence, less robbery. It is fresh.	075
Because there is no bench and the smell is too bad ato sit down.	076
It is a **tranquil** place, a place where I can read, I can see a lot of beautiful things.	077
Cleanliness, care, good gardening, trees.	078
The **trees** which give us shaded areas, there are people to talk to. Near to work.	079

CONTINUATION ON THE NEXT PAGE.

Answers given by stationary users interviewed in Raul Soares Square	**ID**
It is because of the **landscape**, it is fresh.	080
It is because of the **greenery** in the square.	081
It is a place which has **greenery**; there are benches where we can read.	082
Because I can be in contact with **nature**, there are shaded areas, fresh air. It is a place to meditate.	083
It is a place where **we can rest**, it is well ventilated.	084
Because it is a **relaxing** place; with leisure, little noise and oxygen from the trees.	085
The dirty, the bad smells, there are too many homeless people.	086
There is **greenery**, despite the buildings around. There is a garden. It is a tranquil ambient. There is a peace here, a space where we can stop and talk. This square is old, since JK's time, it is a heritage; it is part of Minas and BH's history. There is shade from the trees.	087
From here we can **see** many **things** and different people. Here we rest, kill time, distract our mindsand think about life while the time passes by.	088
Because it is a tranquil **restful** place.	089
Because of the **trees**, of the people moving. It is good to sit down, rest a little, think, read a newspaper, or a magazine.	090
It is **tranquil**. You run away from the city centre's noise for a while. It is quieter here. In the city centre there is a lot of traffic noises. It is noisy here as well, but a bit less. People washing clothes in the centre of the square are not cool. The square is beautiful, but you look at that there... That is a tragedy.	091
I like this place because of the **view that we have of the square**. There are people walking, the place is tranquil and there is shade.	092
Too much dirt, the abandoned square, there are robberies here.	093
It could be better here; the bench could be better maintained.	094
No one disturbs us.	095
Because of the **trees**, plants, we can sit and date.	096
Where there is some **natural elements it** is pleasant including even when it is not well preserved. It is a calmer place and you can sit down and kill time.	097
Because **you can see lots of beautiful things**, it is calm, you can see cars, churches, buildings.	098
The weather.	099
The place is pleasant because there is **sunshine** and it is because of this that I have chosen it.	100
It is the unique place where there is **peace**, it is good to rest.	101
It is **fresh**, people walking, the ambient is familiar.	102
Because of the movement, which is **tranquil**. I like it very much here.	103
There is individuality here, I feel tranquil, no one disturbs me. The trees also help to refresh the ambience.	104
Because it is **tranquil**, it has a beautiful view and if it were cleaner, it would be very pleasant. The trees help to refresh the place.	105
It is pleasant **to think a little**, to be tranquil, see people.	106
Because it is **tranquil**, seeing the people and cars moving, resting during the lunch hour.	107
Because here there are many **trees**, loads of not polluted air. The trees above everything.	108
Raul Soares Square is always a **tranquilizer**, there is greenery, you mix yourself with the nature and get calm. When you are worried or something similar, look towards the green, it is the colour of the hope. I can look out for any danger here. I am in a strategic position. Here I can be seen.	109
It is nice, **tranquil**, and quiet. Sometimes, there are no street urchins to disturb our peace. It is peaceful here. When my mind is busy, I come to here to think and leave this place much calmer.	110

CONTINUATION ON THE NEXT PAGE.

Continuation:

Answers given by stationary users interviewed in Raul Soares Square	ID
Because it has **shade**, it is clean. I feel well here, there is shade.	111
There is **shade**, trees and it is tranquil.	112
Because it is **tranquil**, nice. It is a calm place.	113
Because I am comfortable, I am in the **sun**.	114
Because of the **shade** and fresh air, we can rest during our lunch break. There are no street urchins.	115
Because the bench is rubbish, it could be better maintained. It is too dirty.	116
Because of the **shade**, it is a ventilated place. It is a tranquil place.	117
Because it is very good to **distract the mind**, the air is less polluted.	118
There is lots of **greenery**; it is a tranquil place, beautiful.	119
There is **shade**, less noise.	120
The **shade** and it is fresh.	121
It is a place which gives me **a sense of peace** and it has a good ambience.	122
It is a **tranquil** place, little noise and because of the landscape.	123
Simply sitting down to smoke a cigarette after lunch.	124
Because of the **air**, and the entertainment. It is a hobby and it is good. Take in some fresh air, and resting in the shade is good.	125
It is **calm**, tranquil despite having too much movement. You come here to think, there is nothing to disturb you. They could clean it here and there could be more police officers. There are many people circulating.	126
The **trees** which provide shade, there is the fountain, which could be working. There are benches. The square in itself is a pleasant place.	127
Tranquility. Away from the cars. Security during the day in relation to the bandits.	128

Source: instrument type B, fieldwork 2007.

'Why do you have this opinion about this place?'

Answers given by stationary users interviewed in Estação Square	ID
Tranquil. The landscape from the square is beautiful.	001
It is beautiful, it was refurbished.	002
Because of the violence, bad treatment of the statue, because of the violence and pollution.	003
Because it is **comfortable,** I feel well here.	004
Firstly because the **view** is beautiful, secondly because it reminds me of good memories.	005
Because of the beggars in front of us begging and urinating everywhere.	006
Because of the **trees**, the shade.	007
It is **tranquil here**, it is a cultural place, it promotes a moment of reflection because of the palace. I stare at this palace everyday, its structures. Here there is a flow of people because of the coach station. A lot of tourists come here to take photos. It is a touristic attraction; it is becoming a touristic attraction.	008
There is **fountain**, there is a bench.	009
The **violence has diminished**.	010
To stare at the **water** brings me peace, the breeze, here there is a breeze, and nice weather. It is beautiful. I think the architecture of the museum is beautiful. Because it is a public place, it is well maintained. It is one of the few places which is clean in BH.	011
Architecture of the square, the beauty.	012

CONTINUATION ON THE NEXT PAGE.

Answers given by stationary users interviewed in Estação Square	ID
There is a good **view**, the air is fresh.	013
It is a **place to rest**, there are benches.	014
Because it is a very **tranquil place** to rest, to take my lunch break.	015
Because it is a **place where people talk and rest**.	016
It brings **tranquillity**.	017
Because of the **tranquillity**, where we can be without worrying about, for example, being robbed.	018
The lack of comfort and the necessity makes the place indifferent, so as not to stay standing, I prefer to be seated here.	019
It is not too tranquil to be here, there are too many bums, and street urchin, fear of being robbed.	020
Sometimes we have peace, sometimes we do not. Sometimes a person arrives to disturb you. Everything for them is a reason for a discussion. Sometimes it is better to be alone than with bad people.	021
For those of us who sleep in the street, here is a good place. Here there is **police officer** nearby and nobody disturbs anybody. The water is good.	022
It is a space that I have to **rest** and wait for people in the city centre.	023
From here I can contemplate the **fountain**, the monument, the people going in and out of the tube station and the generic movement through the square. From here I have a privileged angle.	024
It is **tranquil**, there is less noise, and traffic. Less pollution.	025
Here it is **tranquil**, it is busy, the surveillance is good. There are many times that I am sit here and no one comes to disturb me. Usually there are many Jehovah's Witnesses that come here seeking attention. Here is a good place to think.	026
It is a very good place **to walk along**, lots many people use it, it is a place that is visited a lot because of the fountain.	027
Because it is a **spacious** and clean place.	028
Very **safe**, clean, we feel at home to sit down here. The square is very well ventilated because it is very big. Without a doubt, the sqaure is part of the city's tradition since its inception.	029
It is **calmer**, I do not know how to explain, but it is because of this.	030
There is no reason.	031
Beautiful **landscape**, tranquil, there are no street urchins.	032
Because **there are not as many thieves** as before, the square became more beautiful with the fountains and safer with the police.	033
I usually **meet with my workmates** in this place.	034
It is a **tranquil** place, we almost never see dirt, After the refurbishment, the square became even more beautiful. I have never been robbed and it has many events.	035
I like this place because from here we have a **wide view**. We can observe the flux of cars and people as well as the Rui Barbosa Square. We feel very satisfied when we see this landscape.	036
Because it is **tranquil**, it is very fresh because of the fountain.	037
There is **freedom** here, which has become beautiful with the refurbishment.	038
It has a cool **landscape**, and fresh water to cool the square.	039
Because of the regeneration, the **architecture**.	040
I like it here because **it has been a long time that I have worked in the museum**. Comparing it now to how it was, it is much better.It is good to be seated here, catching some sun.	041
You can **rest**, talk. You can meditate, see a lot of people. There are benches, the water, there are many things, lots of options.	042
It is a beautiful place, but it has too much pollution. After the refurbishment it became more beautiful because of the **trees** and the square which was refurbished. Because of Andradas Avenue, the smoke from the cars is too much.	043

CONTINUATION ON THE NEXT PAGE.

Answers given by stationary users interviewed in Estação Square	ID
It has a nice **landscape**, a not polluted air.	044
Because of the **space** it has. The view is beautiful, mainly when the fountain is on.	045
Because I like to be here **watching the people circulating**. There is not too much noise, it is calm.	046
Here I can **kill time**, read a newspaper, do nothing, see beautiful women walking around.	047
Because it is uncomfortable, there is no entertainment.	048
It is a **point of reference**. The square is very good to rest.	049
Because of the refurbishment of the square.	050
The square became nice, but the people who use the space...the beggars... Sometimes you want to sit on the bench, but there is a smelly beggar beside you. Sometimes they bathe here and it is strange. Things have improved, but people do not value it, they want to use the square disregarding its proper use.	051
I like this place because the **environment** is very comfortable and the landscape is very beautiful. I also enjoy the flux of people walking from here to there and vice-versa. Everything is clean and organised.	052
Because from here I do not see anything bad, I do **smell any bad smells**.	053
Because there are no plants, no shade.	054
The square could have more events, be used more. The square has little publicity. It would have to have a cultural space.	055
Because the bench is too hard, but the place is beautiful.	056
Because it is a **tranquil** place, it is good to think.	057
Because of the **shade**. The sun also helps. A little of everything. The square also helps, doesn't it? The fountain, the water. The flux of people has improved.	058
It has a very nice **atmosphere**. There is no disturbance from anyone. I like this column, no sun. Here I stay in the shade. The garden, in front of the museum, is very beautiful, it catches our attention, it is a focal point.	059
Sun, it is very comfortable. An awning is lacking here.	060
Because of the **atmosphere**, because of the benches where we can sit and observe the fountain.	061
Because of the **shade**, little noise, few people, the weather during the day also helps.	062
It is a **tranquil** place, good to rest.	063
The ambience is apparently **clean**, it is not smelly, there is no violence.	064
The **atmosphere**, the people here are good people, I play cards with my friends, without mentioning the shade on this side of the square.	065
It is a **place where I feel at home**, it is safe.	066
It is about **freedom**, a spacious vista, you feel at home. The Seven Square is squeezed. Here no one will run you over. You see people moving from here to there, as they were at home.	067
It is **fresh**, we see people moving around, we see the four corners, we see everything from here. I see the tube as well.	068
Because from here in the square we can see everything, we have a **wide view** of everything. And because of the place's beauty.	069
It brings **peace**, calm, it is a place where we see the city from another perspective. It is a place to sit and think, a place of meditation.	070
The **landscape**, the fountain, it is a good place to be during the lunch break and it is well ventilated.	071
There is **no commotion** from the people who use it.	072

CONTINUATION ON THE NEXT PAGE.

Answers given by stationary users interviewed in Estação Square	ID
The **environment is open**, there is fresh air, we have a good view of the city. It is good to rest, relax and watch the time go by. I do not do anything special here.	073
The **shade** of the columns. It is the only place here which has shade. To rest, relax, spend time, doing nothing special is what is good to do here. Then I go home.	074
It is a beautiful place, it was refurbished. Sometimes I feel **safer** here because of the police. It gives a sensation of comfort. Usually, I meet my friends and girlfriend here.	075
When I sit here I feel well, I **forget my problems**. Stay near the pub and sometimes I kiss some women. I always meet my wife here.	076
It is a **tranquil** place.	077
Because it is **safe** be it day or night.	078
Because it has **greenery** and water.	079
The **landscape** of the square, the station.	080
The **shade** of the statue.	081
Here there is a clean **air**.	082
Here we **can sit and kill time**.	083
It is **less busy, very tranquil**, it is a place I come all the time.	084
The **landscape** is chic and cultural.	085
It is where I **stay to think**.	086
The **landscape** is beautiful, it is a calm place, tranquil.	087
Because **I do not see anything wrong here, it is very difficult to see a robbery,** there are not many beggars.	088
The **shade** from the statue.	089
It is a **tranquil** place. The coconut palms. I am used to see a lot of people seated here.	090
I enjoy the **leisure** here. It is part of the heritage, I do not know... I like it. I feel it is pleasant here.	091
Because it has **sun**, the plants, the landscape.	092
Because of the continuous stream of people passing through and we cannot rest.	093
Because of the **sensation of space**. Because there are lots events. The square is democratic.	094
Because it is **tranquil** during the lunch time.	095
The **freedom of feeling at home**, it is safe, as there are military police and municipal guards. In addition you do not need to be apprehensive in relation to robberies.	096
Good **atmosphere**, a lot of people passing around, clean, of course.	097
Clean, where I come during my lunch break, no option.	098
The **appearance** changed a lot, it is very beautiful.	099
-9 (missing)	100
The **atmosphere** is very familiar, it is much better to rest.	101
The environment is **clean**, safe, the air, the people who use the square.	102
Cleanliness, the preservation, well maintained by the government.	103
Various types of people pass around it. I think this place has a bad smell, people with special needs, beggars. But many people pass around because of the tube.	104
Because of the **architecture**, constructions, the fountain, it is lacking greenery here. It is more about the architecture, by sure.	105
Because there is a lot of mess in the square, there is no tranquility, the people are not polite.	106
It is **busy**.	107
Unsafe.	108

CONTINUATION ON THE NEXT PAGE.

Answers given by stationary users interviewed in Estação Square	ID
The **shade** of the tree, the benches for resting.	109
You **meet many familiar people**. It is near the entrance to the tube station. It is really pleasant, very nice. Here there are people that I know, we exchange gossip and we reminisce about the time that I used to work there.	110
Pleasant, but dirty. They throw paper, old food. They have to remove the beggars from the squares. It is a **tranquil** place, I have never seen robbery. It is beautiful, there is running water, we can refresh ourselves a little.	111
Doesn't matter if we sit here or there on the bench. Here we get sun and on the bench we get sun in the same way. Here we can be robbed in the same way as there. Here we can people watch and on the bench we can people watch in the same way.	112
The **landscape**, the flux of people, the shade of the statue.	113
Tranquil, nothing and no one disturbs me.	114
Because it is **clean**, it is very well maintained.	115
Because it does not offer anything attractive, a place that is a little deserted and, around it is badly maintained.	116
Because it is a **tranquil** place, we can be distracted.	117
Because it is **tranquil**, the security is good, it is clean.	118
It could be better if some space in the square was covered. I like to **sit** here and see the flux of people. I also observe the architecture.	119
Ventilated, tranquil, good to read.	120
Because the sun is strong and there is no shade here. Because of the people who use the space besides the beggars. Although the beggars have disappeared from the square. The square is well maintained. Lacking more guards.	121
Because I am waiting for someone. The square is well maintained, the only thing missing is the shade.	122
I like being in this square because it is **tranquil**, because of the sound of the water, and because no one disturbs you.	123
Because of the square, because of the **fountain**.	124
Because it should have shade.	125
Good **atmosphere**, safety.	126
I like to be here **looking at people passing by**, the flux. It is very calm and tranquil.	127
In the square there is **safety**, facility of shopping and commerce nearby. It is accessible by public transport.	128
Because the place was refurbished and they inaugurated the **museum**, the fountains and the benches.	129
Because I can **rest**, there are police, the fountain is beautiful, the paint is nice.	130
Unpolluted air, nature.	131
There is no cover and too much sun in Estação Square. There is nothing to protect us from the sun here.	132
I have a very **good view from this place**, the square is very beautiful. Tranquil place to think.	133
Safety.	134
Ventilated, it has everything that we need.	135
I like to be here because of the **flux of people**, tranquility and the fountain.	136
It is a **clean** place, well structured. It is tranquil, beautiful.	137
It is a place where there is **no annoyance**, tranquil.	138
Shade, the water, the landscape.	139

CONTINUATION ON THE NEXT PAGE.

Continuation:

Answers given by stationary users interviewed in Estação Square	**ID**
It is not too smelly, but it should be cleaner.	140
Because it is a **calm** place, tranquil. The landscape helps.	141
Because **it is here that I spend my lunch break**.	142
Because of the **benches to rest on**, despite of the smell of urine and the presence of beggars. There are public telephones, the fountains and the square is clean.	143
It is a nice place, with **water**. It is a beautiful place.	144
Landscape, people passing through, it is fresh.	145

Source: instrument type B, fieldwork 2007.